

### Practical lesson № 1

#### Pathophysiology of the blood system. White blood disorders. Leukocytosis. Leukopenia. White blood cell dysfunction. Hemoblastosis.

1. Leukocytosis: definition, types, etiology, pathogenesis.
2. Diagnostic significance of changes in the leukocyte formula.
3. Leukopenia: definition, types, etiology, pathogenesis, manifestations. Agranulocytosis.
4. Leukocyte dysfunctions: types, etiology, pathogenesis, and manifestations.
5. Acute leukemias: definition, classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
6. Chronic leukemias: definition, classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
7. Leukemoid reactions: types, etiology, pathogenesis, differences from leukemias.
8. Pathogenesis of manifestations in the oral cavity and maxillofacial region in white blood disorders.

#### TASK

Patient A., 64 years old, is in the clinic for treatment.

Objectively: the patient is in serious condition, body temperature 37.9°C, heart rate 85 / min., skin is pale, small-point rash of red-brown color on the body, sometimes merging, suppurated hematoma on the left shin, lymphadenopathy, breathing is hard in the lungs, heart tones are muffled, the abdomen is soft, painless, hepatomegaly, splenomegaly.

A dental consultation was scheduled due to complaints of bleeding gums, pain in the oral cavity.

Dental examination: the tonsils are enlarged, covered with a white coating with small sores, the oral mucosa is pale with a small-point rash of red-brown color.

Total blood count: red blood cells  $3.1 \cdot 10^{12}/l$ , hemoglobin 91 g/l, **color index - ? (to be calculated)**, hematocrit 39 %, reticulocytes 0%, platelets  $82\% \cdot 10^9/l$ , white blood cells  $117.2\% \cdot 10^9/l$ . White blood cell formula: eosinophils 8 %, basophils 7 %, metamyelocytes 0 %, rod neutrophils 2 %, segmented neutrophils 77 %, lymphocytes 4 %, monocytes 2. ESR 32 mm/h.

Cytogenetic study: changes were found in the 22nd pair of chromosomes (Philadelphia chromosome).

#### QUESTIONS:

1. Make an informed conclusion about the patient's syndrome.
2. Indicate the etiology of this syndrome in the patient, as well as other possible factors for the occurrence of this syndrome.
3. Explain the pathogenesis of the described clinical and laboratory manifestations.
4. Explain the principles of treatment for this syndrome.

## Practical lesson № 2

### Pathophysiology of the blood system. Anemia. Red blood cells.

1. Anemia: definition, classification, clinical and hematological manifestations.
2. Erythrocytosis, general characteristics.
3. Acute posthemorrhagic anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
4. Iron metabolism in the body and its disorders.
5. Iron deficiency anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
6. Hypoplastic anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
7. Vitamin<sub>B12</sub>-deficient and folate-deficient anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
8. Acquired (exoerythrocytic) hemolytic anemia: etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
9. Congenital (endoerythrocytic) hemolytic anemia: classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
10. Pathogenesis of manifestations in the organs of the oral cavity and maxillofacial region in anemia.

#### TASK

Patient S., 43 years old, is being treated in the hematology department. He was admitted to the clinic with complaints of weakness, rapid fatigue.

Objectively: body temperature is 36.5°C, heart rate is 80 / min, skin is pale, warm and dry, respiration is vesicular in the lungs, heart sounds are clear, muted, the abdomen is soft, painless, the liver and spleen are not palpable.

A dental consultation was scheduled in connection with complaints of unpleasant sensations in the oral cavity.

Dental examination: the oral mucosa is pale pink, the tongue is smooth and shiny.

From anamnesis: **two** years ago I was diagnosed with atrophic gastritis.

Total blood count: red blood cells  $3,9 \cdot 10^{12}/l$ , hemoglobin 110 g/l, color index - ? (to be calculated), hematocrit 40 %, reticulocytes 0%, platelets  $350 \pm^{10^9}/l$ , white blood cells  $7.1 \pm^{10^9}/l$ . White blood cell formula: eosinophils 0 %, basophils 1 %, metamyelocytes 0 %, rod neutrophils 2 %, segmented neutrophils 54 %, lymphocytes 37 %, monocytes 6 %. ESR of 15 mm/h.

