

MINISTRY OF HEALTH OF UKRAINE  
ZAPORIZHZHIA STATE MEDICAL UNIVERSITY

DEPARTMENT OF PATHOPHYSIOLOGY  
WITH THE COURSE OF NORMAL PHYSIOLOGY

# **PATHOPHYSIOLOGY OF ORGANS AND SYSTEMS**

**MANUAL FOR THE STUDENTS OF THE 3<sup>RD</sup> COURSE**

field of study 22 «Health Care» specialty 222 «General Medicine»

**educational qualification «Master of Medicine»  
professional qualification «Physician»**

2<sup>nd</sup> revised edition

Student of \_\_\_\_\_ group

\_\_\_\_\_

UTSYS login \_\_\_\_\_

Teacher \_\_\_\_\_

Zaporizhzhia 2021

*Approved on meeting of Central methodical council-board of ZSMU  
and recommended for application in the process of study  
(protocol № \_\_\_\_\_ dated « \_\_\_\_\_ » \_\_\_\_\_ 2021)*

**Authors:**

*Olga Valerivna Melnikova – Associate Professor, Ph.D.*

*Tatyana Anatolivna Grekova – Associate Professor, Ph.D.*

*Taras Vasylevich Ivanenko – Associate Professor, Ph.D.*

*Yelizaveta Vitalivna Kadzharyan – Associate Professor, Ph.D.*

*Maksim Viktorovich Danukalo – Assistant Professor*

*Maria Igorivna Isachenko – Assistant Professor*

**Reviewers:**

*O. A. Hryhorieva - Full Professor, MD, PhD*

*A. K. Kulichenko – Associate Professor.*

**Pathophysiology of Organs and Systems:** Manual for the students of the 3<sup>rd</sup> course of international faculty speciality “General medicine” English medium of instruction / O.V. Melnikova [et al.]. – Zaporizhzhia : [ZSMU], 2021. – 93 p.

UDC 616-092(075.8)

©Melnikova O. V., Ivanenko T. V., Grekova T. A., Kadzharyan Y. V., Danukalo M.V., Isachenko M.I. 2021.

©Zaporizhzhia State Medical University, 2021.

6<sup>th</sup> semester - 105 hours: lectures – 16, pr.classes – 30, independent work - 59

**LECTURE PLAN (LECTURE PLAN (PART 2, 6<sup>th</sup> semester)**

	<b>TOPIC</b>	<b>Hours</b>
1.	WBC pathology. Leukocytosis, leukopenia, leukemia: etiology, pathogenesis, clinical manifestation, laboratory findings.	2
2.	Heart pathology. Arrhythmia, myocarditis: etiology, pathogenesis, clinical manifestation, ECG signs, complications and outcomes.	2
3.	Heart pathology. Ischemic heart disease, heart failure: etiology, pathogenesis, clinical manifestation, ECG signs, complications and outcomes	2
4.	Blood vessels pathology. Arterial hypertension: classification, etiology, pathogenesis, clinical manifestation. Arterial hypotension. Atherosclerosis.	2
5.	Lungs pathology. Respiratory failure: classification, etiology, pathogenesis, clinical manifestation. Shortbreath.	2
6.	GIT and liver pathology. Gastritis, peptic ulcer disease, intestinal obstruction, malabsorption syndrome, syndromes of liver affection: classification, etiology, pathogenesis, clinical manifestation.	2
7.	Kidneys pathology. Glomerulonephritis, nephrotic syndrome, renal failure: classification, etiology, pathogenesis, clinical manifestation.	2
8.	Endocrine system pathology. Clinical manifestation of hypophysis, thyroid and adrenal glands hyper- and hypofunction	2

**PRACTICAL CLASSES PLAN (PART 2, 6<sup>th</sup> semester)**

	<b>TOPIC</b>	<b>Hours</b>
1.	Blood pathology. ESR and ORE changes. Pathology of hemostasis.	2
2.	RBC pathology. Anemia and erythrocytosis.	2
3.	WBC pathology. Leukocytosis and leukopenia.	2
4.	WBC pathology. Leukemia and leukemoid reaction.	2
5.	Heart pathology. Arrhythmia, myocarditis.	2
6.	Heart pathology. Ischemic heart disease, heart failure.	2
7.	Blood vessels pathology. Arterial hypertension and hypotension. Atherosclerosis.	2
8.	<b>Section 2 Intermediate Control “Blood and CVS pathology”</b>	2
9.	Lungs pathology. Respiratory failure, shortbreath.	2
10.	GIT and liver pathology. Peptic ulcer disease, intestinal obstruction, jaundice, hepatic failure, portal hypertension	2
11.	Kidneys pathology. Glomerulonephritis, nephrotic syndrome, renal failure.	2
12.	General principles of endocrine system pathology. Pathology of hypophysis.	2
13.	Pathology of thyroid, parathyroid and adrenal glands. Stress conception	2
14.	Pathology of nervous system. Pathophysiology of extreme states.	2
15.	<b>PART 2 FINAL SEMESTER CONTROL</b>	2

**UNIT 1**  
**ALTERATIONS OF BLOOD VOLUME, ESR AND ORE. REGENERATIVE AND DEGENERATIVE FORMS OF RBC. PATHOLOGY OF BLOOD CLOTTING.**

1. Changes of blood circulating volume: hyper- and hypovolemia. Types and causes of appearance.
2. Qualitative changes of RBC. Regenerative and degenerative forms of RBC.
3. Osmotic resistance of erythrocytes: defining factors, normal indices, changes in pathology.
4. Definition of erythrocyte sedimentation rate (ESR), ESR mechanisms. Causes and mechanisms of ESR changes.
5. Vascular-thrombocytic hemostasis in norm. Pathology of vessels and platelets hemostasis.
6. Disturbances of blood coagulation.
7. Syndrome of disseminated intravascular coagulation (DIC-syndrome).

**Task 1. Complete the table “Causes of total blood volume alterations”**

type	hematocrit, %	hypovolemia	normovolemia	hypervolemia

**Task 2. Name the causes and explain the mechanism of alteration of erythrocytes regenerative forms percentage**

**increase of %** \_\_\_\_\_

\_\_\_\_\_

**decrease of %** \_\_\_\_\_

\_\_\_\_\_

**Task.3 Name the main types of RBC degenerative forms, give examples of degenerative forms of erythrocytes.**


**Task 4. Complete the table “Factors influencing erythrocytes sedimentation rate”**

	Increase of ESR	Decrease of ESR
RBC		
WBC		
Blood substances		
Diseases and clinical conditions		

**Task 5. Name the causes and mechanism of alterations of osmotic resistance of erythrocytes.**

increase of ORE \_\_\_\_\_  
 \_\_\_\_\_

decrease of ORE \_\_\_\_\_  
 \_\_\_\_\_

**Task 6. Name the stages of blood coagulation and list the factors participating at each stage**

Stage 1 \_\_\_\_\_

Stage 2 \_\_\_\_\_

Stage 3 \_\_\_\_\_

**Task 7. Give the definition, causes, clinical manifestation and examples of blood coagulation disturbances:**

Coagulopathy \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Pathology of thrombocytes \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Pathology of blood vessels \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Teacher’s signature** \_\_\_\_\_

## UNIT 2

### RBC PATHOLOGY. ANEMIA CAUSED BY INCREASED HEMOLYSIS AND DISTURBED ERYTHROPOIESIS. ERYTHROCYTOSIS.

1. Anemia definition, principles of classification. Clinical features and blood count at anemia.
2. Acute posthemorrhagic anemia. Stages of development, blood count at different stages.
3. Chronic posthemorrhagic anemia. Stages of development, blood count at different stages
4. Hemolytic anemias principles of classification. Mechanisms of erythrocytes hemolysis.
5. Acute hemolytic anemias: causes and mechanisms of development, clinical manifestation, blood count.
6. Chronic hemolytic anemias: classification, causes and mechanisms of development, clinical manifestation, blood count.
7. Anemias caused by disturbed erythropoiesis:
  - a. iron deficiency anemia;
  - b. B12 and folic acid deficiency;
  - c. iron refractory anemia;
  - d. hypoplastic and metaplastic anemia.
8. Erythrocytosis definition, principles of classification. Clinical features and blood count at erythrocytosis. Mechanism of primary and secondary erythrocytosis development.

#### Normal indices of blood count

Index	Unit	Reference interval	
		Male	Female
Blood volume	ml/kg	75-80	70-75
RBC	*10 <sup>12</sup> /L	4,5-5	3,9-4,7
hemoglobin	g/L	130-160	120-140
color index		0,85-1	0,85-1
reticulocytes	%	0,5-2	0,5-2
hematocrit	%	40-48	36-42
ORE (osmotic fragility test)	%	minimal 0,44-0,48; maximal 0,28-0,32	
ESR	mm/hour	1-10	2-15
iron in blood serum	μmol/L	10-28	7-25

#### Task 1.

**Complete the table describing the stages of acute blood loss.**

	Stages of acute blood loss		
	1	2	3
Name of the stage			
Time of duration			
Blood circulating volume			
RBC and HB quantity			
Color index			
Reticulocytes quantity			

### Situational Problem 1

Patient A, 54 years, 7<sup>th</sup> day after surgical operation. **Blood count:** RBC  $3,6 \cdot 10^{12}/L$ , Hb 95 g/L, Color index 0,78 Leukocytes  $16 \cdot 10^9/L$ , Platelets  $450 \cdot 10^9/L$

**Blood smear:** single anizocytes, poikilocytosis, reticulocytes- 3,8%.

1. Define RBC state and diagnose the disease.
  2. What stage of disease is diagnosed? How can you prove it?
- 
- 

### Situational Problem 2

Patient D., 54 years, complains about general weakness, headache, giddiness, troubled sleep, frequent bloody stools.

**Blood count:** RBC  $3,8 \cdot 10^{12}/L$ , Hb 68 g/L, Color index 0,54 Leukocytes  $6,1 \cdot 10^9/L$ .

Iron content in blood serum – 6  $\mu\text{mol}/L$

**Blood smear:** hypochromic erythrocytes, microcytes, single polychromatophilic normocytes, reticulocytes – 1,8%.

1. Define RBC state and diagnose the disease and its stage.
  2. Explain the mechanism of its development
  3. Explain the mechanism of low erythrocyte's color index.
- 
- 
- 
- 
- 

### Situational Problem 3

Patient R., 54 years, arrived to clinic with complains about weakness, short breath after minimal physical loading, pain in tongue and fingers. **Blood count:** RBC  $1,44 \cdot 10^{12}/L$ , Hemoglobin 66 g/L, Leukocytes  $2,8 \cdot 10^9/L$ , Platelets  $100 \cdot 10^9/L$ . **Blood smear:** expressed anizocytosis, poikilocytosis, megaloblasts, megalocytes, erythrocytes with basophilic granularity, hypersegmented neutrophils, reticulocytes - 0,4%.

1. Calculate color index of RBC

**The degree of saturation of each erythrocyte with hemoglobin is determined by color index. It is calculated by formula:  $CI = (\text{content of Hb in g/L} \times 0,03) / \text{three first figures of RBC quantity}$ .**

Color index=

2. Define RBC state and diagnose the disease. Explain the mechanism of its development.
  3. Explain the mechanism of high color index of erythrocytes.
  4. Why neutrophils have hypersegmented nuclei?
- 
- 
- 

### Situational Problem 4

Patient W, arrived to clinic in order to define diagnosis. Complains about weakness, dizziness, loss appetite. Clinical examination of the patient revealed the thickening of skull bones. **Blood count:** RBC  $2,7 \cdot 10^{12}/L$ , Hemoglobin 81 g/L, Color index 1,0; Leukocytes  $7,5 \cdot 10^9/L$ , Platelets  $230 \cdot 10^9/L$ . **Blood smear:** normochromic RBCs, microspherocytes, reticulocytes - 12%.

**ORE (osmotic fragility test):** minimal -0,56%, maximal 0,42%

1. Define RBC state and diagnose the disease.
  2. Explain the mechanism of its development.
  3. Explain the result of osmotic fragility test.
  3. What type of hemolysis is activated in this case and what is the reason of its activation?
- 
- 
- 
- 

### Situational Problem 5

A 12-year-old boy presents in the emergency room with severe chest pain. His mother reports he was doing well until he came down with a respiratory tract infection. **Blood count:** Erythrocytes  $3,4 \cdot 10^{12}/L$ , Hemoglobin 85 g/L, Color index 0,79; Leukocytes  $5,6 \cdot 10^9/L$ , Platelets  $210 \cdot 10^9/L$ , Reticulocytes 16%. **Blood smear:** anizocytosis, poikilocytosis, sickle cells.

1. Define RBC state and diagnose the disease.
  2. What is the most likely cause of pain in this boy?
  3. The patients with the disease usually experience anemia but not iron deficiency. Can you explain it?
- 
- 
- 
- 

### Situational Problem 6

A 19-year-old female patient has had low haemoglobin rate of 90-95 g/L since childhood. Blood count results obtained after hospitalisation are as follows: erythrocytes -  $3,1 \cdot 10^{12}/L$ , Hb- 85 g/L, colour index - 0,78; leukocytes -  $5,6 \cdot 10^9/L$ , platelets -  $210 \cdot 10^9/L$ . Blood smear examination revealed anisocytosis, poikilocytosis and target cells. Reticulocyte rate is 9%. Therapy with iron-containing medicines was ineffective.

1. Define RBC state and diagnose the disease.
  2. Explain the mechanism of target-like erythrocytes appearance in patient's blood.
  3. Evaluate the number of reticulocytes and explain if it's different from the normal.
- 
- 
- 
- 

### Situational Problem 7

Patient G is ill with chronic obstructive pulmonary disease for 12 years. He presented with the symptoms of chronic respiratory insufficiency. Blood count: Erythrocytes  $6,0 \cdot 10^{12}/L$ , Hemoglobin 180 g/L, Color index 0,9 Leukocytes  $7 \cdot 10^9/L$ , Platelets  $200 \cdot 10^9/L$ . Blood smear: non-expressed anizocytosis, reticulocytes - 3,4%.

1. Define RBC state and diagnose the disease.
  2. What is the leading reason of RBC quantity change?
- 
-



3. The patients with the disease usually experience anemia but not iron deficiency. Can you explain it?

---

---

---

---

### Situational Problem 8

Patient F., 56 years arrived to clinic with stenocardia attack and suspicion of myocardial infarction. **Blood count:** RBC  $8,5 \cdot 10^{12}/L$ ; Hemoglobin 170 g/L; Color index 0,6; WBC  $23 \cdot 10^9/L$ ; Platelets  $550 \cdot 10^9/L$ . **Blood smear:** hypochromic and polychromatophilic erythrocytes, anizocytosis, poikilocytosis, reticulocytes - 2,5%.

1. Define RBC state and diagnose the disease.
2. Define the state of bone marrow regeneration.
3. How can you explain the changes in WBC and platelets number?
4. Is stenocardia somehow related to blood count changes? Explain it.

---

---

---

---

Teacher's signature \_\_\_\_\_

## UNIT 3

### WBC PATHOLOGY. LEUKOCYTOSIS AND LEUKOPENIA

1. Definition of leukocytic formula. Regenerative and degenerative forms of leukocytes.
2. Leukopenia definition. Causes, mechanisms of development, importance for the organism:
  - a) Neutropenia and agranulocytosis; b) Lymphopenia
3. Leukocytosis definition. Classification of leukocytosis. Physiological leukocytosis causes and mechanisms of development.
4. Pathological leukocytosis different forms. Explain the mechanism of development:
  - a) Eosinophilia
  - b) Basophilia
  - c) Lymphocytosis
  - d) Neutrophilia
  - e) Monocytosis
5. Definition of neutrophils nuclear shift in the leukocytic formula. Types of neutrophils nuclear shift.

### Task 1

List the main functions of different types of leukocytes:

Eosinophil \_\_\_\_\_

Basophil \_\_\_\_\_

Neutrophil \_\_\_\_\_

Lymphocyte \_\_\_\_\_

Monocyte \_\_\_\_\_

### Task 2

**Calculate the absolute number of each type of leukocytes.**

In order to determine absolute number of each kind of leukocytes divide the general quantity of white cells in liter into 100 and multiply by number of percent maintenance of each kind of leukocytes. Use the data from the Situational Problem, given by your teacher. Arrange the data as a table.

Total WBC =

#### Leukocytic formula

	Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
			myelo-cytes	juvenile cells	band cells	segmented cells		
Normal rate	2-4%	0-1%	0%	0-1%	2-6%	50-70%	20-40%	3-10%
%								
absolute number								

### Task 3. Fill the table with the most common causes of leukocytosis and leukopenia

	Eosinophils	Basophils	Neutrophils	Lymphocytes	Monocytes
Increased number					
Decreased number					

### Situational Problem 1

Patient T., 27 years, works as a laboratory assistant of radiological department. His usual work is to do the roentgenography. Last month complains about weakness and frequent bleedings. Blood count: Erythrocytes  $1,46 \cdot 10^{12}/L$ , Hemoglobin 42 g/L, Color index 0,85; Erythrocytes sedimentation rate 23 mm/hour, Leukocytes  $3,1 \cdot 10^9/L$ , Platelets  $97 \cdot 10^9/L$  Leukocytes count:

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelo-cytes	juvenile cells	bands cells	segmented cells		
1	0	0	0	2	18	68	11

Blood smear: normochromic RBCs, reticulocytes - 0,1%.

1. Define the state of WBC and diagnose the disease. . What is the cause of it?
2. Define the type of anemia that is present in the patient?
3. What is the mechanism of RBC and platelets number change?

### Situational Problem 2

Patient A, 54 years, is admitted to the cardiological ward with acute myocardial infarction. Blood count: Erythrocytes  $3,9 \cdot 10^{12}/L$ , Hemoglobin 110 g/L, Color index 0,85 Leukocytes  $23 \cdot 10^9/L$ , Platelets  $250 \cdot 10^9/L$

Leukocytes count

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelo-cytes	juvenile cells	bands cells	segmented cells		
3	1	1	2	8	64	18	3

Blood smear: normochromic RBC, reticulocytes- 1,3%.

1. Which pathology of WBC is described?
2. Does this pathology have an attitude to acute myocardial infarction? Explain.
3. Define the type of neutrophils nuclear shift in the patient. Describe the mechanism of it.

**Situational Problem 3**

A 32-year-old man presents in the allergy clinic with complaints of those of nasal pruritus (itching), nasal congestion with profuse watery drainage, sneezing, and eye irritation. The physical examination reveals edematous and inflamed nasal mucosa and redness of the ocular conjunctiva. He relates that this happens every autumn during “ragweed season.”

Blood count: Erythrocytes  $3,8 \cdot 10^{12}/L$ , Hemoglobin 120 g/L, Color index 0,86 Leukocytes  $10,7 \cdot 10^9/L$ , Platelets  $195 \cdot 10^9/L$

Leukocytes count:

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelo-cytes	juvenile cells	bands cells	segmented cells		
12	1	0	0	5	55	22	5

1. Which pathology of WBC is described?
2. What is the cause and mechanism of its development?
3. Explain the role of eosinophils in allergy pathogenesis/

**Situational Problem 4**

A 40-year-old man presents in the therapeutic ward with the tuberculous inflammation of the lungs. His complaints now are: cough with bloody phlegm, pain in the chest, general malaise.

Blood count: Erythrocytes  $4 \cdot 10^{12}/L$ , Hemoglobin 125 g/L, Color index 0,85 Leukocytes  $11,5 \cdot 10^9/L$

Leukocytes count:

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelo-cytes	juvenile cells	bands cells	segmented cells		
3	0	0	0	1	35	53	8

1. Which pathology of WBC is described?
2. What is the cause and mechanism of its development?
3. Describe the role of lymphocytes in tuberculous inflammation.

---

---

---

---

**Situational Problem 5**

A child 2 year old was taken to the regular medical examination. His mother says that the child has frequent respiratory infections. At the moment of examination there are no signs of infection.

Blood count: Erythrocytes  $3.7 \cdot 10^{12}/L$ , Hemoglobin 115 g/L, Color index 0,87, Leukocytes  $9 \cdot 10^9/L$

Leukocytes count:

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelo-cytes	juvenile cells	bands cells	segmented cells		
3	0	0	0	2	33	55	7

1. Describe blood indices and evaluate them. Is there any pathology in the child?

2. Explain the mechanism of the revealed changes.

---

---

---

---

---

**Teacher's signature**

---

**UNIT 4**

**WBC PATHOLOGY. LEUKEMIA AND LEUKEMOID REACTION.**

1. Leukemoid reaction: definition, causes of development. Types of leukemoid reactions.
2. Leukemia: definition, the difference between leukemia and leukemoid reaction. Principles of leukemia classification
  - due to the maturation degree
  - due to the type of the abnormal cell
  - due to the total WBC count
3. Etiology of leukemia, stages of leukemia pathogenesis.
4. Common symptoms and signs of leukemia manifestation, mechanisms of their development.
5. Acute leukemias (AML, ALL, undifferentiated type) – clinical and hematological characteristic.
6. Chronic leukemias (CML, CLL) – clinical and hematological characteristic.

**Task. 1**

**Describe briefly the stages of leukemia pathogenesis.**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Task 2.**

**Fill the table «Comparison of leukemia and leukemoid reaction»**

<b>Sign</b>	<b>Leukemia</b>	<b>Leukemoid reaction</b>
WBC count		
cause		
leukocytic formula		
total blood count		
reversibility		

**Task 3.**

**Fill the table «Common signs of leukemia and their mechanisms of development»**

<b>Sign</b>	<b>Manifestation</b>	<b>Mechanism of development</b>
anemia syndrome		
immunodeficiency syndrome		
hemorrhagic syndrome		
intoxication		
leukemic infiltration		

**Define the pathology of blood in the given clinical Situational Problems and give the answers for the following questions.**

- Put the diagnosis according to all classifications.**
- Explain the mechanism of development of underlined symptoms and signs.**

**Situational Problem 1**

Woman C., 38 years is in a hard state after abortion. Blood count: RBC  $4.1 \cdot 10^{12}/L$  Hemoglobin 129 g/L ; Color index 0,94 WBC  $36 \cdot 10^9/L$ ,

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
3	1	4	7	9	51	20	5

Blood smear: single promyelocytes, toxic grain in neutrophile's cytoplasm, reticulocytes - 0,9%.

Define type of neutrophils nuclear shift

---



---



---

### Situational Problem 2

Patient K., 55 years, arrived to clinic with complains about general weakness, fever, enlarged regional lymph nodes. Blood count: RBC  $2,8 \cdot 10^{12}/L$ , Hemoglobin 84 g/L, Color index 0,9; ESR 30 mm/hour **WBC  $22 \cdot 10^9/L$** , Platelets  $142 \cdot 10^9/L$

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
1	0	0		1	22	61	3

88

Lymphoblasts – 3%, prolymphocytes – 9%

Blood smear: normochromic RBC, anizocytosis, poikilocytosis, reticulocytes- 0,4%, many **“lymphocyte’s shadows” (Gumprecht cells)**

### Situational Problem 3

Patient M., 17 years complains of plural **subcutaneous hemorrhages**. Blood count: RBC  $3,6 \cdot 10^{12}/L$ , Hemoglobin 100 g/L, Color index 0,83 ESR 50 mm/hour, WBC  $6,5 \cdot 10^9/L$ , Platelets  $60 \cdot 10^9/L$

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	1	19	12	2

Lymphoblasts - 63%, prolymphocytes - 4%

Blood smear: normochromic RBCs, anizocytosis, poikilocytosis, reticulocytes - 0,2%.

### Situational Problem 4

Patient A., 42 years, arrived to clinic with complains of general weakness, fever, **pains in bones and joints**. Blood count: RBC  $2,8 \cdot 10^{12}/L$ , Hemoglobin 84 g/L, Color index 0,9; ESR 50 mm/hour; WBC  $82 \cdot 10^9/L$ , Platelets  $142 \cdot 10^9/L$

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	2	12	10	2

Myeloblasts - 70%, promyelocytes - 4%

Blood smear: normochromic RBCs, anizocytosis, poikilocytosis, reticulocytes- 0,4%.

### Situational Problem 5

Patient G., 34 years, complains of weakness, fatigue, sweatiness, pains in left subcostal region. Blood count: RBC  $2,9 \cdot 10^{12}/L$ , Hemoglobin 120 g/L, Color index 0,85 ESR 50 mm/hour; Leukocytes  $93 \cdot 10^9/L$ , Platelets  $190 \cdot 10^9/L$

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
9	4	20	20	13	12	10	5

Myeloblasts - 1%, promyelocytes - 6% Blood picture: normochromic RBCs, reticulocytes - 0,1%.

### Situational Problem 6

A girl, 4 years. Three weeks after quinsy (acute suppurative inflammation of the tonsils) became weak and pale. Blood count: RBC  $2,9 \cdot 10^{12}/L$ , Hemoglobin 89 g/L, Color index 0,9 ESR 50 mm/hour ; WBC  $5,9 \cdot 10^9/L$ , Platelets  $120 \cdot 10^9/L$

Eosinophils	Basophils	Neutrophils				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	1	16	31	2

Blasts cells 50% Morphological and biochemical signs of blasts cells are similar to lymphoblasts and myeloblasts.

Which type of anemia is present in the patient?

Which type of leukemia has the most unfavourable prognosis? Explain your answer

Teacher's signature \_\_\_\_\_

## UNIT 5 HEART PATHOLOGY. DISORDERS OF HEART RHYTHM

1. Heart functions. Electrical conduction system of the heart.
2. Arrhythmia: definition, principles of classification.
3. Arrhythmias caused by disorders of heart automatism.
4. Arrhythmias caused by conduction abnormalities.
5. Arrhythmias caused by pathology of excitability.
6. Arrhythmias caused by pathology of contractility.
7. Myocarditis: classification, etiology, pathogenesis, clinical manifestation.

### Task 1.

**a) Draw electrical conduction system of the heart.**

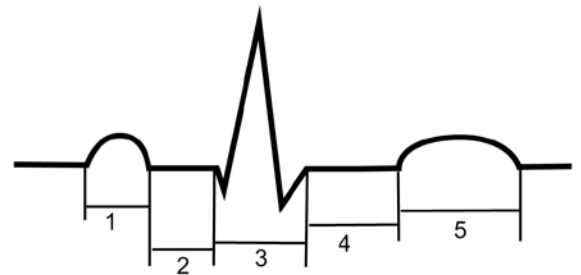


Point out on the picture the following elements:

1. Sinoatrial node; frequency of impulses generation \_\_\_\_\_
2. Internodal pathways
3. Atrioventricular node, frequency of impulses generation \_\_\_\_\_
6. His bundle, frequency of impulses generation \_\_\_\_\_
7. Right bundle branch
8. Left bundle branch
9. Purkinje fibers, frequency of impulses generation \_\_\_\_\_

**b). Describe the mechanism of ECG formation: which electrical processes in which heart part the named ECG segment reflects:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_



### Task 2.

Estimate the changes in given ECG recordings and define the pathology. Describe typical changes of ECG of the given arrhythmias.

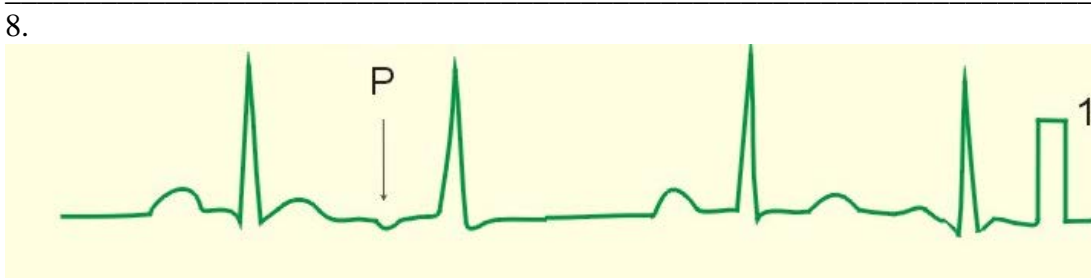
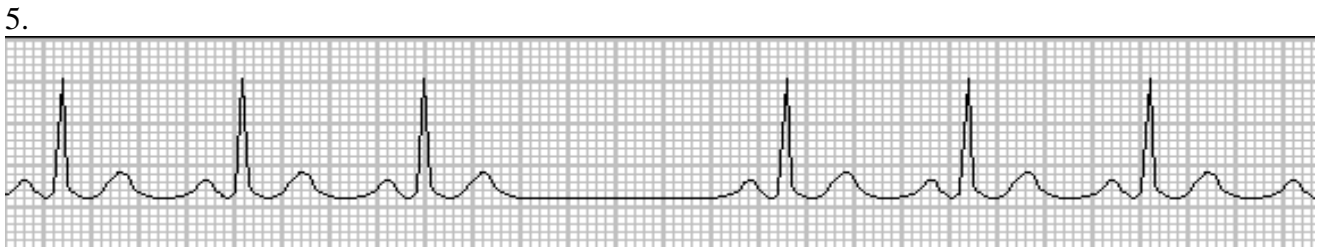
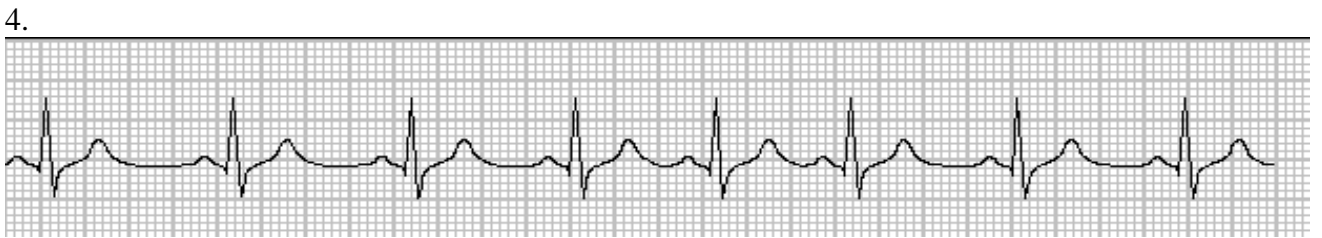
1.



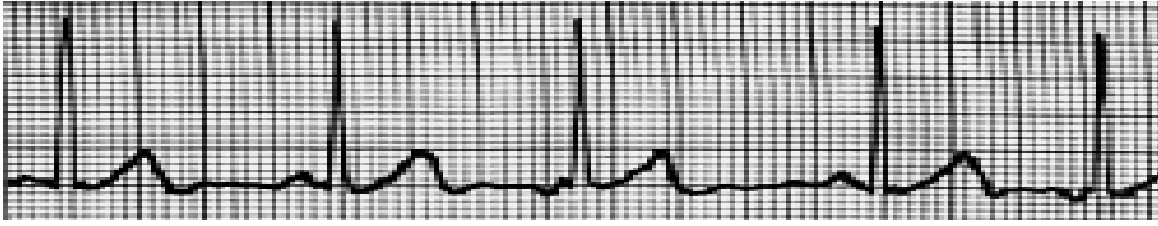
2.







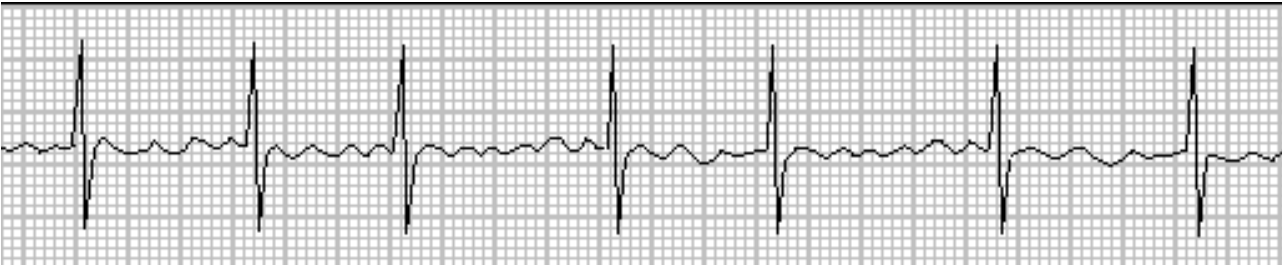
9.



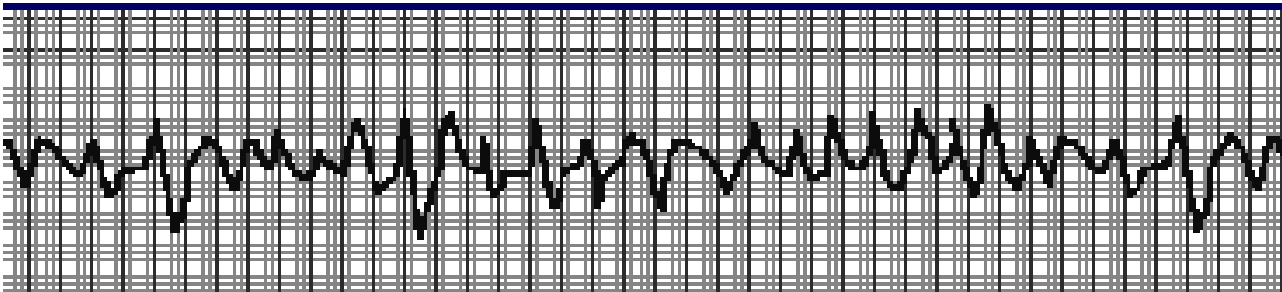
10.



11



12.



13.



Teacher's signature \_\_\_\_\_

## UNIT 6

### HEART FAILURE. ISCHEMIC HEART DISEASE. MYOCARDITIS

1. Heart failure: definition, principles of classification.
2. Clinical manifestation of heart failure. Right-sided and left-sided heart failure.
3. Urgent mechanisms of heart failure compensation.
4. Long-term mechanisms of heart failure compensation.
5. Ischemic heart disease: etiology, pathogenesis, classification.
6. Stenocardia (angina pectoris): etiology, pathogenesis, clinical manifestation, ECG-signs.
7. Myocardial infarction: clinical manifestation. ECG-signs. Reperfusion damage of myocardial cells. Cardiogenic shock.

#### Task 1.

**Draw a scetch of systemic and pulmonary circulation connecting them with appropriate heart chamber.**

#### Task 2.

**Give the definition to the Minute Blood Volume, write the formula of it, and give the normal rate of it.**

**MBV=**

---



---

#### Task 3.

**Fill the table: “Causes of heart failure”.**

Myocardial injury	Myocardial overload	
	increase of preload	increase of afterload

#### Task 4.

**Fill the table: “Urgent mechanisms of heart failure compensation”.**

Intra-cardiac mechanisms	Extra-cardiac mechanisms

**Task 5.**

**Fill the table: “Signs of left-sided and right-sided heart failure”.**

<b>Left-sided heart failure</b>	<b>Right-sided heart failure</b>

**Situational Problem 1**

Patient M., 46-year-old after intensive physical work felt severe pain behind the sternum. He experienced earlier the episodes of pain with such localization. Usually there was a relief from pain in the rest. He stopped his work, but the pain was still severe. In a few hours shortness of breath and coughing with abundant mucus appeared. The patient was hospitalized in cardiological department.

Clinical examination of the patient: pale skin with cyanotic tint. Moist rales are auscultated over left and right lung. Breath frequency – 42 per minutes. Heart rate – 120 bpm. BP – 110/70 mmHg. Arterial blood oxygenation is 85% (normal 95 to 100%).

1. What is the most likely diagnosis?
2. Which type of heart failure has developed in the patient?
3. Explain the mechanism of low blood oxygen saturation and moist rales.

---

---

---

---

---

**Situational Problem 2**

A 56-year-old woman complains of dyspnoe in the rest which increases with physical activity, legs edema, pains in the right subcostal region.

Clinical examination: pale skin with cyanotic tint, enlargement of the liver, fluid accumulation in the peritoneal cavity. Breath frequency – 38 per minute, heart rate – 136 bpm. Borders of the heart are enlarged.

1. Which type of heart failure has developed in the patient?
2. Explain the mechanism of legs edema and liver enlargement.

---

---

---

---

**Situational Problem 3**

A 58-year-old male teacher notices the sudden onset of “chest tightness” when he walks upstairs. The pain, which is localized over the sternum, goes away when he sits down. He does not experience any pain or discomfort at other times. He has mild hypertension, for which he is on dietary therapy. His cholesterol level is elevated. He does not smoke.

1. What is the most likely diagnosis?
2. What is the most likely mechanism for these symptoms?

3. What are the complications and prognosis for this patient?

---

---

---

---

**Situational Problem 4**

A 40-year-old man presents in the emergency department complaining of substernal chest pain that is also felt in his left shoulder. He is short of breath.

His blood pressure is 148/90 mm Hg and his heart rate is 110 bpm. Body temperature 37,3<sup>0</sup> C. His ECG shows an ST-elevation with T-wave inversion. He is given aspirin, morphine, and oxygen. Blood tests reveal elevated levels of creatin kinase and troponin.

1. What is the probable cause of the man's symptoms?
2. Explain the origin of the left arm pain, fever, and increased heart rate.
3. What is the significance of the ST-segment changes and elevation in creatin kinase and troponin?
4. Relate the actions of aspirin, morphine, and oxygen to the treatment of this man's condition.

---

---

---

---

---

---

---

**Situational Problem 5**

A 26-year-old patient presents in the infectious department complaining of throat pain, coughing, shortness of breath, shooting pain in the heart. The throat is hyperemic, tonsils are covered with fibrinous coating. His heart rate is 92 bpm, body temperature 39<sup>0</sup> C, breath rate – 25 per minute. Diphtheria diagnosis is supposed.

ECG shows multiply ventricle extrasystoles, amplitude of the ECG is lower than normal. Ultrasound research of the heart shows dilatation of left ventricle. Laboratory findings: total WBC - 15\*10<sup>9</sup>/L (neutrophils -80%), ESR – 18 mm/hour, antibodies to diphtheria's toxins are found in high amount.

1. What heart pathology has developed in the patient?
2. Which clinical signs can prove your answer?
3. Describe the connection between infectious disease and heart pathology.

---

---

---

---

---

---

---

**Teacher's signature**

---

**UNIT 7**  
**BLOOD VESSELS PATHOLOGY.**  
**ARTERIAL HYPERTENSION AND HYPOTENSION. ATHEROSCLEROSIS.**

1. Mechanisms of arterial pressure regulation.
2. Definition of arterial hypertension. Classification of arterial hypertension.
3. Causes of primary and secondary hypertension development.
4. Pathogenesis of hypertension.
5. Signs, symptoms and complications of hypertension; general principles of treatment.
6. Arterial hypotension: types, causes, pathogenesis. Acute decrease of blood pressure.
7. Atherosclerosis definition, etiology, risk factors.
8. Pathogenesis and clinical manifestation of atherosclerosis.

**Task 1. Complete the table «Physiological mechanisms of vascular tone regulation»**

Mechanism	Vasoconstriction	Vasodilation
nervous		
humoral		
hormonal		

**Task 2. List the factors which influence systemic blood pressure:**

---



---

**Task 3. Draw schematically and explain principles of renin-angiotensin-aldosterone system function**

**Task 4. Name the basic pathogenetic mechanisms of arterial hypertension:**

↑cardiac output \_\_\_\_\_

↑total peripheral vascular resistance \_\_\_\_\_

**Task 5. Complete the table «Arterial hypotension pathogenesis»**

type of hypotension	pathogenesis
acute	
primary chronic	
secondary chronic	

**Task 6. Calculate the Kerdo index of vegetative homeostasis. Experimental work.**

Measure arterial pressure (AP) on the hand; determine the heart rate (HR). Kerdo index (KI) is calculated by the formula:

$$KI = \left( 1 - \frac{HR}{AP_{diastolic}} \right) \times 100$$

Ideal KI equal to 0.

