MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
UZHHOROD NATIONAL UNIVERSITY
FACULTY OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY, PHARMACOLOGY
AND PHYSICAL MEDICINE

MEDICINE
BIOLOGICAL CHEMISTRY – KROK 1

Self-Study guide for students
for licensing examination Krok 1 (medicine)

Uzhhorod – 2019

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Упорядники:

- в.о. зав. кафедри біохімії, фармакології, фізичних методів лікування з курсом аналітичної медицини медичного факультету ДВНЗ «УжНУ», доц. **Ростока Лариса Михайлівна,**
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- асистент кафедри біохімії, фармакології, фізичних методів лікування з курсом аналітичної медицини медичного факультету ДВНЗ «УжНУ» **Рейті Габріела Едуардівна.**

Методична розробка для студентів складено у відповідності з вимогами освітньо-професійної програми підготовки спеціаліста (Крок – 1).

Рецензенти:

Грига І.В. – к.мед.н., професор кафедри біохімії, фармакології, фізичних методів з курсом аналітичної медицини лікування медичного факультету ДВНЗ «УжНУ»

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Затверджено на засіданні кафедри біохімії, фармакології, фізичних методів з курсом аналітичної медицини лікування ДВНЗ «УжНУ» від 19.09.2019 р., протокол №2.

BIOLOGICAL CHEMISTRY
KROK 1
(all answers - A)

ENZYMES

1. Blood test of the patient revealed albumine content of 20 g/l and increased activity of lactate dehydrogenase isoenzyme 5 (LDH5). These results indicate disorder of the following organ:
A. Liver
B. Kidneys
C. Heart
D. Lungs
E. Spleen

2. A patient has been admitted to the contagious isolation ward with signs of jaundice caused by hepatitis virus. Which of the symptoms given below is strictly specific for hepatocellular jaundice?
A. Increase of ALT, AST level
B. Hyperbilirubinemia
C. Bilirubinuria
D. Cholemia
E. Urobilinuria

3. Researchers isolated 5 isoenzymic forms of lactate dehydrogenase from the human blood serum and studied their properties. What property indicates that the isoenzymic forms were isolated from the same enzyme?
A. Catalyzation of the same reaction
B. The same molecular weight
C. The same physicochemical properties
D. Tissue localization
E. The same electrophoretic mobility

4. 12 hours after an accute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
A. Myocardium infarction
B. Viral hepatitis
C. Collagenosis
D. Diabetes mellitus
E. Diabetes insipidus

5. There are several groups of molecular mechanisms playing important part in pathogenesis of insult to cells which contributes to the pathology development. What processes are stimulated by proteinic damage mechanisms?
A. Enzyme inhibition
B. Lipid peroxidation
C. Phospholipase activation
D. Osmotic membrane distension
E. Acidosis

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

7. An oncological patient had been administered methotrexate. With time target cells of the tumour lost sensitivity to this drug. At the same time the change in gene expression of the following enzyme is observed:
A. Dehydropholate reductase
B. Thiaminase
C. Deaminase
D. Pholate oxidase
E. Pholate decarboxylase

8. An infectious disease unit admitted a patient with signs of jaundice caused by hepatitis virus. Select an indicator that is specific only for parenchymatous jaundice:
A. Increase in ALT and AST rate

B. Hyperbilirubinemia
C. Bilirubinuria
D. Cholaemia
E. Urobilinuria

9. Some infectious diseases caused by bacteria are treated with sulfanilamides which block the synthesis of bacteria growth factor. What is the mechanism of their action?
A. They are antivitamins of para-amino benzoic acid
B. They inhibit the absorption of folic acid
C. They are allosteric enzyme inhibitors
D. They are involved in redox processes
E. They are allosteric enzymes

10. To prevent attacks of acute pancreatitis a doctor prescribed the patient trasylol (contrycal, gordox), which is an inhibitor of:
A. Trypsin
B. Elastase
C. Carboxypeptidase
D. Chymotrypsin
E. Gastricsin

11. It is known that the monoamine oxidase (MAO) enzyme plays an important part in the metabolism of catecholamine neurotransmitters. In what way does the enzyme inactivate these neurotransmitters (norepinephrine, epinephrine, dopamine)?
A. Oxidative deamination
B. Addition of an amino group
C. Removal of a methyl group
D. Carboxylation
E. Hydrolysis

12. 6 hours after the myocardial infarction a patient was found to have elevated level of lactate dehydrogenase in blood. What isoenzyme should be expected in this case?
A. LDH1
B. LDH2
C. LDH3
D. LDH4
E. LDH5

13. For biochemical diagnostics of myocardial infarction it is necessary to measure activity of a number of enzymes and their isoenzymes. What enzymatic test is considered to be the best to prove or disprove the diagnosis of infarction in the early period after the chest pain is detected?
A. Creatine kinase isoenzyme CK-MB
B. Creatine kinase isoenzyme CK-MM
C. LDH1 lactate dehydrogenase isoenzyme
D. LDH2 lactate dehydrogenase isoenzyme
E. Aspartate aminotransferase cytoplasmic isoenzyme

14. Apatient has been admitted to the contagious isolation ward with signs of jaundice caused by hepatitis virus. Which of the symptoms given below is strictly specific for hepatocellular jaundice?
A. Increase of ALT, AST level
B. Hyperbilirubinemia
C. Bilirubinuria
D. Cholemia
E. Urobilinuria

15. In cancer patients who have been continuously receiving methotrexate, the target cells of tumor with time become insensitive to this drug. In this case, gene amplification of the following enzyme is observed:
A. Dihydrofolate reductase
B. Thiaminase
C. Deaminase
D. Thioredoxin reductase
E. -