Blood smear: anisocytosis, poikilocytosis, macrocytosis, red blood cells with Jolly bodies and Kebot rings.

#### QUESTIONS:

1. Make an informed conclusion about the patient's syndrome. Give a classification of the specified syndrome.
2. Indicate the etiology of this syndrome in the patient, as well as other possible factors for the occurrence of this syndrome.
3. Explain the pathogenesis of the described clinical and laboratory manifestations.
4. Explain the principles of treatment for this syndrome.

## Practical lesson № 3

### Pathophysiology of hemostasis. Hemorrhagic syndrome.

1. Hemostasis and antihemostasis: vascular, cellular, plasma components, their role in ensuring the rheological properties of blood in normal and pathological conditions.
2. Types of bleeding.
3. Clinical and laboratory methods of hemostatic system research.
4. Vasopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
5. Thrombocytopenia: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
6. Thrombocytopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
7. Coagulopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
8. Pathogenesis of manifestations in the oral cavity and maxillofacial region in hemorrhagic syndrome.

#### TASK

Patient A., 43 years old, complained about the resumption of bleeding from the hole of the extracted tooth after removing the tampon.

Objectively: body temperature 36.5 ° C, heart rate 82 / min, BPD 12 / min, blood pressure 122/84 mm Hg, normal skin color, warm, dry, pink pharynx, vesicular respiration in the lungs, heart sounds clear, rhythmic, heart borders within normal limits, stomach soft, painless, liver and the spleen is not palpable.

Medical history: has been abusing alcohol for the last 5 years.

General blood test: red blood cells  $4,0 \cdot 10^{12}/l$ ; hemoglobin 119 g / l; color index ? (**must be calculated**); hematocrit 40%; reticulocytes 0%; platelets  $220 \cdot 10^9/l$ ; white blood cells  $8,0 \cdot 10^9/L$ . White blood cell formula: eosinophils 1%, basophils 1%, metamyelocytes 1%, rod neutrophils 2%, segmented neutrophils 53%, lymphocytes 35%, monocytes 7%, ESR 10 mm / h.

Blood chemistry: total bilirubin 24.5 mmol / l, direct bilirubin 8.0 mmol/L, ALT 55 IU / L, AsAT 41 IU/ L, alkaline phosphatase 140 IU/L, total protein 54 g/l, albumin 32 g/L, urea 1.9 mmol/L, cholesterol 5.9 mmol/L.

Coagulogram: bleeding time 2 min (according to Duka); Rumpel-Leede-Konchalovsky cuff test negative, ADP-induced platelet aggregation normal, blood clotting time 15 min (according to Mas Magro), thrombin time 19 s, prothrombin time 25 s, APTT 48 s, fibrinogen 1.5 g / l, antithrombin 70%, protein C and S are normal.

#### QUESTIONS:

1. What is the leading syndrome, taking into account complaints, that can be identified in the patient? Justify the specified syndrome and its variant in accordance with the classification.
2. Specify the etiology of the indicated variant of the syndrome. What other etiological factors can lead to the development of the indicated variant of the syndrome?
3. Explain the pathogenesis of the described clinical and laboratory changes in this patient.
4. List the principles of therapy and prevention of the indicated syndrome.

## Practical lesson № 4

### Pathophysiology of hemostasis. Thrombophilic syndrome. DIC-syndrome.

1. Thrombophilic syndrome: definition, classification. etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
2. Outcomes and complications of thrombosis.
3. DIC-syndrome: definition of the concept, etiology, pathogenesis, manifestations, laboratory screening.

#### TASK

Patient A., 25 years old, went to the doctor with complaints of pain, swelling and redness of the left shin.

Objectively: body temperature 36.9 ° C, heart rate 76 / min, blood pressure 120/80 mm Hg, BPD 12 / min, skin pink, warm, pharynx pink, vesicular respiration in the lungs, heart sounds clear, rhythmic, heart boundaries within normal limits, stomach soft, painless, liver and spleen are not palpable.

