

ONTÜSTIK-QAZAQSTAN MEDISINA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ		 SOUTH KAZAKHSTAN MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия»
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METHODOLOGICAL RECOMMENDATIONS FOR PRACTICAL CLASSES

Discipline: Pathological physiology of organs and systems

Discipline Code: POS3202-1

EP: 6B10101- "General Medicine"

Academic hours (credits): 150 hours /5 credits

Course and semester of study: III year, VI semester

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Methodical recommendations for practical classes were developed in accordance with the work program of the discipline (syllabus) EP 6B130100-"General Medicine" and discussed at a meeting of the department

Protocol No. 10² from " 6 " 06 2022

Head Department  Zhakipbekova G.S.

Lesson #1

1. Topic: Pathophysiology of the nervous system.

2. Purpose: to learn the general etiopathogenesis of dysfunction of the nervous system.

3. Learning objectives

- characterize the etiological factors of damage to the nervous system;
- explain the pathogenesis of nervous system dysfunctions;
- characterize sensory disturbances and explain their pathogenesis;
- characterize movement disorders and explain their pathogenesis;
- explain the etiology and pathogenesis of neuroses.

4. Main questions of the topic

1. Etiopathogenesis of nervous disorders.
2. Neurogenic movement disorders.
3. Neurogenic disorders of sensitivity.
4. Neuroses.

5. Features of the development of disorders of the nervous system in childhood.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

Practical work

Fill the table. Give the name of the types of sensory impairment

Type of violation	Definition of the concept, pathogenesis
	Complete loss of sensation. It develops due to the presence of obstacles for the passage of impulses from receptors along conductors to the corresponding cortical zones
	Decreased sensitivity. Occurs due to an increase in the threshold of excitability
	Increased sensitivity. Develops due to a decrease in the threshold of excitability
	Excessive pain sensitivity

	Loss of pain and temperature sensitivity while maintaining tactile and deep in a certain area of the body
	Perverse perception of stimuli (heat is perceived as cold, touch as pain)
	Pathological perception of irritation not at the place of its application, but at a symmetrical point of the other half of the body
	Single stimulus perceived as multiple

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Etiopathogenesis of nervous disorders.
2. Neurodystrophic process.
3. Neuron pathology.
4. Generator of pathologically enhanced excitation.
5. Pathological determinant.
6. Pathological system.
7. Neurogenic movement disorders.
8. Neurogenic disorders of sensitivity.
9. Pain.
10. Antinociceptive system.
11. Neuroses.
12. Pathophysiological principles for the prevention and treatment of disorders of the nervous system.
13. Features of the development of disorders of the nervous system in childhood.
14. Features of the development of neuroses in children.

Tests

1. Viruses that form intraneuronal connections in children
 - A) cytomegaloviruses
 - B) enteroviruses
 - C) rabies viruses
 - D) herpes virus
 - E) polio virus
2. Etiological factors of exogenous origin that cause damage to the nervous system:
 - A) alcohol intoxication
 - B) damage to neurons in hepatic coma
 - C) cerebral ischemia

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- D) hypoglycemia
 E) damage to neurons in uremia
3. Resistance of the nervous system is provided by:
- A) anti-systems
 B) airborne barrier
 C) low degree of intracellular regeneration of neurons
 D) spilled excitement
 E) low activity of glial cells
4. Denervation syndrome is
- A) violation of the transport of trophogens and the formation of pathogens
 B) decrease in afferent impulses to the neuron
 C) exit of the underlying departments of the central nervous system from the control of the overlying departments
 D) reduction of nerve influences on postsynaptic structures
 E) a group of hyperactive neurons
5. Primary inhibitory deficit develops due to ...
- A) overstimulation of the nervous system
 B) violations of the structure and function of inhibitory neurons
 C) violations of the structure and function of excitatory synapses
 D) increase the synthesis of excitatory mediators
 E) an excess of descending inhibitory influences during the destruction of parts of the nervous system

Situational task

Medical worker D., 59 years old, on the eve of admission to the clinic, getting out of bed in the morning, noticed that he could hardly keep his balance, constantly falling to the left. After being helped into bed, he felt very dizzy and nauseous. Calling for help a second time, he drew attention to the development of aphonia (a). After about an hour, he noted the appearance and, then, the increase in signs of paresthesia (b) in the right half of the body. During the intake of liquid food (he did not take solid food due to nausea), her regurgitation often occurred (c).

Neurological examination revealed: paresis (d) of the soft palate on the left; when looking to the side - horizontal nystagmus (e), more pronounced when looking to the left; left-sided hemihypesthesia (e) of the face and trunk; in the left limbs - muscular hypotension (g) and hyporeflexia (h); discoordination of movements during finger-nose and calcaneal-knee tests, tremor of the extremities (and) on the left. BP 195/106 mm Hg, expansion of the borders of the heart to the left by 1.5 cm, pulse 90.

Questions

1. What form of pathology has developed in the patient?
2. What is its most likely cause? Are there signs of a violation of the pyramidal and extrapyramidal systems?

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3. Describe the symptoms, labeled with letters corresponding to medical terms. What are the possible

Lesson #2

1. Topic: Pathophysiology of external respiration.

2. Purpose: to teach to conduct a pathophysiological analysis of situations associated with impaired external respiration, to learn the etiopathogenesis of respiratory failure.

3. Learning objectives

- to study the general etiology and pathogenesis of disorders of the respiratory system;
- to study violations of the central regulation of respiration, types, mechanisms of development;
- explain the pathogenesis of impaired diffusion and perfusion of the lungs;
- determine the type of respiratory failure by changing the gas composition of the blood.

4. Main questions of the topic

1. Violation of lung ventilation.
2. Violation of diffusion of gases through the alveolar-capillary membrane.
3. Violation of pulmonary blood flow.
4. Violation of the regulation of breathing.
5. Features of violation of external respiration in children.

5. Methods / technologies of learning and teaching:

- TBL.
- in distance learning - TBL, individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Classroom" section AIS Platonus, as well as on the Zoom, Webex and Wathsapp platforms.

6. Assessment methods/technologies: The general form of assessment, including the answers of individual and group testing, self- and mutual assessment.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Violation of lung ventilation.
2. Alveolar hypo- and hyperventilation.
3. Obstructive and restrictive types of hypoventilation.
4. Violation of diffusion of gases through the alveolar-capillary membrane.
5. Violation of pulmonary blood flow.
6. Pulmonary hypertension.
7. Lack of external respiration.
8. Pulmonary edema.
9. Disorders of regulation of the respiratory center.
10. Pathophysiological principles of prevention and therapy of respiratory disorders.
11. Features of respiratory failure in children.

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12. Violations of the regulation of breathing in children.