Positive KI (+) testifies to prevalence of sympathetic influence upon the heart, negative (-) testifies to prevalence of parasympathetic influences.

KI needs to be calculated in the rest and after physical activity.

Arrange obtained results as a table in the protocol, in conclusions explain the change of KI after physical activity.

Student's name	Arterial BP	Heart rate	Kerdo index	Conclusion

**Task 5. Complete the table “Atherosclerosis: risk factors”**

Major Risk Factors	Minor Risk Factors

**The stages of hypertension**

Category	Systolic BP (mm hg)	Diastolic BP (mm hg)
Normal BP	Below 130	Below 85
High-normal BP (pre-hypertension)	130-139	85-89
Stage 1 (mild) hypertension	140-159	90-99
Stage 2 (moderate) hypertension	160-179	100-109
Stage 3 (severe) hypertension	180 or higher	110 or higher

**Situational Problem 1**

A 47-year-old man, who is an executive in a law office, had his blood pressure taken at a screening program and had been told that his pressure was 144/90 mm Hg. His father and older brother have hypertension, and his paternal grandparents had a history of stroke and myocardial infarction. The patient enjoys salty foods and gained about 7 kg in the past year. His physical activity is very low: he prefers watching television.

1. According to classification into what category does the patient’s blood pressure fall?
2. What are his risk factors for hypertension?
3. Explain how an increased salt intake might contribute to an increase in blood pressure.
4. What type of treatment would you suggest to the patient?

---



---



---



---



---

**Situational Problem 2**

A 36-year-old woman enters the clinic complaining of headache and not feeling well. Her blood pressure is 175/90 mm Hg. Her renal tests are abnormal, and follow-up tests confirm that she has a stricture of the left renal artery.

1. What type of arterial hypertension does the woman have?
2. Explain the physiologic mechanisms underlying her blood pressure elevation.

---



---



---



---

---

### Situational Problem 3

A group of people was in the elevator, when the electricity was turned off and elevator was stopped. A 21-year-old man suddenly felt extreme weakness, nausea and palpitations. He turned pale, his skin was covered with cold sweats and he was near-loss of consciousness. Blood pressure – 80/50 mmHg.

1. Explain the mechanism of blood pressure fall in this patient.
  2. Which other causes of low blood pressure can you name?
- 
- 
- 
- 
- 

### Situational Problem 4

A 56-year-old man complains of constant feeling of “chest tightness”. When patient’s BP increases he feels severe substernal pain with irradiation to left shoulder. He is smoking for 35 years. His body mass index is 33,5.

Clinical examination of the patient: heart rate – 76 bpm, BP 150/80 mm Hg.

Laboratory data: total blood cholesterol level 6,2 mmol/L, LDL – 4,1 mmol/L, HDL 0,7 mmol/L.

Normal indices of lipid metabolism:

blood cholesterol level - < 5,2 mmol/L, LDL - <3,36 mmol/L, HDL - >1,15 mmol/L

1. Define the pathology. Prove your answer.
  2. What is the role of LDL and HDL in pathogenesis of the revealed disorders?
  3. Describe pathogenesis of the revealed pathology?
  3. Which possible complications of atherosclerosis do you know?
- 
- 
- 
- 
- 
- 
- 
- 
- 

Teacher’s signature \_\_\_\_\_

## UNIT 8

### **INTERMEDIATE CONTROL 2 Checking of practical skills and theoretical knowledge «PATHOLOGY OF BLOOD AND CARDIOVASCULAR SYSTEM»**

To be allowed to pass Section 4 control the student should:

1. successfully complete 5<sup>th</sup> semester (Part 1 General Pathophysiology);
2. attend all the lectures and practical classes to the current date;
3. get positive mark on each practical class;
4. complete all the practical classes' protocols and show the lectures notebook.

#### **SECTION 4 PRACTICAL SKILLS**

##### **1. Students should be able to define:**

- typical disorders in blood system: anemia, erythrocytosis, leukocytosis, leukopenia, leukemia, coagulation disturbances;
- typical disturbances of blood circulating system: heart failure, circulatory failure, arrhythmia, arterial hypotension and hypertension, arteriosclerosis, atherosclerosis using modern classifications;

##### **2. Students should be able to analyze:**

- complete blood count in different types of anemia, leukocytosis, leukopenia, leukemia and leukemoid reaction;
- changes of the cardiohaemodynamic indices in the pathology;
- causality-effective relations, pathological and adaptive features in pathogenesis of the following diseases: heart failure, circulatory failure, arrhythmia, ischemic heart disease, cardiogenic shock, arterial hypotension and hypertension, arteriosclerosis, atherosclerosis.

##### **3. To obtain practical skills:**

- in solving Situational Problems and tests – definition of etiology, pathogenesis, mechanisms of clinical signs development, principles of diagnosing, prophylaxis and treatment in such clinical conditions: anemia, erythrocytosis, leukocytosis, leukopenia, leukemia, coagulation disturbances, heart failure, circulatory failure, arrhythmia, ischemic heart disease, cardiogenic shock, arterial hypotension and hypertension, atherosclerosis;
- in solving problem Situational Problems and tests – definition of etiology, pathogenesis, mechanisms of clinical signs development, principles of diagnosing, prophylaxis and treatment in such clinical conditions: anemia, erythrocytosis, leukocytosis, leukopenia, leukemia, coagulation disturbances;
- to define different WBC forms count with the help of blood count;
- to define hemoglobin blood content and interpret the result;
- to calculate color index and interpret the result;
- to identify regenerative and degenerative forms of RBC and WBC in peripheral blood smear and interpret the results of findings.

**UNIT 9**  
**PATHOLOGY OF LUNGS. RESPIRATORY FAILURE, SHORTBREATH.**

1. Respiratory failure definition, classification. Intrapulmonary and intrapulmonary causes of development.
2. Causes and mechanisms of development of:
  - a. disturbances of alveolar ventilation;
  - b. disorders of blood perfusion in the lungs;
  - c. mismatching of ventilation/perfusion ratio;.
  - d. impairment of gases diffusion in the lungs.
3. Clinical manifestation of respiratory failure: hypoxemia and hypercapnia signs and symptoms.
4. Pulmonary edema: mechanisms of development, signs and symptoms.
5. Short breath. Principles of classification.
6. Cerebral dyspnoea, periodic and agonal breathing: causes and mechanisms of development.
7. Causes and mechanisms of lungs, cardiac and hematic shortbreath development.
8. Asphyxia: stages and mechanisms of development.

**Task 1. Complete the table “Normal parameters of gases content in blood”**

<b>index</b>	<b>arterial blood</b>	<b>venous blood</b>
partial oxygen pressure		
carbon dioxide partial pressure		
oxygen saturation		

**Task 2. Describe clinical manifestation of hypoxemia** \_\_\_\_\_

---



---



---

**Task 3. Describe clinical manifestation of hypercapnia** \_\_\_\_\_

---



---



---

**Task 4. Complete the table “Etiology of respiratory insufficiency”**

<b>Lung disorders</b>	<b>Extra-lung disorders</b>

**Difference between obstructive, restrictive and mixed disorders of alveolar ventilation**

Measure	Obstructive Disorders	Restrictive Disorders	Mixed Disorders
FEV1/FVC	↓	Normal or ↑	↓
FEV1	↓	Normal ↑ ↓	↓
FVC	Normal or ↓	↓	↓
TLC	Normal or ↑	↓	↓
RV	Normal or ↑	↓	Normal ↑ ↓

**Situational Problem 1**

Patient A has been working at cement factory for 30 years. He complains of inability to do his usual work due to short breath which appears during physical load. Clinical examination: skin is pale, stiff breathing with dry crepitation (rales) all over the lungs are heard. Lung's X-ray picture: pneumosclerosis. Arterial blood oxygen saturation - 74 %.

1. Disturbance of which process of external breathing is observed in the patient?
2. Is respiratory failure present in this patient? Prove it.
2. Why short breath develops only during physical load? Explain the mechanism of its development.

**Situational Problem 2**

Patient C ill with bronchial asthma suffers from frequent attacks of suffocation (asthmatic fit) without any apparent reason. The breathing become hard during this attack, it is accompanied by cough with little amount of viscous phlegm. Whistling rales during exhalation are heard.

1. What type of short breath is characteristic for such lungs pathology? Explain the mechanism of its development.
2. Is respiratory failure present in this patient? Prove it.
3. Will the partial pressure of carbon dioxide be normal in this patient? Explain it.

**Situational Problem 3**

Patient B. was treated in neurological ward with diagnosis "brain stroke". His state was hard. Breathing had a periodic pattern of Cheyne-Stokes. Two days later the type of breathing changed to Bioto type.

1. What is the leading factor in Cheyne-Stokes breathing development?
2. How can you estimate the changes of patient's breathing? Do they have good prognostic features?

#### Situational Problem 4

Patient R, 20 years suffering from kidneys disease was taken to hospital in pre-coma state. Short breath with high frequency of respirations was observed. In spite of treatment the state of the patient get worse and coma developed. Now patient is unconsciousness. The breath is characterized with regularly deep inhalations and exhalations.

1. What type of short breath has developed in the patient and why?
2. What type of short breath has appeared in coma state? Explain the mechanism of it.

---

---

---

---

#### Situational Problem 5

Patient G., 42 years is present in traumatology department with a closed fracture of right X and XI ribs, without lung tissue injury. Patient is in satisfactory state. Breathing is shallow, 16 in a minute. The amplitude of the right part of thoracic chest movements is lower in comparison with the left one. Spirogram of the patient: respiratory volume – 83%, minute ventilation of lungs – 82%, total lung capacity – 90% of the normal volume.

1. Disturbance of which process of external breathing is observed in the patient? Describe the mechanism of it.
2. Which type of respiratory failure will develop in the patient?

---

---

---

---

#### Situational Problem 6

Patient F. is present in cardiological department in the heard state. Diagnosis: ischemic heart disease, acute myocardial infarction of the left ventricle, heart failure. Bp 140/100 mm Hg, HR- 124 bpm, inspiratory shortbreath, cough with pink phlegm.

1. Explain the mechanism of shortbreath development in this patient.
2. Which lung pathology development can you suppose in this patient? Explain it.

---

---

---

---

Teacher's signature \_\_\_\_\_

## UNIT 10

### GIT and liver pathology. Jaundice, hepatic failure, portal hypertension Gastritis, peptic ulcer disease, intestinal obstruction, malabsorption syndrome

1. Gastritis: classification, etiology, pathogenesis, clinical symptoms. The role of gastric mucosal barrier damage in stomach pathology development
2. Peptic ulcer disease: etiology, pathogenesis, clinical symptoms, complications, principles of therapy
3. Intestinal obstruction: types, mechanisms of development, clinical manifestation, complications.
4. Normal bilirubin metabolism. Syndromes of liver affection.
5. Jaundice: classification, mechanisms of development, clinical and laboratory findings in
  - a. hemolytic jaundice;
  - b. hepatic jaundice;
  - c. obstructive jaundice.
6. Cholemia and acholya syndromes: mechanisms of development, clinical and laboratory findings.
7. Hepatic failure: classification, mechanisms of development, clinical and laboratory findings. Hepatic encephalopathy.
8. Portal hypertension syndrome: classification, mechanisms of development, clinical manifestation. Complications of portal hypertension syndrome: ascites, splenomegaly, portosystemic shunts.
9. Hepatorenal and hepatolienal syndromes: mechanisms of development, clinical and laboratory findings.

#### Normal indices of gastric secretion

	Volume (ml.)	General acidity	Free HCl	Combined HCl	Pepsin
fasting secretion	less than 50	up to 40	up to 20		0-20
basal secretion	50-100	40-60	20-40	10-15	20-40
stimulated secretion	50-100	40-60	20-40	10-15	21-45

#### Normal indices of bilirubin metabolism

Index	Blood ( $\mu\text{mol/L}$ )	Urine	Feces
Total bilirubin	5,1 – 17		
Direct (conjugated) bilirubin	1,7 – 5,1		
Indirect (unconjugated) bilirubin	3,4 – 12		
Urobilinogen		present	
Stercobilinogen)			present

**Task 1. Complete the table  
“Disorders of bilirubin metabolism in different types of jaundice”**

<b>Index</b>	<b>Hemolytic jaundice</b>	<b>Hepatic jaundice</b>	<b>Obstructive jaundice</b>
<b>Synonym</b>			
<b>Synonym</b>			
Total bilirubin			
Direct bilirubin			
Indirect bilirubin			
Urine			
Feces			

**Task 2. Complete the table “Pathogenesis of liver failure clinical manifestation”**

<b>Disorder</b>	<b>Pathogenesis</b>	<b>Clinical manifestation</b>
Disturbance of digestion		
Hemorrhagic syndrome		
Endocrine disorders		
Disturbance of water-electrolyte metabolism		
Skin disorders		
Hepatorenal syndrome		
Encephalopathy		

**Situational Problem 1**

Patient D., 35 years old was admitted to the hospital with complaints about episodes of severe gnawing pain (burning sensation) in the epigastria area which occurs 2-3 hours after meals. Sometimes pain occurs at night and wakes him up. Pain is accompanied by nausea and occasionally vomiting. The patient claimed that after vomiting he feels better. Pain can be relived by food and antacides. Eight month ago he had divorced and moved to a hostel near his workplace. In addition, he reports that he lost 8 kg of his body weight during last months; he smokes heavily and drinks alcohol almost every day in order to suppress his personal stress

1. What form of pathology does the patient suffer from?

2. What is the most likely cause of pathology and what are the risk factors in this case?
  3. Explain the mechanism of pain in epigastrium and weight loss in the patient.
- 
- 
- 

### Situational Problem 2

Patient G. 75 years old, complains of the pain in the abdomen and dyspepsia disorders: eructation, pain, feeling of the fullness in the stomach. Anamnesis: during 8 years, patient had suffered from rheumatoid polyarthritis. Lately he took acetylsalicylic acid and prednisolone without doctor's prescription because of arthritis exacerbation. Defect of the gastric mucosa was found after gastroscopy (erosion 0.5 X 0.5 cm).

1. What pathology of the gastrointestinal tract is described in the Situational Problem? Explain your answer.
  2. What is the mechanism of the gastric's mucous defect development?
  3. What are the mechanisms of the dyspepsia disorders in this case?
- 
- 
- 
- 

### Situational Problem 3

Patient E. 55 years old was delivered to the surgery department in a severe condition. She complains of the intensive belting pain, continuous vomiting without relief. Examination: cyanosis of the skin, tachycardia, decrease of the BP, tongue with white spot, swollen stomach. Anamnesis: patient fell from stairs and got a trauma of the abdomen 3 days ago. Blood count: leukocytosis with regenerative neutrophils nuclear shift to the left, increase of the hematocrit, increase of the blood amylase level. Patient had been moved to the resuscitation department and intensive antienzymatic therapy was started.

1. What pathology of the GIT does this patient have? What is the cause of its development?
  2. Explain the decrease of BP and increase of hematocrit in the patient.
  3. Explain the pathogenetic meaning of the antienzymatic therapy to this patient.
- 
- 
- 
- 

### Situational Problem 4

Patient H. 56 years old suffers from diabetes mellitus, cholelithiasis and chronic cholecystitis. He complains of the pain in the epigastric area shortly after fat or pungent food. In addition, he has eructation, nausea, meteorism and diarrhea. Blood count: during worsening – increase of the ESR, neutrophilic leukocytosis, hypo- and dysproteinemia (increase of the globulins), moderate hyperglycemia and glucosuria, moderate increase of the pancreas's enzymes (trypsin and amylase).

1. Do these symptoms confirm pancreas' function disorders?
2. What is the possible mechanism of this pathology development?
3. What is the pathogenesis of the diabetes mellitus and its progress in this case?



---

---

---

---

### Situational Problem 5

Patient G. 68 years old was hospitalized to the surgery department with diagnosis “suppurative appendicitis, peritonitis”. Examination: peristalsis of the intestines is absent, pain, flabbiness, sickness, symptoms of the intoxication (decrease of the BP, fever, vomiting). Diagnosis “intestinal obstruction, intestinal autointoxication” was established.

1. What is the mechanism of the gastrointestinal tract’s function disorders during peritonitis?
  2. What kind and what is the cause of the bowel obstruction in this case?
  3. What is the mechanism of the intestinal autointoxication development?
- 
- 
- 
- 

### Situational Problem 6

Patient K., 14 years old arrived to clinic with complaints about general weakness, pain in left subcostal region. Icteric skin had appeared in her from the childhood. Three months ago jaundice has strengthened and pains in liver region appeared. Blood analysis showed increased level of non-conjugated bilirubin, urine and feces are darkly colored.

1. Which type of jaundice is present in this patient?
  2. What is the mechanism of dark color of urine and feces?
  3. Explain the mechanism of pain in the left subcostal region.
- 
- 
- 
- 

### Situational Problem 7

Patient R., last week complained of weakness, headache, body temperature increase (37,3 – 37,9<sup>0</sup>C). A day ago, he noticed the yellowing of scleras and dark color of the urine. The doctor directed him to infectious hospital. Laboratory data: direct (conjugated) bilirubin 27,4 μmol/L, indirect (unconjugated) bilirubin 51,3 μmol/L. Urine: brown color, bilirubin is present. Feces: slightly colored.

1. Which type of jaundice is present in this patient?
  2. Explain the mechanism of conjugated and unconjugated bilirubin blood level increase.
  3. Which type of bilirubin can be found in the patient’s urine? Why?
- 
- 
- 
- 

### Situational Problem 8

Patient L., complains of itching, icteric skin and scleras plural small hemorrhages on the skin BP – 110/80 mmHg, heart rate – 58 bpm. Laboratory data: direct (conjugated) bilirubin 147 μmol/L, indirect (unconjugated) bilirubin 19 μmol/L. Laboratory analysis of feces shows increased amount of non-digested lipids (steatorrhea). Feces are colorless, urine – dark color. Protrombin level is decreased

in the blood. Patient was treated with vitamin K injections for 5 days. After last vitamin K injection prothrombine level increased on 40 %.

1. Which type of jaundice is present in this patient?
2. Does the result of vitamin K injection prove disturbances in protein-synthesizing liver function?
3. What is the mechanism of steatorrhea, alterations of blood pressure and heart rate indices.

---

---

---

---

---

---

### Situational Problem 9

Patient C., is treated in the clinic with diagnosis chronic hepatitis complicated by liver cirrhosis. The patient is weak, complaints about appetite loss and waste of weight. His skin is dry and pale with yellow tint and small hemorrhages on it. His belly is enlarged because of ascites. Subcutaneous veins are enlarged and well seen on the skin of belly. Concentration of proteins in the blood is lower than normal.

1. What pathology has developed in this patient and what are the reasons of it?
2. Explain the mechanism of ascites development.
3. Why subcutaneous veins on the skin of belly are enlarged?

---

---

---

---

---

---

### Situational Problem 10

Patient W, is ill with a severe form of viral hepatitis for two weeks. The patient is passive and disorientated, his skin is with yellow tint with hemorrhages on it, his weight loss is 7 kg.. He has a specific sweet smell from the mouth. Blood analysis: albumens 28g/L, alaninaminotransferase -5,5  $\mu$ U/L (N=0,1-0,88  $\mu$ U/L) general bilirubin 171 mmol/L (N=3,4 -22,2 mmol/L), fibrinogen 1,2 g/L (N=1,5-3,6 g/L), ammonia 65  $\mu$ mol/L (N 17,6-47,0  $\mu$ mol/L).

1. Which liver pathology has developed in the patient as a complication of viral hepatitis?
2. Explain the pathogenesis of the patient's clinical signs (weight loss, disorientation, smell from the mouth) and laboratory findings.

---

---

---

---

---

---

**Teacher's signature**

---

## UNIT 11

### Kidney pathology. Glomerulonephritis, nephrotic syndrome, renal failure.

1. Quantitative and qualitative violations of uropoiesis: mechanisms of development, laboratory findings.
2. Pathological components of the urine: types of disorders, mechanisms of proteins, erythrocytes, leukocytes, renal casts and glucose appearance in the urine.
3. Glomerular diseases classification. Etiology and pathogenesis of glomerulonephritis.
4. Nephrotic and nephritic syndrome: clinical and laboratory findings, mechanisms of development.
5. Renal failure: etiology, classification, stages of development.
6. Clinical manifestation of renal failure: renal symptoms, extra-renal manifestations. Pathogenesis of renal hypertension.
7. Uremia syndrome: etiology, pathogenesis, clinical manifestation.

#### Normal indices of urine analysis

Daily diuresis: 1,5 – 2 L (or 65-75% of the ingested fluid)

Urine specific gravity: 1,010-1,020

Glomerular filtration: 90-120 ml/min

Daily protein: 10 mg/100 ml or 50-100 mg/24 hours

#### Task 1.

**Complete the table «Pathogenesis of alterations in urine analysis»**

Urinary alterations		Pathogenesis
Quantitative	Polyuria	
	Oliguria, anuria	
Qualitative	Isostenuria	
	Hypostenuria	
	Hyperstenuria	
	Proteinuria	
	Glucosuria	
	Hemoglobinuria	
	Hematuria	
	Leukocyteuria	
Cylinderuria		

## Task 2

### Complete the table «Pathogenesis of the main symptoms in nephrotic syndrome»

Symptom	Pathogenesis
oliguria	
proteinuria	
hypoalbuminemia	
edema	
hyperlipidemia	

### Situational Problem 1

The mother of the 3-year-old boy complains of his weakness, fatigue, polyphagia and polydipsia. Clinical examination of inner organs shows absence of pathology. Urine analysis: daily diuresis about 3 l., urine's specific gravity - 1,020 to 1,038. Daily glucose urine excretion 1,2 g. Blood analysis: glucose plasma level 3 mmol/L. Clinical examination of boy's brother (1,5 years) revealed the same clinical picture.

1. What kidney's function is disturbed in the patient?
  2. What is the reason and mechanism of glucosuria occurrence in this case?
  3. What is the reason of polyphagia and polydypsia in this case?
- 
- 
- 

### Situational Problem 2

An 8-year-old boy is brought to the pediatrician's office with a 2-day history of malaise, fever of 38.8°C, nausea, and vomiting. His mother reports that he has decreased urine output and that his urine is a dark, smoky color. His blood pressure is slightly elevated, and there is some swelling of his hands and feet and around his eyes. He has been in good health except for a sore throat a week or so ago.

Urine analysis: proteins 1,2 g/L, leukocytes 3-8, erythrocytes 40-100 (in the field of vision), hyalinic cylinders. Glomerular filtration – 56 ml/min.

1. What kidney's function is disturbed in the patient? What is the most likely diagnosis?
  2. Which mechanism is involved in disease pathogenesis?
  3. Which additional laboratory data do you need to prove this mechanism?
- 
- 
- 

### Situational Problem 3

Patient P., complains of fatigue, pain in lumbar region, nausea, increased thirst, dryness in the mouth, edema, rare urinations, decreased amount of daily urine.

Clinical examination: edema of face, feet and shins. Skin is pale and dry with fragile hair. BP - 150/95 mmHg, increased left border of the heart.

Laboratory data: total serum protein – 30 g/L (N – 60 – 80 g/L), blood cholesterol level – 13 mmol/L (N – 3 – 6 mmol/L), creatinine – 0,3 mmol/L (N – 0,088-0,18 mmol/L), urea – 28 mmol/L (N – 14,2-28

mmol/L). Urine total amount – 600 ml, specific gravity 1,040, albumens 5 g/L, renal casts (cylinders). In the field of vision: 3-4 erythrocytes, 1-2 leukocytes, single epithelial cells.

1. Which syndrome of kidney affection is present in this patient?
2. Explain the mechanism of edema in the patient.
3. Explain the mechanism of cardiovascular abnormalities in the patient

---

---

---

---

#### **Situational Problem 4**

Patient A., 45 years arrived the clinic with acute abundant gastric bleeding. The patient is in a hard state. BP– 85/60mmHg, daily diuresis less than 250 ml. Blood analysis: blood nitrogen – 62 mmol/L (norm 14,3 – 28,5 30 g/L), blood urea – 36 mmol/L (norm 2,5-8,3 mmol/L).

1. What kidney's function is disturbed in the patient? What are the signs of such disturbance?
2. What kidney's pathology has developed in this patient?
3. Describe the mechanism of oliguria development.

---

---

---

---

#### **Situational Problem 5**

Patient G., 43 years was admitted to clinic a hard state. She is unconscious, breath smells with ammonia. She suffers from kidney disease for 16 years. Clinical examination: edema of face and legs, enlarged liver, BP –190/120 mmHg., blood nitrogen – 148 mmol/L, glomerular filtration – 12 ml/min., daily diuresis 360 ml, urine specific gravity - 1003-1007.

Blood analysis: RBC –  $2,4 \times 10^{12}/L$ , Hb – 68 g/L, color index 0,85, WBC –  $5,6 \times 10^9/L$ . leukocytic formula – without changes. In a blood smear: anizocytosis, poikilocytosis.

1. What kidney's pathology has developed in the patient?
2. Are there signs of uremia in this patient?
3. Describe blood count of the patient and explain the mechanism of the changes.

---

---

---

---

**Teacher's signature**

---

**UNIT 12**  
**Pathology of endocrine system.**  
**Hyper- and hypofunction of endocrine glands. Pathology of hypophysis**

1. General mechanisms of endocrine system functions disturbances. General principles of endocrine diseases treatment.
2. General mechanisms of increased and decreased function of endocrine glands manifestation.
3. Anterior pituitary lobe disorders. Etiology, pathogenesis, clinical manifestations of:
  - a. pathology of growth hormone secretion;
  - b. pathology of ACTH, TSH, FSH secretion;
  - c. panhypopituitarism.
4. Posterior pituitary lobe disorders Etiology, pathogenesis, clinical manifestations of:
  - a. diabetes insipidus;
  - b. syndrome of inappropriate ADH secretion.

**Task 1. Complete the table «Levels of endocrine disturbances development»**

level of disturbance	description

**Task 2. Complete the table «General mechanisms of endocrine hypofunction and hyperfunction»**

hypofunction	hyperfunction

**Task 3. Complete the table «Chemical structure of hormones»**

	source of synthesis, examples of hormones
amines	
peptides	
steroids	

**Task 4. Complete the table “Physiological effects of hypophyseal hormones”**

posterior pituitary	
anterior pituitary (FLAGTOP)	

**Task 5. Complete the table “Growth hormone pathology”**

signs	pituitary dwarfism	gigantism	acromegaly
causes			
disease onset			
body proportion			
inner organs size			
blood pressure			
blood glucose			

**Situational Problem 1**

A 20-year-old man after cerebral trauma complains of excessive thirst and abundant urination (up to 7 L for 24 hours). Urine specific gravity - 1005. Blood glucose concentration is normal, glucose is absent in the urine.

1. Which endocrine pathology can be suggested?
2. Explain the mechanism of polyuria, hyposthenuria, polydypsia.

---



---



---

**Situational Problem 2**

Patient S., 28 years 6 months ago had difficult deliveries with abundant blood loss. Now she complains of significant weight loss, dry and thin skin. Body temperature – 35.7°C, ABP – 100/60 mmHg, blood glucose – 3,3 mmol/L, decreased level of urinary 17-ketosteroids.

1. Which endocrine pathology can be suggested?
2. Explain patient’s body temperature, ABP and laboratory data.

---



---



---

**Teacher’s signature**

---

## UNIT 13

### Pathology of endocrine system.

#### Hyper- and hypofunction of thyroid, parathyroid and adrenal glands.

1. Disturbances of thyroid gland function. Etiology, pathogenesis, clinical manifestations of hyperthyroidism and hypothyroidism.
2. Pathology of parathyroid glands. Etiology, pathogenesis, clinical manifestations of parathyroid hormone inadequate secretion.
3. Hypofunction of adrenal cortex. Etiology, pathogenesis, clinical manifestations of Addison's disease and secondary adrenal insufficiency.
4. Hyperfunction of adrenal cortex. Etiology, pathogenesis, clinical manifestations of adrenal virilism, Conn's syndrome, Cushing's syndrome.
5. Pathology of adrenal medulla.
6. General adaptation syndrome and stress. Stages of development. Biological role of general adaptation syndrome.

#### Task 1. Complete the table "Physiological effects of thyroid, parathyroid, and adrenal glands"

thyroid gland	follicular cells	
	C cells	
parathyroid gland		
adrenal cortex		
adrenal medulla		

#### Task 2. Complete the table "Stages of general adaptation syndrome"

Stage	Pathogenesis and manifestation

#### Situational Problem 1

A 34-year-old woman complains of increased irritability, perspiration, weakness, loss of body weight, tremor of the limbs, increased heart rate and exophthalmia. Clinical examination: body temperature 37,5<sup>0</sup>C, heart rate 122 bpm, thyroid gland is increased in size. Anti-thyroid antibodies were found during blood analysis.

1. What diagnosis would this woman's history, physical, and laboratory tests suggest?
2. Explain the mechanism of the given symptoms and the role of anti-thyroid antibodies in the endocrine disorder development.



---

---

### Situational Problem 2

A 76-year-old woman presents with weight gain, subjective memory loss, dry skin, and cold intolerance. On examination, she is found to have a multinodular goiter. Laboratory findings reveal a low serum T4 and elevated TSH.

1. What diagnosis would this woman's history, physical, and laboratory tests suggest?
  2. Explain the possible relationship between the diagnosis and her weight gain, dry skin, cold intolerance, and subjective memory loss.
- 
- 

---

---

### Situational Problem 3

A 45-year-old woman presents with a history of progressive weakness, fatigue, weight loss, nausea, and increased skin pigmentation (especially of skin folds; pressure points such as the elbows, knees, knuckles, and toes). Her blood pressure is 115/75 mm Hg when supine and 105/52 mm Hg when standing. Laboratory findings revealed a serum sodium level of 120 mmol/L (normal is 135-145 mmol/L); potassium level of 5.9 mmol/L (normal is 3.5 - 5.0 mmol/L); low plasma cortisol, and high ACTH levels.

1. What diagnosis would this woman's clinical features and laboratory findings suggest?
  2. Would her diagnosis be classified as a primary or secondary endocrine disorder?
  3. What is the significance of her darkened skin?
- 
- 
- 

---

---

### Situational Problem 4

Patient F., 26 years, complaints about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of flesh crawling, pains in heart. ABP 190/110 mmHg. Borders of heart are widened to the left; at examination of eye-ground is revealed presence of spasm of arteriole and expanded venules; activity of renin in plasma is decreased,  $K^+$  - 2,9 mmol/L,  $Na^+$  - 165 mmol/L.

1. What diagnosis would these clinical features and laboratory findings suggest?
  2. How can you explain increase of arterial blood pressure in the patient?
- 
- 
- 

---

---

### Situational Problem 5

Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of sella Turcica (Turkish saddle). The patient has high blood glucose level and glucosuria.

1. What endocrine pathology can be suggested?
  2. Would it be classified as a primary or secondary endocrine disorder?
- 
- 

Teacher's signature \_\_\_\_\_

**UNIT 14**  
**Pathology of nervous system. Pathogenesis of extremal states.**

1. Disorders of the sensor functions of the nervous system. Types of sensitivity. Qualitative and quantitative disorders of sensitivity.
2. Pain receptors. Nociceptive pain, mechanisms of development. natural antinociceptive mechanism. Head ache. Migraine.
3. Disorders of moving function of the nervous system. Kinds of disorders. Peripheral and central paralysis and paresis. Myasthenia.
4. Acute and chronic disorders of cerebral circulation. Strokes. Brain edema.
5. General characteristic of extremal states (shock, collapse, coma).
6. General pathogenesis of shock. Alterations of neuroendocrine regulation, central haemodynamics and microcirculation and metabolic processes.
7. Types of shock (traumatic, hypovolemic, cardiogenic, septic, anaphylactic, burn)

**Task 1. Complete the table “Signs of central and peripheral paralysis”**

	Central paralysis	Peripheral paralysis
Damage location		
Muscle tone		
Muscles atrophy		
Neural reflexes		

**Task 2. Complete the table “Mechanisms of shock development”**

type of shock	reason of development	main link of pathogenesis
traumatic		
hypovolemic		
cardiogenic		
septic		
anaphylactic		
burn		

### Situational Problem 1

A 32-year-old woman presents with complaints of drooping eyelids, difficulty chewing and swallowing, and weakness of her arms and legs that is less severe in the morning but becomes worse as the day progresses. She complains that climbing stairs and lifting objects is becoming increasingly difficult. Clinical examination confirms weakness of the eyelid and jaw muscles. She is told that she may have myasthenia gravis and is scheduled for a test using the short-acting acetylcholinesterase inhibitor edrophonium (Tensilon).

1. Explain the pathogenesis of this woman's symptoms as it relates to myasthenia gravis.
2. Explain how information from the administration of the acetylcholinesterase inhibitor edrophonium can be used to assist in the diagnosis of the disorder.

---

---

---

---

### Situational Problem 2

Patient N., 49 years, is delivered to neurology department. There is limitation of voluntary movements in the left extremities, more in a hand. Tone of muscles in the left hand and leg is increased according to spastic type. There are increased local tendinous reflexes, pathologic reflexes.

1. How can you characterise the neurologic disorders of this patient?
2. Explain the mechanism of muscles tone increase in the left extremities.

---

---

---

---

### Situational Problem 3

Patient L., 40 years, a month ago got the trauma of right thigh. At the examination of the neurologic status: active movements in right leg are limited because of severe pain, volume of muscles on the right leg is on 2 cm lesser, then on the left, Achilles and knee reflexes on the right side are absent. There is decreased proprioceptive sensitivity on the right leg in the region of foot.

1. How can you characterise the neurologic disorders at a patient?
2. Explain the mechanism of decreased muscles volume and reflexes absence in the patient.

---

---

---

---

---

Teacher's signature

---

**UNIT 15**  
**FINAL SEMESTER CONTROL**  
**Checking of practical skills and theoretical knowledge**

To be allowed to pass **FINAL SEMESTER CONTROL** the student should:

1. successfully complete all previous Controls;
2. attend all the lectures and practical classes to the current date;
3. get positive mark on each practical classes;
4. complete all the practical classes' protocols and show the lectures notebook.

**SECTION 5 PRACTICAL SKILLS**

**1. Students should be able to define:**

- respiratory failure using indices of blood gases and modern classifications;
- to define typical disturbances of GIT, liver and kidneys functions: malabsorption, peptic ulcer disease gastritis, intestinal obstruction, jaundice, hepatic failure, portal hypertension, glomerulonephritis, renal failure;
- to define typical disturbances of endocrine system disorders: acromegaly, gigantism, panhypopituitarism, Sheehan's syndrome, Cushing's disease and Cushing's syndrome, Grave's disease, myxedema, adrenal virilism, Conn's syndrome, Addison's disease
- to define typical disturbances of nervous system disorders: central and peripheral paralysis, Brown-Sequard syndrome, myasthenia

**2. Students should be able to analyze:**

- changes of spirogram and lungs volume.
- causality-effective relations, pathological and adaptive features in pathogenesis of the following diseases: lung edema, asphyxia and shortbreath;
- the role of disturbances of alveolar ventilation, disorders of blood perfusion in the lungs, mismatching of ventilation/perfusion ratio and impairment of gases diffusion in the lungs;
- to analyze the consequences of inadequate hormones secretion of hypophysis, thyroid, parathyroid, adrenal glands;
- to estimate biological role of general adaptation syndrome and stress, its etiology and pathogenesis.

**3. To obtain practical skills:**

- in solving Situational Problems and tests – definition of etiology, pathogenesis, mechanisms of clinical signs development, principles of diagnosing, prophylaxis and treatment in such clinical conditions: heart failure, circulatory failure, arrhythmia, ischemic heart disease, cardiogenic shock, arterial hypotension and hypertension, arteriosclerosis, atherosclerosis, respiratory failure, lungs edema, asphyxia and shortbreath.

### **List of topics for individual study:**

1. Hemorrhagic shock – mechanisms of development. Consequences of blood transfusion; etiology pathogenesis, clinical manifestation.
2. Pathogenesis and clinical manifestations of blood circulation disturbances in the patients with arrhythmias.
3. Metabolic syndrome: etiology, pathogenesis clinical manifestation.
4. Experimental models of arterial hypertension.
5. Cholelithiasis: etiology, pathogenesis clinical manifestation, complications. Types of gallstones.
6. Urolithiasis: etiology, pathogenesis clinical manifestation, complications. Types and locations of urinary stones.
7. Chronic renal failure treatment. Principles of extracorporeal hemodialysis, peritoneal dialysis.
8. Primary and secondary hypogonadism – etiology and pathogenesis. Adrenogenital syndrome (congenital adrenal hyperplasia) – etiology pathogenesis clinical manifestation.
9. The role of vegetative nervous system in regulation of homeostasis. Vegetative vascular dysfunction: etiology, pathogenesis, features.
10. Types of pain: complex regional pain syndrome (causalgia), neuralgia, phantom pain, psychogenic pain – etiology and pathogenesis. Principles of anesthesia.
11. Mechanism of addiction development to chemical substances. Alcoholism, narcomania

### **RECOMMENDED LITERATURE**

#### *Basical:*

1. Pathophysiology : textbook for students of higher medical educational institutions of the III-IV accreditation levels / N. V. Krishtal [et al.] ; ed. by.: N. V. Krishtal, V. A. Mikhnev. - Kyiv : AUS Medicine Publishing, 2017. - 656 p.
2. General and clinical pathophysiology : textbook for students of higher educational institutions, of IV th level of accreditation / A. V. Kubyshkin [et al.] ; ed. by.: A. V. Kubyshkin, A. I. Gozhenko. - 2nd ed. - Vinnytsya : Nova Knyha Publishers, 2016. - 656 p.
3. Simeonova, N. K. Pathophysiology : textbook for students of higher medical educational institutions of the III-IV accreditation levels / N. K. Simeonova ; ed. by.: V. A. Mikhnev. - 2nd ed. - Kyiv : AUS Medicine Publishing, 2015. - 544 p.

#### *Additional:*

1. C. M. Porth Pathophysiology: Concepts of Altered Health States. – Lippincott Williams & Wilkins; 7th Edition USA.- 2004ю- 1616 p
2. Kumar V. Robbins and Cotran Pathologic Basis of Disease. V. II / V. Kumar, A. K. Abbas, J. C. Aster. - South Asia ed. - India : Elsevier, 2015. - 1391 p.
3. McPhee, Stephen J. Pathophysiology of Disease An Introduction to Clinical Medicine [Electronic resource] : учебник / Stephen J. McPhee. - 2nd ed. - 107 МБ. - NY : Appleton & Lange, 2000.
4. Mufson, Maurice A. Pathophysiology : PreTest Self-Assessment & Review / M.A. Mufson, C. A. Heck, S. M. Nesler. - 3th ed. - Chicago : Medical Publishing Division, 2002. - 268 p.
5. Pathophysiology: textbook for students / P.F. Litvitsky, S.V. Pirozhkov, E.B. Tezikov). - Moscow:Geotar-Media, 2016. – 432 p.

