BIOLOGICAL CHEMISTRY. THE BANK OF TESTS FOR KROK 1. FOR FOREIGN CITIZENS TRAINING DEPARTMENT STUDENTS DENTISTRY SPECIALTY.

Module 3

IV. Metabolism of carbohydrates.

1. Digestion and absorbtion of carbohydrates.

1. A newborn child had dyspepsia phenomena (diarrhea, vomiting) detected after feeding with milk. After additional feeding with glucose the morbid symptoms disappeared. The insufficient activity of what enzyme that takes part in the carbohydrates breakdown causes the indicated disorders?

A. Saccharase.
B. Amylase.
C. Lactase.
D. Isomaltase.
E. Maltase.

2. A newborn develops dyspepsia after the milk feeding. When the milk is substituted by the glucose solution the dyspepsia symptoms disappear. The newborn has the subnormal activity of the following enzyme:

A. Amylase
B. Maltase
C. Invertase
D. Isomaltase
E. Lactase

3. A 30-year-old woman was diagnosed with insufficiency of exocrinous function of pancreas. Hydrolisis of what nutrients will be disturbed?

A. Proteins
B. Fats, carbohydrates
C Proteins, carbohydrates
D. Proteins, fats
E. Proteins, fats, carbohydrates.

2. Anaerobic glycolysis. Aerobic oxidation of carbohydrates. Gluconeogenesis. Pentose phosphate pathway.

1. How many molecules of ATP can be synthesized in case of the complete oxidation of acetyl-CoA in the tricarboxylic acid cycle?

A. 1.
B. 12.
C. 5.
D. 5
E. 8.

2. During starvation muscle proteins break up into free amino acids. These compounds will be the most probably involved into the following process:

A. Glycogenolysis
B. Synthesis of higher fatty acids
C. Gluconeogenesis in muscles
D. Decarboxylation
E. Gluconeogenesis in liver

3. A patient ill with neurodermatitis has been taking prednisolone for a long time. Examination revealed high rate of sugar in his blood. This complication is caused by the drug influence upon the following link of carbohydrate metabolism:

A. Activation of insulin decomposition
B. Intensification of glucose absorption in the bowels
C. Glycogenogenesis activation
D. Gluconeogenesis activation
E. Inhibition of glycogen synthesis.

4. Untrained people often have muscle pain after sprints as a result of lactate accumulation. This might be caused by intensification of the following biochemical process:

A. Lipogenesis
B. Glycogenesis
C. Pentose phosphate pathway
D. Glycolysis
E. Gluconeogenesis.

5. A patient has an increased pyruvate concentration in blood, most of it is excreted with the urine. What kind of avitaminosis has this patient?

A. B_6
B. B_3
C. E
D. B_2
E. B_1

6. After taking sulfonamides and aspirin by a 38-year-old patient, hemolysis of erhytrocytes caused by the insufficiency of glucose-6-phosphate dehydrogenase developed. The disturbance of what coenzyme formation does this pathology result from?

A. Ubiquinone

B. $FADH_2$
C. Pyridoxal phosphate
D. $FMNH_2$
E. $NADPH_2$.

7. The intake of aspirin by a 3-year-old child with a fever caused marked erythrocytes hemolysis. The inherited deficiency of what enzyme could be the cause of the hemolytic anemia development?
A. Glycerophosphate dehydrogenase.
B. Glucose-6-phosphatase.
C. Glycogen phosphorylase.
D. Glucose-6-phosphate dehydrogenase.
E. y-Glutaminyl transferase.

8. Some hours after an intensive physical training a sportsman showed activated gluconeogenesis. Which of the following is the basic substrate of gluconeogenesis?
A. Serine.
B. Aspartate.
C. Glutamate.
D. α-Ketoglutarate.
E. Lactate.

9. The high speed sprint causes a feeling of pain in skeletal muscles of untrained people that occurs due to lactate accumulation. The activation of what biochemical process is it resulting from?
A. Gluconeogenesis.
B. Glycolysis.
C. Pentose phosphate pathway.
D. Lipogenesis.
E. Glycogenesis.

10. A worker of a chemical plant was brought to a hospital with signs of poisoning. In the woman's hair a high level of arsenate that blocks the lipoic acid was revealed. The disorder of what biochemical process is the most probable cause of poisoning?
A. Oxidative decarboxylation of pyruvate.
B. Microsomal oxidation.
C. Reduction of methemoglobin.
D. Reduction of organic oxides.
E. Rendering superoxide radicals harmless.

11. Protein avidin, a minor constituent of uncooked eggs, is a powerful specific inhibitor of biotin enzymes. Which of the below listed metabolic transformations would be blocked in case of the avidin addition to the cells homogenate?
A. Glucose —> ribose 5-phosphate.
B. Glucose —> pyruvate.
C. Oxaloacetate —> glucose.
D. Oxaloacetate —> pyruvate.
E. Pyruvate —> oxaloacetate.

12. What biochemical process is stimulated in the liver and kidneys of a patient exhausted by starvation?
A. Synthesis of bilirubin.
B. Synthesis of urea.
C. Gluconeogenesis.
D. Formation of hippuric acid.
E. Synthesis of uric acid.

13. Erythrocytes require energy of ATP for their vital functions. What process provides these cells with the necessary amount of ATP?
A. Anaerobic glycolysis.
B. Aerobic oxidation of glucose.
C. Pentose phosphate pathway.
D. β-Oxidation of fatty acids.
E. Citric acid cycle.

14. Anaerobic oxidation of glucose to lactate is regulated by appropriate enzymes. What enzyme is the main regulator of this process?
A. Lactate dehydrogenase.
B. Glucose-6-phosphate isomerase.
C. Aldolase.
D. Enolase.
E. Phosphofructokinase.

15. Biosynthesis of the purine ring occurs owing to ribose-5-phosphate by gradual joining of nitrogen and carbon atoms inside the heterocycle structure and closing of the rings. The metabolic source of ribose-5-phosphate is:
A. Pentose phosphate pathway.
B. Glycolysis.
C. Glycogenesis.
D. Gluconeogenesis.
E. Glycogenosis.

16. Because of prolonged starvation, the tissue carbohydrate stores are quickly exhausted and hypoglycemia ensues in a human body. Which of the following metabolic pathways can restore the level of glucose in blood?
A. Aerobic glycolysis.
B. Anaerobic glycolysis.
C. Gluconeogenesis.
D. Glycogenolysis.
E. Pentose phosphate pathway.

17. Krebs cycle plays an essential role in the realization of gluconeogenic effect of certain amino acids. It is caused by the obligatory transformation of their anazotic carbon skeletons into:
A. Malate.

