

ОНТУСТИК-КАЗАХСТАН MEDICINA AKADEMIASY «Онтустік Қазақстан медицина академиясы» АҚ	 SOUTH KAZAKHSTAN MEDICAL ACADEMY АО «Южно-Казахстанская медицинская академия»	
Кафедра «Химических дисциплин, биологии и биохимии»	046-П/...	
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CONTROL AND MEASURING EQUIPMENT

Questions of the program for intermediate control

EP name: 6B10115 "Medicine"

Discipline code: Bio 2204

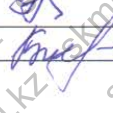
Discipline name: Biochemistry

Study hours / credits: 120/4 credits

Course and study semester: 2/4

Compiled by: 1. 

Art. teacher Asilbekova G.K.

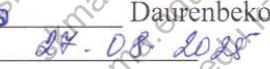
2. 

teacher Khanzhigitova M. Zh

Head of the Department 

Daurenbekov K.N

Protocol № 

Date 

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Issues of midterm control number №1

1. Introduction to biochemistry. The subject and objectives of biochemistry.
2. Methods of biochemical research.
3. Amino acids: structure, classification, acid-base properties, isoelectric point of amino acids.
4. Structural organization of proteins. Primary, -secondary, -tertiary, -quaternary structures of proteins.
5. Structural features of domain proteins, their biological significance.
6. Structure and classification of chaperones.
7. Molecular chaperones and their role in preventing protein denaturation.
8. The functional role of chaperones in protein folding.
9. The biological role of fibrillar proteins.
10. Structural features of some of the most important fibrillar proteins (collagen, elastin, fibroin, keratin, etc.).
11. The chemical composition and structure of collagen.
12. Classification of proteins in structure, physiological values, in the form of molecules.
13. Characterization of simple proteins (histones, protamines, prolamins, glutelins, albumin, globulins, proteinoids)
14. Chromoproteins: characteristic of representatives - non-enzymatic and enzymatic hemoproteins (hemoglobin, myoglobin, catalase, etc.).
15. Glycoproteins: structure, functions in the body. Proteoglycans.
16. Lipoproteins: structure, functions. Blood plasma lipoproteins (HDL, LDL, VLDL, chylomicrons).
17. Metalloproteins: structure, functions, characteristics of representatives (ferritin, transferrin, hemosiderin).
18. Phosphoproteins: characterization of representatives and their biological role.
19. Nucleoproteins: characterization of DNP and RNP, their biological role.
20. Denaturation and renaturation of proteins. Properties of denatured proteins.
21. Proteins as amphoteric macromolecules. Isoelectric point of protein.
22. Buffer, colloidal and osmotic properties of proteins. Protein hydration. Salting out.
23. Enzymes. Similarities and differences between enzymes and non-enzymatic catalysts. Activation energy.
24. Structural and functional organization of enzymes. Apoferritin, cofactor, Multienzyme complexes.
25. Methods for determination and units of enzyme activity.
26. The mechanisms of action of enzymes.
27. The specificity of enzymes. Hypothesis of Fisher and Cochland.
28. Kinetics of enzymatic reactions.
29. Nomenclature and classification of enzymes.
30. The class of oxidoreductases, the biological role, the characteristics of the main representatives (aerobic dehydrogenase, anaerobic dehydrogenase, monooxygenase, cytochrome, catalase, etc.).
31. Transferase class, biological role, characteristics of the main representatives.
32. Hydrolase class, biological role, characteristics of the main representatives.