## MODULE 2

### SECTION 4 “BLOOD AND CVS PATHOLOGY”

#### RBC pathology. ESR and OER changes. Pathology of hemostasis.

1. The following RBC's forms were found in patient's blood smear. Choose the regenerative forms of RBCs
  - a. poikilocytes
  - b. oxyphilic normocytes
  - c. anisocytes
  - d. hypochromic RBCs
  - e. RBCs with Jolly's bodies
2. The following RBC's forms were found in patient's blood smear. Choose the regenerative forms of RBCs
  - a. poikilocytes
  - b. anisocytes
  - c. polychromatic normocytes
  - d. hypochromic RBCs
  - e. RBCs with Jolly's bodies
3. The following RBC's forms were found in patient's blood smear. Choose the regenerative forms of RBCs
  - a. poikilocytes
  - b. anisocytes
  - c. ovalocytes
  - d. reticulocytes
  - e. schistocytes
4. The following degenerative forms of RBC's may be found in patient's blood smear. Which of them means “erythrocytes with shape that differ from normal”?
  - a. hypochromic RBC
  - b. anisocytes
  - c. microcytes
  - d. megalocytes
  - e. poikilocytes
5. The following degenerative forms of RBC's may be found in patient's blood smear. Which of them means “erythrocytes with size that differ from normal”?
  - a. hypochromic RBC
  - b. polychromatic normocytes
  - c. polychromatic RBCs
  - d. poikilocytes
  - e. anisocytes
6. The following degenerative forms of RBC's may be found in patient's blood smear. Which of them means “erythrocyte with low haemoglobin content”?
  - a. hypochromic RBC
  - b. anisocytes
  - c. microcytes
  - d. megalocytes
  - e. RBC with Jolly bodies
7. The following degenerative forms of RBC's may be found in patient's blood smear. Which of them means “extra-large RBC”?
  - a. hypochromic RBC
  - b. anisocyte
  - c. microcyte
  - d. megalocyte
  - e. RBC with Jolly bodies
8. Patient with anemia carried out blood test for estimation of bone marrow's regeneration. Increased quantity of which cells is the evidence of erythropoiesis high rate in bone marrow?
  - a. reticulocytes
  - b. pronormocytes
  - c. erythroblasts
  - d. lymphocytes
  - e. platelets
9. Patient has an increased ESR. Which disease increased ESR is typical for?
  - a. nephritis
  - b. polycytemia
  - c. ascites
  - d. heart failure
  - e. cataract
10. Patient has reduced ESR. Which disease decreased ESR is typical for?
  - a. hepatitis
  - b. polycytemia
  - c. splenomegaly
  - d. anemia
  - e. myocardial infarction
11. Patient with anemia was carried out blood test. Oxyphilic normocytes were found in blood smear. How can you describe the state of bone marrow in this case?
  - a. hyperregeneration
  - b. normal regeneration
  - c. hyporegeneration
  - d. not effective erythropoiesis
  - e. insufficient erythropoiesis
12. Patient has hereditary hemolytic anemia - thalassemia. Which degenerative RBC forms are typical for this disease?
  - a. polychromatophils
  - b. megalocytes
  - c. target-like erythrocytes
  - d. poikilocytes
  - e. anisocytes
13. Patient has acute thrombopenia as a result of acute platelets destruction. Which changes will be in bone marrow after one week?
  - a. Absence of megakaryocytes
  - b. Reduce of megakaryocytes number
  - c. Reduce of megakaryoblasts
  - d. Absence of megakaryoblasts
  - e. Increased megakaryocytes number
14. Which change of blood volume will be observed in the patient with infectious diseases accompanied by severe diarrhoea and vomiting?
  - a. simple hypovolaemia
  - b. oligocytemic hypovolaemia
  - c. polycytemic hypovolaemia
  - d. oligocytemic hypervolaemia
  - e. polycytemic hypervolaemia
15. Which change of blood volume will be observed in the patient on the second day after acute bloodloss?
  - a. simple hypervolaemia
  - b. oligocytemic hypovolaemia
  - c. polycytemic hypovolaemia
  - d. oligocytemic hypervolaemia
  - e. polycytemic hypervolaemia
16. Which change of blood volume will be observed in the patient with chronic kidney's disease accompanied by renal failure?
  - a. simple hypovolaemia
  - b. oligocytemic hypovolaemia
  - c. polycytemic hypovolaemia
  - d. oligocytemic hypervolaemia
  - e. polycytemic hypervolaemia
17. Which change of blood volume will be observed in the patient with Vaquez' disease?

- a. simple hypovolaemia
  - b. oligocytic hypovolaemia
  - c. polycytic hypovolaemia
  - d. oligocytic hypervolaemia
  - e. polycytic hypervolaemia
- 18.** Woman has a premature detachment of placenta and 1st phase of disseminated intravascular coagulation syndrome. Activation of which blood factor leads to this pathology?
- a. tissue thromboplastin
  - b. plasminogen
  - c. fibrinogen
  - d. Hageman's factor
  - e. ions of calcium

- 19.** Megalocytes were found in patient's blood smear. Which RBCs color index is possible in this case?
- a. 1,4
  - b. 1,0
  - c. 0,8
  - d. 0,5
  - e. 0,2
- 20.** Administration of which of the following substances would theoretically correct the abnormal bleeding laboratory tests in a person who is deficient in coagulation factor V?
- a. Activated factor VIII
  - b. Activated factor X
  - c. Fibrinogen
  - d. Plasmin
  - e. Thrombin

### RBC pathology. Anemia and erythrocytosis.

- 21.** Which of the following red cell abnormalities is most indicative of hemolysis?
- a. Target cells
  - b. Acanthocytes
  - c. Schistocytes
  - d. Basophilic stippling
  - e. Heinz bodies
- 22.** A single nucleotide change in a codon on chromosome 11 that causes valine to replace glutamic acid at the sixth position of the beta-chain of hemoglobin is associated with:
- a. alpha thalassemia
  - b. glucose-6-phosphate dehydrogenase deficiency
  - c. hereditary spherocytosis
  - d. paroxysmal nocturnal hemoglobinuria
  - e. sickle cell anemia
- 23.** Megaloblasts observed in the blood smear of the patient with B12 folic acid deficiency anemia result from the impaired synthesis of:
- a. DNA
  - b. RNA
  - c. glutathione
  - d. beta-globin chains
  - e. decay-accelerating factor
- 24.** What is the leading pathophysiological mechanism that causes the disturbances of body's functions in anemic patients?
- a. Polycytic hypervolemia
  - b. Hemic hypoxia
  - c. Circulatory hypoxia
  - d. Oligocytic hypovolemia
  - e. Hypoxic hypoxia
- 25.** Patient was hospitalized with profound gastric bleeding. Blood count: RBCs 4,8 T/L; HB-140 g/L; RBCs color index 0,88; reticulocytes 0,6%. For which stage of acute posthaemorrhagic anemia such blood count is typical?
- a. reflexive
  - b. hydremic
  - c. marrow's activation
  - d. latent
  - e. final
- 26.** Patient arrived in a hospital with gastric bleeding. Blood count: RBCs 3,3 T/L; HB-110 g/L; RBCs color index 1,0; reticulocytes 0,8%. Which stage of acute posthaemorrhagic anemia is such blood count typical for?
- a. reflexive
  - b. hydremic
  - c. marrow's activation
  - d. latent
  - e. final
- 27.** Patient arrived in a hospital with gastric bleeding. Blood count: RBCs 2,9 T/L; HB-70 g/L; RBCs color index 0,72; reticulocytes 2,5% Which stage of acute posthaemorrhagic anemia is such blood count typical for?
- a. reflexive
  - b. hydremia
  - c. marrow's activation
  - d. latent
  - e. final
- 28.** Patient has normochromic anemia in combination with abnormalities of skeleton. Which type of anemia it's typical for?
- a. Iron deficiency
  - b. Microspherocytosis
  - c. Iron refractory
  - d. Folate deficiency
  - e. Hypoplastic
- 29.** In patient's blood were found: decreased RBCs number, microspherocytosis. Name the main mechanism of anemia development in this case:
- a. chronic bleeding
  - b. G6PD deficiency
  - c. inherited RBC membrane defect
  - d. bone marrow hypoplasia
  - e. B12-folate deficiency
- 30.** Blood count of the patient G.: decreased RBCs number, hyperchromia, RBCs with Jolly's bodies and Keboťs rings. Which type of anemia it's typical for?
- a. Chronic posthaemorrhagic
  - b. Acquired hypoplastic
  - c. B12-folate deficiency
  - d. Hereditary hemolytic
  - e. Thalassemia
- 31.** Patient has a sickle-cell anemia. What is pathogenetic mechanism of sickle erythrocytes formation?
- a. Membrane structural defect
  - b. Defect of enzymes function
  - c. Changes in chromosomes structure
  - d. Defect of hemoglobin synthesis
  - e. Not effective erythropoiesis
- 32.** Patient has a pernicious anemia. Which substances metabolism is disturbed in the patient with this anemia?
- a. glucose
  - b. nucleic acids
  - c. amino acid
  - d. cholesterol
  - e. lipoproteids
- 33.** Patient has hemolytic crisis after reception of sulfonamides. Which type of anemia reveals itself in such manner (hemolysis in response to external influence)?
- a. Hereditary hemolytic
  - b. Hypoplastic
  - c. Iron refractory
  - d. B12-folate deficiency

- e. Chronic posthaemorrhagic
- 34.** It is known that in some patient erythrocytes hemolysis is possible during prolonged high physical activity, which is accompanied by march hemoglobiuria. What is the mechanism of RBC hemolysis in this case?
- immune abnormalities
  - mechanical injury
  - infectious agents direct toxic effect
  - non-infectious agents direct toxic effect
  - reticuloendothelial hyperactivity
- 35.** Increased serum iron is typical for syderoblastic anemia. What is the mechanism of it?
- Alimentary iron excess
  - Increased hemoglobin dissociation
  - Decreased iron absorption
  - Increased iron absorption
  - Defect of iron junction to hemoglobin
- 36.** Patient, 13 years, has RBC membrane enzyme deficiency. What is the leading pathogenetic mechanism of hemolysis at glucose-6-phosphate dehydrogenase deficiency?
- energy deficiency
  - hypoxia
  - defect of proteins conformation
  - decreased antioxidant protection
  - decreased electric potential
- 37.** Patient has trophic ulcers of shin in consequence of iron deficiency anemia. What is the main mechanism of cell injury in case of iron deficiency anemia?
- hypoxic
  - free radical
  - metabolic
  - enzymatic
  - ionic
- 38.** Patient with mild form of sickle cell anemia has no complaints and his blood analysis is normal. Which of the following external influences can cause manifestation of anemia symptoms in this patient?
- extreme of cold temperature
  - extreme low oxygen content in the air
  - extreme of high temperature
  - extreme of air humidity
  - venomous insects bites
- 39.** Patient, 54 years, is often working with lead at work place. As a result he has hypochromic anemia. Treatment with iron medication gives no results. Iron concentration in blood serum is increased. What is the cause of anemia in this case?
- Defect of iron junction to hemoglobin.
  - Vitamin B12 deficiency
  - Folic acid deficiency
  - Hypoplasia of red bone marrow
  - Protein deficiency
- 40.** Woman has period's disorders, which are accompanied by prolonged bleedings. Blood analysis: hypochromia, decreased reticulocytes number, microcytosis. What is the reason of anemia in this case?
- B12-folate deficiency
  - Erythrocyte's hemolysis
  - Hypoplasia of bone marrow
  - Iron deficiency
  - Methaplasia of bone marrow
- 41.** Woman is pregnant (6 month). She has iron deficiency anemia. What is the mechanism of iron deficiency anemia at pregnancy?
- Defect of iron deposition
  - Iron deficiency in food
  - Defect of iron absorption
  - Increased iron usage
  - Deficiency of inner factor
- 42.** Patient has hypochromic anemia on 5<sup>th</sup> day after the acute bleeding. What is the main mechanism of hypochromia?
- Defect of iron absorption in the intestines
  - Output of non-matured RBCs from the marrow
  - Increased destruction of RBCs in the spleen
  - Defect of haemoglobin synthesis
  - increased iron output from the organism
- 43.** Patient has anemia in consequence of burn disease. Which factor deficiency is responsible for anemia development?
- myeloepoetin
  - vitamin B12
  - catecholamines
  - erythropoetin
  - thrombopoetin
- 44.** Woman at 7<sup>th</sup> month of pregnancy has acutely developing anemia. RBCs -  $2,7 \times 10^6/\mu\text{L}$ , HB - 110 g/L, RBCs color index - 1,2, anisocytosis, poikilocytosis, single megalocytes. Which anemia type is present?
- B12 deficiency
  - Iron deficiency
  - hemolytic
  - posthaemorrhagic
  - talassemia
- 45.** Patient, 3 years has hemoglobinopathia (sickle-cells anemia). In this case glutamine acid in globin beta-chain was changed on:
- serine
  - tyrosine
  - valine
  - phenylalanine
  - arginine
- 46.** Patient has hemolytic jaundice. In blood: microspherocytes 1-6 in field of vision. What is the cause of RBCs hemolysis at such form of jaundice?
- Defect of RBCs enzyme systems
  - Influence of bile acids over erythrocyte's membrane
  - Hereditary defect of RBCs membrane
  - Hereditary defect of hemoglobin structure
  - Influence of bilirubin on the erythrocyte's membrane
- 47.** Woman, 36 years, was treated by sulfonamides on the occasion of respiratory virus infection. Blood count: hyporegenerative normochromic anemia, leukopenia, thrombocytopenia. In bone marrow: decrease number of marrow stem cells. Which type of anemia is described?
- Hemolytic
  - Posthemorrhagic.
  - B12 and folate deficiency
  - Hypoplastic.
  - Iron deficiency.
- 48.** In patient's blood smear: target-like RBCs. Which process directly causes target cells development?
- Hb precipitation inside the RBC
  - external RBC injury
  - defect of RBC membrane
  - increased RBC hemolysis
  - iron accumulation in RBC
- 49.** Patient's complaints are typical for chronic gastritis. In peripheral blood smear megalocytes are found. In bone marrow: megaloblastic erythropoiesis. Which type of anemia?
- Aplastic anemia
  - Hypoplastic anemia
  - B12 deficiency anemia
  - Hemolytic anemia
  - Iron deficiency anemia
- 50.** Patient is carrier of sickle-cell anemia. He has got pneumonia and in few days his condition was complicated with anemia due to haemolytic crisis. What is the direct cause of hemolytic crisis in this case?



- a. Changes in blood osmotic pressure
  - b. Heterozygosis on Hb S
  - c. Hereditary defect of Hb synthesis
  - d. Hyperoxia in consequence of hyperventilation
  - e. Hypoxia in consequence of pneumonia
- 51.** The destruction of RBC may occur by 2 mechanisms: intravascular and extravascular hemolysis. Most hemolysis is extravascular and occurs in phagocytic cells of the spleen, liver, and bone marrow. Choose the case which is characterized by intravascular RBC hemolysis?
- a. defect of RBC membrane
  - b. deficiency of RBC enzymes
  - c. mechanical injury of RBC
  - d. increased spleen activity
  - e. pathological haemoglobin synthesis
- 52.** A 12-year-old boy presents in the emergency room with severe chest pain. His mother reports he was doing well until he came down with a respiratory tract infection. Blood count: Erythrocytes  $3,4 \cdot 10^{12}/L$ , Hemoglobin 85 g/L, Color index 0,79; Leukocytes  $5,6 \cdot 10^9/L$ , Platelets  $210 \cdot 10^9/L$ , Reticulocytes 16%. Blood smear: anizocytosis, poikilocytosis, sickle cells. What is the most likely cause of chest pain in this boy?
- a. chest trauma
  - b. chest vessels occlusion with sickle cells
  - c. respiratory tract infection
  - d. respiratory failure development
  - e. myocardial infarction development
- 53.** Baby on artificial feeding (cow's milk) has severe anemia: RBCs  $-2 T/L$ , Hb - 68 g/L, reticulocytes - 0%. Which type of anemia is this?
- a. B12 deficiency
  - b. Physiological hemolytic
  - c. Iron deficiency
  - d. Talassemia
  - e. Sickle-cell
- 54.** The deficiency of vitamin B12 and folic acid causes serious disorders in the human body. What is the direct reason of neurological disorders in the patient with vitamin B12 deficiency?
- a. disturbance of peripheral nerves myelination
  - b. hemic hypoxia development
  - c. vitamin B12 deficiency
  - d. increased peripheral nerves sensitivity
  - e. imbalance between sympathetic and sympathetic activity
- 55.** Man, 40 years has sickle-cell anemia. Which is the mechanism of RBCs quantity decrease?
- a. Iron deficiency in organism
  - b. B12 folate deficiency
  - c. Protein deficiency
  - d. Extravascular hemolysis of RBC
  - e. Intravascular hemolysis of RBC

### WBC pathology. Leukocytosis and leukopenia.

- 56.** A person taking an oral sulfonamide is found to have a markedly decreased peripheral blood neutrophil count, but the numbers of platelets and erythrocytes are normal. If the peripheral neutropenia is the result of antineutrophil antibodies being produced in response to taking the sulfonamide, then this patient would be expected to have:
- a. An atrophic spleen
  - b. Decreased vitamin B12 levels
  - c. Hypoplasia of the bone marrow myeloid series
  - d. Hyperplasia of the bone marrow myeloid series
  - e. A monoclonal large granular lymphocyte proliferation in the peripheral blood
- 57.** Blood test was carried out in the patient with acute inflammation. Regenerative shift was found in leukocytic formula. Shift of leukocyte's formula "to the left" is the increased count of young forms of ...:
- a. eosinophils
  - b. neutrophils
  - c. basophils
  - d. lymphocytes
  - e. monocytes
- 58.** Blood test was carried out in the patient. What is the absolute leukocytes number?
- a. Number of leukocytes different forms in the unit of blood volume
  - b. Number of leukocytes different forms in organism
  - c. Correlation among RBCs and leukocytes quantity
  - d. Correlation among number of different forms of neutrophilic leukocytes
  - e. Proportion between granulocytes and agranulocytes
- 59.** Which of the listed WBC is a degenerative form of leukocyte?
- a. Eosinophils with red granularity
  - b. Basophils with blue granularity
  - c. Neutrophils with Dohle bodies
  - d. Neutrophils with asurophilic granularity
  - e. RBCs with pathological inclusions
- 60.** Which of the WBC from listed below is a degenerative form of leukocyte?
- a. Eosinophils with red granularity
  - b. Basophils with blue granularity
  - c. Neutrophils with toxic granularity
  - d. Neutrophils with asurophilic granularity
  - e. RBCs with pathological impurities
- 61.** Blood test was carried out in the patient. Choose regenerative form of WBC.
- a. Young neutrophil
  - b. Segmented neutrophil
  - c. Eosinophilic leukocyte
  - d. Basophilic leukocyte
  - e. Small lymphocyte
- 62.** Blood test was carried out to the patient. Choose regenerative form of WBC
- a. lymphocyte
  - b. monocyte
  - c. segmented neutrophil
  - d. prolymphocyte
  - e. eosinophil
- 63.** Blood test was carried out to the patient. Choose regenerative form of WBC
- a. segmented neutrophil
  - b. eosinophilic leukocyte
  - c. promonocyte
  - d. lymphocyte
  - e. monocyte
- 64.** Blood test was carried out to the patient. Choose regenerative form of WBC
- a. segmented neutrophil
  - b. myelocyte
  - c. eosinophil
  - d. basophilic leukocyte
  - e. small lymphocyte
- 65.** The deficiency of vitamin B12 and folic acid causes serious disorders in the human body. Describe the state of WBC count in the patient with vitamin B12 deficiency:
- a. normal count
  - b. absolute leukocytosis
  - c. absolute lymphocytosis
  - d. physiological leukopenia
  - e. absolute neutropenia
- 66.** Patient has neutrophilia with regenerative shift to the left in leukocytic formula on the 1<sup>st</sup> day after

appendectomy. What is the main mechanism of absolute leukocytosis in this case?

- a. Redistribution of leukocytes in organism
  - b. Decreased leukocytes destruction
  - c. Slowing down of leukocytes emigration into the tissues
  - d. Increased leukopoiesis
  - e. Activation of immunity
- 67.** In a day after examination leukocytosis without changes in leukocytic formula was revealed in the blood count of a student. Choose the most probable mechanism of relative leukocytosis development in peripheral blood.
- a. Redistribution of leukocytes in organism
  - b. Increased leukopoiesis
  - c. Decreased leukocytes destruction
  - d. Slowing down of leukocytes emigration into the tissues
  - e. Rapid leukopoiesis
- 68.** Leukocytosis was found in the patient. Which leukocytosis from listed below is pathological leukocytosis?
- a. Emotional
  - b. Distributive
  - c. Myogenous
  - d. Neutrophilic
  - e. In newborns
- 69.** Leukocytosis was found in the patient. Which leukocytosis from listed below is physiological leukocytosis?
- a. Emotional
  - b. Eosinophilic
  - c. Neutrophilic
  - d. Absolute
  - e. Relative
- 70.** Leukopenia was found in the patient. What is correct definition for agranulocytosis?
- a. Increased agranulocytes number
  - b. Increased granulocytes number
  - c. Decreased agranulocytes number
  - d. Increased eosinophils and basophils number
  - e. Decreased granulocytes number
- 71.** Significant decrease of leukocyte's quantity was found in the patient. Which sign from listed below in a combination with leukopenia is characteristic for agranulocytosis?
- a. Neutropenia and lymphopenia
  - b. Neutrophilosis and eosinopenia
  - c. Neutropenia and eosinopenia
  - d. Lymphopenia and monocytopenia
  - e. Without changes of correlation
- 72.** After uncontrolled reception of non-steroid anti-inflammatory drugs fever, vomiting and stool with blood occurred in the patient. Blood count: leukocytes- 0.9G/L, leucoagglutinines (anti-leukocyte's antibodies). Leukocytic formula: segm. neutrophils - 22, lymphocytes - 68, monocytes - 10. Which blood state this blood count corresponds to?
- a. leukopenia
  - b. leukemia
  - c. agranulocytosis
  - d. normal blood count
  - e. decreased platelets amount
- 73.** After uncontrolled reception of non-steroid anti-inflammatory drugs fever, vomiting and stool with blood occurred in the patient. Blood count: leukocytes- 0.9G/L, leucoagglutinines (anti-leukocyte's antibodies). Leukocytic formula: segm. neutrophils - 22, lymphocytes - 68, monocytes - 10. What is the mechanism of this leukocytes count development?
- a. myelotoxic influence of NSADs
  - b. redistribution of WBC
  - c. increased spleen activity
  - d. idiopathic

e. autoimmune destruction

- 74.** Relative neutropenia is revealed in the patient with a lasting fever. Which probable mechanism underlies such neutropenia?
- a. Decreased leukocytes production at marrow
  - b. Redistribution of leukocytes in the vessels
  - c. Decreased leukocytes circulation time in vessels
  - d. Rapid leukocytes destruction at spleen
  - e. Decreased leukopoietines production at fever
- 75.** Absolute neutropenia was revealed in the patient with splenomegalia. Which probable mechanism underlies such neutropenia?
- a. Redistribution of leukocytes in vessels
  - b. Output of immature leukocytes
  - c. Decreased marrow's production
  - d. Accelerated leukocytes destruction
  - e. Decreased leukopoietines production
- 76.** Patient arrived in a hospital for specification of the diagnosis. Blood count: eosinophilia. Which disease from the following can be accompanied by such changes in blood?
- a. hepatitis
  - b. lympholeukemia
  - c. bronchial asthma
  - d. erythrocytosis
  - e. anemia
- 77.** Patient arrived to the hospital for specification of the diagnosis. Blood analysis has revealed neutrophilic leukocytosis with the shift of leukocytic formula to the left. Which disease from the following can be accompanied by such changes in blood?
- a. Allergic dermatitis
  - b. Lympholeukemia
  - c. Bronchial asthma
  - d. Iron deficiency anemia
  - e. Myocardial infarction
- 78.** Patient arrived to the hospital for specification of the diagnosis. Blood analysis: neutrophilic leukocytosis with the regenerative shift of leukocytic formula to the left. Which disease from the following can be accompanied by such changes in blood?
- a. Allergic dermatitis
  - b. Hemophilia
  - c. Lympholeukemia
  - d. Glomerulonephritis
  - e. Virus hepatitis
- 79.** Patient arrived to the hospital for specification of the diagnosis. Blood analysis: neutrophilic leukocytosis with the hyperregenerative shift of leukocytic formula to the left. Which disease from the following can be accompanied by such changes in blood?
- a. Tuberculosis
  - b. Sepsis
  - c. Hemophilia
  - d. Virus hepatitis
  - e. Lymphogenous leukemia
- 80.** Patient arrived to the hospital for specification of the diagnosis. Blood analysis: absolute lymphocytosis. Which disease from the following can be accompanied by such changes in blood?
- a. Myeloleukemia
  - b. Allergic dermatitis
  - c. Viral hepatitis
  - d. Acute sepsis
  - e. Hemophilia
- 81.** Patient arrived to the hospital for specification of the diagnosis. Blood analysis: lymphocytosis. Which disease from the following can manifest with such changes in blood count?
- a. Myocardial infarction
  - b. Allergic dermatitis

- c. Myeloleukemia
  - d. Tuberculosis
  - e. Hemophilia
- 82.** The child 6 years old with diarrhoea was treated by his parents with different antibiotics without doctor's control. In a month later the blood count of this child shows decreased WBC count, decreased neutrophils count, increased lymphocytes and monocytes count. What is most probable mechanism of the given blood count changes development in the child?
- a. autoimmune destruction of neutrophils
  - b. redistribution of leukocytes in the vessels
  - c. myelotoxic influence of antibiotics
  - d. age-specific changes
  - e. increased spleen activity
- 83.** Splenectomy was carried out in the patient with abdominal trauma. Blood analysis –leukocytosis without essential changes in leukocytic formula. What is the most probable mechanism of leukocytosis in the patient?
- a. Activation of leukopoiesis
  - b. Stimulation of leukocytes exit from bone marrow
  - c. Slowing of leukocytes destruction
  - d. Decreased WBC migration to the tissues
  - e. Physiological leukocytosis
- 84.** The patient with atrophic gastritis had deficiency of vitamin B12. Which change of leukocytic formula is most typical for hypovitaminosis B12?
- a. Lymphocytosis
  - b. Monocytosis
  - c. Degenerative neutrophils nuclear shift to the left
  - d. Degenerative neutrophils nuclear shift to the right
  - e. Regenerative neutrophils nuclear shift to the left
- 85.** The patient with tuberculosis was made blood count. Which changes of leukocytic formula are most typical for this pathology?
- a. Neutrophils nuclear shift to the left
  - b. Lymphocytosis
  - c. Neutrophils nuclear shift to the right
  - d. Eosinophilia
  - e. Neutrophilia
- 86.** Acute inflammation of upper respiratory ways and eyes manifested with hyperemia and edema of conjunctiva occurs in the woman during grass flowering period. Which type of leukocytosis will be most typical for this case?
- a. Eosinophilia
  - b. Basophilia
  - c. Neutrophilia
  - d. Lymphocytosis
  - e. Monocytosis
- 87.** Wheals of urticaria accompanied with leukocytosis appeared at the teenager after eating honey. Which type of leukocytosis is typical in this case?
- a. Basophilic
  - b. Eosinophilic
  - c. Neutrophilic
  - d. Lymphocytosis
  - e. Monocytosis
- 88.** Increased leukocytes' number in peripheral blood is revealed in the patient with acute appendicitis. Which type of leukocytosis will be most typical in this case?
- a. Basophilic
  - b. Eosinophilic
  - c. Neutrophilic
  - d. Lymphocytosis
  - e. Monocytosis

### **WBC pathology. Leukemia and leukemoid reaction.**

- 89.** It is known that enlargement of liver and spleen is a typical clinical manifestation of leukemia. Why it happens?
- a. due to increased functional activity of these organs
  - b. due to leukemic infiltration of these organs
  - c. due to acute inflammation of these organs
  - d. due to edema of these organs
  - e. spleen and liver enlargement is not a specific symptom
- 90.** Patient has high neutrophilia (90G/L) with shift up to promyelocytes and myeloblasts as a result of acute sepsis development. To which type of leukemoid reaction it concerns?
- a. lymphogenous
  - b. eosinophilous
  - c. erythromyelogenous
  - d. agranulocytous
  - e. myelogenous
- 91.** The patient arrived to hospital with suspicion on leukaemia. Which sign from listed below is diagnostic criterion of leukemia?
- a. Significant increase of leukocytes quantity
  - b. Spleen enlargement
  - c. Eosinophil-basophil association
  - d. Blast cells in peripheral blood
  - e. Development of aplastic anemia
- 92.** The patient arrived to hospital with suspicion on leukaemia. Which sign from listed below is diagnostic criterion of leukemia?
- a. Significant increase of leukocytes quantity
  - b. Spleen hyperplasia
  - c. Suppression of normal hemopoiesis
  - d. Eosinophil-basophil association
  - e. Development of aplastic anemia
- 93.** The patient arrived to hospital with suspicion on leukemia. Which sign from listed below is diagnostic criterion differentiating acute leukemia from chronic?
- a. Significant increase of leukocytes quantity
  - b. Speed of disease development
  - c. Eosinophil-Basophil association
  - d. Gumprecht's cells
  - e. Prevalence of blasts cells in blood
- 94.** The patient arrived to hospital with suspicion on leukemia. Which sign from listed below is diagnostic criterion differentiating acute leukemia from chronic?
- a. Substantial growth of leukocytes quantity
  - b. Hiatus leukemicus
  - c. Speed of disease development
  - d. Eosinophil-basophil association
  - e. Gumprecht's cells
- 95.** The patient arrived to hospital with suspicion on leukemia. Which criterion from listed below verifies chronic myelogenous leukemia?
- a. Gumprecht's cells
  - b. Speed of disease development
  - c. Myeloblasts prevalence in blood count
  - d. Eosinophil-basophil association
  - e. Lymphoblasts presence in blood
- 96.** The patient arrived to hospital with suspicion on leukemia. Which criterion from listed below verifies chronic lymphogenous leukemia?
- a. Eosinophil-basophil association
  - b. Speed of disease development
  - c. Gumprecht's cells
  - d. Lymphoblasts presence in blood
  - e. Myeloblasts presence in blood
- 97.** Patient S, 43 years, has CML, anemia, and decreased platelets number. What anemia from listed below accompanies leukemia?
- a. Hypoplastic
  - b. Aplastic
  - c. Hyperplastic

- d. Metaplastic  
e. Aneplastic
- 98.** Patient K, 46 years has anemia, decreased platelets number, high leukocytosis with immature WBC forms presence in blood smear. What is probable diagnosis for him?
- Leukemia
  - Hypoplastic anemia
  - Hemophilia
  - Leukemoid reaction
  - Leukocytosis

- 99.** During clinical examination of the patient with acute myelogenous leukemia enlargement of liver and spleen is found. Blood analysis: anemia, myeloblasts in peripheral blood. What is the basic distinction between acute and chronic myelogenous leukemia?
- Blast cells in peripheral blood
  - Anemia
  - Hiatus leukemicus
  - Pancytopenia
  - Decreased platelets

### Situational problems on blood pathology

Patient A, 54 years, 5<sup>th</sup> day after surgical operation. Blood count: Erythrocytes  $3,6 \cdot 10^{12}/L$ , Hemoglobin 95 g/L, Color index 0,78; Leukocytes  $16 \cdot 10^9/L$ , Platelets  $450 \cdot 10^9/L$   
Leukocytic formula

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
3	1	1	2	8	64	18	3

Blood picture: single anizocytes, poikilocytosis, reticulocytes- 3,8%.

**100.** Increased quantity of which cells verify activation of haemopoiesis in this patient?

- leukocytes
- platelets
- reticulocytes
- poikilocytes
- anisocytes

**101.** Which change of circulating blood volume can be revealed in the given clinical situation?

- Normocytic hypovolemia
- Polycytic hypovolemia
- Oligocytic hypervolemia
- Oligocytic normovolemia
- Simple hypovolemia

**102.** Describe the state of WBCs in the given clinical situation:

- Relative neutrophilic leukocytosis
- Absolute neutrophilic leukocytosis
- Absolute lymphopenia
- Normal count
- Eosinophil-basophil association

Woman C., 38 years is in a hard state suffering from acute sepsis. Blood count: Erythrocytes  $4,1 \cdot 10^{12}/L$  Hemoglobin 129 g/L; Color index 0,94; Leukocytes  $36 \cdot 10^9/L$ ,  
Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
3	1	4	7	9	51	20	5

Blood picture: single promyelocytes, toxic grain in neutrophile's cytoplasm, reticulocytes - 0,9%.

**106.** Toxic grain in neutrophiles cytoplasm verifies:

- the presence of inflammation
- normal neutrophil
- presence of allergy
- leukemia
- degenerative changes in neutrophil

**107.** Presence of promyelocytes in blood smear verifies:

- normal blood smear
- hyperproduction of WBC
- hypoproduction of WBC
- increased WBC destruction
- decreased WBC destruction

**108.** Which mechanism underlies changes in leukocytic formula?

- Activation of immune system
- Activation of neutrophils phagocytic activity
- Development of autoimmune reaction
- Activation of granulocytopenia
- Tumor hyperplasia of bone marrow

**109.** Describe the state of WBCs at the given clinical situation:

- Relative neutrophilic leukocytosis
- Leukemoid reaction
- Absolute lymphopenia
- Chronic myeloleukemia
- Eosinophil-basophil association

Patient D., 54 years, complains about general weakness, headache, giddiness, troubled sleep. Blood count: Erythrocytes  $3,8 \cdot 10^{12}/L$ , Hemoglobin 68 g/L, Color index 0,54 Leukocytes  $6,1 \cdot 10^9/L$ ,

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
3	1	0	0	6	62	24	4

100

Blood picture: hypochromic erythrocytes, microcytes, erythrocytes with basophilic granularity, single polychromatophilic normocytes, reticulocytes – 1,8%.

**110.** What type of anemia is present in the patient?

- Acute posthemorrhagic
- Chronic hemolytic
- Iron deficiency
- Acquired hemolytic
- Hypoplastic

**111.** Increased quantity of which cells can verify the activation of haemopoiesis?

- leukocytes
- platelets
- poikilocytes
- polychromatophils
- anisocytes

**112.** Picture of WBC in the patient can be characterized as:

- normal count
- absolute neutrophilic leukocytosis
- relative neutrophilic leukocytosis
- leukopenia with relative lymphocytosis
- eosinophil-basophil association

**113.** Which substance deficiency may result in such type of anemia?

- vitamin B12
- folic acid
- protein
- bilirubin
- iron

Patient K., 55 years complains about general weakness, fever, digestion violation, enlarged lymph nodes. Blood count: Erythrocytes  $2,8 \cdot 10^{12}/L$ , Hemoglobin 84 g/L, Color index 0,9; Erythrocytes sedimentation rate 30 mm/hour Leukocytes  $22 \cdot 10^9/L$ , Platelets  $142 \cdot 10^9/L$

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
1	0	0	0	2	37	58	6

100

**114.** Picture of WBC of the patient can be characterised as:

- neutrophilic leukocytosis
- absolute neutropenia
- eosinophilic leukocytosis
- relative monocytosis
- absolute lymphocytosis

**115.** Choose the most correct description of neutrophils state in this patient:

- absolute neutropenia
- normal neutrophils count
- relative neutrophilia
- absolute neutrophilia
- relative neutropenia

**116.** Estimate the ESR level and explain the mechanism of it:

- increased ESR due to anemia
- increased ESR due to lymphocytosis

- normal ESR
- decreased ESR due to fever
- decreased ESR due to inflammation

**117.** What is the mechanism of leukocytes quantity change?

- redistribution of leukocytes in organism
- decreased leukocytes destruction
- slowing down of leukocytes migration to the tissues
- activation of lymphopoiesis
- exit from depot

**118.** Changes in leukocytic formula can verify:

- sepsis
- inflammation
- chronic infection
- exogenous intoxication
- tumour progress

Blood count of the Patient S.: Leukocytes  $3,2 \cdot 10^9/L$  Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	0	26	63	11

100

**119.** Picture of WBC in the patient can be characterized as:

- absolute neutropenia
- absolute lymphocytosis
- relative eosinopenia
- agranulocytosis
- absolute monocytosis

**120.** Picture of WBC in the patient can be characterized as:

- relative lymphocytosis
- relative neutropenia
- relative eosinopenia

- absolute monocytosis
- agranulocytosis

**121.** Choose the most probable reason of such changes in leukocytic formula:

- activation of granulocytes production
- depression of granulocytes production
- activation of lymphocytes production
- allergic reaction development
- leukemia development

Patient F., 56 years arrived to clinic with stenocardia attack and suspicion of myocardial infarction. Blood count: Erythrocytes  $8,5 \cdot 10^{12}/L$  Hemoglobin 170 g/L Color index 0,6 Erythrocytes sedimentation rate 1 mm/hour Leukocytes  $23 \cdot 10^9/L$  Platelets  $550 \cdot 10^9/L$  Leukocytic formula

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
5	1	1	3	14	55	18	3

100

Blood picture: hypochromic and polychromatophilic erythrocytes, anizocytosis, poikilocytosis, reticulocytes - 2,1%.

**122.** Picture of WBC in the patient the most probably can be characterized as:

- relative lymphocytosis
- relative eosinopenia
- absolute monocytosis
- absolute neutrophilia
- agranulocytosis

**123.** Estimate presence of neutrophils nuclear shift and choose the most correct answer:

- hyperregenerative
- degenerative shift to the right
- regenerative shift to the right
- regenerative shift to the left
- degenerative shift to the left

**124.** What is the reason of the patient's blood count changes?

- Bone marrow hyperplasia
- Disturbances of blood circulation
- Changes of coronary vessels
- Stenocardia
- Cardiosclerosis

**125.** Define the state of blood circulating volume in this patient:

- Normocytic hypovolemia
- Polycytemic hypovolemia
- Oligocytemic hypervolemia
- Oligocytemic normovolemia
- Polycytemic hypervolemia

**126.** Define the RBC count in this patient:

- normal RBC count
- iron deficiency anemia
- secondary erythrocytosis
- myelogenous leukemia
- primary erythrocytosis

**127.** Which from the given changes of blood indices can be the cause of problems with coronary circulation in the patient?