Tests

1. Surfactant deficiency in newborns is associated

- A) with dysfunction of the endothelial cells of the pulmonary capillaries
- B) with impaired function of cells of the bronchial mucosa
- C) with impaired function of the epithelial cells of the respiratory bronchioles
- D) with impaired function of type I alveocytes
- E) with impaired function of type II alveocytes

2. Insufficiency of external respiration is observed with

- A) an increase in pO₂ and pCO₂ in the blood
- C) an increase in pO₂ and a decrease in pCO₂ in the blood
- C) decrease in pO₂ and pCO₂ in the blood
- E) a decrease in pO₂ and an increase in pCO₂ in the blood
- E) increase in pO₂ and normal pCO₂ in the blood

3. Obstructive type of respiratory failure occurs when

- A) pneumosclerosis
- B) pneumonia
- C) broken ribs
- D) paralysis of the respiratory center
- E) bronchospasm

4. Alveolar hypoventilation leads to

- A) hypoxemia, hypocapnia, acidosis
- B) hypoxemia, hypocapnia, alkalosis
- C) hypoxemia, hypercapnia, acidosis
- D) hypoxemia, hypercapnia, alkalosis
- E) non-gas alkalosis

5. Restrictive violations of lung ventilation can lead to

- A) bronchial tumor
- B) emphysema
- C) bronchospasm
- D) surfactant deficiency
- E) laryngospasm

Situational task

A 24-year-old patient was admitted to the clinic with complaints of shortness of breath and palpitations during exercise, aching pain in the heart area. During a pronounced shortness of breath, a small amount of mucous sputum with an admixture of blood is released. Based on these complaints of the patient and subsequent research, an assumption arose about the violation of pulmonary circulation due to mitral stenosis. RR 20 per minute. Spirometry data: VC 81% of the predicted value, CVL 76% of the predicted value, MOD 133% of the predicted value, FVC1/VC 80%.

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Questions

1. What types of pulmonary perfusion disorders are possible in this patient?
2. Explain the possible mechanisms for reducing VC and OYOL in a patient.
3. Does this patient have an obstructive alveolar ventilation disorder?

Lesson #3

1. Topic: Lack of external respiration. Breathing disorders.

2. Purpose: Understanding the etiopathogenesis of respiratory failure.

3. Learning objectives

- explain the pathogenesis of impaired diffusion and perfusion of the lungs
- determine the type of respiratory failure by changing the gas composition of the blood
- give an opinion on situational tasks

4. Main questions of the topic

1. Diffusion form of pulmonary insufficiency.
2. Causes and mechanisms of impaired diffusion of gases through the alveolocapillary membrane.
3. Perfusion form of respiratory failure.
4. Causes and mechanisms of development of pulmonary hypertension and pulmonary hypotension.
5. Violations of ventilation-perfusion relations, significance in the pathogenesis of respiratory failure.
6. Lack of external respiration.
7. Violations of the regulation of breathing.
8. Pathogenesis of impaired diffusion and perfusion of the lungs.
5. Methods of learning and teaching: performing practical work, solving situational problems, oral questioning, testing.

6. Literature: see Appendix No. 1.

7. Control

Questions

Tests

1. Insufficiency of external respiration is accompanied by
 - A) an increase in the partial pressure of oxygen (pO₂) and carbon dioxide (pCO₂) of arterial blood
 - B) decrease in pO₂ and pCO₂ in arterial blood
 - C) decrease in pO₂ and pCO₂ in venous blood
 - D) increase in pO₂ and normal pCO₂ in the blood
 - E) decrease in pO₂ and increase in pCO₂ in arterial blood
2. Alveolar hypoventilation leads to
 - A) hypoxemia, hypocapnia, acidosis
 - B) hypoxemia, hypocapnia, alkalosis
 - C) hypoxemia, hypercapnia, acidosis

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- D) hypoxemia, hypercapnia, alkalosis
- E) non-gas alkalosis
- 3. Obstructive type of lung hypoventilation occurs when
 - A) airway obstruction
 - B) dysfunction of the respiratory muscles
 - C) lung atelectasis
 - D) decrease in the respiratory surface of the lungs
 - E) inhibition of the function of the respiratory center
- 4. The valvular mechanism of bronchial obstruction may occur when
 - A) emphysema
 - B) pneumonia
 - C) surfactant deficiency
 - D) resection of a lobe of the lung
 - E) pulmonary edema
- 5. Extrathoracic obstruction (in the neck) of the upper respiratory tract is accompanied by
 - A) Biot's breath
 - B) frequent shallow breathing
 - C) breathing with difficulty in the expiratory phase
 - D) Cheyne-Stokes breathing
 - E) breathing with difficulty in the inspiratory phase
- 6. Intrathoracic airway obstruction is accompanied by
 - A) stenotic breathing
 - B) frequent shallow breathing
 - C) difficulty in the expiratory phase
 - D) Cheyne-Stokes breathing
 - E) difficulty in the inspiratory phase
- 7. Stenosis of the larynx is accompanied by
 - A) rapid shallow breathing (tachypnea)
 - B) frequent deep breathing (hyperpnea)
 - C) infrequent deep breathing with difficult exhalation
 - D) infrequent deep breathing with difficulty inhaling
 - E) Biot type breathing
- 8. In the pathogenesis of stenotic breathing matters
 - A) decreased excitability of the respiratory center
 - B) acceleration of the Hering-Breuer reflex
 - C) delayed Hering-Breuer reflex
 - D) activation of the Bainbridge reflex
 - E) Euler-Lilliestrand reflex
- 9. Lower airway obstruction is accompanied by
 - A) decrease in the Tiffno index

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- B) difficulty in the inspiratory phase
 - C) stenotic breathing
 - D) an increase in the Tiffno index
 - E) a decrease in the OOL
10. Restrictive violations of lung ventilation can lead to
- F) bronchial tumor
 - G) emphysema
 - H) bronchiolospasm
 - I) surfactant deficiency
 - J) laryngospasm

Situational task

Task #1

Patient M., 26 years old, who inhaled a nut while laughing, was taken to the clinic. It was revealed that the nut closed the lumen of the right bronchus. How will the blood counts change, below the place of blockage of the bronchus? Choose the correct answer.

- A) The content of dissolved oxygen is greater than normal
- B) Oxyhemoglobin dissociation curve is shifted to the left
- C) $p\text{CO}_2$ is less than normal
- D) pH is less than normal
- E) $p\text{O}_2$ is equal to $p\text{O}_2$ of arterial blood

Task number 2.

Patient N., 55 years old, with deep vein thrombosis of the lower extremities, had thromboembolism of the branches of the pulmonary artery. Completely closed branch of the left pulmonary artery.

How will the gas composition change in this part of the lungs?

- A) $p\text{O}_2$ is equal to $p\text{O}_2$ of arterial blood
- B) $p\text{O}_2$ is equal to $p\text{O}_2$ of atmospheric air
- C) $p\text{O}_2$ is equal to $p\text{O}_2$ of air after inhalation
- D) $p\text{O}_2$ is equal to $p\text{O}_2$ of venous blood
- E) $p\text{O}_2$ is lower than $p\text{O}_2$ of venous blood

Task #3

Patient R., 60 years old, had one lung removed due to lung cancer. At rest, the pressure in the pulmonary artery is normal, and during exercise, pulmonary hypertension develops. How to explain it?

- A) Airway resistance increases under load
- B) Under load, stretching the lungs reduces blood flow
- C) Under load, the vessels of the lungs constrict
- D) Increased blood supply to the lungs during exercise due to insufficient compensation

Lesson # 4

1. Topic: Violations of vascular tone.

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2. Purpose: to form an understanding of the pathophysiological mechanisms of the occurrence and development of vascular tone disorders.