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33. Class lyases, biological role, characteristics of the main representatives;
34. Class of isomerase, biological role, characteristics of the main representatives.
35. Class ligases, biological role, characteristics of the main representatives.
36. Regulation of enzyme activity. Inhibition of enzymes.
37. Isoenzymes. Enzymopathies.
38. The relationship of metabolism and energy in living organisms.
39. Molecular structure, functions and composition of biological membranes.
40. Asymmetry, fluidity and self-assembly of membranes. The movement of lipid membranes.
41. Transmembrane transport of substances and its kinetics.
42. Biochemical basis of a balanced diet.
43. The main components of nutrition (proteins, fats and carbohydrates).
44. Digestion biochemistry. The composition of the gastric juice.
45. Essential nutritional factors. Essential amino acids, vitamins, minerals, etc.
46. The nomenclature and classification of vitamins. Hypo - and hypervitaminosis
47. Food sources, biological functions and the structure of fat-soluble vitamins.
48. Food sources, biological functions and structure of water-soluble vitamins.
49. Mineral substances. Trace elements.
1. Stages of energy exchange in the body.
2. Catabolism of basic nutrients (proteins, fats and carbohydrates).
3. Macroergic compounds (the role of ATP).
4. Oxidative decarboxylation of pyruvate. The structure of the pyruvate dehydrogenase complex.
5. The cycle of tricarboxylic acids and its main functions.
6. Hydrogen-generating reactions of the Krebs cycle.
7. Substrate phosphorylation.
8. The process of biological oxidation, value.
9. The structure and properties of enzymes of the mitochondrial electron transfer chain (CPE).
10. Oxidative phosphorylation.
11. The combination of respiration with phosphorylation. Mitchell's theory.
12. Non-phosphorylating oxidation and its significance.
13. Inhibitors of dehydrogenases, respiration, phosphorylation and uncouplers of respiration from phosphorylation.
14. Carbohydrates, classification, biological role.
15. The main stages of carbohydrate metabolism in the body.
16. Digestion and absorption of carbohydrates in the digestive tract.
17. Glucostatic function of the liver.
18. Anaerobic glycolysis, biological significance.
19. Aerobic glycolysis, localization of processes, sequence of reactions, lactate dehydrogenase isoenzymes;
20. Oxidation of extra-mitochondrial NADH₂. Shuttle transport mechanisms H₂.
21. The relationship of aerobic and anaerobic glycolysis.
22. Glycogen, a biological role. Glycogenogenesis.
23. Glycogenolysis, amylolysis and phosphorolysis;
24. The relationship of the processes of synthesis and breakdown of glycogen;
25. Glycogenoses and aglycogenoses.
26. Gluconeogenesis, biological significance.
27. The Corey cycle, meaning.

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28. Pentose phosphate cycle, value.
29. Regulation of carbohydrate metabolism in the body.
30. Factors contributing to the violation of carbohydrate metabolism;
31. Pathology of carbohydrate metabolism. (hyperglycemia, hypoglycemia).
32. Classification, chemical structure and biological functions of lipids.
33. Fatty acids, neutral fats, phospho-, sphingo- and glycolipids.
34. Arachidonic acid and its derivatives (prostaglandins), eicosanoids.
35. Cholesterol and its derivatives.
36. Stages of lipid metabolism in the body.
37. The mechanism of digestion of lipids in the digestive tract. Enzymes involved in this process.
38. The chemical nature and role of bile acids in the digestion and absorption of lipids;
39. Metabolism of chylomicrons, VLDL, LDL, HDL.
40. Intracellular lipolysis. Glycerol oxidation.
41. The oxidation of fatty acids. Energy balance.
42. Oxidation of unsaturated fatty acids and odd carbon atoms.
43. The biosynthesis of fatty acids.
44. The biosynthesis of triglycerides.
45. The biosynthesis of phosphoglycerides and phosphatidic acid. Ways of application.
46. The biosynthesis of ketone bodies.
47. Cholesterol biosynthesis, excretion from the body.
48. The use of lipids as drugs.
49. Regulation and violation of lipid metabolism.
50. Biochemical basis of lipid metabolism.
51. Pathology of lipid metabolism (hyperlipoproteinemia, fatty liver infiltration, ketonemia, hypercholesterolemia, atherosclerosis).
52. Protein nutrition. The biological value of proteins. Nitrogen balance.
53. Digestion of proteins in the digestive tract. Absorption of amino acids and their conversion.
54. Decay of proteins in the intestine. Clinical significance of the determination of indican and hippuric acid in urine.
55. Common pathways of amino acid catabolism: transamination, deamination and decarboxylation.
56. Biosynthesis and degradation of biogenic amines.
57. Characterization of some representatives of biogenic amines (structure, physiological effect).
58. Ways of formation and neutralization of ammonia in the body.
59. Ornithine urea formation cycle.
60. Features of the exchange of certain sulfur-containing and aromatic amino acids.
61. The relationship of the exchange of proteins, carbohydrates and lipids.
62. Regulation and disturbances of nitrogen metabolism: kwashiorkor, insanity, gout, etc.
63. The exchange of nucleoproteins. Digestion and absorption of food nucleoproteins.
64. Exchange of purine nucleotides: synthesis and decay.
65. The exchange of pyrimidine nucleotides: synthesis and decay.
66. Disorders of the exchange of purine and pyrimidine nucleotides: hyperuricemia, gout, oratociduria.
1. Classification of pituitary and hypothalamic hormones.
2. Mechanisms of action of pituitary and hypothalamus hormones.