In the area of the left lower leg, hyperemia of the skin is detected, the lower leg is enlarged in volume compared to the right limb, edematous, hot to the touch, pain is noted on palpation, the subcutaneous veins are not dilated.

Medical history: she has been taking oral contraceptives for the last 6 months, and the patient's grandfather suffered a stroke at the age of 45.

General blood test: red blood cells  $4,1 \cdot 10^{12}/l$ ; hemoglobin 128 g / l; **color index ? (must be calculated)**; hematocrit 41%; reticulocytes 0%; platelets  $335 \cdot 10^9/l$ ; white blood cells  $8,0 \cdot 10^9/L$ . White blood cell formula: eosinophils 1%, basophils 0%, metamyelocytes 1%, rod neutrophils 2%, segmented neutrophils 58%, lymphocytes 32%, monocytes 6%, ESR 15 mm / h.

Blood chemistry: total bilirubin 17.5 mmol / l, direct bilirubin 4.1 mmol/L, ALT 23 IU/ L, AsAT 17 IU/L, alkaline phosphatase 89 U / L, total protein 65 g/l, albumin 38 g/L, urea 2.3 mmol/l, cholesterol 5.2 mmol/lL.

Coagulogram: bleeding time 2.8 min (according to Duka); Rumpel-Leede-Konchalovsky cuff test negative, ADP-induced platelet aggregation normal, blood clotting time 4 min (according to Mas Magro), thrombin time 9 s, prothrombin time 10 s, APTT 23 s, fibrinogen 4 g / l, antithrombin 70 %, протеины C and S proteins are reduced.

#### QUESTIONS:

1. What is the leading syndrome of the blood system that can be identified in the patient? Justify the specified syndrome and its stage in accordance with the classification.
2. Specify the etiology of the indicated syndrome in this patient.
3. What other etiological factors can lead to the development of this syndrome?
4. Explain the pathogenesis of the described clinical and laboratory changes in this patient.
5. List the principles of therapy and prevention of the indicated syndrome.

## Practical lesson № 5

### Overview session. Pathophysiology of the blood system

1. Leukocytosis: definition, types, etiology, pathogenesis.
2. Diagnostic significance of changes in the leukocyte formula.
3. Leukopenia: definition, types, etiology, pathogenesis, manifestations. Agranulocytosis.
4. Leukocyte dysfunctions: types, etiology, pathogenesis, and manifestations.
5. Acute leukemias: definition, classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
6. Chronic leukemias: definition, classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
7. Leukemoid reactions: types, etiology, pathogenesis, differences from leukemias.
8. Anemia: definition, classification, clinical and hematological manifestations.
9. Erythrocytosis, general characteristics.
10. Acute posthemorrhagic anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
11. Iron metabolism in the body and its disorders.
12. Iron deficiency anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
13. Hypoplastic anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
14. Vitamin<sub>B12</sub>-deficient and folate-deficient anemia: etiology, pathogenesis, features of clinical manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
15. Acquired (exerythrocytic) hemolytic anemia: etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
16. Congenital (endoerythrocytic) hemolytic anemia: classification, etiology, pathogenesis, manifestations, characteristics of hematopoiesis and principles of laboratory diagnostics.
17. Hemostasis and antihemostasis: vascular, cellular, plasma components, their role in ensuring the rheological properties of blood in normal and pathological conditions.
18. Types of bleeding.
19. Clinical and laboratory methods of hemostatic system research.
20. Vasopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
21. Thrombocytopenia: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
22. Thrombocytopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
23. Coagulopathies: definition, classification, etiology, pathogenesis, manifestations, principles of laboratory diagnostics. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
24. Thrombophilic syndrome: definition, classification. etiology, pathogenesis, manifestations, principles of laboratory diagnostics.
25. Outcomes and complications of thrombosis.
26. DIC-syndrome: definition of the concept, etiology, pathogenesis, manifestations, laboratory screening.