- low ESR
- low color index
- increased blood viscosity
- increased WBC quantity
- poikilocytosis

Patient K., 55 years, arrived to clinic with complains about general weakness, fever, enlarged spleen and regional lymph nodes. Blood count: Erythrocytes  $2,8 \cdot 10^{12}/L$ , Hemoglobin 84 g/L, Color index 0,9 Erythrocytes sedimentation rate 30 mm/hour

Leukocytes  $22 \cdot 10^9/L$ , Platelets  $142 \cdot 10^9/L$

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
1	0	0		1	22	61	3

87

Lymphoblasts – 3%, prolymphocytes – 9%, big lymphocytes – 13%, medium lymphocytes – 18%, small lymphocytes – 30%

Blood picture: normochromic erythrocytes, anizocytosis, poikilocytosis, reticulocytes- 0,05%, many "lymphocyte's shadows" (Gumprecht cells)

**128.** Which of the listed forms of leukemia is present in the patient?

- leukemic
- subleukemic
- aleukemic
- leukopenia
- leukemia is not indicated

**129.** Estimate ESR level and choose the most correct mechanism that caused this disturbance:

- normal ESR
- increased albumen-globulin coefficient
- decreased albumen-globulin coefficient
- damage of RBCs membrane
- increased blood viscosity

**130.** Define the state of neutrophils count in this patient:

- absolute neutropenia
- normal neutrophils count
- relative neutrophilia
- absolute neutrophilia
- relative neutropenia

**131.** What is the mechanism of Gumprecht cells appearance in the blood smear?

- lymphocytes breakdown during smear preparation
- due to their increased blood count
- due to autoimmune reaction against lymphocytes
- due to increased hemolysis

**132.** What mechanism is responsible for change in leukocytic formula in the patient?

- Activation of the immune system

- Development of allergic reaction
- Development of autoimmune reaction
- Activation of lymphopoiesis
- Endogenous intoxication

**133.** What is the probable reason of the changes in patient's leukocytic formula?

- Metastases of tumor into bone marrow
- Autoimmune inflammation
- Tumor hyperplasia of bone marrow
- Endogenous intoxication
- Allergic reaction

**134.** What pathology of RBCs from listed below is present in the patient?

- aplastic anemia
- chronic posthemorrhagic anemia
- acquired hemolytic anemia
- metaplastic anemia
- iron deficiency anemia

**135.** What is the most probable mechanism of RBCs quantity change in the patient?

- Loss of RBCs
- Violation of hemopoietic regulation
- Intravascular RBCs hemolysis
- Accumulation of RBCs in liver
- Deficiency of plastic and energy substances

**136.** What pathology of WBCs from listed below is present in the patient?

- chronic lymphogenous leukemia
- acute lymphogenous leukemia

- c. undifferentiated leukemia
- d. lymphogenous leukemoid reaction
- e. relative lymphocytosis

**137.** What importance has presence of Gumprecht's cells in peripheral blood?

Patient M., 17 years. Complains of great number of subcutaneous hemorrhages and gums bleedings. Blood count: Erythrocytes  $3,6 \cdot 10^{12}/L$ , Hemoglobin 100 g/L, Color index 0,83 Erythrocytes sedimentation rate 50 mm/hour; Leukocytes  $6,5 \cdot 10^9/L$ , Platelets  $60 \cdot 10^9/L$

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	1	18	12	2

Lymphoblasts - 63%, prolymphocytes - 4%

Blood picture: normochromic RBCs, anizocytosis, poikilocytosis, reticulocytes - 0,02%.

**138.** Which form of leukemia from listed below is present in the patient?

- a. Subleukemic
- a. Aleukemic
- b. Leukemic
- c. Leukopenia
- d. No leukemia

**139.** What is the reason of hemorrhagic syndrome manifestation in this patient?

- a. decreased platelets count due to bone marrow metaplasia
- b. decreased platelets count due to their increased use
- c. anemia development
- d. blood vessels pathology
- e. mechanical trauma of blood vessels

**140.** Describe WBC state in this patient:

- a. agranulocytosis
- b. leukemoid reaction
- c. absolute lymphocytosis
- d. acute lymphogenous leukemia
- e. chronic lympholeukemia

**141.** Estimate regenerative ability of marrow in the patient.

Bone marrow is....:

- a. normregenerative
- b. aregenerative
- c. hyporegenerative
- d. degenerative
- e. hyperregenerative

- a. testifies about leukemia cells apoptosis development
- b. it is diagnostic criterion of lymphogenous leukemia
- c. confirms disturbance of haemopoiesis regulation
- d. is an attribute of an output of leukemia cells in blood
- e. testifies to activation of antitumor protection

**142.** What is the most probable reason of leukocytes' quantity change in the patient?

- a. leukocyte's quantity is not changed
- b. decreased leukocytes destruction
- c. slowing down of leukocytes migration to the tissues
- d. redistribution of leukocytes in organism
- e. tumor development in the bone marrow

**143.** Choose the most probable reason describing platelets level in the patient :

- a. decreased marrow's production
- b. increased platelets usage
- c. normal platelets amount
- d. autoimmune destruction of platelets
- e. platelets deposition in the vessels

**144.** What mechanism more probably underlies change in leukocytic formula in the patient?

- a. Activation of immune system of the organism
- b. Development of allergic reaction
- c. Development of autoimmune reaction
- d. Malignant activation of lymphopoiesis
- e. Development of immune deficiency

**145.** What is the most probable mechanism of RBCs quantity change in the patient?

- a. loss of RBCs
- b. disturbance of haemopoietic regulation
- c. suppression of erythropoiesis
- d. intravascular RBCs hemolysis
- e. RBCs deposit

Patient A., 42 years, arrived to clinic with complains about general weakness, fever, severe quinsy, pains in bones and joints. Blood count: Erythrocytes  $2,8 \cdot 10^{12}/L$ , Hemoglobin 84 g/L, Color index 0,9 Erythrocytes sedimentation rate 50 mm/hour Leukocytes  $82 \cdot 10^9/L$ , Platelets  $142 \cdot 10^9/L$  Leukocytic formula

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0			2	12	10	2

Myeloblasts - 70%, promyelocytes - 4%

Blood picture: normochromic RBCs, anizocytosis, poikilocytosis, reticulocytes- 0,04%.

**146.** What form of leukemia from listed below is present in the patient?

- a. Aleukemic
- b. Subleukemic
- c. Leukopenic
- d. No leukemia
- e. Leukemic

**147.** Estimate presence of neutrophils nuclear shift and choose the most correct answer:

- a. regenerative shift to the left
- b. degenerative shift to the right
- c. hyperregenerative
- d. hiatus leukemicus
- e. no shift

**148.** Describe the state of WBCs in the patient:

- a. acute myelogenous leukemia
- b. chronic myeloleukemia
- c. undifferentiated leukemia
- d. leukemoid reaction
- e. neutrophilic leukocytosis

**149.** Estimate regenerative ability of marrow in the patient.

Bone marrow is... :

- a. hyporegenerative
- b. degenerative
- c. normregenerative
- d. aregenerative
- e. hyperregenerative

- 150.** What is the most probable reason of leukocytes quantity change in the patient?
- output of leukocytes from depot
  - decreased leukocytes destruction
  - redistribution of leukocytes in organism
  - disturbance of leukocytes deposit
  - increased leukocytes production

- 151.** What is the reason of severe quinsy development in the patient?
- primary immunodeficiency development
  - secondary immunodeficiency development
  - hyperergic inflammation
  - increased neutrophils count
  - low platelets counts

- 152.** Which pathological process underlies changes in patient's leukocytic formula?
- tumour metastases into a hemopoietic tissue
  - tumour hyperplasia of hemopoietic tissue
  - acute infectious process
  - autoimmune inflammation
  - development of allergic reaction

- 153.** What is the direct reason of pains in bones and joints in this clinical case?
- osteoporosis
  - leukemic infiltration
  - rheumatism
  - trauma of bones
  - increased blood hemolysis

- 154.** What pathology of RBC from listed below is present in the patient?
- Chronic posthemorrhagic anemia
  - Acquired hemolytic anemia
  - Metaplastic anemia
  - Aplastic anemia
  - Iron deficiency anemia

- 155.** What is the most probable mechanism of RBCs quantity change in the patient?
- Loss of RBCs
  - Disturbance of hemopoietic regulation
  - Intravascular hemolysis of RBCs
  - Depression of erythropoiesis
  - RBCs deposit in liver

Patient G., 34 years, complains of weakness, fatigue, sweatness, pains in left subcostal region. Blood count: Erythrocytes  $2,9 \times 10^{12}/L$ , Hemoglobin 120 g/L, Color index 0,85 Erythrocytes sedimentation rate 50 mm/hour  
Leukocytes  $93 \times 10^9/L$ , Platelets  $190 \times 10^9/L$  Leukocytic formula

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
9	4	20	20	13	12	10	5

Myeloblasts - 1%, promyelocytes - 6% Blood picture: normochromic RBCs, reticulocytes - 0,1%.

- 156.** Estimate presence of neutrophils nuclear shift and choose the most correct answer:
- regenerative
  - degenerative
  - no shift
  - hyperregenerative
  - hiatus leukemicus
- 157.** Which form of leukemia from listed below is the most probably present in the patient?
- aleukemic
  - subleukemic
  - leukemic
  - leukopenia
  - there is no leukemia

- 158.** What mechanism underlies changes in leukocytic formula in the patient?
- suppression of phagocytes activity of neutrophils
  - activation of granulocytopenia
  - development of allergic reaction
  - development of autoimmune reaction
  - development of immune deficiency

- 159.** Describe WBCs state in the patient:
- non-differentiated leukemia
  - acute myeloblastic leukemia
  - leukemoid reaction
  - chronic myeloleukemia
  - neutrophilic leukocytosis

- 160.** Which specific sign from listed below can be found in all the granulocytes of this patient?
- Philadelphia chromosome
  - Gumprecht cells
  - Jolly bodies
  - Kebo rings
  - Dohle bodies

- 161.** What is the mechanism of pain in the left subcostal region of the patient?
- spleen inflammation due to infection
  - spleen enlargement due to increased hemolysis
  - increased intraintestinal pressure
  - spleen enlargement due to leukemic infiltration
  - pathology of the kidneys

- 162.** What pathology from listed below does changes in patient's leukocytic formula testify?
- endogenous intoxication
  - acute infectious process
  - autoimmune inflammation
  - disseminated intravascular coagulation syndrome
  - tumour hyperplasia of hemopoietic tissue

- 163.** What is the most probable reason of leukocytes quantity change in the patient?
- decreased leukocytes destruction
  - slowing down of leukocytes emigration to the tissues
  - redistribution of leukocytes in organism
  - increased leukocytes production
  - leukocytes deposit

Patient Tch., 27 years, laboratory assistant of X-ray cabinet. Arrived to clinic with suspicion of acute leukemia. Last month there were complaints about weakness and frequent bleedings. Blood count: Erythrocytes  $1,46 \times 10^{12}/L$ , Hemoglobin 42 g/L, Color index 0,85 Erythrocytes sedimentation rate 23 mm/hour; Leukocytes  $3,1 \times 10^9/L$ , Platelets  $97 \times 10^9/L$

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
1	0	0	0	2	18	68	11

Blood picture: normochromic RBCs, reticulocytes - 0,01%.



**164.** Which form of leukemia from listed below is most probably present in the patient?

- leukemic
- aleukemic
- subleukemic
- leukopenia
- no leukemia

**165.** Picture of WBC in the patient can be characterized as :

- absolute neutropenia
- agranulocytosis
- absolute lymphocytosis
- absolute monocytosis
- relative eosinopenia

**166.** Suppose the functional state of bone marrow in this patient using the blood count:

- hyperplasia
- normal functional state
- hypoplasia
- metaplasia
- dysplasia

**167.** Choose the most probable reason of platelets quantity change in the patient:

- autoimmune destruction of platelets
- disturbance of hemopoietic regulation
- increased platelets usage
- decreased marrow's production
- platelets deposit

**168.** What is the most probable reason of leukocytes quantity change in the patient?

- increased leukocytes destruction
- slowing down of leukocytes migration to the tissues
- decreased leukocytes production
- redistribution of leukocytes in organism
- autoimmune hemolysis

**169.** Estimate RBC state in the patient:

- metaplastic anemia
- hypoplastic anemia
- chronic posthaemorrhagic anemia
- norm picture of RBC
- iron deficiency anemia

Patient K., 54 year. Last 6 months complains of frequent headaches, caused by high ABP.

Blood count: Erythrocytes  $6,4 \cdot 10^{12}/L$ , Hemoglobin 178 g/L, Color index 0,85 Erythrocytes sedimentation rate 2 mm/hour  
Leukocytes  $14 \cdot 10^9/L$ , Platelets  $460 \cdot 10^9/L$  Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
6	1	0	2	11	62	16	2

100

Blood picture: normochromic RBCs, single erythroblasts, pronormocytes, normocytes, reticulocytes - 5,6%. Oxygen blood concentration 95%.

**170.** Estimate change of ESR and choose the most correct mechanism of change:

- increased viscosity of blood
- increased electrical charge of RBCs
- damage of RBCs membrane
- increased platelets amount
- increased leukocytes amount

**171.** Estimate regenerative ability of marrow in the patient.

Bone marrow is...:

- normregenerative
- hyporegenerative
- hyperregenerative
- aregenerative
- degenerative

**172.** What is the reason of WBC count change in the patient?

- redistribution of leukocytes
- decreased destruction of WBC
- exit of leukocytes from depot
- increased leukopoetines level
- hyperplasia of WBC in marrow

**173.** What is the most probable mechanism of RBCs quantity change in the patient?

- excess of plastic and energy substances
- hypoxic stimulation of hemopoietic tissue

- decreased blood hemolysis in spleen
- disturbance of RBCs deposit
- hyperplasia of RBC in bone marrow

**174.** Which pathology of WBC from the following is observed in the patient?

- lympholeukemia
- leukocytosis
- myeloleukemia
- leukemoid reaction
- leukopenia

**175.** What is the reason of arterial hypertension development in the patient?

- increased blood viscosity
- spasm of arterioles
- thrombosis of myocardial vessels
- increased myocardial needs in oxygen
- atherosclerosis

**176.** What pathology from listed below is present in the patient?

- leukemoid reaction
- myeloleukemia
- lympholeukemia
- polycythemia vera
- neutrophilic leukocytosis

A girl., 4 years old. Three weeks after quinsy become weak and pale. Blood count: Erythrocytes  $2,9 \cdot 10^{12}/L$ , Hemoglobin 89 g/L, Color index 0,9 Erythrocytes sedimentation rate 50 mm/hour Leukocytes  $2,9 \cdot 10^9/L$ , Platelets  $120 \cdot 10^9/L$   
Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	1	16	31	2

50

Blasts cells 50% Morphological and biochemical signs of blasts cells are similar both to lymphoblasts and myeloblasts; reticulocytes - absent

177. Which of the listed forms of leukemia is the most probably present in the patient
- subleukemic
  - leukemic
  - aleukemic
  - leukopenic
  - no leukemia
178. What pathology of WBC is observed in the patient?
- lympholeukemia
  - myeloleukemia
  - leukemoid reaction
  - relative leukocytosis
  - undifferentiated leukemia
179. Which pathology of RBC from listed below is present in the patient?
- hypoplastic anemia
  - metaplastic anemia
  - chronic posthemorrhagic anemia
  - acquired hemolytic anemia
  - iron deficiency anemia
180. What is the most correct mechanism of WBC changes development in the patient?
- decreased leukocytes destruction
  - increased WBC destruction

- disturbance of hemopoiesis regulation
- mutation of marrow stem cells
- increased leukopoietines level

181. Estimate regenerative ability of marrow in the patient.

Bone marrow is...:

- aregenerative
- normregenerative
- hyporegenerative
- hyperregenerative
- degenerative

182. What is the most probable mechanism of RBCs quantity change in the patient?

- disturbance of hemopoietic regulation
- intravascular RBCs hemolysis
- Intracellular RBCs hemolysis
- RBCs deposit
- deficiency of plastic and energetic substances

183. What cell the most probably is a source of blasts in the patient?

- erythroblast
- hemopoietic pluripotent cell
- myeloblasts
- lymphoblast
- megacaryoblast

Patient K., 34 years, arrived to clinic with clinical manifestation of gastric bleeding. Blood count: Erythrocytes  $3,0 \cdot 10^{12}/L$ , Hemoglobin 100 g/L, Color index 1,0; Leukocytes  $3,4 \cdot 10^9/L$ , Platelets  $120 \cdot 10^9/L$  Leukocytic

formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
0	0	0	0	1	50	40	9

Blood picture: normochromic RBCs, reticulocytes - 0,7%.

184. Which type of anemia is present in the patient
- acquired hemolytic
  - iron deficiency
  - hypoplastic
  - acute posthemorrhagic
  - chronic posthemorrhagic
185. Explain, what is the cause of platelets amount change in peripheral blood at this clinical situation
- increased platelets use
  - accelerated destruction of platelets
  - decreased thrombocytopoiesis
  - deposit of platelets in peripheral vessels
  - aggregation of platelets in plasma
186. Which stage of acute blood loss was developed in the given clinical situation?
- hydremia
  - marrow's

- reflective
- prodromal
- stop of bleeding

187. What change of blood circulating volume can be revealed in the given clinical situation?

- Simple hypovolemia
- Polycytemic hypovolemia
- Oligocytemic hypovolemia
- Oligocytemic hypervolemia
- Normocytemic normovolemia

188. Suppose at what time after acute bleeding beginning this blood count of the patient was made?

- in a few hours
- in 2-4 days
- in 5-7 days
- in 8-12 days
- during acute bleeding

Patient B., 54 years, arrived to clinic with complaints about weakness, shortbreath after minimal physical loading, pain in tongue and fingers. Blood count: Erythrocytes  $1,44 \cdot 10^{12}/L$ , Hemoglobin 66 g/L, Color index 1,4 Leukocytes  $2,8 \cdot 10^9/L$ , Platelets  $100 \cdot 10^9/L$

Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
5	0	0	0	1	43	48	3

Blood picture: expressed anizocytosis, poikilocytosis, megaloblasts, megalocytes, hypersegmented neutrophiles, reticulocytes - 0,1%.

189. What type of anemia is present in the patient?
- Chronic posthemorrhagic
  - Acquired hemolytic
  - B12 deficiency
  - Iron deficiency
  - Hypoplastic

190. Explain, what is the reason of changed platelets amount in peripheral blood at this clinical situation:

- increased metabolism
- increased destruction
- decreased production
- deposit in peripheral vessels

- e. aggregation in plasma
- 191.** What is the direct mechanism of pain in tongue and fingers in the patient with the described pathology?
- infectious disease
  - epithelium atrophy
  - nervous fibres degeneration
  - non-sufficient blood supply
  - it is a common symptom for anemia
- 192.** Define the type of erythropiesis in the patient:
- normoblastic
  - metaplastic
  - megaloblastic
  - non-effective
  - fastened
- 193.** Describe WBCs state in the patient.
- relative eosinophilic leukocytosis
  - absolute lymphopenia
  - absolute neutropenia

- eosinophil-basophil association
  - normal count
- 194.** Estimate presence of neutrophils nuclear shift and choose the most correct answer:
- degenerative shift to the right
  - regenerative shift to the left
  - degenerative shift to the left
  - regenerative shift to the right
  - hyperregenerative shift to the right
- 195.** What pathogenetic mechanism has caused change of the leukocytes contents in peripheral blood at the given clinical situation?
- Destruction due to intoxication
  - Autoimmune hemolysis
  - Lazy leukocytes syndrome
  - Decreased marrow's production
  - Redistribution in blood vessels

Patient W, arrived to clinic in order to define diagnosis. He complains of weakness, dizziness, loss of appetite. Blood count: Erythrocytes  $2,7 \cdot 10^{12}/L$ , Hemoglobin 81 g/L, Color index 1,0; Leukocytes  $7,5 \cdot 10^9/L$ , Platelets  $230 \cdot 10^9/L$   
Leukocytic formula

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
2	0	0	0	4	54	37	3

Blood picture: normochromic RBCs, microspherocytes, reticulocytes - 12%.

- 196.** Which type of anemia is present in the patient?
- Hereditary hemolytic
  - B12 deficiency
  - Chronic posthemorrhagic
  - Iron deficiency
  - Hypoplastic
- 197.** Explain, what is the reason of RBCs haemolysis in peripheral blood at this clinical situation:
- defect of RBC enzyme systems
  - activation of blood destruction in spleen
  - change of haemoglobin structure
  - autoimmune reaction
  - pathology of RBCs membrane
- 198.** Describe WBCs state in the patient.
- Absolute neutropenia
  - Normal state
  - Relative eosinophilic leukocytosis
  - Absolute lymphopenia
  - Eosinophil-basophil association
- 199.** Estimate presence of neutrophils nuclear shift and choose the most correct answer:
- degenerative shift to the right
  - no shift

- regenerative shift to the left
  - degenerative shift to the left
  - regenerative shift to the right
- 200.** Estimate reticulocytes amount in this patient and explain it:
- normal reticulocytes count
  - high reticulocytes count due to chronic hemolysis
  - high reticulocytes count due to acute hemolysis
  - high reticulocytes count due to bone marrow hyperplasia
  - low reticulocytes count due to problems with digestion
- 201.** Choose the most probable reason of decreased RBC quantity in this patient
- increased hemolysis due to low osmotic resistance of RBC
  - increased hemolysis due to spleen hyperactivity
  - increased hemolysis due to haemolytic poisons
  - RBC quantity is decreased due to bone marrow hypoplasia
  - RBC quantity is decreased due to chronic hemorrhages

Patient X 19 years, arrived to clinic in order to define diagnosis. Blood count: Erythrocytes  $5,1 \cdot 10^{12}/L$ , Hemoglobin 140 g/L, Color index 0,82; Leukocytes  $5,9 \cdot 10^9/L$ , Platelets  $220 \cdot 10^9/L$   
Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
3	1	0	0	1	55	37	3

Blood picture: normochromic RBCs, reticulocytes - 0,5%.

- 202.** Describe RBCs state in the patient?
- No pathology
  - B12 deficiency
  - Iron deficiency anemia
  - Hypoplastic anemia
  - Absolute erythrocytosis
- 203.** Describe RBCs state in the patient?
- Absolute erythrocytosis
  - No pathology

- B12-folate deficiency
  - Iron deficiency anemia
  - Hypoplastic anemia
- 204.** Describe WBCs state in the patient
- Absolute neutropenia
  - Relative eosinophilic leukocytosis
  - Absolute lymphopenia
  - Eosinophil-Basophil association
  - Normal blood



Patient G with chronic respiratory insufficiency. Blood count: Erythrocytes  $6,0 \cdot 10^{12}/L$ , Hemoglobin 180 g/L, Color index 0,9  
 Leukocytes  $7 \cdot 10^9/L$ , Platelets  $200 \cdot 10^9/L$  Leukocytic formula:

Eosinophiles	Basophiles	Neutrophiles				Lymphocytes	Monocytes
		myelocytes	juvenile cells	bands cells	segmented cells		
2	1	0	2	8	60	23	4

Blood picture: non-expressed anizocytosis, reticulocytes - 3,4%.

205. Describe WBCs state in the patient

- Absolute neutropenia
- Relative eosinophilic leukocytosis
- Absolute lymphopenia
- Eosinophil-basophil association
- Normal count

206. Which level of erythropoietin can you suppose in the patient?

- high
- low
- normal
- erythropoietin is absent

207. Estimate presence of neutrophils nuclear shift and choose the most correct answer:

208.

- degenerative shift to the right
- regenerative shift to the left
- degenerative shift to the left
- regenerative shift to the right
- hyperregenerative shift to the right

209. What is the direct mechanism that causes changes of RBC count in this patient:

- anizocytosis
- hypoxia
- respiratory failure
- anemia
- erythrocytosis

### KROK TESTS ON BLOOD PATHOLOGY

- Blood count of an athlete is as follows: erythrocytes -  $5,5 \cdot 10^{12}/L$ , Hb-180 g/L, leukocytes -  $7 \cdot 10^9/L$ , neutrophils -64%, basophils - 0,5%, eosinophils - 0,5%, monocytes - 8%, lymphocytes - 27%. First of all, such results indicate the stimulation of:
  - Erythropoiesis
  - Leukopoiesis
  - Lymphopoiesis
  - Granulocytopoiesis
  - Immunogenesis
- A 3-year-old boy with pronounced hemorrhagic syndrome doesn't have antihemophilic globulin A (factor VIII) in the blood plasma. Hemostasis has been impaired at the following stage:
  - Internal mechanism of prothrombinase activation
  - External mechanism of prothrombinase activation
  - Conversion of prothrombin to thrombin
  - Conversion of fibrinogen to fibrin
  - Blood clot retraction
- Examination of a 52-year-old female patient has revealed a decrease in the amount of red blood cells and an increase in free hemoglobin in the blood plasma (hemoglobinemia). Color index is 0,85. What type of anemia is being observed in the patient?
  - Acquired hemolytic
  - Hereditary hemolytic
  - Acute hemorrhagic
  - Chronic hemorrhagic
  - Anemia due to diminished erythropoiesis
- A patient is diagnosed with iron deficiency sideroachrestic anemia, progression of which is characterized by skin hyperpigmentation, pigmentary cirrhosis, heart and pancreas affection. Iron level in the blood serum is increased. What disorder of iron metabolism causes this disease?
  - Failure to assimilate iron leading to iron accumulation in tissues
  - Excessive iron intake with food
  - Disorder of iron absorption in bowels
  - Increased iron assimilation by body
- A 30-year-old patient's blood test revealed the following: erythrocyte count is  $6 \cdot 10^{12}/L$ , hemoglobin is 10,55 mmol/L Vaquez's disease was diagnosed. Name the leading part of pathogenesis:
  - Neoplastic erythroid hyperplasia
  - Iron-deficiency
  - B12-deficiency
  - Hypoxia
  - Acidosis
- A 37-year-old female patient complains of headache, vertigo, troubled sleep, numbness of limbs. For the last 6 years she has been working at the gas-discharge lamp-producing factory in the lead-processing shop. Blood test findings: low hemoglobin and RBC level, serum iron concentration exceeds the norm by several times. Specify the type of anemia:
  - Iron refractory anemia
  - Iron-deficiency anemia
  - Minkowsky-Shauffard disease
  - Hypoplastic anemia
  - Metaplastic anemia
- A patient is diagnosed with chronic atrophic gastritis attended by deficiency of Castle's intrinsic factor. What type of anemia does the patient have?
  - B12-deficiency anemia
  - Iron refractory anemia
  - Hemolytic anemia
  - Iron-deficiency anemia
  - Protein-deficiency anemia
- Biochemical analysis of an infant's erythrocytes revealed evident glutathioneperoxidase deficiency and low concentration of reduced glutathione. What pathological condition can develop in this infant?
  - Hemolytic anemia
  - Pernicious anemia
  - Megaloblastic anemia
  - Sickleemia
  - Iron-deficiency anemia
- A tooth extraction in a patient with chronic persistent hepatitis was complicated with prolonged hemorrhage. What is the reason for the haemorrhagic syndrome?
  - Decrease in thrombin production
  - Increase in thromboplastin production
  - Decrease in fibrin production
  - Increase in fibrinogen synthesis
  - Fibrinolysis intensification
- A patient visited a dentist to extract a tooth. After the tooth had been extracted, bleeding from the tooth socket continued for 15 minutes. Anamnesis states that the patient suffers from active chronic hepatitis. What phenomenon can extend the time of hemorrhage?
  - Iron-deficiency
  - B12-deficiency
  - Hypoxia
  - Acidosis

- a. Decrease of fibrinogen content in blood
  - b. Thrombocytopenia
  - c. Hypocalcemia
  - d. Increased activity of anticoagulation system
  - e. Decrease of albumine content in blood
11. A 3-year-old child has eaten some strawberries. Soon he developed a rash and itching. What was found in the child's leukogram?
    - a. Eosinophilia
    - b. Lymphocytosis
    - c. Hypolymphemia
    - d. Neutrophilic leucocytosis
    - e. Monocytosis
  12. A 59-year-old woman has been hospitalized in a surgical ward due to exacerbation of chronic osteomyelitis of the left shin. Blood test: leukocytes -  $15,0 \cdot 10^9/L$ . Leukogram: myelocytes - 0%, metamyelocytes - 8%, stab neutrophils - 28%, segmented neutrophils - 32%, lymphocytes - 29%, monocytes - 3%. Such blood count would be called:
    - a. Regenerative left shift
    - b. Right shift
    - c. Hyperregenerative left shift
    - d. Degenerative left shift
    - e. Regenerative-degenerative left shift
  13. A patient is 20 years old, an athlete. He addressed a doctor with complaints of fatigue, fever up to  $38^{\circ}C - 40^{\circ}C$ . Objectively: the liver and spleen are enlarged, lymph nodes on palpation are slightly enlarged, dense, painless. Blood test: Hb- 100 g/L; erythrocytes -  $2,9 \cdot 10^{12}/L$ ; leukocytes -  $4,4 \cdot 10^9/L$ . Leukogram: 68% of blast cells. Cytochemical investigation of blast cells revealed negative reactions to glycogen, peroxidase, non-specific esterase, lipids. Name this disease:
    - a. Acute undifferentiated leukemia
    - b. Acute myeloid leukemia
    - c. Acute monoblastic leukemia
    - d. Acute lymphoblastic leukemia
    - e. Acute megakaryoblastic leukemia
  14. A 19-year-old female patient has had low haemoglobin rate of 90-95 g/L since childhood. Blood count results obtained after hospitalisation are as follows: erythrocytes -  $3,2 \cdot 10^{12}/L$ , Hb- 85 g/L, colour index - 0,78; leukocytes -  $5,6 \cdot 10^9/L$ , platelets -  $210 \cdot 10^9/L$ . Smear examination revealed anisocytosis, poikilocytosis and target cells. Reticulocyte rate is 6%. Iron therapy was ineffective. What blood pathology corresponds with the described clinical presentations?
    - a. Thalassemia
    - b. Enzymopathy
    - c. Membranopathy
    - d. Sickle-cell anemia
    - e. Favism
  15. A 26-year-old man is in the torpid shock phase as a result of a car accident. In blood: leukocytes -  $3,2 \cdot 10^9/L$ . What is the leading mechanism of leukopenia development?
    - a. Redistribution of leukocytes in bloodstream
    - b. Leikopoiesis inhibition
    - c. Disturbed going out of mature leukocytes from the marrow into the blood
    - d. Lysis of leukocytes in the blood-forming organs
    - e. Intensified elimination of leukocytes from the organism
  16. After a tourniquet application a patient was found to have petechial haemorrhages. The reason for it is the dysfunction of the following cells:
    - a. Platelets
    - b. Eosinophils
    - c. Monocytes
    - d. Lymphocytes
    - e. Neutrophils
  17. After an attack of bronchial asthma a patient had his peripheral blood tested. What changes can be expected?
    - a. Eosinophilia
    - b. Leukopenia
    - c. Lymphocytosis
    - d. Thrombocytopenia
    - e. Erythrocytosis
  18. A patient suffering from chronic myeloleukemia has got the following symptoms of anemia: decreased number of erythrocytes and low haemoglobin concentration, oxyphilic and polychromatophilic normocytes, microcytes. What is the leading pathogenetic mechanism of anemia development?
    - a. Substitution of haemoblast
    - b. Intravascular hemolysis of erythrocytes
    - c. Deficiency of vitamin B12
    - d. Reduced synthesis of erythropoietin
    - e. Chronic haemorrhage
  19. Blood test of a patient suffering from atrophic gastritis gave the following results: RBC -  $2,0 \cdot 10^{12}/L$ , Hb- 87 g/L, colour index - 1,3, WBC -  $4,0 \cdot 10^9/L$ , thrombocytes -  $180 \cdot 10^9/L$ . Anaemia might have been caused by the following substance deficiency:
    - a. Vitamin B12
    - b. Vitamin A
    - c. Vitamin K
    - d. Iron
    - e. Zinc
  20. On the fifth day after the acute blood loss a patient has been diagnosed with hypochromic anemia. What is the main mechanism of hypochromia development?
    - a. Release of immature red blood cells from the bone marrow
    - b. Impaired iron absorption in the intestines
    - c. Increased destruction of red blood cells in the spleen
    - d. Impaired globin synthesis
    - e. Increased excretion of body iron
  21. A 12-year-old patient has been admitted to a hospital for hemarthrosis of the knee joint. From early childhood he suffers from frequent bleedings. Diagnose the boy's disease:
    - a. Hemophilia
    - b. Hemorrhagic vasculitis
    - c. Hemolytic anemia
    - d. B12 (folic acid)-deficiency anemia
    - e. Thrombocytopenic purpura
  22. In a car accident a man got injured and lost a lot of blood. What changes in peripheral blood are most likely to occur on the 2nd day after the injury?
    - a. Erythropenia
    - b. Hypochromia
    - c. Anisocytosis
    - d. Microplania
    - e. Significant reticulocytosis
  23. After the prolonged vomiting a pregnant 26-year-old woman was found to have the reduced volume of circulating blood. What change in the total blood volume can be the case?
    - a. Polycythemic hypovolemia
    - b. Simple hypovolemia
    - c. Oligocythemic hypovolemia
    - d. Polycythemic hypervolemia
    - e. Oligocythemic hypervolemia
  24. In a dysentery patient undergoing treatment in the contagious isolation ward, a significant increase in packed cell volume (hematocrite) has been observed (60%). What other value will be affected by this change?
    - a. Increasing blood viscosity

- b. Increasing volume of blood circulation
  - c. Leukopenia
  - d. Thrombocytopenia
  - e. Increasing erythrocyte sedimentation rate (ESR)
25. A patient is diagnosed with hereditary coagulopathy that is characterised by factor VIII deficiency. Specify the phase of blood clotting during which coagulation will be disrupted in the given case:
- a. Thromboplastin formation
  - b. Thrombin formation
  - c. Fibrin formation
  - d. Clot retraction
26. 10 minutes after the beginning of heavy physical work a person demonstrates increase of erythrocyte number in blood from  $4,0 \cdot 10^{12}/L$  to  $4,5 \cdot 10^{12}/L$ . What is the cause of this phenomenon?
- a. Erythrocytes exit from depot
  - b. Suppression of erythrocyte destruction
  - c. Erythropoiesis activation
  - d. Increase of cardiac output
  - e. Water loss
27. A 60-year-old man suffering from chronic hepatitis frequently observes nasal and gingival hemorrhages, spontaneous hemorrhagic rashes on the skin and mucosa. Such presentations result from:
- a. Decreased synthesis of prothrombin and fibrinogen
  - b. Increased blood content of aminotransferases
  - c. Decreased synthesis of serum albumins
  - d. Increased blood content of macroglobulins and cryoglobulins
  - e. Decreased blood content of cholinesterase

### Heart pathology. Arrhythmia, myocarditis.

**215.** Single ventricle's extrasystoles were found during ECG examination of the patient. P wave was absent before extrasystole. What is the most probable cause of the P wave disappearance in this clinical situation?

- a. Block of the impulse conduction in atrium
- b. Occurrence of the refractory period in ventricles
- c. Block of the impulse in SA-node
- d. Occurrence of the refractory period in atriums
- e. Impossibility of the retrograde impulse conduction through the AV-node

**216.** Multiply extrasystoles manifesting as premature not changed ventricles complexes, with negative P wave and incomplete compensatory pause were found during ECG examination of the patient with diabetes mellitus. What is the probable mechanism of extrasystoles development?

- a. Re-entry mechanism of electric impulse circulation
- b. SA-node weakness syndrome
- c. Forming of the excitation ectopic center in ventricles
- d. Forming of the excitation ectopic center in atriums
- e. Presence of the additional conducting ways in the myocardium

**217.** ECG examination of the patient O. showed that P wave periodically becomes negative and is situated after QRS, interval T-P is increased (the basic rhythm is normal). Which disturbance of the cardiac rhythm was described in this case?

- a. AV extrasystole from the top part of AV-node
- b. AV extrasystole from the bottom part of AV-node
- c. Atrial extrasystole from the bottom part of atrium
- d. Ventricle extrasystole from the top part of His' bundle
- e. AV extrasystole from the medium part of AV-node

**218.** Patient B., 52 years complains of suddenly beginning and suddenly ending attacks of the tachycardia (200 bpm), duration up to 15 minutes. On the ECG: deformation and widening of QRS complex, T wave and ST segment are lower than normal. Which disturbance of the heart rhythm is observed in the given clinical situation?

- a. Ventricle extrasystolia
- b. Tachycardia with basic rhythm
- c. Extrasystolia with basic rhythm
- d. Paroxysmal tachycardia
- e. Fibrillation of ventricles

**219.** Patient begins to feel pauses in the heart rhythm in 2 weeks after quinsy. ECG: decreased wave voltage, periodic loss of PQRST, frequency of heart contractions is 55 bpm. What is the most probable mechanism of the revealed disturbances of the heart function?

- a. Ischemic damage of SA-node
  - b. Inflammatory damage of SA-node
  - c. Development of respiratory arrhythmia
  - d. Sclerotic changes in SA-node
  - e. Damage of SA-node by toxins
- 220.** In the patient with chronic cholecystitis the jaundice has developed. On the ECG: basic rhythm is normal, frequency of heart contractions is 51 bpm, periodic premature not changed PQRST complexes. What is the most probable mechanism of the heart rhythm disturbances?

- a. Irritation of vagus receptors by bile acids
- b. Damaging action of bile acids on the myocardium
- c. Damaging action of bile acids on SA-node
- d. Irritating action of bile acids on SA-node
- e. Irritating action of bile acids on AV-node

**221.** Patient F., 38 years complains of short breath during physical loading and cough. ECG examination: frequency of heart contractions 90 bpm, P wave is splintered, duration 0,14 sec, QRS complex is not changed. The patient suffers from rheumatism. What is the most probable cause of the heart function disturbance?

- a. Increased left atrium muscular weight
- b. Stretching of the left atrium by increased blood volume
- c. Circulation of excitation in the conducting system of atrium
- d. Sclerotic changes in conducting system of atrium
- e. Sclerotic changes in SA-node

**222.** Patient F., 38 years complains of short breath during physical loading and cough. ECG examination: frequency of heart contractions 90 bpm, P wave is splintered, duration 0,14 sec, QRS complex is not changed. The patient suffers from rheumatism. Which pathology from the given is presented on the ECG?

- a. Intra-atrial block
- b. Left atrium hypertrophy
- c. Re-entry phenomenon activation in the left atrium
- d. SA block
- e. Tonogenic dilatation of the left atrium

**223.** On the patient's ECG positive P wave arises prematurely, PQ is shortened, ventricle complex is not changed, compensatory pause is absent. Which disturbance of heart rhythm is observed on the ECG?

- a. Sinus bradycardia
- b. Ventricle extrasystole
- c. Sinus tachycardia
- d. Atrial extrasystole
- e. AV extrasystole

**224.** On the ECG deformed QRS complex without P-wave with long pause appears after several normal contractions. After that normal contraction follows. Which disturbance of the heart rhythm is observed in the given clinical situation?

- a. Sinus extrasystolia
- b. Intra-atrium block
- c. AV block
- d. Ventricle extrasystole
- e. Atrial extrasystole

**225.** Diabetic cardiomyopathia manifested with extrasystoles has developed in the patient with the 2<sup>nd</sup> type of DM. Disturbance of which myocardium function determines extrasystoles pathogenesis?

- a. Contractility
- b. Energy supply of a myocardium
- c. Automatism
- d. Excitability
- e. Conductivity

**226.** Negative P wave, shortened PQ interval, and not changed ventricle complex are revealed on the ECG recording of the patient with diabetes mellitus. Which disturbance of the rhythm is observed in the given clinical situation?