B. Oxaloacetate.
C. Succinate.
D. Fumarate.
E. Citrate.

18. Some students developed myodynia after continuous physical activity during physical education. The reason for such condition was accumulation of lactic acid in the skeletal muscles. It was generated in the students' bodies after activation of the following process:
A. Gluconeogenesis
B. Glycolysis
C. Glycogenesis
D. Pentose-phosphate cycle
E. Lipolysis

19. When blood circulation in the damaged tissue is restored, then lactate accumulation comes to a stop and glucose consumption axelerates. These metabolic changes are caused by activation of the following process:
A. Gluconeogenesis
B. Aerobic glycolysis
C. Glycogen biosynthesis
D. Lipolysis
E. Anaerobic glycolysis

20. Myocyte cytoplasm contains a big number of dissolved metabolites of glucose oxidation. Name one of them that turns directly into a lactate:
A. Glucose 6-phosphate
B. Oxaloacetate
C. Pyruvate
D. Fructose 6-phosphate
E. Glycerophosphate

21. A 3 year old child with fever was given aspirin. It resulted in intensified erythrocyte haemolysis. Hemolytic anemia might have been caused by congenital insufficiency of the following enzyme:
A. Glucose 6-phosphate dehydrogenase
B. Glucose 6-phosphatase
C. Glycogen phosphorylase
D. Glycerol phosphate dehydrogenase
E. γ-glutamiltransferase

22. A 45 y.o. woman suffers from Cushing's syndrome - steroid diabetes. Biochemical examination revealed: hyperglycemia, hypochloremia. Which of the under-mentioned processes is the first to be activated?
A. Gluconeogenesis
B. Glycogenolysis
C. Glucose reabsorption
D. Glucose transport to the cell
E. Glycolysis

23. To what total ATP quantity is the full glucose oxidation and its linking with phosphorylation equivalent?
A. 38
B. 8
C. 12
D. 52
E. 58

24. Decreased ratio of adenylic nucleotides ATP/ADP results in intensified glycolysis in parodentium tissues under hypoxia conditions. What reaction is activated in this case?
A. Phosphofructokinase
B. Aldolase
C. Triosophosphate isomerase
D. Enolase
E. Lactate dehydrogenase

25. To what total ATP quantity is the full glucose oxidation and its linking with phosphorylation equivalent?
A. 38
B. 8
C. 12
D. 52
E. 58

26. Decreased ratio of adenylic nucleotides ATP/ADP results in intensified glycolysis in parodentium tissues under hypoxia conditions. What reaction is activated in this case?
A. Phosphofructokinase
B. Aldolase
C. Triosophosphate isomerase
D. Enolase
E. Lactate dehydrogenase

27. A non trained man has usually muscular hypoxy after a sprint. What metabolite accumulates in the muscles as a result of it?
A. Lactate
B. Ketone bodies
C. Glucose 6-phosphate
D. Oxaloacetate
E. -

28. Chronic overdosage of glucocorticoids leads to the development of hyperglycemia. What process of carbohydrate metabolism is responsible for this effect?
A. Gluconeogenesis
B. Glycogenolysis
C. Aerobic glycolisis
D. Pentose-phosphate cycle
E. Glycogenesis

29. A 38 year old patient takes aspirin and sulfanilamides. After their intake intensified erythrocyte haemolysis is observed which is caused by deficiency of glucose 6-phosphate dehydrogenase. This pathology is caused by failure of the following coenzyme:

A. NADP-H
B. FAD-H_2
C. Pyridoxal phosphate
D. FMN-H_2
E. Ubiquinone

30. During starvation normal rate of glucose is maintained by means of gluconeogenesis activation. What substance can be used as a substrate for this process?

A. Alanine
B. Ammonia
C. Adenine
D. Urea
E. Guanine

31. Clinical examination enabled to make a provisional diagnosis: stomach cancer. Gastric juice contained lactic acid. What type of glucose catabolism turns up in the cancerous cells?

A. Anaerobic glycolysis
B. Pentose-phosphate cycle
C. Gluconeogenesis
D. Aerobic glycolysis
E. Glucose-alanine cycle

3. Glycogen metabolism.

1. Post-translational covalent modification is an important factor in the regulation of the enzymes' activity. Choose the mechanism of regulation of glycogen phosphorylase and glycogen synthetase activities from the following:

A. ADP-ribosylation.
B. Methylation.
C. Adenylation.
D. Restricted proteolysis.
E. Phosphorylation-dephosphorylation.

2. A 34-year-old patient's resistance to heavy physical load is reduced while the skeletal muscles glycogen level is increased. By decreasing of the activity of what enzyme can this phenomenon be explained?

A. Phosphofructokinase.
B. Glucose-6-phosphate dehydrogenase.
C. Glycogen phosphorylase.
D. Glycogen synthetase.
E. Glucose-6-phosphatase.

3. A child with point mutation has the absence of glucose 6-phosphatase in body tissues, hypoglycemia and hepatomegaly detected. Define the type of pathology which these symptoms are characteristic of.

A. Girke's disease.
B. Measles.
C. Addison's disease.
D. Parkinson's disease.
E. McArdle's disease.

4. Under Girke's glycogenosis the conversion of glucosc-6-phosphate into glucose is disturbed, which results in excessive glycogen accumulation in liver and kidneys. The deficiency of what enzyme is the cause of the disease?

A. Glycogen phosphorylase.
B. Glycogen synthase.
C. Glucose-6-phosphatase.
D. Hexokinase.
E. Aldolase.

5. A child is sluggish and inert. His liver is enlarged. The liver biopsy showed the excess of glycogen. The concentration of glucose in blood plasma is below the normal range. What is the cause of the glucose level decrease in blood?

A. High activity of glycogen phosphorylase in the liver.
B. Reduced (or absent) activity of hexokinase.
C. High activity of glycogen synthase.
D. Reduced (or absent) activity of glucose-6-phosphatase.
E. Deficiency of the gene, which is responsible for the synthesis of glucose-1-phosphate uridine transferase.

6. Girke's disease is an inherited pathology due to which the superfluous accumulation of glycogen occurs in liver and kidneys. The deficiency of which enzyme is the cause of this disease?

A. Glycogen phosphorylase.
B. Glucose-6-phosphatase.
C. Phosphorylase kinase.
D. Phosphoglucomutase.
E. Glucokinase.

7. Skeletal muscle pain during physical work is a characteristic sign of glycogenosis. The inherited deficiency of what enzyme does this pathology result from?

A. Glycogen phosphorylase.
B. Glucose-6-phosphatase.
C. Glycogen synthetase.
D. Amylo-1,6-glicosidase.
E. Lysosomal glycosidase.

8. Characteristic sign of glycogenosis is muscle pain during physical work. Blood examination reveals usually hypoglycemia. This pathology is caused by congenital deficiency of the following enzyme:

A. Glycogen phosphorylase
B. Lysosomal glycosidase
C. Gamma amylase
D. Glucose 6-phosphate dehydrogenase
E. Alpha amylase.

9. A patient with chronic hypoglycemia had adrenaline introduction. After introduction blood test hasn't changed essentially. Doctor assumed liver pathology. What liver function may have been changed?

A. Function of glycogen depositing
B. Function of cholesterin production
C. Ketogenic function
D. Glycolytic function
E. Excretory function

10. Medical ambulance delivered a 2 year old girl to the children's department. Objectively: the child is inert, apathetic. Liver is enlarged, study of biopsy material revealed glycogen excess. Blood glucose rate is below normal. The most probable cause of hypoglycemia is:

A. Low activity of glycogen phosphorylase
B. High activity of glucokinase
C. Low activity of glucose 6-phosphatase
D. Low activity of glucose 1-phosphate uridine transferase
E. Low activity of glycogen synthase

4. Regulation and pathologies of carbohydrate metabolism.

1. A child has Essential fructosuria. Total concentration of sugar in blood is higher then norm but glucose level is not considerably changed. Deficiencies of what enzyme cause this condition?

