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Federal state budgetary educational institution of higher education
«North-Ossetian state medical academy»
of the Ministry of healthcare of the Russian Federation

Department of biological chemistry

APPROVED
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EVALUATION MATERIALS

by discipline Biochemistry

the main professional educational program of higher education – specialty program in the specialty 31.05.01 General medicine, approved on 24.05.2023

for 2nd year students
by specialty 31.05.01 General medicine

Considered and approved at the meeting of the department
from "18" May 2023 year (protocol № 10)

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STRUCTURE OF EVALUATION MATERIALS

1. Title page
2. Structure of evaluation materials
3. Review on evaluation materials
4. Passport of evaluation materials
5. *Kit of evaluation materials:*

- list of issues to prepare for the modular lessons
- examination questions
- bank of situational and practical tasks
- standards of test tasks (with title page and table of contents)
- examination tickets
- examination tickets on practical skills
- examination tickets with situational tasks

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ «СЕВЕРО-ОСЕТИНСКАЯ ГОСУДАРСТВЕННАЯ МЕДИЦИНСКАЯ АКАДЕМИЯ» МИНИСТЕРСТВА ЗДРАВООХРАНЕНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ

РЕЦЕНЗИЯ
на оценочные материалы

по дисциплине Биохимия

для студентов 2 курса

по специальности 31.05.01 «Лечебное дело» (образовательная программа, частично реализуемая на английском языке)

Оценочные материалы составлены на кафедре биологической химии на основании рабочей программы дисциплины Биохимия, утвержденной в 2023 году, и соответствуют требованиям ФГОС ВО 3++ по специальности 31.05.01 «Лечебное дело» (образовательная программа, частично реализуемая на английском языке).

Оценочные материалы включают в себя:
- вопросы к модулю
- вопросы к экзамену
- банк ситуационных задач и практических заданий
- эталоны тестовых заданий (с титульным листом и оглавлением)
- экзаменационные билеты

Банк ситуационных задач и практических заданий включает в себя сами задания и шаблоны ответов. Все задания соответствуют рабочей программе дисциплины Биохимия, формируемым при ее изучении компетенциям, и охватывают все её разделы. Банк содержит ответы ко всем ситуационным задачам и практическим заданиям.

Эталоны тестовых заданий включают в себя следующие элементы: тестовые задания, шаблоны ответов. Все задания соответствуют рабочей программе дисциплины Биохимия формируемым при ее изучении компетенциям, и охватывают все её разделы .

Сложность заданий варьируется. Количество заданий по каждому разделу дисциплины достаточно для проведения контроля знаний и исключает многократное повторение одного и того же вопроса в различных вариантах. Эталоны содержат ответы ко всем тестовым заданиям.

Количество экзаменационных билетов достаточно для проведения экзамена и исключает неоднократное использование одного и того же билета во время экзамена в течение одного дня. Экзаменационные билеты выполнены на бланках единого образца по стандартной форме, на бумаге одного цвета и качества. Экзаменационный билет включает в себя 4 вопроса. Формулировки вопросов совпадают с формулировками перечня вопросов, выносимых на экзамен. Содержание вопросов одного билета относится к различным разделам рабочей программы дисциплины, позволяющее более полно охватить материал дисциплины.

Дополнительно к теоретическим вопросам предлагается банк ситуационных задач и практических заданий. Ситуационные задачи и практические задания дают возможность объективно оценить уровень усвоения обучающимся теоретического материала при текущем контроле успеваемости и промежуточной аттестации. Сложность вопросов в экзаменационных билетах распределена равномерно.

Замечаний к рецензируемым оценочным материалам нет.

В целом, оценочные материалы по дисциплине Биохимия способствуют качественной оценке уровня владения обучающимися универсальными, общепрофессиональными, профессиональными компетенциями.
Рецензируемые оценочные материалы по дисциплине Биохимия могут быть рекомендованы к использованию для текущего контроля успеваемости и промежуточной аттестации на лечебном факультете у обучающихся 2 курса.

Рецензент:

Председатель ЦУМК
естественно-научных и математических дисциплин
с подкомиссией экспертизы оценочных материалов,
доцент кафедры химии и физики *Н.И.Боциева*

Passport of evaluation materials for the discipline
«Biochemistry»

№	Name of the controlled section (topic) of the discipline / module	Code of formed competence	Name of the evaluation material
1	2	3	4
type of control	**Current progress monitoring/Interim certification**		
1.	Chemistry of simple and complex proteins	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
2.	Enzymes, medical aspects of enzyme science	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
3.	Vitamins and coenzymes	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
4.	Basic biosynthesis of nucleic acids and proteins	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
5.	Lipids, structure, properties, classification. The structure and function of biological membranes.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
6.	Energy metabolism and the	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular

	General ways of catabolism		lessons, examination questions, bank of situational and practical tasks, examination tickets
7.	Carbohydrate metabolism.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
8.	Lipid metabolism.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
9.	Exchange of amino acids.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
10.	The exchange of nucleotides	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
11.	Metabolism of heme and iron metabolism.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
12.	Hormonal regulation of metabolism and body functions	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
13.	Biochemistry of blood and immunity.	GPC-4,GPC-5,UC-1,PC-2	test control, issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination

			tickets
14.	Biochemistry of organs and tissues.	GPC-4,GPC-5,UC-1,PC-2	examination questions, bank of situational and practical tasks, examination tickets
15.	Water-mineral exchange. The regulation of water-salt metabolism.	GPC-4,GPC-5,UC-1,PC-2	issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets
16.	Introduction to clinical biochemistry.	GPC-4,GPC-5,UC-1,PC-2	issues to prepare for the modular lessons, examination questions, bank of situational and practical tasks, examination tickets

List of issues to prepare for the modular lessons

Issues for module № 1: "Structure and properties of proteins".

1. What are proteins, what are the main functions they perform in animal organisms;
2. Amino acids as a structural unit of protein;
3. Classification of amino acids and their characteristics;
4. Representatives of aliphatic amino acids and their characteristics;
5. Part of examination in the formation of phosphoproteins;
6. Homocyclic amino acids
7. Heterocyclic amino and iminoacid;
8. The value of sulfur-containing amino acids in the stabilization of tertiary protein structure
9. Monoaminodicarboxylic amino acids in the formation of amides (glutamine and asparagine);
10. Rational classification of amino acids based on the polarity of radicals;
11. General properties of amino acids.
12. The primary structure of the protein and linking it to the retaining;
13. Secondary, tertiary, Quarternary structure of the protein and its fixing bonds;
14. The availability of peptides in the body, the representatives, nomenclature;
15. Physical and chemical properties of protein;
16. The essence of the denaturation process and the factors causing it;
17. Methods of protein purification and fractionation separation;
18. The classification of simple proteins;
19. Structure and functions of albumins and globulins;
20. Structure and functions of histones;
21. Classification of complex proteins;
22. Nucleoproteins, the nature of the prosthetic groups;
23. Primary, secondary, tertiary level of nucleic acid structure;
24. The chromoproteids, the nature of the prosthetic groups;
25. Phosphoproteins, structure and role in the formation of the child's body, representatives
26. Glycoproteins and lipoproteins.

Issues for module № 2: "Enzymes".

1. Enzymes are biological catalysts. Structure, properties of enzymes.
2. The specificity of enzymes. The types of specificity.
3. Enzymatic catalysis, its main provisions. Kinetics of enzymatic reactions.
4. Structure of enzymes: coenzymes, cofactors and their role in enzymatic reactions. Structure NAD, FAD.
5. Basic principles of classification and nomenclature of enzymes:
• oxidoreductases, the subclass representatives;
• transferase subclasses, representatives;
* hydrolases, subclasses, representatives;
* liases, subclasses;
* isomerases subclasses;
* ligases subclasses.
6. The main principe quantitative determination of enzyme activity.

7. Units of measurement of enzymatic activity. The specific activity of the enzymes.
8. Opportunities and prospects for the use of enzymes in laboratory diagnosis of diseases (enzyme diagnostics).
9. Possible mechanisms of enzymatic catalysis (by the example of chymotrypsin).
10. The concept of active and allosteric centers.
11. Factors affecting the rate of enzymatic reactions. The nature of their influence.
12. The relationship between the conformation of enzymes and their catalytic activity.
13.Activators. The main types of regulation of enzyme activity.
14. Inhibitors. The main types of inhibition of enzymes (specific and non-specific, competitive and noncompetitive).
15. Allosteric enzymes, especially their structure, the role in the regulation of their catalytic reaction.
16. Isoenzymes, their role in enzymatic activity. Their role in the diagnosis of diseases.
17. The main directions of the use of enzymes in medicine.
18. Enzyme therapy, its capabilities and prospects.

Issues for module № 3: "Introduction to metabolism. Vitamins. Bioenergetics. Biological oxidation. TCA".

1. Classification of vitamins.
2. Methods for determination of vitamins.
3. Structure and biological role of vitamin B1 (thiamine), B6.
4. Chemical nature, the biological role of vitamin B2 (Riboflavin).
5. Vitamin PP (nicotinic acid amide), biological role, structure.
6. Fat-soluble vitamins (A, D, E, K).
7. What is biological oxidation?
8. Respiratory chain.
9. Enzymes and coenzymes of the respiratory chain. Hydrogen carrying and electron transferring parts of the respiratory chain.
10.Oxidative phosphorylation.
11. Macroergic compounds.
12. The pairing process of respiration and oxidative phosphorylation.
13. Hemostatically the essence of the theory of coupling electron transport to ATP synthesis.
14. The role of vitamins in the biological oxidation process.
15. Vitamins B2 and B5, their structure and biological role.
16. Ubiquinone or coenzyme Q, its structure and its role in biological oxidation.
17. Structure and function of cytochromes.
18. Intracellular localization of enzymes of the respiratory chain.
19. Common ways of catabolism of carbohydrates, fats, proteins.
20.Tricarboxylic acid cycle.
21. The characteristics of enzymes of the TCA.
22. Ways of oxaloacetate formation.
23. Substrate phosphorylation in TCA.
24. Regulation of TCA.
25. The energy balance of the TCA.
26. The anabolic function of the TCA.
27. Disconnectors of biological oxidation of oxidative phosphorylation.

Issues for module № 4: "Metabolism and function of carbohydrates".

1. Classification of carbohydrates.
2. Monosaccharides (aldoses and ketoses). Structure, representatives, properties.
3. Phosphorous monosaccharides. Their biological significance.
4. Amine derivatives of monosaccharides .Their biological significance.
5. Disaccharides, their structure, properties and representatives.
6. Classification of polysaccharides.
7. Homopolysaccharides, their structure, properties, representatives.
8. Acidic and neutral mucopolysaccharides.
9. The carbohydrate food. daily need. Digestion and absorption of carbohydrates.
10. The fate of absorbed monosaccharides; isomerization of fructose and galactose into glucose.
11. Biosynthesis and decay of glycogen, enzymes involved in these processes, and their balanced regulation, the role of hormones.
12. The catabolism of glucose. Anaerobic decomposition of glucose (glycolysis).
13. Glycolytic oxidation reduction. Pyruvate as the acceptor of hydrogen.
14. Substrate phosphorylation in glycolysis.
15. The spread and physiological significance of anaerobic glucose breakdown.
16. Aerobic decay is the main pathway of glucose catabolism in humans. Oxidative decarboxylation of pyruvic acid. Energy effect.
17. Interrelation of glycolysis and aerobic disintegration of carbohydrates. Pasteur's effect.
18. Pentose phosphate way, the localization and biological value.
19. The role of the liver in regulating blood sugar levels.
20.Gluconeogenesis. The Cori cycle.
21. Neurohumoral mechanisms of regulation of carbohydrate metabolism.
22. Biosynthesis of carbohydrate metabolism disorders (diabetes mellitus).
23. Disorders : galactosemia, lactose intolerance.

Issues for module № 5: "Metabolism and function of lipids".

1. Modern ideas about the role of lipids in the body.
2. Classification of lipids.
3. Structure of saturated and unsaturated fatty acids which are a part of lipids.
4. Essential fatty acids and their biological role.
5. Triacylglycerols, their structure and role in the body.
6. Phospholipids, structure, representatives, role in the body.
7. Sphingophospholipids, structure, representatives, role in the body.
8. Cerebrospinal fluid, structure, representatives, role in the body.
9. Gangliosides, structure, representatives, role in the body.
10. Sterols and sterids, structure, representatives, biological role.
11. Digestion of lipids in the gastrointestinal tract. Bile acids and their role in lipid metabolism.
12. The mechanism of absorption of lipids and products of their hydrolysis.
13. Resynthesis of lipids in the intestinal wall.
14. The formation of chylomicrons and their characteristics.
15. Transport of lipids in blood.

16. Intermediate lipid metabolism: disintegration and synthesis of fat in cells.
17. Decay and synthesis of phospholipids in cells.
18. Decay and synthesis of sphingophospholipids, cerebrosides, gangliosides.
19. Cholesterol synthesis.
20. Mevalonic acid, its role in the biosynthesis of cholesterol.
21. Features of synthesis of cholesterol (conditions) in norm and pathology.
22. Biosynthesis of fatty acids, its terms and conditions. The role of citrate in the synthesis of fatty acids. The effect of insulin on the synthesis.
23. Carnitine, his role in lipid metabolism.
24. The fate of exogenous and endogenous glycerol.
25. β-oxidation of fatty acids, its localization.
26. Scheme of β-oxidation of fatty acid, oxidation products.
27. Activation of fatty acids
28. The conversion of acetyl-COA in norm and pathology.
29. The role thiolase in the process.
30. Acetone body formation in health and disease causes.
31. The collapse of the acetone bodies in the muscles and the kidneys.
32. β-oxidation of fatty acids with an odd number of carbon atoms.
33. Energy effect of the oxidation of palmitic acid.
34. Regulation of lipid metabolism: nervous and hormonal.
35. Lipid metabolism disorders: diabetes, atherosclerosis.
36. Violation of lipid metabolism: obesity and lipids.
37. Congenital acid oxidation disorders in diabetes.
38. The reason for blocking the synthesis of citric acid in diabetes.
39. The reasons for the decrease in the formation of (OAA) in diabetes.
40. The reason of violations of the oxidation of the acids at diabetes.
41. The reasons for the increase of cholesterol in blood at diabetes.
42. Causes of pathological obesity.
43. Enzymes involved in the biosynthesis of fatty acids.
44. Classification of lipoproteins. Clinical significance of determination of lipoproteins of different density in blood. Hyperlipoproteinemias.
45. Disorders of lipid digestion and absorption.
46. Violation of the exchange of polyenic fatty acids. Lipidosises.

Issues for module № 6: "Simple proteins exchange".

1. Digestion of protein in the gastrointestinal tract, digesting enzymes, their characteristics.
2. Pepsin, the mechanism of activity, structure, properties, specificity.
3. Trypsin, mechanism of activity, structure, properties, specificity, mechanism of action.
4. Chymotrypsin, mechanism of activity, structure, properties, specificity, mechanism of action.
5. Exopeptidase, the principle of action on peptide bonds, properties. The mechanism of action of exopeptidase A.
6. Putrefaction of proteins in the intestines, neutralization of toxic products. Indikan, his education, diagnostic value.
7. The fate of the absorbed amino acids. The mechanism of oxidative deamination. Direct and indirect deamination of amino acids.

8. Transamination of amino acids with the participation of transaminases. ASAT and ALAT, the role in clinical diagnosis.
9. Non-oxidative deamination of amino acids, deamination products, their significance.
10. The concept of biogenic amines, their formation, role, transformation.
11. Special ways of transformation of separate amino acids (glycerin, alanine, methionine, arginine).
12. Transformation of histidine and tryptophan, products of transformations.
13. Conversion of phenylalanine and tyrosine in normal and pathological conditions. Molecular diseases.
14. Biosynthesis of protein and its regulation.
15. Ways to neutralize ammonia in the body (synthesis of urea, urea disruption).
16. Ways to neutralize ammonia in the body (synthesis and decomposition of asparagine and glutamine)
17. Synthesis of creatine, its role in the body. Creatinine.

Issues for module № 7: "Complex proteins exchange".

1. Sources of purine nucleotide synthesis.
2. Synthesis of purine nucleotides (AMP).
3. Synthesis of purine nucleotides (GMP).
4. Pathways of purine nucleotides reutilization.
5. Breakdown of nucleotides in the intestines and tissues. The decay scheme of the AMP.
6. The decay scheme of the GMP. Structure and properties of uric acid. Gout.
7. Synthesis of pyrimidine nucleotides (UMP, d-TMP, CMP).
8. Breakdown scheme of pyrimidine bases, decay products.
9. Hemoglobin synthesis in normal and pathological conditions. Porphyrinuria.
10. The breakdown of hemoglobin and the fate of bile pigments in normal and pathological conditions.
11. Jaundice, their types and causes.
12. Violation of protein metabolism, their types and causes.
13. Qualitative reaction to uric acid.
14. Formation of a protein complex with bilirubin.
15. Quantitative determination of bilirubin in blood serum.
16. Quantitative reaction to bile pigments.

Issues for module № 8: "Hormones".

1. Hormones of the hypothalamus, their key role in the system of hormonal regulation. Liberins and statins.
2. Protein-peptide hormones, their representatives, mechanism of cellular action.
3. Chemical structure, synthesis , secretion and biological action of thyroid hormones.
4. Adrenaline, its synthesis , secretion, transport and biological action.
5. Chemical structure and biological effect of parathyroid hormone.
6. The insulin synthesis, secretion, transport in blood, metabolism.
7. Cellular mechanism of insulin action at the level of target organs.
8. Insulin-dependent enzymes.
9. The basic metabolic disturbances, with insulin deficiency – diabetes.
10. Glucagon, its structure and biological effect.

11. Classification of steroid hormones.
12. Synthesis , secretion, blood transport of mineralocorticoids.
13. Regeneration of mineralocorticoids at the target level and the mechanism of their cellular action.
14. The role of mineralocorticoids in the regulation of the tubular transport of ions and water-salt metabolism.
15. Synthesis, secretion and transport of blood glucocorticoids.
16. Synthesis and secretion, transport of male and female sex hormones, their biological effect.
17. Regulation of corticosteroid synthesis. The role of corticotropin (ACTH).

Issues for module № 9: "Biochemistry of blood".

1. The main protein fractions of blood plasma. Protein coefficient. Hypo - and hyperproteinemia.
2. Individual plasma proteins. Acute phase proteins, their diagnostic role.
3. Immunoglobulins, their classes, synthesis, structure and biological role.
4. The specificity of the antigens. Antigenic determinants and their role in the production of immunoglobulins.
5. Immunocompetent cells (monocytes, T-and B-lymphocytes), their role in antibody formation.
6. Organic composition of blood plasma. Residual nitrogen. Azotemia, production and retention.
7. Mineral composition of blood plasma. Electrolytes. Trace elements and their biological role.

Issues for module № 10: "Biochemistry of urine".

1. Filtration-reabsorption theory of urine formation.
2. The function of urine concentration. The role of the chemical composition of the interstitial medulla of the kidney in the formation of definitive urine.
3. Vasopressin, its structure and role in osmotic concentration of urine.
4. Na-K-ATP-ase, its characteristic and role in the tubular transport of sodium.
5. Acid-forming function of the kidneys. Role of carbonic anhydrase. The process of H+ion secretion.
6. Biological processes that ensure the formation of ammonia renal tubules in cells. The role of glutaminase and glutamate dehydrogenase.
7. Physical and chemical properties of urine: quantity, specific gravity and its changes, reaction, color, transparency, smell of urine.
8. Chemical composition of definitive urine. Organic and inorganic components.
9. Pathological components of urine (protein, sugar, blood, acetone bodies, bile pigments).