- a. Sinus extrasystole
- b. Extrasystole from the atrium
- c. His' bundle block
- d. Extrasystole from the bottom part of AV node
- e. Right ventricle's extrasystole

**227.** The patient with rheumatic myocarditis periodically feels interruptions in heart's rhythm. Irregular ventricle extrasystoles are revealed on the ECG. Which pathogenic mechanism causes occurrence of compensatory pauses at these extrasystoles?

- a. Inability of myocardium to percept next impulse
- b. A delay of excitation in AV node
- c. Retrograde conduction of excitation to atrium
- d. Suppression of the SA-node function
- e. Disturbance of myocardium contractility

**228.** Absence of the P wave, frequent and chaotic QRS complexes and F-waves are observed on the ECG in the patient with a heart attack. Which disturbance of the rhythm is described?

- a. Paroxysmal tachycardia
- b. Fibrillation of the ventricles
- c. Fibrillation of the atriums
- d. Ventricle extrasystoles
- e. Idioventricle rhythm

**229.** Absence of the P wave, frequent and chaotic QRS complexes and F-waves are observed on the ECG in the patient with a heart attack. Which pathogenic mechanism determines such violations of heart function?

- a. Re-entry phenomenon activation in the atriums
- b. Increased heart contractility
- c. Distension of atriums with blood
- d. Increased heart contractility

e. SA node increased excitability

**230.** ECG examination: PQ interval is gradually extended and one QRST complex is dropped out every 8 heart contractions. Which kind of arrhythmia is described?

- a. 3 degree of AV block
- b. 1 degree of AV block
- c. 2 degree of AV block
- d. Synoatrial block
- e. Intra-atrium block

**231.** During ECG examination it was found that atriums and ventricles have been contracted in the own rhythm: atriums - 60 contractions per 1 minute, ventricles - 30 contractions per 1 minute. Which disturbance of the heart rhythm was observed in the given clinical situation?

- a. AV Block of 1 degree
- b. Plural ventricle's extrasystoles
- c. Synoatrial block
- d. AV block of 2 degree
- e. Full AV block

**232.** ECG recording was made to the student after examination: the rhythm is normal, TP interval is shortened, ventricle complex is not changed. Which disturbance of the heart rhythm is observed in the given clinical situation?

- a. Synoatrial block
- b. Sinus tachycardia
- c. Complete AV block
- d. Block of His' bundle
- e. Sinus bradycardia

**233.** The function of certain structures was stopped on the isolated heart by its cooling. That resulted first in short-term absence of heart contractions, but then contraction appeared with a rate 2 times slower than initial one. Which structure was cooled?

- a. Sinus node
- b. His bundle
- c. AV node
- d. Purkinje fibers
- e. The branches of His bundle

**234.** A person after severe cooling was examined in the clinic. The ECG recording shows different frequency of atriums (70 bmp) and ventricles (35 bpm) contractions. Which arrhythmia is manifested in the patient?

- a. AV block 2 stage
- b. complete AV block
- c. AV block 1 stage
- d. sinus bradycardia
- e. atrial flutter

**235.** Clinical manifestation of myocarditis includes many symptoms. What is the reason of QRS complexes low voltage on the ECG?

- a. increased excitability of myocardium
- b. decreased excitability of myocardium
- c. increased contractility of myocardium
- d. decreased contractility of myocardium
- e. conduction block development

### Heart pathology. Ischemic heart disease, heart failure.

**236.** In the patient B. acute fall of systolic blood pressure up to 60 mmHg, tachycardia - 140 bpm, short breath and loss of consciousness has developed in 2 days after heart attack. What is the main mechanism of the shock development in this case?

- a. Decrease of the minute blood volume
- b. Increased excitability of myocardium
- c. Decreased volume of circulating blood
- d. Development of paroxysmal tachycardia
- e. Development of anaphylactic reaction

**237.** Clinical examination of the patient with hypertension: arterial blood pressure is 180/110 mmHg, tachycardia; borders of the heart are enlarged to the left, rales

in lungs. Which sign of cardiac failure urgent compensation is observed in the patient?

- a. tachycardia
- b. increased blood pressure
- c. cyanosis
- d. short breath
- e. myogenic dilatation of heart

**238.** Patient M., 56 years, suffers from mitral valve stenosis. He feels discomfort in the field of heart, short breath, palpitation and fatigue during physical load. On an ECG - signs of the left ventricle hypertrophy. Which changes in myocardium are characteristic for physiological hypertrophy?

- a. Increased energy supply of myocardium



- b. Activation of Starling mechanism in myocardium
- c. Increased electric activity of the conducting system
- d. Lag of skeletal muscles weight growth from the myocardium

e. Decrease of the lipid peroxidation in myocardium

**239.** ECG-examination shows signs of the left ventricle pathological hypertrophy in the patient with acquired mitral stenosis. What is the leading pathogenic mechanism of the physiological hypertrophy transformation into pathological?

- a. Increased capillaries number in the myocardium
- b. Increased of the lipid peroxidation
- c. Decrease of blood residual diastolic volume
- d. Disparity between weight growth of skeletal muscles and myocardium
- e. Disparity between the quantity of capillaries, nervous fibers and myocardial cells

**240.** Ultrasonic examination revealed pathological hypertrophy of the left ventricle in the patient with chronic cardiac failure. Which changes in the hypertrophied heart are observed in the patient?

- a. Increased quantity of the capillaries and the nervous fibers in the myocardium
- b. Activation of the conducting system electric activity
- c. Decrease of blood residual diastolic volume
- d. Decrease of the myocardial cells energy supply
- e. Increased blood circulation minute volume

**241.** Patient M., 64 years suffers from hyperthyroidism. She complains of the weakness, increased irritability, jugular venous distention, pain in the field of the liver. What is the probable pathogenic connection between the basic disease and cardiac failure development?

- a. Increased myocardium excitability
- b. Functional overload of the heart
- c. Impaired metabolism of myocardium
- d. Damage of the heart cells enzymes
- e. Development of the portal hypertension

**242.** Ultrasonic examination revealed dilatation of the heart chambers in the patient with hypertonic disease. Which sign can prove tonogenic dilatation development?

- a. Dilatation of the heart chambers with increase of stroke volume.
- b. Dilatation of the chambers without change of stroke volume
- c. Dilatation of the chambers with decrease of stroke volume
- d. Dilatation of all the heart borders
- e. Enlarging of the heart borders to the left

**243.** Tonogenic dilatation of the left ventricle is revealed at the sportsman during planned examination. Which haemodynamic parameter characterizes tonogenic dilatation of the heart chambers?

- a. Increased stroke volume
- b. Decrease of stroke volume
- c. The stroke volume does not change.
- d. Decreased force of contraction
- e. Increased residual diastolic volume

**244.** Myogenic dilatation of the left ventricle was revealed in the patient with chronic cardiac failure during clinical examination. Which haemodynamic parameter characterizes myogenic dilatation of the heart chambers?

- a. Decrease of stroke volume
- b. Increased heart contractility
- c. Activation of Starling's mechanism
- d. Increased stroke volume of heart
- e. Decrease of heart automatism

**245.** The patient with chronic pneumonia complains of fatigue, cyanosis and edema of the extremities, pain in the liver. Which pathology from the given may cause such clinical symptoms?

- a. Chronic right ventricle failure
- b. Chronic left ventricle failure
- c. Liver cirrhosis
- d. Myocardial infarction
- e. Stenocardia

**246.** The patient with varicose veins after intensive physical work suddenly felt acute pain in the chest, difficulty in breathing. He quickly became cyanotic, jugular veins were distended. The embolism of pulmonary artery was suggested in the patient. Which heart pathology from the given may accompany this pathological state?

- a. Chronic right ventricle failure
- b. Chronic left ventricle failure
- c. Acute right ventricle failure
- d. Acute left ventricle failure
- e. Myocardial infarction

**247.** Patient is suffering from chronic renal failure for a long period. His BP is constantly elevated to 160/110 mmHg. He also complains of increased fatigue, short breath is manifested even in the period of rest. Which heart pathology from the given may accompany this pathological state?

- a. Chronic right ventricle failure
- b. Chronic left ventricle failure
- c. Acute right ventricle failure
- d. Acute left ventricle failure
- e. Myocardial infarction

**248.** Patient with hypertonic disease during physical or emotional loading had felt short breath and tachycardia. In a year after that pains in the right subcostal region and edema of the legs appeared. What is the probable mechanism that causes occurrence of new symptoms in the patient?

- a. Functional overload of the heart
- b. Ischemic damage of the myocardial cells
- c. Disturbance of heart energy supply
- d. Damage of the myocardial cells enzymes
- e. Disturbance of the neurohumoral heart activity

regulation

**249.** Decompensation of heart function has developed in the patient with chronic cardiac failure after viral infection. Which haemodynamic index proves the development of decompensation?

- a. Decrease of minute blood circulating volume
- b. Tachycardia
- c. Decrease of blood circulating volume
- d. Decrease of the central venous pressure
- e. Bradycardia

**250.** Examination of the heart haemodynamic parameters was provided in the patient with chronic cardiac failure. Which parameter from listed below can prove development of the heart decompensation?

- a. Myogenic dilatation of the heart
- b. Development of a tachycardia
- c. Tonogenic dilatation of the heart
- d. Decrease of blood circulating volume
- e. Increased central venous pressure

**251.** Rales appeared in lungs and short breath developed in the patient with myocardial infarction in 2 days after heart attack. Which pathological process could develop in the patient's heart?

- a. Acute left ventricle failure
- b. Acute right ventricle failure
- c. Metabolic syndrome X
- d. Reperfusion damage of myocardium
- e. AV block

**252.** Physiological hypertrophy of myocardium is often developing in the sportsmen. What are the most characteristic signs of the physiological hypertrophy?

- a. Increased speed of myocardial contractility
- b. Prevalence of anaerobic glycolysis in the myocardium

- c. Increased volume of right ventricle muscular fibers
- d. Increased volume of muscular fibers of all heart chambers
- e. Increased volume of left ventricle muscular fibers

**253.** The patient complains of the intensive burning pain located behind the sternum irradiating to the left hand after intensive physical work. Condition of the patient was normalized in 15 minutes of rest. What is the probable mechanism of stenocardia development in the patient?

- a. Increased catecholamines' level in the blood
- b. Atherosclerosis of the coronary vessels
- c. Intravascular aggregation of blood cells
- d. Thrombosis of the coronary vessels
- e. Functional overload of the heart

**254.** Patient suffers from stenosis of a.pulmonalis. Cyanosis, enlargement of the liver, jugular veins distention, edema of the legs has appeared in the patient recently. On the ECG – signs of right ventricle's failure. What is the leading pathogenic mechanism of the given symptoms development?

- a. Decreased speed of contract process in a myocardium
- b. Increased venous pressure in the systemic circulation
- c. Disturbance of diastolic fillings of atrium
- d. Dilatation of heart chambers
- e. Disturbance of the heart conducting system electric activity

**255.** Patient spent his summer holidays in mountains. Acute cardiac failure with acute short breath, dry cough, and tachycardia has developed during climbing on the height about 2000 m. What is the probable cause of the cardiac failure development at this patient?

- a. High concentration of adrenaline
- b. Calcium channels block
- c. Acute hypoxia
- d. Decompression syndrome
- e. Arterial hypertension

**256.** Patient with chronic exudative pericarditis in the anamnesis was delivered to resuscitation unit. Examination: BP - 60/30, heart rate-95 bpm, pale and cold skin. Acute left ventricle failure was diagnosed in the patient. What was the probable cause of its development?

- a. Decrease of preloading on heart
- b. Increased postloading at heart
- c. Impairment of heart neurohumoral regulation
- d. Development of orthostatic collapse
- e. Compression of heart by exudate

**257.** Which enzyme's increased blood level can prove diagnosis of myocardial infarction at first 2-4 hours of its development?

- a. Aldolase
- b. Lipoproteinlipase (LPL)
- c. Alanine aminotransferase (ALT)
- d. Creatin phosphokinase (CPhK)
- e. Acetylcholinesterase

**258.** Patient suffers from hypertension for 7 years. Last year during physical and emotional loading she feels short breath, palpitation and fatigue. Lately her condition has worsened: pain in the right subcostal region, edema on the legs had been appeared. What is the most probable cause of the given symptoms development at this patient?

- a. Ischemic damage of myocardial cells
- b. Increased preload on the heart
- c. Disturbance of the heart neurohumoral regulation
- d. Activation of lipid peroxidation
- e. Increased afterload heart

**259.** Hypertrophy of left ventricle has developed in the patient who suffers from hypertonic disease. Which pathogenic mechanism causes increased volume of the myocardium during hypertrophy?

- a. Increased volume of the myocardial cells
- b. Increased quantity of the myocardial cells
- c. Growth of the connecting tissue in the myocardium
- d. Delay of water in interstitial tissue of the myocardium
- e. Accumulation of the lipids in the myocardial cells

**260.** Ischemic heart disease causes feeling of pain in the patient chest. Which of the named events is the direct reason of pains in the patient with angina pectoris?

- a. coronary vessels spasm
- b. left ventricle failure
- c. myocardial ischemia
- d. local disturbance of contractility
- e. increased diastolic pressure in the left ventricle

**261.** Heart failure development is accompanied with different metabolism changes. Which correlation of sodium and potassium blood content is typical for heart failure?

- a. increased Na and decreased K
- b. normal Na and decreased K
- c. normal Na and normal K
- d. increased Na and increased K
- e. decreased Na and decreased K

**262.** Many heart diseases are manifested with excessive fatigue of the patient. What is the direct reason of excessive fatigue in the patients with different cardiac diseases?

- a. myocardial ischemia
- b. decreased cardiac output
- c. increased AP
- d. myocardial necrosis
- e. myocardial inflammation

**263.** Hypertensive disease in the patient 48 years old was complicated with heart failure. Define the type of cardiac failure in this case.

- a. myocardial cardiac failure
- b. overload cardiac failure
- c. haemodynamic heart failure
- d. mixed heart failure

**264.** The patient with aortic valve stenosis has developed cardiac failure. Define the direct reason of cardiac failure in this case.

- a. myocardial affection
- b. increased pressure load
- c. increased volume load
- d. low cardiac output
- e. low arterial pressure

**265.** The patient with mitral valve insufficiency has developed cardiac failure. Define the direct reason of cardiac failure in this case.

- a. myocardial affection
- b. increased pressure load
- c. increased volume load
- d. low cardiac output
- e. low arterial pressure

**266.** Ischemic heart disease is defined as acute or chronic form of cardiac disability which results from imbalance between the myocardial supply and its demands in oxygenated blood. Which of the listed conditions results in low myocardial oxygen supply?

- a. exercises
- b. lungs diseases
- c. pregnancy
- d. increased basal metabolic rate
- e. hypertrophy of cardiac muscle

**267.** Ischemic heart disease is defined as acute or chronic form of cardiac disability which results from imbalance between the myocardial supply and its demands in oxygenated blood. Which of the listed conditions results in high myocardial demands in oxygenated blood?

- a. atherosclerosis of coronary arteries
- b. severe anemia

- c. CO poisoning
  - d. lung disease
  - e. pregnancy
- 268.** Angina pectoris is chest pain due to ischemia of the heart muscle. Which of the following conditions can cause angina pectoris attack?
- a. physical exertion
  - b. changes in emotional state
  - c. heavy meals
  - d. cold weather
  - e. all of the mentioned are true
- 269.** A patient with acute myocardial infarction presents in the emergency department. He is given aspirin, morphine, and oxygen. Blood tests reveal elevated levels of creatin kinase and troponin. Explain why oxygen is needed for patient's treatment in this case?
- a. to treat hemic hypoxia
  - b. to treat circulatory hypoxia
  - c. to improve heart contractility
  - d. to improve metabolism in myocardial cells
  - e. to prevent myocardial ischemia

### **Blood vessels pathology. Arterial hypertension and hypotension. Atherosclerosis.**

**272.** Patient P. suffers from atherosclerosis, IHD, stenocardia. Increased level of the lipids in blood plasma was revealed during laboratory examination. Which class of the plasma's lipids plays the leading role in the pathogenesis of atherosclerosis?

- a. chylomicrons
- b. very low density lipoproteins
- c. alpha-lipoproteins
- d. high density lipoproteins
- e. complexes of fat acids with albumens

**273.** Blood pressure was increased up to 140/110 mmHg at surgeon C. after long operation ending. Which changes of humoral regulation can increase arterial pressure in this case?

- a. Activation of aldosterone formation
- b. Activation of rennin-angiotensin system
- c. Activation of sympathetic-adrenal system
- d. Activation of kallikrein-kinin system
- e. Inhibition of sympathetic-adrenal system

**274.** Patient suffers from atherosclerotic damage of coronal vessels which causes attacks of a stenocardia. Which substance can promote development of the atherosclerosis?

- a. Fibers
- b. Glucose
- c. Triglycerides
- d. Cholesterol
- e. Phospholipids

**275.** Patient complains of headache, bad appetite, blunt pain in a loin. Heart rate – 70 bpm, BP – 190/100 mmHg. Patient complains of the often urination, mainly at night. Blood count: Hb-96 g/l, erythrocytes-3.0 T/l. Urine analysis: protein-3.0 g/l, leukocytes 1-3, erythrocytes 10-15. ECG examination: signs of the left ventricle hypertrophy. Which kind of the arterial hypertension is observed in the given clinical situation?

- a. Endocrine - caused by Kushing disease
- b. Cerebroischemic - caused by disturbance of brain blood circulation
- c. Endocrine - caused by feochromocytoma
- d. Primary arterial hypertension
- e. Renal - caused by glomerulonephritis

**276.** Patient complains of headache attacks accompanied with palpitation, feeling of fear, increased arterial pressure up to 260/160 mmHg. Between attacks blood pressure is in the borders of 180/90 mmHg. Examination: heart rate 120 bpm, BP – 250/140 mmHg. ECG – single extrasystoles. Glucose's level in the blood - 10.5 mmol/l. Urine analysis - without

**270.** A 40-year-old man presents in the emergency department complaining of substernal chest pain that is also felt in his left shoulder. The diagnosis is "acute myocardial infarction". He is given aspirin, morphine, and oxygen. Why aspirin is given to the patient?

- a. to treat circulatory hypoxia
- b. to improve heart contractility
- c. to improve metabolism in myocardial cells
- d. to prevent myocardial ischemia
- e. to prevent thrombi formation

**271.** A 40-year-old man presents in the emergency department complaining of substernal chest pain that is also felt in his left shoulder. Heart rate - 98 bpm. Body temperature – 37,5 C. Blood tests reveal elevated levels of creatin kinase and troponin. Why body temperature is increased in the patient?

- a. due to aseptic inflammation
- b. due to increased basal metabolic rate
- c. due to increased heart rate
- d. due to elevated levels of creatin kinase and troponin
- e. due to emotional stress

pathology. What kind of arterial hypertension is observed in the given clinical situation?

- a. Secondary endocrine
- b. Cerebroischemic
- c. Essential
- d. Primary arterial hypertension
- e. Renal hypertension

**277.** The complications of uncontrolled hypertension include all of the following EXCEPT:

- a. cerebrovascular accidents
- b. anemia
- c. renal injury
- d. cardiac hypertrophy

**278.** Primary hypertension

- a. is essentially idiopathic
- b. can be caused by renal disease
- c. can be caused by hormone imbalance
- d. results from arterial coarctation
- e. all above is correct

**279.** Two types of hypertension are known: primary or essential and secondary which occurs as a result of other diseases. Which parameter is typical for the patient with primary hypertension?

- a. Increased TPVR
- b. Decreased TPVR
- c. Increased heart stroke volume
- d. Decreased heart stroke volume
- e. Increased minute blood volume

**280.** A female patient 18-year-old complains of general weakness, fatigueability, depressed mood. She has asthenic type of constitution. ABP -90/60 mmHg, heart rate 68 bpm. Primary neurocirculatory arterial hypotension was diagnosed. What is the main factor of AP decreasing in the patient?

- a. Decrease of blood minute volume
- b. Decrease of cardiac output
- c. Decrease of resistant vessels tension
- d. Hypovolemia
- e. Deposition of the blood in the veins of systemic circulation

**281.** While climbing upstairs on the 5-th floor the patient has got an increased arterial blood pressure. The cause is the increase of:

- a. Minute volume of blood
- b. The number of functioning capillaries
- c. Ion content in blood plasma
- d. Viscosity of the blood

- e. Circulating blood volume
- 282.** One of the most dangerous events in myocardial necrosis development is the further increase of the necrosis zone. The important role in it belongs to the increase of the oxygen consumption by myocardium. Which substance contributes to this process?
- Chlorine ion
  - Cholesterol
  - Catecholamine
  - Acetylcholine
  - Adenosine
- 283.** Renal hypertension is known to be the most frequent cause of secondary hypertension. Name the main reason leading to AP increase in the case of secondary renal hypertension.
- increased glomerular filtration rate
  - decreased glomerular filtration rate
  - chronic glomerulonephritis
  - renal vessels atherosclerosis
  - activation of aldosterone synthesis
- 284.** A patient with chronic kidney's disease has high AP. What is the main factor causing the increase of AP in this patient?
- Excess of angiotensin II
  - Excess of antidiuretic hormone
  - Increase of heart output
  - Increased activity of sympathetic nervous system
  - Excess of catecholamines
- 285.** Which substance secretion is primarily increased in the patients with secondary renal hypertension?
- angiotensin
  - aldosterone
  - rennin
  - glucocorticoids
  - bradykinin
- 286.** The kidneys play an important role in vessels tone regulation. Which substance secreted by the kidneys can cause direct vessels dilation?
- angiotensin
  - aldosterone
  - rennin
  - glucocorticoids
  - bradykinin
- 287.** It is known that essential hypertension is asymptomatic until the complications occur. Which of the listed complications can occur as a result of arterial hypertension?
- circulatory hypoxia
  - hemic hypoxia
  - myocardial hypertrophy
  - increased urine formation
  - decreased urine formation
- 288.** Clinical manifestation of arterial hypotension includes variety of symptoms. Which of the listed complications can occur as a result of arterial hypotension?
- overload heart failure
  - myocardial hypertrophy
  - brain stroke
  - ischemic heart disease
  - circulatory hypoxia
- 289.** Measuring of BP is an important diagnostic criterion in the diagnosing pathology of blood vessels tonus. Which index of BP can indicate the presence of arterial hypertension in middle aged person?
- 125/75 mm Hg
  - 135/85 mm Hg
  - 120/89 mm Hg
  - 90/60 mm Hg
  - 160/95 mm Hg
- 290.** Measuring of BP is an important diagnostic criterion in the diagnosing pathology of blood vessels tonus. Which index of BP can indicate the presence of arterial hypotension in middle aged person?
- 115/80 mm Hg
  - 100/60 mm Hg
  - 90/55 mm Hg
  - 108/70 mm Hg
  - 160/95 mm Hg
- 291.** The atherosclerotic plaque formation is the main event in atherosclerosis pathogenesis. Which of the listed blood cells take active part in atherosclerotic plaque formation?
- erythrocytes
  - monocytes
  - leukocytes
  - basophils
  - eosionophils
- 292.** The atherosclerotic plaque formation is the main event in atherosclerosis pathogenesis. Accumulation of which substance inside the cells found in the atherosclerotic plaque transforms them into the "foam cells"?
- glucose
  - proteins
  - chilomicrones
  - low density lipoproteins
  - calcium
- 293.** Atherosclerosis is known to be a multifactorial disease. Choose the negative risk factor of atherosclerosis (which decreases the risk of disease development) from the following:
- hypertension
  - diabetes mellitus
  - high levels of high density lipoproteins
  - high levels of low density lipoproteins
  - excess of alcohol consumption
- 294.** The prognosis of atherosclerosis is determined by the state of atherosclerotic plaque. Which complication of atherosclerotic plaque development can lead to acute myocardial infarction?
- plaque rupture
  - plaque calcinations
  - inflammation of the vessel wall
  - coronary vessels spasm
  - sludge phenomena
- 295.** Two types of hypertension are known: primary or essential and secondary which occurs as a result of other diseases. Choose the reason of secondary arterial hypertension development from the following:
- sodium retention
  - arteriosclerosis
  - hereditary predisposition
  - decreased cardiac contractility
  - increased heart preload
- 296.** Many factors can contribute to atherosclerotic plaque formation. Which of the under mentioned conditions are important in atherosclerotic plaque formation:
- hereditary predisposition
  - vessel wall injury
  - increased blood cholesterol
  - adhesion and aggregation of platelets
  - all of the mentioned are true

### KROK TESTS ON CVS PATHOLOGY

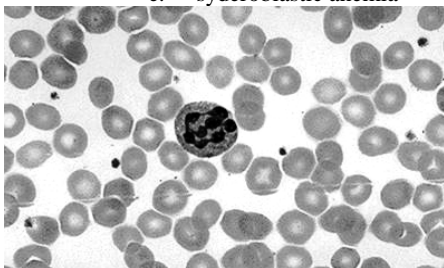
- ECG of a 44-year-old patient shows signs of hypertrophy of both ventricles and the right atrium. The patient was diagnosed with the tricuspid valve insufficiency. What pathogenetic variant of cardiac dysfunction is usually observed in case of such insufficiency?
  - Heart overload by volume
  - Heart overload by resistance
  - Primary myocardial insufficiency
  - Coronary insufficiency
  - Cardiac tamponade
- 12 hours after an acute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
  - Myocardium infarction
  - Viral hepatitis
  - Collagenosis
  - Diabetes mellitus
  - Diabetes insipidus
- A 45-year-old patient was admitted to the cardiological department. ECG data: negative P wave overlaps QRS complex, diastolic interval is prolonged after extrasystole. What type of extrasystole is it?
  - Atrioventricular
  - Sinus
  - Atrial
  - Ventricular
  - Bundle-branch
- A patient has been diagnosed with influenza. His condition became drastically worse after taking antipyretic drugs. His consciousness is confused, AP is 80/50mm Hg, Ps is 140/m, body temperature dropped down to 35, 8°C. What complication developed in this patient?
  - Collapse
  - Hyperthermia
  - Hypovolemia
  - Acidosis
  - Alkalosis
- A month after surgical constriction of rabbit's renal artery the considerable increase of systematic arterial pressure was observed. What of the following regulation mechanisms caused the animal's pressure change?
  - Angiotensin-II
  - Vasopressin
  - Adrenaline
  - Noradrenaline
  - Serotonin
- After a serious psychoemotional stress a 48 year old patient suddenly developed acute heart ache irradiating to the left arm. Nitroglycerine relieved pain after 10 minutes. What is the leading pathogenetic mechanism of this process ?
  - Spasm of coronary arteries
  - Dilatation of peripheral vessels
  - Obstruction of coronary vessels
  - Compression of coronary vessels
  - Increase in myocardial oxygen consumption
- The patient with acute myocardial infarction was given intravenously different solutions during 8 hours with medical dropper 1500 ml and oxygen intranasally. He died because of pulmonary edema. What caused the pulmonary edema?
  - Volume overload of the left ventricle
  - Decreased oncotic pressure due to hemodilution
  - Allergic reaction
  - Neurogenic reaction
  - Inhalation of the oxygen
- A 67 year old patient complains of periodic heart ache, dyspnea during physical activities. ECG reveals extraordinary contractions of heart ventricles. Such arrhythmia is called:
  - Extrasystole
  - Bradycardia
  - Tachycardia
  - Flutter
  - Fibrillation
- Since a patient has had myocardial infarction, atria and ventricles contract independently from each other with a frequency of 60-70 and 35-40 per minute respectively. Specify the type of heart block in this case:
  - Complete atrioventricular
  - Partial atrioventricular
  - Sino-atrial
  - Intra-atrial
  - Intraventricular
- A patient with constant headaches, pain in the occipital region, tinnitus, dizziness has been admitted to the cardiology department. Objectively: AP- 180/110 mm Hg, heart rate - 95/min. Radiographically, there is a stenosis of one of the renal arteries. Hypertensive condition in this patient has been caused by the activation of the following system:
  - Renin-angiotensin
  - Hemostatic
  - Sympathoadrenal
  - Kinin
  - Immune
- A patient with a pathology of the cardiovascular system developed edemata of the lower extremities. What is the mechanism of cardiac edema development?
  - Increased hydrostatic pressure at the venous end of the capillary
  - Increased oncotic pressure
  - Increased hydrostatic pressure at the arterial end of the capillary
  - Reduced osmotic pressure
  - Lymph efflux disorder
- A 43-year-old-patient has arterial hypertension caused by an increase in cardiac output and general peripheral resistance. Specify the variant of hemodynamic development of arterial hypertension in the given case:
  - Eukinetic
  - Hyperkinetic
  - Hypokinetic
  - Combined
- A patient has insufficient blood supply to the kidneys, which has caused the development of pressor effect due to the constriction of arterial resistance vessels. This is the result of the vessels being greatly affected by the following substance:
  - Angiotensin II
  - Angiotensinogen
  - Renin
  - Catecholamines
  - Norepinephrine
- When studying the signs of pulmonary ventilation, reduction of forced expiratory volume has been detected. What is the likely cause of this phenomenon?
  - Obstructive pulmonary disease
  - Increase of respiratory volume
  - Increase of inspiratory reserve volume
  - Increase of pulmonary residual volume
  - Increase of functional residual lung capacity
- A patient complains of palpitation after stress. The pulse is 104 bpm, P-Q=0,12 seconds, there are no changes of QRS complex. What type of arrhythmia does the patient have?
  - Sinus tachycardia
  - Sinus bradycardia
  - Sinus arrhythmia
  - Ciliary arrhythmia
  - Extrasystole
- A patient has insufficient blood supply to the kidneys, which has caused the development of pressor effect due to constriction of arterial resistance vessels. This condition results from the vessels being affected by the following substance:

- a. Angiotensin II
  - b. Angiotensinogen
  - c. Renin
  - d. Catecholamines
  - e. Norepinephrine
17. When studying the signs of pulmonary ventilation, reduction of forced expiratory volume (FEV) has been detected. What is the likely cause of this phenomenon?
- a. Obstructive pulmonary disease
  - b. Increase of respiratory volume
  - c. Increase of inspiratory reserve volume
  - d. Increase of pulmonary residual volume
  - e. Increase of functional residual lung capacity
18. A patient complains of palpitations after stress. Pulse is 104/min., P-Q=0,12seconds, there are no changes in QRS complex. What type of arrhythmia does the patient have?
- a. Sinus tachycardia
  - b. Sinus bradycardia
  - c. Sinus arrhythmia
  - d. Ciliary arrhythmia
  - e. Extrasystole
19. An athlete (long-distance runner) during a contest developed a case of acute cardiac insufficiency. This pathology resulted from:
- a. Cardiac volume overload
  - b. Disrupted coronary circulation
  - c. Direct damage to myocardium
  - d. Pericardium pathology
  - e. Cardiac pressure overload
20. A 67-year-old man was delivered to the cardiology unit with complaints of periodical pain in the heart, dyspnea after even insignificant physical exertion, cyanosis, and edemas. ECG revealed additional contractions of the heart ventricles. Name this type of rhythm disturbance:
- a. Extrasystole
  - b. Tachycardia
  - c. Flutter
  - d. Bradycardia
  - e. Fibrillation
21. A 16-year-old girl fainted when she tried to change quickly her position from horizontal to vertical. What caused the loss of consciousness in the girl?
- a. Decreased venous return
  - b. Decreased oncotic plasma pressure
  - c. Increased arterial pressure
  - d. Increased central venous pressure
  - e. Increased venous return
22. Increased HDL levels decrease the risk of atherosclerosis. What is the mechanism of HDL anti-atherogenic action?
- a. They remove cholesterol from tissues
  - b. They supply tissues with cholesterol
  - c. They are involved in the breakdown of cholesterol
  - d. They activate the conversion of cholesterol to bile acids
  - e. They promote absorption of cholesterol in the intestine
23. A 15-year-old teenager complains of lack of air, general weakness, palpitations. Heart rate is 130/min. BP is 100/60 mmHg. ECG: QRS complex has normal shape and duration. The number of P-waves and ventricular complexes is equal. T wave merges with P-wave. What type of cardiac arrhythmia is observed in the teenager?
- a. Sinus tachycardia
  - b. Atrial thrill
  - c. Paroxysmal atrial tachycardia
  - d. Sinus extrasystole
  - e. Atrial fibrillation
24. A woman who has been suffering from marked hypertension for 15 years, has lately developed dyspnea, palpitations, slightly decreased systolic pressure, while diastolic remains the same. What is the main mechanism of heart failure development in this case?
- a. Cardiac overload due to increased vascular resistance
  - b. Disorder of impulse conduction in the myocardium
  - c. Damage to the myocardium
  - d. Cardiac overload due to increased blood volume
  - e. Dysregulation of cardiac function

## Images for SECTION 4

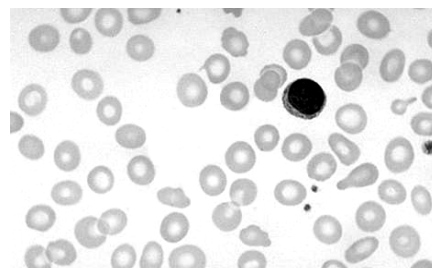
**F1)** Degenerative form of leukocyte which is present on this slide is usually associated with the following anemia...:

- a. iron deficiency anemia
- b. thalassemia
- c. metaplastic anemia
- d. B12 deficiency anemia
- e. syderoblastic anemia



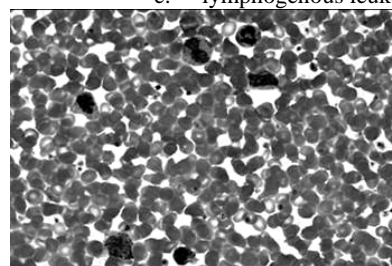
**F2)** The color index of these erythrocytes differs from normal; you can also see poikilocytosis and anisocytosis. What anemia is presented on this slide?

- a. iron deficiency anemia
- b. thalassemia
- c. sickle cell anemia
- d. B12 deficiency anemia
- e. syderoblastic anemia



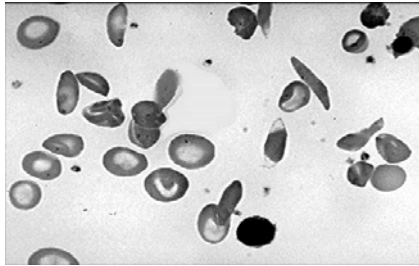
**F3)** The amount of blood cells in this slide is enormously increased. Which blood pathology from listed below can be characterized with such blood smear?

- a. iron deficiency anemia
- b. neutrophilic leukocytosis
- c. metaplastic anemia
- d. polycythemia vera
- e. lymphogenous leukemia



**F4)** The patients with such type of anemia may be asymptomatic until they experience hypoxia. It is ...

- a. iron deficiency anemia
- b. thalassemia
- c. sickle cell anemia
- d. B12 deficiency anemia
- e. syderoblastic anemia

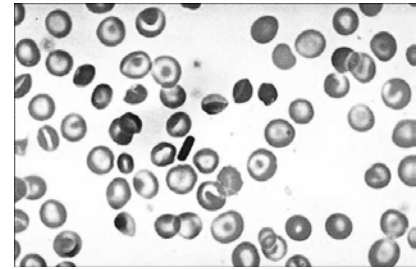


**F4)** The cells present on this slide are less flexible than normal RBC and may cause occlusion of vessels. Such problem is typical for...

- a. iron deficiency anemia
- b. thalassemia
- c. sickle cell anemia
- d. B12 deficiency anemia
- e. syderoblastic anemia

**F5)** The degenerative forms of RBC, which are present here, are a specific sign of ....

- a. iron deficiency anemia
- b. thalassemia
- c. sickle cell anemia
- d. B12 deficiency anemia
- e. syderoblastic anemia



**A01** Disturbance of which heart function is present in the

**A01** Which arrhythmia type is present on the ECG?



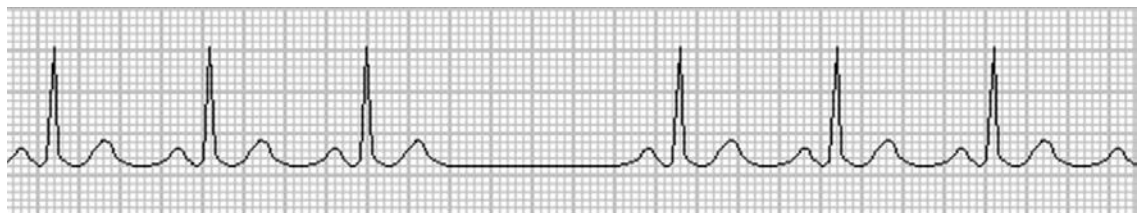
submitted recording of the ECG?

- a. Excitability
- b. Automatism
- c. Conductivity
- d. Contractility
- e. Tonicity

- a. Sinus tachycardia
- b. Sinus bradycardia
- c. Sinus extrasystole
- d. Paroxysmal atrial tachycardia
- e. Pulsus alternans

**A02** Disturbance of which heart function arrhythmia

**A02** Which disturbance of heart rhythm is on the

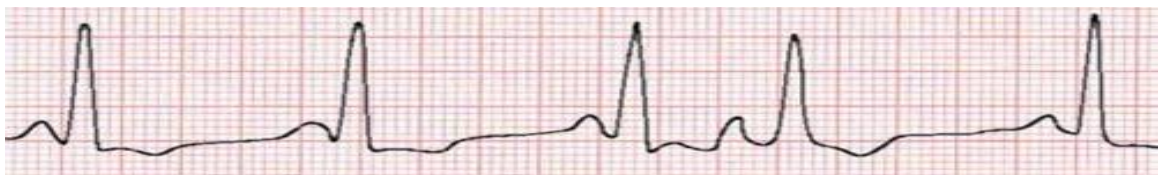


in the submitted recording of the ECG reflects?

- a. Excitability
- b. Automatism
- c. Conductivity
- d. Contractility
- e. Tonicity

submitted recording of the ECG?

- a. SA block
- b. Atrial extrasystolia
- c. Idioventricle extrasystolia
- d. AV block
- e. Block of HIS bundle.



**A03** Disturbance of which heart function is manifested in arrhythmia on the submitted ECG recording?

- a. Excitability
- b. Automatism
- c. Conductivity
- d. Contractility
- e. Tonicity

**A03** Which disturbance of heart rhythm is on the submitted ECG recording?

- a. Sinus extrasystole
- b. Premature junctional contraction
- c. Premature ventricular contraction
- d. Sinus arrhythmia
- e. Sinus block



**A04** Disturbance of which heart function is manifested in arrhythmia on the submitted ECG recording?

- Excitability
- Automatism
- Conductivity
- Contractility
- Tonicity

**A04** Which disturbance of heart rhythm is on the submitted ECG recording?

- Sinus extrasystole
- Premature junctional contraction
- Premature ventricular contraction
- Sinus arrhythmia
- Sinus block

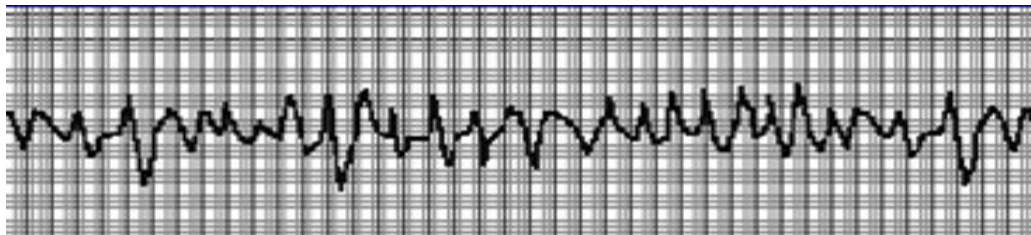


**A05** Disturbance of which heart function is manifested in arrhythmia on the submitted ECG recording?

- Excitability
- Automatism
- Conductivity
- Contractility
- Tonicity

**A05** Which heart rhythm disturbance is present on the submitted ECG recording?

- Atrial fibrillation
- Atrial extrasystolia
- Ventricular fibrillation
- Ventricular tachycardia
- Full AV block.