## Practical lesson № 6

### Pathophysiology of the cardiovascular system. Heart defects.

1. Heart defects: definition, classification, compensation mechanisms.
2. Congenital heart defects: definition, classification, etiology, and pathogenesis of hemodynamic disorders.
3. Acquired heart defects: definition, classification, etiology, pathogenesis of hemodynamic disorders in mitral valve disease.
4. Acquired heart defects: definition, classification, etiology, pathogenesis of hemodynamic disorders in aortic valve disease.
5. Acquired heart defects: definition, classification, etiology, pathogenesis of hemodynamic disorders in tricuspid valve disease.
6. Acquired heart defects: definition, classification, etiology, pathogenesis of hemodynamic disorders in pulmonary artery valve disease.

#### TASK

A 26-year-old woman went to the doctor with complaints of general weakness, leg pain and swelling, a feeling of heaviness in the right hypochondrium, fever up to 38°C-39°C, chills, night sweats, lack of appetite, vomiting, nausea, weight loss, pain in the joints of the hands and feet.

From anamnesis: has been using intravenous drugs for 3 years, this clinic appeared a month ago.

Objectively: the skin is pale, cyanotic with an icteric tinge, breathing is hard, heart tones are rhythmic 110 beats per minute, pulse is small and frequent, blood pressure is 124/82 mm Hg, the borders of the heart are expanded to the right, the abdomen is soft, increased in volume, free fluid in the abdominal cavity is determined, the liver protrudes from under the edge costal arch, the edge of the liver is tight, painful, splenomegaly. Dense symmetrical swelling of the lower extremities to the lower third of the thighs.

Total blood count: red blood cells  $2.8 \cdot 10^{12}/l$ , hemoglobin 90 g/l, **color index – ? (need to calculate)**, hematocrit 36%, reticulocytes 0%, platelets  $120 \cdot 10^9/l$ , white blood cells  $16.6 \cdot 10^9/l$ . White blood cell formula: eosinophils 2%, basophils 1%, neutrophils: rod neutrophils 18%, segmented neutrophils 52%; lymphocytes 22%, monocytes 5%. ESR of 44 mm/h.

Echocardiography shows expansion of the right atrial cavity, massive vegetations on the tricuspid valve leaves, and the presence of grade 3 regurgitation on the valve.

#### QUESTIONS:

1. Make a reasonable conclusion about the form of pathology of the cardiovascular system in this patient.
2. Indicate the etiology of this form of pathology in the patient, as well as other possible factors for the occurrence of this form of pathology.
3. Explain the pathogenesis of the described clinical and instrumental manifestations.
4. Explain the principles of therapy for this form of pathology.

## Practical lesson № 7

### Pathophysiology of atherosclerosis. Coronary heart disease

1. Atherosclerosis: definition of the concept, etiology.
2. Risk factors and laboratory signs.
3. Atherosclerosis: pathogenesis, stages.
4. Clinical consequences of atherosclerosis.
5. Ischemic heart disease, definition, causes, classification.
6. Pathogenesis of ischemic myocardial damage.
7. Main forms of coronary heart disease, pathogenesis, clinical manifestations.

#### TASK

Patient M., 62 years old, was hospitalized with complaints of sharp compressive pains behind the sternum, which spread to the left shoulder and occur when walking for short distances or climbing 2-3 floors, difficulty breathing when performing minor physical exertion.

Objectively: body temperature is 36.3 ° C, skin is pale, BPD is 23 per minute, breathing is hard, heart rate is 90 / min, pulse is rhythmic, heart sounds are muffled, blood pressure is 130/100 mm Hg. The abdomen is soft, painless, the liver and spleen are not palpable.

A dental consultation is scheduled for pain in the tongue, dryness of the oral mucosa.

Dental examination: the oral mucosa is dry, there are cracks in the tongue, there are hemorrhages in the papillae and interstitial structures of the tongue.

From the anamnesis: smokes 12 cigarettes a day from the age of 20, work is associated with constant psychoemotional stress.

Biochemical blood test: total cholesterol 11.5 mmol / l (norm 3.1-8.1 mmol/L), high-density lipoprotein cholesterol 0.3 mmol / l (norm 0.75 -1.8 mmol/L).

Electrocardiogram shows signs of ischemia of the anterolateral parts of the left ventricle.