3. Learning objectives

- explain the pathogenesis of arterial hypertension;
- explain the pathogenesis of vascular insufficiency.

4. Main questions of the topic

1. Arterial hypertension.
2. Vascular insufficiency.
3. Features of violations of vascular tone in childhood.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Arterial hypertension, types.
2. Primary arterial hypertension.
3. Symptomatic hypertension.
4. Vascular insufficiency.
5. Pathophysiological principles for the prevention and treatment of vascular tone disorders.
6. Arterial hypertension in childhood.
7. Features of hypotonic conditions in children.

Tests

1. In children, the most common type of symptomatic hypertension is:

- A) endocrine
- B) renal
- B) neurogenic-centrogenic
- D) neurogenic reflex
- E) hemodynamics

2. Substances with a depressant effect include

- A) nitric oxide
- B) angiotensin-II
- C) aldosterone

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- D) endothelins
E) adrenaline
3. Pressor action has
A) adrenaline
B) kallikrein
C) prostaglandin E
D) nitric oxide
E) atrial natriuretic hormone
4. Secondary (symptomatic) arterial hypertension is one of the symptoms of diseases
A) liver
B) gastrointestinal tract
C) kidney
D) spleen
E) lungs.
5. The following are involved in the pathogenesis of primary arterial hypertension:
A) persistent hyperexcitability and hyperergy of higher sympathetic nerves centers
B) prolonged inhibition of emotional centers
C) an increase in the inhibitory effect of the cerebral cortex on the pressor centers
D) increased production of natriuretic hormone
E) insufficiency of the function of the adrenal cortex

Situational task

Patient N., aged 44, complained of headache, dizziness, tinnitus, constant weakness, sometimes nausea and "flies" before the eyes.

From the anamnesis of the disease: she considers herself ill for 5 years, when she began to notice: general weakness, insomnia, decreased performance, transient headaches.

Recently, the pain has become constant, sometimes accompanied by nausea and "flies" before the eyes. He associates the onset of the disease with frequent psychotraumatic situations at work (he works as a dispatcher at the railway station). I did not measure blood pressure, I took sedatives. Heredity is burdened - the father suffers from arterial hypertension.

Objectively: Height is 164 cm, weight is 100 kg. Skin: there is hyperemia of the face and décolleté. No edema was found. Weakened vesicular breathing, no wheezing, respiratory rate 20 in 1 min. Borders of relative cardiac dullness: right - 1.0 cm outward from the right edge of the sternum, left - along the left mid-clavicular line, top - III rib. The rhythm of the heart is correct, the tones are weakened, the emphasis of the second tone is on the aorta. The pulse is hard and tense, heart rate 90 in 1 min. BP at the time of examination 180/100 mm Hg. Art. on both hands. The abdomen is soft, painless on palpation. The size of the liver according to Kurlov was 10-9-6 cm.

Questions

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1. Is N. AH at high risk? Why?
2. Does heredity matter in the occurrence and development of the detected pathology?
3. Name the main pathogenetic

Lesson # 5

1. Topic: Coronary insufficiency. Heart rhythm disturbances.

2. Purpose: to form an understanding of the pathophysiological mechanisms of the onset and development of coronary insufficiency.

3. Learning objectives

- explain the etiopathogenesis of coronary insufficiency;
- explain the etiopathogenesis of various types of arrhythmias.

4. Main questions of the topic

1. Coronary insufficiency.
2. Arrhythmias of the heart.
3. Features of the development of cardiac arrhythmias in childhood.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Ischemic damage to the myocardium.
2. Coronary insufficiency.
3. Myocardial infarction.
4. Pathogenesis of reperfusion injury of the myocardium.
5. Endogenous mechanisms of protection of the heart during ischemia and reperfusion.
6. Pathophysiological principles of prevention and therapy of coronary insufficiency.
7. Cardiac arrhythmias, types, etiopathogenesis, principles of therapy.
8. Features of the development of cardiac arrhythmias in childhood.

Tests

1. In children, the excitation mechanism can lead to re-admission
 - A) atrial fibrillation
 - B) sinus bradycardia
 - C) sinus tachycardia
 - D) atrioventricular block
 - E) sinus arrhythmia

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2. Arrhythmias of the heart occur as a result of a violation of

- A) automatism
- B) excitability
- C) conductivity
- D) elasticity
- E) extensibility

3. Sinus tachycardia occurs when

- A) strengthening sympathetic influences on the heart
- B) strengthening parasympathetic influences on the heart
- C) weakening of sympathetic influences on the heart
- D) an increase in body temperature
- E) hyperoxia

4. Sinus tachycardia is characterized by:

- A) Heart rate reaches 90 - 180/min.
- B) heart rate exceeds 200/min.
- C) acceleration of spontaneous diastolic depolarization of the sinus node
- D) increased automatism of the sinus node
- E) pronounced changes in the shape of the P wave

5. Sinus bradycardia develops with

- A) decrease in body temperature
- B) strengthening parasympathetic influences on the heart
- C) increased tone of the sympathetic nervous system
- D) hypoxia
- E) hypothyroidism

Situational task

Patient V., 46 years old, was hospitalized in the intensive care unit of the hospital with complaints of severe compressive pain in the chest, lasting for 1.5 hours. From the anamnesis: the day before, he worked intensively for a week, slept little, smoked more than usual, drank tea and coffee. Prior to this illness, he considered himself a healthy person, went in for sports. On examination: the general condition is severe, the skin is pale, acrocyanosis. Auscultation revealed vesicular breathing in the lungs, no wheezing, respiratory rate - 28 per minute, heart sounds muffled, arrhythmic, BP 100/70 mm Hg. On the ECG: periodic atrial fibrillation with a frequency of 360, blockade of impulse conduction in the right leg of the His bundle, ST segment elevation in I, AVL, V1–V4 leads. In the blood test: leukocytes $9.2 \times 10^9/l$, other indicators are within the normal range.

1. What forms of heart pathology did the patient develop?
2. What, in your opinion, is the causal relationship between the forms of pathology you named?
3. What is the most likely cause of the condition accompanied by chest pain?
4. What additional studies should be done to confirm myocardial damage?

Lesson # 6

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1. Topic: Pathophysiology of the heart. Congenital and acquired heart defects.

2. Purpose: to form an understanding of the pathophysiological mechanisms of disorders in the body with heart defects.

3. Learning objectives

- explain changes in hemodynamics in heart disease;
- explain the etiopathogenesis of congenital heart defects;
- explain the etiopathogenesis of acquired heart defects.
- classify types of heart failure;
- explain the pathogenesis of congestion and myocardial forms of heart failure;
- explain the mechanisms of hemodynamic compensation in heart failure

4. Main questions of the topic

1. Congenital heart defects of the "white" type.
2. Congenital heart defects of the "blue" type.
3. Acquired heart defects.
4. Heart failure, forms.
5. Mechanisms of hemodynamic compensation in heart failure.
6. Features of the development of heart failure in children.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Congenital heart defects, types.
2. Congenital heart defects of the "white" type, hemodynamic disorders, manifestations.
3. Congenital heart defects of the "blue" type, hemodynamic disorders, manifestations.
4. Acquired heart defects, hemodynamic disorders, manifestations.
5. Insufficiency of the mitral and aortic valves.
6. Mitral stenosis and stenosis of the aortic mouth.
7. Malformations of the tricuspid valve.
8. Principles of therapy for heart defects.