Examination questions

I. Introduction to the subject. The structure and function of proteins

1. The subject and problems of biological chemistry. Place of biochemistry among other biological sciences.
2. The most important stages in the development of biochemistry. Biochemistry and medicine.
3. Proteins are the basis of life. Physical and chemical properties of proteins: molecular weight, methods of its determination; size and shape of the protein molecule, stability of aqueous solutions, amphotericity.
4. The primary structure is the basis of biological properties and species specificity of proteins. A peptide bond, its formation.
5. Levels of protein molecule organization: secondary, tertiary, quaternary structure. Types of interaction in their formation. Methods of studying the structure of proteins.
6. The denaturation of proteins. Factors causing denaturation. Renaturation.
7. Classification of proteins. General characteristics of complex proteins.
8. Nucleoproteins. Structure , functions. Nucleic acids: structure. Distinctive features of RNA and DNA.
9. The chromoproteins. Structure and examples.
10. Hemoglobin. Structure and function of hemoglobin. Types of hemoglobin. Derivatives of hemoglobin. The importance of 2,3-diphosphoglycerate in hemoglobin transport of oxygen.
11.Lipoproteins. Structure. Separate classes of lipoproteins.
12.Phosphoproteins. Individual member.
13.Glycoproteins. Structure. Representatives. Biological role.

II. Enzymes.

14. The history of the discovery and study of enzymes. Features of enzymatic catalysis.
15. Modern classification and nomenclature of enzymes.
16. The chemical nature of enzymes. One-component and two-component enzymes. Examples.
17. The structural organization of enzymes. The concept of active, allosteric centers. Functional groups of enzymes.
18. The mechanism of action of enzymes. The main differences between enzymatic catalysis and non-enzymatic catalysis.
19. The properties of enzymes. Dependence of enzymatic reaction on pH, temperature. The specificity of action of enzymes.
20. Activators and inhibitors of enzymes. Enzyme inhibitors of different nature.
21. The concept of proenzyme.
22. The concept of isoenzymes.
23. Regulation of enzyme activity. Allosteric inhibitors and activators.
24. Principles of quantitative determination of enzyme activity. Units of enzyme activity.
25. The use of enzymes as analytical reagents in laboratory diagnostics. Enzyme therapy. Enzyme diagnostics. The immobilized enzymes.

III. Vitamins

26.Vitamins. History of vitamins. Classification.
27.Vitamins. The concept of hypo - and hypervitaminosis. Examples. Causes of vitamin deficiency. Antimatter.
28. Vitamin B1. Structure, role in metabolism.

29. Vitamin B2. Structure. Biological role.
30. Vitamin B6. Structure. Biological role.
31. The Vitamin B12. Structure. Biological role.
32. Vitamin C .Structure. Role in metabolism, food sources, daily requirement and signs of deficiency.
33. Vitamin PP. The structure/ the Biological role.
34. Vitamin A. the Biological role.
35. Vitamin D. the Biological role.
36. Vitamin E. the Biological role.
37. Vitamin K. the Biological role.
38. Biochemical mechanisms of metabolism and vitamin functions. Coenzymes. Examples.

IV. Hormones. The regulation of metabolism.

39. The concept of hormones. Classification of hormones. The general mechanism of action of hormones.
40. Mechanism of cellular action of hormones: with the participation of C-AMP; mechanism with direct interaction with chromatin.
41. Thyroid hormone. The role of thyroxine and thyrocalcitonin in metabolism.
42. Parathormone. Role in metabolism.
43. Hormones of the adrenal cortex. Mineralocorticoids, biosynthesis and structure, role in metabolism.
44. Hormones of the adrenal cortex. Glucocorticoid. Structure. Biosynthesis. The mechanism of cellular action.Role in metabolism.
45. Hormones of the medulla of the adrenal glands. Structure, synthesis, mechanism of cellular action.Role in metabolism.
46. Hormones of the posterior pituitary Vasopressin, structure and its role in the osmotic concentration of urine.
47. Male sex hormone. Synthesis, mechanism of cellular action. Effects on metabolism.
48. Female sex hormones. Synthesis, mechanism of cellular action. Effects on metabolism.
49. Cellular mechanism of insulin action at the level of target organs.
50. Glucagon, role in metabolism.
51. Metabolic disorders in insulin deficiency.

V. Energy exchange

52. Metabolism, the main stages of unification of energy matter.
53. The relationship of different types of exchange. The regulation of the metabolism.
54. General concepts of biological oxidation. ATP is a universal form of energy in a cell.
55. The concept of oxidative and substrate phosphorylation. Localization of phosphorylation points.
56. Modern scheme of terminal phase of biological oxidation (tissue respiration). Structure of the respiratory chain. Characteristics of the electron carriers of the respiratory chain.
57. The structure of the mitochondria. Structural organization of the electron and proton transport chain. The mechanism of conjugation of respiration and phosphorylation. General characteristics of the chemosmotic hypothesis of oxidative phosphorylation of Mitchell-Skulachev.
58. The concept of metabolic pathways. General and specific ways of catabolism of carbohydrates, fats, amino acids.

VI. Exchange and functions of carbohydrates.

59.Basic carbohydrates of animals and their content in tissues, biological role.
60.Classification of carbohydrates. Examples.
61.Thehomopolisaccharides. The structure and properties of glycogen, as the main homopolysaccharide.
62.Theheteropolysaccharides. Individual member. Biological role.
63.Basic carbs food. The digestion of carbohydrates. The characteristics of enzymes.
64. Glucose as the most important metabolite of carbohydrate metabolism. The general scheme of sources and ways of consumption of glucose in the body.
65. The content of glucose in the blood. Hormonal regulation.
66. Anaerobic decomposition of glucose (glycolysis). Stages. Glycolytic oxidative reduction. Regulation.The physiological importance of anaerobic breakdown of glucose. Energy balance.
67. Glycogenolysis. Separate stage. The characteristics of enzymes.
68. Aerobic oxidation of glucose. To explain the anaerobic phase.
69. Aerobic oxidation of glucose. Shuttle mechanisms.
70. Aerobic oxidation of glucose. State the aerobic phase, starting with the oxidation of pyruvic acid.
71. The citrate cycle. The sequence of reactions, the characteristics of enzymes, the relationship with the ETC. Allosteric mechanisms of regulation.
72. Pentose-phosphate pathway of glucose conversion. Separate stages.
73. The total results of the pentose-phosphate pathway: the formation of NADP H+(H+), pentose, ATP, value.
74. The biosynthesis of glycogen in the liver. Regulation. .
75. Reservation and mobilization of glycogen. Hormonal regulation.
76. Regulation of pathways of glucose metabolism. Diabetes mellitus.
77. Congenital disorders of carbohydrate metabolism. Glycogenosises.
78. Gluconeogenesis. Main stages.Value.

VII. Structure, exchange and functions of lipids.

79.The concept of the lipids. Biological role. Classification of lipids.
80.Neutral fats. Simple and mixed triacylglycerols.
81.Higher fatty acids, structure, properties, biological role. The concept of polyunsaturated fatty acids.
82. Phosphoglycerides. Structure, biological role. Individual member.
83. The sphingolipids. Structure, biological role.
84. Glycolipid. Structure. The main representatives.
85. The main representatives of the steroids.
86. Food lipids, their characteristics. The daily requirement of lipids.
87. The digestion of lipids. Stages. Factors involved in this process.
88. The chemical composition of bile. The role of bile in lipid digestion.
89. Disorders of digestion and absorption of edible fats.
90. Products of enzymatic hydrolysis of various lipids in the intestine and their absorption.
91. The resynthesis of triacylglycerols in the intestinal wall.
92. The content of lipids in the blood. Transport forms of lipids. Deposition of lipids.
93. Mobilization of fat from the fat depot. Cascading mechanism of lipolytic process, its regulation.

94. Oxidation of higher fatty acids. The preparatory reaction. Activation of fatty acids. The role of carnitine in fatty acid oxidation. The sequence of reactions occurring in the mitochondria.
95. Energy value of oxidation of higher fatty acids. The overall equation for the oxidation of fatty acids, for example palmitic acid.
96. Features of fatty acid oxidation with an odd number of carbon atoms and unsaturated higher fatty acids.
97. Biosynthesis and the use of acetoacetic acid in tissues. The physiological importance of this process.
98. Formation of ketone bodies. Causes and consequences of ketosis.
99. The biosynthesis of higher fatty acids. The role of acetyl-COA in biosynthesis of high fatty acids, transport through the mitochondrial membrane.
100. The biosynthesis of fatty acids. Generalities. The formation malonyl-CoA.ACP, biological role. Stages of lengthening the chain of fatty acid.
101. Unsaturated higher fatty acids. Representatives of the acids, times-personal level. The formation of unsaturated fatty acids.
102. Biosynthesis of triacylglycerols in tissues. Ways of formation of glycerophosphate in tissues.
103. Phosphoglycerides biosynthesis in tissues.
104. Phosphatidic acid, structure, participation in the biosynthesis of lipids.
105. Cholesterol metabolism. Biological role. Path of catabolism.
106. Cholesterol, structure, properties, the main stages of synthesis and its regulation.
107. Pathology of lipid metabolism.
108. Atherosclerosis. The most common hypotheses about the cause of atherosclerosis.

VIII. The exchange of simple proteins.

109.Food products-sources of proteins. Value of protein in the diet. Biological value of proteins. The concept of nitrogen balance.
110.Digestion of proteins in the stomach, characteristics of enzymes. The role of hydrochloric acid.
111.The digestion of proteins and polypeptides in the bowel. Characterization of the proteinase.
112.Bacterial decomposition of amino acids in the intestine. Neutralization.
113.Bacterial decomposition of amino acids in the intestine. Neutralization of toxic products in the liver. The diagnostic value of a Quick sample.
114.The absorption of amino acids. The fate of the absorbed amino acids.
115.Common ways of amino acid metabolism. Transamination. The most important representatives of transaminases. The value of transamination.
116. Oxidative deamination. Other types of deamination. The biological significance of this process.
117. Decarboxylation of amino acids. Histamine, serotonin and other biogenic amines.
118. Ways of accumulation of ammonia in the human body. Formation of ammonia in the process of amino acid catabolism, other sources of ammonia in the body.
119. Urea biosynthesis: the sequence of reactions, the connection of the ornithine cycle with the transformation of fumaric and aspartic acids.
120. Formation of amides is a way of fixing ammonia.
121. The fate of the hydrocarbon skeleton of amino acids.
122.Features of the exchange of sulfur-containing amino acids.

123.Synthesis of creatine and creatinine, creatine phosphate is an additional source of muscle contraction energy.
124.Specific pathways metabolism of phenylalanine and tyrosine.
125.Pathology of protein metabolism. Protein starvation.Causes and consequences.
126.Congenital metabolic disorders of some amino acids (phenylketonuria, alkaptonuria, cystinosis and cystinuria).

IX. The exchange of complex proteins. Biosynthesis of protein and nucleic acids.

127.The exchange of nucleoproteins. Digestion and absorption.
128.Decay of nucleic acids in tissues. Catabolism of purine bases.
129.Decay of nucleic acids in tissues. Catabolism of pyrimidine nucleotides.
130.Biosynthesis of purine nucleotides in tissues. Regulation.
131.Biosynthesis of pyrimidine nucleotides in tissues.
132.Disorders of purine nucleotide metabolism. Gout.
133.Disorders of porphyrin metabolism. Porphyria.
134.Catabolism of hemoglobin in the tissues.
135.Bilirubin. The path of neutralization. The concept of" direct "and" indirect " bilirubin.
136.Violations of bilirubin metabolism. Jaundice: the suprarenal, hepatic, subhepatic (hemolytic, parenchymal, obstructive).
137.The biosynthesis of heme.
138. The concept of hemoglobinopathies.

X. Biochemistry of blood.

139..Proteins of blood serum. The protein ratio and its significance.
140.Proteins of blood serum. Individual member. Biological function.
141.Separate proteins of blood plasma. Proteins of "acute" phase and their diagnostic value.
142.Immunoglobulins: classes, structure, synthesis and biological role.
143.Non-protein organic composition of blood plasma, residual nitrogen. Azotemia: production and retention.
144.Lipoprotein composition of blood plasma, the characteristics and clinical value of determination of lipoproteins. Hyperlipoproteinemias.
145.Enzymes the blood. Enzymes in the diagnosis of diseases. Examples.
146.Transaminases. Methods of determining coefficient de Ritis, clinical value.

XI. Biochemistry of the kidneys.

147.The role of kidneys in the regulation of water-salt metabolism. Vasopressin, aldosterone, renin-angiotensin system.
148.Physico-chemical properties of urine in normal and its chemical composition.
149.The role of kidneys in the regulation of acid-base state. Glutaminase of the kidneys: formation, isolation of ammonium salts from the body, changes in activity during acidosis.
150.Pathological components of urine. Clinical significance of urine analysis.

XII. Water-salt exchange.

151.Endogenous water. Compartmentalization of fluids in the body. The value of water in the body.
152.Biological role of Na+ and K+. Their contents in blood plasma and tissues. Biological role, regulation of the level.
153.The biological role of calcium and phosphorus. Their content in blood and tissues. Biological role, regulation of the level.

154.Regulation of the level of Ca++ in the blood (parathyroid hormone, calcitonin, 1,25 - dioxycholycalciferol).
155. Iron, its concentration in the blood serum. Biological role. The determination of iron in serum.
156.Trace elements and their biological role.
157.The role of minerals in the body.

Bank of situational and practical tasks

1. Lactic acid was found in the gastric juice of the patient. What diseases suggest the presence of this component? What are the components of gastric juice to determine in addition to clarify the diagnosis?
2. In the urine of the patient discovered a significant amount of the homogentysin acid. The defect of what enzyme of tyrosine metabolism can be assumed. What kind of reaction catalyzes the enzyme?
3. Based on the data provided, make a conclusion about the disease and its possible causes:

The child 1.5 months in the blood phenylalanine content is 35 mg /DL (norm 1,4-1,9 mg/ DL) , the content of phenylpyruvate in urine – 150 mg/day (rate 5-8 mg / day).

4. The animal was injected with a mixture of amino acids, the carbon atoms which were labeled (C14). Through some time in blood discovered histamine with labeled carbon atoms. What amino acid metabolism led to the formation of this compound? Write the reaction, specify enzyme. List the functions of histamine in the human body.
5. The child's lethargy, weakness, low mobility. Determination of serum transaminases activity showed that ASAT activity was increased by 1.6 times compared to the norm, and ALAT – by 3.5 times. The resident A. wrote out to mother of the child the direction on hospitalization, assuming the hidden form of hepatitis (mucous membranes, skin of normal coloring). Resident K. decided that it was too drastic measures that increase the activity of enzymes in the blood due to teething baby, since the gums he had raised, tender, painful. Given that the activity of transaminases in gum tissues is low, suppose which of them is right and why?
6. The person received 250 g of carbohydrates for one meal and within 2 hours did not perform physical work. Answer the question:

1.What process is the synthesis or decomposition of fatty acids will be activated in adipose tissue in 1.5-2 hours after a meal?

2.What hormone stimulates this process?

7. There are several types of enzyme activity suppression (inhibition). To what type of inhibition include the following examples?

A) Interaction of malonic acid with the enzyme succinate dehydrogenase

B) Interaction of diisopropylfluorophosphate with acetylcholinesterase.

8. In the patient, in the study of the activity of blood enzymes, it was found that the de Ritis coefficient (ASAT/ALAT normally equals 1.33) was increased. What kind of pathology you can think what additional methods need to be undertaken.
9. In liver cells is an intensive synthesis of protein, which requires amino acids formed as a result of transamination. What vitamin in the form of what coenzyme is involved in this reaction.
10. The patient does not tolerate milk. As soon as he drinks it, he starts vomiting and diarrhea. The lactose tolerance test was conducted. In the patient in this test, the concentration of glucose and galactose in the blood did not increase, but remained constant. Name the defective enzyme and give appropriate advice by selecting them from the proposed list. Indicate what your decision is based on. Explain why in healthy people the concentration of glucose and galactose in the blood increases first and then decreases. Why does the patient have such changes do not occur?
11. During strenuous work the muscle tissue consumes much more ATP than at rest. In white skeletal muscle, e.g., leg muscles of a rabbit, almost all ATP is formed during anaerobic glycolysis. ATP is formed in the second stage of glycolysis in two enzymatic

reactions catalyzed by phosphoglycerate and pyruvate kinases. Imagine that in skeletal muscle there is no lactate dehydrogenase (LDH). Could the muscle in this case work hard, that is, with high speed to generate ATP by glycolysis? Argument the answer. Note that lactatdehydrogenase reaction does not require the participation of ATP.

12. Patient A., 16 years old. Has addressed to the endocrinologist with complaints of thirst, dry mouth, increased urination, weight loss (3 weeks and lost 6 kg), people keep commenting on bad breath (smell of acetone). The study revealed-blood glucose - 10,2 mmol / l. per day the volume of urine-2800 ml, urine glucose-2 mmol / l, ketone bodies + 3. Which presumably can be diagnosed, what examination methods should be assigned to the patient. What are the causes and consequences of acidosis and dehydration in diabetes
13. In the clinic, where the patient received complaints of acute pain in the area of small joints, he was diagnosed with gout and prescribed treatment with allopurinol. Explain why allopurinol eases the patient's condition.
14. In patients with a genetic defect of the key enzyme glycolysis – pyruvate kinase – there is jaundice caused by hemolysis of red blood cells. What type of jaundice do these patients suffer? To answer the questions:
15. Specify the cause of destruction of red blood cells.
16. Explain how to change the level of direct and indirect bilirubin in the blood by hemolysis of red blood cells.
17. The woman in the pregnancy the doctor prescribed the drug "Calcium advans" that contains vitamin D3, magnesium, etc. Explain why your doctor has prescribed this medication pregnant. To answer this question, enter:
    a) the reasons for the increased need for calcium during pregnancy
    b) Hormones that support calcium levels in the blood
    c) what are the sources of these hormones in maintaining the concentration of calcium in the blood normal
    d) why vitamin D3 and magnesium are a necessary component of a drug prescribed by a pregnant woman.
18. Adreno-genital syndrome (congenital dysfunction of the adrenal cortex) is manifested by premature puberty of boys and the development of secondary sexual characteristics in girls. At the specified hereditary pathology defect 21-hydroxylase (at least 11-hydroxylase) is determined. To determine how the ratio of hormones changes: cortisol, aldosterone, androgens with the specified enzyme defect (to justify the answer in the form of a scheme).
19. A woman of 35 years old appealed to the endocrinologist with complaints about frequent headaches, pain in the limbs, changes in appearance, hair growth by male type, apathy, drowsiness. During the examination, the doctor drew attention to the selective localization of fat on the face (moon-shaped, crimson face). On his stomach, chest stretch band red-purple (striae). What pathology of the endocrine system You can suggest?
20. During the First World War, in factories in Western Europe, where 2.4-dinitrophenol was used for explosives production, there were cases of severe illness among workers, accompanied by a rise in temperature, often fatal. How can we explain the emergence of this disease?
21. To a suspension of mitochondria added malate and ADP. How will the concentrations of these substances change during incubation? What products are formed of them?

What enzymes catalyze these reactions? What can be the maximum value of the ratio P/O ?

