


ОҢТҮСТІК-ҚАЗАҚСТАН MEDISINA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ		SOUTH KAZAKHSTAN MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия»
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METHODICAL RECOMMENDATIONS FOR PRACTICAL CLASSES

Discipline: General pathological physiology

Discipline code: GP 3201-2

Name of the EP: 6B130100 - "General Medicine"

Volume of teaching hours/credits: 150 hours/5 credits

Course and semester of study: III course, V semester

Practical training: 35 hours

Shymkent , 2022



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

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Lesson #1

1. Topic: Subject, tasks and methods of pathological physiology. General nosology .

2. Purpose: to teach how to use the main categories and concepts of general nosology in the assessment and pathophysiological analysis of typical pathological processes.

3. Learning objectives

- to study the significance and possibilities of modeling pathological processes and experimental therapy;
- to study the basic concepts of nosology ;
- apply the categories and concepts of general nosology in the pathophysiological analysis of typical pathological processes.

4. Main questions of the topic

1. Subject and tasks of pathophysiology.
2. Methods of pathophysiology.
3. Basic concepts of general nosology.
4. Features of the course and outcomes of diseases in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to create a model of the pathological process - kinetosis.

Mice are placed in a cloth bag and hung from the disk of a manual centrifuge (carousel). Scroll for 30-40 seconds and quickly remove. Observe the general condition, changes in breathing, mobility of animals. Mice make movements around the axis of their body and circular movements.

Questions

1. What animals caused the pathological process?
2. What pathogenic factor did the animal undergo in this experiment?
3. What is the mechanism of development of this pathological process?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Subject and tasks of pathological physiology; its place among other medical sciences.
2. The main sections of pathological physiology.
3. Methods of pathophysiology.
4. Significance of the experiment. General principles for constructing biomedical experiments and interpreting their results.
5. Basic concepts of general nosology.
6. Norm, health, predisease, disease.
7. Stages of the disease. Outcomes. Recovery is complete and incomplete.
8. Features of the course and outcomes of diseases in children.

Tests

1. The features of the pathology of childhood include
- A) high permeability of biological barriers
B) inhibition of biosynthetic processes

- C) chronic disease
 D) high incidence of tumor diseases
 E) multiplicity of pathology
2. Pathological physiology is a science that studies
 a) general patterns of occurrence, course and end of the disease
 b) life of an organism under physiological conditions
 c) classification and nomenclature of diseases
 d) clinical manifestations of diseases
 e) the effect of drugs on the human body
3. Mandatory in the pathophysiological experiment is
 a) study of functional indicators
 b) modeling of human disease in animals
 c) study of morphological indicators
 d) study of biochemical parameters
 e) study of clinical indicators of the disease
4. A scar on the skin after a burn refers to
 A) pathological process
 C) pathological reaction
 C) pathological condition
 D) pathological activation
 E) pathological suppression

Situational task

The patient received a thermal burn II degree 25% of the body surface. The general condition is severe. The patient is agitated, sharp thirst, frequent pulse, weak filling and tension. BP 100/60 mmHg

Questions

1. How can the patient's condition be characterized?
2. What are the pathophysiological bases of therapeutic measures that the patient needs?

Lesson #2

1. Topic: General etiology and pathogenesis.

2. Purpose: to teach to determine the significance of etiological factors in the emergence and development of the pathological process, as well as cause-and-effect relationships in pathogenesis.

3. Learning objectives

- to study the significance of etiological factors in the occurrence and development of the pathological process;
- determine cause-and-effect relationships in pathogenesis.

4. Main questions of the topic

1. Etiology.
2. Damage as the initial link in pathogenesis.
3. Causal relationships in pathogenesis.
4. The main causes of diseases in childhood .

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to conduct a pathophysiological analysis of the results of experiments .

A laboratory animal (mouse, rat) is placed in a small pressure chamber. Within 2-3 minutes, air is pumped out of the pressure chamber, lowering the pressure to 170 180 ммHg . (23-24 kPa). After 0.5-1 min of being in a rarefied atmosphere, the animal shows signs of anxiety: it moves its paws, scratches its muzzle, runs around the pressure chamber; after another 2-3 minutes, clonic-tonic convulsions, urination, the animal lies on its side, rare deep “sighs” occur (terminal breathing “gasping”). Soon there is a complete cessation of breathing, the animal dies. The duration of his life in a rarefied atmosphere is, therefore, 3-4 minutes.

Questions

1. What pathogenic factors did the animal undergo in this experiment?
2. Which of the following factors could be the cause of the developed pathological process (hypobaric hypoxia)?
3. How can the above assumptions be verified experimentally?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Etiology. Definition.
2. The role of causes and conditions in the occurrence of the disease and their relationship.
3. The main exogenous and endogenous causes of diseases.
4. Pathogenic influence of environmental factors and their classification.
5. Damage as the initial link in pathogenesis.
6. Causal relationships in pathogenesis.
7. The main causes of diseases in childhood .

Tests

1. High permeability of histo-hematic barriers in young children contributes to
 - A) generalization of infectious and inflammatory processes
 - B) penetration of microorganisms and toxins into tissues
 - C) inhibition of autoimmune organ damage
 - D) development of tumors
 - E) the emergence of unresponsiveness of the body to all antigens
2. The doctrine of the causes and conditions of the onset of the disease is called
 - a) nosology
 - b) pathogenesis
 - c) etiology
 - d) pathology
 - e) valeology
3. The cause of the disease is a factor,
 - A) conducive to disease
 - B) which causes a disease and gives it specific features
 - C) determining the nonspecificity of the disease
 - D) affecting the incidence of the disease
 - E) affecting the severity and duration of the disease
- 4 . Pathogenesis is the doctrine of
 - a) about the causes and conditions for the development of the disease
 - b) about illness
 - c) about the mechanisms of the development of the disease



- d) about the reactivity of the body
- e) about the heredity of an organism

Lesson # 3

1. Topic: The role of reactivity in pathology.

2. Purpose: to teach to explain the influence of external and internal factors on the reactivity of the organism; explain the basic mechanisms of formation of the reactivity of the body.

3. Learning objectives

- study the factors that determine reactivity;
- to study the possibility of a directed change in reactivity as the most important means of preventing and treating the disease ;
- explain the basic mechanisms of formation of the reactivity of the body.

4. Main questions of the topic

1. Reactivity and resistance.
2. Types of reactivity.
3. Immunity.
4. Features of the reactivity of the child's body.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to study the adaptation of the human body to high-speed work and endurance work.