#### QUESTIONS:

1. Make a reasonable conclusion about the form of pathology of the cardiovascular system in this patient.
2. Indicate the etiology of this form of pathology in the patient, as well as other possible factors for the occurrence of this form of pathology.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of therapy for this form of pathology.

## **Practical lesson № 8**

### **Pathophysiology of the cardiovascular system. Arterial hypertension: hypertension, symptomatic hypertension.**

1. Local and systemic mechanisms of blood pressure regulation.
2. Arterial hypertension: definition of the concept, etiology, classification.
3. Features of blood circulation in the small circle.
4. Small circulatory hypertension: etiology, mechanisms of development and compensation, consequences.
5. Primary arterial hypertension( hypertension): definition, etiology, pathogenesis.
6. Secondary (symptomatic) arterial hypertension: definition, types, causes and main mechanisms of their development.
7. Pathogenesis of manifestations in the oral cavity and maxillofacial region in arterial hypertension.

#### **TASK**

A 23-year-old woman went to the doctor with complaints of constant headaches, irritability, visual disturbances in the form of flickering "flies", puffiness of the face.

Objectively: the body temperature is 36.6°C, the skin is pale, the face is swollen, the BPD is 26 per minute, the respiration is vesicular. The heart rate is 104 beats per minute, the pulse is rhythmic, tense, the borders of the heart are extended to the left, the heart sounds are increased, blood pressure on the brachial arteries is 186/112 mm Hg, the abdomen is soft, painless, the liver and spleen are not palpable.

Blood chemistry: angiotensin II 560 pg/ml, aldosterone 800 ng/dl, sodium 154 mmol/l.

Ultrasound examination of the kidneys revealed 80% stenosis of the right renal artery.

During ophthalmoscopy, there is swelling of the retina and the edges of the optic nerve.

#### **QUESTIONS:**

1. Make a reasonable conclusion about the form of pathology of the cardiovascular system in this patient.
2. Indicate the etiology of this form of pathology in the patient, as well as other possible factors for the occurrence of this form of pathology.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of therapy for this form of pathology.



## Practical lesson № 9

### Pathophysiology of the cardiovascular system. Heart failure

1. Heart failure: definition, classification, etiology, compensation mechanisms.
2. Chronic heart failure: pathogenesis, manifestations, mechanisms of compensation and decompensation. Pathogenesis of manifestations in the oral cavity and maxillofacial region.
3. Pathological myocardial hypertrophy, pathogenesis. The concept of heart remodeling in chronic heart failure.
4. Acute heart failure: types, etiology, pathogenesis, manifestations. Pathogenesis of manifestations in the oral cavity and maxillofacial region.

#### TASK

Patient V., 61, was hospitalized with Wandlalami on the General weakonSt I nedonMoginie, perionditcheski inOzniitandsaid Yesinthe introduction to system administration baboutwhether gRatDina, PRondonleiternaboutSTU to ponthe beamwitha, aboutteCHNoSt and boleof snenonLD butgthat occur in the second half of the day, bonLi and ChuinStino tlifeSTI tinom poDrebof Erie.

It is shown that the body temperature is  $36.3^{\circ}\text{C}$ , the skin is blue-transparent, the nail plates are cyanotic, the lower teeth are visible, the lungs are dry, the lower lungs are dry. you have small frequent wheezing, heart rate 78/min, pulse straight, blood pressure 140/90 mmHg, tongue is soft, swollen, enlarged in size. The abdomen is soft, enlarged in size, splenomegaly.

A dental consultation was scheduled due to complaints of swelling of the tongue.

Dental examination: teeth imprints were found on the side surfaces of the tongue and cheeks, the swelling of the tongue is pronounced to a significant extent, the tongue is enlarged in size.

From the anamnesis of: 3 years ago in Leningrad stenosis of the mouth of the river.

Total blood analysis: erythrocytes  $6,0 \cdot 10^{12}/\text{l}$ , hemoglobin 160 g / l, hematocrit 45%, reticulocytes 1%, thrombocytes  $330 \cdot 10^9/\text{l}$ , leukocytes  $7,6 \cdot 10^9/\text{l}$ . Leukocyte formula: eosinophils 0%, basophils 1%, neutrophils: metamyelocytes 0%, polymorphonuclear 2%, mononuclear 60%, lymphocytes 30%, monocytes 7%. ESR of 25 mm/h.