22. Two brothers-a student back home in the evening. One dinner and lying on the sofa with a book. The other postponed dinner and makes a twenty-minute jog. Describe the differences in carbohydrate metabolism in these students. Describe the differences in fat metabolism among these students.
23. A student who at night prefer to lie on the sofa, the third day of not eating anything to lose weight, and envious to his brother, who, after a twenty-minute run had dinner and now watching TV. Specify the differences in the exchange of fats in these brothers.
24. At the distance of two runners: Sprinter completes a sprint, Stayer runs of 10-km. Describe the difference in the energy supply of muscle work these runners.
25. Why and how do you determine glucose tolerance?
26. Specify the similarities and differences in the role of glycogen and fats as spare forms of energy material.
27. The work processes of the living cell took reinforced
28. oxidation-reduction reactions. The need for what vitamins in this case arises?
29. In a patient who has referred to the doctor with complaints of General weakness and abundant urination, urine analysis revealed its low specific density, a decrease in the amount of urea and creatinine and lack of glucose. Specify the pathology with which these changes are associated.
30. 40 year old man complains of yellowness of the skin. In blood the content of indirect (unconjugated) bilirubin is increased, in urine direct bilirubin is not found. The urobilin in the urine and in the feces sterkobilina in small quantities. Specify the cause of the jaundice.
31. In the blood plasma of the patient complaining of pain in the small joints, an increase in the concentration of uric acid was revealed. What pathology is characterized by such manifestations?
32. Methanol is a very toxic compound: ingestion of 30 ml of methanol can result in death. This toxicity is due to the action of formaldehyde-the product of its transformation. Methanol is oxidized by the enzyme liver alcohol dehydrogenase. One of the methods of treatment for methanol poisoning is that the patient is prescribed inside or intravenously ethanol in doses that cause intoxication in a healthy person. Explain why this treatment is effective?
33. The patient developed an allergic reaction in response to the introduction of protein preparations. With the formation of a substance associated with the development of an allergic reaction?
34. The patient has dizziness, headaches, shortness of breath, palpitations, pain in the limbs. The analysis of the blood discovered elongated, similar to a Crescent, the red blood cells. What is the cause of this disease?
35. Patients suffering from diseases of the cardiovascular system, for the treatment and prevention of myocardial damage prescribed drug "Neoton", similar to endogenous phosphocreatine. What is the biological role of phosphocreatine?
36. In a patient with a blockage of the biliary tract, hemorrhages appeared on the skin and the time of blood clotting increased due to insufficient intake of vitamin K into the body. What is the cause of vitamin K deficiency?
37. In a patient who has referred to the doctor with complaints of General weakness and abundant urination, urine analysis revealed its low specific density, a decrease in the

amount of urea and creatinine and lack of glucose. Specify the pathology with which these changes are associated.

38. Sportsmen to increase the efficiency of muscles are recommended products that contain carnitine. In what reactions is carnitine involved?
39. In liver cells is an intensive synthesis of protein, which requires amino acids formed as a result of transamination. What vitamin in the form of what coenzyme is involved in this reaction.
40. The study of a girl 3 years with progressive mental retardation revealed the presence of phenylpyruvate in the urine. The content of phenylalanine in the blood was increased. Specify the pathology, which is characterized by these symptoms.
41. The patient in coma, in the blood plasma increased the activity of CK at the expense of the MB fraction. Specify the reason for the increase in activity of CK (MB) in blood plasma.
42. The patient had complained of palpitations, muscle weakness, weight loss, fever. The examination found proptosis and enlargement of the thyroid gland. What is the cause of this pathology.
43. Quantitative determination of saliva amylase activity.
44. Determination of succinate dehydrogenase activity and study of competitive inhibition.
45. The principle of the quantitative method for determining glucose in the blood (glucose oxidase method).
46. Quantitative determination of cholesterol in blood serum.
47. Quantitative determination of pepsin activity of gastric juice.
48. Quantitative determination of urea in the blood.
49. The principle of the method of quantitative determination of direct bilirubin in blood serum.
50. Quantitative determination of Ca++ in the blood.
51. Quantitative determination of iron in the blood.
52. Determination of serum ALAT and ASAT activity and clinical significance.
53. Quantitative determination of protein in blood and urine.
54. Determination of bile pigments in urine.
55. Determination of glucose in urine.
56. Methods for detecting blood in urine.
57. Method of quantitative determination of urea in urine.
58. Biuretic reactions to polypeptides
59. Effect of activator and non-specific inhibitor on amylase activity
60. Qualitative reaction to lactic acid (Uffelman reaction)
61. Quantitative determination of pyruvic acid in urine
62. Legal test for acetone
63. Gerhardt's reaction to acetoacetic acid
64. Determination of creatinine in urine by Folin
65. Color reactions to insulin. Detection of peptide bonds (biuretic reaction)
66. Determination of the titration acidity of urine
67. Detection of mineral substances in urine
68. Detection of pathological components in urine
69. The discovery of iodine in thyroidin
70. Determination of 17-ketosteroids in urine.
71. The Veltman test.

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«North-Ossetian state medical academy»
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Department of biological chemistry

APPROVED
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STANDARD OF TEST TASKS

by discipline _____Biochemistry_____

the main professional educational program of higher education – specialty program in the specialty 31.05.01 General medicine, approved on 24.05.2023

for _____2nd year students_____

by specialty_____31.05.01 General medicine_____

Vladikavkaz 2023

Content

STANDARD OF TEST TASKS

Entrance control of student's level training

1. It is not an amino acid:
    1) leucine
    2) lysine
    3) choline
    4) β-alanine
    5) arginine
2. Proteins are characterized by:
    1) amphoteric properties
    2) lack of a specific molecular configuration
    3) preservation of the structure of the molecules when heated
    4) inability to crystallize
    5) lack of ability to rotate the plane of light polarization
3. The structural component of the membranes is:
    1) triglycerine
    2) fatty acids
    3) phosphatidylcholine
    4) taurocholic acid
4. Which of these compounds are hydrophobic?
    1) a simple protein;
    2) neutral fat;
    3) glycogen;
    4) amino acids.
5. The name of this chemical bond O...H:
    1) ester;
    2) disulfide;
    3) peptide;
    4) hydrogen;
6. Specify which character has the group-NH2:
    1) basic;
    2) acidic;
    3) neutral;
    4) amphoteric.
7. What is the chemical bond -S-S-:
    1) ester;
    2) disulfide;
    3) peptide;
    4) hydrogen;

8. The name of this functional group =NH:
    1) alcohol;
    2) amino;
    3) aldehyde;
    4) imino.

9. Specify which character has –COOH group:
    1) basic;

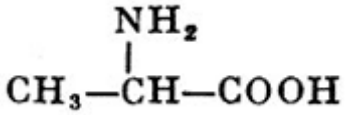
2) acidic;
3) neutral;
4) amphoteric.

10. What is the-CO-NH - connection:
1) ester;
2) peptide;
3) hydrogen;
4) simple essential.

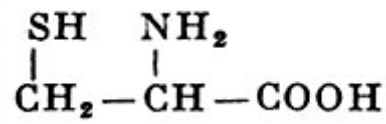
11.Structural element of the starch is:
1) mononucleotides;
2) glucose;
3) fructose + glucose
4) galactose.

12. Essential for human amino acids
1) phenylalanine
2) tyrosine
3) tryptophan
4) threonine
5) methionine

13.Name this amino acid:



14. Name this amino acid:



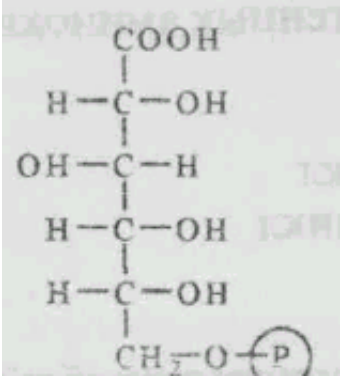
15. Proteins consist of
1) Lipids.
2) Amino acids.
3) Carbohydrates.
4) Phospholipids.

16. Cholesterol is used in the body:
1) As a precursor to all steroid hormones;
2) For the synthesis of bile acids;
3) For the synthesis of catecholamines;
4) For the formation of vit. D 3;
5) It is a part of biological membranes;
6) True 1, 2, 4, 5;
7) All right.

17. Lipid digestion is carried out in:
1) Oral cavity;
2) Stomach;

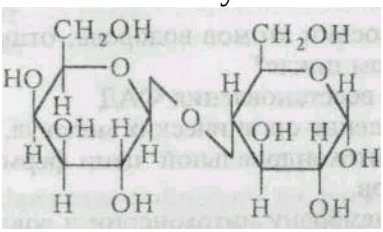
3) Duodenum;
4) Intestine;
5) Large intestine.

18. What substance corresponds formula?



1) Glucose-6-phosphate
2) Fructose-6-phosphate
3) Galactose-6-phosphate
4) 6-Phosphogluconate
5) Mannose-6-phosphate.

19.What carbohydrate has the structure:



1) Sucrose
2) Maltose
3) Ribose
4) Cellobiose
5) Lactose.

20.Proteins of blood plasma:
1) Albumin
2) Globulins
3) Histones
4) Fibrinogen

21. What is the prosthetic group of nucleoproteins?
1) phosphoric acid
2) nucleic acid
3) complex lipids
4) neutral carbohydrates
5) heme iron

22.What are nucleotides?
1) structural units of nucleic acids
2) structural units of simple proteins
3) structural units of hyaluronic acid
4) structural units of chondroitin sulfate

5) structural units of heparin

23. What determines the specificity of the primary RNA structure?
    1) both DNA chains
    2) one strand of DNA
    3) DNA polymerase
    4) tertiary structure of DNA
    5) structural DNA gene
24. What is a codon?
    1) two adjacent nucleotides
    2) three adjacent nucleotides
    3) two adjacent nucleoside triphosphates
    4) three adjacent nucleoside diphosphates
    5) three adjacent nucleoside triphosphates

25. Nucleic acids consist of…
    1) nitrogenous bases, ribose or deoxyribose, phosphoric acid;
    2) nitrogenous bases, glucose or deoxyglucose, phosphoric acid;
    3) purine and pyrimidine bases, phosphoric acid;
    4) purine and pyrimidine bases, ribose or deoxyribose.

26. Antibodies in blood plasma are found mainly in fraction:
    1) Albumins';
    2) α1-globulin;
    3) A2-globulin;
    4) β-globulins;
    5) γ-globulins.

27. The group of fat-soluble vitamins include:
    1) Vit .B1
    2) Vit. B6
    3) Vit.D
    4) Vit. C
    5) Vit. PP

28. Endocytosis and exocytosis are:
    1) The process of transport of insoluble substances together with a part of the membrane by facilitated diffusion.
    2) The transport process of the insoluble substance together with a part of the membrane in need of ATP energy.
    3) The process of transportation of the substance through the membrane associated with irreversible loss of the membrane.

29.Hemoglobin belongs to the class:

1) nucleoproteins';
2) phosphoproteins';
3) chromoproteins;
4) flavoproteins.

30.The main cations and anions of extracellular space are:

1) Sodium;
2) Chlorine;
3) Calcium;
4) Bicarbonate;
5) All of these ions.
6)

"CHEMISTRY OF SIMPLE AND COMPLEX PROTEINS»

1. Specify the functions of proteins:

1. Hemoglobin;	A. Structural;
2. Collagen;	B. Catalytic;
3. Elastin;	C. Protection;
4. Mucin;	D. Transport;
5. Insulin;	E. Contractionary;
6. Actin;	F. Regulatory.
7. Immunoglobulin;	
8. Amelogenins;	
9. Beta-globulins;	
10. LDH;	

2. Pick the right features of amino acids:

1. Lysine	A. Contains an indole ring
2. Serine	B. Imino Acid
3. HistidineC. Aminoacids with (+) charge	
4. Tryptophan	D. is one of the most part of collagen proteins
5. Proline	E. is part of phospho and glycoproteins

3. Sulfur-containing amino acids are:

1. Threonine;
2. Tyrosine;
3. Cysteine;
4. Tryptophan;
5. Methionine.

4. Prevents the formation of α-helix amino acid residue:

1.Alanine's;
2. serine's
3. Valine;
4. Proline's;
5. Glutamine's.

5. Choose the correct definition of the structure of the protein:

1.Primary structure;	A. Polypeptide chain, the amino acid sequence of
2.Secondary structure;	which is determined genetically and formed
3.Tertiary structure;	peptide bonds between other amino acid residues.

4.Quaternary structure.	B. Conformation of the polypeptide chain fixed by interradical bonds; C. Sequence of amino acids in a polypeptide chain; D. the spatial arrangement of the polypeptide chain, fixed by hydrogen bonds between peptide groups; E. Spatial location, number and nature of the interaction between polypeptide chains in oligomeric proteins.

6. Specify proteins that have a Quaternary structure:

1. Hemoglobin
2. Myoglobin
3. Immunoglobulins
4. LDH
5. The correct answers are 1,3,4

7. What is used burlovaBiuret reaction in the laboratory?

1. For a qualitative reaction to proteins.;
2. To discover free amino acids.
3. For quantitative determination of protein.
4. 1.3 correct .
5. There is no correct answer

8. Protein solubility in water is determined by:

I. ionization of protein molecules;
2. Hydration of protein molecules;
3. Form of protein molecule;
4. Ionic strength of the solvent;
5. That's all right.

9. Protein denaturation is accompanied by:

1. Change non-covalent bonds;
2. A decrease in the solubility of the protein;
3. Changes in the primary structure of the protein;
4. True: 1,2

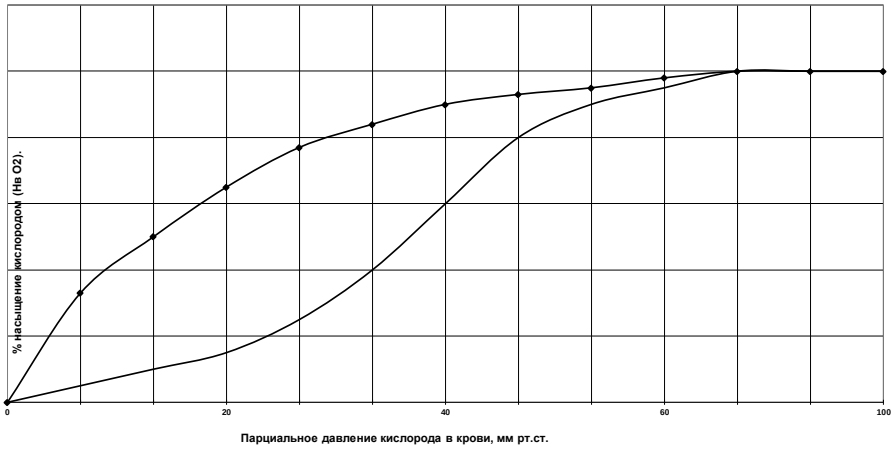
10. Specify carbohydrates that form a prosthetic group in proteoglycans.

1. Pentoses;
2. Chondroitin sulfate;
3. Hyaluronic acid;
4. 2.3 correct.
5. All the answers are correct.

11. Specify the correct definition of nucleic acids (NC):

1. High molecular weight compounds consisting of nitrogen bases, pentose and phosphate;
2. Biopolymers of polynucleotide nature, in which mononucleotides are connected by 3, 5-phosphodiester bond;
3. High molecular weight compounds consisting of phosphorylated nucleotides;
4. All the answers are correct;
5. True to 2.3.

12. The figure shows graphs showing the binding of oxygen by hemoglobin and myoglobin. Determine which of these curves belongs to myoglobin?



13. Antibodies in blood plasma are found mainly in fraction:
1. Albumins';
2. α1-globulin;
3. A2-globulin;
4. β-globulins;
5. γ-globulins.

14. Specify the correct definition of gene
1. The portion of DNA that codes for 1 amino acid
2. The portion of DNA that encodes the sequence of amino acids in protein;
3. The portion of DNA that encodes the sequence of amino acids in a polypeptide I chain protomer
4. Correctly 1,2;
5. That's all right.

15. The hemoglobin of the red blood cells of the mother or fetus under physiological conditions has a higher affinity for oxygen:
1. Hb A
2. Hb F

16. Specify the reason for the increase in affinity for O2 by Hb oxygenation Hb.
1. The change of the tertiary structure of protomers;
2. The edit relationships in the Quaternary structure;

3. The change in mutual position of protomers;
4. The cooperative interaction of protomers;
5. Changing the location of the gem in Hb

17. Myoglobin refers to:

1. Metalloprotein;
2. Hemoproteins;
3.Lipoproteins;
4.Glycoproteins;
5. A flavoprotein.

18. Uracil is a part of:

1. Only RNA;
2. Only DNA;
3. RNA and DNA.

19. The structure of the nucleotide is included:

1. Nitrogen base;
2.Nitrogenous base and pentose;
3. Nitrogenous base, pentose and phosphoric acid.

20. Specify the carbohydrate composition of nucleoproteins:

1. Pentoses;
2. Chondroitin sulfate;
3. Hyaluronic acid;
4. 2.3 correct.
5. All the answers are correct.

21. Make the right pairs:

1 albumins;	A. Nuclear proteins;
2. globulins;	B. water-soluble proteins that regulate the oncotic pressure of blood;
3. histones;	
4. collagens;	C. connective tissue Proteins rich in Gli and Pro;
5. elastins;	D. Heterogeneous fraction of blood proteins, one of whose functions-protective;
	E. connective tissue Proteins rich in Glycine and Valine.

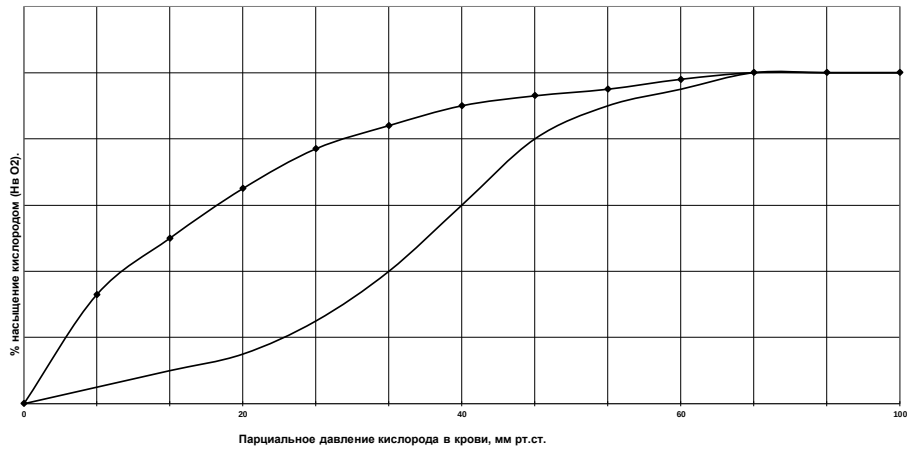
22. The imino acid is:

1. Glycine;
2. Cysteine;
3. Arginine;
4. Proline;
5. Serine.

23. Pick the right features of amino acids

1. Histamine	A. with an anionic Hydrophilic group
2. leucine	B.with a Hydrophilic cationic group
3. Serine	C. is a Hydrophilic uncharged
4. Lysine	D. Hydrophobic
5. Glutamine	E. Is a part of albumins
6. Tyrosine	
7. Tryptophan	

24. The figure shows graphs showing the binding of oxygen by hemoglobin and myoglobin. Determine which of these curves belongs to myoglobin?



25. The presence of Proline in the polypeptide chain prevents the formation of an α-spiral, because Proline:

1. Contributes to the electrostatic repulsion of the amino acid residues;
2. The nitrogen atom is part of a rigid ring, which eliminates the possibility of rotation around the C-N bond;
3. Has a large size of radical;
4. There is no hydrogen atom in the peptide bond formed by Proline.

26. When protein denaturation occurs:

1. Change non-covalent bonds;
2. Reducing the solubility of protein;
3. The change in the primary structure of the protein;
4. True: 1,2
5. There is no correct answer.

27. What provides the structural and functional diversity of natural proteins? Choose one most correct and complete answer from the five suggested below:

1. Differences in amino acid composition;
2. Different length of the polypeptide chain;
3. Differences in molecular weight;
4. Differences in the sequence of amino acids in the polypeptide chain;
5. Differences in the number of polypeptide chains in oligomeric protein.

28. To define the tertiary structure of the protein:

1. The spatial structure of a protein is fixed by hydrogen bonds between atoms of peptide composition;
2. Spatial arrangement of polypeptide chain in a certain volume, fixed by bonds between radicals of amino acids far apart in a linear sequence;
3. The order of alternation of amino acids in the polypeptide chain;
4. The spatial arrangement of the polypeptide chain, peptide bonds fixed;
5. The method of stacking protomers in the oligomeric protein.

29. Which amino acids are markers for mature collagen.
1. Gli.;
2. O-Liz – ;
3. O-Pro.;
4. All the answers are correct;
5. True to 2.3.

30. Chaperones:
1. The newly replicated protect proteins from aggregation;
2. Take part in the formation of the tertiary structure;
3. Catalyze the process of formation of disulfide bonds;
4. Participate in the synthesis of amino acids.