A. Galactose-1-phosphate uridyltransferase
B. Hexokinase
C. Amylo-l,6-glucosidase
D. Phosphoglucomutase
E. Fructokinase.

2. A 1-year-old boy has severe hypoglycemia, vomiting, hepatic failure and jaundice. Biochemical investigation shows decreased activity of fructose 1-phosphate aldolase (Aldolase B). What disease do these symptoms testify to?

A. Diabetes mellitus
B. Galactosemia
C. Lactose intolerance
D. Essential fructosuria
E. Hereditary fructose intolerance.

3. On the empty stomach in the patients blood glucose level was 5,65 mmol/L, in an hour after usage of sugar it was 8,55 mmol/L, in a 2 hours - 4,95 mmol/L. Such indicators are typical for:

A. Healthy person
B. Patient with hidden diabetes mellitus
C. Patient with insulin-dependent diabetes mellitus
D. Patient with non-insulin dependent diabetes mellitus
E. Patient with tireotoxicosis

4. A child has galactosemia. Concentration of glucose in blood has not considerably changed. Deficiency of what enzyme caused this illness?

A. Galactose-1-phosphate uridyltransferase
B. Hexokinase
C. Amylo-l,6-glucosidase
D. Phosphoglucomutase
E. Galactokinase

5. A 46-year-old woman complains of dryness in the oral cavity, thirst, frequent urination, general weakness. Biochemical research of the patient's blood showed hyperglycemia and hyperketonemia. Sugar and ketone bodies are revealed in the urine. Diffuse changes in myocardium are marked on the electrocardiogram. Make an assumptive diagnosis of the illness.

A. Diabetes mellitus.
B. Alimentary hyperglycemia.
C. Acute pancreatitis.
D. Diabetes insipidus.
E. Ischemic cardiomyopathy.

6. The concentration of glucose in the blood plasma of a healthy man varies within the following limits:

A. 2.0-4.0 mM/1.
B. 3.3-5.5 mM/1.
C. 10.0-25.0 mM/1.
D. 6.0-9.5 mM/1.
E. 1.0-2.0 mM/1.

7. A man who fainted while training at the final stage of the marathon distance was brought to a hospital in the comatose state. Define the type of coma that was diagnosed.

A. Hypoglycemic.
B. Hyperglycemic.
C. Acidotic.

D. Hypothyroidal.
E. Hepatic.

8. A 2-year-old boy has the increase of liver and spleen sizes detected and eye cataract present. The total sugar level in blood is increased, but glucose tolerance is within the normal range. The inherited disturbance of the metabolism of what substance is the cause of the indicated state?

A. Glucose.
B. Fructose.
C. Galactose.
D. Maltose.
E. Sucrose.

9. A 57-year-old patient, suffering from insulin dependent diabetes mellitus, showed the development of ketoacidosis. The biochemical mechanism of the development of this pathology is decreasing of acetyl-CoA utilization due to the deficiency of:

A. 2-Oxoglutarate.
B. Oxaloacetate.
C. Glutamate.
D. Aspartate.
E. Succinate.

10. Due to the lack of thiamine (vitamin B_1) vitamin deficiency a disease called "beri-beri" develops and carbohydrate metabolism becomes disturbed. What metabolite accumulates in blood under beri-beri?

A. Lactate.
B. Pyruvate.
C. Succinate.
D. Citrate.
E. Malate.

11. A cataract and fatty degeneration of the liver develop in the conditions of high galactose and low glucose level in blood. What disease do these symptoms testify to?

A. Diabetes mellitus.
B. Galactosemia.
C. Lactosemia.
D. Steroid diabetes.
E. Fructosemia.

12. Appearance of sugar and ketone bodies is revealed in the patient's urine. Blood glucose concentration is 12.0 mM/1. What is a presumptive diagnosis of the patient?

A. Atherosclerosis.
B. Diabetes mellitus.
C. Toxic hepatitis.
D. Pancreatitis.
E. Myocardial infarction.

13. A woman in the unconscious state was brought to an emergency clinic. Laboratory research revealed that the blood glucose level makes 1.98 mM/1, the level of hemoglobin is 82 g/1, the amount of erythrocytes is $2.1 \cdot 10^{12}$/l, SSE (speed of erythrocytes settling) is 18 mm/hour and the amount of leucocytes is $4.3\text{-}10^9$/l. Make a possible diagnosis.

A. Hypoglycemia.
B. Diabetes mellitus.
C. Galactosemia.
D. Somatotropin deficiency.
E. Diabetes insipidus.

14. Under diabetes mellitus, the level of ketone bodies in blood dramatically rises, which results in the development of metabolic acidosis. What substance is the precursor of the ketone bodies synthesis?

A. Methylmalonyl-CoA.
B. Succinyl-CoA.
C. Propionyl-CoA.
D. Malonyl-CoA.
E. Acetyl-CoA.

15. A patient manifests ketonuria. What disease is recognized by the augmented concentration of ketone bodies in the urine?

A. Tuberculosis of the kidney.
B. Acute glomerular inflammation.
C. Urolithiasis.
D. Diabetes mellitus.
E. Myocardial infarction.

16. A patient suffering from diabetes mellitus fainted after the introduction of insulin, then cramps appeared. What level of sugar was determined in the patient's blood by means of biochemical analysis?

A. 10.0 mM/1.
B. 3.3 mM/1.
C. 8.0 mM/1.
D. 1.5 mM/1.
E. 5.5 mM/1.

17. A 40-year-old woman diagnosed with diabetes mellitus is admitted to a department of endocrinology. The patient complains of thirst and increased hunger. What pathological components are exposed at laboratory research of the patient's urine?

A. Glucose, ketone bodies.
B. Proteins, amino acids.
C. Proteins, creatine.
D. Bilirubin, urobilin.
E. Blood.

18. Patients who suffer from severe diabetes and don't receive insulin have metabolic acidosis. This is caused by increased concentration of the following metabolites:

A. Ketone bodies
B. Fatty acids
C. Unsaturated fatty acids
D. Triacylglycerols
E. Cholesterol

V. Metabolism of lipids.

1. Lipid structure, function, digestion and absorption.

1. A patient complains of frequent diarrheas, especially after consumption of rich food, weight loss. Laboratory examination revealed steatorrhea, his feces were hypocholic. What might have caused such condition?

A. Unbalanced diet
B. Obturation of biliary tracts
C. Lack of pancreatic lipase
D. Lack of pancreatic phospholipase
E. Inflammation of mucous membrane of small intestine

2. The treatment of a child, who suffers from rachitis, with vitamin D_3 proved to be unsuccessful. Which is the most likely cause of treatment inefficiency?

A. Insufficiency of lipids in food.
B. Disturbance of hydroxylation of vitamin D.
C. Disturbance of insertion of vitamin D_3 into the molecule of enzyme.
D. Increased consumption of vitamin D by microorganisms of intestines.
E. Disturbance of vitamin D transport by the proteins of blood.