When performing the test, the subject performs 3 loads. 1st consists in doing 20 squats in 30 seconds. 2nd - running in place at a maximum pace for 15 seconds - is performed 3 minutes after the 1st. 3rd - 3-minute run in place at a pace of 180 steps / min - performed 4 minutes after the 2nd.

At the end of each load, the subject's recovery of heart rate and blood pressure is recorded. These indicators are recorded throughout the entire rest period between loads and within 5 minutes after the third load. The pulse is counted at 10 second intervals. According to the results of the study, fill in table 4 .

The NORMOTONIC type of reaction to the test is characterized by an increase in heart rate, an increase in systolic and a decrease in diastolic blood pressure, expressed to varying degrees.

Time, s	Pulse before exercise	Pulse after each load		
		1st load	2nd load	3rd load
		1'2' 3'	1'2'3'4' _	1'2'3'4'5'
ten				
twenty				
thirty				
40				
fifty				
60				
BP syst.				
BP diast.				

An important criterion is the rate of recovery of heart rate and blood pressure to the level of rest values: after the 1st load - at the 2nd minute, after the 2nd - at the 3rd minute, after the 3rd - at the 4th minute of rest.

HYPERTENSION type of reaction is characterized by a sharp increase in systolic blood pressure up to 180 220 ммHg. Art. Diastolic pressure either does not change or increases. There is a higher pulse response with a slow recovery of heart rate to the original values.

The **HYPOTONIC** type of reaction is characterized by an extremely slight increase in systolic blood pressure, a sharp increase in heart rate after the 2nd and 3rd loads up to 170-190 beats / min. Recovery time is slowed down. These changes may be due to the fact that the increase in cardiac output is mainly due to increased heart rate, while the increase in systolic volume is insignificant.

The **DYSTONIC** type of reaction is characterized by a decrease in diastolic blood pressure, which after the 2nd and 3rd loads becomes equal to 0 - the "endless current phenomenon". At the same time, systolic blood pressure rises to a maximum of 180 200 ммHg .

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Reactivity and resistance. Definition of concepts.
2. Types, forms of reactivity, their characteristics.
3. Factors determining reactivity: the role of the genotype, age, gender, constitution.
4. Pathological reactivity. Concept definition. Characteristic.
5. Directed change in individual and group reactivity as the most important means of prevention and treatment of diseases.
6. Immunity, its types.
7. Features of the reactivity of the child's body.

Tests

1. Diathesis is

- A) genetically determined anomaly of the constitution of childhood
- B) congenital immunodeficiency disease
- C) hereditary disease of children of the first year of life
- D) allergic disease in children of the first year of life
- E) acquired resistance anomaly of childhood

2. Manifestations of biological (species) reactivity are

- a) seasonal hibernation
- b) zoonoses
- c) inflammation
- d) allergy
- e) anthroponoses
- f) seasonal animal migrations.

3. The manifestation of nonspecific physiological reactivity can be

- a) shock
- b) coma
- c) seasonal hibernation
- d) immunity
- e) allergy
- f) seasonal changes in the function of organs and systems

4. A manifestation of reduced specific pathological reactivity can be:

- a) humoral type allergy
- b) immunity
- c) shock
- d) immunodeficiencies
- e) immunosuppression
- f) cell type allergy
- g) coma
- h) anabiosis

Lesson number 4

1. Topic: The role of heredity in pathology.

2. Purpose: to teach to explain the general etiology and pathogenesis of hereditary diseases, to conduct their pathophysiological analysis.

3. Learning objectives

- to study the general etiology and pathogenesis of hereditary diseases ;
- be able to conduct pathophysiological analysis of hereditary diseases .

4. Main questions of the topic

1. General etiology of hereditary forms of pathology .
2. General pathogenesis of hereditary forms of pathology .
3. Principles of prevention and treatment of hereditary forms of pathology
4. Differences between hereditary and congenital diseases.

5. Methods of learning and teaching:

- TBL ;
- 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 , as well as on the Zoom and Webex platforms.

6. Evaluation methods : 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 . Methods for determining hereditary diseases .
- 2 . General etiology and pathogenesis of hereditary forms of pathology.
- 3 . Types of inheritance of diseases.
- 4 . Ides , causes, manifestations of chromosomal diseases.
- 5 . Principles of prevention and treatment of hereditary forms of pathology.
6. Differences between hereditary and congenital diseases.

Tests

1. A congenital non-hereditary disease is
 - A) neonatal syphilis
 - B) Down's disease
 - C) phenylketonuria
 - D) hemophilia
 - E) Gierke's disease
2. Translocation of chromosomes is
 - A) exchange of non-homologous fragments between two chromosomes
 - C) loss of a separate section of the chromosome

- C) the inclusion of an extra section of the chromosome
 D) rotation of a segment of the chromosome by 180 degrees
 E) repeated repetition of the same part of the chromosome
3. The method of studying pedigrees of families in which hereditary diseases are often found is called
 A) clinical and genealogical them
) biochemical
 C) twins
) cytogenetic
 E) population- statistical
4. Monogenic diseases include
 A) glycogenosis
 B) hypertension
 C) atherosclerosis
 D) hemochromatosis
 E) diabetes

Situational task

Healthy woman N., whose father is ill with hemophilia A, and her mother is healthy, turned to a genetic consultation with the question: is there a high risk of this disease in her grandchildren? The woman's husband and their three children - a son and two daughters - are healthy.

Questions

1. What is the type of inheritance and what causes the development of hemophilia A?
2. Is it possible to develop a lethal form of this pathology?
3. What is the likelihood of this disease in grandchildren on the filial line?

Lesson number 5

1. Topic: General cell pathology.

2. Purpose: to teach to analyze the causes, development mechanisms and outcomes of pathological processes at the cellular level.

3. Learning objectives

- to study the principles and methods for detecting, correcting and preventing damage at the cellular level;
- apply knowledge in cases associated with cytolytic syndrome, in various diseases.

4. Main questions of the topic

1. Cell damage.
2. Exogenous and endogenous factors of cell damage.
3. Typical mechanisms of cell damage.
4. Features of damage to the cells of the child's body.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to create a model of hemolytic anemia.

To simulate hemolytic anemia, mice were injected with phenylhydrazine, which is known to stimulate free radical reactions in cells. Half an hour after the administration of phenylhydrazine in

the blood of animals, a decrease in the number of erythrocytes, the presence of free hemoglobin and methemoglobin were found.

Questions

1. What are the mechanisms of damage to erythrocyte membranes?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Characteristics of the concept of "cell damage".

2. Exogenous and endogenous factors of cell damage.

3. Structural, metabolic, physicochemical and functional changes in the cell during its reversible and irreversible damage.