31. Specify the correct definition of nucleic acids (NC):
1. High molecular weight compounds consisting of nitrogen bases, pentose and phosphate;
2. Biopolymers of polynucleotide nature, in which mononucleotides are connected by 3, 5-phosphodiester bond;
3. High molecular weight compounds consisting of phosphorylated nucleotides;
4. All the answers are correct;
5. True to 2.3.

32. Monomers of nucleic acids are:
1. A nitrogenous base;
2. Nucleosides;
3. Dinucleotides;
4. Mononucleotides;
5. The nucleoside triphosphates.

33. In nucleotides, the nitric base and pentose are connected by a bond:
1. Phosphoric ether;
2. N-glycoside bond;
3. O-glycoside bond.

34. Accession of O2 to Hb is accompanied by:
1. Change the valence of Fe2+ to Fe3+;
2. You can change the location of heme in Hb;
3. Additional coordination link between Fe2+ and the remainder of the proximal GIS;
4. All the answers are correct;
5. There is no correct answer.

35. The release of O2 from oxygenating Hb in peripheral tissues is enhanced:
1. Increase in the concentration of H+;
2. By increasing the concentration of CO2;
3. By increasing the concentration of 2,3-diphosphoglycerate (DPG).
4. All the answers are correct.
5. There is no correct answer.

36. Myoglobin refers to:
1.Metalloproteins;
2. Hemoproteins;
3. Lipoproteins;
4. Glycoproteins;
5. Flavoproteins.

37. Adenine is a part of:
1. Only RNA;
2. Only DNA;
3. RNA and DNA.

38. In nucleotides, the nitric base and pentose are connected by a bond:
1. Phosphoric ether;
2. N-glycoside bond;
3. O-glycoside bond.

39. Myoglobin and hemoglobin:
1. Involved in the delivery of O2 from lungs to tissue;
2. Provide intracellular transport of O2;
3. Have identical primary structure;
4. Attach 4 molecules of O2;
5. Are complex proteins.

40. Hemoglobin:
1. Has one O2 binding site.
2. In the capillaries of the tissue attaches in active site 2.
3. Consists of 4 gem-containing protomers;
4. Is a simple protein;
5. Built from 4 α-subunits.

41. The neutral amino acid is:
1. Arginine;
2. Lysine;
3. Valine;
4. Aspartate;
5. Histidine.

42. In the formation of the tertiary structure of the protein does not participate connection:
1. Hydrogen;
2. Peptide;
3. Disulfide;
4. Hydrophobic interaction.

43. Myoglobin is contained in:
1. Livers;
2. Marrow;
3. Muscles;
4. Nervous tissue;
5. Erythrocytes.

44. To the pyrimidine nitrogenous bases include:
1. Thymine;
2. Adenine;
3. Uracil;
4. Guanine;
5. Cytosine.

45. Adenosine triphosphate is:
1. Nitrogen base;
2. Nucleoside;

3. Nucleotide;
4. Dinucleotide.

46. In the process of hydrolysis of protein:

I. Reduces the number of free-COOH groups;
2. Increases the number of free amino groups;
3. Decreasing the pH of the solution;
4. The formation of new peptide bonds;
5. All answers are correct.

47. Denaturation does not occur:

1. Violations of the tertiary structure;
2. Violation of the secondary structure;
3. Hydrolysis of the peptide bonds;
4. Dissociation of the subunits.

48. Proteins perform various functions:

1. structural;
2. Catalytic;
3. Regulatory;
4. Genetic;
5. Receptor

49. Amino acids having a hydrophobic radical:

1. Tyrosine;
2. Alanine;
3. Serine;
4. Threonine;
5. Cysteine.

50. Peptide bond in proteins is:

1. Single;
2. Double;
3. Partly single, partly double.

51.To determine compliance with:

Proteins:
1. Oligomeric;
2. Monomeric.

Thenativestructure:
A. Quaternary;
B. tertiary.

''Enzymes''

1. Specify the correct definition of enzymes:

1. Catalysts-metals;
2. Biological catalysts of protein nature;
3. Catalysts-acids;
4. Catalysts – alkali;
5. All the answers are correct.

2. What is the name of the protein part of the enzyme:

1. The apoenzyme;
2. Holoenzymes;
3. Coenzyme;
4. Protomers.

3. What is the name of the site of the active center of the enzyme, which joins the substrate:

1. Catalytic;
2. Hydrophobic;
3. Allosteric;
4. Hydrophilic;
5. Contact.

4. The active site of the complex enzymes is formed from:

1. One amino acid;
2. Residues of several amino acids;
3. Residues of several amino acids and non-protein components;
4. Non-protein components.

5. The Michaelis constant is numerically equal to the concentration of the substrate at which the reaction rate is equal to:

1. Maximum;
2. ½ Maximum;
3. 1/5 max;
4. 1/10 of the maximum.

6. What part of the enzyme protein molecule provides the addition of the substrate to the enzyme and its further transformation:

1. Allosteric center;
2. The catalytic center;
3. Active center;
4. Anchor platform;
5. Coenzyme.

7. The author of the theory of induced correspondence in enzymatic catalysis is:

1. L. Michaelis;
2. D. Koshland;
3. John. Briggs;
4. E. Fisher

8. Make a pair between the names of the specificity of enzymes (numbers) and their definition (letters):

1.Absolute
2.Team;
3. Stereospecificity;

A. Transformation of only certain spatial isomers
B. transformation of only one substrate
C. effect on the chemical bonding of certain groups.
D. the Conversion of various classes of chemical compounds.

9. The nature of the rate curve of the enzymatic reaction from pH is determined:

1. The concentration of the enzyme;
2. The concentration of the substrate;
3. Ionization of the functional groups of the active center of enzyme's;
4. Ionization of the chemical groups of the substrate.

10. What temperature is optimal for the activity of most enzymes:

1. 50-600^{0}C;
2. 15-200^{0}C;
3. 80-1000^{0}C;

4. 35-400^{0}C;

11. Specify what is the property of specificity of enzymes.

1. Chemical compliance of the enzyme active center (AC) substrate;
2. Spatial correspondence of enzyme AC to substrate;
3. Set of radicals amino acids in the AC;
4. The presence of coenzyme;
5. Complementarity of enzyme AC to substrate.

12. Acid-base catalysis is realized in the presence of:

1.Acid groups in the active center of the enzyme;
2. Acid groups in the substrate;
3. basic groups in the active center of the enzyme;
4. Acidic and basic groups in the active center of the enzyme;
5. Acidic and basic groups in the substrate.

13. Competitive enzyme inhibitors are:

1.Metals;
2.Amino acid;
3. Substances, similar in structure to the substrate;
4. Substances similar in structure to the active center of the enzyme;
5. Polypeptides.

14. Multi-enzyme complexes are:

1. The set of enzymes of the same class;
2. Enzymes catalyzing similar reactions;
3. Multienzyme system that performs a specific function;
4. Enzymes associated with the cell membrane.

15. Specify the amino acids that form the active center of chymotrypsin.

1.Serine;
2.Histidine;
3.Asparagine;
4. All right.;
5. It's wrong.

16. The decrease of enzyme activity in violation of the optimum pH of the medium due to:

1. The change in ionization of functional groups of AC enzymes.
2. The change in ionization of the substrate;
3. The violation of complementarity between E and S;
4. All right.;
5. It's wrong.

17. Specify incorrectly labeled enzyme among those used to diagnose lesions of the heart muscle

1. CPK (MB);
2. LDG1;
3. ASAT;
4.ALAT;
5. Histidase

18. What kind of reaction they catalyze esterase:

1. Non-hydrolytic decay reactions of organic compounds due to carbon-oxygen;
2. Action on complex ester bonds;

3. Oxidation of organic compounds with molecular oxygen to form a hydroxyl group.

19. The diagnostic test for prostate cancer is:

1. Aldolase;
2. Acid phosphatase;
3. The malate dehydrogenase;
4. Dehydrogenase.

20. As a result of digestion occurs:

1. Hydrolysis of food biopolymers to monomers.
2. Formation of products devoid of species specificity .
3. The absorption of products deprived of species specificity.
4. That's all right.
5. It's all wrong.

21. Specify the correct definition of the active center of the enzyme.

1. Union of amino acids radicals in space;
2. The site of the polypeptide chain in the tertiary structure of the enzyme;
3. Combining protomers in the oligomeric protein is an enzyme;
4. Association of several AMC radicals located in different places of the polypeptide chain (s);
5. 1,4 is true.

22. What is the name of the site of the active center of the enzyme, which joins the substrate:

1.Catalytic;
2.Hydrophobic;
3.Allosteric;
4.Hydrophilic;
5.Contact.

23. Similar features between enzymes and non-enzymatic catalysts are:

1. Catalysis of only energetically possible reactions;
2. Interaction with one of the components of the reaction medium;
3. The constancy of the direction of the reaction;
4. Reversibility of the catalytic reaction;
5. Direct proportional dependence of the reaction rate on temperatures.

24. The coenzymes are:

1. Pyruvate;
2. NAD;
3. Heme;
4. Vitamin B1;
5. Tyrosine.

25. The class of enzymes indicates:

1. The conformation of the enzyme;
2. Coenzyme type;
3. The type of chemical reaction catalyzed by an enzyme;
4. The structure of the active site of the enzyme.

26. Specify what is the property of specificity of enzymes.

1. Chemical compliance of the enzyme active center (AC) substrate;
2. Spatial correspondence of enzyme AC to substrate;
3. Set of radicals amino acids in the AC;
4. The presence of coenzyme;

5. Complementarity of enzyme AC to substrate.

27. The author of the theory of induced correspondence in enzymatic catalysis is:

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28. What kind of reaction that catalyze esterase:

1. Non-hydrolytic decay reactions of organic compounds due to carbon-oxygen;
2. Action on complex ester bonds;
3. Oxidation of organic compounds with molecular oxygen to form a hydroxyl group.

29. Before the interaction of the enzyme with the substrate of the spatial structure of the enzyme and substrate:

1. Fully correspond to each other;
2. Approximately correspond to each other;
3. They don't match each other.

30. What happens to the enzyme at high temperature:

1.Hydrolysis;
2.Denaturation;
3. The formation of the substrate-enzyme complex;
4. Blocking of the active site;
5. The violation of the primary structure.

31. Specify the correct definition of the Michaelis constant (Km).

3. The concentration of the substrate, at which the reaction rate increases linearly;
4. The concentration of the substrate, at which the reaction rate became maximum;
5. The concentration of the substrate, at which the reaction rate is half the maximum;
6. All right.;
7. It's not true.

32. What type of inhibition is observed under the action of the inhibitor, which has a structural similarity with the substrate:

1.Competitive;
2.Noncompetitive;
3.Allosteric;
4.Nonspecific;
5.Irreversible.

33.Which substance is the activator of pepsin:

1.Hydrochloric acid;
2.Sodium chloride;
3.Copper sulphate;
4.Potassium chloride;
5. The hydrate of copper oxide.

34. For the diagnosis of pancreatic lesions determine the activity of enzymes:

I. alpha-amylase;
2. Lipases;
3. Proteinase;
4. All right.;
5. It's wrong.

35. Clinical significance in liver diseases is the determination of enzyme activity:

1.Cholinesterase;

2. α-amylases;
3.Phosphorylase;
4. Aspartate aminotransferase;
5.Peroxidases.

36. What is the enzymes:

1. Complex proteins, which are the structural material of the cell;
2. Biocatalysts of protein nature;
3. Inorganic catalysts;
4. Trace elements that increase the speed of chemical processes;
5. Factors affecting the rate of chemical reactions.

37.The rate of enzymatic reaction depends on:

1. The concentration of the enzyme;
2. The molecular weight of the enzyme;
3. The molecular weight of the substrate;
4. Molecular heterogeneity of the enzyme.

38. What is the optimum pH has the enzyme amylase:

1. 1.5-2.0
2. 7-7,5;
3. 6-7;
4. 4.5-5;
5. 8-9.

39. An uncompetitive inhibition is the inhibition of an enzymatic reaction caused by the addition of an inhibitor;

1. To the substrate;
2. To the enzyme;
3. To the enzyme-substrate complex.

40. Before the interaction of the enzyme with the substrate of the spatial structure of the enzyme and substrate:

1. Fully correspond to each other;
2. Approximately correspond to each other;
3. They don't match each other.

41. The nature of the speed of the enzymatic reaction depends on the temperature:

1. Ionic strength of the solution;
2. PH values;
3. Denaturation of the protein part of the enzyme;
4. Thermal denaturation of the substrate.

42. Enzymes are irreversibly inhibited under the action of:

1.Lipid;
2.Amino acid;
3. Heavy metal ions;
4.Carbohydrates'.

43. As a result of the enzyme interaction with the substrate, the activation energy of the corresponding enzymatic reaction:

1. Increases;
2. Decreases;
3. Not changing.

44. In acute pancreatitis diagnostic value has definition in blood of the enzyme:

1. Alanine aminotransferase:

2. α-amylases;
3. Lactate dehydrogenase;
4. Of creatine phosphokinase.

45. In the diagnosis of bone lesions, the determination of activity is of the greatest informational importance:

1. Proteinase;
2. Acid phosphatase;
3. Alkaline phosphatase;
4. Lipases;
5. Alpha-amylase.

46. What coenzymes are associated with the class of enzymes oxidoreductase:

1. The thiamin pyrophosphate;
2. NAD+ and NADP+;
3. FMN and FAD;
4.biotin;

47. In multienzyme complexes:

1. All substrates are similar to each other;
2. All substrates are different from each other;
3. The transformation products of a single substrate are original substrate for the next enzyme;
4. All enzymes catalyze the transformation of the same substrate.

48. Acid-base catalysis is realized in the presence of:

1.Acid groups in the active center of the enzyme;
2. Acid groups in the substrate;
3. Major groups in the active center of the enzyme;
4. Acidic and basic groups in the active center of the enzyme;
5. Acidic and basic groups in the substrate.

49. The Michaelis constant is numerically equal to the concentration of the substrate at which the reaction rate is equal to:

1.Maximum;
2. ½ Maximum;
3.1/5 max;
4.1 / 10 max.

50. Simple enzymes consist of:

1.Amino acid;
2. Amino acids and carbohydrates;
3.Lipid;
4.Carbohydrates';
5.Amino acids and non-protein components;
6. Lipids and carbohydrates.

"VITAMINS AND COENZYMES»

1. The group of fat-soluble vitamins include:

1.Vit .B1
2.Vit. B6
3.Vit.D
4. Vit. C;
5. Vit. PP

2. As structural elements, isoprenoid fragments contain vitamins:
1.Thiamine;
2.Tocopherol;
3.Ruthin;
4.Retinol;
5.Ascorbic acid.

3. For normal color perception is necessary:
1.Retinol;
2.Tocopherol;
3.Riboflavin;
4.Pyridoxal;
5.Biotin.

4. Active forms of vitamin B2 are:
1. Pyridoxal phosphate;
2. Flavin mononucleotide;
3. Nicotinamide adenine dinucleotide;
4. The thiamin pyrophosphate;
5. Flavinadenin nucleotide.

5. Set compliance:

1. Thiamine	A. Pellagra.;
2. Ascorbicacid;	B. Anemia
3. Folicacid;	C. Beri-beri;
4. Nicotinicacid..	D. Scurvy.

6. FMN include:
1. Nicotinic acid amide;
2. Isoalloxazine;
3. AMP;
4. Ribitol.

7. Set compliance:

vitamin	*Participation in the exchange*
1) Niacin	*(a)FAD*
2) Pantothenic acid	*(b) NADP+*
3) pyridoxine	*(c) acetyl-COA*
4) Riboflavin	*(d) pyridoxal phosphate*
5) thiamine	*(e) thiaminepyrophosphate*

8. Set compliance:

vitamin	*Participation in the exchange*
1) of thiamine	*(a) carbohydrates and lipids*
2) Biotin	*(b) carbohydrates and amino acids*
3) pyridoxine	*(c) nucleic acids*
4) folic acid	*(d) carbohydrates*
5) thiamine	

9. The mechanism of biological action of Biotin is associated with its participation in the reactions:
1) redox
2) the carboxylation of acetyl-COA
3) carboxylation of pyruvate
4) transfer of acetyl groups
5) decarboxylation of amino acids

10. Avitaminosis B1, the operation of the following enzymes:
1) aminotransferase
2) pyruvate dehydrogenase
3) pyruvate carboxylase
4) glutamate dehydrogenase
5) transketolase

11. An integral part of acetyl coenzyme A is:
1) n-aminobenzoic acid
2) pyridoxine
3) carnitine
4) orotic acid
5) Pantothenic acid

12. Vitamin B12 is part of the following enzymes:
1) acetyltransferase
2) methyltransferasehomocysteine
3) pyruvate decarboxylase
4) racemases
5) methyl malonylmutase

13. The coenzyme of decarboxylase amino acid is:
1) thiamine pyrophosphate
2) pyridoxal phosphate 3)FAD
4) NADH+
5) 4-phosphopantetheine

14. Set compliance:

vitamin	*peculiar properties*
1) water soluble	*a) act as anti coenzymes*
2) antivitamins	*(b) partially synthesized in the body*
3) vitamin-like substances	*c) are converted in the body to coenzymes*

15 Vitamin B6 is part of the following amino acid metabolism enzymes:
1) methyltransferase
2) aminotransferase
3) glutamate dehydrogenase
4) decarboxylase

16 On the permeability of capillaries is affected:
1) nicotinamide
2) Riboflavin
3) pyridoxine
4) routine
5) pangamic acid

17 Coenzymes of the multi-enzyme α-Ketoglutaratedehyrogenase complex are:
1. Lipoic acid, FAD, NAD, thiamine pyrophosphate, Coenzyme A;
2. The thiamin pyrophosphate, lipoic acid, FAD;
3. Lipoic acid. FAD, coenzyme a;
4. Thiamine pyrophosphate, lipoic acid, NAD.

18. Specify the appropriate vitamin function:

vitamins	*functions*
1) vitamin A	A.Suppression of free radical oxidation;
2) vitamin E	B. strengthening the synthesis of contractile proteins;
3) 1,25 (OH)2	C. formation of Ca2 + - binding sites in proteins of blood coagulation system and mineralized tissues;
4) vitamin K	D. mobilization of calcium from bone - demineralization of bone;
5) 24.25 (OH)2	E. photoreception;
6) vitamin F	F. increased synthesis of chondroitin sulfate;
	D. stimulation of immunoglobulin;
	I. increased synthesis of organic bone matrix-mineralization
	K. stimulation of cholesterol metabolism, formation of prostaglandins, thromboxanes, prostacyclins, leukotrienes

19. Correspond to the symptoms of hypovitaminosis:

1. hypovitaminosis A	A. skin lesions on the type of eczema psoriasis. Follicular hyperkeratosis.
2. hypovitaminosis D	B. violation of blood clotting.
3. hypovitaminosis E	C. myodystrophy, termination of pregnancy.
4. hypovitaminosis K	D. osteoporosis, osteomalacia, rickets.
5. hypovitaminosis F	E. violation of dark adaptation (night blindness).
	F. increased cornification of the epithelium on the skin, cornea and mucous membranes.
	G. inhibitionofgrowth.