3. After the consumption of animal food rich in fats, a patient feels discomfort, and droplets of fats are found during laboratory investigation of his feces. Bile acids are revealed in the urine. The cause of such state is the deficiency of ... in the digestive tract.

A. Phospholipids.
B. Fatty acids.
C. Chylomicrons.
D. Triacylglycerols.
E. Bile acids.

4. After the consumption of a diet rich in fats, a patient complains of languor and nausea. Later signs of steatorrea appear. The level of blood cholesterol makes 9.2 mM/1. The shortage of what substances causes this state of a patient?

A. Fatty acids.
B. Triacylglycerols.
C. Bile acids.
D. Phospholipids.
E. Chylomicrons.

5. Arachidonic acid, an essential component of a human diet, acts as a precursor of the vitally important physiologically active biomolecules. Which substances are synthesized from arachidonic acid?

A. Ethanolamine.
B. Choline.
C. Noradrenaline.
D. Prostaglandin E_1
E. Triiodothyronine.

6. Laboratory investigation of the patient's blood plasma, which was performed 4 hours after a consumption of a fat diet, displayed a marked increase of plasma turbidity. The most credible cause of this phenomenon is the increase of ... in the plasma.

A. HDL.
B. Chylomicrons.
C. LDL.
D. Cholesterol.
E. Phospholipids.

7. The insufficient secretion of what enzyme is the cause of incomplete fats degradation in the digestive tract and appearance of great quantity of neutral fats in feces?

A. Pepsin.
B. Phospholipase.
C. Enterokinase.
D. Amylase.
E. Pancreatic lipase.

8. A coprological survey revealed light-colored feces containing drops of neutral fat. The most likely reason for this condition is the disorder of:

A. Bile inflow into the bowel
B. Pancreatic juice secretion
C. Intestinal juice secretion
D. Intestinal absorption
E. Gastric juice acidity

9. Examination of a patient suffering from chronic hepatitis revealed a significant decrease in the synthesis and secretion of bile acids. What process will be mainly disturbed in the patient’s bowels?

A. Glycerin absorption
B. Fat emulsification
C. Protein digestion
D. Carbohydrate digestion

E. Amino acid absorption

10. After consumption of rich food a patient has nausea and heartburn, steatorrhea. This condition might be caused by:

A. Disturbed phospholipase synthesis
B. Increased lipase secretion
C. Amylase deficiency
D. Bile acid deficiency
E. Disturbed tripsin synthesis

11. Examination of an ill child's blood revealed inherited hyperlipoproteinemia. Genetic defect of what enzyme synthesis causes this phenomenon?

A. Lipoprotein lipase
B. Glycosidase
C. Proteinase
D. Hemsynthetase
E. Phenylalanine hydroxylase

12. In patients with the biliary tract obstruction the blood coagulation is inhibited; the patients have frequent haemorrhages caused by the subnormal assimilation of the following vitamin:

A. A
B. K
C. E
D. D
E. C

2. Catabolism of triacylglycerols. Oxidation of fatty acids and glycerol. Biosynthesis of fatty acids and triacylglycerols.

1. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?

A. Diacylglycerol
B. Ions of Ca^{2+}
C. Cyclic guanosine monophosphate
D. Cyclic adenosine monophosphate
E. Adenosine monophosphate

2. A sportsman needs to improve his sporting results. He was recommended to take a preparation that contains carnitine. What process is activated the most by this compound?

A. Vitamin K transporting
B. Glucose transporting
C. Fatty acids transporting
D. Amino acids transporting
E. Calcium ions transporting

3. Under diabetes mellitus, the level of ketone bodies in blood dramatically rises, which results in the development of metabolic acidosis. What substance is the precursor of the ketone bodies synthesis?

A. Methylmalonyl-CoA.
B. Succinyl-CoA.
C. Propionyl-CoA.
D. Malonyl-CoA.
E. Acetyl-CoA.

4. The essence of lipolysis, that is the mobilization of fatty acids from neutral fats depots, is an enzymatic process of hydrolysis of triacylglycerols to fatty acids and glycerol. Fatty acids that released during this process enter blood circulation and are transported as the components with:

A. LDL.
B. Globulins.
C. HDL.
D. Serum albumins.
E. Chylomicrons.

5. A 35-year-old man with pheochromocytoma has high levels of epinephrine and norepinephrine registered in the blood. The concentration of free fatty acids is increased by a factor of eleven. Which of the following enzymes accelerates the lipolysis under the action of epinephrine?

A. Triacylglycerol lipase
B. Lypoprotein lipase
C. Phospholipase A_1
D. Phospholipase C
E. Cholesterol esterase.

6. Aerobic oxidation of substrates is typical for cardiac muscle. Which of the following is the major substrate for oxidation in a cardiac muscle?

A. Fatty acids.
B. Triacylglycerols.
C. Glycerol.
D. Glucose.
E. Amino acids.

7. In a human body the adipose tissue is the basic location of triacylglycerols (TAG) deposit. At the same time their synthesis takes place in hepatocytes. In the form of what molecular complexes TAG transported from the liver into the adipose tissue?

A. Chylomicrons.
B. VLDL.
C. LDL.
D. HDL.
E. Complexes with albumin.

8. Carnitine is recommended to a sportsman as a preparation that increases physical activity and improves achievements. What biochemical

process is mostly activated under the action of carnitine?

A. Transport of fatty acids into mitochondria.

B. Ketone bodies synthesis.

C. Lipids synthesis.

D. Tissue respiration.

E. Steroid hormones synthesis.

9. A 1-year-old baby has been hospitalised for body and limbs lesions. Examination revealed carnitine deficiency in the child's muscles. A biochemical reason for this pathology is the disorder of:

A. Substrate-linked phosphorylation

B. Transport of fatty acids to mitochondria

C. Utilization of lactic acid

D. Oxidative phosphorylation

E. Regulation of Ca^{2+} rate in mitochondria

10. A patient with high rate of obesity was advised to use carnitine as a food additive in order to enhance "fat burning". What is the role of carnitine in the process of fat oxidation?

A. FFA activation (free fatty acids)

B. Activation of intracellular lipolysis

C. Transport of FFA from cytosol to the mitochondria

D. Transport of FFA from fat depots to the tissues

E. It takes part in one of reactions of FFA beta-oxidation

11. An experimental animal has been given excessive amount of carbon-labeled glucose for a week. What compound can the label be found in?

A. Palmitic acid

B. Methionine

C. Vitamin A

D. Choline

E. Arachidonic acid

12. A patient with high obesity was recommended to take carnitine as a food additive for better fat burning. What function is fulfilled by carnitine in the process of fat oxidation?

A. Transport of fatty acids from the cytosol to the mitochondria

B. Transport of fatty acids from the fat depots to the tissues

C. Participation in one of the reactions of beta-oxidation of fatty acids

D. Fatty acid activation

E. Intracellular lipolysis activation

13. A sportsman was recommended to take a preparation with carnitine in order to improve his achievements. What process is activated by carnitine to the most extent?