4. Typical mechanisms of cell damage.

5. The role of free radicals and Ca^{2+} in cell damage.

6. Adaptive reactions of the cell in case of its damage.

7. Features of damage to the cells of the child's body.

Tests

1. What substances appear on cell membranes in children:

A) non-esterified fatty acids

B) lysophospholipids

C) bile acids

D) lactate

E) glycogen

2. The manifestations of the imbalance of ions and water in the cell during ischemic damage include

... .

a) accumulation of K^{+}

b) accumulation of Na^{+}

c) with a decrease in the content of Cl^{-}

d) accumulation of RO_4^{-}

e) with a decrease in the content of H^{+}

f) g overhydration

g) accumulation of HCO_3^{-}

h) OH accumulation

3 . The difference between a poptosis and necrosis is

a) c occurs with severe damage to cell membranes, including plasma

b) o ensures the removal of "extra" cells under physiological conditions

c) and trigger inflammation

d) by "wrinkling" of cells

e) lysosomal enzymes play a role in the implementation of its mechanisms

f) in the implementation of the mechanisms of apoptosis play the role of caspasecytosol

g) genetically programmed

h) can occur with a deficiency of hormonal factors

4. Substances that protect the cell from the action of free radicals include

a) tons of copherols

b) ferrous ions _ _

c) SOD

d) with sulfatase

e) p eroxidase

- f) g lucuronidase
- g) to vitamin A

Situational task

Two monozygotic infant twins admitted to the clinic were found to have an enlarged liver, a reduced level of fasting blood plasma glucose, the glucose content in response to the administration of adrenaline increases slightly, the activity of phosphorylase is sharply reduced in the liver cells and the content of glycogen is increased.

Questions

1. What pathological process has developed in twins?
2. What are the possible causes of this pathological process?
3. What are the mechanisms of formation of this pathological state of hepatocytes?
4. What is the mechanism of occurrence of hepatomegaly, hypoglycemia and weak hyperglycemic effect of adrenaline?

Lesson number 6

1. Topic: General body reactions to damage.

2. Purpose: to teach to analyze the causes and mechanisms of development of general body reactions to damage .

3. Learning objectives

- to study the etiology and pathogenesis of general body reactions to damage ;
- be able to conduct a pathophysiological analysis of the body 's general reactions to injury .

4. Main questions of the topic

1. Stress .
2. Shock .
3. Coma .
4. Features of general reactions to injury in children.

5. Methods of learning and teaching:

- TBL ;
- 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 , as well as on the Zoom and Webex platforms.

6. Evaluation methods :

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 . From the stage of stress.
- 2 . Triad Selye.
- 3 . Protective -adaptive and pathogenic significance of stress.
- 4 . Shock, concept, types.
- 5 . Coma , concept, types.
- 6 . Features of general reactions to injury in children.

Tests

1. In the symptomatology of shock in children prevail :
 - A) hemodynamic disorders
 - B) centralization of blood circulation
 - C) respiratory failure



- D) peripheral circulatory failure
 E) no diuresis
- 2 . The resistance stage of the general adaptation syndrome is characterized by
 A) d hyperplasia of the adrenal cortex
 B) a trophy of the anterior pituitary gland
 C) with a persistent decrease in the level of corticotropin in the blood
 D) low level of glucocorticoids in the blood
 E) decreased activity of the sympathetic nervous system
- 3 . The stress-limiting system includes
 A) d pituitary gland
 B) d hypothalamus
 C) GABAergic system
 D) adrenal glands
 E) with impatoadrenal system
- 4 . The first stage of the general adaptation syndrome is called
 A) _ _ _ _
 B) with stage of resistance
 C) with tadi her exhaustion
 D) emergency (alarm stage) _
 E) p reagonal _

Situational task

20 minutes after the antibiotic injection, a patient with leg phlegmon developed anxiety, a feeling of fear, reddening of the face, and blood pressure of 180/90 mm Hg. After another 20 minutes, the patient's condition deteriorated sharply: there was weakness, confusion, convulsions, blood pressure 75/55 mm Hg.

Questions

1. What condition has developed in the patient?
2. What are the therapeutic measures for this condition?

Lesson number 7

1. Topic: Violations of water and electrolyte metabolism.

2. Purpose: to teach how to conduct a pathophysiological analysis of clinical and model situations associated with disorders of water and electrolyte metabolism .

3. Learning objectives

- to study the violation of the mechanisms of regulation of the exchange of water and electrolytes;
- to characterize the main types of violations of the external water balance and distribution of water in the internal environments of the body;
- explain the etiology and pathogenesis of the most common manifestations of dyshydria.

4. Main questions of the topic

1. Causes of violation of the external water balance and distribution of water in the internal environment of the body.
2. Etiology and pathogenesis of the main forms of water and electrolyte balance disorders .
3. Metabolic and functional shifts in the body in violation of water and electrolyte metabolism.
4. Features of violations of water and electrolyte metabolism in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to study the effect of pharmacological effects of various doses of catecholamines on the hemodynamics of a laboratory rat.

The rat was intravenously injected with a 0.1% solution of adrenaline at the rate of 0.004 ml per 1 rbody weight. Immediately after the administration of adrenaline, the skin and mucous membranes turned pale, blood pressure increased from 120/70 to 210/175 mm Hg, pronounced tachycardia with extrasystole appeared, breathing became more frequent, $p_a O_2$ remained unchanged, p_{CO_2} decreased . However, after 12 minutes, against the background of hyperventilation, the skin acquired a gray color, the gas composition of arterial blood did not change significantly, and an increasing decrease in $p_y O_2$ was noted . in the next 3-4 minutes, signs of a violation of external respiration developed, which became irregular, severe, with the appearance of moist rales on exhalation, blood pressure decreased, pulse pressure decreased, and arrhythmia occurred. At the same time, paO_2 began to decrease, and $paCO_2$ began to increase . By the end of 20 minutes, clonicotonic convulsions, atonal breathing developed, foamy discharge from the oral cavity and nose appeared. The animal is dead.

Make conclusions and conclusions by answering the following questions:

- 1 . What are the likely causes of death of the animal?
- 2 . What signs indicate the development of pulmonary edema?
- 3 . What is the pathogenesis of acute pulmonary edema in this experiment?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Causes of violation of the external water balance and distribution of water in the internal environment of the body.
2. Starling's law and pathogenetic factors of edema formation.
3. Causes, basic mechanisms and manifestations of violations of the content of ions Na^+ , K^+ , Ca^{2+} , Mg^{2+} in the internal environment of the body.
4. Etiology and pathogenesis of the main forms of water and electrolyte balance disorders .
5. Metabolic and functional shifts in the body in violation of water and electrolyte metabolism.
6. Features of violations of water and electrolyte metabolism in children.