20.Hypervitaminosis corresponds to the symptoms:

1. hypovitaminosis A	A. non-digestion of the palate and lips, bone pain, acute poisoning.
2. hypovitaminosis D	B. vascular thrombosis.
3. hypovitaminosis E	C. hypercalcemia, hypercalciuria, vascular calcification and internal organs (nephrocalcinosis).
4. hypovitaminosis K	D. Notdescribed.
5. hypovitaminosis F	

21. The group of fat-soluble vitamins include:
1.Vitamin A
2.Vitamin B6
3.Vitamin B2
4.ascorbic acid;
5.Biotin.

22. As structural elements, isoprenoid fragments contain vitamins:
1) ergocalciferol
2) tocopherol
3) routine
4) retinol
5) ascorbic acid

23. Derivatives of sterols are:
1) cyanocobalamin
2) ergocalciferol
3) retinol acetate
4) cholecalciferol
5) tocopherol

24. Vitamin K in its structure contains a:
1) pyrimidine and thiazole ring
2) methylbenzoquinone
3) a quinone derivative having a hydroxyl group and a residue of acetate
4) benzopyran derivative
5) a sulfo group

25. One of the most effective natural antioxidants is:
1) phyllochinone
2) vicasol
3) cholecalciferol
4) retinol
5) tocopherol

26. For normal color perception is necessary:
1) retinol
2) tocopherol
3) Riboflavin
4) pyridoxal
5) Biotin

27. Antihemorrhagic action has:
1) ergocalciferol

2) retinol
3) phyllochinone
4) routine
5) ascorbic acid

28. Xerophthalmia causes deficiency in the body:

1) ascorbic acid
2) thiamine
3) retinol
4) cholecalciferol
5) tocopherol

29. Vitamin D in its structure contains a:

1. Ring of pyrimidine and thiazole;
2. Methylbenzophenone;
3. Cyclopentanoperhydrophenanthrene ring;
4.Phylloquinone.

30. Antihemorrhagics action has vitamin:

1.Ergocalciferol;
2.Retinol;
3.Phylloquinone;
4.Ruthin;
5.Ascorbic acid.

31. The active form of vitamin B1 is:

1. Pyridoxal phosphate;
2. Flavin mononucleotide;
3. Nicotinamide adenine dinucleotide;
4. The thiamin pyrophosphate;
5. Flavinadenin nucleotide.

32. Vitamin is a part of prosthetic groups of flavin dehydrogenases:

1. B1;
2. B2;
3. B5;
4. B3;
5. B6.

33. The active form of vitamin B6 is:

1. Pyridoxal phosphate;
2. Flavin mononucleotide;
3. Nicotinamide adenine dinucleotide;
4. The thiamin pyrophosphate;
5. Flavinadenin nucleotide.

34. On the permeability of capillaries is affected:

1. Nicotinamide;
2. Riboflavin;
3. Pyridoxine;
4. Ruthin;

35. The coenzyme of transaminases is:

1. The thiamin pyrophosphate;
2. Pyridoxal phosphate;

3. NAD;
4. FAD;
5. Acetyl CoA.

36. While avitaminosis B6, the operation of the following enzymes:
1. Aminotransferase;
2. Pyruvate dehydrogenase;
3. Pyruvate carboxylase;
4. Glutamate dehydrogenase;
5.Hexokinases.

37. FMN include:
1. Nicotinic acid amide;
2. Isoalloxazine;
3. AMP.;
4. Ribitol.

38. Active forms of vitamin PP are:
1.Pyridoxal phosphate;
2.Flavin mononucleotide;
3. Nicotinamide adenine dinucleotide;
4. thiamin pyrophosphate;
5.Nicotinamide adenine dinucleotide phosphate;

39. Increased permeability and fragility of blood vessels occur in vitamin deficiency:
1. Thiamine's;
2. Niacin's;
3. Pyridoxine's;
4. Ascorbic acid;
5. Tocopherol's.

40. The group of water-soluble vitamins include:
1. Vitamin A
2. Vitamin B6
3. Vitamin D
4. Vitamin E;
5. Vitamin K

41. Vitamin A in its structure contains:
1. Ring of pyrimidine and thiazole;
2. Methylbenzophenone;
3. β-ion ring;
4. Cyclopentanoperhydrophenanthrene ring;
5. Phylloquinone.;

42. Takes part in carboxylation reactions:
1.Thiamine;
2.Riboflavin;
3.Biotin;
4.Pantothenic acid;
5.Carnitine.

43. The active form of vitamin B6 is:
1. Pyridoxal phosphate;

2. Flavin mononucleotide;
3. Nicotinamide adenine dinucleotide;
4. The thiamin pyrophosphate;
5. Flavinadenin nucleotide.

44. On the permeability of capillaries is affected:

1. Nicotinamide;
2. Riboflavin;
3. Pyridoxine;
4. Ruthin;
5. Pangamic acid.

45. The mechanism of biological action of Biotin is associated with its participation in the reactions:

1) redox
2) the carboxylation of acetyl-COA
3) carboxylation of pyruvate
4) transfer of acetyl groups
5) decarboxylation of amino acids

46. Antihemorrhagic action has:

1) ergocalciferol
2) retinol
3) phyllochinone
4) routine
5) ascorbic acid

47. Xerophthalmia causes deficiency in the body:

1) ascorbic acid
2) thiamine
3) retinol
4) cholecaliferol
5) tocopherol

48. Vitamin D in its structure contains a:

1. Ring of pyrimidine and thiazole;
2. Methylbenzophenone;
3. Cyclopentanoperhydrophenanthrene ring;
4.Phylloquinone.

49. Thiamine in its structure contains:

1. Ring of pyrimidine and thiazole;
2. Methylbenzophenone;
3. Cyclopentanoperhydrophenanthrene ring;
4.Phylloquinone

50. NAD includes:

1. Nicotinic acid amide;
2. Isoalloxazine;
3. AMP.;
4. Ribitol.

"Structure and functions of biological membranes»

1.Fatty acids in blood plasma circulate in:
1. the kernel of LP plasma;
2. the membranes of the PL;
3. complex with serum albumin;
4. they are freely transported with the flow of blood, without contacting any structures.

2.Lipotropic substances that protect the liver from fatty degeneration are:
1. unsaturated fatty acids;
2.methionine;
3. phosphatidylcholine
4.phosphatidic acid;
5.triglyceride.

3.Liquid-crystalline structure of membranes is characterized by:
1. osmotic transfer of water inside the membrane.
2. Chaotic construction of bilipid layer and proteins during self-Assembly of membranes.
3. Ordered position of lipid molecules retain the ability to lateral diffusion.
4. Strong fixation of protein molecules in the bilipid layer.
5. The fact that protein molecules "float" in the lipid layer.

4.Membrane proteins:
1. They have hydrophobic radicals that provide hydrophobic interactions with membrane lipids.
2. Have a covalent bond with the lipids of the membranes that allows some their orientation in the membrane.
3. They have a carbohydrate component represented by monosaccharide or oligosaccharide residues attached covalently.
4. They have hydrophilic groups by which they bind to membrane lipids.

5. Among the functions of membrane proteins are the following:
1.Catalytic.
2.Structural.
3.Integration.
4.Dividing.

6. The lipid component of membranes has the following properties:
1. phospholipids and glycolipids have a certain packing in a membrane since possess amphiphilicity.
2. Membranes have fluidity due to cholesterol, which is a part of them.
3. Membranes have fluidity, which depends on the qualitative composition of fatty acids in membrane phospholipids.
4. The transport function of membranes is associated with the movement of lipids flip-flop.

7. Membrane proteins can bind to lipids as follows:
1. completely immersed in the lipid layer of the membrane.
2. Located on the inner or outer surface of the membrane.
3. Hydrophobic interactions are retained on the water-soluble surface of the membrane.

4. Covalent bonds to connect with the lipid membranes.

8. K-Na-ATP-Aza catalyzes the following processes:
1. equivalent transfer of cations from the cell and intercellular substance.
2. Transfer of ions from the cell to the intercellular substance.
3. Transfer of Na ions from the intercellular substance into the cell.
4. Forms transmembrane electrochemical potential from the energy of concentrations of substances on both sides of the membrane.
5. PA transfers the ions from the cell into the intercellular space and the ions It transports into the cell.

9. Simple diffusion is:
1. transfer of proteins, fats, carbohydrates along the concentration gradient.
2. The transfer of low-molecular organic substances against the concentration gradient.
3. The migration of low molecular weight hydrophobic substances down a concentration gradient.
4. Transfer of neutral molecules such as water, carbon dioxide, oxygen

10. Transport of substances against concentration gradient occurs as follows:
1. by light diffusion.
2. By simple diffusion.
3. Spontaneous way, not related to the expenditure of ATP.
4. Associated with the cost of energy ATP.

11. Light diffusion is:
1. transport of low molecular weight substances by concentration gradient without the participation of the vector.
2. Transport of substances with the participation of protein carriers.
3. Transfer of CO2, H2O, O2 by means of protein - carriers.
4. Transfer of fatty acids through the membrane of red blood cells with bile acids.

12. Active transport of substances through the membrane is accompanied by:
1. the synthesis of ATP - primary active transport.
2. The expenditure of ATP - primary active transport.
3. Transport of substances along the concentration gradient due to the electrochemical potential.
4. The transport of substances through second messengers.

13.Under the action of K-Na-ATP-Aza occurs:
1. transfer of 3 Na + ions from the intercellular substance to the cell and 2 K+ions from the cell to the intercellular substance.
2. Transfer of 3 Na + ions into the intercellular space and 2 K+ions in the opposite direction.
3. Action K-PA-ATPase tends to equalize the concentrations of K+ and PA+on the membrane.
4. Since cation transport is not equivalent, a potential difference occurs on the membrane.

14 .Endocytosis and exocytosis are:

1. the process of transport of insoluble substances together with a part of the membrane by facilitated diffusion.
2. The transport process of the insoluble substance together with a part of the membrane in need of ATP energy.
3. The process of transportation of the substance through the membrane associated with irreversible loss of the membrane.

15. Active forms of oxygen are:
1. O2 because it is formed by the action of metals with variable valence.
2. H2O2, because it spontaneously decays with the formation of OH*-radical.
3. OH*, because it has an unpaired electron and easily binds to different organic compounds.
4. O2, because it is necessary for the body of the electron transport chain.

16. In the human body, the following fatty acids are more prone to oxidation:
1. stearic.
2. Oleic.
3. Linoleic.
4. Palmitic.
5. Arachidonic.

17. Membrane proteins:
1. They have hydrophobic radicals that provide hydrophobic interactions with membrane lipids.
2. Have a covalent bond with the lipids of the membranes that allows some their orientation in the membrane.
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2. Structural.
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1. the process of transport of insoluble substances together with a part of the membrane by facilitated diffusion.
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3. The process of transportation of the substance through the membrane associated with irreversible loss of the membrane.

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1. O2 because it is formed by the action of metals with variable valence.
2. H2O2, because it spontaneously decays with the formation of OH*-radical.
3. OH*, because it has an unpaired electron and easily binds to different organic compounds.
4. O2, because it is necessary for the body of the electron transport chain.

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3. heliported;
4.phosphatidic acid;
5.triglyceride.

33. Fatty acids in blood plasma circulate in:
1. the kernel of LP plasma;
2. the membranes of the LP;
3. complex with serum albumin;
4. they are freely transported with the flow of blood, without contacting any structures.

ENERGY METABOLISM

1. For consistent oxidation of succinate to CO2 and water, the following participants of the respiratory chain are required
1.FMN
2.CoQ

3.FAD
4. cytB
5.cyt c1
6.cyt aa3
7.cyt c
8.H-ATPase
9.oxygen
10-succinate
(Select and arrange components in the correct order)

2. Specify the appropriate sections of the respiratory chain, transporting:

A-protons and electrons …
B-electrons only …
1.NADH-dehydrogenase, SDG, Co A,
2. cytochrome b, C1, C, a, A3

3. What is the coefficient of R/O in the oxidation of malate in the following conditions? (against each point, set the Appropriate p / O

A- without additional supplements (complete pair).....
B – when added to the incubation medium of rotenone with succinate....
C – when added to the incubation medium protonophore (2,4-dinitrophenol)...

4. Characterize the processes of substrate and oxidative phosphorylation

A-substratephosphorylation;	1. the formation of ATP is associated with the transfer of electrons along the respiratory chain.
B-oxidativephosphorylation;	2. the formation of ATP does not require oxygen consumption.
C-bothprocesses;	3. the hydrolysis of the substrates.
D-Not one of them.	4. synthesis of ATP from ADP and H3RO4 using energy.

5. Distribute the following substances according to their mechanism of action:

A- inhibitors of tissue respiration;
B – uncouplers of oxidative phosphorylation

1. antimycin a	5. 2,4-dinitrophenol;
2. valinomycin	6. thyroxine;
3. barbiturates	7. fattyacids;
4. oxaloacetate	8. cyanides.

6. What factors are capable of reversibly locking two protons?

1. FMN;
2.NAD;
3. FAD.;
4. the iron in the cytochromes.

7. Choose statements, correctly reflects the mechanism of oxidative phosphorylation:

1. the respiratory enzymes transport protons outside the inner mitochondrial membrane into the matrix;

2. the energy difference of the redox potentials transformered into the energy of electrochemical potential;
3. H+-ATP-synthetase creates an electrochemical potential;
4. the redox potential of red/ox-system characterizes the amount of emitted energy;
5. the process of oxidative phosphorylation is possible only in a closed membrane.

8. Oxidative phosphorylation in the respiratory break of mitochondria is:

1. the formation of ATP by the energy of the substrates;
2. the formation of ATP without requiring oxygen flow rate;
3. the formation of ATP coupled with electron transport along the respiratory break;
4. the oxidation of ATP in the respiratory break;
5. the decay of ATP to ADP and phosphoric acid.

9. The composition of the FMN includes:

1. Nicotinic acid amide;
2. Isoalloxazine;
3. AMP;
4. Ribitol.

10. To indicate an incorrect position in lot metabolism.

1. The decay of food of active substances to the monomers under the action of digestive enzymes.
2. The collapse of the absorbed food of active substances and structural-functional components of the cell to CO2 and H2O catabolism.
3. Constellation energy today nutritional active substances.
4. Constellation energy today structural and functional components of cells.
5. Synthesis of structural and functional components of the cell - anabolism.

11. When catabolism of amino acids, glucose, glycerol and services of fatty acids form a common metabolite:

1. pyruvate
2. Lactate.
3. Acetyl-Co-A
4. Acetoacetyl-CoA.
5. The oxaloacetate.

12. The tricarboxylic acid cycle in the processes of catabolism plays the role of:

1. Specific pathways of oxidation of amino acids and lipids;
2. The General ways of catabolism;
3. Specific pathways of oxidation of glucose.

13. Dehydration in the Krebs cycle occurs in the reactions of education:

1. Isocitrate;
2. Succinyl CO A;
3. Oxaloacetate;
4. Fumarate;
5. α-Ketoglutarate;
6. Citrate;
7. Succinate;
8. Malate.

14. In the tricarboxylic acid cycle in reaction of substrate phosphorylation takes:

1 Malate;
2. Citrate;
3. Fumarate;

4. Succinate;
5. Succinyl-CoA;

15. Coenzymes of the multienzyme α-Ketoglutarate of the complex are:

1. Lipoic acid, FAD, NAD, thiamin pyrophosphate, Coenzyme A;
2. The thiamin pyrophosphate, lipoic acid, FAD;
3. Lipoic acid. FAD, Coenzyme A;
4. The thiamin pyrophosphate, lipoic acid, NAD.

16. The chain of electron transfer is :

1. NAD+ -dependent dehydrogenase .
2. NADH dehydrogenase
3. FAD-dependent dehydrogenase.
4. FAD-dependent oxidase.
5. The combination of the enzyme complex that transports electrons (-) from NADH+H+, ФАДН2 and some of the substrates O2 and simultaneously pump H+ in the mitochondrial matrix in memebrane space.

17. Respiratory control is the regulation of the rate of respiration:

1. A cytochrome oxidase;
2. NADH-dehydrogenase;
3. The concentration of ADP.

18. In the process of oxidation of isocitrate to carbon dioxide and water, electrons and protons are transported by the carriers of the respiratory break in the following order (arrange components in the right order):

1. Ubiquinone.
2. Cytochromes a, a3.
3. Cytochrome b
4. Cytochrome C.
5. Cytochrome C1.
6. FMN.
7. NADH2.
8. Oxygen.

19. Name 3 non-protein components of the 1st set of breathing break:

1. FMN, Fe, S,
2. FMN, Fe, Cu
3. FMN, Fe, O2

20. Non-protein component of the cytochromes is:

1. heme,
2. Fe
3. FAD,
4. NAD

21. What cofactors are capable of reversibly locking two characteristic?

1. FMN;
2. NAD;
3. FAD;
4. the iron in the cytochromes.

22. What structures are not part of the complexes of the respiratory chain:

1. cytochrome and cytochrome C1
2. coenzyme Q and cytochrome C;

3. cytochrome and cytochrome C1;
4. succinate dehydrogenase and NADH-dehydrogenase;

23. Oxidative phosphorylation in the respiratory break of mitochondria is:

1. the formation of ATP by the energy of the substrates;
2. the formation of ATP without requiring oxygen flow rate;
3. the formation of ATP coupled with electron transport along the respiratory break;
4. the oxidation of ATP in the respiratory break;
5. the decay of ATP to ADP and phosphoric acid.

24. To indicate an incorrect position in lot metabolism.

1. The decay of food of active substances to the monomers under the action of digestive enzymes.
2. The collapse of the absorbed food of active substances and structural-functional components of the cell to CO2 and H2O catabolism.
3. Constellation energy today nutritional active substances.
4. Constellation energy today structural and functional components of cells.
5. Synthesis of structural and functional components of the cell - anabolism.

25. The source of energy the human body refers to:

1. The heterotrophs;
2. The hemotrofy;
3. Autotrophs;
4. The phototrophs.

26. The tricarboxylic acid cycle in the processes of catabolism plays the role of:

1. Specific pathways of oxidation of amino acids and lipids;
2. The General ways of catabolism;
3. Specific pathways of oxidation of glucose.

27. In the course of TCA is formed:

1. Acetyl-CoA;
2. Molecules NADH2;
3. Glutamate;
4. Glucose;
5. Acetoacetate.

28. In the tricarboxylic acid cycle in reaction of substrate phosphorylation takes:

1 Malate;
2. Citrate;
3. Fumarate;
4. Succinate;
5. Succinyl-CoA;

29. The chain of electron transfer is :

1. NAD+ -dependent dehydrogenase .
2. NADH dehydrogenase
3. FAD-dependent dehydrogenase.
4. FAD-dependent oxidase.

5. The combination of the enzyme complex that transports electrons (-) from NADH+H+, FADH2 and some of the substrates O2 and simultaneously pump H+ in the mitochondrial matrix in memebrane space.

30. The composition of the prosthetic group of NADH-CoQ-oxidoreductase complex includes:
1. FMN;
2. FAD;
3. Quinone.

31. Respiratory control is the regulation of the rate of respiration:
1. A cytochrome oxidase;
2. NADH-dehydrogenase;
3. The concentration of ADP.

32. Catabolism and anabolism are linked:
1. Common intermediate metabolites.
2. Formed during the catabolism of energy.
3. Formed during the catabolism of restorative ek-
bivalente.
4. All it really is.
5. All wrong.

33. The end products of metabolism are:
1. Acetyl-CoA;
2. Urea;
3. pyruvate;
4. H2O;
5. CO2.

34. Specify the sequence (I— 8) of metabolites in the Krebs cycle.

A. Citrate	1
B. Isocitrate	2
C. Succinate	3
D.Malate.	3
E. Oxaloacetate.	4
F. Fumarate .	5
G. Succinyl-CoA	6
J. 2-oxoglutarate	7
	8

35. Set compliance:

Enzyme	Coenzyme
1. Succinate dehydrogenase;	A. FMN;
2. Decarboxylase pyruvate	B. TPP;
3. Isocitrate dehydrogenase;	C. FAD;
4 NADH: CoQ-oxidoreductase;	D. NAD;
5. Dehydrolipoyldehydrogenase	E. Lipoic acid.

36.In the Krebs cycle in reaction of substrate phosphorylation takes:
1. Succinate;

2. Succinyl-CoA;
3. α-Ketoglutarate;
4. Malate;
5. Acetyl-CoA.

37. The composition of the FMN includes:
1. Nicotinic acid amide;
2. Isoalloxazine;
3. AMP;
4. Ribitol.

38. Hydration of the substrate in the tricarboxylic acid cycle occurs in the reactions of transformation:
1. Citrate in cisaconite;
2. Succinyl CO A in succinate;
3. Fumarate to malate;
4. Of oxaloacetate into citrate;
5. Cisaconitate in isocitrate.