#### QUESTIONS:

1. What is the leading syndrome of the cardiovascular system that can be identified in this patient? Justify the specified syndrome.
2. Indicate the etiology of this syndrome in the patient, as well as other possible factors for the occurrence of this syndrome.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of treatment for this syndrome.

## II Practical lesson № 10

### Pathophysiology of shock.

1. Shock: definition, classification, general pathogenesis, manifestations.
2. General pathogenesis of shock: changes in central hemodynamics.
3. General pathogenesis of shock: changes in microcirculation, metabolism and cell damage during shock.
4. Features of pathogenesis of traumatic shock, burn shock, cardiogenic shock.
5. Features of etiology and pathogenesis of septic shock and anaphylactic shock Principles of shock therapy and prevention.

### TASK

A 38-year-old patient was taken to the clinic in serious condition. It was found under the rubble of a building 2 hours after the collapse of a panel house in an explosion. The right lower limb was squeezed by a panel plate for a long time.

Objectively: the body temperature is 36.0 ° C, the patient's condition is severe, consciousness is confused, the patient is slowed down, multiple bone fractures, abrasions and bruises. The skin is pale, cold sticky sweat, acrocyanosis. The pupils are narrow and the reaction to light is weak. The skin of the compressed limb is dark purple, with areas of hemorrhage, a clearly defined demarcation line, many blisters filled with cloudy hemorrhagic contents, the frequency of respiratory movements is 30 per minute, vesicular breathing. The heart rate is 110 beats per minute, the pulse is weak, the heart sounds are weakened, the blood pressure is 58/32 mm Hg. The abdomen is soft, painful in the flank areas on both sides, the liver and spleen are not palpable.

After installing the urinary catheter, 100 ml of dirty - brown urine was released, followed by anuria.

Blood chemistry: urea 8.6 mmol/L, creatinine 160 mmol/L, potassium 6.9 mmol/L, myoglobin more than 1000 mcg/ml, creatine phosphokinase 5500 U/l.

Indicators of the acid-base state of the blood: pH = 7.15, PaCO<sub>2</sub> = 24.5 mm Hg, AB = 5.0 mmol/L, SB = 8.6 mmol/L, BE = -22.5 mmol/L, lactate 12.6 mmol/l.

### QUESTIONS:

1. What is the typical pathological process developed in this patient? Justify the answer. Name the option according to its classification.
2. Indicate the etiology of this typical pathological process in the patient, as well as other possible factors for the occurrence of this typical pathological process.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of therapy for this typical pathological process.

## Practical lesson № 11

### Pathophysiology of the external respiratory system: respiratory failure

1. Breathing as a process. Methods for evaluating ventilation, lung perfusion, and gas diffusion.
2. Respiratory failure: definition of the concept, classification.
3. Ventilation form of respiratory failure: types, etiology, pathogenesis, manifestations.
4. The concept of chronic obstructive pulmonary disease.
5. Diffusive form of respiratory failure: etiology, pathogenesis, manifestations.
6. Adult respiratory distress syndrome.
7. Ventilation form of respiratory failure: violation of central respiratory regulation, etiology, pathogenesis, manifestations.
8. Perfusion form of respiratory failure: etiology, pathogenesis.
9. Pulmonary hypertension: mechanism of development and compensation, consequences.
10. Dyspnea: definition, pathogenesis.
11. Pathological types of breathing.
12. Pulmonary edema: types, causes, and mechanisms of development.

#### TASK

A 48-year-old man, who has been working at a quartz sand mill for 10 years, went to the doctor with complaints of a strong dry cough with mucosal sputum and severe difficulty breathing when walking and little physical activity, notes weakness and rapid fatigue, weight loss.