Tests

1. Dehydration occurs in the following cases:

- A) hyposalivation.
- B) oliguria.
- C) decrease in sweating.
- D) chronic blood loss.
- E) hyperventilation syndrome in children.

2. Edema is

- A) an increase in intracellular fluid
- B) accumulation of fluid in the serous cavities
- C) increased lymph formation
- D) increase in intravascular fluid
- E) fluid accumulation in tissues and interstitial space

3. The development of edema contributes to

- A) increased production of ADH and aldosterone

- B) elevated levels of blood albumin
 - C) enhanced drainage of the interstitium by lymphatic vessels
 - D) decreased production of antidiuretic hormone
 - E) reduced permeability of the vascular wall
4. The main pathogenetic factor of cardiac edema is
- A) increased venous pressure
 - C) increase in colloid osmotic pressure in tissues
 - C) increased permeability of the vascular wall
 - D) decrease in oncotic blood pressure
 - E) decreased lymph flow

Situational task

Patient Z., 40 years old, complains of shortness of breath, pain in the right hypochondrium.

Objectively: the face is pale and puffy. Expansion of the boundaries of the heart to the left and right by 2 cm, heart rate 100, heart sounds are muffled, fine bubbling rales in the lungs, respiratory rate 26 per minute, swollen neck veins, the liver protrudes 3 cm from under the edge of the costal arch, pastosity of the legs.

On chest x-ray: globular shadow of the heart.

Questions

1. What condition has developed in the patient?
2. What are the mechanisms of its development in this patient?

Lesson number 8

1. Topic: Disorders of carbohydrate metabolism.

2. Purpose: to teach how to conduct a pathophysiological analysis of clinical and model situations associated with carbohydrate metabolism disorders.

3. Learning objectives

- to study the causes and mechanisms of hypo- and hyperglycemic conditions;
- Based on the analysis of blood samples or ready-made laboratory data, determine the form of carbohydrate metabolism disorders .

4. Main questions of the topic

1. Causes and mechanisms of impaired hydrolysis and absorption of carbohydrates.
2. Causes and mechanisms of impaired glucose utilization by cells.
3. Features of disorders of carbohydrate metabolism in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to determine glucose and ketone bodies in the urine of rats with alloxan diabetes.

A 5% solution of alloxan is administered once subcutaneously to the experimental animal at the rate of 15-20 mg/kg of body weight. After 48 hours, persistent glucosuria appears due to insular insufficiency. Control and experimental rats are placed in exchange cages, and urine is collected through urinals into separate test tubes. Then, 1 ml of urine from each animal is poured into 2 clean separate test tubes and 0.2 ml of Nieler's reagent is added. The contents of the tubes are boiled for 3 minutes. In the presence of glucose in the urine, the liquid in the test tubes should turn black. To determine ketone bodies, urine is collected in separate test tubes and 0.25 ml of a previously

prepared saturated sodium nitroprusside solution and 0.5 ml of glacial acetic acid are added. The tubes are shaken and a concentrated solution of ammonia in the amount of 1 ml is carefully layered along the wall. In the presence of acetone in the urine, an annular violet layer appears at the interface.

Make conclusions and conclusions.

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Causes and mechanisms of impaired hydrolysis and absorption of carbohydrates.
2. Tolerance of body cells to glucose.
3. Causes and mechanisms of impaired glucose utilization by cells.
4. Hyperglycemia, types.
5. Hypoglycemia, causes.
6. Features of disorders of carbohydrate metabolism 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. Extra-pancreatic insulin deficiency may be due to ...

- A) tumor of the pancreas
- C) increased concentration of proteolytic enzymes in the blood
- C) past pancreatitis
- D) circulatory disorders in the area of the islets of Langerhans
- E) production of autoantibodies to β - cells of the islets of Langerhans

3. Pancreatic insulin deficiency develops with

- A) blockade of insulin by antibodies in the blood
- C) a strong connection of insulin with plasma proteins
- C) destruction of β -cells of the islets of Langerhans
- D) increased secretion of contra-insular hormones
- E) increased activity of insulinase.

4. The leading symptom of diabetic syndrome is

- A) polyphagy
- B) polyuria
- C) glycosuria
- D) polydipsia
- E) hyperglycemia

Situational task

Patient M., 60 years old, was delivered to the emergency department in an unconscious state.

Objectively: shallow breathing, PR - 96 bpm, blood pressure - 70/50 mm Hg. Art., spasms of the extremities are periodically observed.

In the analyzes: hyperglycemia 33 mmol / l, hyperazotemia, hypernatremia, pH - 7.32.

Questions

1. What condition has developed in the patient?

2. What are the mechanisms of its development?

lesson number 9

1. Topic: Violations of fat metabolism.

2. Purpose: to teach to conduct a pathophysiological analysis of clinical and model situations associated with disorders of fat metabolism .

3. Learning objectives

- to characterize the main types of disorders of fat metabolism;
- explain the etiology and pathogenesis of the most common manifestations of fat metabolism disorders.

4. Main questions of the topic

1. Violations of the breakdown and absorption of fats in the intestine.
2. Violations of the transport of fats and their transition from the blood to the tissue.
3. Violations of the intermediate metabolism of fats.
4. Violations of the metabolism of fats in adipose tissue.
5. Features of disorders of fat metabolism in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Causes of impaired digestion and absorption of fats in the intestine.
2. Types of hyperlipoproteinemias.
2. Types of hyperlipemia.
3. Types of obesity.
5. Pathogenesis of fatty infiltration of the liver.
6. Causes of disorders of cholesterol metabolism.
7. Features of disorders of fat metabolism 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 bile acids
 - D) hyperproteinemia
 - E) high activity of glycogenolysis enzymes
2. The pathogenesis of alimentary hyperlipidemia is due to
 - A) hypoalbuminemia
 - C) increased mobilization of fat from the depot
 - C) a delay in the transfer of fat from the blood to the tissues
 - D) low activity of lipoprotein lipase in the blood
 - E) increased dietary fat intake
3. Anti-atherogenic properties have
 - A) low density lipoproteins

- B) high density lipoproteins
 - C) very low density lipoproteins
 - D) intermediate density lipoproteins
 - E) chylomicrons
4. Exogenous-constitutional obesity occurs when

- A) habitual overeating
- B) hyperinsulinism
- C) hypothyroidism
- E) damage to the ventromedial nuclei of the hypothalamus
- E) hypercortisolism

Lesson number 10

1. Topic: Hypoxia.

2. Purpose: to teach to conduct a pathophysiological analysis of pathological processes associated with the development of hypoxic conditions.