A. Transporting of fatty acids to the mitochondrions

B. Synthesis of steroid hormones

C. Synthesis of ketone bodies

D. Lypide synthesis

E. Tissue respiration

14. A patient was diagnosed with seborrheic dermatitis associated with vitamin H (biotin) deficiency.The patient has disturbed activity of the following enzyme:

A. Acetyl-CoA-carboxylase

B. Pyruvate decarboxylase

C. Alcohol dehydrogenase

D. Amino transferase

E. Carbomoyl phosphate synthetase

3. Metabolism of phospholipids. Cholesterol metabolism.

1. Synthesis of phospholipids is disturbed as a result fatty infiltration of liver. Indicate which of the following substances can enhance the process of methylation during phospholipids synthesis?

A. Glycerin

B. Citrate

C. Ascorbic acid

D. Methionine

E. Glucose

2. Under fatty infiltration of the liver the synthesis of phospholipids is disturbed. Which substance from the listed below can stimulate processes of methylation in the synthesis of phospholipids?

A. Methionine.

B. Ascorbic acid.

C. Glucose.

D. Glycerol.

E. Citrate.

3. A diet enriched with lipotropic substances is recommended to a 65-year-old patient with signs of total obesity and fatty dystrophy of the liver. Which substances from the listed below are lipotropic?

A. Vitamin C.

B. Cholesterol.

C. Glucose.

D. Methionine.

E. Glycine.

4. In a human body the adipose tissue is the basic location of triacylglycerols (TAG) deposit. At the same time their synthesis takes place in hepatocytes. In the form of what molecular

complexes TAG transported from the liver into the adipose tissue?

A. Chylomicrons.
B. VLDL.
C. LDL.
D. HDL.
E. Complexes with albumin.

5. A 28 year old pregnant woman had the enzymes in the cells of amniotic fluid analyzed. The analysis revealed insufficient activity of beta-glucuronidase. What pathological process is it?

A. Mucopolysaccharidosis
B. Glycogenosis
C. Aglycogenosis
D. Collagenosis
E. Lipidosis

4. Regulation and pathologies of lipid metabolism.

1. The living organisms that did not develop the system of defence against the unfavorable action of H_2O_2 during the evolution can exist only in anaerobic conditions. Which of the enzymes can destroy hydrogen peroxide?

A. Oxygenases and hydroxylases.
B. Peroxidase and catalase.
C. Cytochrome oxidase, cytochrome b.
D. Oxygenase and catalase.
E. Flavin-linked oxidases.

2. A 6 year old child was delivered to a hospital. Examination revealed that the child couldn't fix his eyes, didn't keep his eyes on toys, eye ground had the cherry-red spot sign. Laboratory analyses showed that brain, liver and spleen had high rate of ganglioside glycometide. What congenital disease is the child ill with?

A. Tay-Sachs disease
B. Turner's syndrome
C. Wilson's syndrome
D. Niemann-Pick disease
E. MacArdle disease

3. Which of the listed hormones reduces the rate of lipolylis in fatty tissue?

A. Adrenaline.
B. Insulin.
C. Hydrocortisone.
D. Somatotropin.
E. Noradrenaline.

4. Activation of membrane lipids peroxidation is one of the basic mechanisms of membrane structure and functions damage as well as the death of a cell. The cause of this pathology is:

A. B_{12}-hypervitaminosis.
B. B_1 -deficiency.
C. B_3-hypervitaminosis.
D. B_{12}-deficiency.
E. Vitamin E deficiency.

5. A patient suffers from arterial hypertension due to atherosclerotic injury of blood vessels. The consumption of what dietary lipid needs to be limited?

A. Lecithine.
B. Oleic acid.
C. Cholesterol.
D. Monooleateglycerol.
E. Phosphatidylserine.

6. Laboratory investigation of a patient revealed a high level of plasma LDL. What disease can be diagnosed?

A. Gastritis.
B. Nephropathy.
C. Acute pancreatitis.
D. Atherosclerosis.
E. Pneumonia.

7. Clinical signs and laboratory testing of a patient allow to make the assumption of gall-bladder inflammation, colloid properties of bile disorder, the occurrence of gall-stones. Which substances can underlie the formation of gall-stones?

A. Oxalates.
B. Urates.
C. Cholesterol.
D. Chlorides.
E. Phosphates.

8. A 1-year-old child was brought to a clinic with signs of muscle weakness. Through the inspection, the deficiency of carnitine in the muscles was determined. The biochemical mechanism of the development of this pathology consists in the disorder of the process of:

A. Transport of fatty acids into mitochondria.
B. Regulation of the level of Ca^{2+} in mitochondria.
C. Substrate level of phosphorylation.
D. Utilization of lactate.
E. Synthesis of actin and myosin.

9. An experimantal animal that was kept on protein-free diet developed fatty liver infiltration, in particular as a result of deficiency of methylating agents. This is caused by disturbed generation of the following metabolite:

A. Acetoacetate
B. Cholesterol

C. DOPA
D. Choline
E. Linoleic acid

10. A 58-year-old patient suffers from the cerebral atherosclerosis. Examination revealed hyperlipoidemia. What class of lipoproteins will most probably show increase in concentration in this patient's blood serum?
A. Fatty acid complexes with albumins
B. Cholesterol
C. Chylomicrons
D. Low-density lipoproteins
E. High-density lipoproteins

11. In course of metabolic process active forms of oxygen including superoxide anion radical are formed in the human body. By means of what enzyme is this anion inactivated?
A. Super oxide dismutase
B. Glutathionereductase
C. Peroxidase
D. Catalase
E. Glutathioneperoxidase

12. Patient with abscess of the cut wound applied to the traumatological department. Doctor for the cleaning of the wound from the pus washed it with 3% hydrogen peroxide. Foam was absence. What caused the absents on the drug activity?
A. Inherited insufficiency of catalase
B. Low concentration of H_2O_2
C. Inherited insufficiency phosphatedehydrogenase of erythrocytes
D. Shallow wound
E. Pus in the wound.

13. A 57 year old patient with diabetes mellitus was developed ketoacedosis. Biochemical base of this condition is smaller extent of acetyl-CoA utilization. What cell compound deficit causes this effect?
A. Oxaloacetate
B. 2-oxoglutarate
C. Glutamate
D. Aspartate
E. Succinate

14. Examination of an ill child's blood revealed inherited hyperlipoproteinemia. Genetic defect of what enzyme synthesis causes this phenomenon?
A. Lipoprotein lipase
B. Glycosidase
C. Proteinase
D. Hemsynthetase
E. Phenylalanine hydroxylase

VI. Metabolism of proteins and amino acids.

1. Digestion of proteins in the gastrointestinal tract.

1. In a newborn's stomach the conversion of soluble milk proteins, so-called caseins, into the insoluble derivatives occurs in the presence of calcium ions and a certain enzyme. Name this enzyme.
A. Trypsin.
B. Pepsin.
C. Gastrin.
D. Rennin.
E. Lipase.