39. Pick up couples between complexes of enzymes of ETC and the corresponding names:

1. I - complex	A. Co Q H2 / cytochrome C - oxidoreductase.
2. II - complex	B. cytochrome oxidase (cytochrome C/O2 -
3. III - complex	oxidoreductase).
4. IV - complex	C. NADH / CO Q-oxide reductase.
	D. Succinate / CoQ-oxidoreductase.

40. Oxygen plays a role:
1. Primary acceptor of hydrogen atoms separated from the substrate dehydrogenases;
2. Final hydrogen acceptor.

41. The composition of the NADH-CoQoxidoreductases addition to the complex flavin enzyme includes:
1. CoQ;
2. Copper atom;
3. Glandular proteins.

42. The amount of energy released during electron transfer from FADH2 to molecular oxygen provides ATP synthesis:
1. 3(2,5);
2. 2(1.5);
3. 1.

43. ATP production by oxidative phosphorylation decreases:
1. The inhibition of the enzymes of the ETC.
2. The inhibition of oxidative phosphorylation;
3. When oxidative phosphorylation is separated;
4. All right.;
5. True I and 2.

44. In the ATP molecule is a macroergic bond:
1. Glycosidic;
2. Phosphodiester;
3. Phosphoanhydride.

45.The sequence of complexes of enzymes in TCA due to:
1. Structure of complexes of enzymes;
2. Affinity complexes of enzymes to the lipid membrane;
3. The size of ih redox potentials;
4. Everything really;
5. All wrong.

46. In the course of TCA is formed:
1. Acetyl-CoA;
2. Molecules NADH2;
3. Glutamate;
4. Glucose;
5. Acetoacetate.

47. pyridine-dependent dehydrogenase as a coenzyme include:
1. heme;
2. FMN;
3. NAD;
4. FAD;
5.NADP.

.

48. Dehydration in the Krebs cycle occurs in the reactions of education:
1. Isocitrate;
2. Succinyl CoA;
3. Oxaloacetate;
4. Fumarate;
5. α-Ketoglutarate;
6. Citrate;
7. Succinate;
8. Malate.

49. Ubiquinone transfers electrons between the enzyme complexes of the mitochondrial respiratory chain:
1. I and II;
2. I and III;
3. II and III;
4. III and IV.

50. Biological oxidation reactions, accompanied by the transformation of the energy of chemical bonds of oxidized substrates into ATP energy, proceed by:
1. Activation of molecular oxygen;
2. Dehydration, followed by the transfer of electrons to oxygen;
3. Connections of activated oxygen to the substrate.

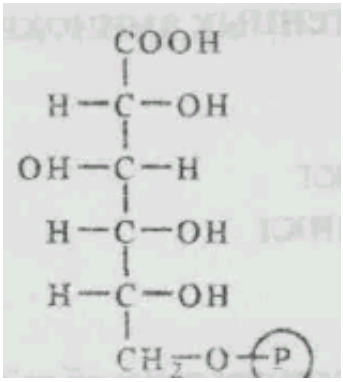
Carbohydrate metabolism

1. Hormone that increases permeability of the plasma membrane of cells to glucose, resulting in accelerated its transfer from the blood into cells, is ...
1. Inulin
2. Insulin.
3. Glucagon.
4. thyrotropin.

2. What a phosphorylated nucleotide is a carrier of glucosamine groups in reactions of biosynthesis of glycogen?
A. ATP
V. GTP
C. ADP
D. UTP
3. The end product of anaerobic glycolysis is:
A. Propionate
B. Pyruvate
C. Lactate
D. Pyruvate and lactate
E. Ethanol and CO2.
4. What are the enzymes of the digestive tract involved in the complete breakdown of glycogen and starch to glucose molecules?
A. b-Amylase
V. a-Amylase,a-1,6-glycosidase
S. a-Amylase
D. gamma-Amylase, b-galactosidase
E. b-Amylase, a-1,6-glycosidase.

5. What is the yield of ATP from the anaerobic breakdown of 1 mole of D-glucose to lactate?
A. 1 mole
V. 2 mole
C. 3 mole
D. 4 moles
E. 6 moles.
6. Inhibitory effect on the General ways of catabolism (the process of oxidative decarboxylation of pyruvate and the Krebs cycle) having ribonucleotide:
A. AMF
V. ADP
C. ATP
D. UMF
7. The process of gluconeogenesis when fully prolonged fasting stimulates:
A. Insulin
V. Adrenaline
C. Cortisol
D. Thyroxine
8. In the hydrolysis of lactose monosaccharides are formed:
A. Two residue of D-glucose
V. a-D-Glucose and b-D-galactose
C. D-Glucose and D - fructose
D. D-Glucose and D-mannose
9. Normal glucose fasting blood:
A. 2,22-4,44 mmol/l
V. 3,33-5,55 mmol/l
S. 4,44-6,66 mmol/l
D. 5,55-of 7.77 mmol/l

E. of 6.66-8,88 mmol/L.
10. As a result of the process is the synthesis of glucose from glycerol, lactate, glycogenic amino acids?
A. Glycolysis
V. Glycogenesis
C. Glucose-lactate cycle
D Glucose-alanine cycle
E Gluconeogenesis
11. The structure of the coenzyme of pyruvate decarboxylase is part of the vitamin:
A B2
B. B6
C. B12
D. B3
E. B1
12. The number of dehydrogenation reactions in the Krebs cycle one:
A 1
B. 2
C. 3
D. 4
E. 5.
13. At what stage of the reactions in the Krebs cycle is synthesized GTF?
A. Citrate ->cisaconite
B. a-Ketoglutarate ->succinyl-COA
C. Succinyl-COA -> succinate
D. Succinate ->fumarate
E. Malate -> oxaloacetate.
14. In what part of the cell, the formation of oxaloacetate from pyruvate under the action of piruvatcarboxylase in the process of gluconeogenesis?
A. The Nucleus
B. Mitochondria
C. Endoplasmic reticulate
D. Microsome
E. Cytoplasm.
15. What substance corresponds formula?



A. Glucose-6-phosphate
B. Fructose-6-phosphate
C. Galactose-6-phosphate
D. 6-Phosphogluconate

E. Mannose-6-phosphate.

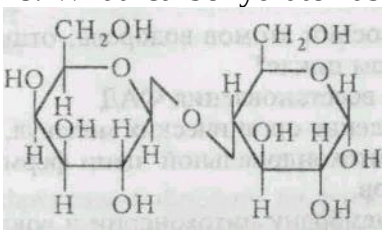
16. Hereditary deficiency of what enzyme causes the symptoms of glycogen storage disease Gierke?
A. Galactose - 1-phosphatedehydrogenase
B. Phosphofructokinase
C. Fructose-1,6-hospitalilty
D Glucose-6-phosphatase
E. Lactase.
17. Which product is synthesized by oxidative decarboxylation of pyruvate?
A. Citrate
B. a-Ketoglutarate
C. Acetyl-CoA
D. Atsetilholin
E. Malonyl-CoA.
18. How many moles of ATP formed by the complete oxidation of one mole of D-glucose to CO2 and H2O?
A. 12.
B. 24
P. 26
D. 32
E. 38.
19. In the formation of glucose-1-phosphate from glycogen is participating:
A. Amylase
B. Hexokinase.
C Phosphoglucomutase
D. Phosphorylase

20. The splitting of fructose-1,6-bisphosphate two posttreaty catalyzes:
A. Triosophosphateisomerase
B. Aldolase
C. Hexokinase
D. Phosphofructokinase
E. Enolase.
21. A coenzyme of glucose-6-phosphate dehydrogenase is:
A. Thiamine pyrophosphate
B. Pyridoxal Phosphate
C. NAD+
D. NADP+
E. FMN.
22. For the conversion of fructose-6-phosphate into fructose-1,6-bis-phosphate under the influence of the enzyme phosphofructokinase you must have:
A. NADPH
B. GTP
C. ADP
D. NAD+
E. ATP.

23. Specify ,which allosteric enzyme of glycolysis is inhibited by high concentrations of ATP:
A. Glucose-6-fortismere
B. Pyruvate Kinase
C. Phosphofructokinase
D. Glyceraldehyde
E. Hexokinase

24. What reasons can lead to loss of enzyme activity piruvatdegidrogenzu complex?
A. High concentration of acetyl-S-KoA
B. of Poisoning with compounds of trivalent arsenic (As3+), reacting with SH-groups.
C. Insufficient content of thiamine in the diet
D. High concentration of ATP, leading to inactivation of pyruvate decarboxylase
25. What is the fate of the eight hydrogen atoms, useplease from different substrates in citrate cycle?
A. Used to restore the FAD
B. Go to the reduction of organic molecules.
C. Used in the mitochondrial chain enzymes transfer of protons and electrons.
D. Pass through the membrane of the mitochondria and involved in anabolic processes in the cell.
E. goes to the formation of heat.

26. How many moles of ATP need to two moles of pyruvate to synthesize 1 mole of glucose?
A. 1 mole
B. 2 mole
C. 4 moles
D, 6 moles
E. 8 moles.
27. Gluconeogenesis occurs in the liver and kidney but not in heart and skeletal muscle, because in the latter bodies have no enzyme:
A. Hexokinase
B. Glucose-6-phosphatase
C. Piruvatcarboxylase
D. Glyceraldehydes
E. Aldolase
28. What carbohydrate has the structure



:

A. Sucrose
B. Maltose
C. Ribose
D. Cellobiose
E. Lactose.

29. What is the key intermediate compound is formed during the oxidation of sugars, lipids and amino acids?
A. Oxaloacetate
B. Acetyl- CoA
C. Phosphoenolpiruvat
D. Malate
E. Phosphogluconate.
30. The formation of excess amounts of acetyl-COA and its incomplete utilization in the oxidation process is dangerous for the following reason:
A. It is the synthesis of lipids
B. Can dramatically increase the number of ketone bodies
C. Increased synthesis of bile acids
D. Disturbed fat absorption in the gastrointestinal tract
E. Reduced glycogen storage in the liver.

31. What is the metabolite of the tricarboxylic acid cycle is a key compound for the process of gluconeogenesis?
A. Citric acid
B. Oxaloacetate
C. Any of the intermediate products of the tricarboxylic acid cycle
D. a -Ketoglutarate
E. CIS-aconitate.
32. Specify,the deficit of what enzyme leads to the development of galactosemia?
A. Phosphatase
B. Glucoamylase
S. Triosophosphateisomerase
D. Galactose-1 -phosphate uridyltransferase
E. Galactokinase.
33. In the absence of oxygen pyruvate is converted ...
1.To lactic acid
2.In oxaloacetic acid
3.In acetic acid
4.To acetyl-COA
34.Glucose refers to?
35.Fructose refers to?
36.In potatoes most part of carbohydrates are:
1. glucose;
2. fructose;
3. sucrose;
4. starch;
5. glycogen.

37. Functions of carbohydrates in the body are numerous but the most important ones:
a) energy;
b) structural;
C) homeostatic;
g) protective.

38. The pentose monosaccharides include the following:
a) ribulose;
b) ribose;
C) xylulose;
g) arabinose;
d) a- deoxyribose;
e) xylose.
39. Carbohydrates is:
a) polyhydric alcohols containing in its composition the alcohol, aldehyde and keto team;
b) organic molecules, which include multiple amino acid residues linked by a peptide bond;
C) esters of fatty acids and various alcohols.
40. Substances produced by partial hydrolysis of starch or glycogen:
a) heparin;
b) sucrose;
C) dextrins.
41. According to the currently accepted classification carbohydrates are classified into three main groups:
a) monosaccharides;
b) pyranose;
C) oligosaccharides;
g) furanose;
d) aldose;
e) polysaccharides.
42. The disaccharides include:
a) starch;
b) glucose;
C) sucrose;
g) cellobiose;
d) fructose;
e) glycogen.
43. The end product of anaerobic glycolysis :
1.pyruvate
2 .lactate
3. oxaloacetate
4. ethanol
5. acetyl-COA
44.What products are formed from glucose-6-phosphate ?
1. fructose-6-phosphate
2. glucose
3 .6-phosphogluconate
4. glucose-1-phosphate
5 .fructose-1-phosphate

45.The highest content of glycogen in the human body (by weight):
1 liver
2 muscles
3 the brain

4 buds
5 adipose tissue
46.Glucose can be formed in the body from:
1 acetyl-COA
2 pyruvate
3 lactate
4 glycerin
5 leucine
47.Enzymes of the biosynthesis of glycogen from glucose?
1 amylase
2 phosphorylase
3 glycogen synthase
4 phosphoglucomutase
5 Hexokinase
48.The rate of glycolysis in muscle is reduced when you add:
1 ADP
2 ATP
3 citrate
4 AMF
49.From pyruvate in one step are formed:
1 citrate
2 oxaloacetate
3 lactate
4 acetyl-COA
5 glycerin
50.Fructose-6-phosphate is formed:
1 glycolysis
2-glycogenolysis
3 pentose phosphate way
4 TCA
5 gluconeogenesis
51. Lactate from the blood is converted into glucose in
1 liver
2 cardiac muscle
3 erythrocytes
4 adipose tissue
5 brain
52.The primary product of the splitting of glycogen in the muscles is:
1 UDP-glucose
2 glucose-1-phosphate
3 glucose-6-phosphate
4 fructose-6-phosphate
5 glucose
53.Coenzyme oxidative decarboxylation of pyruvate :
1 NAD+
2 ATP
3 CoA
4 FAD

5 NADP+
54.The first enzyme of pentose phosphate pathway of the transformation of glucose:
1 aldolase
2 transketolase
3 phosphorylase
4 transaldolase
5 glucose-6-phosphate dehydrogenase
55. In the synthesis of glycogen from glucose in the liver involved
1 glucokinase
2 glycogensinthetase
3 phosphorylase
4 phosphoglucomutase
5 glucose-1-phosphate uridyltransferase
56. Which enzyme present in liver and absent in the muscles
1 glucose-6-phosphatase
2 hexokinase
3 pyruvate kinase
4 phosphorylase
57. The coenzyme of succinate dehydrogenase
1 FAD
2 FMN
3 NAD+
4 NADP
58.Amino acid is the main precursor of gluconeogenesis in the liver:
1 alanine
2 methionine
3 cysteine
4 arginine
5 Serine

Lipid metabolism

1. The specified lipids pick up the appropriate functions:

1. Triacylglycerols;	A. source of energy-fat fuel;
2. Saturatedfattyacid;	B. Tissue hormones;
3. Phospholipids;	C. Component of cell membranes, ensuring their fluidity;
4. Glycolipid;	D. formation of endogenous water;
5. Cholesterol;	E. Standby energy material;
6. Polyunsaturated fattyacids;	F. component of cell membranes, ensuring their rigidity;
7. Prostaglandins;	D. Precursor of steroid hormones;
8. Glycerophospholipids;	J. Component of cell membranes, ensuring the specificity of their structure;
	I. fatty Acid component of membrane lipids;
	K. a Precursor of prostaglandins, thromboxanes, leukotriene;

2. Steroids are:

1. Complex lipids containing a carbohydrate group;
2. Derivatives of phosphatidic acid;
3. Derivatives cyclopentanoperhydrophenanthrene;
4. Glycerol esters and higher fatty acids;
5. High molecular weight organic compounds consisting of amino acid.

3. Violation of digestion and absorption of lipids leads to:

1. Hypovitaminosis A, D, E, K;
2. Failure of cholesterol;
3. Insufficiency of linoleic and linolenic acids;
4. Deficiency of arachidonic acid;
5. True 1 and 3;
6. True 1, 3, and 4.
7. That's right.

4. In the formation of paired bile acids involved:

1. Taurine;
2. Serine;
3. Cysteine;
4. Glycine;
5. Alanine.

5. The role of bile acids in lipid digestion is to :

1. The emulsification of fat;
2. Activation of pancreatic lipase;
3. Micelle formation and lipid absorption;
4. Resynthesis in the intestinal wall;
5. Transport lipids into the bloodstream.

6. Lipases belong to:

1. Class I enzymes;
2. II class of enzymes;
3. III class of enzymes;
4. IV class of enzymes;
5. V class of enzymes;
6. VI class of enzymes.

7. Transport forms of lipids include:

1. Chylomicrons (HM);
2. The very low density lipoproteins (VLDL) – pre-β- lipoproteins;
3. Low density lipoproteins (LDL) - β-lipoproteins;
4. High-density lipoproteins;
5. That's all right.

8. The transport of activated fatty acids from the cytosol to the mitochondrial matrix provides:
1. ATP;
2. HS-Co A
3. Carnitine;
4. Creatine;
5. Carnosine.

9. Carnitine is used to treat heart disease and periodontal disease, as it:
1. Has a bactericidal effect;
2. Reduces the permeability of cell membranes;
3. Increases β-oxidation of fatty acids and increases tissue energy supply;
4. Enriches tissues with fat-soluble vitamins;
5. That's all right.

10. To activate fatty acids is necessary:
1. The thiamin pyrophosphate;
2. The amide of lipoic acid;
3. HS-COA, ATP;
4.Biotin;
5. Pyridoxal phosphate.

11. Specify hydrogen donors involved in the synthesis of fatty acids in the body:
1. FADH2;
2. NADH+(H+);
3.Ascorbic acid;
4. NADPH+(H+).

12. To establish the sequence of reactions of synthesis of fatty acids, catalyzed enzyme complex fatty acid synthase:
1. β-ketoacyl-APP-synthase;
2. APP-acetyltransferase;
3. β-hydroxyl-APP-dehydratase;
4. Enoil-PB-reductase;
5. APP-malonyltransferase;
6. β-ketoacyl-APP-reductase.

13. To arrange in a sequence (1 - 6) metabolites of the synthesis of ketone bodies.
1. A. Acetone;
2. B. β-oxybutyrate;
3. B. Acetyl COA;
4. G. Acetoacetate;
5. D. Acetoacetyl CoA;
6. E. HMG-COA.

14. The biological role of cholesterol:
1. It is a part of cell membranes;
2. The source of the synthesis of bile acids;
3. The source of the synthesis of steroid hormones;
4. Source of vitamin D;
5. A source of vitamin A.

15. Specify a common metabolite for ketogenesis and cholesterol synthesis.
1. Butyryl-CoA;

2.Phosphatidic acid;
3. HMG COA;
4. True 1, 3, 5;
5.Mevalonic acid.

16. Specify the normal content of cholesterol in plasma (mol/l).

1. 3.0-5.0;
2. 3.5-6.5
3. 4.0-8.0
4. All right.;
5. It's wrong.

17. The common intermediate for the synthesis of triacylglycerols and glycerophospholipids is:

1. Dihydroxyacetone;
2. 3-phosphoglyceric aldehyde;
3. Phosphatidic acid;
4. 2-monoacylglycerol;
5. 1,2-diacylglycerol.

18. The donor of methyl groups for the synthesis of phosphatidylcholinephosphatidylethanolamine is:

1. Methyltetrahydrofolate acid;
2. S-adenosylmethionine;
3. Methylmalonyl-CoA;
4. Propionyl-CoA

19. Atherogenic lipids are:

1. β-lipoproteins;
2. Pre-β-lipoproteins;
3. α-lipoproteins;
4.Phospholipids;
5.Glycolipid.

20. Synthesized in liver TAG, phospholipids, cholesterol:

1. Remain in the liver;
2. Used to build membranes;
3. Included in the VLDL;
4. Burn in the TCA;
5. Hydrolyzed to glycerol and fatty acids.

21. Steroids are derivatives:

1.Phenanthrene's;
2.Cyclopentane's;
3. Cyclopentanoperhydrophenanthrene;
4. Perhydrophenanthrene;
5.Protoporphyrin's.