3. Learning objectives

- study the mechanisms of development of hypoxia of various nature;
- to characterize the mechanisms of emergency and long-term adaptation of the body to hypoxia;

4. Main questions of the topic

1. Etiopathogenesis of hypoxia.
2. Types of hypoxia.
3. Adaptation to hypoxia.
4. Features of the development of hypoxic conditions in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to conduct a pathophysiological analysis of the results of experiments .

A laboratory animal (mouse, rat) is placed in a small pressure chamber. Within 2-3 minutes, air is pumped out of the pressure chamber, lowering the pressure to 170 180 ммHg . (23-24 kPa). After 0.5-1 min of being in a rarefied atmosphere, the animal shows signs of anxiety: it moves its paws, scratches its muzzle, runs around the pressure chamber; after another 2-3 minutes, clonic-tonic convulsions, urination, the animal lies on its side, rare deep “sighs” occur (terminal breathing “gasping”). Soon there is a complete cessation of breathing, the animal dies. The duration of its life in a rarefied atmosphere is, therefore, 3-4 minutes.

Questions

1. What pathogenic factors did the animal undergo in this experiment?
2. Which of the following factors could be the cause of the developed pathological process (hypobaric hypoxia)?
3. How can the above assumptions be verified experimentally?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. General characteristics of hypoxia as a typical pathological process.



2. Criteria for the classification of hypoxic conditions and the main types of hypoxia.
3. Clinical and pathophysiological characteristics of the main types of hypoxia.
4. Metabolic, morphological and functional disorders in the body in an acute hypoxic state.
5. Mechanisms of compensation and adaptation in the body during hypoxia.
6. Features of the development of hypoxic conditions in children.

Tests

1. To ... reactivity refers to a stronger effect of hypoxia on adults than on newborns.
 - A) age
 - B) specific
 - C) biological
 - D) sexual
 - E) individual
2. Hypoxia is
 - A) pathological reaction
 - B) pathological condition
 - C) typical pathological process
 - D) disease
 - E) symptom complex
3. Hypoxia, which develops with a decrease in the partial pressure of oxygen in the inhaled air, is called
 - A) circulatory
 - B) exogenous
 - C) tissue
 - D) hemic
 - E) endogenous
4. Exogenous normobaric hypoxia occurs when
 - A) being in an unventilated room
 - B) as barometric pressure rises
 - C) decrease in barometric pressure
 - E) increase in O_2 in the air
 - E) climbing mountains

Lesson number 11

1. Topic: Peripheral circulatory disorders.

2. Purpose: to teach to conduct a pathophysiological analysis of clinical and model situations associated with disorders of organo-tissue circulation and microcirculation.

3. Learning objectives

- to study the clinical manifestations of disorders of the peripheral circulation and microcirculation, and their pathogenesis ;
- explain the classification of the main forms of peripheral circulatory and microcirculation disorders .

4. Main questions of the topic

1. Arterial and venous hyperemia.
2. Ischemia.
3. Thrombosis and embolism.
4. Features of peripheral circulation disorders in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to reproduce arterial and venous hyperemia in a frog.

The immobilized frog is placed on the board with its belly up so that its right side in its middle third is placed above the round hole in the board. Scissors cut the skin, muscles and peritoneum in layers on the lateral line of the abdomen on the right in its middle and lower thirds. From the opened abdominal cavity, carefully, without injuring the internal organs, a loop of the small intestine is removed, the mesentery of which is straightened over the side opening of the plate, fixing it with pins. When making a preparation of the mesentery, it is necessary to ensure that the bowel loop is not twisted. The prepared preparation is microscopically studied, under low magnification, the picture of normal blood flow in the vessels is studied. At the same time, attention is paid to the size of the lumen of the vessels, the number of functioning capillaries, and the rate of blood flow in them. Describe the changes characteristic of arterial and venous hyperemia.

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Forms of violation of peripheral circulation and microcirculation.
2. Mechanisms of vasoconstriction, vasodilation.
3. Mechanisms of compression and recirculatory ischemia.
4. Mechanisms of arterial and venous plethora.
5. Clinical manifestations of ischemia.
6. Clinical manifestations of arterial and venous plethora.
7. Thrombosis. Thromboembolism.
8. Features of peripheral circulation disorders in children.

Tests

1. Capillaries _ at children :

- A) short
- B) long
- C) straight
- D) tortuous

2. The leading link of arterial hyperemia is

- A) increased blood flow
 -) a decrease in the number of functioning capillaries
 - C) obstruction of the outflow of blood
 - E) increase in the linear velocity of blood flow
 - E) expansion of arterioles and an increase in blood flow
3. The reason for the development of venous hyperemia can be
- A) compression of the adductor artery
 - B) angiospasm
 - C) blockage of the lumen of the adductor artery by a thrombus
 - D) compression of the veins by the tumor
 - E) strengthening tissue activity
4. Compression ischemia occurs when
- A) spasm of the arteries

- B) ruptured arteries
- C) blockage of arteries by a thrombus
- D) compression of the arteries from the outside
- E) blockage of arteries by embolism

Situational task

A 56-year-old man complains of fatigue and pain in the calf muscles when walking, which stops after stopping, chilliness of the legs, and a feeling of numbness.

On examination: the feet are pale, the skin on them is dry, cold, the nails crumble, the pulse on the dorsal artery of the foot on both limbs is not palpable.

Questions

1. What form of regional circulatory disorders does the patient have?
2. What are the mechanisms of its development in this patient?
3. What are the possible adverse effects of circulatory disorders in the patient?

Lesson #12

1. Topic: Inflammation.

2. Purpose: to teach to conduct a pathophysiological analysis of clinical and model situations, the basis of which is the inflammatory process.

3. Learning objectives

- to study the main components of the pathogenesis of the inflammatory process ;
- explain the classification of phlogogenic factors .

4. Main questions of the topic

1. Etiology of inflammation.
2. Pathogenesis of inflammation.
3. Biological significance of inflammation.
4. Features of the course of the inflammatory process in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to determine the main signs of inflammation.

At the very beginning of the lesson, the intact ear of the rabbit is immersed in water heated to 55 ° C for 30 seconds. During the lesson, the stages of development of an acute inflammatory reaction with its characteristic signs are periodically observed.

Draw conclusions and conclusions by answering the following questions:
of inflammation and in what sequence were observed in this experiment?

- 2) What are the mechanisms of development of each of these traits?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Characteristics of the concept of "inflammation".
2. Etiology of inflammation. Classification of phlogogenic factors.
3. Pathogenesis of inflammation, its main components.
4. Alteration as a triggering factor for inflammation.