Tests

1. With tetralogy of Fallot II tone over the pulmonary artery
- A.)reinforced

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- B. not changed
- C. weakened
- D. is normal
- E. not auscultated
- 2. One of the causes of left ventricular failure is
 - A) lung disease
 - B) stenosis of the mouth of the pulmonary artery
 - C) mitral valve insufficiency
 - D) right ventricular infarction
 - E) tricuspid valve insufficiency
- 3. An overload of the heart with blood volume can develop with
 - A) mitral valve insufficiency
 - B) arterial hypertension
 - C) arterial hypotension
 - D) stenosis of the aortic valve opening
 - E) hypervolemia
- 4. Congenital heart disease, accompanied by severe cyanosis:
 - A. narrowing of the mouth of the pulmonary artery
 - B. low ventricular septal defect
 - C. patent ductus arteriosus
 - D. Fallot's tetrad
 - E. Coarctation of the aorta
- 5. With complete transposition of the great vessels, the presence of a compensatory defect
 - A. Required
 - B. optional
 - C. dangerous
 - D. fraught with complications
 - E. doesn't matter

Situational task

Patient B., aged 37, has been suffering from rheumatic fever since childhood. At the age of 14 he was diagnosed with heart disease. All the years I felt well. In the spring, after suffering a sore throat, she began to complain of shortness of breath, palpitations, pain in the heart, and hemoptysis. Objectively: cyanosis of the skin and mucous membranes, the borders of the heart are expanded in all directions, moist rales in the lungs. Pulse 126 beats per minute, irregular. Hell 100/75 mmHg ECG shows atrial fibrillation.

Questions

1. What heart disease does the patient suffer from?
2. Explain the pathophysiology of defective development?

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1. Topic: Pathophysiology of digestion. Digestive disorders in the stomach and intestines.

2. Purpose: to form knowledge about the causes and mechanisms of development of the syndrome of dysphagia, gastric and intestinal dyspepsia.

3. Learning objectives

- characterize the causes and conditions for the occurrence of dysphagia syndrome, gastric and intestinal dyspepsia syndrome;
- explain the pathogenesis of the main syndromes of dysphagia, gastric and intestinal dyspepsia;
- give an opinion on situational tasks;
- to analyze changes in indicators of gastric secretion.

4. Main questions of the topic

1. Insufficiency of digestion.
2. Digestive disorders in the stomach.
3. Digestive disorders in the intestines.
4. Features of the development of digestive disorders in children.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks; PBL;
- for distance learning – PBL; individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus, as well as on platforms Zoom, Webex, and Whatsapp.

Practical work

Purpose: to study the general toxic effect of bile on a frog.

In the frog in the initial state, check the motor activity, the speed of turning over on the stomach when laying on its back, and the reaction to pain stimulation (pinch). Inject 2-3 ml of bile into the dorsal lymphatic sac with a syringe and note changes in the general condition of the frog every 3-4 minutes.

Draw conclusions and conclusions by answering the following questions:

1. What is the pathophysiological significance of motor and sensory disturbances observed in the experiment in a frog after bile administration?
2. What is the mechanism of the noted changes?

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Insufficiency of digestion.
2. Etiopathogenesis of disorders of appetite, salivation and chewing.
3. Dysphagia.

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4. Digestive disorders in the stomach.
5. Etiopathogenesis of primary and secondary malabsorption.
6. Violations of the motor function of the intestine.
7. Pathophysiological principles for the prevention and treatment of indigestion.
8. Features of the development of disorders of the stomach in children.
9. Features of the development of intestinal disorders in children.

Tests

1. The reasons for the difficult absorption of fats in young children are
 - A) low intestinal lipase activity
 - B) rapid emulsification of fats
 - C) excess of bile acids
 - D) hyperproteinemia
 - E) high activity of glycogenolysis enzymes
2. Hypersalivation is observed with
 - A) salivary gland tumors
 - B) sialolithiasis
 - C) increased tone of the vagus
 - D) decreased tone of the vagus
 - E) strong emotions
3. With indomitable vomiting, there are:
 - A) hyperkalemia
 - B) hypernatremia
 - C) hyperchloremia
 - D) metabolic alkalosis
 - E) paresis, paralysis
4. The reason for the decrease in the secretion of gastric juice may be
 - A) excessive parasympathetic stimulation of the stomach
 - B) decrease in secretin secretion
 - C) decreased secretion of gastrin
 - D) increase in histamine secretion
 - E) Zollinger-Ellison Syndrome
5. Increasing the acidity of gastric juice leads to
 - A) the development of fermentation and putrefaction processes in the stomach
 - B) difficulty in the evacuation of food masses from the stomach
 - C) rapid neutralization of food masses from the stomach by duodenal contents
 - D) diarrhea
 - E) gaping pylorus

Situational task

Patient M., 52 years old, recently began to notice aching pains in the left part of the epigastric region, radiating to the region of the xiphoid process and the left half of the

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chest. I thought that the pains were caused by angina pectoris, I took Validol, but the pains did not go away. She paid attention to the fact that pains occur 30 minutes-1 hour after eating, there was an eructation of bitterness, flatulence. The chair is unstable - more often diarrhea. He sleeps badly, his working capacity has decreased, he gets tired quickly, became irritable, his mood is bad, sometimes he is depressed.

Data of an objective study: the physique is correct, normosthenic, the subcutaneous fat layer is within the normal range. The tongue is coated with a white coating, the papillae are smoothed. Bad breath from the mouth, on palpation - pain in the epigastric region to the left of the midline. BP - 140/80 mm Hg, heart rate - 70, respiratory rate - 16, Hb - 115 g/l, L - 8 x10⁹/l. Analysis of urine and feces without deviations from the norm. Basal and stimulated secretion of gastric juice is sharply reduced. Test for the presence of urease in gastric juice is positive. The proteolytic activity of gastric juice is increased. The content of fructose and N-acetylneuraminic acid in gastric juice is reduced. X-ray reveals a symptom of a "niche" in the region of the upper part of the cardiac part of the stomach.

1. What disease can be assumed in this case?
2. What does a positive test for the presence of urease in gastric juice indicate?
3. What is the cause of belching bitterness?

Lesson # 8

1. Topic: Pathophysiology of the liver. Violations of the external secretion of the pancreas.

2. Purpose: to form an understanding of the etiopathogenesis of the syndrome of liver failure and disorders of the exocrine function of the pancreas.

3. Learning objectives

- characterize the etiopathogenesis of liver failure;
- identify in the experiment and explain the manifestations of cholemia;
- characterize the features of the pathogenesis of liver dysfunction in children;
- explain the etiopathogenesis of digestive disorders in violation of the exocrine function of the pancreas;
- explain the features of the etiopathogenesis of pancreatic dysfunction in children.

4. Main questions of the topic

1. Liver failure.
2. Jaundice.
3. Violations of the exocrine function of the pancreas.
4. Features of the development of liver pathology and disorders of the exocrine function of the pancreas in childhood.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks; PBL;

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● for distance learning – PBL; individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line **mode to discuss the** topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus, as well as on platforms Zoom, Webex, and Whatsapp.