22. In the long-term absence of vegetable fats in food in the body there is a lack of fatty acid:

1. Palmitic;
2. Oleic;
3. Linoleic;
4. Stearic;
5. Pantothenic.

23. The products of hydrolysis of lipids to form mixed micelles, composed of:
a. Vitamins A, D, E, K.
b. Fatty acids.
c. 2-MAG.
d. The bile acids.
e. Cholesterol.
f. True 2, 3, 4.
g. That's all right.
24. The products of hydrolysis of TAG are:
a. Glycerin;
b. 2-MAG;
c. Fatty acids;
d. Phosphoric acid;
e. Choline;
f. True 1, 2, 3.
g. That's all right.
25. Intracellular hormone-dependent lipase, activated by 3, 5 cyclic AMP, called:
1. TAG-lipase;
2. DAG-lipase;
3. MAG-lipase;
4. All right.;
5. It's wrong.
26. The main amount of TAG is transported:
1. chylomicrons'
2. VLDL
3. LDL
4. HDL
5. True 1 and 2
27. Catabolism of fatty acids to CO_2 involves:
1. ETC;
2.Glycolysis;
3. β-oxidation;
4.Tricarboxylic acid cycle;
5.Lipolysis.
28. To establish a sequence of reactions of β-oxidation of fatty acids:
1. thiolase reaction
2. The first dehydrogenation;
3. The second dehydrogenation;
4. activation of fatty acid;
5. Hydration.
29. Part of acyl transferring protein includes vitamin:
1. Thiamine;
2. Biotin;
3. Riboflavin;
4. Pantothenic acid;
5. Pyridoxine.
30. The structural precursor for the synthesis of higher fatty acids is:
1. Malonyl CoA;

2.Citrate;
3. Acetyl-CoA;
4.Oxaloacetate;
5.Pyruvate

31. Specify an incorrect statement in the characteristic of lipoproteins:

1. Mandatory component of biological membranes;
2. Transport function in the blood;
3. Investigated for the diagnosis of atherosclerosis;
4. An important component of connective tissue;
5. It is constructed due to formation of hydrophobic and ion bonds between protein and non-protein components.

32. Ketone bodies are used as an energy source in the following bodies (specify incorrect position):

1. Myocardium;
2. Skeletal muscles;
3. Lungs;
4. The cortex of the kidney;
5. Liver.

33. Intracellular lipolysis is carried out by enzymes:

1. TAG-lipase;
2. DAG-lipase;
3. MAG-lipase;
4. All right.;
5. It's not true.

34.Lipids in the body perform the following functions:

1.Energy;
2.Plastic;
3.Protective;
4. Are the source of endogenous water;
5. Thermally insulating.
6. True 1, 2, 3, 5;
7. That's right.

35.Simple lipids include:

1.Wax's;
2. Triacylglycerols;
3.Steroids;
4.Phospholipids;
5. Cerebrosides.
6. Right 1, 2. ;
7. True 1, 2, 4;
8. That's right.

36. Lipid digestion is carried out in:

1.Oral cavity;
2.Stomach;
3.Duodenum;
4.Intestine;
5.Large intestine.
6. Right 2, 3. ;

7. Right 3, 4. ;

37. Enzymes that break down lipids in the intestine:

1.Amylase;
2.Lipase;
3.Pepsin;
4.Maltase;
5. Dipeptidase.

38. Resynthesis of fats is carried out in:

1. Livers;
2. Intestinal wall;
3. The lumen of the intestine;
4. Duodenum;
5. Muscles.

38. TAG resynthesized in enterocytes included in the lipoprotein:

1. chylomicrons Mature;
2. VLDL;
3. LDL;
4. chylomicrons immature;
5. HDL.

39. Hydrolysis of TAG in lipid transport forms is carried out:

1. Pancreatic lipase;
2. Intracellular TAG-lipase;
3. A known as lipoprotein lipase vascular endothelial;
4. True 2 and 3;
5. That's right.

40. Glycerol, formed by the decay of triacylglycerols, regardless of the way of its further transformation in the body, primarily:

1. Oxidizes;
2. Regenerates;
3. Methylated;
4. Phosphorylates;
5. Acylated.

41. Phosphatidic acid is synthesized in the process:

1. Phosphorylation of glycerol:
2. Recovery of dihydroxyacetone;
3. Hydrolysis of esters;
4. Splitting phosphoanhydride higher fatty acids;
5. Esterification of glycerol-3-phosphate.

42. The composition of lipoproteins include:

1.Protein;
2. Cerebrosides;
3. Triacylglycerols;
4.Cholesterol;
5.Phospholipids.
6. That's right

43. Fatty acid oxidation is carried out in:

1.Cytoplasm;
2.Kernel;

3.Mitochondria;
4.Ribosomes.

44. Fatty acids as an energy source are intensively used in:

1.Heart muscle;
2.Nervous tissue;
3.Livers;
4.Skeletal muscle.

45. The end products of fatty acid oxidation:

1. β-lipoproteins;
2. Acetyl-CoA;
3. β-hydroxyacyl-COA;
4. Acyl-CoA;
5. H2O and CO2.
6. Enoyl-CoA.

46. Coenzyme needed for synthesis of higher fatty acids:

1. NAD+;
2. FAD+;
3. NADPH2;
4. Pyridoxal phosphate;
5. FMN.

47. Biosynthesis of monounsaturated fatty acids comes from saturated with the participation of enzymes:

1. NAD-dependent dehydrogenases;
2. FAD-dependent dehydrogenases;
3. Desaturase of fatty acids;
4. Oxidases'.

48. The first product of squalene cyclization is:

1.Cholesterol;
2. Cholesterol;
3.Squalene;
4. Lanosterol.

49. In the formation of paired bile acids involved:

1.Taurine;
2.Serine;
3.Cysteine;
4.Glycine;
5.Alanine

50. The precursor for the synthesis of ketone bodies is:

1.Fatty acid;
2.Glucose;
3. Acetyl-CoA;
4. Malonyl-CoA;
5. Succinyl-CoA.

"METABOLISM OF AMINO ACIDS»

1. The biological value of dietary protein depends on:

1. The sequence of amino acids;
2. The presence of essential amino acids;
3.Amino acid composition.

2. In the splitting of proteins to polypeptides in the intestine involved:

1.Elastase;
2.Carboxypeptidase;
3.Trypsin;
4.Aminopeptidase;
5.Chymotrypsin.

3. Set compliance:

Amino acid	The product of amino acid breakdown by intestinal microflora.
1.Ornithine;	A. Methyl Mercaptan;
2.Cysteine;	B. Phenol;
3.Tyrosine;	C. Scatol;
4.Lysine;	D. Cadaverine;
5Tryptophan.	E. Indole;
	F. Putrescine.

4.For glutamic acid is unusual:

1. deaminated active at a pH of 7.3 with glutamate dehydrogenase;
2. Is a universal donor of amino groups in transamination reactions;
3. Exposed to oxidative deamination;
4. Participates in the neutralization of ammonia;
5.Involved in transdeamination other amino acids.

5.Indirect deamination of amino acids catalyzed by enzymes:

1.Aminotransferase;
2. L-oxidase;
3. α-decarboxylase;
4. Glutamate dehydrogenase.

6. Correlate the name of biogenic amines with the amino acids from which they are formed.

Amino acid	1.Histamine.
A. Tyrosine	2. Gamma aminobutyric acid
B. Glutamate	3.Serotonin.
C. Tryptophan	4.Dopamine.
D. Histidine	5.Noradrenaline.
	6.Adrenaline..

7. Thecatecholaminesare:

1. Tyramine.
2. Dopamine.
3. dihydroxyphenylalanine.
4. Noradrenaline
5. Adrenaline.
6. Serotonin

8.Sources of ammonia in the body are not:

1. Amino acid;
2. Urea;
3. Biogenic amines;
4. Purine bases;
5. Cytosine.

9. Nitrogen which substances make up the bulk of the residual nitrogen?

1.Urea nitrogen.
2. Amino acid nitrogen.
3. Nitrogen of creatine.
4. Creatinine nitrogen.
5. Uric acid nitrogen.
6. Nitrogen bilirubin.
7. That's all right.

10. Specify the amino acids involved in the formation of creatine.

1.Glycine.
2.Alanine.
3.Arginine
4.Lysine.
5. Methionine.

11. Specify the sources of N in urea in its synthesis

1.Ammonia.
2. The amide nitrogen.
3. The amino group of aspartate.
4. Amino group of ornithine.
5. 1.3 is true.

12. To correlate the types of nitrogen with the processes that cause them.

1. Nitrogen production	A. circulatory Insufficiency
2. Nitrogen retention, extrarenal .	B. decreased renal blood flow. renal.
3. Nitrogen retention, renal	C. with increasing catabolism of proteins and amino acids.
	D. violation of liver function.
	E. violation of kidney function in renal disease.

13. Set compliance:

Amino acid:	Predecessor:
1. Alanine ;	A. α-Ketoglutarate:
2. Glutamic acid;	B. pyruvate;
3. Aspartic acid;	C. Oxaloacetate;
4. Serine.	D.3-phosphoglycerate

14. Nucleic acids are broken down by enzymes:

1. Peptidases;
2. Lipases;
3. Nucleases;
4. Glycosidases
5. Nucleotide phosphorylase.

15. δ-aminolevulinic acid is formed by condensation:

1. Glycine and α-Ketoglutarate;
2. Glycine and oxaloacetate;
3. glycine and succinyl-COA;
4. Glutamate and succinyl COA;
5. Alanine and acetylcoa.

16. The donor of methyl groups in the reaction of conversion of UMP to TMP is:

1. Choline;
2. S-adenosylmethionine;
3. Methylene-tetrahydrofolate.

17. For the synthesis of heme is not required:

1. Glycine;
2. Succinyl-CoA;
3. ATP;
4. Pyridoxal phosphate;
5. Fe2+.

18. The mechanism of formation of active peptidases from Pro-enzymes includes:

1. The change in secondary structure;
2. Allosteric activation;
3. Phosphorylation-dephosphorylation;
4. Partial proteolysis;
5. Change of tertiary structure.

19. Neutralization of toxic products of protein decay occurs with the participation of:

1. ATP;
2. Mono amino adenosine monophosphate;
3. Uridinediphosphoglucuronic acid.

20. The process of non-oxidative deamination is typical for::

1. Serine's;
2. Alanine's;
3. Tyrosine's;
4. Glutamic acid;
5. Cysteine's;

21.Pyridoxal phosphate is not part of the enzyme catalyzing the process:

1. Transamination of amino acids;
2. Decarboxylation of amino acids;
3. Oxidative deamination of L-amino acids;
4. Tryptophan synthesis from indole-3-phosphoglycerate.

22. For the inactivation of biogenic amines uses enzymes:

1.Decarboxylase.
2.Transaminases.
3. Monoamine oxidase.
4. transmethylase.
5. True 2.4

23. In the treatment of central nervous system diseases is used decarboxylation derivative:

1. Tyrosine's;
2. Phenylalanine's;
3. Glutamic acid;
4. Aspartic acid;
5. Arginine's.

24.Sources of ammonia in the body are not:

1. Amino acid;
2. Urea;

3. Biogenic amines;
4. Purine bases;
5. Cytosine.

25. To specify the way of ammonia neutralization.

1. The synthesis of glutamine
2.Reductive amination
3. Synthesis of urea
4. Formation of ammonium salts
5. That's all right.

26. The main final metabolites of nitrogen metabolism removed from the body are:

1.Urea.
2.Ammonium salt.
3.Creatinine.
4.Uric acid.
5. That's all right.

27. Donors of nitrogen atoms in the urea molecule during its biosynthesis in the body are:

1. Ammonia;
2. Citrulline;
3. Ornithine;
4. Aspartate;
5. Arginine.

28. Ammonia-dependent carbamoyl phosphate synthetase localized:

1. In mitochondria;
2. In the lysosomes;
3. In the cytoplasm;
4. In the Golgi complex;
5. In the endoplasmic reticulum.

29. The common metabolite in the synthesis of methionine and threonine is:

1. Serine;
2. Homoserine;
3. Homocysteine;
4. Cysteine;
5. Cistation.

30. In the synthesis of purine nucleotides is not involved:

1. Glutamine;
2. Glycine;
3.Alanine;
4.Aspartate;
5. CO_2.

31. For transformation of UMP in TMP required:

1. Nucleotide transferase;
2. The methylene tetrahydrofolic acid;
3. Phosphatase;
4. NADPH;
5. Thymidylate synthase

32. Synthesis of purine nucleotides with nitrogenous bases reutilization occurs with the participation of enzymes:
1. Carbamoylphosphatesynthetase;
2. Phosphorylase nucleoside;
3. Adenine phosphoribosyltransferase;
4. guanine hypoxanthine phosphoribosyltransferase.

33. The catabolism of heme:
1. Occurs only in the liver;
2. Accompanied by the formation of NADPH
3. Leads to the formation of bilirubinuria;
4. Ends with the formation of indirect bilirubin;
5. The most active are in the intestines.

34. In the process of recovery bilirubin intestinal microflora is not formed:
1. Mezobilirubinogen;
2. Stercobilinogen;
3. Biliverdin;
4. Stercobilin.

35. Excess iron in the reticuloendothelial cells of the liver and spleen is deposited in:
1. Ferritin;
2. Ceruloplasmin;
3. Transferrin;
4. Hemosiderin.

36.Set compliance:

Proenzyme	Activating agent
1.Pepsinogen;	A. Pepsin;
2. Trypsinogen;	B. Trypsin;
3.Chymotrypsinogen.	B. Hydrochloric acid;
	G. Enteropeptidase.

37.Transport of amino acids through cell membranes occurs:
1. By means of primary active transport;
2. Pinocytosis;
3. By light diffusion;
4. By simple diffusion;
5. By means of secondary-active transport.

38. When intramolecular deamination of amino acids are formed:
1. Limit acids;
2. Unsaturated acids;
3. Hydroxy acids;
4.Ketoacids.

39. Not typical for aminotransferases:
1. Catalyze irreversible reaction;
2. Contain pyridoxal phosphate as coenzyme;
3. Use ATP as an energy source;
4. Localized in cytosol and mitochondria;
5. During the reaction to form the substrate Schiff base.

40. Synthesis of urea occurs:

1. In nerve tissue.
2. In the retina.
3. In the liver.
4. In the kidneys.
5. That's all right.

41. Decrease of urea content in blood conditioned:

1. Reduced protein intake.
2. Liver damage.
3. Kidney damage.
4. Right of 1.2.
5. That's all right.

42. Reactions of the ornithine cycle of urea synthesis in cytosol are catalyzed by enzymes:

1. Carbamoylphosphatesynthetase;
2. Argininosuccinatesynthetase;
3. Ornithine carbamoylphosphatetransferase;
4. Arginase;
5. Argininosuccinase.

43. Sources of ammonia in the body are not:

1. Amino acid;
2. Urea;
3. Biogenic amines;
4. Purine bases;
5. Cytosine.

44. Set compliance:

The reaction of transamination	Reaction product
1. Pyruvate and glutamate;	A. Aspartate and α-Ketoglutarate;
2. Pyruvate and aspartate;	B. Alanine and α-Ketoglutarate;
3. Oxaloacetate and glutamate	C. Alanineandoxaloacetate.

45. The reason for the development of gout can be the following biochemical disorders:

1. Activation of purine nucleotide synthesis;
2. Activation of pyrimidine nucleotide synthesis;
3. Suppression of the reutilization of purine nucleotides;
4. Inhibition of reutilization of pyrimidine nucleotides.

46. In the synthesis of purine nucleotides is not involved:

1. Glutamine;
2. Glycine;
3.Alanine;
4.Aspartate;
5. CO_2.

47. Carbamoylphosphate formed in the biosynthesis of pyrimidine nucleotides is synthesized from:

1. Glutamine, CO_2, and 2 ATP;
2. NH_3, aspartate and ATP;
3. Ribozo-5-phosphate and ATP.

48. When deamination of adenine is formed:
1. Guanine;
2. Hypoxanthine;
3. Xanthine;
4. Uric acid;
5. Uracil.

49. All types of jaundice are accompanied by an increase in blood concentration:
1. Hemoglobin's;
2. Indirect bilirubin;
3. Transferrin;
4. Total bilirubin

50. Most ferritin is delayed:
1. In the liver;
2. In adipose tissue;
3. In muscles;
4. In the spleen;
5. In bone marrow.

"THE EXCHANGE OF NUCLEOTIDES»

1.Set the match.To reactions of synthesis of purine nucleotides pick up the missing components.

A. Riboso-5-phosphate.	1.Glutamine + ?→ 5-phosphoribosylamine + Glu + H4P2O7
B. ATP.	2. ? + ATP→ Phosphoribosylpyrophosphate + AMP.
C. GTP.	3. IMP + aspartate + ? →adenylosuccinate + GDP + N3PO4
D. Phosphoribosylpyrophosphate.	
E. INP.	

2. Choose the correct answers.
hypoxanthine -guaninephosphoribosyltransferase:
A. Returns guanine and hypoxanthine to the nucleotide Fund.
B. Makes adenine in the AMP.
C.Often low in patients suffering from hyperuricemia.
D. Inactive boys with a syndrome of Lesha-Nicene.
E. Participates in the resynthesis of nucleotides from nucleosides by spare paths.

3. Possible causes of gout are:
1. Excessive intake of purines from food.
2. Enhanced decay of purine nucleotides.
3. Reducing the rate of reutilization of purine bases and strengthening de novo synthesis.
4. Increased oxygen content in drinking water and food foods.
5. That's right.

4. What are mainly composed of urinary stones formed in patients with gout?
(a) Cystine.
b) Oxalates.
C) Phosphates.
d) Oxalates and phosphates.
e) Uric acid.

5. Select compounds that serve as nitrogen donors in the synthesis of purine nucleotides.

1.CO_2
2. Aspartate.
3.Glutamate.
4. Alanine.
5. Glycine.
6. Formyl-THFA.
7. Have methenyl- THFA.

6. Select compounds that serve as carbon donors in the synthesis of purine and nucleotides.

1.Glycine.
2.Glutamine.
3.Aspartate.
4. CO_2.
5. Formyl- THFA.
6. The methylene THFA.
7. Have methenyl- THFA.

7.Choose the correct answers.

Phosphoribosylpyrophosphate:
A. Formed by the interaction of ribozo-5-phosphate and ATP.
B. is Involved in the conversion of uridine to UMP.
C. Is one of the substrates hypoxanthine -guaninephosphoribosyltransferase.
D. Participates in the transformation of orotate into orotidine-5-monophosphate(OMP).
D. Formed in the reaction catalyzed by PRDP-synthetase.

8.What is the connection of healthy people is the end product of metabolism of purine nucleosides adenosine and guanosine?

(a) Hypoxanthine.
b) Xanthine.
C) Creatinine.
d) Urea.
(e) Uric acid.

9. What is required for the biosynthesis of GMP from IMP?

a) NAD+, ATP, NH3.
b) NADH, ATP, and glutamine.
C) NADH, GTP, and glutamine.
d) NAD, ATP, glutamine.
d) NADP+, GTP, NH3.

10. The reaction of formation of a compound is considered to be regulatory for the synthesis of nucleotides of AMP and GMP?

(a) 5-Phosphoribosyl-1-pyrophosphate.
b) 5-Phosphoribosylamine.
C) Inosinic acid.
d) Orotic acid.
d) GMP and AMP.

11. The source of NH2-group in the synthesis of AMP from inosinic acid is:

1. urea

2. aspartic acid
3. asparagine
4. carbamoylphosphate
5. ammonium ion

12. The source of NH2 groups in the synthesis of GMP from inosinic acid is

1. glutamic acid,
2. aspartate,
3. glycine

13. The final product of TMP catabolism in the human body:

1. uric acid
2. □-aminobutyric acid
3. inosinic acid
4. creatine
5. □-alanine

14. The final product of the decay of adenosine in humans:

1. uric acid,
2. urea,
3. hypoxanthine

15. Does carbamoylphosphate participate in the synthesis of pyrimidine nucleotides:

1.Yes,
2.No

16. What are mainly composed of urinary stones formed in patients with gout?

(a) Cystine.
b) Oxalates.
C) Phosphates.
d) Oxalates and phosphates.
e) Uric acid.