5. Inflammatory mediators , their role in the inflammatory process.
6. Physical and chemical phenomena in the focus of inflammation.
7. Vascular reactions in the focus of inflammation.
8. Exudation and release of blood cells from the vascular bed.
9. Characteristics of the process of exudation.
10. Stages and mechanisms of leukocyte migration to the focus of inflammation.
11. Phagocytic reaction during inflammation.
12. Features of the pathogenesis of acute and chronic inflammation.
13. Biological significance of inflammation.
14. Features of the course of the inflammatory process in children.

Tests

1. High permeability of histo-hematic barriers in young children contributes to
 - A) generalization of infectious and inflammatory processes
 - B) penetration of microorganisms and toxins into tissues
 - C) inhibition of autoimmune organ damage
 - D) development of tumors
 - E) the emergence of unresponsiveness of the body to all antigens
2. The most common cause of inflammation are ... factors.
 - A) chemical
 - B) biological
 - C) physical
 - D) mechanical
 - E) thermal
3. The components of inflammation include
 - A) a acidosis, hyperosmia, hyperonkia of the focus of inflammation
 -) arterial hyperemia, venous hyperemia,
 - C) alteration, circulatory disorders with exudation, proliferation
 - E) swelling , redness, dysfunction, pain, local increase in the temperature of the inflammation focus
 - E) l leukocytosis, increased ESR, increased body temperature
4. The first stage of inflammation is
 - A) an alteration
 - B) migration of leukocytes
 - C) phagocytosis
 - D) exudation
 - E) proliferation

Situational task

Two workers who received burns of their shins in an autoclave accident turned to the company's first-aid post. They presented similar complaints of headache, burning pain and swelling at the burns. On examination: in the victim A., the shins are hyperemic, their skin is edematous; in the victim B. (in addition to hyperemia and edema of the skin), vesicles were found filled with a transparent light yellow liquid. Both victims received sick leaves and recommendations for treatment, but did not comply with them.

After 3 days, the condition of the victim A. returned to normal. The condition of the injured B. deteriorated significantly: a widespread edema developed, and the pain in the burnt places increased; numerous vesicles with purulent contents appeared in the burn area (bacteriological examination revealed *Staphylococcus aureus*); body temperature 38.9 °C.

Questions

1. What pathological processes have developed in patients?

2. What are the reasons for the different course of pathological processes caused by the same factor?

3. What are the mechanisms for the development of symptoms in the victim B.?

Lesson #13

1. Theme: Fever .

2. Purpose: to teach to conduct a pathophysiological analysis of pathological processes associated with the development of fever.

3. Learning objectives

- study the causes and mechanisms of fever development;
- describe the main stages of fever .

4. Main questions of the topic

1. Etiology of fever.
2. Pathogenesis of fever.
3. Features of the course of fever in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Objective: To reproduce fever in a rat.

An adult white rat is injected intramuscularly into the back of the thigh with 2.5 MPD (minimum pyrogenic dose) of pyrogenal in 0.5 ml of saline. solution. Measurement of body temperature is carried out with an electrothermometer in the rectum before injection and 15, 30, 45, 60, 90 minutes after pyrogenal injection. Build a temperature curve.

Draw conclusions and conclusions by answering the following questions:

1. What is the nature of the pyrogenic stimulus in this experiment and to which class does it belong to pyrogens?
2. What are the possible mechanisms for increasing heat production and reducing heat transfer in the first stage of fever?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Definition of the concept of fever.
2. Etiology of fever.
3. Pathogenesis of fever.
4. Stages of fever.
5. Types of fever.
6. Features of the course of fever in children.

Tests

1. Features of the process of thermoregulation in newborns are
 - A) weak sensitivity of hypothalamic neurons to leukocyte pyrogen
 - B) low blood concentration of arginine-vasopressin, which lowers body temperature
 - C) low intensity of heat transfer in relation to heat production
 - D) pronounced contractile thermogenesis

- E) stable homiothermia
2. In the first stage of fever, ... is observed.
- A) a decrease in heat transfer and an increase in heat production
- C) increased heat production and heat transfer
- C) decrease in heat production and heat transfer
- E) increased heat production without changing heat transfer
- E) a decrease in heat production and an increase in heat transfer
3. Increased heat transfer in the third stage of fever is associated with
- A) increased sweating
-) according to the pressure of perspiration processes
- C) increased metabolism
- D) vasoconstriction
- E) high blood pressure
4. A "critical" drop in temperature during a fever is dangerous
- A) the development of collapse
- B) the development of hyperhydration
- C) increased heart rate
- D) increased blood pressure
- E) increased motility of the gastrointestinal tract

Lesson #14

1. Topic: Allergy.

2. Purpose: to teach how to conduct pathophysiological analysis of clinical and model situations associated with the development of allergic reactions.

3. Learning objectives

- to study the causes and mechanisms of development of allergic reactions;
- to study the classification of allergic reactions;
- to characterize the principles of detecting allergies of immediate and delayed types.

4. Main questions of the topic

1. Allergy, concept.
2. Types of allergic reactions.
3. The concept of allergens.
4. Features of the development of allergic reactions in children.

5. Methods of learning and teaching:

- performing practical work, solving situational problems, discussing the main issues of the topic, performing 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 , as well as on the Zoom and Webex platforms.

Practical work

Purpose: to investigate the manifestations and analyze the mechanisms of development of the Arthus phenomenon.

20-30 days before the lesson, the rabbit is sterilely injected under the skin with the same normal horse serum in a volume of 3-5 ml 5 times at intervals of 5-6 days. The rabbit is shown during the period of pronounced changes in the skin, characteristic of the Arthus phenomenon. Find out the localization, doses and time intervals of serum administration, the latent period of manifestation of pathological changes in the skin after the administration of serum. Determine the

localization, nature and severity of tissue damage, the reaction of the surrounding skin, the presence of edema and soreness in it.

Draw conclusions and conclusions by answering the following questions:

- 1 . What type of allergic reaction is the Arthus phenomenon?
- 2 . What factors are most important in the development of skin lesions in Arthus phenomenon?

6. Evaluation methods : Checklist

7. Literature: see Appendix No. 1.

8. Control

Questions

1. Allergy, concept, general characteristics.
2. Types of allergic reactions, classification, their characteristics.
3. The concept of allergens. Sensitization.
4. Immediate type allergy, sensitization mechanism.
- 5 . Allergy for slow type, sensitization mechanism.
- 6 . The concept of autoallergic conditions of the body.
7. Features of the development of allergic reactions in children.