2. A 30-year-old male patient with acute pancreatitis has been found to have a disorder of cavitary protein digestion. The reason for such condition can be the hyposynthesis and hyposecretion of the following enzyme:
A. Pepsin
B. Dipeptidase
C. Amylase
D. Lipase
E. Tripsin

3. A patient with encephalopathy was admitted to the neurological department. There was revealed a correlation between increasing of encephalopathy and substances absorbed by the bloodstream from the intestines. What substances that are formed in the intestines can cause endotoxemia?
A. Ornithine
B. Biotin
C. Butyrate
D. Acetacetate
E. Indole

4. A newborn child suffers from milk curdling in stomach, this means that soluble milk proteins (caseins) transform to insoluble proteins (paracaseins) by means of calcium ions and a certain enzyme. What enzyme takes part in this process?
A. Pepsin
B. Renin
C. Lipase
D. Secretin
E. Gastrin

5. The formation and secretion of trypsin is disturbed in case of pancreas diseases. The hydrolysis of which of the following substances is impaired in this case?
A. Proteins.
B. Lipids.

C. Carbohydrates.
D. Nucleic acids.
E. Phospholipids.

6. Proteins digestion in the stomach constitutes the initial stage of protein destruction in a human digestive tract. Name the enzymes, which take part in the protein digestion in the stomach.
A. Chymotrypsin and lysozyme.
B. Trypsin.
C. Pepsin and gastrixin.
D. Enteropeptidase and elastase.
E. Carboxypeptidase and aminopeptidase.

7. In a human body chymotrypsin is produced by the pancreas as the inactive precursor called chymotrypsinogen. What intestinal lumen enzyme leads to the transforming of chymotrypsinogen into the catalytically active enzyme molecule?
A. Aminopeptidase.
B. Enterokinase.
C. Pepsin.
D. Trypsin.
E. Carboxypeptidase.

8. A patient complains of bad appetite and belching. General acidity of gastric juice makes 10 units. Such symptoms develop under:
A. Gastritis with anacidity.
B. Gastritis with hyperacidity.
C. Acute pancreatitis.
D. Hypoacidic gastritis.
E. Ulcerous illness of stomach.

9. Fats, proteins, carbohydrates, vitamins, mineral salts, and water constitute the daily diet of a healthy adult. Name the amount of proteins, which provides normal vital functions of the organism:
A. 100-120 g daily
B. 50-60 g daily
C. 10-20 g daily
D. 70-80 g daily
E. 40-50 g daily

10. A 2-year-old boy has been admitted to a hospital because of recurrent vomiting, especially after meals. The child does not gain weight, his physical development is retarded. His hair is dark with grey locks here and there. Prescribe proper treatment to him.
A. Introduction of specific amino acid mixtures.
B. Enzymatic therapy.
C. A diet with the lowered content of phenylalanine.
D. A diet with the increased content of carbohydrates (or fats) and the lowered content of proteins.
E. A protein-free diet.

11. A patient consumed a lot of reach in proteins food that caused increase of rate of proteolytic enzymes of pancreatic juice. It is also accompanied by increase of rate of the following enzyme:
A. Pepsin
B. Gastricsin
C. Renin
D. Tripsin
E. Enterokinase

12. A hospital admitted a patient with complaints about abdominal swelling, diarrhea, meteorism after consumption of food rich in proteins. It is indicative of disturbed protein digestion and their intensified decaying. What substance is the product of this process in the bowels?
A. Indole
B. Bilirubin
C. Cadaverine
D. Agmatine
E. Putrescine

13. A 60-year-old man with a history of chronic intestinal obstruction has excessive protein putrefaction in the colon. What is the indicator of this process?
A. Indicanuria
B. Bilirubinuria
C. Hyperuricuria
D. Creatinuria
E. Glycosuria

14. Clinical examination enabled to make a provisional diagnosis: stomach cancer. Gastric juice contained lactic acid. What type of glucose catabolism turns up in the cancerous cells?
A. Anaerobic glycolysis
B. Pentose-phosphate cycle
C. Gluconeogenesis
D. Aerobic glycolysis
E. Glucose-alanine cycle

2. Deamination, transamination and decarboxylation of amino acids.

1. During hypersensitivity test a patient got subcutaneous injection of an antigen which caused reddening of skin, edema, pain as a result of histamine action. This biogenic amine is generated as a result of the following transformation of histidine:
A. Phosphorylation
B. Decarboxylation

C. Deamination
D. Isomerization
E. Methylation

2. A patient with a cranial trauma manifests repeated epileptoid seizures. The biosynthesis of what biogenic amine is disturbed in this clinical situation?

A. Histamine.
B. GABA.
C. Adrenaline.
C. Serotonin.
E. Dopamine.

3. In psychiatric practice, biogenic amines and their derivatives are used for the treatment of certain diseases of the central nervous system. Name the substance of the mentioned below biochemical class which acts as an inhibitory mediator.

A. Dopamine.
B. Histamine.
C. Serotonin.
D. GABA.
E. Taurine.

4. Biogenic amines, namely histamine, serotonin, dopamine etc., are very active substances that affect markedly various physiological functions of the organism. What biochemical process is the principal pathway for biogenic amines production in body tissues?

A. Decarboxylation of amino acids.
B. Deamination of amino acids.
C. Transamination of amino acids.
D. Oxidation of amino acids.
E. Reductive amination.

5. Which of the substances listed below is an acceptor of NH_2;-groups in the reactions of amino acids transamination?

A. Argininosuccinate.
B. a-Ketoglutarate.
C. Lactate.
D. Citrulline.
E. Ornithine.

6. Krebs cycle plays an essential role in the realization of gluconeogenic effect of certain amino acids. It is caused by the obligatory transformation of their anazotic carbon skeletons into:

A. Malate.
B. Oxaloacetate.
C. Succinate.
D. Fumarate.
E. Citrate.

7. A 7-year-old child was admitted to an emergency clinic in the state of allergic shock provoked by a wasp sting. High concentration of histamine was determined in the patient's blood. Which biochemical reaction leads to the production of this amine?

A. Reduction.
B. Hydroxylation.
C. Dehydration.
D. Deamination.
E. Decarboxylation.

8. An unusually active amine, a mediator of inflammation and allergy, appears via decarboxylation of histidine. Which of the following is it?

A. Serotonin.
B. Histamine.
C. Dopamine.
D. y-Aminobutyrate.
E. Tryptamine.

9. A patient complained about dizziness, memory impairment, periodical convulsions. It was revealed that these changes were caused by a product of decarboxylation of glutamic acid. Name this product:

A. ATP
B. GABA
C. TDP
D. THFA
E. Pyridoxal phosphate

10. During hypersensitivity test a patient got subcutaneous injection of an antigen which caused reddening of skin, edema, pain as a result of histamine action. This biogenic amine is generated as a result of the following histidine transformation:

A. Isomerization
B. Decarboxylation
C. Methylation
D. Deaminization
E. Phosphorylation

11. Depressions and emotional insanities result from the deficit of noradrenalin, serotonin and other biogenic amines in the brain. Their concentration in the synapses can be increased by means of the antidepressants that inhibit the following enzyme:

A. Diamine oxidase
B. L-amino-acid oxidase
C. Phenylalanine-4-monooxygenase
D. Monoamine oxidase
E. D-amino-acid oxidase

12. Pharmacological effects of antidepressants are based upon blocking (inhibiting) the enzyme that acts as a catalyst for the breakdown of biogenic amines noradrenalin and serotonin in the mitochondria of cephalic neurons. What enzyme takes part in this process?