Objectively: the condition is satisfactory, the body temperature is 36.6°C, the skin is pale, with a cyanotic tint, the skin elasticity is reduced. BDD 24 per minute, hard breathing. Heart rate 72 beats per minute, pulse is rhythmic, heart sounds are muffled, blood pressure is 130/80 mm Hg, the abdomen is soft, painless, the liver and spleen are not palpable.

Spirometry: VEL = 2400 ml, FVC = 2400 ml, FEV1= 1300 ml, **Tiffno index ? (you need to calculate the indicator).**

On the X-ray of the lungs, multiple small nodular shadows with a size of 2-4 mm in diameter are noted.

#### QUESTIONS:

1. Make a reasonable conclusion about the form of pathology of the external respiratory system in this patient.
2. Indicate the etiology of this form of pathology in the patient, as well as other possible factors for the occurrence of this form of pathology.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of therapy for this form of pathology of the external respiratory system

## Practical lesson № 12

### Pathophysiology of the gastrointestinal tract: disorders of the functions of the stomach, small and large intestines. Peptic ulcer of the stomach and duodenum.

1. Violation of motor, evacuation and secretory functions of the stomach: etiology, mechanisms of development, manifestations and consequences.
2. Peptic ulcer of the stomach and duodenum: definition of the concept, etiology.
3. Influence of gastric and duodenal ulcers on the development and course of dental diseases.
4. The role of dysregulation of gastric secretion.
5. Peptic ulcer of the stomach and duodenum: pathogenesis, complications.
6. Consequences of gastrointestinal surgery. Dumping syndrome, shortened bowel syndrome, consequences of vagotomy: etiology, pathogenesis of manifestations.
7. Maldigestion and malabsorption syndrome: definition of concepts, etiology, pathogenesis.
8. Intestinal enzymopathies.

#### TASK

Patient A., 45 years old, went to the doctor with complaints of weight loss by 7 kg over the past 6 months, attacks of weakness and dizziness, tinnitus, nausea, sometimes vomiting that occur after eating; pressing and bursting pains in the left hypochondrium, bloating, and intermittent diarrhea. Notes the occurrence of panic attacks 20-30 minutes after eating.

Objectively: body temperature 36.3 ° C, heart rate 72 / min, BPD 15 / min, blood pressure 112/78 mm Hg, skin pale, moist, visible mucous membranes clean, vesicular respiration in the lungs, heart sounds clear, rhythmic, stomach painful in the epigastric region, swollen, rumbling is detected, liver and spleen it is not palpable.

Medical history: 11 months ago, a gastrectomy was performed for a perforated ulcer.

General blood test: red blood cells  $3,5 \cdot 10^{12}/l$ ; hemoglobin 90 g/l; **color index - ? (it is necessary to calculate)**; hematocrit 37%; reticulocytes 0%; platelets  $290 \cdot 10^9/l$ ; leukocytes  $6.0 \cdot 10^9/l$ . White blood cell formula: eosinophils 1%, basophils 0%, metamyelocytes 0%, rod neutrophils 2%, segmented neutrophils 62%, lymphocytes 29%, monocytes 6%, ESR 10 mm / h.

In the blood smear: anisocytosis, poikilocytosis, microcytosis.

Blood chemistry: total bilirubin 17.7 mmol / l, direct bilirubin 5.2 mmol/L, ALT 45 IU / L, AsAT 39 IU/L, alkaline phosphatase 98 U/L, total protein 55 g/l, albumin 29 g/l, urea 1.5 mmol/l, cholesterol 3.5 mmol/l, the serum iron content is 10.7 mmol/l.

#### QUESTIONS:

1. What is the leading gastrointestinal syndrome that can be identified in this patient? Justify the specified syndrome.
2. Indicate the etiology of this syndrome in the patient, as well as other possible factors for the occurrence of this syndrome.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of treatment for this syndrome.