Tests

1. In young children, it is more common

- A) food allergy
- B) infectious form of allergy
- C) drug allergy
- D) inhalation allergy
- E) household allergies

2. Based on the classification of allergic reactions according to P. Gell and R. Coombs lies

- A) pathogenesis of allergic reactions
- C) the time of onset of clinical manifestations of allergic reactions
- C) the etiology of allergic reactions
- D) severity of allergic reactions
- E) the nature of clinical manifestations

3. The pathophysiological stage of allergic reactions is characterized by

- A) violation of the structure and functions of organs and tissues under the influence of biologically active substances
- C) the influence of biologically active substances
- C) the formation of immune complexes
- D) the formation of antibodies
- E) the formation of sensitized lymphocytes

Immunoglobulins of the ... class take part in the development of allergic reactions of the reagin type

.

- A) E
- C) M
- C) A
- D) C
- E) D

Situational task

20 minutes after the antibiotic injection, a patient with leg phlegmon developed anxiety, fear, facial flushing, blood pressure 180/90 mm Hg. Art. After another 20 minutes, the patient's condition



deteriorated sharply: there was weakness, confusion, convulsions, blood pressure 75/55 mm Hg. Art.

Questions

1. What condition has developed in the patient?
2. What are the therapeutic measures for this condition?

Lesson number 15

1. Topic : Tumors

2 . Purpose: to teach how to conduct a pathophysiological analysis of situations associated with the development of tumors; consolidate the material covered within 10-18 weeks .

3 . Learning objectives

- to study the pathogenetic links of carcinogenesis;
- characterize malignant and benign tumors ;
- explain the mechanism of transformation of a normal cell into a tumor cell .

4 . Main questions of the topic

1. Etiology of tumor growth.
2. Pathogenetic mechanisms of carcinogenesis.
3. Mechanisms of antitumor defense of the organism.
4. Features of the development of tumors in children.

5. Learning and teaching methods:

- TBL ;
- 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 , as well as on the Zoom and Webex platforms.

6. Methods of assessment : The general form of assessment, including the answers of individual and group testing, self- and peer assessment

7 . Literature: see Appendix No. 1.

8 . The control

Questions

1. Cyto- and histodifferentiation.
2. Etiology of tumor growth.
3. Pathogenetic mechanisms of carcinogenesis.
4. Mechanisms of blast transformation of somatic cells.
5. Atypism of transformed cells.
6. Mechanisms of tumor progression.
7. Ways of tumor expansion.
8. Relationship between organism and tumor.
9. Mechanisms of antitumor defense of the body.
10. Features of the development of tumors in children.

Tests

1. Basic causes of tumors at children :

- A) lowering the partial pressure of oxygen
- B) ionizing radiation
- C) occupational hazards
- D) chronic inflammatory processes
- E) chemicals

2. The second stage of carcinogenesis is called

- A) initiation



B) syncarcinogenesis

C) promotion

D) procarcinogenesis

E) cocarcinogenesis

3 . Endogenous chemical carcinogens include

A) aromatic hydrocarbons

C) free oxygen radicals and nitric oxide

C) nitrosamines

D) a minoazo compounds

E) simple chemical compounds

4. Simplification of the chemical composition of tumor tissue is called

A) dysplasia

B) complication

C) convergence

D) hypertrophy

E) anaplasia

Situational task

Patient Yu. after exercise suddenly developed a feeling of fear, dizziness, tachycardia. BP 270/165 mmHg Art. Ultrasound and X-ray examination of the adrenal glands revealed a tumor of the medulla - pheochromocytoma.

Questions

1. What tumors does pheochromocytoma belong to?

2. What is the condition of pain

Appendix No. 1

Literature

In Russian

main:

1. Ado A.D. Pathophysiology: a textbook: in 2 volumes - Evero, 2015 .-- T. 1.
2. Ado A.D. Pathophysiology: a textbook: in 2 volumes - Evero, 2015 . - T. 2.
3. Pathophysiology. Guide to practical exercises: a training manual. - M.: GEOTAR-Media, 2014.
4. Fr. about fishing VA et al. General pathological physiology: a textbook. - M., 2013.
5. Pathophysiology. In 2 vol. T. 2: textbook / ed. V.V. Novitsky, E. D. Goldberg, O. I. Urazova ; M-education of the science of the Russian Federation. - 4th ed., Revised . and additional ; Rec. GOU VPO "MMA named after I. Sechenov." - M.: GEOTAR - Media, 2012 .-- 640 p. + email Optical disk (CD-ROM): ill.

additional:

1. Pathophysiology. Guide to practical exercises: a training manual / Ed. V.V. Novitsky, O.I. Urazova . - M. : GEOTAR-Media, 2011.
2. Pathophysiology: a textbook: in 2 volumes / Ed. V.V. Novitsky, E.D. Goldberg, O.V. Urazova . - 4th ed., Revised . and add. - M.: GEOTAR-Media, 2010 .-- T. 1.
3. Pathophysiology: a textbook: in 2 volumes / Ed. V.V. Novitsky, E.D. Goldberg, O.V. Urazova . - 4th ed., Revised . and add. - M.: GEOTAR-Media, 2010 .-- T. 2.
4. Litvitsky P.F. Pathophysiology: a textbook. - 4 th ed. Ispra . and add. - M.: GEOTAR-Media, 2010.
5. Pathophysiology: manual for practical training: textbook. allowance / ed. V.V. Novitsky, O. I. Urazova . - M.: GEOTAR - Media, 2011 .-- 336 s
6. Pathophysiology. Tasks and test tasks: textbook.-methodical manual / ed. PF Litvitskogo ; M-education and science of the Russian Federation. -; Rec. GOU VPO "MMA named after I. Sechenov." - M.: GEOTAR - Media, 2013 .-- 384 p. : silt

electronic resources :

1. Pathophysiology [Electronic resource]: textbook: in 2 volumes / Ed. V.V. Novitsky, E.D. Goldberg, O.V. Urazova . - 4th ed., Revised . and add. - Electronic textual data. (59.9 Mb). - M.: GEOTAR-Media, 2010. - T. 1, T. 2. - El. opt. disk (CD-ROM).
2. Pathological physiology [Electronic resource]: textbook / ed. N. N. Zaiko. - 2nd ed. - Electronic textual data. (20.5 Mb). - M.: Medpress-inform , 2004. - 1 email. Optical disk (CD-ROM).

3. Medicine. 3 course [Electronic resource]: lecture course. - Electronic textual data. (24.0 Mb). - M.: Publishing House "Equilibrium", 2005. - 1 email. Optical disk (CD-ROM).

4. Spiders, V. S. Pathological anatomy and pathological physiology [Electronic resource]: textbook. for colleges. - The electron. text data (44 , 7 Mb). - M.: Publishing House group "GEOTAR-Media", 2010. - 256 p. email optical disc (CD-ROM)

In Kazakh

main:

1. Нұрмұхамбетұлы Ә. Pathophysiology-1. Clinicals қ practice өте маңызды біртектес дертік үрдистердің pathogenesis ме мендеу zholdaryna нұсқама. Volume 1: Оқу Urals. - Almaty: Evero, 2016.