Heme metabolism and iron metabolism

1. Arrange the reaction of heme synthesis in the sequence in which they occur in the body:

1. the education of porphobilinogen;
2. the formation of δ-aminolevulinic acid;
3. the formation of protoporphyrin IX;
4. the attaching iron.

2. The key reaction of heme synthesis is the formation of δ-aminolevulinic acid, the reaction catalyzes the enzyme δ-aminolevulinate, which is inhibited

1.heme
2.hemoglobin
3.1, 2

3. How many molecules of glycine are used for synthesis of one molecule of heme?

1-8 molecules,
2-9molecules,
3-10 molecules,
4-11molecules.

4. Diseases caused by hereditary enzyme defects of heme synthesis are called:

1. porphyria,
2.hemoglobinoses

3. thalassemias

5. Hemoglobin is transported by blood:
1. nitrogen;
2. carbon dioxide;
3. oxygen;
4. ammonia.

6. Hemoglobin belongs to the class:
1.nucleoproteins';
2.phosphoproteins';
3. chromoproteins;
4. flavoproteins.

7. Select the compounds that are used for heme synthesis:
1.glycine;
2. acetyl-COA;
3.iron;
4. guanidinoacetate;
5. succinyl-COA;
6.malate.

8. The key reaction in the synthesis of heme, which is the regulation of the process, is:
1. the education of porphobilinogen;
2. the formation of δ-aminolevulinic acid;
3. the formation of protoporphyrin IX;
4. joining iron to form heme.

9. Non-protein component of aminolevulinate is:
1. FAD.
2.NAD
3.NADP
4. TPP
5.PP

10. Where is the destruction of heme and bilirubin formation:
1. In the lungs.
2. In small intestine.
3. In the liver.
4. The cells RES spleen, bone marrow, Kupfer cells.
5. Right of 1.2.

11. What is the state of bilirubin in the blood?
1. Forms a complex with albumin.
2. Forms a complex with the globulin.
3. Forms a complex with fibrinogen.
4. Does not form complexes.
5. Right of 1.2.

12. The aggregation of bilirubin with albumin bilirubin provides:
1. Solubility.
2. Neutralizes its toxic properties.
3. Facilitates the transport to the liver.

4. That's right.
5. It's wrong.

13. In hepatocytes from bilirubin is formed:
1. Biliverdin
2. Bilirubin – monoglucuronide.
3. Bilirubin-diglucuronide.
4. Mutability.
5. True 2.3.
6. True to 1.4.

14. Hemoglobin is transported by blood:
1. nitrogen;
2. carbon dioxide;
3. oxygen;
4. ammonia.

15. Hemoglobin belongs to the class:
1. nucleoproteins';
2. phosphoproteins';
3. chromoproteins;
4. flavoproteins.

16. Select the compounds that are used for heme synthesis:
1. glycine;
2. acetyl-COA;
3. iron;
4. guanidinoacetate;
5. succinyl-COA;
6. malate.

17. The key reaction in the synthesis of heme, which is the regulation of the process, is:
1. the education of porphobilinogen;
2. the formation of δ-aminolevulinic acid;
3. the formation of protoporphyrin IX;
4. joining iron to form heme.

18. Non-protein component of aminolevulinate is:
1. FAD.
2.NAD
3.NADP
4. TPP
5.PP

19. Where is the destruction of heme and bilirubin formation:
1. In the lungs.
2. In small intestine.

3. In the liver.
4. The cells RES spleen, bone marrow, Kupfer cells.
5. Right of 1.2.

20. What substances improve the infusion of iron in the intestine?
1. ascorbic acid,
2. Hydrochloric acid,
3. Fatty acids
4. Pepsin
5. True 1.2
6. Right 3,4

21. What properties are characteristic of direct bilirubin:
1. Hydrophobic,
2. Hydrophilic,
3. Free,
4. Associated,
5. Lipophilic ,
6. Threshold,
7. Toxic

22. What properties are characteristic of indirect bilirubin:
1. Hydrophobic,
2. Hydrophilic,
3. Free,
4. Associated,
5. Lipophilic ,
6. Threshold,
7. Toxic

"HORMONAL REGULATION OF METABOLISM»

1. The main function of hormones is:
1. Protective
2. Regulatory
3. catalytic
4. transport

3. Specify the processes carried out by the parathyroid hormone.
1. Increases the level of cyclic AMP in target cells.
2. Enhances reabsorption of Ca2+.
3. Enhances reabsorption of H2O.
4. Causes a delay of Na + in the body.
5. Reduces the reabsorption of phosphate.
6. Enhances the mobilization of Ca2+ from the bones.
7. increases the content of Ca2+ in the blood.

4. Iodine is a part of:
1. glucagon's
2. parathormone's
3. calcitonin

4. thyroxine's

5. In regulation of an exchange of electrolytes takes part:

1. insulin
2. noradrenaline
3. aldosterone
4. progesterone
5. thyrotropin

6. Indicate changes characteristic of rickets and hypoparathyroidism.

1. Osteoporosis.	A. Characteristic of rickets
2.The decrease in the concentration of Ca2+ in the blood.	B. Typical hiphopera-thyroidism.
3.Decrease in absorption in the intestine.	C.Characteristic of both. Ca2+ in
4.Increase in reabsorption of + in the kidneys.	D. For any not characteristic of Ca2
5.Increasing the concentration of Ca2+ in the blood.	

7. In the intestinal mucosa secreted hormone:

1. insulin
2. secretin
3. somatoliberin
4. gastrin
5. corticotropin

8. Cortisol - the hormone of the adrenal cortex regulates:

1. metabolism of fats, proteins, carbohydrates
2. exchange of water and mineral salts
3. biosynthesis of glycogen synthetase enzyme

9. Secondary mediators of hormone in the cell are:

1. Calcium ion
2. Cyclic-AMP.
3. GDP
4. ATP
5. calmodulin

10. Specify the processes carried out by glucocorticoids.

1. Increase the permeability of membranes of muscle cells and adipocytes for glucose.
2. Strongly inhibit protein synthesis in muscles.
3. Stimulate amino acids catabolism in muscles and in the liver.
4. Increase the formation of urea.
5. that's right .

11. Dopamine is produced:

1. in the brain layer of the adrenal glands
2. in the adrenal cortex

3. in the thymus
4. in the testes
5. parathyroid gland.

12. Calcitriol has an effect:
1. Stimulates the mobilization of Ca2+ from the bones.
2. Activates the absorption of Ca2 + in the intestine.
3. Enhances reabsorption of Ca2 + in the kidneys.
4. Increases the concentration of Ca2 + in the blood.
5. 1,2,3 is true.
6. That's 2,3,4.
7. That's right.

13. Adenylatecyclase complex is:
1. a set of cytoplasmic receptors
2. Association of three components: receptor, mating and catalytic proteins
3. cytoplasmic multi-enzyme complex.

14. Does not participate in regulation of maintenance of level of calcium in blood:

1. Parathormone;
2. Calcitriol;
3. Calcitonin;
4. Cortisol;
5. Parotin.

15. Vasopressin and aldosterone:
1. Are steroid hormones;
2. Regulate water-salt exchange;
3. Synthesized in adrenal cortex;
4. Have membrane receptors;
5. Cause the reabsorption of NaCl

16. When hunger is reduced:
1. Content of ketone bodies in urine;
2. Mobilization of TAG;
3. Glycogen synthesis;
4. The rate of β-oxidation;
5. Synthesis of ketone bodies.

17. The focal point of the endocrine system is:
1. pituitary
2. spinal cord
3. pancreas
4. hypothalamus
5. thymus

18. To steroid hormones are:
1. Calcitonin;
2. Vasopressin;
3. Oxytocin;

4. Testosterone;
5. Adrenaline.

19. Indicate which processes are enhanced by excessive consumption of carbohydrates from food.

1. Receipt of glucose in the tissue.
2. The rate of gluconeogenesis.
3. Disintegration of glycogen in liver and muscles.
4. Synthesis of glycogen in the liver.
5. Rate of synthesis of TAG from carbohydrates.
6. The rate of lipolysis in adipose tissue.
7. 1,4,5 is true.

20. Set compliance:

Hormones	Type of reception
1. Adrenaline;	A. Cytosolic;
2. Glucagon;	B. Membrane-mediated
3. Thyroxine;	
4. Progesterone	

21. The content of calcium and phosphorus in the blood regulate:

1. parathormone
2. calcitonin
3. adrenocorticotropic hormone
4. estradiol
5. glucagon

22. Development of secondary sexual characteristics in males stimulates:

1. testosterone
2. androsterone
3. estradiol
4. progesterone
5. oxytocin

23. The deposition of energy material of carbohydrates during rest periods, provide:

1. Adrenaline.
2. Aldosterone.
3. Glucagon.
4. Insulin.
5. Cortisol.

24. Mineralocorticoids regulate the exchange:

1. carbohydrate
2. lipid
3. water-salt

25. Insulin-the hormone of the pancreas is:

1. steroid hormone
2. amino acid derivatives
3. hormones of protein-peptide nature

26. Specify the processes carried out by glucocorticoids.

1. Increase the permeability of membranes of muscle cells and adipocytes for glucose.

2. Strongly inhibit protein synthesis in muscles.
3. Stimulate amino acids catabolism in muscles and in the liver.
4. Increase the formation of urea.
5. that's right.

27. Adrenaline and glucagon:

1. Increase the concentration of glucose in the blood;
2. Stimulate the mobilization of glycogen;
3. Secreted into the blood by lowering the concentration of glucose in the blood;
4. Synthesized in the adrenal medulla;
5. Do not affect lipid and fat metabolism.

28. Adrenaline activates the enzyme:

1. catalase
2. adenylatecyclase
3. glycogen synthetase
4. cholinesterase
5. phosphatase

29. The role of hormones of the anterior pituitary is:

1. in the regulation of functions of the peripheral endocrine glands
2. the inhibition of the secretion of releasing factors
3. in the activation of the production of statins.

30. Hormones derived from aromatic amino acids include:

1. estradiol
2. thyroxine
3. secretin
4. noradrenaline

31. Adenylatecyclase activate:

1. progesterone
2. melanotropin
3. glucagon
4. adrenaline
5. aldosterone

32. The biosynthesis of corticosteroids stimulates:

1. adrenocorticotropic
2. calcitonin
3. corticosterone
4. insulin

33. Hormones of protein nature include:

1. triiodothyronine
2. thyroxine
3. parathormone
4. adrenaline
5. aldosterone

34. The deposition of energy material of carbohydrates during rest periods, provide:

1. Adrenaline.
2. Aldosterone.
3. Glucagon.

4. Insulin.
5. Cortisol.

35. Insulin is a:

1.a derivative of saturated fatty acids
2. a derivative of the amino acid tyrosine
3. low molecular weight protein
4.glycopeptide.

"BLOOD BIOCHEMISTRY»

1. Which of these functions performs serum albumin:

1. Binds and transports endogenous metabolites;
2. Participates in maintenance of osmotic pressure of blood;
3. Participates in immune processes;
4. Transports many xenobiotics, including a number of drugs.

2. The main cations and anions of extracellular space are:

1.Sodium;
2.Chlorine;
3.Calcium;
4.Bicarbonate;
5. All of these ions.

3. Acidosis is characterized by:

1. Increase in blood pH;
2. By increasing the concentration of OH;
3. A decrease in blood pH;
4. Reducing the concentration of H + in blood plasma;
5. Reducing lactate in the blood.

4. The content of total protein in plasma is (g/l):

1. 30 – 40. 2. 40 – 60. 3. 65 – 85. 4. 80 – 120.

5. Specify the places of synthesis of plasma protein fractions.

1.Albumins.	A. The Liver.
2. alpha-1 globulins.	B. The Intestines.
3. alpha-2 globulins.	B. Lungs.
4. beta-globulins.	D. cells of lymphoid tissue.
5. gamma globulins.	
6.Fibrinogen	

6. 50% of residual blood nitrogen is nitrogen:

1. amino acid.
2. Creatine's.
3. Ureas.
4. Uric acid.
5. Bilirubin's.
6. protein.

7. The content of creatinine in the blood increases:

1.Starvation.

2. Enhanced muscular work.
3. Insufficiency of kidney function.
4. Right of 1.2.
5. That's right.

8. The level of sodium in the blood is regulated:
a. By aldosterone;
b. The parathyroid hormone;
c. Adrenaline;
d. Prostaglandins;
e. Calcitonin.

9. The content of whey protein inhibitors of proteinases in inflammatory diseases:
1.Increases.
2. Not changing.
3.Decreases
10. Fermentatively myocardial infarction recommended change in serum:
1.AST;
2. ALT.;
3. Creatinkinase MB;
4. LDH-1.

11. For the diagnosis of latent diabetes spend:
2. Determination of glucose on an empty stomach.
3. Determination of glucose in urine.
4. The determination of glucose in blood after sugar load.
5. Determination of blood glucose during the day - daily glucose profile.
6. Right of 1.2.
7. That's right 3.4.

12. The advantage of determining creatine phosphokinase in acute myocardial infarction in relation to the definition of other enzymes is:
1. Stable long-term increase;
2. Organospecific;
3. Rapid increase of enzyme activity in blood serum , high sensitivity and specificity.
4. Simplicity in the formulation of the test.

13. Where is the destruction of heme and bilirubin formation:
1.In the lungs.
2.In small intestine.
3.In the liver.
4. The cells RES spleen, bone marrow, Kupfer cells.
5. Right of 1.2.

14. To specify a plasma protein, which is absent in healthy subjects.
1.Transferrin.
2.Ceruloplasmin.
3.Fibrinogen.

4. Alpha-1 antitrypsin.
5. Alpha - 2-macroglobulin.
6. C is a reactive protein (CRP).

15. The content of urea in the blood decreases with:
1.Kidney damage.
2.Lesion of lungs.
3.Liver damage.
4. 1,3,5 is true.
5. That's right.
16. Determination of the relative density of urine gives an idea of:
1. Excretory function of the kidneys;
2. The concentration function of kidneys;
3. Renal filtration function;
4. All the listed functions;
5. None of these.

17. Ketone bodies in urine are found in:
1.Diabetes;
2.Starvation;
3.Urolithiasis;
4.Chronic renal failure;
5.Cystitis.

18. What hormones regulate the process of urine formation:
1.Glucagon;
2.Adrenaline;
3.Vasopressin;
4.Thyroxine;
5.Aldosterone.

19. Under any jaundice in urine is determined by urobilin:
1.Hemolytic;
2.Parenchymatous;
3. Obstructive,

20. The effect of aldosterone on water and mineral metabolism:
1. Water retention in the body;
2. Increase in renal sodium reabsorption;
3. Increased renal potassium excretion;
4. All of the above is true;
5. All of the above is incorrect
21. In the serum in contrast to plasma do not exist:
1. Fibrinogen;
2. Albumins;
3. Complement;
4. Kallikrein;
5. Antithrombin.

22. Albumins are involved in:
1. Activation of lipoprotein lipase;
2. Regulation of free calcium concentration in blood plasma;
3. The transport of fatty acids;
4. Regulation of the concentration of free hormones;
5. Maintaining the constancy of homeostasis.

23. The value of serum oncotic pressure is determined by:
1.Bandgaps;
2.Carbohydrates;
3.Lipid;
4.Proteins;
5. Low molecular weight nitrogenous compounds.

24. Causes of hyponatremia:
1. Water retention in the body;
2. Enhanced perspiration;
3. Atrophy of the adrenal glands;
4. All of the above.

25. The level of calcium in the blood regulates hormone:
1. Calcitonin;
2. Parathormone;
3. Calcitriol;
4. All of these reasons.

26. Creatine kinase is in the active form:
1. Monomer;
2. Dimer;
3. Tetramer;
4. Polymer;
5. Isomer mixture.

27. The content of cholesterol in the plasma increases with: (specify the wrong position)
1.Atherosclerosis.
2.Kidney damage.
3.Diabetes.
4. Gall-stone disease.
5.Acute infection.

28. What is the state of bilirubin in the blood?
2. Forms a complex with albumin.
3. Forms a complex with the globulin.
4. Forms a complex with fibrinogen.
5. Does not form complexes.
6. Right of 1.2.

29. Alkalosis is characterized by:
1. A decrease in blood pH;
2. By increasing the concentration of OH
3. The increase of lactate in the blood;
4. Increase in blood pH;
5. Reducing lactate in the blood.

30. Residual blood nitrogen is the nitrogen of the following compounds:
1. Proteins, HB, bilirubin, uric acid, urea, aminoacids, vitamins, creatine, creatinine.
2. Hb, bilirubin, uric acid, urea, aminoacids, vitamins, creatine, creatinine.
3. Bilirubin, uric acid, urea, aminoacids, vitamins, creatine, creatinine.
4. Right of 1.2.
5. True 2.3.

31. Hypoalbuminemia occurs when:
1.Starvation.
2.Liver damage.
3.Kidney damage.
4. Defective protein the diet.
5. Violation of digestion of protein.
6. True 2.3.
7. 1,4,5 is true.
8. That's right.

32. The content of urea in the blood of healthy people is (mmol/l):
1. 3.0-8.3. 2. 7.0-14.0. 3. 2.0-6.5. 4. 5.0-10.0.

33. The content of urea in the blood decreases with:
1.Kidney damage.
2.Lesion of lungs.
3.Liver damage.
4. 1,3,5 is true.
5. That's right.

34. Where is the destruction of heme and bilirubin formation:
1.In the lungs.
2.In small intestine.
3.In the liver.
4. In RES cells of the spleen, bone marrow, Kupffer cells.
5. Right of 1.2.

35. In case of kidney damage, pathological components appear in the urine:
1. Protein > 70 mg / day.
2.Glucose.
3.Blood.
4.Creatine.
5. 1,2,3 is true.
6. That's right.

36. The increase night diuresis is called:
1. Polyuria;
2. Oliguria;
3. Anuria;
4. Pollakiuria;
5. Nocturia

37. The relative density of the morning urine is normal:
1. 1,000;
2. 1,004;
3. 1,010;
4. 1,015;
5. 1,040.

38. At what jaundice in the urine is determined bilirubin:
1.Hemolytic;
2.Parenchymatous;
3. Obstructive

39. Hypocalemia may be at:
1. Vomiting, diarrhea;
2. Acute and chronic renal failure;
3.Sepsis;
4. Split syndrome;
5. All of these States.

40. Indicative for acute myocardial infarction is:
1. Dynamics of creatine phosphokinase in the first 3 hours of the attack;
2. Dynamics of creatine phosphokinase within 3-6 hours of the attack above normal;
3. Dynamics of creatine phosphokinase in terms of 8-24 hours after the beginning of a painful attack with a level 1.5 times higher standards;
4. a stable level of creatine phosphokinase with the values in 1.5 times above the norm;
5. Stable increase of creatine kinase during the 2 days'.

41. Whey protein inhibitors of proteinases perform functions:
1. Bind proteinases and protect plasma proteins from hydrolysis's.
2. Regulate blood clotting.
3. Regulates fibrinolysis.
4. True 2.3.
5. That's right.

42. Transferrin is a compound of globulin with:
1.Zinc;
2.Iron;
3.Sodium;
4.Cobalt;
5.Potassium.

43. The urine of a healthy person contains:
1. Biliverdin;
2. Stercobilinogen;
3. Mesobilirubin;
4. bilirubin;
5. all of these chemicals.

44. Of diabetes in urine can be detected:
1.Bilirubin;
2.Glucose;
3.Creatine;
4.Acetone;
5.Albumin.
45. Influence of vasopressin on water-mineral metabolism:
1. Increase in reabsorption of sodium and water in the kidneys;
2. Reduction of osmolarity of blood serum;
3. The increase in extracellular fluid;
4. All of the above is true;
5. All of the above is incorrect.
46. Dysproteinemia is:
1. The increase in total protein;
2. Reduction of total protein;
3. The decrease of fibrinogen;
4. Violation of the ratio of plasma protein fractions;
5. All of the above.
47. Reduction of daily diuresis is called:
1. Polyuria;
2. Oliguria;
3. Anuria;
4. Pollakiuria;
5. Nocturia.