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3. Hypo- and hyperfunction of pituitary hormones. Hypo- and hyperfunction of hypothalamus hormones. Structure and synthesis of thyroid hormones.
4. Mechanisms of action of thyroid hormones. Hypo- and hyperfunctions of the thyroid gland.
5. Chemical structure, biosynthesis of insulin. Target cells, target tissues for insulin.
6. The mechanism of action of the hormone insulin. The effect of insulin on carbohydrate metabolism. Glucagon, chemical nature, biological role.
7. The mechanism of action of the hormone glucagon. The effect of glucagon on carbohydrate metabolism. Diabetes mellitus, the main biochemical disorders in diabetes mellitus.
8. General characteristics of hormones of the cortical layer of the adrenal glands.
9. Mineralocorticoids, chemical nature, mechanism of action.
10. Glucocorticoids, chemical nature, mechanism of action. The effect of cortisol on the metabolism. Hypo- and hyperfunction of hormones of the cortical layer of the adrenal glands.
11. Chemical structure, kidney function. The role of the kidneys in the regulation of water-salt metabolism.
12. Urinary function of the kidneys. Features of the metabolism of substances in the kidneys. Chemical composition, physico-chemical properties of normal urine.
13. The composition of abnormal urine (glucose, protein, blood, ketone bodies, bilirubin).
14. Mechanisms of action of aldosterone and vasopressin on diuresis.
15. Biochemistry of the intercellular matrix. Collagen, elastin. Composition, synthesis, structures.
16. Glycosaminoglycans and proteoglycans of connective tissue. Changes in connective tissue during aging and collagenoses. Factors affecting the metabolism of connective tissue.
17. Chemical composition of nervous tissue, biological functions. The structure of the nerve fiber.
18. Mechanisms of occurrence and conduction of a nerve impulse. Action potential development inhibitors.
19. Chemical composition of liquor, biological functions.
20. Synaptic transmission of a nerve impulse. Nervous tissue peptides.
21. Compounds affecting the synaptic transmission of nerve impulses. Vision. brain metabolism.
22. The chemical composition of muscle tissue, biological functions.
23. Varieties of muscle tissue (striated, cardiac, smooth), compositional features. Muscle proteins.
24. Sarcoplasmic and myofibrillar proteins. The structure of myosin filaments. The structure of actin filaments.
25. The chemical composition of blood plasma, biological functions. Enzymes in blood plasma. Blood plasma proteins.
26. Non-protein nitrogenous substances of the blood. Azotemia.
27. Diagnostic value of determination of biochemical parameters of blood.
28. The transport role of blood in the transfer of oxygen and carbon dioxide, as well as its buffering properties. Features of erythrocyte metabolism.
29. The process of hemostasis, coagulation factors.
30. External and internal mechanisms of blood coagulation. fibrinolysis process.
31. Anticoagulant blood system.
32. Chemical composition, structure and biological functions of the liver.
33. The biological role of the liver in metabolism. Neutralizing function of the liver. Biochemical methods for diagnosing liver dysfunction.

34. General characteristics of chromoproteins.
35. Stages of hemoglobin synthesis. Violations of the synthesis of hemoglobin.
36. Porfiry.
37. The breakdown of hemoglobin, the formation of pigments in bile, urine and feces.
38. Diagnostic value of determination of bilirubin and other bile pigments in blood and urine.
39. The structure of antibodies. Importance of the immune system.
40. T-receptors and proteins of the main complex. Acquired immunodeficiency syndrome (AIDS).
41. Autoimmune diseases.
42. Oncogenesis.
43. Organic and inorganic composition of bone tissue and tooth tissue.
44. Processes of mineralization and demineralization of bone tissue and tooth tissue.
45. Factors affecting the metabolism of bone tissue and tooth tissue.
46. Regulation of the metabolism of bone tissue and tooth tissue.