2. Нұрмұхамбетұлы Ә. Pathophysiology-1. Clinicals қ practice өте маңызды біртектес дертік үрдистердің pathogenesis ме мендеу zholdaryna нұсқама. Volume 2: Оқу құрылы. - Almaty: Evero, 2016.

3. Нұрмұхамбетұлы Ә. Pathophysiology: Ouly. - 4 bass. - Evero, 2015 .-- Т. 1.

4. Нұрмұхамбетұлы Ә. Pathophysiology: Ouly. - 4 bass. - Evero, 2015 .-- Т. 2.

5. Нұрмұхамбетұлы Ә. Pathophysiology: Ouly. - 4 bass. - Evero, 2015 .-- Т. 3.

6. Нұрмұхамбетұлы Ә. Pathophysiology: Ouly. - 4 bass. - Evero, 2015 .-- Т. 4.

7. Ado A.D. Pathophysiology: Ouly. 1 volume - Evero, 2015.

8. Pathophysiology. 2 томдық. 1 т .: оқулық / қазақ тіл. aud. B. A. Zhetpisbaev ; ed. V.V. Novitsky. - M.: GEOTAR - Media, 2017. - 640 bet.s .

9. Pathophysiology. Eki томдық. 2 т.: Оқулық / қазақ тіл. aud. S. B. Zhutikova ; ed. V.V. Novitsky. - M.: GEOTAR - Media, 2018 .-- 464 b. + email Optical disk (CD-ROM).

8. Ado A.D. Pathophysiology: Ouly. 2 volume - Evero, 2015.

9. Pathology physiology. Тәжірибелік сабақтарға нұсқау: оқу құралы. - M.: GEOTAR-Media, 2014.

10 . Urazalina N.M. Tapsyrmalary test. I-бөлім. Biriktes дертік үрдистер. –Almaty: Evero, 2014.

11. Urazalina N.M. Tapsyrmalary test. II-бөлім. Biriktes дертік үрдистер. –Almaty: Evero, 2014.

1 2. Urazalina N.M. Tapsyrmalary test. III-бөлім. Biriktes дертік үрдистер. –Almaty: Evero, 2014.

13. Urazalina N.M. Tapsyrmalary test. IV-бөлім. Biriktes дертік үрдистер. –Almaty: Evero, 2014.

14. Zhәutikova S.B. Mamandyryлған pathology physiology courses: Оқу-әдістемелік құралы. - Karagandy: LCD "Ak Nur", 2013.

15. Zhәutikova S.B. Pathologies қ physiology ә ә і ы ы ситуация ситуация ситуация ситуация еп еп еп еп::: лы лы лы лы лы лы лы лы лы лы: құ құ еп құ і лы лы лы құ. - Karagandy: LCD "Ak Nur", 2013.

additional:

1. Нұрмұхамбетұлы, Ә. Pathophysiology-1. Clinicals қ practice өте маңызды біртектес дертік үрдистердің pathogenesis me mendeu zholdaryna нұсқама. Volume 2: Оқу құрылы. - Almaty: Evero, 2016 .-- 248 b.
2. Pathologies қ physiology. Тәжірибелік сабақтарға нқсқау [Мәтін]: оқу құрылы = Pathophysiology. Guide to practical exercises: textbook / V.V. Novitsky [f. b.]; ed. bass . V.V. Novitsky, O. I. Urazova; Kaz . tiline aud. S. B. Zhutikova . - M.: GEOTAR - Media, 2014. - 768 bet.s .
3. Urazalina , N. M. Test tapsyrmalary . II- Бөлім . Біртектес дертік үрдистер : - Almaty: Evero , 2014. - 184 bet.
4. Zhәutikova, S. B. Mamandandyryлған pathology physiology courses: Оқу-әдістемелік құралы. - Karagandy: LCD "Ak Nur", 2013
5. Zhәutikova, S. B. Pathology қ physiology of the бой boy’s situation қ ester F F F қ: қи-әдістемелік құрал. - Karagandy: LCD "Ak Nur", 2013
6. Нұрмұхамбетұлы Ә. Ұрық дамуы мен балалық шақ ауруларының pathophysiology: monograph - A., 2006

electronic resources:

1. Pathologies қ physiology: Pathophysiology: tәzhiribelik sabақтарға нұсқау: оқу құралы / V.V. Novitskydin ed. - M.: GEOTAR-Media, 2014.
2. Pathology: оқулық: 2 vols. [Electronic resource] / M.A. Pal'tsev, V. S. Paukov revised by son Bасқарқандar: M.: GEOTAR.- Media. 2015
3. Pathologists қ physiology. Тәжірибелік сабақтарға нұсқау [Electronic resource]: оқу құралы = Pathophysiology. Guide to practical exercises: a training manual / қаз.тіліне Aud . S. B. Zhutikova ; ed. V.V. Novitsky. - Electronic textual data. (63.4 Mb). - M.: GEOTAR - Media, 2014. - 768 bet.el . opt. Disk

In English

main :

1. Pathophysiology: Concepts of Altered Health States / Porth CM, Matfin G .; Lippincott Williams & Wilkins / Wolters Kluwer, 2013.
2. Pathophysiology. Volume 1 .: the book for medical institutes / AD Ado [and others]. - Almaty: "Evero", 2017. - 216 p.
3. Pathophysiology. Volume 2 .: the book for medical institutes / AD Ado [and others]. - Almaty: "Evero", 2017. - 188 p.
4. Pathophysiology. Volume 3 .: the book for medical institutes / AD Ado [and others]. - Almaty: "Evero", 2017. - 328 p
5. Zhautikova, SB Review of pathophysiology: educational-methodical manual / SB Zhautikova, U. Faroog. - Karaganda: АҚНҰП, 2017 .-- 388 p.
6. Zhautikova, SB Collection of situational problems for discipline of pathological physiology-2: educational-methodical manual / SB Zhautikova, U. Faroog. - Karaganda: АҚНҰП, 2017 .-- 126 p

additional:



1. Pathophysiology / Copstead LC, Banasik JL; Saunders / Elseviere , 2012.

E-sources

№	Title	Link
1.	«BooksMed»	http://www.booksmed.com
2.	«Web of science» (Thomson Reuters)	http://apps.webofknowledge.com
3.	«Science Direct» (Elsevier)	https://www.sciencedirect.com
4.	«Scopus» (Elsevier)	www.scopus.com
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