6. Methods of assessment: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Liver failure.
2. The mechanism of the damaging effect of chemical, physical and biological factors on hepatocytes.
3. Portal hypertension.
4. Hepatic encephalopathy.
5. Jaundice.
6. Pathophysiological principles for the prevention and treatment of liver pathology.
7. Features of the development of liver pathology in childhood.
8. Violations of the exocrine function of the pancreas.
9. Pathophysiological principles for the prevention and treatment of disorders of the exocrine function of the pancreas.
10. Features of the development of disorders of the exocrine function of the pancreas in childhood.

Tests

1. With jaundice, children develop jaundice on the skin and mucous membranes
 - A) an increase in bilirubin in the blood
 - B) Increased urobilin in the blood
 - C) formation of bile acids in the blood
 - D) high blood cholesterol
 - E) increased urination in the blood
2. The leading link in the pathogenesis of shunt hepatic coma is
 - A) hypoglycemia
 - B) acidosis
 - C) autointoxication of the body
 - D) hyperbilirubinemia
 - E) secondary aldosteronism
3. The leading link in the pathogenesis of suprahepatic jaundice is
 - A) dehydration of the body
 - B) heart failure
 - C) insulin deficiency
 - D) violation of the outflow of bile
 - E) enhanced hemolysis of erythrocytes

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4. The most common manifestation of pancreatic achylia:

- A) weight loss
- B) vitamin B12 deficiency
- C) steatorrhea
- D) osteoporosis
- E) nephrolithiasis

5. The leading link in the pathogenesis of acute pancreatitis is the activation of

- A) trypsin
- B) elastase
- C) kallikrein-kinin system
- D) clotting system
- E) fibrinolytic system

Situational task

A 56-year-old patient complains of weight loss (14 kg in 8 months), mushy stools. At the time of examination, there is no pain in the abdomen, but from the anamnesis it is known that two months ago the patient noted pain in the abdomen, radiating to the back. Such pains, lasting about seven days, had been a regular occurrence for the past five years, twice a year. The stool is usually mushy, sometimes greasy. During the period of pain, the patient had no bleeding, fever and chills. The patient has a good appetite, does not follow a diet. A few years ago, I was diagnosed with impaired glucose tolerance. Doesn't take medication all the time. He is married, works in his own company, smokes one pack of cigarettes a day for the past 20 years. Drinks a glass of wine daily at dinner and 200 ml of whiskey, 6 cans of beer at the weekend. Objectively: the patient is somewhat hypotrophic, there is a decrease in fat and muscle volume in the temporal areas, peripheral lymph nodes are not enlarged. Examination of the heart and lungs revealed no changes. On palpation, the abdomen is soft, not swollen. The liver is slightly enlarged, the edge is smooth. The spleen is not palpable. Laboratory data:

electrolytes are normal, glucose level is 7 mmol/l, AST is 800 IU/l, ALT is 600 IU/l (normal is 400 IU/l); bilirubin is normal; the content of amylase and lipase is increased, albumins - 30 g / l, Hb - 130 g / l, the volume of erythrocytes is increased, platelets $135 \times 10^9 / l$.

Questions

1. What disease can be thought of in this patient?
2. What is the possible cause of the development of the disease?
3. Explain the pathogenesis of clinical manifestations.

Lesson #9

1. Topic: Pathophysiology of the kidneys. Dysfunction of the glomeruli and tubules.

2. Purpose: to form knowledge on the etiology and pathogenesis of violations of the main functions of the kidneys.

3. Learning objectives

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- characterize the etiology and pathogenesis of violations of the main functions of the kidneys;
- explain the pathogenesis of urinary syndrome;
- explain the etiology and pathogenesis of pyelonephritis, obstructive uropathy;
- draw up a scheme of the pathogenesis of symptoms and syndromes in kidney pathology.
- classify types of renal insufficiency;
- explain the etiopathogenesis of renal failure;
- explain the features of the etiopathogenesis of pancreatic dysfunction in children.

4. Main questions of the topic

1. Violation of glomerular filtration.
2. Violation of tubular reabsorption.
3. Nephritic and nephrotic syndrome.
4. Features of the development of impaired renal function in children.
5. Acute renal failure.
6. Chronic renal failure.
7. Features of the development of renal failure in children.

5. Methods / technologies of learning and teaching:

- TBL.
- in distance learning - TBL, individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Classroom" section AIS Platonus, as well as on the Zoom, Webex and Watsapp platforms.

6. Assessment methods/technologies: The general form of assessment, including the answers of individual and group testing, self- and mutual assessment.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Violation of glomerular filtration.
2. Violation of tubular reabsorption.
3. Tubulopathy.
4. The role of the kidneys in the violation of water-electrolyte metabolism and acid-base state.
5. Renal and extrarenal disorders in kidney pathology.
6. Etiology and pathogenesis of nephritic and nephrotic syndrome.
7. Pathophysiological principles for the prevention and treatment of renal dysfunction.
8. Renal failure, types.
9. Etiopathogenesis of acute renal failure.
10. Etiopathogenesis of chronic renal failure.
11. Uremia.
12. Manifestations of renal failure.

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13. Pathophysiological principles for the prevention and treatment of renal failure.

14. Features of the development of renal failure in children.

Tests

1. The most common form of glomerular lesions in children:

- A) nephropathy with minimal changes.
- B) membranoproliferative glomerulonephritis.
- C) membranous glomerulonephritis.
- D) segmental glomerulonephritis.
- E) chronic glomerulonephritis.

2. Hematuria is the appearance in the urine

- A) erythrocytes
- B) leukocytes
- C) epithelial cells
- D) cylinders
- E) proteins

3. Reducing the relative density of urine is called

- A) hypostenuria
- B) cylindruria
- C) nocturia
- D) hyperstenuria
- E) isostenuria

4. Relative density of the final urine in isostenuria -

- A) 1020-1030
- C) 1016-1020
- C) 1010-1011
- D) 1025-1035
- E) 1006-1012

5. Prerenal polyuria develops with

- A) prostate adenoma
- B) Decreased production of antidiuretic hormone
- C) dehydration of the body
- D) acute arterial hypotension
- E) stricture of the urinary canal

Situational task

The patient, extracted from the rubble, where he was about 5 hours, consciousness is inhibited, complaints of pain in the lumbar region, blood pressure 80/60 mm Hg. Art., heart rate 110 per minute.

In peripheral blood: erythrocytes - $3.0 \times 10^{12}/l$, hemoglobin - 100 g/l, leukocytes - $9.2 \times 10^9/l$. In serum: creatinine - 17.2 mg / l, urea - 8.6 mmol / l, residual nitrogen - 28 mmol / l, total bilirubin - 45 μmol / l, indirect - 45 μmol / l. Hourly diuresis: 1 hour after

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admission - 15 ml, after 2 hours - 10 ml, after 3 hours - 7 ml, after 4 hours - 2 ml. **Urine** creatinine 1 hour after admission 530 mg/l. Urine reactions for sugar and protein are negative.