A. Lyase
B. Transaminase
C. Peptidase
D. Decarboxylase
E. Monoamine oxidase

13. Glutamate decarboxylation results in formation of inhibitory transmitter in CNS. Name it:

A. GABA
B. Glutathione
C. Histamine
D. Serotonin
E. Asparagine

14. A patient diagnosed with carcinoid of bowels was admitted to the hospital. Analysis revealed high production of serotonin. It is known that this substance is formed from tryptophane aminooacid. What biochemical mechanism underlies this process?

A. Decarboxylation
B. Desamination
C. Microsomal oxydation
D. Transamination
E. Formation of paired compounds

3. The final products of amino acids catabolism. Biosynthesis of urea.

1. After a serious viral infection a 3-year-old child has repeated vomiting, loss of consciousness, convulsions. Examination revealed hyperammoniemia. What may have caused changes of biochemical blood indixes of this child?

A. Activated processes of aminoacids decarboxylation
B. Inhibited activity of transamination enzymes
C. Disorder of biogenic amines neutralization
D. Disorder of ammonia neutralization in ornithinic cycle
E. Increased purlefaction of proteins in intestines

2 A cerebral trauma caused increased ammonia generation. What amino acid participates in the excretion of ammonia from the cerebral tissue?

A. Lysine
B. Tryptophan
C. Valine
D. Tyrosine
E. Glutamate

3. Ammonia is a very poisonous chemical, especially for the nervous system. What substance takes a particularly active part in the detoxication of ammonia in the brain tissue?

A. Lysine.
B. Glutamic acid.
C. Proline.
D. Histidine.
E. Alanine.

4. A citrulline and a high level of ammonia are determined in the urine of a newborn child. The formation of what substance is the most credible to be disturbed?

A. Ammonia.
B. Uric acid.
C. Urea.
D. Creatinine.
E. Creatine.

5. Most of the nitrogen amount is excreted from the body in the form of urea. The decrease of activity of what liver enzyme results in inhibiting of urea synthesis and acumulation of ammonia in blood and tissues?

A. Carbamoyl phosphate synthase.
B. Aspartate aminotransferase.
C. Urease.
D. Amylase.
E. Pepsin.

6. The greater amount of nitrogen is excreted from the organism in form of urea. Inhibition of urea synthesis and accumulation of ammonia in blood and tissues are induced by the decreased activity of the following liver enzyme:

A. Urease
B. Aspartate aminotransferase
C. Carbamoyl phosphate synthetase
D. Pepsin
E. Amylase

7. A newborn child was found to have reduced intensity of sucking, frequent vomiting, hypotonia. Urine and blood exhibit increased concentration of citrulline. What metabolic process is disturbed?

A. Glyconeogenesis
B. Cori cycle
C. Tricarboxylic acid cycle
D. Glycolysis

E. Ornithinic cycle

8. Examination of urine in a newborn revealed presence of citrulline and high ammonia concentration. This baby is most likely to have the disorder of the following substance production:

A. Urea
B. Uric acid
C. Ammonia
D. Creatinine
E. Creatine

9. After severe viral hepatitis a 4-year-old boy presents with vomiting, occasional loss of consciousness, convulsions. Blood test revealed hyperammoniemia. Such condition is caused by a disorder of the following biochemical hepatic process:

A. Disorder of ammonia neutralization
B. Disorder of biogenic amines neutralization
C. Protein synthesis inhibition
D. Activation of amino acid decarboxylation
E. Inhibition of transamination enzymes

10. Depressions and emotional disorders result from noradrenaline, serotonin and other biogenic amines deficiency in brain. Concentration of these compounds in synapses can be increased by means of antidepressants that inhibit the activity of the following enzyme:

A. Monoamine oxidase
B. Diamine oxidase
C. L-amino acid oxidase
D. D-amino acid oxidase
E. Phenylalanine-4-monooxigenase

4. Specific metabolism of some amino acids.

1. A 1,5-year-old child presents with both mental and physical lag, decolorizing of skin and hair, decrease in catecholamine concentration in blood. When a few drops of 5% solution of trichloroacetic iron had been added to the child's urine it turned olive green. Such alteration are typical for the following pathology of the amino acid metabolism:

A. Tyrosinosis
B. Alkaptonuria
C. Phenylketonuria
D. Albinism
E. Xanthinuria

2 Laboratory examination of a child revealed increased concentration of leucine, valine, isoleucine and their ketoderivatives in blood and urine. Urine smelt of maple syrup. This disease is characterized by the deficit of the following enzyme:

A. Dehydrogenase of branched amino acids
B. Phosphofructomutase
C. Aminotransferase
D. Glucose-6-phosphatase
E. Phosphofructokinase

3. Urine analysis of a 12-year-old boy reveals high concentration of all aliphatic amino acids with the highest excretion of cystine and cysteine. US of kidneys revealed kidney concrements. What is the most likely pathology?

A. Cystinuria
B. Phenylketonuria
C. Alkaptonuria
D. Cystitis
E. Hartnup disease

4. A patient has been diagnosed with alkaptonuria. Choose an enzyme whose deficiency can be the reason for this pathology:

A. Dioxyphenylalanine decarboxylase
B. Homogentisic acid oxidase
C. Phenylalanine hydroxylase
D. Glutamate dehydrogenase
E. Pyruvate dehydrogenase

5. A 2-year-old child with mental and physical retardation has been delivered to a hospital. He presents with frequent vomiting after having meals. There is phenylpyruvic acid in urine. Which metabolism abnormality is the reason for this pathology?

A. Phosphoric and calcium metabolism
B. Water-salt metabolism
C. Amino-acid metabolism
D. Carbohydrate metabolism
E. Lipidic metabolism

6. Albinos suffer badly from the influence of ultraviolet light — they get sunburns because of spending too much time in the sun. Metabolism disturbance of what amino acid is the reason for this phenomenon?

A. Tryptophan.
B. Methionine.
C. Phenylalanine.
D. Glutamate.
E. Histidine.

7. There is a peptide in a human body in which the formation of the γ-carboxylic group of glutamate takes part. What is this peptide called?

A. Vasopressin.
B. Carnosine.
C. Anserine.
D. Oxytocin.
E. Glutathione.

8. The increased level of homogentisate is revealed in the urine of a three-month child. Being exposed to the open air, the urine darkens. Which of the following inherited diseases are the described symptoms typical of?
A. Cystinuria.
B. Phenylketonuria.
C. Albinism.
D. Aminoaciduria.
E. Alcaptonuria.

9. High levels of serotonin and 3-oxianthranilate are revealed in the blood of a patient suffering from urinary bladder cancer. By the disturbance of the metabolism of what amino acid is it caused?
A. Tryptophan.
B. Alanine.
C. Histidine.
D. Methionine.
E. Tyrosine.

10. A newborn child rejects breast feeding, he is restless, his breathing is unrhythmical, and the urine has a specific smell of beer ferment or maple syrup. The innate defect of what enzyme causes this pathology?
A. Aspartate aminotransferase.
B. Glucose-6-phosphate dehydrogenase.
C. Glycerol kinase.
D. Dehydrogenase of branched-chain α-ketoacids.
E. UDP-glucuronyltransferase.