**A06** Disturbance of what function of heart reflects arrhythmia in the submitted ECG recording?

- Excitability
- Automatism
- Conductivity
- Contractility
- Tonicity

**A06** Which disturbance of heart rhythm is present on the submitted ECG recording?

- Atrial fibrillation
- Atrial extrasystolia
- Ventricular fibrillation
- Ventricular tachycardia
- Full AV block.

## Section 5 “Lung, GIT, Kidney, endocrine and Nervous System Pathology”

### LUNGS PATHOLOGY. RESPIRATORY FAILURE, SHORTBREATH.

**297.** In the patient who suffers from cardiac failure with typical signs of brain hypoxia short breath has developed. Pathogenesis of which short breath is explained by decreased excitability of the respiratory center due to hypoxia?

- Periodic breath
- Expiratory short breath
- Inspiratory short breath
- Frequent and deep breath
- Mixed short breath

**298.** Patient who suffers from stomach ulcer complains of the weakness, nausea, dizziness, noise in ears. Clinical examination: the expressed short breath and pallor of the skin. In subcostal region – there is a moderate pain. BP - 100/70 mmHg. Heart rate – 95 bpm. What is the cause of the short breath development in the patient?

- Decreased O<sub>2</sub> in blood
- Increased CO<sub>2</sub> in blood
- Decreased pH of blood
- Increased pH of blood
- Decreased CO<sub>2</sub> in blood

**299.** Patient who suffers from bronchial asthma complains of frequent attacks. During the attack breath becomes difficult and is accompanied by cough. What is the leading mechanism that defines character of the short breath during bronchial asthma?

- Increased lungs tissue density
- Braking of the respiratory center’s expiratory neurons
- Excitation of the respiratory center’s inspiratory neurons



- d. Difficulty of exhalation  
e. Difficulty of inhalation
- 300.** The ambulance surgeon was called to the patient with expiratory short breath. Which disease can be accompanied by such disturbance of the breathing?
- Lung's fever
  - Exudative pleurisy
  - Bronchial asthma
  - Tuberculosis of lungs
  - Stenocardia
- 301.** Patient suffers from restrictive respiratory failure. Which pathology from listed below can be the cause of such type of the failure?
- Compression of bronchial ways by a tumor
  - Rib fractures
  - Bronchospasm
  - Lungs emphysema
  - Bronchitis
- 302.** Breath becomes complicated during exhalation in the patient who suffers from bronchial asthma. What is the leading mechanism which determines the character of the short breath in bronchial asthma?
- Decrease of lungs tissue elasticity
  - Inhibition of the respiratory center
  - Excitation of the respiratory center
  - Passivity of the exhalation
  - Decrease of the alveolar receptors sensitivity
- 303.** Emphysema was found in the patient during X-ray examination. Which pathogenic mechanism determines expiratory short breath at this pathology?
- Increased lungs tissue elasticity
  - Inhibition the respiratory center
  - Excitation of the respiratory center
  - Decreased sensitivity of alveolus's receptors
  - Violation of bronchi flexibility
- 304.** Patient with signs of stenotic breath was delivered to the center of extreme medicine. What is the cause of patient's breath changes?
- Narrowing of the upper respiratory ways
  - Decrease of lungs tissue elasticity
  - Occurrence of inflammatory process in lungs
  - Development of pneumothorax
  - Spasm of the bronchioles
- 305.** Patient had attack of the bronchial asthma accompanied with changes of respiratory movements frequency and change of the breath during exhalation. What kind of the short breath is often observed at this pathology?
- Stenotic breath
  - Frequent and superficial breath
  - Inspiratory short breath
  - Expiratory short breath
  - The mixed short breath
- 306.** Noisy breath is observed in the comatose patient. Characteristics: after a deep inhalation follows amplified exhalation with participation of the expiratory muscles and long pause. What is the name of this breath type?
- Kussmaul breath
  - Bioth breath
  - Cheyne-Stokes breath
  - Agonal breath
  - Stenotic breath
- 307.** Patient who suffers from diabetes during 10 years was delivered to the hospital in a heavy condition. His condition was acutely worsened for 2<sup>nd</sup> day at the hospital – coma with noisy deep breath had been developed. Characteristics of the breath: after a deep inhalation follows amplified exhalation with participation of the expiratory muscles and long pause. Which form of the breath disturbance is observed in the patient?
- Kussmaul breath
  - Stenotic breath
  - Tachipnoe
  - Cheyne-Stokes breath
  - Bioth breath
- 308.** The patient with asbestosis in 5 years has developed chronic respiratory failure due to the gases diffusion through alveolar membrane disturbance. Which concentrations of oxygen and carbon dioxide in patient's blood can you suppose?
- hypoxia and normocapnia
  - hypoxia and hypercapnia
  - hypoxia and hypocapnia
  - normoxia and normocapnia
  - normoxia and hypercapnia
- 309.** Acute respiratory failure has developed in the patient who suffers from bronchial asthma. What is the basic pathogenic mechanism of the given pathology development?
- Restrictive disturbances of lungs ventilation
  - Obstructive disturbances of lungs ventilation
  - Disturbances of lungs blood supply
  - Disturbances of surfactant's system in lungs
  - Disturbances of oxygen diffusion through membranes
- 310.** In the patient with a craniocerebral trauma breath is characterized by the respiratory movements increasing on depth and then decreasing with short pause. Which type of the periodic breath is observed in the task?
- Bioth breath
  - Kussmaul breath
  - Cheyne-Stokes breath
  - Gasping-breath
  - Apnoe
- 311.** Acute respiratory failure was developed in the patient with multiply rib's fractures. Which pathogenic mechanism explains the development of complications in this case?
- Restrictive disturbance of alveolar ventilation
  - Obstructive disturbance of alveolar ventilation
  - Disturbance of blood perfusion in lungs capillaries
  - Disregulatory disturbance of alveolar ventilation
  - Disturbance of gases diffusion through membranes
- 312.** Patient who suffers from lungs tuberculosis for 10 years complains of the cough with bloody phlegm, weakness, short breath. Which reason from listed below caused respiration insufficiency in this case?
- decrease of functioning alveoles' quantity
  - disturbances of respiratory center functions
  - disturbances of airways passage
  - decrease of thorax flexibility
  - disturbance of thorax muscles function
- 313.** It is known that there are cardiogenic and non-cardiogenic types of pulmonary edema. Which from the listed conditions will not be accompanied by pulmonary edema,
- Right sided heart failure
  - Left sided heart failure
  - Acute respiratory distress syndrome
  - Excessive intravenous infusion of physiological solution
  - Acute pneumonia
- 314.** A 54-year-old man sustains third degree burns in a house fire. His respiratory rate is 30/min, arterial O<sub>2</sub> saturation is 50%. The most likely cause of his low oxygen saturation is
- Airway obstruction from smoke inhalation
  - Carbon monoxide poisoning
  - Pulmonary edema
  - Fever
- 315.** Patient was admitted to cardiological ward in a severe state with the diagnosis "myocardial infarction of the left ventricle posterior wall, starting pulmonary edema". Which

mechanism causes the development of pulmonary edema in the patient?

- Pulmonary arterial hypertension
- Left ventricular failure
- Pulmonary venous hypertension
- Hypoxemia
- Decrease of alveolo-capillary diffusion of oxygen

**316.** Pulmonary edema developed in a patient with hypertonic crisis. Which factor determines pulmonary edema in this clinical case?

- Increase of arterial pressure
- Increased permeability of the pulmonary vessels
- Increased hydrostatic pressure in pulmonary vessels
- Increased resistance of pulmonary vessels
- Decreased oncotic pressure of blood plasma

**317.** A 3 year old child developed asphyxia after inhalation of a hard candy. The breathing is regular - 20 per minute, expiratory short breath, heart rate – 40 bpm, BP 70/50 mmHg. Define the stage of asphyxia in the patient:

- 1 stage of asphyxia
- 2 stage of asphyxia
- 3 stage of asphyxia
- 4 stage of asphyxia

**318.** A patient with respiratory failure was examined in order to measure spiogram and lungs volumes. The following indices were obtained after examination: total lungs capacity

and residual volume are increased, forced expiratory volume and forced vital capacity are decreased. Define the mechanism of respiratory failure development in this case:

- restrictive disturbances
- obstructive disturbances
- diffusion disturbances
- perfusion disturbances
- regulation disturbances

**319.** A patient with respiratory failure was examined in order to measure spiogram and lungs volumes. The following indices were obtained after examination: total lungs capacity, forced vital capacity and residual volume are decreased, forced expiratory volume is increased. Define the mechanism of respiratory failure development in this case:

- restrictive disturbances
- obstructive disturbances
- diffusion disturbances
- perfusion disturbances
- regulation disturbances

**320.** A 3 year old child developed asphyxia after inhalation of a hard candy. The frequency of breathing is 56 per minute, inspiratory short breath, heart rate – 135 bpm, BP 140/100 mmHg. Define the stage of asphyxia in the patient:

- 1 stage of asphyxia
- 2 stage of asphyxia
- 3 stage of asphyxia
- 4 stage of asphyxia

## PATHOLOGY OF GASTRO-INTESTINAL TRACT

**321.** Signs of the food poisoning are observed at patient. Chemical analysis of the food's rests has shown presence of nitrites. What is the most specific mechanism of the nitrites poisoning?

- Blocking enzymes of the respiratory circuit
- Toxic damage of the respiratory center
- Disturbance of the myocardium contractive functions
- Damage of the digestive mucous tunic
- Inactivation of the hemoglobin in erythrocytes

**322.** Signs of steatorrhea and avitaminosis of fat-soluble vitamins are observed in the patient. What enzyme's deficiency is most frequently reason of fats digestion disturbances in the gastrointestinal tract and increase of neutral fat's quantity in the faeces?

- Pancreatic lipase
- Gastric lipase
- Intestinal lipase
- Hepatic lipase
- Enterokinase

**323.** Patient with duodenal ulcer complains of stable weight loss. Examination: atrophy of the intestine's membrane, in faeces –increased amount of not digested food. What is the most probable mechanism of the patient's exhaustion in the given clinical situation?

- Disturbance of digestion in a stomach
- Disturbance of nutrients absorption
- Increased proteins catabolism
- Disturbance of digestion in the large intestine
- Insufficient receipt of plastic substances

**324.** Patient E. with pneumonia was treated with antibiotics last two weeks. Now he complains about rumble in the stomach, frequent diarrhea with a specific smell. What is the probable mechanism of these disturbances?

- Toxic action of antibiotics on the mucous membrane
- Development of cytotoxic immune reaction
- Development of intestines' dysbacteriosis
- Action of bacterial toxins on the mucous membrane
- Hereditary defect of mucous membrane's enzymes

**325.** Increased production of glucocorticoids is revealed in the patient. She complains of pain in subcostal region, heartburn. Hyperacidity was found during fractional sounding of the stomach. What is the probable mechanism of such hyperacid state development?

- Stimulation of the pepsin secretion only
- Stimulation of the hydrochloric acid secretion only
- Stimulation of the parietal cells proliferation
- Stimulation of the pepsin and hydrochloric acid secretion
- Stimulation of main cells proliferation

**326.** Patient who suffers from rheumatic polyarthritis was treated by aspirin and prednisolon for a long time. Now he complains of pain in the stomach, nausea, flatulence. Gastroscopia examination- erosion (0.5cm x 0.5 cm) of the stomach's mucosa was found. What is the most probable cause of defect formation?

- Development of cytotoxic immune reaction
- Development of the dysbacteriosis
- Age changes of the mucous membrane
- Ulcer action of the Helicobacter pylori
- Treatment with NSAIDs

**327.** Patient L. who professionally contacting with lead, complains of weakness, dryness of the skin, increased frailness of nails. Blood count: hypoglycemia, hypochromic anemia. Examination: atrophic changes of the small intestine's mucosa. What is the name of this phenomenon?

- Malabsorption syndrome
- Disturbance of stomach digestion
- Formation of a stomach tumor
- Development of leukemia
- Insufficient exogenous receipt of nutrients

**328.** At the child of 5 years swelling of the stomach, spastic pain and diarrhea are happened after milk taking. What enzyme's lack causes these symptoms?

- glucose-metabolizing enzymes
- lactose-metabolizing enzymes
- maltose- metabolizing enzymes
- saccharose- metabolizing enzymes
- fructose- metabolizing enzymes

**329.** Patient 50 years old complains of bad appetite, weight loss, weakness, pain in the field of the stomach and eructation. Laboratory examination: Hb 90 g/l, erythrocytes 2,0T/l, erythrocyte color index 1,4; gastric secretion 0,4 l, pH gastric juice - 7,0. B<sub>12</sub>-deficiency anemia was diagnosed. What substance's deficiency is the cause of anemia in this patient?

- pepsin
- renin
- secretin
- intrinsic factor
- hydrochloric acid

**330.** In the patient with chronic cholecystitis light-colored feces and drops of the neutral fat in feces are found. What is the most probable cause of these disturbances?

- Decrease of intestinal juice secretion
- Increased acidity of gastric juice
- Activation of absorption in intestines
- Increased secretion of pancreatic juice
- Decrease of bile entry into intestines

**331.** De-nol and metronidazole are prescribed for the man of 42 years who suffers from duodenal and stomach ulcer. Therapy appeared effective. What is the mechanism of these medicines' high efficiency?

- Depression of *Helicobacter pylori*
- Decrease of the intestines pathogenic flora influence
- Improvement of microcirculation
- Stimulation of duodenum mucosa's resistance
- Stimulation of prostaglandins' synthesis

**332.** Which factor from the given is the most potentially lethal for the patient with intestinal obstruction?

- bowel distension
- loss of fluid
- electrolyte disorders
- absolute constipation
- production of endotoxins by anaerobes

**333.** Which substance from the listed is not playing role in the development of intestinal autointoxication?

- ethanol
- hydrogen sulphide
- skatole
- indole
- phenol

**334.** Patient was treated by aspirin and prednisolon for a long time. Now he complains of pain in the stomach, nausea, flatulence. Gastroscoopia found erosion of the stomach's mucosa. What is the most probable cause of defect formation?

- Increased bloodflow in the stomach
- Enhanced mucus secretion
- Decreased HCl secretion
- Increased HCl secretion
- Decreased secretion of prostoglandines

**335.** Prostoglandins play an important role in protecting the gastrointestinal mucosa from injury. Which from the named effects IS NOT caused by prostoglandins?

- increased bloodflow in stomach
- decreased bloodflow in stomach
- increased bicarbonate ion secretion
- enhanced mucus production

**336.** What is the result of *Helocobacter pylori* action on the mucosal layer of stomach and duodenum?

- increase pepsin secretion
- increase HCl secretion
- increase bicarbonate secretion
- increase bicarbonate secretion
- decrease bloodflow in the stomach

**337.** Which pathological process underlies the mechanism of chronic gastritis type A development?

- decrease of HCl secretion
- decrease of prostoglandins formation
- production of autoantibodies to parietal cells
- production of autoantibodies to epithelial cells
- production of autoantibodies to gastrin-producing cells

**338.** Which pathological process underlies the mechanism of chronic gastritis type C development?

- production of autoantibodies to parietal cells
- reflux of duodenal contents and bile into the stomach
- Helicobacter pylori* infection
- environmental influences
- decreased parietal cells function

**339.** Gastric intubation was done to the patient with stomach discomfort. The following results were obtained: volume of fasting secretion 47 ml, general acidity of basal secretion 50, pepsin content in stimulated secretion 45 . Describe the state of gastric secretion in the patient.

- neutral acidity
- increased acidity
- normal acidity
- decreased acidity
- alkaline reaction of acidity

**340.** Gastric intubation was done to the patient with stomach discomfort. The following results were obtained: volume of fasting secretion 69 ml, general acidity of basal secretion 74, pepsin content in stimulated secretion 49 . Describe the state of gastric secretion in the patient.

- neutral acidity
- increased acidity
- normal acidity
- decreased acidity
- alkaline reaction of acidity

**341.** Gastric intubation was done to the patient with stomach discomfort. The following results were obtained: volume of fasting secretion 10 ml, general acidity of basal secretion 0 units, pepsin content in stimulated secretion 7 units . Describe the state of gastric secretion in the patient.

- neutral acidity
- increased acidity
- normal acidity
- decreased acidity
- alkaline reaction of acidity

**342.** A 54-year-old male alcoholic presents with the sudden onset of severe, constant epigastric pain that radiates to his midback. Further evaluation finds fever, steatorrhea, and discoloration around his flank and umbilicus. Laboratory tests find elevated serum levels of amylase and lipase. What is the most likely cause of these findings?

- acute appendicitis
- acute cholangitis
- acute cholecystitis
- acute diverticulitis
- acute pancreatitis

## LIVER PATHOLOGY

**343.** Patient G. was delivered into resuscitation department with poisoning. His condition is heavy, patient unconscious, has weak pulse about 40 bpm, BP 75/40 mmHg. Examination - Bioth type periodic breath. Blood count:

decreased protein's level (16 g/l), conjugated bilirubin - 155 mkmol/l. Urine analysis: high amount of ammonia and conjugated bilirubin. What is the basic pathogenic mechanism of the patient's state?

- a. Cardiac shock  
b. Hepatic failure  
c. Respiratory failure  
d. Cardiac failure  
e. Renal failure
- 344.** In the patient with a jaundice it is revealed: increased non-conjugated bilirubin plasma level, conjugated bilirubin level within the limits of norm, in faeces - the high maintenance of stercobilin, in urine increased level of urobilin. What is the reason of such changes?  
a. Damage of hepatocytes  
b. Lack of enzymes  
c. Erythrocytes increased hemolysis  
d. Disturbance of bile outflow  
e. Functional failure of hepatocytes
- 345.** The jaundice was marked in the newborn from 3<sup>rd</sup> to 10<sup>th</sup> day of a life. The general condition is satisfactory. A maximum level of bilirubin in blood during this period - 102 mkmol/l, 8,2 mkmol/l due to conjugated bilirubin. What condition development is most probable at this baby?  
a. Fetal hepatitis  
b. Hemolytic illness of newborns  
c. Hereditary hemolytic microspherocytic anemia  
d. Physiological jaundice  
e. Atresia of bile vessels
- 346.** The teenager 12 years old, complains of periodically appearing weakness, dizziness, pains in left subcostal region. Skin and mucous membranes are icteric. A tower skull and liver and spleen enlargement are observed. In blood: erythrocytes.-2,7 T/l, Hb-88 g/l, leukocytes-5,6 G/l, ESR -15mm/hour. What most probable bilirubin level change can be observed in this patient?  
a. Increased non-conjugated and conjugated bilirubin  
b. Increased conjugated bilirubin  
c. Decreased free bilirubin  
d. Decreased the connected bilirubin  
e. Increased non-conjugated bilirubin
- 347.** Patient D., 38 years. During 5 years suffers from chronic cholecystitis. 2 day ago after disturbances in a feed the pain in the right subcostal region has appeared. For 3 day icteric coloring of skin and sclera's had appeared. In blood: 35 mkmol/l of non-conjugated bilirubin and 147 mkmol/l of conjugated bilirubin. Urine is dark colored, faeces colorless. What caused dark coloring of urine in this case?  
a. Increased conjugated bilirubin  
b. Increased non-conjugated bilirubin  
c. Increase if urobilin  
d. Presence of bile acids  
e. Decrease of stercobilin allocation with faeces
- 348.** Patient A., 12 years, complain about nausea, vomiting, a skin itch. He was ill 8 days ago. Clinical examination: scleras and skin are icteric, the liver and a spleen are enlarged. Bilirubin plasma level- 76 mkmol/l (non-conjugated - 20,5 mkmol/l). At urine are present conjugated bilirubin and urobilin. Faeces- colorless. What is the possible reason of a skin itch at the given type of jaundice?  
a. Increased blood cholesterol level  
b. Increased blood conjugated bilirubin level  
c. Increased blood non-conjugated bilirubin level  
d. Increased blood bile acids level  
e. Increased blood erythrocytes disintegration products level
- 349.** Patient E., 39 years. Disease has developed acutely, after cooling. Acute weakness, short breath, short-term loss of consciousness, moderate icteric skin and scleras have suddenly appeared. Laboratory data: non-conjugated bilirubin of plasma-70 mkmol/l. Urine and faeces contains increased quantity of urobilin and stercobilin. Bilirubin in urine is not defined. What is the most probable mechanism of short breath development and loss of consciousness in the patient?  
a. Toxic action of conjugated bilirubin on CNS  
b. Toxic action of bile acids on CNS  
c. Toxic action of microorganisms on CNS  
d. Toxic action of urobilinogen on CNS  
e. Toxic action of non-conjugated bilirubin on CNS
- 350.** Patient H., 46 years, complain about appetite absence, nausea, pains in the right subcostal region, that are increased after fat food, icteric scleras, dark color of urine. In plasma of blood: non-conjugated bilirubin - 50 mkmol/l and conjugated bilirubin - 71,8 mkmol/l. In urine conjugated bilirubin and urobilin in a plenty is defined. Explain absence of non-conjugated bilirubin in urine?  
a. Impossibility of its filtration in primary urine  
b. Increased inactivation of it by macrophages  
c. Decreased conjugation of it in hepatocytes  
d. Conjugation of bilirubin with blood albumens  
e. Conjugation of bilirubin with immune complexes
- 351.** In a ward there is a patient with an attack of a chronic cholecystitis. He complains of itch and the yellowness of skin, plural small pointed hemorrhages. At laboratory research it is revealed expressed steatorrhea, decreased parameters of blood coagulation. What is pathogenic connection between steatorrhea and development of hemorrhages:  
a. Disturbance of vit A absorption  
b. Disturbance of vit K absorption  
c. Disturbance of vit C absorption  
d. Disturbance of vit B12 absorption  
e. Disturbance of vit B6 absorption
- 352.** Patient C., is treated in the clinic with diagnosis chronic hepatitis complicated by liver cirrhosis. The patient is weak, complains about appetite loss and waste of weight. His skin is dry and pale with yellow tint and small hemorrhages. His belly is enlarged because of ascites. Subcutaneous veins are enlarged and well seen on the skin of belly. Concentration of proteins in the blood is lower than normal. What pathological condition has developed in the patient?  
a. Inflammation of mesenteries vessels  
b. DIC-syndrome (phase of hypocoagulation)  
c. Portal hypertension syndrome  
d. Hemophilia  
e. Cholemia syndrome
- 353.** At patient P., 25 years, the diagnosis of a chronic hepatitis is established. The patient complains of loss of weight (10 kg during 2 months), pallor of a skin with a yellow shade, small pointed haemorrhages on a skin, gum bleeding. Disturbance of which liver function results in skin haemorrhages and gum bleeding?  
a. Chromogenic  
b. Synthesis of glycogen  
c. Detoxification  
d. Synthesis of albumens  
e. Deposition of substances
- 354.** Patient T., 47 years, develops quickly increasing jaundice. Blood contains 82 mkmol/l conjugated bilirubin. In urine - great amount of bilirubin, faeces are non-colored. What type of a jaundice is present at this patient?  
a. Hepatic jaundice (cholestatic stage)  
b. Acquired hemolytic (prehepatic) jaundice  
c. Parenchymatous (hepatic) jaundice (necrotic stage)  
d. Mechanical (posthepatic) jaundice  
e. Hereditary hemolytic jaundice
- 355.** Patient K. arrived to clinic with complaints about general weakness, pain in left subcostal region. Icteric skin had appeared in her from the childhood. Three months ago jaundice has strengthened and pains in liver region appeared. Blood analysis showed increased level of non-conjugated bilirubin, urine and faeces are darkly colored. What type of jaundice is present in this patient?  
a. Hepatic jaundice (cholestatic stage)

- b. Acquired hemolytic (prehepatic) jaundice
  - c. Parenchymatous (hepatic) jaundice (necrotic stage)
  - d. Mechanical (posthepatic) jaundice
  - e. Hereditary hemolytic jaundice
- 356.** In the patient with jaundice irritability, a headache, insomnia is marked. Objectively: heart rate - 54 bpm, BP - 90/60 mmHg, blood coagulation is decreased. What substance increased level leads to described symptoms?
- a. Bile acids
  - b. Bilirubin
  - c. Cholesterol
  - d. Bile pigments
  - e. Fat acids
- 357.** In the patient with acholia low heart rate (60 bpm) was found during clinical examination. What bile component can cause this phenomenon?
- a. Bile acids
  - b. Cholesterol
  - c. Bile pigments
  - d. Fat acids
  - e. Bilirubin
- 358.** Patient D., 22 years, complains of fever, general weakness and jaundice. The doctor diagnosed viral hepatitis. What blood analysis is necessary for proving hepatic cells acute damage?
- a. Conjugated and non-conjugated bilirubin
  - b. Activity of aminotransferase enzymes
  - c. Concentration of urobilin
  - d. Cholesterol and bile acids
  - e. Proteins fractions
- 359.** Patient with yellowish discoloration of the skin was examined by the physician. The signs of cholemia were found during examination. Which type of jaundice is usually accompanied by cholestasis and cholemia syndrome?
- a. prehepatic
  - b. intrahepatic
  - c. mechanical
  - d. neonatal
  - e. hemolytic
- 360.** It is known that jaundice may manifest with the changes in urine and feces coloring. Which pigment will give the dark color of urine in the case of posthepatic jaundice?
- a. conjugated bilirubin
  - b. non-conjugated bilirubin
  - c. urobilin
  - d. stercobilin
  - e. hemoglobin
- 361.** It is known that jaundice may manifest with the changes in urine and feces coloring. Which pigment will give the dark color of urine in the case of prehepatic jaundice?
- a. conjugated bilirubin
  - b. non-conjugated bilirubin
  - c. urobilin
  - d. urobilinogen
  - e. hemoglobin
- 362.** Mechanical jaundice usually results from biliary obstruction is accompanied by acholia and cholemia. Choose the consequence of acholia in the patient from the following:
- a. increased motility of intestines
  - b. increased absorption of A, D E , K vitamins
  - c. increased absorption of B1, B2, C vitamins
  - d. intestinal autointoxication
  - e. inhibition of proteins putrefaction in intestines
- 363.** Hepatic failure is a serious disorder because liver functions of detoxication, proteins synthesis and others are

impaired. The patient with liver failure is usually prescribed a strict diet. Excessive intake of which nutrients may worsen hepatic failure and may lead to hepatic encephalopathy?

- a. carbohydrates
- b. lipids
- c. proteins
- d. water
- e. sodium chloride

**364.** Jaundice is not a disease itself; it is a syndrome of liver affection. Jaundice may accompany many of liver diseases. Which type of jaundice may be accompanied with the appearance of hepatic enzymes (transaminase) in the peripheral blood?

- a. hemolytic
- b. intrahepatic
- c. neonatal
- d. enzymopathic
- e. mechanical

**365.** Hepatic encephalopathy refers to the totality of central nervous system manifestations of liver failure. Which substance is directly causing CNS disorders which occur in the course of hepatic failure?

- a. ammonia
- b. urea
- c. conjugated bilirubin
- d. non-conjugated bilirubin
- e. bile acids

**366.** Portal hypertension is classified into pre-hepatic, intra-hepatic and post hepatic forms due to the level of venous obstruction. Choose the reason of posthepatic portal hypertension from the following:

- a. liver cirrhosis
- b. portal vein thrombosis
- c. hypovolemia
- d. left-sided heart failure
- e. right-sided heart failure

**367.** It is known that portal hypertension may be complicated with ascites. Choose the factor which IS NOT taking part in this case of ascites development:

- a. obstruction of venous flow through the liver
- b. salt and water retention by the kidney
- c. increased salt intake
- d. decreased blood colloidal pressure
- e. impaired synthesis of albumens in the liver

**368.** Mechanical jaundice usually results from biliary obstruction is accompanied by acholia and cholemia. Explain the mechanism of bradycardia which occurs in the patient with cholemia. It happens due to...

- a. influence of bile acids on SA node
- b. activation of sympathetic activity
- c. His bundle branch block
- d. re-entry phenomenon
- e. influence of bilirubin on SA node

**369.** A 62-year-old male with hepatic failure secondary to cirrhosis develops a pungent odor in his breath (feto hepaticus). He is also noted to have marked ascites, gynecomastia, asterixis, and palmar erythema. His serum ammonia levels are found to be elevated. This patient's gynecomastia is the result of

- a. Decreased synthesis of albumin
- b. Defective metabolism of the urea cycle
- c. Deranged bilirubin metabolism
- d. Impaired estrogen metabolism
- e. The formation of mercaptans in the gut

#### KIDNEYS PATHOLOGY

**370.** Patient R. urine analysis: urine specific gravity 1,034-1,050; daily diuresis 3,8 L. Characterize daily diuresis at the patient.

- a. Oliguria

- b. Hypostenuria
- c. Disuria
- d. Polyuria
- e. Normal diuresis

**371.** Patient R., urine analysis: color - light yellow, transparent, acid reaction, traces of protein. Urine microscopy: single epithelium cells, leukocytes - 0-2, erythrocytes - 0-1 in the field of vision. Name the cause of protein presence in urine:

- Damage of glomerular capillaries basal membrane
- Normal processes of a filtration
- Damage of tubules
- Excessive consumption of proteins with food

**372.** Patient S., urine analysis: color - light yellow, transparent, acid reaction, traces of protein, glucose-10 g/L. Presence of glucosuria probably testifies about:

- Increased glucose concentration in blood
- Normal function of kidneys
- Disturbance of glomerular capillaries basal membrane permeability
- Increased filtration ability of kidneys
- Secretion of glucose in renal tubules

**373.** Patient T., urine analysis: specific gravity 1,034-1,050; daily diuresis 3,8 L. At the analysis of urine it is revealed: protein - traces, glucose - 10 g/L. Nitrogen of blood - 15,2 mmole/L. Name the cause of specific gravity increase:

- Presence of protein traces in urine
- Change of daily diuresis
- Increased filtration ability of kidneys
- Presence of glucose in urine
- Increased residual nitrogen in blood

**374.** Patient U. urine analysis: specific gravity 1,003-1,010; daily diuresis 6,8 L. Urine is of yellow color, transparent, subacidic reaction, protein is absent, glucose is absent. What is the reason of decreased urine specific gravity in the given clinical situation?

- Increased filtration ability of kidneys
- Increased daily diuresis
- The increased consumption of water
- Absence of protein and glucose in urine
- Decreased kidney's reabsorbing ability

**375.** Patient K., 23 years. A month after flu began to complain of constant thirst, often and abundant urination, insomnia. Urine analysis: urine specific gravity 1,003-1,010; daily diuresis 6,200 L, pathological components of urine are not revealed. What is the most probable mechanism that had led to poliuria at the patient?

- Increased glomerular capillaries basal membrane permeability
- Decreased vasopressin secretion
- Increased daily consumption of water
- Injury of kidneys tubules
- Inflammation of urinary bladder

**376.** Patient M., 16 years, was delivered to the hospital in the hard shock condition. ABP - 80/60 mmHg. Daily diuresis 60-80 ml. Urine analysis: protein - 0,66 g/L, specific gravity 1,029. Estimate patient's diuresis:

- polyuria
- oliguria
- disuria
- anuria
- hypostenuria

**377.** Patient M., 16 years, was delivered to the hospital in the extremely shock condition after car accident. There are plural fractures of both legs. ABP - 80/60 mmHg. Daily diuresis 60-80 ml. What is the mechanism of decreased diuresis at this patient?

- decreased hydrostatic pressure in capillaries of glomerules
- increased colloid-osmotic pressure in capillaries of glomerules
- increased pressure of primary urine in Bowman's capsule
- increased concentration of vasopressin in blood
- traumatic violation of urinary bladder innervation

**378.** Patient M., 16 years, delivered in the hospital in the shock condition. ABP - 80/60 mmHg. Daily diuresis 60-80 ml. Urine analysis: protein - 0,66 g/L, urine specific gravity 1,029. Residual blood nitrogen - 120 mmol/L; blood urea - 35 mmol/L. What is the mechanism of azotemia in the patient?

- decreased glomerular filtration rate in kidneys
- violation of urea secretion in kidneys
- violation of protein metabolism in liver
- increased catabolism of proteins in the damaged tissues
- increased reabsorption in kidneys

**379.** Patient M., 16 years, with craniocerebral trauma was delivered to the hospital in the shock condition. ABP - 80/60 mmHg. Excretes 60-80 ml of urine for a day. In urine: protein - 0,66 g/L, urine specific gravity 1,029. What is the most possible cause of development of proteinuria at patient?

- ischemic affection of kidneys
- traumatic affection of kidneys
- inflammatory affection of kidneys
- inflammatory affection of urinary bladder
- traumatic affection of urinary bladder

**380.** In the analysis of urine of patient K., 3 years, is glycosuria, diurnal excretion of glucose with urine is 1,2 g, degree of glycosuria is the same in day and night portions of urine; glucose of blood - 3 mmol/L, glycemic line at sugar loading or injection of insulin is normal. What is the cause of glycosuria at patient?

- excess of glucose in blood concentration
- increased filtration of glucose in kidneys
- deficiency of enzyme glucose transport systems in the tubules
- high income of glucose with food
- violation of glucose consumption by tissues

**381.** Patient K., 3 years, complaints about quick fatiguability, constant hunger, high thirst. There are no objective changes in the internal organs. Urine analysis: urine specific gravity 1,020 - 1,038 at daily diuresis 3,0 l. Diurnal excretion of glucose with urine is 1,2 g. What pathogenetic mechanism caused changes of diurnal diuresis at patient?

- increased hydrostatic pressure in capillaries of glomerules
- decreased colloid-osmotic pressure in capillaries of glomerules
- decreased hydrostatic pressure in Bowman capsule
- increased osmotic pressure of urine
- decreased secretion of vasopressin in blood

**382.** Patient A., 38 years, at 3-d year of disease of systemic lupus erythematosus it is revealed diffuse affection of kidneys, with massive edema, expressed proteinuria. What has caused the development of proteinuria at a patient?

- inflammatory affection of kidneys
- ischemic affection of kidneys
- autoimmune affection of kidneys
- inflammatory affection of urinary bladder
- inflammatory affection of urinary tracts

**383.** Patient A., 38 years, at 3-d year of disease of systemic lupus erythematosus revealed diffuse affection of kidneys, with massive edema, expressed proteinuria, hyperlipidemia, disproteinemia. Which mechanism of proteinuria development is the most possible at the patient?

- violation of proteins reabsorption in tubules
- diffuse kidneys parenchyma destruction
- increased concentration of proteins in the urinary tracts
- increased permeability of Bowman's capsule basal membrane
- excess of blood proteins amount

**384.** Patient A., 38 years, at 3-d year of disease of systemic lupus erythematosus revealed diffuse affection of kidneys, with massive edema, expressed proteinuria,

hyperlipidemia, disproteinemia. Suppose the possible changes in blood protein content in this patient. There will be ...

- a. increased concentration of albumins in blood
- b. decreased concentration of proteins in blood
- c. increased concentration of globulins in blood
- d. decreased concentration of albumins in blood
- e. decreased concentration of globulins blood

**385.** Patient N., 36 years, is on inpatient treatment in nephrological department. Urine analysis: specific gravity - 1,004-1,015, diurnal diuresis 2600 ml. What do indexes of urine specific gravity indicate?

- a. isohyposthenuria
- b. hypersthenuria
- c. hyposthenuria
- d. dysuria
- e. polyuria

**386.** Patient N., 36 years. Analysis of urine: urine is stramineous in colour, limpid, acid reaction, protein 0,8 g/L, glucose is absent. In urinal sediment: single epithelial cells, leukocytes - 1-5, RBC - 2-3 in field of vision, fresh and modified; hyaline casts - single in field of vision. What index from pathological components of urine testifies about the violation of filtration function of kidneys at a patient?

- a. protein
- b. fresh RBC
- c. cylinders
- d. leukocytes
- e. pH of urine

**387.** Patient H., 36 years, in urine - 0,8 g/L of protein, in urinal sediment - single epithelium and hyaline cylinders, leukocytes - 1-5, fresh and modified RBC - 2-3 in field of vision. Urine analysis: specific gravity 1,004-1,015, diurnal diuresis 2600 ml. What index from the given can suggest about the violation of kidneys ability to concentrate the urine?

- a. polyuria
- b. proteinuria
- c. cylinderuria
- d. microhematuria
- e. pH of urine

**388.** Patient N., 36 years. Analysis of urine: urine is stramineous in colour, limpid, acid reaction, protein 0,8 g/L, glucose is absent. Urine analysis: specific gravity 1,004-1,015, diurnal diuresis 2600 ml. In blood: urea- 5,1 mmol/L, creatinine- 70 micromol/L. Affection of which part of kidneys caused the violation of kidneys ability to concentrate the urine?

- a. kidney parenchyma
- b. basal membrane of Bowman capsule
- c. tubular part of nephron
- d. collective tubules
- e. glomerular part of nephron

**389.** Patient A., 27 years, delivered in the hospital with the profuse gastric bleeding in severe condition. ABP - 80/60 mmHg. Patient excretes 60 - 80 ml of urine for a day with urine specific gravity 1,028-1,036. How can you describe diurnal diuresis at patient in this clinical situation?

- a. pollakiuria
- b. anuria
- c. oliguria
- d. dysuria
- e. hyposthenuria

**390.** Patient A., 24 years, delivered in the hospital with the profuse gastric bleeding in severe condition. ABP - 80/60 mmHg. Patient excretes 60 - 80 ml of urine for a day with urine specific gravity 1,028-1,036. Residual nitrogen of blood - 62 mmol/L, urea of blood - 36 mmol/L, creatinine of plasma - 260 micromole/L. What pathogenetic mechanism caused changes of diurnal diuresis at a patient?

- a. increased osmotic pressure of urine
- b. high level of residual nitrogen in blood

- c. increased colloid-osmotic pressure in capillaries of glomerules
- d. decreased hydrostatic pressure in capillaries of glomerules
- e. increased hydrostatic pressure in Bowman capsule

**391.** Patient A., 27 years, delivered in the hospital with the profuse gastric bleeding in severe condition. ABP - 80/60 mmHg. Patient excretes 60 - 80 ml of urine for a day with urine specific gravity 1,028-1,036. Residual nitrogen of blood - 62 mmol/L, urea of blood - 36 mmol/L, creatinine of plasma - 260 micromol/L. What pathogenetic mechanism caused the increased products of nitrogenous metabolism in blood of patient?