Questions

1. What renal syndrome has developed in the patient?
2. What are the causes of this syndrome?

Lesson # 10

1. Topic: General pathophysiology of the endocrine system.

2. Purpose: to study the general etiopathogenesis of endocrinopathies.

3. Learning objectives

- to characterize the main mechanisms of development of endocrinopathies;
- explain dysregulation of the endocrine glands;
- to explain the peculiarities of endocrine gland regulation disorders in childhood.

4. Main questions of the topic

1. Violation of the central mechanisms of regulation of the endocrine glands.
2. Pathological processes in the endocrine glands.
3. Peripheral (extra-glandular) mechanisms of hormone activity disturbance.
4. Features of the development of dysregulation of the endocrine glands in childhood.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

Practical work

Purpose: To obtain a model of hypoglycemic coma in mice, to observe its development. Three mice are taken into the experiment. Two are injected with 1-2 units of simple insulin, placed in a jar. The control mouse is placed in a separate jar. Both banks are placed in a warm place. Watching animals. After about 40 minutes, the experimental mice show symptoms of hypoglycemic coma (unusual posture, rapid breathing, incoordination). One of the experimental mice is injected intraperitoneally with 1.0 - 1.5 ml of 10% glucose solution, the observation is continued, comparing the states of the two experimental animals. After completing the observations, explain the difference in the condition of the animals, draw conclusions.

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

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1. The main mechanisms of dysfunction of the endocrine glands.
2. Violation of the central mechanisms of regulation.
3. Violation of trans- and parahypophyseal regulation.
4. Feedback mechanism.
5. Pathological processes in the gland itself: infectious processes and intoxications, tumor processes, genetically determined defects in hormone biosynthesis.
6. Peripheral (extra-glandular) mechanisms of hormone activity disturbance.
7. Pathophysiological principles for the prevention and treatment of endocrine gland dysfunction.
8. Features of the development of dysregulation of the endocrine glands in childhood.

Tests

1. Refers to hypothyroidism in childhood
 - A) Defects in mental development to the point of idiocy (cretinism)
 - B) hyperglycemia
 - C) positive nitrogen balance
 - D) dehydration
 - E) early puberty
2. Causes of violation of parahypophyseal regulation can be:
 - A) impaired blood supply to the pituitary gland in DIC
 - B) damage to the neurohypophysis
 - C) toxic or immune damage to hypothalamic neurosecretory cells
 - D) pituitary tumor
 - E) damage to nerve conductors
3. Transhypophyseal regulation is the main one for
 - A) zona fasciculata of the adrenal cortex
 - B) pancreas
 - C) glomerular zone of the adrenal cortex
 - D) parathyroid glands
 - E) thymus
4. Violation of the feedback mechanism is based on
 - A) a decrease in the sensitivity of the hypothalamic centers that perceive fluctuations in the concentrations of the hormone of the peripheral gland in the blood
 - B) a decrease in the production of liberins in response to an increase in the production of tropic hormones
 - C) an increase in the production of statins with an increase in hormones of peripheral glands
 - D) an increase in the production of adenohipophysis hormones with an increase in the production of liberins
 - E) an increase in the production of liberins with a decrease in the concentration of tropic hormones

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5. Peripheral, extraglandular mechanisms of hormone activity disturbance include:

- A) gland tumors
- B) violation of the biosynthesis of gland hormones
- C) violation of the blood supply to the gland
- D) congenital malformations of the gland
- E) blockade of hormonal receptors

Situational task

Patient V., aged 27, was admitted to the clinic with complaints of a gradual increase in weakness, decreased performance, insomnia, lack of appetite, and emaciation.

Examination of the patient revealed:

- Dirty-brown pigmentation of the skin in the area of the white line of the abdomen, elbows, in the armpit, oral mucosa, tongue.
- Blood pressure 80/60 mm Hg.
- Decreased muscle tone.
- Hypokalemia, hypernatremia, blood sugar - 3.3 mmol/l.
- The content of cortisol in the blood is reduced, the content of corticosteroids in the urine is reduced.

Questions

1. What gland is affected by these manifestations?
2. What is the name of the disease?
3. What is the pathogenesis of the observed changes?

Lesson # 11

1. Topic: Pathophysiology of individual endocrine glands.

2. Purpose: to learn the etiology, pathogenesis of disorders in the body with hypo- and hyperthyroidism, hypo- and hypercortisolism, hyperglycemia and hypoglycemia syndromes.

3. Learning objectives

- list the etiological factors of hypo- and hyperfunction of the thyroid gland and adrenal glands;
- explain the pathogenesis of the main manifestations of hypo- and hyperfunction of the thyroid gland and adrenal glands;
- explain the pathogenesis of type I and II diabetes mellitus and the main symptoms of the diabetic syndrome.

4. Main questions of the topic

1. Pathology of the pituitary gland.
2. Pathology of the thyroid gland and parathyroid glands.
3. Violations of the intrasecretory function of the pancreas.
4. Pathology of the adrenal glands.
5. Features of the development of endocrinopathies in children.
5. Methods / technologies of learning and teaching:

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- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Hypo- and hyperfunction of the pituitary gland.
2. Panhypopituitarism.
3. Hypo- and hyperfunction of the adrenal glands.
4. Corticosteroid deficiency.
5. Hypo- and hyperfunction of the thyroid gland.
6. Hypo- and hyperfunction of the parathyroid glands.
7. Violations of the intrasecretory function of the pancreas.
8. Diabetes.
9. Diabetic coma.
10. Pathophysiological principles of prevention and therapy of endocrinopathies.
11. Features of the development of endocrinopathies in children.

Tests

1. The course of insulin-dependent diabetes mellitus in children, compared with adults, is characterized by
 - A) more severe course
 - B) the absence of the occurrence of diabetic coma
 - C) the impossibility of developing microangiopathies
 - D) slow progression of the disease
 - E) more benign course
2. The consequence of protein metabolism disorders in hypercortisolism is
 - A) increased production of antibodies
 - B) muscle atrophy, osteoporosis
 - C) decreased gluconeogenesis
 - D) decrease in residual nitrogen in the blood
 - E) increasing resistance to infections
3. Violations of water-electrolyte metabolism in hypercortisolism include:
 - A) hypernatremia, hypokalemia, inhibition of calcium absorption in the intestine
 - B) hyponatremia, hyperkalemia, increase in BCC
 - C) hypercalcemia, decrease in BCC
 - D) hypovolemia

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E) hyperkalemia, hypervolemia

4. The cause of acute adrenal insufficiency may be

A) autoimmune damage to the adrenal cortex

B) adrenal tuberculosis

C) tumor metastases in the adrenal cortex

D) thrombosis of the adrenal arteries in DIC

E) congenital adrenal hypoplasia

5. Addison's disease is characterized by:

A) skin hyperpigmentation, hyponatremia, hyperkalemia

B) skin hyperpigmentation, hypernatremia, hypokalemia

C) convulsions

D) arterial hypertension

E) obesity

Situational task

A 5-year-old child from a separated region was admitted to the clinic. There is a lag in growth and mental development. The face is puffy, the tongue is large, there are teeth marks along the edges of the tongue. The skin is dry. Abdomen swollen, frequent constipation. Pulse 60 per minute, BP 95/60.