11. Laboratory analysis of the urine of a six-day infant displayed excessive concentration of phenylpyruvate and phenylacetate. Metabolism of what aminoacid is disturbed in the body of the child?
A. Methionine.
B. Tryptophan.
C. Phenylalanine.
D. Histidine.
E. Arginine.

12. Albinos become tanned poorly, instead they get sunburns. The disorder of what amino acid metabolism causes this phenomenon?
A. Glutamate.
B. Methionine.
C. Tryptophan.
D. Phenylalanine.
E. Histidine.

13. Under alcaptonuria, the excessive quantity of homogentisate was found in the patient's urine (the urine darkens in the air). The innate defect of what enzyme is apparent?
*A. Homogentisate oxidase.
B. Alanine aminotransferase.
C. Tyrosinase.
D. Phenylalanine-4-monooxygcnase.
E. Tyrosine aminotransferase.

14. An infant shows the darkening of scleras, mucous membranes, and auricles. The excreted urine darkens in the air, homogentisate is determined both in the blood and urine. What is the diagnosis?
A. Alkaptonuria.
B. Albinism.
C. Cystinuria.
D. Porphyria.
E. Hemolytic anemia.

15. A 9-year-old boy was brought to a hospital with signs of mental and physical retardation. A biochemical blood test revealed the increased level of phenylalanine. The blockage of what enzyme can result in such state of the patient?
A. Glutamate decarboxylase.
B. Homogentisate oxidase.
C. Glutamine transaminase.
D. Aspartate aminotransferase.
E. Phenylalanine-4-monooxygenase.

16. A mother of a 5-year-old child has noticed that the child's urine is too dark. The child does not have any complaints. Bile pigments are not present in the urine. The diagnosis of alcaptonuria is set. The deficiency of what enzyme is observed in this case?
A. Oxyphenylpyruvate oxidase.
B. Phenylalanine hydroxylase.
C. Tyrosinase.
D. Homogentisate oxidase.
E. Decarboxylase of phenylpyruvate.

17. A 13-year-old patient complains of general weakness, rapid fatigue. There is retardation in his mental development. Laboratory investigation revealed high concentrations of valine, isoleucine and leucine in his blood and urine. The urine has a specific smell. What can the cause of such state be?
A. Histidincmia.
B. Addison's disease.
C. Tyrosinosis.
D. «Maple syrup» disease.

E. Diffuse toxic goiter.

18. A ten-month-old child, whose parents are dark-haired, is fair-haired, fair-complexioned and blue-eyed. The neonate seemed to be healthy, but during the last three months the cerebral circulation disorder and the retardation of mental development appeared. The cause of such state is:

A. Phenylketonuria.
B. Galactosemia.
C. Glycogenosis.
D. Acute porphyria.
E. Histidinemia.

19. A newborn child has dark coloring of scleras and mucous membranes. The excreted urine darkens in the air. Laboratory tests of blood and urine have revealed the occurrence of homogentisic acid. What can the cause of this state be?

A. Cystinuria.
B. Albinism.
C. Galactosemia.
D. Alcaptonuria.
E. Histidinemia.

20. One of the forms of innate human pathology is accompanied by the blockage of the conversion of phenylalanine into tyrosine. The biochemical manifestation of the disease is the accumulation of certain organic acids in the organism including:

A. Phenylpyruvate.
B. Citrate.
C. Pyruvate.
D. Lactate.
E. Glutamate.

21. The signs of skin depigmentation of a 19-year-old patient are caused by the disorder of melanin synthesis. The disturbance of the metabolism of what amino acid is it caused by?

A. Histamine.
B. Tryptophan.
C. Tyrosine.
D. Proline.
E. Lysine.

22. Affected by ultraviolet radiation, human skin darkens, which is a protective reaction of the organism. What protective substance, namely amino acid derivative, is synthesized in the cells under these conditions?

A. Arginine.
B. Melanin.
C. Methionine.
D. Phenylalanine.
E. Thyroxin.

23. Under the repeated action of ultraviolet rays, skin darkens because of the synthesis of melanin which protects cells from damage. The principal mechanism of this defence reaction is:

A. Inhibition of tyrosinase.
B. Activation of tyrosinase.
C. Activation of homogentisate oxidase.
D. Inhibition of homogentisate oxidase.
E. Inhibition of phenylalanine hydroxylase.

24. A male patient has been diagnosed with acute radiation disease. Laboratory examination revealed a considerable reduction of platelet serotonin level. The likely cause of platelet serotonin reduction is the disturbed metabolism of the following substance:

A. 5-oxytryptophane
B. Phenylalanine
C. Histidine
D. Serine
E. Tyrosine

25. A patient has pellagra. Interrogation revealed that he had lived mostly on maize for a long time and eaten little meat. This disease had been caused by the deficit of the following substance in the maize:

A. Tryptophan
B. Proline
C. Tyrosine
D. Histidine
E. Alanine

26. Examination of a patient suffering from cancer of urinary bladder revealed high rate of serotonin and hydroxyanthranilic acid. It is caused by excess of the following amino acid in the organism:

A. Alanine
B. Tyrosine
C. Tryptophan
D. Methionine
E. Histidine

27. Nappies of a newborn have dark spots being the evidence of homogentisic acid formation. This is caused by the metabolic disorder of the following substance:

A. Cholesterol
B. Methionine
C. Galactose
D. Tyrosine
E. Tryptophan

28. A baby refuses the breast, he is anxious,

presents with arrhythmic respiration. The urine smells of "brewer's yeast" or "maple syrup". This pathology was caused by the inherited defect of the following enzyme:

A. UDP-glucuronil transferase
B. Glycerol kinase
C. Aspartate aminotransferase
D. Dehydrogenase of branched-chain alpha-keto acids
E. Glucose 6-phosphate dehydrogenase

29. A 13-year-old boy complains of general weakness, dizziness, tiredness. He is mentally retarded. Increased level of valine, isoleucine, leucine is in the blood and urine. Urine has specific smell. What is the diagnosis?

A. Maple syrup urine disease
B. Addison's disease
C. Tyrosinosis
D. Histidinemia
E. Graves' disease

30. Nappies of a newborn have dark spots that witness of formation of homogentisic acid. Metabolic imbalance of which substance is it connected with?

A. Thyrosine
B. Galactose
C. Methionine
D. Cholesterine
E. Tryptophane

31. Albinos can't stand sun impact - they don't acquire sun-tan but get sunburns. Disturbed metabolism of what aminoacid underlies this phenomenon?

A. Phenilalanine
B. Methionine
C. Tryptophan
D. Glutamic acid
E. Histidine

32. In course of histidine catabolism a biogenic amin is formed that has powerful vasodilatating effect. Name it:

A. Histamine
B. Serotonin
C. Dioxyphenylalanine
D. Noradrenalin
E. Dopamine

33. Examination of a 6 days old infant revealed phenyl pyruvate and phenyl acetate excess in his urine. What aminoacid metabolism is disturbed in the child's organism?

A. Phenylalanine
B. Tryptophan
C. Methionine
D. Histidine
E. Arginine