- a. violation of urea excretion in kidneys
- b. violation of protein metabolism in liver
- c. decreased amount of functioning nephrons
- d. decreased filtration function of kidneys
- e. increased reabsorbing function of kidneys

**392.** Patient A., 27 years, delivered in the hospital with the profuse gastric bleeding in severe condition. ABP - 80/60 mmHg. Daily diuresis 60 - 80 ml, urine specific gravity 1,028-1,036. Residual nitrogen of blood - 62 mmol/L, urea of blood - 36 mmol/L, creatinine of plasma - 260  $\mu$ mol/L. Define kidney's pathology?

- a. acute renal failure
- b. chronic renal failure
- c. nephritic syndrome
- d. nephrotic syndrome
- e. hematuria

**393.** Patient R., 39 years, was delivered to nephrological department in precoma condition. The patient is ill with glomerulonephritis for 8 years. Complaints about increased fatigue, apathy, pain in muscles and joints, skin itching, ammonia smell from mouth. Clinical examination: edema of legs and face, enlarged liver. ABP - 190/120 mmHg. Residual nitrogen of blood - 148 mmol/L. Glomerular filtration rate - 12,0 ml/min. Urine analysis: specific gravity 1,003 - 1,005, daily diuresis - 360 ml. What syndrome of kidneys affection is the reason of the patient's severe condition?

- a. nephritic
- b. nephrotic
- c. hypertensive
- d. chronic renal failure
- e. acute renal failure

**394.** Patient R., 39 years, was delivered to nephrological department in precoma condition. The patient is ill with glomerulonephritis for 8 years. Complaints about increased fatigue, apathy, pain in muscles and joints, skin itching, ammonia smell from mouth. Clinical examination: edema of legs and face, enlarged liver. ABP - 190/120 mmHg. Residual nitrogen of blood - 148 mmol/L. Glomerular filtration rate - 12,0 ml/min. Urine analysis: urine specific gravity 1,003 - 1,005, daily diuresis - 360 ml. Characterize the concentrating ability of the kidney's according to the indices of urine specific gravity:

- a. hyposthenuria
- b. proteinuria
- c. hypersthenuria
- d. dysuria
- e. polyuria

**395.** Patient R., 39 years, was delivered to nephrological department in precoma condition. The patient is ill with glomerulonephritis for 8 years. Complaints about increased fatigue, apathy, pain in muscles and joints, skin itching, ammonia smell from mouth. Clinical examination: edema of legs and face, enlarged liver. ABP - 190/120 mmHg. Residual nitrogen of blood - 148 mmol/L. Glomerular filtration rate - 12,0 ml/min. Urine analysis: specific gravity 1,003 - 1,005, daily diuresis - 360 ml. What is the initial mechanism that has caused the increase of ABP in the patient?

- a. increased secretion of glucocorticoids

- b. increased secretion of aldosterone
  - c. increased secretion of catecholamines
  - d. increased secretion of renin
  - e. increased concentration of angiotensin in blood
- 396.** Patient R., 39 years, delivered in nephrological department in precoma condition as a result of chronic renal failure. Residual nitrogen of blood - 148 mmol/L. Glomerular filtration rate - 12,0 ml/min. What chemical substance is not related to the waste products of protein metabolism?
- a. urea
  - b. ketone bodies
  - c. phenols
  - d. creatinine
  - e. ammonia
- 397.** Patient V., 19 years, complains of general asthenia, headaches, decreased appetite, thirst, frequent quinsies in anamnesis. Blood analysis: low RBC. Urea of blood - 10,7 mmol/L. ABP - 130/90 mmHg. Daily diuresis - 2600 ml. Urine specific gravity - 1,009 - 1,018, the amount of protein in the urine - 0,2 g/L. In urine sediment: single epithelial cells, leukocytes - 1-2 in field of vision, single RBC and hyaline cylinders. Glomerular filtration rate - 50 ml per minute. Name the pathology of kidneys.
- a. acute nephritic syndrome
  - b. nephritic syndrome
  - c. chronic renal failure
  - d. acute renal insufficiency
  - e. hypertensive syndrome
- 398.** Patient V., 10 years, complains of general asthenia, headaches, decreased appetite, thirst, frequent quinsies in anamnesis. Clinical examination revealed lag in physical development, pale and dry skins. Blood analysis: RBC -  $2,5 \cdot 10^{12}/L$ . Urea of blood - 10,7 mmol/L. ABP - 130/90 mmHg. Daily diuresis - 2600 ml. Urine specific gravity - 1,009 - 1,018, the amount of protein in the urine - 0,2 g/L. In urine sediment: single epithelial cells, leukocytes - 1-2 in field of vision, single RBC and hyaline cylinders. What pathogenetic mechanism caused the development of anaemia in the patient?
- a. decreased iron absorption
  - b. intravascular hemolysis of RBC
  - c. decreased erythropoietin synthesis
  - d. loss of RBC with urine
  - e. toxic influence of urea on the red marrow
- 399.** Patient V., 40 years, complains of general asthenia, headaches, decreased appetite, thirst, frequent quinsies in anamnesis. Urea of blood - 10,7 mmol/L. ABP - 130/90 mmHg. Daily diuresis - 2600 ml. Urine specific gravity - 1,009 - 1,018, the amount of protein in the urine - 0,2 g/L. In urine sediment: single epithelial cells, leukocytes - 1-2 in field of vision, single RBC and hyaline cylinders. What pathogenetic mechanism caused the increased concentration of urea in the blood of patient?
- a. decreased urea excretion in tubules
  - b. decreased urea filtration in kidneys
  - c. increased urea synthesis in organism
  - d. increased urea reabsorption in tubules
  - e. predominance of night diuresis
- 400.** What is the most likely cause of the combination of generalized edema, hypoalbuminemia, hypercholesterolemia, marked proteinuria, and fatty casts and oval fat bodies in the urine?
- a. Nephritic syndrome
  - b. Nephrotic syndrome
  - c. Acute renal failure
  - d. Renal tubular defect
  - e. Urinary tract infection
- 401.** Immunological mechanisms are participating in pathogenesis of different diseases. Which kidney disease from the given is caused by immunologic mechanisms?
- a. urinary stones
  - b. glomerulonephritis
  - c. pyelonephritis
  - d. polycystic kidney
  - e. kidney tumor
- 402.** In the patients with kidney diseases pathological components may be found in the urine. Which finding in urine analysis from the given reflects the disturbance of glomerular filtration?
- a. isosthenuria
  - b. leached RBC
  - c. aminoaciduria
  - d. glucosuria
  - e. decreased secretion of H<sup>+</sup> ions
- 403.** Quantitative changes of diuresis are frequently accompanying kidney pathology. Which mechanism from the given can result in polyuria?
- a. decrease of systolic BP lower than 60 mmHg
  - b. dehydration due to diarrhea
  - c. decreased vasopressin secretion
  - d. increased colloid and osmotic blood pressure
  - e. decreased number of functioning nephrons
- 404.** Kidney pathology sometimes is divided to glomerular and tubular pathology. Which finding in urine analysis from the given reflects the disturbed function of renal tubules?
- a. azotemia
  - b. oliguria
  - c. poorly -selective proteinuria
  - d. leached RBC in urine
  - e. polyuria
- 405.** Acute renal failure is a severe life-threatening condition. Choose pre-renal mechanism of acute renal failure development from the given:
- a. acute glomerulonephritis
  - b. thrombosis of renal vessels
  - c. acute pyelonephritis
  - d. cardiogenic shock
  - e. strictures of lower urinary ways
- 406.** Acute renal failure is a rapid loss of renal function due to damage to the kidneys. Choose intra-renal mechanism of acute renal failure development from the given:
- a. cardiogenic shock
  - b. disturbance in urine outflow
  - c. acute glomerulonephritis
  - d. dehydration due to fluid loss
  - e. crush syndrome
- 407.** Acute renal failure is a rapid loss of renal function due to damage to the kidneys. Choose post-renal mechanism of acute renal failure development from the given:
- a. tumor of urine bladder
  - b. acute glomerulonephritis
  - c. thrombosis of renal vessels
  - d. acute pyelonephritis
  - e. decreased ABP
- 408.** Protein can be found in the urine because of glomerular and tubular reasons. Which pathology from the given can cause tubular type of proteinuria?
- a. acute glomerulonephritis
  - b. chronic glomerulonephritis
  - c. pyelonephritis
  - d. diabetic nephropathy
  - e. systemic collagenous diseases
- 409.** Immune mechanisms are taking part in pathogenesis of kidney diseases. Decreased content of which blood component can prove immune mechanism of acute glomerulonephritis pathogenesis?
- a. complement
  - b. Ig A
  - c. Ig M
  - d. Ig G



- e. albumin
- 410.** Index of which laboratory finding can help you to differentiate between nephritic and nephrotic syndromes of kidney affection?
- a. edema

- b. hypertension
- c. oliguria
- d. proteinuria
- e. leukocyturia

#### PATHOLOGY OF ENDOCRINE SYSTEM. STRESS

**411.** Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of Turkish saddle. The patient has high blood glucose level, glucose is also present in the urine. What endocrine pathology can be suggested?

- a. Diabetes mellitus 1<sup>st</sup> type
- b. Diabetes mellitus 2<sup>nd</sup> type
- c. Cushing's disease
- d. Cushing's syndrome
- e. Diabetes insipidus

**412.** Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of Turkish saddle. The patient has high blood glucose level, glucose is also present in the urine. What is the reason of the patient's increased body weight?

- a. Hypersecretion of glucocorticoids
- b. Increased food consumption
- c. Hypersecretion of insulin
- d. Development of diabetes mellitus
- e. Postpartum obesity

**413.** Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of Turkish saddle. ABP – 150/85 mmHg. The patient has high blood glucose level; glucose is also present in the urine. Secondary diabetes mellitus is diagnosed. What is the mechanism of ABP increase?

- a. Development of hyperglycemia because of decreased insulin secretion
- b. Increased amount of blood volume because of vasopressin hypersecretion
- c. Increased secretion of catecholamines by adrenal medulla
- d. Increased secretion of renin because of kidneys ischemia
- e. High blood levels of cortizol and aldosterone

**414.** Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of Turkish saddle. ABP – 150/85 mmHg. The patient has high blood glucose level, diabetic type of sugar line at glucose tolerance test; glucose is also present in the urine. What causes change of glucose tolerance test?

- a. increased glycogenolysis in liver under glucocorticoids influence
- b. increased gluconeogenesis in liver under glucocorticoids influence
- c. inhibition of insulin secretion by beta-cells under glucocorticoids influence
- d. decreased sensitivity of muscle and adipose tissue to insulin under glucocorticoids influence
- e. increased glycogenolysis in muscles under glucocorticoids influence

**415.** Patient L. 30 years, in 3 months after childbirth gained weight - 7 kg per month and her attention was drawn by unusual location of fat: in the neck and face. X-ray examination revealed increased size of Turkish saddle. ABP – 150/85 mmHg. The patient has high blood glucose level; glucose is also present in the urine. What hormones blood level should be researched in order to more accurate diagnosing?

- a. Cortizol and insulin

- b. Insulin and glucagon
- c. GH and insulinlike growth factor I
- d. renin and angiotensin II
- e. ACTH and cortizol

**416.** Patient D., 35 years, complains about general asthenia, drowse, apathy, headache, pains in back, hands and legs, violation of menstrual cycle, increased body weight. At examination: "moon" face, truncal obesity, purple striae on the skin of abdomen, thin extremities and fingers. Why the patient has thin extremities together with truncal obesity?

- a. increased catabolism of protein in muscles
- b. development of insulin resistance in muscles
- c. development of "buffalo hump"
- d. violation of proteins absorption in GIT
- e. development of aminoaciduria

**417.** Boy, 14 years, of proportionally build figure, growth 104 cm, secondary sex signs are not expressed. Gap in growth and physical development was noticed when he was 4 years old. About what endocrine pathology should you think?

- a. Cushing's disease
- b. hypothyroidism
- c. diabetes insipidus
- d. hypophysial nanism
- e. hypophysial cachexia

**418.** Boy, 14 years, of proportionally build figure, growth 104 cm, second sex signs are not expressed. Gap in growth and physical development was noticed when he was 4 years old. Hyposecretion of which hormone can cause the development of this pathology?

- a. vasopressin
- b. gonadotropins
- c. ACTH
- d. glucocorticoids
- e. growth hormone

**419.** Mother of a boy of 14 years complains of gap in growth and physical development since he was 4 years old. Boy is of proportionally build figure, growth 104 cm, secondary sex signs are not expressed. What has caused the gap in growth?

- a. Decreased GH concentration in blood
- b. Violation of synthesis of insulin-like growth factor I
- c. Increased secretion of somatostatin
- d. Decreased affinity of cell receptors to GH
- e. Decreased concentration of gonadotropins in blood

**420.** Patient V., 46 years, during 2 years complains of headache, numbness in hands, asthenia, pain in joints, thirst. Clinical examination: non-proportionally increased hands, feet, nose, ears. Blood analysis - hyperglycemia, violation of glucose tolerance test, high cholesterol level. What endocrine pathology should you suggest?

- a. hypophysial gigantism
- b. diabetes insipidus
- c. Cushing's disease
- d. acromegaly
- e. diabetes mellitus 1 type

**421.** Patient V., 46 years, during 2 years complains of headache, numbness in hands, asthenia, pain in joints, thirst. He has noticed that he needed buy shoes and gloves of bigger size three times. Blood analysis - hyperglycemia, violation of glucose tolerance test, high cholesterol level. What is the main reason of this pathology development?

- a. hypersecretion of growth hormone

- b. hypersecretion of anterior pituitary hormones
  - c. hypersecretion of insulin
  - d. hyposecretion of insulin
  - e. hypersecretion of glucocorticoids
- 422.** Patient V., 46 years, during 2 years complains of headache, numbness in hands, asthenia, pain in joints, thirst. He has noticed that he needed buy shoes and gloves of bigger size three times. Blood analysis - hyperglycemia, violation of glucose tolerance test, high cholesterol level. What is the reason of non-proportional increase of single parts of a body of a patient?
- a. increased sensitivity of bones' s tissue to GH
  - b. development of age-specific osteodystrophy
  - c. increased sensitivity of separate tissues to insulin
  - d. development of chronic inflammation of cartilages and joints
  - e. cartilage tissue proliferation under influence of GH
- 423.** Patient V., 46 years, during 2 years complains of headache, numbness in hands, asthenia, pain in joints, thirst. He has noticed that he needed buy shoes and gloves of bigger size three times. Blood analysis - hyperglycemia, violation of glucose tolerance test, high cholesterol level. What causes the development of peripheral neuropathy at patient, that is manifested by numbness of extremities?
- a. compression of peripheral nerves by proliferating cartilaginous tissue
  - b. hyperglycemia, that leads to diabetic neuropathy
  - c. ischemic injury of extremities' tissues
  - d. microcirculation block in the region of peripheral nerve tissue
  - e. violation of blood supply of extremities because of atherosclerosis
- 424.** Patient K., 35 years, 2 months ago had a flu with the expressed intoxication. Now he complains of constant thirst, decreased appetite, headache, irritability. He drinks about 6 L of water per a day. Daily diuresis is increased, urine is discoloured, without pathologic components, urine specific gravity - 1,005. About what endocrine pathology should you think?
- a. Cushing's disease
  - b. hypothyroidism
  - c. hyperthyroidism
  - d. diabetes mellitus of 1 type
  - e. diabetes insipidus
- 425.** Patient K., 35 years, 2 months ago had flu with the expressed intoxication. Now he complains of constant thirst, decreased appetite, headache, irritability. He drinks about 6 L of water per a day. Daily diuresis is increased, urine is discoloured, without pathologic components, urine specific gravity - 1,005. Pathology of what endocrine gland can you suggest?
- a. posterior pituitary
  - b. anterior pituitary
  - c. adenohipophysis
  - d. adrenal glands
  - e. thyroid gland
- 426.** A 20-year-old man complains of excessive thirst and abundant urination (up to 10 L for 24 hours). Urine specific gravity -1005. Blood glucose concentration is normal, glucose is absent in the urine. What is the reason of polyuria development?
- a. increased blood glucose concentration
  - b. decreased blood oncotic pressure
  - c. decreased sensitivity of epithelium of renal tubules to influence of ADH
  - d. increased osmotic pressure of urine
  - e. decreased concentration of vasopressin on blood
- 427.** A 20-year-old man complains of excessive thirst and abundant urination (up to 10 L for 24 hours). Urine specific gravity -1005. Blood glucose concentration is normal, glucose

- is absent in the urine. What is the reason of low urine specific gravity?
- a. Excess of water intake
  - b. Decreased electrolytes concentration in blood
  - c. Violation of water reabsorption in kidneys
  - d. Increased filtration pressure in kidneys
  - e. Decreased oncotic pressure of plasma
- 428.** A 34-year-old woman complains of increased irritability, perspiration, weakness, loss of body weight, tremor of the limbs, increased heart rate and exophthalmia. Clinical examination: body temperature 37,5<sup>0</sup>C, heart rate 122 bpm, thyroid gland is increased in size. What endocrine pathology can be suggested?
- a. hypothyroidism
  - b. hyperthyroidism
  - c. diabetes insipidus
  - d. Cushing's basophilism
  - e. diabetes mellitus type 1
- 429.** A 34-year-old woman complains of increased irritability, perspiration, weakness, loss of body weight, tremor of the limbs, increased heart rate and exophthalmia. Clinical examination: body temperature 37,5<sup>0</sup>C, heart rate 122 bpm, thyroid gland is increased in size. Choose the level of hormones typical for this endocrine disorder?
- a. high TSH, T3 and T4
  - b. high TSH, low T3 and T4
  - c. low TSH, high T3, low T4
  - d. low TSH and T3, high T4
  - e. low TSH, high T3 and T4
- 430.** Patient K., 47 years, is delivered with complaints about increased nervous excitability, violation of sleep, palpitation, sudden attacks of muscle weakness, hyperhidrosis. Clinical examination: exophthalmia, skin is humid and hot; there is tremor of hands, increased reflexes. Temperature of body is 37,5 C, heart rate is 150 bpm. ECG revealed the signs of sinus tachycardia. What is the mechanism of sinus tachycardia development?
- a. Stimulation of myocardial adrenoreceptors under influence of T3 and T4
  - b. Stimulation of myocardial adrenoreceptors under influence of catecholamines
  - c. Decreased tone of n.vagus under influence of T3 and T4
  - d. Increased tone of sympathetic innervation of heart under influence of catecholamines
  - e. Increased level of catecholamines under influence of T3 and T4
- 431.** Patient M., 49 years, in 1 year after surgical treatment of thyrotoxicosis presents with weight gain, subjective memory loss, dry skin, and cold intolerance. On examination, she is found to have a goiter, body temperature is 35,2 C. What endocrine pathology should you suggest?
- a. diabetes insipidus
  - b. Cushing's disease
  - c. hypophysial cachexia
  - d. Addison's disease
  - e. myxedema
- 432.** Patient S., 59 years, complains of weakness, weight gain despite a loss of appetite and cold intolerance. Clinical examination: dry and rough skin, husky voice, puffy look of the face, diffuse edema, body temperature – 34.7 C, ABP 110/70 mmHg. What is the reason of edema development in the following clinical situation?
- a. Accumulation of mucopolysaccharides in tissues
  - b. Development of regional lymphostasis
  - c. Decreased synthesis of albumins in liver
  - d. Increased water retention due to kidneys affection
  - e. Increased penetration of capillaries
- 433.** Patient S., 59 years, complains of weakness, weight gain despite a loss of appetite and cold intolerance. Clinical

examination: dry and rough skin, husky voice, puffy look of the face, diffuse edema, body temperature – 34.7 C, ABP 110/70 mmHg, heart rate 60 bpm. What is the reason of low body temperature?

- violation of glucocorticoids synthesis
- anterior pituitary affection
- posterior pituitary affection
- decrease of basal metabolic rate
- decrease of ABP

**434.** Patient S., 32 years, complains of asthenia, fatiguability, decreased capacity for work, increased body weight, violation of menstrual cycle. Heart rate 65 bpm, ABP 105/60 mmHg. Thyroid gland is evenly enlarged, dense, and painless. Diagnosis: Hashimoto's thyroiditis. Name the main reason of thyroid gland enlargement in this pathology.

- Autoimmune inflammation
- Hormone-producing tumour development
- Sclerotic processes in thyroid gland
- Regional lymphadenitis
- Iodine deficiency

**435.** A woman with primary hyperparathyroidism has periodically repeated attacks of renal colic. Ultrasound examination shows presence of small stones in her kidneys. Name the cause of stones formations.

- Hypercholesterolemia
- Hyperuricemia
- Hyperkalemia
- Hyperphosphatemia
- Hypercalcemia

**436.** Patient F. ill with goiter for a long period of time was operated. The attacks of convulsions appeared in the patient after subtotal resection of thyroid gland. What hormone deficiency may cause this complication?

- Growth hormone
- T3
- T4
- Parathyroid hormone
- Calcitonin

**437.** Patient S., 32 years, complaints about asthenia, fatiguability, decreased capacity for work, increased body weight, violation of menstrual cycle. Heart rate 65 bpm, ABP 105/60 mmHg. Thyroid gland is evenly enlarged, dense, painless. The same disease of thyroid gland was diagnosed in her mother and sister. What changes of concentration of biologically active substances will be revealed in the patient's blood?

- increased concentration of T3
- decreased concentration of iodine
- decreased concentration of TSH
- decreased concentration of TRH
- anti-thyroid antibodies

**438.** Patient S., 32 years, complaints about asthenia, fatiguability, decreased capacity for work, increased body weight, violation of menstrual cycle. Heart rate 65 bpm, ABP 105/60 mmHg. Thyroid gland is evenly enlarged, dense, painless. The same disease of thyroid gland was diagnosed in her mother and sister. What is the reason of decreased ABP?

- Decreased metabolism in myocardium because of lack of thyroid hormones
- Increased tone of parasympathetic nervous system
- Decreased metabolism of proteins because of glucocorticoids hyposecretion
- Violation of ABB due to hypoaldosteronism
- Decreased secretion of catecholamines

**439.** Patient S., 32 years, complaints about asthenia, fatiguability, decreased capacity for work, increased body weight, violation of menstrual cycle. Heart rate 65 bpm, ABP 105/60 mmHg. Thyroid gland is evenly enlarged, dense, painless. The same disease of thyroid gland was diagnosed in

her mother and sister. What caused the violation of menstrual cycle and infertility in the patient?

- Early beginning of climax
- Violation of secretion of gonadotropic hormones
- Violation of secretion of gonadotropin-releasing hormone
- Autoimmune affection of ovaries
- Violation of thyroid hormones secretion

**440.** Patient N., 51 years, has been ill with tuberculosis for 10 years. He is abusing alcohol. He complains about irritability, quick fatiguability, muscle asthenia, decreased body weight, orthostatic faints. Objectively: hyperpigmentation of skin, ABP 90/60 mmHg. Laboratory data: glucose of blood 2,2 mmol/L, K - 6,1 mmol/L; Na - 110 mmol/L. About what pathology should you think?

- Diabetes insipidus
- Addison's disease
- Hypophysical cachexia
- Hypothyroidism
- Alcoholic affection of liver

**441.** Patient N., 51 years, for the past 10 years is ill with miliary pulmonary tuberculosis. His latest complaints were irritability, quick fatiguability, muscle asthenia, decreased body weight, orthostatic faints. Nutrition is decreased, hyperpigmentation of skin in natural wrinkles, ABP 90/60 mmHg. Laboratory data: glucose of blood 2,2 mmol/L, K - 6,1 mmol/L; Na - 110 mmol/L. What has caused the development of the disease at this patient?

- Alcoholic affection of liver
- Metastases or undiagnosed tumour
- Chronic alcoholic intoxication
- Tuberculous affection of adrenal glands
- Autoimmune affection of liver

**442.** Patient N., 51 years, for the past 10 years is ill with miliary pulmonary tuberculosis. His latest complaints were irritability, quick fatiguability, muscle asthenia, decreased body weight, orthostatic faints. Nutrition is decreased, hyperpigmentation of skin in natural wrinkles, ABP 90/60 mmHg. Laboratory data: glucose of blood 2,2 mmol/L, K - 6,1 mmol/L; Na - 110 mmol/L. The causes of muscle weakness development are the following factors EXCEPT:

- hypoglycemia
- decreased muscular mass
- decreased secretion of ACTH
- violation of electrolyte balance
- deficit of aldosterone

**443.** Patient N., 51 years, for the past 10 years is ill with miliary pulmonary tuberculosis. His latest complaints were irritability, quick fatiguability, muscle asthenia, decreased body weight, orthostatic faints. Nutrition is decreased, hyperpigmentation of skin in natural wrinkles, ABP 90/60 mmHg. Laboratory data: glucose of blood 2,2 mmol/L, K - 6,1 mmol/L; Na - 110 mmol/L. What is the reason of ABP decrease in the patient?

- decreased synthesis of glucocorticoids
- hypovolemia
- affection of brain vasomotor center
- asthenia
- alcohol abuse

**444.** Patient F., 26 years, complains about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of crawling, pain in the heart region. ABP 190/110 mmHg. Borders of heart are widened to the left. Examination of the eye grounds has revealed spasm of arterioles and expanded venules. Blood analysis: low renin activity, K - 2,9 mmol/L, Na - 165 mmol/L. About what endocrine pathology should you think?

- diabetes insipidus
- Addison's disease
- Graves' disease

- d. pheochromocytoma  
e. Conn's disease
- 445.** Patient F., 26 years, complains about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of crawling, pain in the heart region. ABP 190/110 mmHg. Borders of heart are widened to the left. Examination of the eye grounds has revealed spasm of arterioles and expanded venules. Blood analysis: low renin activity, K - 2,9 mmol/L, Na - 165 mmol/L. What is the reason of the diseasecaused the development of this disease?
- autoimmune affection of kidneys
  - ischemic disease of heart
  - affection of pancreatic islets
  - tumour of adrenal medulla
  - tumour of adrenal cortex
- 446.** Patient F., 26 years, complains about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of crawling, pain in the heart region. ABP 190/110 mmHg. Borders of heart are widened to the left. Examination of the eye grounds has revealed spasm of arterioles and expanded venules. Blood analysis: low renin activity, K - 2,9 mmol/L, Na - 165 mmol/L. How can you explain the increase of ABP together with decreased activity of renin in the patient's plasma?
- hypernatremia
  - hypokalemia
  - hypertension
  - polydipsia
  - spasm of arteriole
- 447.** Patient F., 26 years, complains about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of crawling, pain in the heart region. ABP 190/110 mmHg. Borders of heart are widened to the left. Examination of the eye grounds has revealed spasm of arterioles and expanded venules. Blood analysis: low renin activity, K - 2,9 mmol/L, Na - 165 mmol/L. What is the reason of ABP increase in the patient?
- hypersecretion of catecholamines
  - hyperactivation of angiotensin-converting enzyme
  - increased formation of angiotensin II
  - increased Na ions concentration
  - hypersecretion of aldosterone
- 448.** Patient F., 26 years, complains about muscle asthenia, headaches, thirst, night urination, convulsions of muscles of extremities and feeling of crawling, pain in the heart region. ABP 190/110 mmHg. Borders of heart are widened to the left. Blood analysis: low renin activity, K - 2,9 mmol/L, Na - 165 mmol/L. What is the reason of unnormal concentration of Na in the patient's blood?
- violation of its filtration in kidneys
  - decreased reabsorption in kidneys because of aldosterone deficiency
  - increased reabsorption in kidneys due to excess of aldosterone
  - increased Na intake with food
  - increased reabsorption in kidneys due to aldosterone deficiency
- 449.** Patient V, 19 years, is delivered to the hospital with syndrome of acute stomach. She has troublesome pains in stomach without clear localisation for 1 year. Pains are not connected with food consumption and are accompanied by tachycardia, headache. ABP 250/110 mmHg, after palpation of kidneys ABP increased to 300/130 mmHg. Intravenous introduction of phentolamine caused the normalisation of ABP. Concentration of glucose in blood 7,5 mmol/L, Na - 135 mmol/L. About what endocrine pathology should you think?
- acute adrenal failure
  - Cushing's syndrome
  - tumour of adrenal medulla
  - hypothyroidism
  - Conn's disease
- 450.** Patient V, 19 years, is delivered to the hospital with syndrome of acute stomach. She has troublesome pains in stomach without clear localisation for 1 year. Pains are not connected with food consumption and are accompanied by tachycardia, headache. ABP 250/110 mmHg, after palpation of kidneys ABP increased to 300/130 mmHg. Intravenous introduction of phentolamine caused the normalisation of ABP. Concentration of glucose in blood 7,5 mmol/L, Na - 135 mmol/L. Name the pathology.
- pheochromocytoma
  - perforated stomach ulcer
  - hypertension stroke
  - myocardial infarction
  - acute appendicitis
- 451.** Patient V, 19 years, is delivered to the hospital with syndrome of acute stomach. She has troublesome pains in stomach without clear localisation for 1 year. Pains are not connected with food consumption and are accompanied by tachycardia, headache. ABP 250/110 mmHg, after palpation of kidneys ABP increased to 300/130 mmHg. Intravenous introduction of phentolamine caused the normalisation of ABP. Concentration of glucose in blood 7,5 mmol/L, Na - 135 mmol/L. What diagnostic test should be done for more accurate diagnosis?
- scanning of thyroid gland
  - electrocardiogram
  - tomography of hypophysis
  - angiography of brain vessels
  - tomography of adrenals
- 452.** Patient V, 19 years, is delivered to the hospital with syndrome of acute stomach. She has troublesome pains in stomach without clear localisation for 1 year. Pains are not connected with food consumption and are accompanied by tachycardia, headache. ABP 250/110 mmHg, after palpation of kidneys ABP increased to 300/130 mmHg. Intravenous introduction of phentolamine caused the normalisation of ABP. Concentration of glucose in blood 7,5 mmol/L, Na - 135 mmol/L. What is the reason of the increased ABP in the patient?
- hypersecretion of renin
  - hypersecretion of aldosterone
  - hypersecretion of glucocorticoids
  - hypersecretion of catecholamines
  - hypernatremia
- 453.** Patient V, 19 years, is delivered to the hospital with syndrome of acute stomach. She has troublesome pains in stomach without clear localisation for 1 year. Pains are not connected with food consumption and are accompanied by tachycardia, headache. ABP 250/110 mmHg, after palpation of kidneys ABP increased to 300/130 mmHg. Concentration of glucose in blood 7,5 mmol/L, Na - 135 mmol/L. What caused the increase of blood glucose in the patient?
- hyposecretion of insulin
  - hypersecretion of glucocorticoids
  - hypersecretion of glucagon
  - hypersecretion of somatotropin
  - hypersecretion of catecholamines
- 454.** Patient N., 52 years is ill with severe type of bronchial asthma. On prescription by a doctor had a hormone therapy for a long time, in the last month - 30 mg of prednisolon per day. Following an advice of her relatives she began to use herbal pills instead of drug therapy. On the second day condition suddenly worsened: expressed weakness, pains in stomach, liquid stool, attacks of asthma; ABP 90/50 mmHg. What is the main pathogenetic mechanism of this condition development?
- Decreased synthesis of endogenous glucocorticoids
  - Increased bronchospasm because of long use of glucocorticoids

- c. Development of gastric bleeding because of long use of glucocorticoids
  - d. Development of acute cardiac insufficiency due to glucocorticoid therapy
  - e. Violation of glomerular filtration rate due to decreased ABP
- 455.** Patient N., 52 years is ill with severe type of bronchial asthma. Doctor had prescribed hormonal therapy for a long time, in the last month - 30 mg of prednisolon per day. What complications can result from the long-term therapy with glucocorticoids?
- a. peptic ulcer
  - b. Cushing's disease
  - c. primary immunodeficiency
  - d. arterial hypotension
  - e. acute adrenal failure
- 456.** Patient N., 52 years is ill with severe type of bronchial asthma. Doctor had prescribed hormonal therapy for a long time, in the last month - 30 mg of prednisolon per day. Why was the glucocorticoid therapy prescribed to a patient?
- a. For increased antitoxic effect of basic therapy
  - b. For antibacterial effect of basic therapy
  - c. For stimulation of immunity
  - d. For immunosuppression
  - e. For stimulation of endogenous steroids secretion
- 457.** Patient N., 52 years is ill with severe type of bronchial asthma. Doctor had prescribed hormonal therapy for a long time, in the last month - 30 mg of prednisolon per day. Which changes in blood picture may appear due to long-term use of glucocorticoids?
- a. anaemia
  - b. eosinopenia
  - c. lymphocytosis
  - d. pancytopenia
  - e. agranulocytosis
- 458.** Why a patient, who was prescribed prednisolon for rheumatoid arthritis treatment for a long time should avoid contacts with infectious patients?
- a. Because of secondary immunodeficiency development
  - b. Because of arthritis exacerbation risk
  - c. Because of thromboembolic complications risk
  - d. Because of lymphocytosis development
  - e. Because of interferon blockade
- 459.** Conn's syndrome was diagnosed in a patient who complained of muscular weakness, increased urination in the night and increased ABP. What correlation between the given blood parameters is typical for this syndrome?
- a. High rennin, high aldosterone, high potassium level
  - b. Low rennin, high aldosterone, high potassium level
  - c. Low rennin, high aldosterone, low potassium level
  - d. Low rennin, low aldosterone, low potassium level
  - e. High rennin, low aldosterone, high potassium level
- 460.** A female patient aged 44 complains of general malaise, rapidly increased body weight, growth of hair on the face, amenorrhea, ABP - 165/100 mm Hg. What kind of endocrine disorder can lead to obesity in this case?
- a. Hypercortizolism
  - b. Hypofunction of adrenal glands
  - c. Hyperparathyroidism
  - d. Hypergonadism
  - e. Hyperaldosteronism
- 461.** Arterial hypotension, muscular weakness and periodic convulsions appeared in the patient who suffers from cirrhosis with ascites. Na blood level is higher; K blood level is lower than normal. What kind of endocrine disorder can you suppose in the given clinical situation?
- a. Secondary hyperaldosteronism
  - b. Hypofunction of adrenal glands
  - c. Hyperparathyroidism
  - d. Hypergonadism
  - e. Primary hyperaldosteronism
- 462.** Patient M., 64 years, ill with hyperthyroidism. Now she is in cardiological ward with complaints about asthenia, high irritability, swelling of jugular veins, painfulness in the region of liver. How may main disease be connected with the cardiac insufficiency?
- a. Increased excitability of myocardium
  - b. Development of functional overload of heart
  - c. Damage of myocardium by excess of thyroid hormones
  - d. Development of stable spasm of coronary arteries
  - e. Violation of heart energy supply
- 463.** A laboratory rat was immobilized for 6 hours daily for 5 days. Presence of ulcers on mucous membrane of a stomach and a duodenum, loss of weight and presence of dystrophic changes in the thymus tissue, hypertrophy of adrenal glands cortex are revealed. Development of what process does the revealed changes verify?
- a. Complications of Cushing syndrome
  - b. Development of Cushing illness
  - c. General adaptation syndrome
  - d. Acute adrenal failure
  - e. Autoimmune pathology
- 464.** A laboratory rat was immobilized for 6 hours daily for 5 days. Presence of ulcers on mucous membrane of a stomach and a duodenum, loss of weight and presence of dystrophic changes in the thymus tissue, hypertrophy of adrenal glands cortex are revealed. Name the reason of mucous membrane ulcer development?
- a. Toxic action of glucocorticoids metabolites on a vessels wall
  - b. Toxic action of catecholamines metabolites on a vessels wall
  - c. Excessive production of proteolytic enzymes
  - d. Excessive production of reaginic type antibodies
  - e. Excessive production of glucocorticoids and adrenaline
- 465.** A laboratory rat was immobilized for 6 hours daily for 5 days. Presence of ulcers on mucous membrane of a stomach and a duodenum, loss of weight and presence of dystrophic changes in the thymus tissue, hypertrophy of adrenal glands cortex are revealed. Blood analysis revealed high cortizol level. Choose the probable change of leukocytic formula in this case.
- a. lymphocytosis
  - b. neutrophilia
  - c. eosinophilia
  - d. eosinopenia
  - e. monocytosis
- 466.** A porpoise was immobilized for 5 hours. After 2 hours of experiment the arterial hypotension, hypothermia, skin hemorrhages were observed. In blood: low glucose level, negative nitrogenous balance, eosinopenia. Name the stage of stress:
- a. Alarm
  - b. Resistance
  - c. Exhaustion
  - d. Long-term adaptation
  - e. Urgent adaptation
- 467.** A porpoise was immobilized for 5 hours. After 2 hours of experiment the arterial hypotension, hypothermia, skin hemorrhages were observed. In blood: low glucose level, negative nitrogenous balance, eosinopenia. Name the cause of negative nitrogenous balance:
- a. Reduction of exogenous proteins intake due to immobilization
  - b. Strengthening of anabolic activity
  - c. Strengthening of neutrophiles' phagocytes activity

- d. Strengthening of glucocorticoids catabolic activity
- e. Decrease of phagocytes activity

**468.** A porpoise was immobilized for 5 hours. After 2 hours of experiment the arterial hypotension, hypothermia, skin hemorrhages were observed. In blood: low glucose level, negative nitrogenous balance, eosinopenia. Name the reason of hemorrhages development:

- a. Strengthening of catabolism in a vascular wall
- b. Increased vessels wall permeability by catecholamines
- c. Destruction of a vascular wall by glucocorticoids metabolites
- d. Development of cytotoxic allergic reaction with development of a thrombocytopenia
- e. destruction of vessels walls by complexes antigen/antibody

**469.** A porpoise was immobilized for 5 hours. After 2 hours of experiment the arterial hypotension, hypothermia, skin hemorrhages were observed. In blood: low glucose level, negative nitrogenous balance, eosinopenia. Name the cause of eosinopenia:

- a. Increased blood hemolysis
- b. Destruction of eosinophiles in blood
- c. Eosinophiles migration to the tissues
- d. Depression of granulocytes maturation
- e. Disturbance of eosinophiles output from a bone marrow

**470.** Employees of space flights control centre showed increased number of stenocardias and heart attacks cases. 63 % employees have moderate hyperglycemia, 17% have ulcer of a stomach and a duodenum. Surveyed people had no risk factors increasing probability of a heart attack, such as smoking,

obesity, diabetes, increased blood cholesterol level. What is the most probable mechanism that causes myocardium injury at employees?

- a. Injury of a myocardium by glucocorticoids
- b. Injury of heart valves by antigenic complexes
- c. Increased glucocorticoids secretion
- d. Coronary vessels spasm under catecholamines influence
- e. A high level of glycemia with damage of vessels

**471.** Employees of space flights control centre showed increased number of stenocardias and heart attacks cases. 63 % employees have moderate hyperglycemia (glucose level - 8,5 mmol/L). What is the most probable mechanism that provides hyperglycemia development at employees?

- a. Increased exogenous glucose intake
- b. Increase of gluconeogenesis and glycolysis
- c. Development of a 1<sup>st</sup> type diabetes
- d. Development of a 2<sup>nd</sup> type diabetes
- e. Increased tissue resistance to glucose

**472.** Employees of space flights control centre showed increased number of stenocardias and heart attacks cases. 63 % employees have moderate hyperglycemia, 17% have ulcer of a stomach and a duodenum. The others 20 % of employees complained about decreased work capacity, progressing weakness. What is most probable reason of the immune status of employees' changes?