Questions

1. Excess or deficiency of what hormone leads to such phenomena?

2. What is the name of the disease, what is its possible etiology and mechanisms of development?

What is the pathogenesis of the observed changes?

Lesson #12

1. Topic: Pathophysiology of the blood system. Pathology of erythrocytes.

2. Purpose: to form an understanding of the etiology and pathogenesis of anemic syndrome.

3. Learning objectives

- give a classification of anemia, characterize the causes of anemic syndrome;
- explain the pathogenesis of anemic syndrome, indicate the features of the development of anemic syndrome in children;
- analyze hemograms of patients with various types of anemia;
- explain the etiopathogenesis of erythrocytosis.

4. Main questions of the topic

1. Anemia.

2. Erythrocytosis.

3. Pathological forms of erythrocytes.

4. Features of the development of erythrocyte pathology in childhood.

5. Methods / technologies of learning and teaching:

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- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
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6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Anemia, etiology, classification, manifestations.
2. Etiopathogenesis, changes in peripheral blood, manifestations of posthemorrhagic anemia.
3. Etiopathogenesis, changes in peripheral blood, manifestations of hemolytic anemia.
4. Etiopathogenesis, changes in peripheral blood, manifestations of dyserythropoietic anemia.
5. Anemia in chronic diseases.
6. Pathophysiological principles for the prevention and treatment of anemia.
7. Erythrocytosis, types, causes.
8. Pathological forms of erythrocytes.
9. Features of the development of hemolytic anemia in childhood.
10. Features of the development of iron deficiency anemia in children.

Tests

1. Refers to the clinical manifestations of hemorrhagic disease of the newborn
 - A) melena, bleeding from an umbilical ulcer
 - B) jaundice of the skin and mucous membranes
 - B) kernicterus
 - D) hyperbilirubinemia
 - E) edema
2. The bone marrow stage of acute posthemorrhagic anemia is characterized by:
 - A) the normal content of erythrocytes and hemoglobin per unit volume of blood
 - B) normal hematocrit value
 - C) normocythemich hypovolemia
 - D) reticulocytosis, polychromatophilia, the appearance of normoblasts
 - E) hemodilution
3. The hydremic stage of acute posthemorrhagic anemia is characterized by:
 - A) decrease in hematocrit
 - B) the normal content of erythrocytes and hemoglobin per unit volume of blood
 - C) activation of erythropoiesis

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- D) reticulocytosis, polychromatophilia, the appearance of normoblasts
- A) neutrophilic leukocytosis with a nuclear shift to the left
4. Acute acquired hemolytic anemia is characterized by everything except
- A) an increase in reticulocytes and the appearance of normoblasts
- B) basophilic puncture of erythrocytes
- C) appearance of megaloblasts
- D) the appearance of erythrocytes with Jolly bodies
- E) neutrophilic leukocytosis with a nuclear shift to the left
5. With iron deficiency anemia in the peripheral blood, ... is observed.
- A) erythrocyte hyperchromia
- B) macrocytes
- C) neutrophilic leukocytosis with a shift to the left
- D) appearance of megalocytes
- E) erythrocyte hypochromia

Situational task

Patient K., aged 14, was admitted to the clinic with complaints of weakness, dizziness, fever, pain when swallowing. From the anamnesis it is known that the patient suffers from substance abuse and inhaled benzene vapors for three months. Attention was drawn to the pallor of the skin, multiple hemorrhages in the form of punctate and spotty hemorrhages, necrotic ulcers of the throat and oral cavity, the liver and spleen were not enlarged. Blood test: hemoglobin - 60 g/l; erythrocytes - $2.7 \times 10^{12} / l$; reticulocytes - 0%; platelets - 28×10^9 ; leukocytes - $1.5 \times 10^9 / l$; neutrophils: metamyelocytes - 0%; stab - 0%; segmented - 15%; eosinophils - 0%; basophils - 0%; lymphocytes - 82%; monocytes - 3%, ESR - 45 mm / h.

Questions

1. What is the mechanism of anemia?
2. What objective data support the hematological diagnosis?

Lesson #13

1. Topic: Pathology of leukocytes. hemostasis disorders.

2. Purpose: to form knowledge on the etiology and pathogenesis of leukocytosis and leukopenia, myelo- and lymphoproliferative syndrome.

3. Learning objectives

- to characterize the causes of myelo- and lymphoproliferative syndromes;
- classify leukocytosis, leukopenia, leukemia;
- explain the mechanisms of development of myelo- and lymphoproliferative syndromes, leukocytosis, leukocytopenia;
- analyze hemograms in myelo- and lymphoproliferative syndromes, leukocytosis, leukocytopenia.

4. Main questions of the topic

1. Quantitative and qualitative changes in leukocytes.

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2. Leukemias.

3. Violations of hemostasis.

4. Features of leukemia and hemostasis disorders in children.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

Practical work

Purpose: To master the technique of counting the leukocyte formula.

Technique for calculating the leukocyte formula and analyzing the results. To determine the leukocyte formula, a smear is viewed under an immersion lens and 200 (100 can be used under student conditions) leukocytes are found, the count of which is carried out in groups in accordance with their classification. The search for leukocytes is performed by moving the smear in a certain way, which eliminates the possible distortion of the counting results associated with the uneven distribution of leukocytes in the smear.

There are 2 main ways to move a smear. According to the 1st method, the smear is viewed in the transverse direction, i.e. from one long edge to the opposite. This viewing is carried out in 3 mentally distinguished zones of the preparation: initial, middle and tail. Each of these zones occupies 1/3 of the entire smear area; therefore, in each zone it is necessary to find and count 1/3 of the total counted number of cells, i.e. respectively 33, 33, and 34 leukocytes (or 67, 67, and 66 leukocytes when counting 200 cells).

According to the 2nd method, the count of leukocytes is carried out in 4 zones, into which the smear is divided, mentally drawing longitudinal and transverse axial lines through its center. In each of these zones, you need to find, therefore, 1/4 of the total number of cells, i.e. 25 or 50 leukocytes. The search for leukocytes in each zone in this case is carried out along a zigzag line running along the long edge of the smear and capturing both the marginal and more distant parts of the smear. When calculating the leukocyte formula, all morphological abnormalities of leukocytes, the appearance of immature or unusual cells, and other features of peripheral blood are also noted.

Recording the results of the count. Method 1: carried out using an 11-key mechanical counter. Method 2: a) put vertically at sufficient intervals the first letter of the name of the type of leukocytes; b) each leukocyte visible in the microscope is marked against the corresponding letter first with dots located at the corners of the square, then they are connected with sticks and 2 diagonals are drawn. Obviously, each such figure contains 10 elements corresponding to 10 counted leukocytes. This makes it easier to determine the required total number of them (100 or 200).

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Analysis of the results

1. Using the total number of leukocytes contained in 1 μ l of the test blood, reported in advance by the teacher, and the percentage of different types of leukocytes found, the latter are converted into absolute numbers, i.e. calculate the so-called leukocyte profile.
2. The type of leukocytosis is determined by the total number of leukocytes and the percentage of their species.
3. The presence of relative and absolute deviations from the norm is determined by the percentage and absolute number of individual types of leukocytes.
4. Calculate the neutrophil nuclear shift index.
5. If there is a nuclear shift to the left, its nature is determined.
6. According to the total number of leukocytes and the leukocyte formula, the pathological type of the leukogram is determined.