## Practical lesson № 13

### Pathophysiology of the liver: the main syndromes in liver pathology.

1. Hepatic-cellular insufficiency: definition, etiology, pathogenesis, manifestations.
2. Hepatic encephalopathy: definition, etiology and pathogenesis.
3. The role of alcohol and environmental factors in the occurrence and progression of liver diseases.
4. Jaundice syndrome: definition, classification, manifestations and consequences.
5. Hemolytic jaundice: etiology, pathogenesis, diagnostic criteria.
6. Mechanical jaundice: etiology, pathogenesis, diagnostic criteria.
7. Parenchymal and enzymopathic jaundice: etiology, pathogenesis, diagnostic criteria.
8. Portal hypertension: definition of the concept, etiology, classification, pathogenesis of the main symptoms.
9. Cirrhosis of the liver: definition of the concept, etiology, classification, pathogenesis of the main symptoms.
10. Pathogenesis of manifestations in the organs of the oral cavity and maxillofacial region in liver pathology.

### TASK

Patient B., 52 years old, was admitted to the clinic with complaints of weakness, rapid fatigue, nausea, vomiting, decreased appetite, vomiting with red blood, a feeling of heaviness and pain in the right hypochondrium.

Objectively: body temperature 36.5 ° C, heart rate 72 / min, skin jaundice, warm, telangiectasia, hepatic palms, icteric mucosa, vesicular respiration in the lungs, heart tones are muffled, rhythmic, the abdomen is enlarged in volume, free fluid in the abdominal cavity is determined, the liver protrudes from under the edge of the costal arch by 3 cm, the edge of the liver is dense, painful, palpable enlarged spleen.

Medical history: has been abusing alcohol for the last 15 years.

General blood test: red blood cells  $3,5 \cdot 10^{12}/l$ ; hemoglobin 100 g/l; color index - ? (it is necessary to calculate); hematocrit 33%; reticulocytes 0%; platelets  $115 \cdot 10^9/l$ ; leukocytes  $4.0 \cdot 10^9/l$ . White blood cell formula: eosinophils 0%, basophils 0%, metamyelocytes 1%, rod neutrophils 2%, segmented neutrophils 51%, lymphocytes 39%, monocytes 7%, ESR 35 mm / h.

Blood chemistry: total bilirubin 60 mmol / l, direct bilirubin 11 mmol/L, ALT 68 IU / L, AsAT 57 IU/L, total protein 45 g/l, albumin 19 g/L, urea 4.2 mmol/L, cholesterol 2.98 mmol/L, glucose 3.2 mmol/l, fibrinogen 1.5 g / l, prothrombin index 40%, serum iron 9.7 mmol/l.

The reaction of feces to hidden blood is positive.

Ultrasound examination of the abdominal cavity revealed hepatosplenomegaly, structural changes in the liver-bumpy edges and nodes in the liver parenchyma against the background of a pronounced heterogeneous increase in echogenicity.

fibrogastroduodenoscopy showed no signs of bleeding from the gastrointestinal tract; the veins of the middle and lower thirds of the esophagus expanded to 5 mm and spread to the cardiac part of the stomach.

### QUESTIONS:

1. What is the leading syndrome of the hepatobiliary system that can be identified in this patient? Justify the specified syndrome.
2. Indicate the etiology of this syndrome in the patient, as well as other possible factors for the occurrence of this syndrome.
3. Explain the pathogenesis of the described clinical and laboratory-instrumental manifestations.
4. Explain the principles of treatment for this syndrome.



## **Practical lesson №15**

### **Pathophysiology of the thyroid gland. Round table discussion on the results of independent work.**

1. Hyperthyroidism, etiology, pathogenesis, main clinical manifestations.
2. Hypothyroidism, etiology, pathogenesis, main clinical manifestations.

#### **TASK**

Experiment: a rat with a body weight of 210 g is injected intraperitoneally with 10 ml of 4% sodium citrate solution. After 15-20 minutes, the rat develops clonic and tonic seizures. Convulsions are stopped by intraperitoneal administration of 4-5 ml of a 5% solution of calcium chloride.

#### **QUESTIONS:**

1. What type of pathological process is modeled in this experiment?
2. Specify the etiology of this typical pathological process. What other etiological factors can lead to the development of this typical pathological process?
3. Explain the pathogenesis of the observed changes in the laboratory animal.
4. Explain the principles of therapy and prevention of this typical pathological process.

## **Practical lesson № 16**

### **Private pathophysiology (test control, including general pathophysiology).**