- a. Increased of T-helpers quantity
- b. Increased T-lymphocytes cytotoxic activity
- c. Increased B-lymphocytes quantity in blood
- d. Increased IgG concentration in blood
- e. Decreased IgM and IgG concentration in blood

#### PATHOLOGY OF NERVOUS SYSTEM

**473.** Patient N., 49 years, is delivered in hospital with complaints on headache, vomiting. Psychataxia, ABP 140/90 mmHg, there is limitation of voluntary movements in the left extremities. Tone of muscles in the left hand and leg is increased according to spastic type. There are increased local tendinous reflexes, pathologic reflexes. Choose the most possible diagnosis of the pathology at the patient.

- a. Hemorrhagic stroke
- b. Meningitis
- c. Cardiac infarction
- d. Ischemic stroke
- e. Gastric bleeding

**474.** Patient N., 49 years, is delivered in neurology unit. There is limitation of voluntary movements in the left extremities, more in a hand. Tone of muscles in the left hand and leg is increased according to spastic type. There are increased local tendinous reflexes, pathologic reflexes. How can you characterise the neurologic disorders at a patient?

- a. Peripheral paresis
- b. Extrapyraxidal paresis
- c. Myasthenia
- d. Ataxia
- e. Central paresis

**475.** Patient N., 49 years, with stroke. There is limitation of voluntary movements in the left extremities, increased tone of muscles in the left hand and leg according to spastic type, increased local tendinous reflexes, and pathologic reflexes. What mechanism caused the development of muscle hypertonus and hyperreflexia at a patient?

- a. activation of motoneurons cause of stroke
- b. activation of excitatory influences from the nidus of stroke
- c. activation of synaptic impulse transmission
- d. decreased impeding descending influences
- e. inhibition of cerebral cortex motoneurons

**476.** Patient C., 22 years, came to neuropathologist with complaints about diplopy of text when reading for a long time,

quick fatiguability of mimic muscles, problems with chewing and swallowing. Diagnostic tests revealed asthenia of oculomotor and masticatory muscles. At electromyography there is decreased amplitude of action potential. How can you characterise the neurologic disorders at a patient?

- a. Central paresis
- b. Peripheral paresis
- c. Extrapyraxidal paresis
- d. Myasthenia
- e. Ataxia

**477.** Patient C., 22 years, diagnostic tests revealed asthenia of oculomotor and masticatory muscles. At electromyography there is decreased amplitude of action potential. After proserin injection (blocker of acetylcholinesterase) there is regressing of all symptoms in 30 minutes. What affection of nervous system has caused this pathology at a patient?

- a. affection of pyramidal neurones or their axons
- b. violation of synaptic impulse transmission
- c. affection of motoneurons of spinal cord or their axons
- d. affection of extrapyramidal neurones
- e. affection of cerebral cortex neurones

**478.** Patient C., 22 years, came to neuropathologist with complaints about diplopy of text when reading for a long time, quick fatiguability of mimic muscles, problems with chewing and swallowing. Diagnostic tests revealed asthenia of oculomotor and masticatory muscles. After proserin injection (blocker of acetylcholinesterase) there is regressing of all symptoms in 30 minutes. At electromyography there is decreased amplitude of action potential. What mechanism has caused the development of muscle asthenia in this clinical situation?

- a. activation of impeding descending influences
- b. inhibition of motoneurons of spinal cord or their axons
- c. violation of contractile muscle function

- d. inhibition of synaptic impulse transmission
  - e. inhibition of motoneurons of cerebral cortex
- 479.** Patient C., 22 years, at diagnostic tests there is asthenia of oculomotor and masticatory muscles. At electromyography there is decreased amplitude of action potential. After injection of proserin (blocker of acetylcholinesterase) there is regressing of all symptoms in 30 minutes. What caused the development of this pathology at a patient?
- a. block of acetylcholine receptors
  - b. damage of motoneurons
  - c. violation of conduction by the nervous cells
  - d. violation of muscle membrane polarisation
  - e. lack of ATP in muscles
- 480.** Patient L., 40 years, a month ago got the trauma of right thigh. At the examination of the neurologic status: active movements in right leg are limited because of severe pain, volume of muscles on the right leg is on 2 cm lesser, then on the left, Achilles and knee reflexes on the right side are absent. There is decreased proprioceptive sensitivity on the right leg in the region of foot. How can you characterise the neurologic disorders at a patient?
- a. Central paresis
  - b. Peripheral paresis
  - c. Extrapyrarnidal paresis
  - d. Myasthenia
  - e. Ataxia
- 481.** At the examination of the neurologic status at patient L., 40 years, it is revealed that volume of muscles on the right leg is on 2 cm lesser, then on the left, Achilles and knee reflexes on the right side are absent, there is termhypesthesia and hypalgesia on the external side of right leg, loss of proprioceptive sensitivity in the region of foot. What part of motor analyser is damaged at a patient?
- a. Pyramidal neurones or their axons
  - b. Motoneurons of spinal cord or their axons
  - c. Extrapyrarnidal neurones
  - d. Neurones of cerebral cortex
  - e. Peripheral nerves
- 482.** Patient L., 40 years, a month ago got the trauma of right thigh. At the examination of the neurologic status: active movements in right leg are limited because of severe pain, volume of muscles on the right leg is on 2 cm lesser, then on the left, Achilles and knee reflexes on the right side are absent, right leg is cyanotic. There is decreased proprioceptive sensitivity on the right leg in the region of foot. What mechanism has caused the absence of normal reflexes?
- a. inhibition of motoneurons of spinal cord
  - b. violation of synaptic impulse transmission
  - c. violation of excitation conduction
  - d. activation of excitatory influences
  - e. violation of irritation perception
- 483.** Patient L., 40 years in a month after the trauma of right thigh volume of muscles on the right leg is on 2 cm lesser, then on the left one, active movements in all joints of right leg are limited because of expressed pain syndrome, there is decreased pulsation and cyanosis on the right leg. What mechanism caused the decreased volume of muscles on the affected extremity?
- a. Posttraumatic violation of blood supply
  - b. Detraining of muscles
  - c. Absence of tonic impulsation from motoneurons
  - d. Decreased trophic influence of nervous system
  - e. Pain syndrome
- 484.** At the examination of the neurologic status at patient L., 40 years, it is revealed that active movements in all joints of right leg are limited because of expressed pain syndrome, termhypesthesia and hypalgesia on the external side of right leg, loss of proprioceptive sensitivity in the region of

- foot. What mechanism caused the violations of sensitivity at a patient?
- a. Posttraumatic violation of activity of receptors
  - b. Violation of impulse transmission by sensitive nervous fibres
  - c. Pain inhibition of sensitive nervous centres
  - d. Violation of sensitive receptors blood supply
  - e. Activation of protective antinociceptive system of brain
- 485.** Patient S., 37 years, in the last time notice progressing increased weakness in the lower extremities, pains in sural muscles. Active movements in lower extremities are absent, muscular tone and tendoperiosteal reflexes are increased. How can you characterise the neurologic disorders in the patient?
- a. Extrapyrarnidal paralysis
  - b. Myasthenia
  - c. Central paralysis
  - d. Peripheral paralysis
  - e. Ataxia
- 486.** At the examination of the neurologic status at patient S., 37 years, it is revealed absence of active movements in lower extremities, increased muscular tone, pathologic reflexes, expansion of reflexogenic zones. What mechanism caused the muscular hypertonus?
- a. decreased impeding descending influences on neurones of spinal cord
  - b. activation of cerebral cortex neurones
  - c. increased excitability of sensitive receptors
  - d. activation of synaptic impulse transmission
  - e. inhibition of cerebral cortex neurones
- 487.** Half spinal cord transection was done at frog at the level of thoracic part of on the right. What violation of central nervous system develops at this damage?
- a. Spinal shock
  - b. Brown-Sequard syndrome
  - c. Peripheral paralysis
  - d. Inflammatory edema of spinal cord
  - e. Pain syndrome
- 488.** Half spinal cord transection was done at frog at the level of thoracic part of on the right. What neurological signs are on the side of affection?
- a. Central paralysis
  - b. Hyperesthesia
  - c. Absence of pain and temperature sensitivity
  - d. Areflexia
  - e. Hypesthesia
- 489.** Half spinal cord transection was done at frog at the level of thoracic part of on the right. What neurological signs are on the opposite side?
- a. Central paralysis
  - b. Hyperesthesia
  - c. Hyperpathia
  - d. Areflexia
  - e. Absence of pain and temperature sensitivity
- 490.** Modelling of syndrome of Brown-Sequard was done by half spinal cord transection at the level of thoracic part in the frog. What is the reason of different signs of neurological disorders in the lower limbs?
- a. Crossing of sensitive conduction tracts
  - b. Crossing of motor conduction tracts
  - c. Pain irritation on the side of affection
  - d. Violation of impeding descending influences
  - e. Shock inhibition of CNS neurones
- 491.** Patient R., in four months after old stroke is delivered to hospital with the signs of central paralysis. Movements in the right hand and leg are absent, tone of muscles on these extremities is increased, local reflexes are increased. How can you name patient's state?
- a. Monoplegia

- b. Paraplegia
- c. Hemiplegia
- d. Tetraplegia
- e. Functional paralysis

492. In a month after old stroke there are typical presentations of paralysis of extremities as at hemiplegia at a patient. What clinical signs will prove the affection on the level of peripheral neurones and their axons?

- a. Hypertension and hyperreflexia
- b. Hypotonia and areflexion
- c. Atrophy of muscles and atonia
- d. Areflexia and atonia
- e. Hypertonia and areflexia

### KROK TESTS ON LUNG? GIT, LIVER, KIDNEY, ENDOCRINE, NERVOUS PATHOLOGY AND EXTREMAL STATES

1. When studying the signs of pulmonary ventilation, reduction of forced expiratory volume (FEV) has been detected. What is the likely cause of this phenomenon?

- a. Obstructive pulmonary disease
- b. Increase of respiratory volume
- c. Increase of inspiratory reserve volume
- d. Increase of pulmonary residual volume
- e. Increase of functional residual lung capacity

2. A patient with marked pneumofibrosis that developed after infiltrating pulmonary tuberculosis has been diagnosed with respiratory failure. What is its pathogenetic type?

- a. Restrictive
- b. Obstructive
- c. Dysregulatory
- d. Reflex
- e. Apneistic

3. A 30-year-old man has sustained an injury to his thorax in a traffic incident, which caused disruption of his external respiration. What type of ventilatory difficulty can be observed in the given case?

- a. Restrictive extrapulmonary ventilatory impairment
- b. Restrictive pulmonary ventilatory impairment
- c. Obstructive ventilatory impairment
- d. Impaired ventilation regulation dysfunction
- e. Cardiovascular collapse

4. An unconscious young man in the state of morphine intoxication has been delivered into an admission room. The patient's respiration is slow and shallow due to suppression of the respiratory center. What kind of respiratory failure occurred in this case?

- a. Ventilatory disregulation
- b. Ventilatory obstruction
- c. Ventilatory restriction
- d. Perfusion
- e. Diffusion

5. A 23-year-old patient has been admitted to a hospital with a craniocerebral injury. The patient is in a grave condition. Respiration is characterized by prolonged convulsive inspiration followed by a short expiration. What kind of respiration is it typical for?

- a. Apneustic
- b. Gasping breath
- c. Kussmaul's
- d. Cheyne-Stokes
- e. Biot's

6. A patient with bronchial asthma has developed acute respiratory failure. What kind of respiratory failure occurs in this case?

- a. Obstructive disturbance of alveolar ventilation
- b. Restrictive ventilatory defect
- c. Perfusion
- d. Diffusion
- e. Dysregulation of alveolar ventilation

7. A 46-year-old patient suffering from the diffuse toxic goiter underwent resection of the thyroid gland. After the surgery the patient presents with appetite loss, dyspepsia, increased neuromuscular excitement. The body weight remained unchanged. Body temperature is normal. Which of the following has caused such a condition in this patient?

- a. Reduced production of parathormone
- b. Increased production of thyroxin
- c. Increased production of calcitonin
- d. Increased production of thyroliberin
- e. Reduced production of thyroxin

8. A coprological survey revealed light colored feces containing drops of neutral fat. The most likely reason for this condition is the disorder of:

- a. Bile inflow into the bowel
- b. Gastric juice acidity
- c. Pancreatic juice secretion
- d. Intestinal juice secretion
- e. Intestinal absorption

9. The secretion of which hypophysial hormones will be inhibited after taking the oral contraceptives containing sex hormones?

- a. Gonadotropic hormone
- b. Vasopressin
- c. Thyrotrophic hormone
- d. Somatotrophic hormone
- e. Oxytocin

10. As a result of continuous starvation the glomerular filtration rate has increased by 20%. The most probable cause of the glomerular filtration alteration under the mentioned conditions is:

- a. Decrease in the oncotic pressure of blood plasma
- b. Increase in the systemic arterial pressure
- c. Increase in the permeability of the renal filter
- d. Increase of the filtration quotient
- e. Increase of the renal blood flow

11. Blood analysis of a patient with jaundice reveals conjugated bilirubinemia, increased concentration of bile acids. There is no stercobilinogen in urine. What type of jaundice is it?

- a. Obstructive jaundice
- b. Hepatocellular jaundice
- c. Parenchymatous jaundice
- d. Hemolytic jaundice
- e. Cythemolytic jaundice

12. According to the results of glucose tolerance test a patient has no disorder of carbohydrate tolerance. Despite that glucose is detected in the patient's urine (5 mmol/l). The patient has been diagnosed with renal diabetes. What renal changes cause glucosuria in this case?

- a. Decreased activity of glucose reabsorption enzymes
- b. Increased activity of glucose reabsorption enzymes
- c. Exceeded glucose reabsorption threshold
- d. Increased glucose secretion
- e. Increased glucose filtration

13. A concentrated solution of sodium chloride was intravenously injected to an animal. This caused decreased reabsorption of sodium ions in the renal tubules. It is the result of the following changes of hormonal secretion:

- a. Aldosterone reduction
- b. Aldosterone increase
- c. Vasopressin reduction
- d. Vasopressin increase
- e. Reduction of atrial natriuretic factor

14. Diabetic nephropathy with uremia has developed in a patient with pancreatic diabetes. The velocity of glomerular filtration is 9 ml/min. What mechanism of a decrease in glomerular filtration velocity and chronic renal failure development is most likely in the case of this patient?

- a. Reduction of active nephron mass



- b. Decrease in systemic arterial pressure  
 c. Obstruction of nephron tubules with hyaline casts  
 d. Tissue acidosis  
 e. Arteriolar spasm
- 15.** A 49-year old female patient has limitation of left limbs arbitrary movements. Muscular tonus of left hand and leg is overstrained and spasmodic, local tendon reflexes are strong, pathological reflexes are presented. What is the most likely development mechanism of hypertension and hyperreflexia?
- a. Reduction of descending inhibitory influence  
 b. Motoneuron activation induced by stroke  
 c. Activation of excitatory influence from the focus of stroke  
 d. Activation of synaptic transmission  
 e. Inhibition of cerebral cortex
- 16.** The patient with complaints about permanent thirst applied to the doctor. Hyperglycemia, polyuria and increased concentration of 17-ketosteroids in the urine were revealed. What disease is the most likely?
- a. Steroid diabetes  
 b. Insulin-dependent diabetes mellitus  
 c. Myxedema  
 d. Type I glycogenosis  
 e. Addison's disease
- 17.** A 32-year-old patient consulted a doctor about the absence of lactation after parturition. Such disorder might be explained by the deficit of the following hormone:
- a. Prolactin  
 b. Somatotropin  
 c. Vasopressin  
 d. Thyrocalcitonin  
 e. Glucagon
- 18.** A 41-year-old man has a history of recurrent attacks of heartbeats (paroxysms), profuse sweating, headaches. Examination revealed hypertension, hyperglycemia, increased basal metabolic rate, and tachycardia. These clinical presentations are typical for the following adrenal pathology:
- a. Hyperfunction of the medulla  
 b. Hypofunction of the medulla  
 c. Hyperfunction of the adrenal cortex  
 d. Hypofunction of the adrenal cortex  
 e. Primary aldosteronism
- 19.** A patient complains of polyuria (7 liters per day) and polydipsia. Examination reveals no disorders of carbohydrate metabolism. These abnormalities might be caused by the dysfunction of the following endocrine gland:
- a. Neurohypophysis  
 b. Adenohypophysis  
 c. Islets of Langerhans (pancreatic islets)  
 d. Adrenal cortex  
 e. Adrenal medulla
- 20.** A patient presents with icteritiousness of skin, scleras and mucous membranes. Blood plasma the total bilirubin is increased, stercobilin is increased in feces, urobilin is increased in urine. What type of jaundice is it?
- a. Haemolytic  
 b. Gilbert's disease  
 c. Parenchymatous  
 d. Obstructive  
 e. Cholestatic
- 21.** A patient with massive burns developed acute renal insufficiency characterized by a significant and rapid deceleration of glomerular filtration. What is the mechanism of its development?
- a. Reduction of renal blood flow  
 b. Damage of glomerular filter  
 c. Reduction of functioning nephron number  
 d. Rise of pressure of tubular fluid  
 e. Renal artery embolism
- 22.** A 15-year-old boy has been diagnosed with acute viral hepatitis. What blood value should be determined to confirm acute affection of hepatic cells?
- a. Aminotransferase activity (AST, ALT)  
 b. Erythrocytes sedimentation rate (ESR)  
 c. Protein fraction content  
 d. Cholesterol content  
 e. Unconjugated and conjugated bilirubin content
- 23.** A newborn develops dyspepsia after the milk feeding. When the milk is substituted by the glucose solution the dyspepsia symptoms disappear. The newborn has the subnormal activity of the following enzyme:
- a. Lactase  
 b. Invertase  
 c. Maltase  
 d. Amylase  
 e. Isomaltase
- 24.** A child has abnormal formation of tooth enamel and dentin as a result of low concentration of calcium ions in blood. Such abnormalities might be caused by deficiency of the following hormone:
- a. Parathormone  
 b. Thyrocalcitonin  
 c. Thyroxin  
 d. Somatotropic hormone  
 e. Triiodothyronine
- 25.** A man has a considerable decrease in diuresis as a result of 1,5 l blood loss. The primary cause of such diuresis disorder is the hypersecretion of the following hormone:
- a. Vasopressin  
 b. Corticotropin  
 c. Natriuretic  
 d. Cortisol  
 e. Parathormone
- 26.** A patient with a history of chronic glomerulonephritis presents with azotemia, oliguria, hypo- and isosthenuria, proteinuria. What is the leading factor in the pathogenesis of these symptoms development under chronic renal failure?
- a. Mass decrease of active nephrons  
 b. Intensification of glomerular filtration  
 c. Tubular hyposecretion  
 d. Disturbed permeability of glomerular membranes  
 e. Intensification of sodium reabsorption
- 27.** A 20 year old patient complains of morbid thirst and hyperdiuresis (up to 10 l daily). Glucose concentration in blood is normal but it is absent in urine. The patient has been diagnosed with diabetes insipidus. What hormonal drug is the most appropriate for management of this disorder?
- a. Vasopressin  
 b. Cortisol  
 c. Thyroxin  
 d. Oxytocin  
 e. Insulin
- 28.** A 42 year old patient complains of pain in the epigastric area, vomiting; vomit masses have the colour of "coffee-grounds", the patient has also melena. Anamnesis records gastric ulcer. Blood formula: erythrocytes -  $2,8 \cdot 10^{12}/L$ , leukocytes -  $8 \cdot 10^9/L$ , Hb- 90 g/L. What complication is it?
- a. Haemorrhage  
 b. Penetration  
 c. Perforation  
 d. Canceration  
 e. Pyloric stenosis
- 29.** Blood analysis of a patient with jaundice reveals conjugated bilirubinemia, increased concentration of bile acids. There is no stercobilinogen in urine. What type of jaundice is it?
- a. Obstructive jaundice  
 b. Hepatocellular jaundice

- c. Parenchymatous jaundice
- d. Hemolytic jaundice
- e. Cythemolytic jaundice

**30.** A 5-month-old boy was hospitalized for tonic convulsions. He has a lifetime history of this disease. Examination revealed coarse hair, thinned and fragile nails, pale and dry skin. In blood: calcium - 1,5 millimole/L, phosphor - 1,9 millimole/L. These changes are associated with:

- a. Hypoparathyroidism
- b. Hyperparathyroidism
- c. Hyperaldosteronism
- d. Hypoaldosteronism
- e. Hypothyroidism

**31.** Examination of a 42 year old patient revealed a tumour of adenohypophysis. Objectively: the patient's weight is 117 kg, he has moon-like hyperemic face, red-blue striae of skin distension on his belly. Osteoporosis and muscle dystrophy are present. AP is 210/140 mm Hg. What is the most probable diagnosis?

- a. Cushing's disease
- b. Cushing's syndrome
- c. Conn's disease
- d. Diabetes mellitus
- e. Essential hypertension

**32.** A 38-year-old female patient complains of general weakness, cardiac pain, increased appetite, no menstruation. Objectively: the height is 166 cm, weight 108 kg, the patient has moon-shaped face, subcutaneous fat is deposited mainly in the upper body, torso and hips. There are also blood-red streaks. Ps- 62/min, AP- 160/105 mm Hg. Which of the following diseases is the described pattern of obesity most typical for?

- a. Cushing pituitary basophilism
- b. Alimentary obesity
- c. Myxedema
- d. Insulinoma
- e. Babinski-Frohlich syndrome

**33.** A female patient with bronchial asthma had taken prednisolone tablets (1 tablet 3 times a day) for 2 months. Due to a significant improvement of her condition the patient suddenly stopped taking it. What complication is likely to develop in this case?

- a. Withdrawal syndrome
- b. Cushing's syndrome
- c. Gastrorrhagia
- d. Upper body obesity
- e. Hypotension

**34.** A patient with jaundice has high total bilirubin that is mainly indirect (unconjugated), high concentration of stercobilin in the stool and urine. The level of direct (conjugated) bilirubin in the blood plasma is normal. What kind of jaundice can you think of?

- a. Hemolytic
- b. Parenchymal (hepatic)
- c. Mechanical
- d. Neonatal jaundice
- e. Gilbert's disease

**35.** 14 days after quinsy a 15-year-old child presented with morning facial swelling, high blood pressure, "meat slops" urine. Immunohistological study of a renal biopsy sample revealed deposition of immune complexes on the basement membranes of the capillaries and in the glomerular mesangium. What disease developed in the patient?

- a. Acute glomerulonephritis
- b. Acute interstitial nephritis
- c. Lipoid nephrosis
- d. Acute pyelonephritis
- e. Necrotizing nephrosis

**36.** Due to the use of poor-quality measles vaccine for preventive vaccination, a 1-year-old child developed an

autoimmune renal injury. The urine was found to contain macromolecular proteins. What process of urine formation was disturbed?

- a. Filtration
- b. Reabsorption
- c. Secretion
- d. Reabsorption and secretion
- e. Secretion and filtration

**37.** A patient with signs of osteoporosis and urolithiasis has been admitted to the endocrinology department. Blood test revealed hypercalcemia and hypophosphatemia. These changes are associated with abnormal synthesis of the following hormone:

- a. Parathyroid hormone
- b. Calcitonin
- c. Cortisol
- d. Aldosterone
- e. Calcitriol

**38.** A patient has been admitted to the contagious isolation ward with signs of jaundice caused by hepatitis virus. Which of the symptoms given below is strictly specific for hepatocellular jaundice?

- a. Increase of ALT, AST level
- b. Hyperbilirubinemia
- c. Bilirubinuria
- d. Cholemia
- e. Urobilinuria

**39.** A 41-year-old man has a history of recurrent attacks of heartbeats (paroxysms), profuse sweating, headaches. Examination revealed hypertension, hyperglycemia, increased basal metabolic rate, and tachycardia. These clinical presentations are typical for the following adrenal pathology:

- a. Hyperfunction of the medulla
- b. Hypofunction of the medulla
- c. Hyperfunction of the adrenal cortex
- d. Hypofunction of the adrenal cortex
- e. Primary aldosteronism

**40.** An unconscious patient was delivered by ambulance to the hospital. On objective examination the patient was found to present no reflexes, periodical convulsions, irregular breathing. After laboratory examination the patient was diagnosed with hepatic coma. Disorders of the central nervous system develop due to accumulation of the following metabolite:

- a. Ammonia
- b. Urea
- c. Glutamine
- d. Bilirubin
- e. Histamine

**41.** A 50-year-old man, who has been suffering from chronic hepatic failure for several years, has developed ascites. What is the main mechanism of this disorder development?

- a. Increased pressure in portal vein system
- b. Decrease of albumin and globulin synthesis in liver
- c. Increased content of low-density and very low-density lipoproteins in blood
- d. Neurotoxins appearing in blood
- e. Increase of blood oncotic pressure

**42.** A 43-year-old patient suffers from acute pancreatitis with disrupted common bile duct patency. What condition can develop in this case?

- a. Mechanical jaundice
- b. Hemolytic jaundice
- c. Hepatocellular jaundice
- d. Hepatic coma
- e. Portal hypertension

**43.** A 42-year-old patient complains of pain in the epigastric area, vomiting; vomit masses have the color of coffee-ground; the patient suffers from melena. Anamnesis records gastric ulcer disease. Blood formula: erythrocytes -  $2,8 \cdot 10^{12}/L$ , leukocytes -  $8 \cdot 10^9/L$ , Hb- 90 g/L. What complication is it?

- a. Hemorrhage
  - b. Penetration
  - c. Perforation
  - d. Canceration
  - e. Pyloric stenosis
- 44.** Administration of doxycycline hydrochloride has caused an imbalance of the symbiotic intestinal microflora. Specify the kind of imbalance caused by the antibiotic therapy:
- a. Dysbacteriosis
  - b. Sensibilization
  - c. Idiosyncrasy
  - d. Superimposed infection
  - e. Bacteriosis
- 45.** Cholesterol content in blood serum of a 12-year-old boy is 25 mmol/L. Anamnesis states hereditary familial hypercholesterolemia caused by synthesis disruption of receptor-related proteins for:
- a. Low-density lipoproteins
  - b. High-density lipoproteins
  - c. Chylomicrons
  - d. Very low-density lipoproteins
  - e. Middle-density lipoproteins
- 46.** A patient presents with steatorrhea. This disorder can be linked to disturbed supply of the intestine with the following substances:
- a. Bile acids
  - b. Amylase
  - c. Carbohydrates
  - d. Trypsin
  - e. Chymotrypsin
- 47.** A patient with jaundice has high total bilirubin that is mainly indirect (unconjugated), high concentration of stercobilin in the feces and urine. The level of direct (conjugated) bilirubin in the blood plasma is normal. What kind of jaundice can be suspected?
- a. Hemolytic
  - b. Parenchymal (hepatic)
  - c. Mechanical
  - d. Neonatal jaundice
  - e. Gilbert's disease
- 48.** Poisoning caused by mercury (II) chloride (corrosive sublimate) occurred in the result of safety rules violation. In 2 days the patient's diurnal diuresis became 620 ml. The patient developed headache, vomiting, convulsions, dyspnea; moist crackles are observed in the lungs. Name this pathology:
- a. Acute renal failure
  - b. Chronic renal failure
  - c. Uremic coma
  - d. Glomerulonephritis
  - e. Pyelonephritis
- 49.** A 30-year-old woman exhibits signs of virilism (growth of body hair, balding temples, disturbed menstrual cycle). This condition can be caused by overproduction of the following hormone:
- a. Testosterone
  - b. Prolactin
  - c. Relaxin
  - d. Oestriol
  - e. Oxytocin
- 50.** After a severe stress a patient was found to have eosinopenia. In this case the decreased number of eosinophils can explain changes in the level of the following hormones:
- a. Glucocorticoids
  - b. Adrenaline
  - c. Insulin
  - d. Mineralocorticoids
  - e. Vasopressin
- 51.** A 46-year old woman suffering from cholelithiasis developed jaundice. Her urine became dark yellow, while feces

- are light colored. What substance will be the most increased in concentration in the blood serum in this case?
- a. Biliverdine
  - b. Conjugated bilirubin
  - c. Urobilinogen
  - d. Mesobilirubin
  - e. Unconjugated bilirubin
- 52.** A 40-year-old woman with Cushing's disease presents with steroid diabetes. On biochemical examination she has hyperglycemia and hypochloremia. What process activates in the first place to such patient?
- a. Gluconeogenesis
  - b. Glycogenolysis
  - c. Glucose reabsorption
  - d. Glucose transport to the cell
  - e. Glycolysis
- 53.** On examination the patient presents with hirsutism, moon-shaped face, stretch marks on the abdomen. BP is 190/100 mm Hg, blood glucose is 17,6 mmol/L. What pathology is such clinical presentation characteristic of?
- a. Adrenocortical hyperfunction
  - b. Hypothyroidism
  - c. Gonadal hypofunction
  - d. Hyperthyroidism
  - e. Hyperfunction of the insular apparatus
- 54.** A 50-year-old inpatient during examination presents with glucosuria and blood glucose of 3,0 mmol/L, which are the most likely to be caused by:
- a. Renal disorder
  - b. Diabetes insipidus
  - c. Pellagra
  - d. Myxedema
  - e. Essential hypertension
- 55.** Exophthalmus observed during thyrotoxicosis is caused by accumulation of highly water-binding substances within the retrobulbar tissues. Name these substances:
- a. Phospholipids
  - b. Glycosaminoglycans
  - c. ATP
  - d. Cholesterol
  - e. Kreatine
- 56.** A patient complaining of pain in the left shoulder-blade region has been diagnosed with myocardial infarction. What kind of pain does the patient have?
- a. Radiating
  - b. Visceral
  - c. Phantom
  - d. Protopathic
  - e. Epicritic
- 57.** A patient got a gunshot wound of hip which damaged the sciatic nerve. Any impact on the affected limb causes severe, excruciating pain. What mechanism of pain is most likely in this case?
- a. Causalgic
  - b. Reflex
  - c. Phantom
  - d. Endorphin hypofunction
  - e. Enkephalin hypofunction
- 58.** As a result of a trauma a patient has developed traumatic shock that led to the following disorders: AP is 140/90 mm Hg, Ps is 120 bpm. The patient is fussy, talkative, pale. Such state relates to the following shock phase:
- a. Erectile
  - b. Latent period
  - c. Terminal
  - d. Torpid
- 59.** As a result of a road accident a 26-year-old man is in the torpid phase of shock. Blood count: leukocytes -  $3,2 \cdot 10^9/L$ . What is the leading mechanism of leukopenia development?
- a. Leukocyte redistribution in the bloodstream

- b. Leukopoiesis inhibition
- c. Faulty release of mature leukocytes from the bone marrow into the blood
- d. Leukocyte destruction in the hematopoietic organs
- e. Increased excretion of the leukocytes from the organism

**60.** After a road accident a victim has tachycardia, arterial blood pressure 130/90 mm Hg, tachypnoea, the skin is pale and dry, excitation of central nervous system is observed. What shock stage is the patient most likely in?

- a. Erectile
- b. Terminal
- c. Torpid
- d. Preshock (compensation stage)
- e. Agony

**61.** A 27-year-old patient with injury to the neck has lost approximately 30% of the blood volume. The patient's condition is severe: blood pressure is 60/40 mm Hg, heart rate is 140/min., respiratory rate is 30/min., conscious. Characterize the condition of the patient's circulatory system:

- a. Hypovolemic shock
- b. Cardiogenic shock
- c. Collapse
- d. Coma
- e. Arterial hypertension

**62.** A 62-year-old patient has been hospitalized due to massive cerebral hemorrhage. Blood pressure is 70/30 mm Hg, heart rate is 120/min., respiratory rate is 4/min., unconscious, no response to external stimuli. Such condition can be determined as:

- a. Coma
- b. Shock
- c. Collapse
- d. Stress
- e. Agony

**63.** A victim of a traffic accident was taken to the intensive care unit. The patient is in a grave condition that can be characterized as a severe pathologic process that leads to exhaustion of vital functions and puts the patient into the marginal state between life and death due to critical reduction of capillary circulation in the affected organs. The patient is in the state of:

- a. Shock
- b. Coma
- c. Collapse
- d. Preagony
- e. Agony

**64.** A woman aged 67, who suffered from cholecystitis for a long time, after a meal suddenly has acute pain in the upper abdomen, nausea, vomiting. Diagnosis - acute pancreatitis. What is the main link of the pathogenesis of this disease?

- a. Premature activation of pancreatic enzymes
- b. Reduced secretion of pancreatic polypeptide
- c. Enhancement of enzymes in the duodenum
- d. Increased cholecystokinin level
- e. Decreased enzymes in pancreatic juice

**65.** The patient complains of heartburn, frequent constipation. During titration of gastric juice, the following data were obtained: total acidity - 88 t.u., total HCl - 83 t.u., free HCl - 50 t.u., bound HCl - 33 t.u., acidic phosphates and organic acids - 5 t.u. Evaluate the condition of acidity of gastric juice

- a. Hyperacidity
- b. Hypoacidity
- c. Achylia
- d. Normal
- e. Hypersecretion

**66.** A patient with Zollinger-Ellison syndrome [pancreatic tumor] has an increased secretion, peristalsis of the gastrointestinal tract, as well as diarrhea and peptic ulcer.

Which of the following substances, which is secreted by the specified tumor, causes this complex of symptoms?

- a. Gastrin
- b. Vasoactive intestinal peptide
- c. Pepsin
- d. Trypsin
- e. Secretin

**67.** The gastrointestinal department got a 57-year-old patient suspected of having a Zollinger-Ellison syndrome, as evidenced by a acute increase in gastrin levels in serum. What is a disturbance of the secretory function of the stomach most likely?

- a. Hypersecretory hyperacidic
- b. Hyposecretory hyperacidic
- c. Achylia
- d. Hyposecretion hypoacidic
- e. Hypersecretory hypoacidic

**68.** The patient, who has increased acidity of gastric juice, was recommended to eat boiled, not fried meat. This is due to the fact that the mechanism of action of extractives substances consists of:

- a. Stimulation of gastrin production by G cells
- b. Irritation of taste receptors
- c. Irritation of the mechanoreceptors of the oral cavity
- d. Irritation of the mechanoreceptors of the stomach
- e. Stimulation of secretin production in I2-type intestine

**69.** After the poisoning with mushrooms, the patient has a yellow coloration of the skin and sclera, a dark color of urine appeared. What kind of pigment causes coloring urine in a hemolytic jaundice?

- a. Stercobilin
- b. Monoglycuronide of bilirubin
- c. Unconjugated bilirubin
- d. Verdoglobin
- e. Biliverdin

**70.** A patient with chronic hepatitis complains of increased sensitivity to barbiturates, which she previously tolerated without symptoms of intoxication. With a violation of which of the liver function is this the most possible?

- a. Metabolic
- b. Bile formation
- c. Hemodynamic
- d. hemopoietic
- e. phagocytic

**71.** A woman 57 years after prolonged pain attack in the right subcostal area has jaundice, after which the patient visited the doctor. There was a suspicion of the appearance of acute calculous cholecystitis. Research of what index of a blood test represents the bile duct obstruction?

- a. Conjugated and unconjugated bilirubin
- b. Protein fractions
- c. Total lipids
- d. Uric acid
- e. Residual nitrogen

**72.** The patient is 25 years old is diagnosed with chronic hepatitis. The patient complains of losing body weight by 10 kg for 2 hours months. Objectively: the skin is dry, peeling, pale yellowish shade, skin hemorrhage, bleeding gums. Violations of which the function of the liver shows hemorrhage and bleeding gums:

- a. Protein-Synthesizing
- b. Pigment-forming
- c. Glycogen-Synthesizing
- d. Detoxication
- e. Depositive

**73.** In a patient 24 years and one and a half weeks after severe streptococcal throat infection, facial swelling appeared, arterial pressure increased. Hematuria and proteinuria 1.2 g / L are found. In the blood, antibodies presence and reduction of

complement components are detected. In which kidney structure the localization of immune complexes which determine the development of nephropathy is most likely?

- Glomerules
- Pyramid
- Proximal part of tubules
- Loop Henle
- Distal part of tubules

**74.** In a woman with primary hyperparathyroidism periodic attacks of the renal colic are repeated. An ultrasound examination showed the formation of small stones in the kidneys, the most likely cause of which is the presence of:

- Hypercalcemia
- Hyperphosphatemia
- Hypercholesterolemia
- Hyperuricemia
- Hyperkalemia

**75.** The right leg of a 40-year-old woman measured at the shin level is by 2 cm smaller in the diameter than the left leg. Ankle-jerk (Achilles) and knee-jerk reflexes are absent on the right. What is the most likely mechanism of hyporeflexia development during peripheral paralysis?

- Disturbed conduction of stimulation
- Inhibition of pyramidal motoneuron
- Disturbed synaptic impulse transmission
- Activation of excitatory impulses from CNS
- Disturbed perception of stimulation

**76.** In human organism significant blood loss leads to decreased blood pressure, tachycardia and weakness. Eventually the sensation of thirst appears. What hormone participates in the development of this sensation?

- Angiotensin 2
- Serotonin
- Adrenalin
- Cortisol
- Dopamine

**77.** A 16-year-old girl presents with no hair on the pubis and in the armpits, her mammary glands are underdeveloped, no menstruations. What hormone imbalance can it be indicative of?

- Ovarian failure
- Pancreatic islet failure
- Hyperthyroidism
- Hypothyroidism
- Adrenal medulla hyperfunction

**78.** A lab rat has subcutaneously received mercury (II) chloride in the amount of 5 mg/kg. 24 hours later the plasma

creatinine concentration increased several times. What mechanism of retention azotemia is observed in this case?

- Decreased glomerular filtration
- Increased creatinine production in the renal tubules
- Increased glomerular filtration
- Increased creatinine production in the muscles
- Increased creatinine reabsorption

**79.** A 19-year-old male was examined in the nephrology clinic. High potassium level was found in his secondary urine. What hormone is likely to cause such change if it is produced in excess?

- Aldosterone
- Oxytocin
- Adrenaline
- Glucagon
- Testosterone

**80.** After a case of sepsis a 27-year-old woman developed "bronzed" skin discoloration, characteristic of Addison's disease. Hyperpigmentation mechanism in this case is based on increased secretion of:

- Melanocyte-stimulating hormone
- Beta-lipotropin
- Gonadotropin
- Thyroid stimulating hormone
- Somatotropin

**81.** During removal of the hyperplastic thyroid gland of a 47-year-old woman, the parathyroid gland was damaged. One month after the surgery the patient developed signs of hypoparathyroidism: frequent convulsions, hyperreflexia, laryngospasm. What is the most likely cause of the patient's condition?

- Hypocalcemia
- Hyponatremia
- Hyperchlorhydria
- Hypophosphatemia
- Hyperkalemia

**82.** Encephalopathy has developed in a child with hemolytic disease of the newborn. What substance had increased in the child's blood resulting in damage to CNS?

- Unconjugated bilirubin
- Bilirubin glucuronide
- Verdohemoglobin
- Bilirubin-albumin complex
- Bile acids