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Leukocytosis and leukopenia, types, causes of development, changes in the hemogram.
2. Pathological forms of leukocytes.
3. Leukemoid reactions.
4. Leukemias, etiopathogenesis, classification, clinical and hematological picture.
5. Violations of hemostasis.
6. Hemorrhagic diathesis and syndromes.
7. Etiology and pathogenesis of thrombocytopenia, thrombocytopathies, vasopathies, coagulopathy.
8. Thrombophilia.
9. Pathophysiological principles for the prevention and treatment of leukemia and hemostasis disorders.
10. Features of the course of leukemia in children.
11. Features of the development of hemostasis disorders in childhood.

Tests

1. Physiological true leukocytosis is observed when
 - A) hemolytic anemia
 - B) inflammation
 - C) injuries
 - D) in newborns
 - E) acute posthemorrhagic anemia
2. Neutrophilic leukocytosis with a regenerative nuclear shift to the left is observed with ...
 - A) physical work
 - B) digestion

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C) appendicitis

D) aplastic anemia

E) megaloblastic anemia

3. Diseases accompanied by relative lymphocytosis:

A) agranulocytosis, aplastic anemia

B) purulent infection

C) tuberculosis

D) lobar pneumonia

E) infectious mononucleosis

4. Chronic leukemia is characterized by:

A) sudden onset

B) leukemic gaping

C) extremely severe and fast course

D) preservation of the ability of leukemic cells to differentiate and mature

E) the presence of a large number of blast cells in the blood

5. Leukemic gaping is characteristic of

A) acute myeloid leukemia

B) chronic myeloid leukemia

C) chronic lymphocytic leukemia

D) chronic myelosis

E) chronic monocytic leukemia

Situational task

Patient E., aged 35, was admitted with complaints of pain in the lower extremities, minor abdominal pain, dry cough. On examination, attention was drawn to multiple hemorrhages in the form of punctate and spotted hemorrhages. Lymph nodes, liver and spleen are enlarged. Blood test: Hemoglobin - 90 g/l; Erythrocytes - $3.0 \times 10^{12} / l$; Reticulocytes - 0.2%; Platelets - $30 \times 10^9 / l$; Leukocytes - $17 \times 10^9 / l$; Neutrophils: metamyelocytes - 0%; stab - 1%; segmented - 16%; Eosinophils - 0%; Basophils - 0%; Blast cells - 56% Lymphocytes - 23%; Monocytes - 2%. The reaction to peroxidase and lipids is negative. Shik reaction is positive (glycogen in the form of separate granules).

Questions

1. What blood disease can you think of?

2. Explain the pathogenesis of clinical manifestations.

Lesson #14

1. Topic: Pathophysiology of the musculoskeletal system.

2. Purpose: to form an understanding of the pathophysiological mechanisms of osteopathy, articular syndrome, skin diseases.

3. Learning objectives

- to characterize the etiology and pathogenesis of osteopathies and arthropathy;
- explain the pathogenesis of symptoms of articular syndrome;

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- characterize the etiological factors of skin diseases;
- explain the mechanism of typical pathological processes in the skin.

4. Main questions of the topic

1. Osteopathy.
2. Arthropathy.
3. Myopathies.
4. Typical skin lesions.
5. Features of the development of pathology of the musculoskeletal system and skin in children.

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Inflammatory and degenerative lesions of the musculoskeletal system.
2. Hereditary and acquired osteopathies.
3. Osteoporosis and osteomalacia.
4. Osteoarthritis and arthritis, etiopathogenesis.
5. Myopathy.
6. Etiology and pathogenesis of the main types of skin lesions.
7. Pathogenesis of acute and chronic dermatitis.
8. Pathophysiological principles for the prevention and treatment of disorders of the musculoskeletal system and skin pathology.
9. Features of the development of pathology of the musculoskeletal system in children.
10. Features of the development of skin pathology in children.

Tests

1. Refers to the manifestation of hypovitaminosis D.
 - A) early closure of the fontanel
 - B) calcification
 - C) curvature of tubular bones
 - D) microcephaly
 - E) "amber teeth", blue eyes, joint mobility
2. Activates osteolysis:
 - A) Thyrocalcitonin

- B) Transforming Growth Factor
 C) Epidermal growth factor
 D) Parathyrin
 E) Vitamin D
3. Bone tissue remodeling is
 A) a constant process of bone resorption and its formation
 B) artificial limb lengthening
 C) prosthetic joints
 D) bone resorption by osteoblasts
 E) formation of bone tissue by osteoclasts
4. Mutation of collagen genes is important in the pathogenesis of osteogenesis imperfecta....
 A) type I
 B) type II
 C) III type
 D) Type IV
 E) Type V
5. Typical manifestations of Marfan's syndrome are:
 A) joint hypermobility and arachnodactyly
 B) intrauterine fractures
 C) rheumatoid arthritis
 D) "amber" teeth
 E) overextensible skin

Situational task

Patient M., 65 years old, was observed by a doctor for a long time because of urolithiasis. Fibrous changes were noted on the roentgenogram of the bone tissue. Bone resorption exceeds osteosynthesis.

Questions

1. What changes in the concentration of calcium, phosphates and parathyroid hormone in the blood can be expected in this patient? Choose an option.

	Ca ²⁺	PO ₄ ³⁻	parathormone
A	↓	↓	↑
B	↓	↑	↓
C	↓	↑	↑
D	↑	↓	↑
E	↑	↑	↑

2. Explain the pathogenesis of these changes.

3. Make a scheme of pathogenesis.

Lesson number 15

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1. Topic: Features of the leading syndromes in gerontology and geriatrics.

2. Purpose: to study the causes and mechanisms of aging development.

3. Learning objectives

- characterize the etiology and pathogenesis of aging;
- explain the mechanism of typical pathological processes of aging.

4. Main questions of the topic

- What are the theories of aging?
- What are the mechanisms of aging?
- What changes occur in organs during aging?
- What are the principles of prevention of premature aging

5. Methods / technologies of learning and teaching:

- performance of practical work; solution of situational problems; interpretation of the results of clinical and laboratory studies; discussion of the main issues of the topic; performance of test tasks;
- in distance learning - individual and group work in off-line mode to complete the tasks presented in the "Task" module of AIS Platonus, and in on-line mode to discuss the topic in the chat of the "Task" module and the "Learning room" section of AIS Platonus , and on Zoom, Webex, and Whatsapp.

6. Assessment methods/technologies: Checklist.

7. Literature: see Appendix No. 1.

8. Control

Tests

1. Age in etiology plays the role of ... disease.

- A) conditions only
- B) both causes and conditions
- C) just reasons
- D) only a factor contributing to the emergence
- E) only a factor preventing the occurrence

2. To ... reactivity refers to a stronger effect of hypoxia on adults than on newborns.

- A) age
- B) species
- C) biological
- D) sexual
- E) individual

3. The uniqueness of each individual is determined by

- A) individual reactivity
- B) gender
- C) species reactivity
- D) constitutional features
- E) group reactivity

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Appendix No. 1

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