16. A patient has been diagnosed with alkaptonuria. Choose an enzyme that can cause this pathology when deficient:
A. Homogentisic acid oxidase
B. Glutamate dehydrogenase
C. Pyruvate dehydrogenase
D. Dioxyphenylalanine decarboxylase
E. Phenylalanine hydroxylase

17. A patient is diagnosed with cardi¬ac infarction. Blood test for cardiospecific

enzymes activity was performed. Which of the enzymes has three isoforms?
A. Creatine kinase
B. Pyruvate kinase
C. Alanine transaminase
D. Aspartate transaminase
E. Lactate dehydrogenase

18. A 15-year-old boy has been diagnosed with acute viral hepatitis. What blood value should be determined to confirm acute affection of hepatic cells?
A. Aminotransferase activity (AST, ALT)
B. Cholesterol content
C. Protein fraction content
D. Unconjugated and conjugated bilirubin content
E. Erythrocytes sedimentation rate (ESR)

19. A 50-year-old woman diagnosed with cardiac infarction has been delivered into an intensive care ward. What enzyme will be the most active during the first two days?
A. Aspartate aminotransferase
B. Alanine aminotransferase
C. LDH4
D. Alanine aminopeptidase
E. LDH5

20. Fructosuria is known to be connected with inherited deficiency of fructose 1-phosphate aldolase. Which product of fructose metabolism will accumulate in the organism resulting in toxic action?
A. Fructose1-phosphate
B. Fructose 1,6-biphosphate
C. Glucose 1-phosphate
D. Fructose 6-phosphate
E. Glucose 6-phosphate

21. Methotrexate (structural analogue of the folic acid which is competitive inhibitor of the dihydrofolatreductase) is prescribed for treatment of the malignant tumour. On which level does methotrexate inhibit synthesis of the nucleic acids?
A Mononucleotide synthesis
B Replication
C Transcription
D Reparation
E Processing

22. 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

23. A 46-year-old female patient has a continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?
A Creatine phosphokinase
B Lactate dehydrogenase
C Pyruvate dehydrogenase
D Glutamate dehydrogenase
E Adenylate cyclase

24. Researchers isolated 5 isoenzymic forms of lactate dehydrogenase from the human blood serum and studied their properties. What property indicates that the isoenzymic forms were isolated from the same enzyme?
A Catalyzation of the same reaction
B The same molecular weight
C The same physicochemical properties
D Tissue localization
E The same electrophoretic mobility

25. A patient presents high activity of $LDH_{1,2}$, aspartate aminotransferase, creatine phosphokinase. In what organ (organs) is the development of a pathological process the most probable?
A In the heart muscle (initial stage of myocardium infarction)
B In skeletal muscles (dystrophy, atrophy)
C In kidneys and adrenals
D In connective tissue
E In liver and kidneys

26. Marked increase of activity of MB-

forms of CPK (creatinephosphokinase) and LDH-1 were revealed on the examination of the patient's blood. What is the most likely pathology?
A Miocardial infarction
B Hepatitis
C Rheumatism
D Pancreatitis
E Cholecystitis

27. 12 hours after an accute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
A Myocardium infarction
B Viral hepatitis
C Collagenosis
D Diabetes mellitus
E Diabetes insipidus

28. 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 Phenylketonuria
B Alkaptonuria
C Tyrosinosis
D Albinism
E Xanthinuria

29. A patient has been diagnosed with alkaptonuria. Choose an enzyme whose deficiency can be the reason for this pathology:
A Homogentisic acid oxidase
B Phenylalanine hydroxylase
C Glutamate dehydrogenase
D Pyruvate dehydrogenase
E Dioxyphenylalanine decarboxylase

30. A child's blood presents high content of galactose, glucose concentration is low. There are such presentations as cataract, mental deficiency, adipose degeneration of liver. What disease is it?
A Galactosemia
B Diabetes mellitus
C Lactosemia
D Steroid diabetes
E Fructosemia

31. An oncological patient had been administered methotrexate. With time target cells of the tumour lost sensitivity to this drug. At the same time the change in gene expression of the following enzyme is observed:
A Dehydropholate reductase
B Thiaminase
C Deaminase
D Pholate oxidase
E Pholate decarboxylase

32. 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 Lactase
B Invertase
C Maltase
D Amylase
E Isomaltase

33. A 49-year-old driver complains about unbearable constricting pain behind the breastbone irradiating to the neck. The pain arose 2 hours ago. Objectively: the patient's condition is grave, he is pale, heart tones are decreased. Laboratory studies revealed high activity of creatine kinase and LDH_1. What disease are these symptoms typical for?
A Acute myocardial infarction
B Acute pancreatitis
C Stenocardia
D Cholelithiasis
E Diabetes mellitus

34. An oncological patient was prescribed methotrexate. With the lapse of time target cells of the tumour lost susceptibility to this

drug. There is change of gene expression of the folowing enzyme:
A Dehydrofolate reductase
B Thiaminase
C Deaminase
D Folate oxidase
E Folate decarboxylase

35. To prevent attacks of acute pancreatitis a doctor prescribed the patient trasylol (contrycal, gordox), which is an inhibitor of:
A Trypsin
B Elastase
C Carboxypeptidase
D Chymotrypsin
E Gastricsin

36. Pharmacological effects of antidepressants are connected with inhibition of an enzyme catalyzing biogenic amines noradrenaline and serotonine in the mitochondrions of cerebral neurons. What enzyme participates in this process?
A Monoamine oxidase
B Transaminase
C Decarboxylase
D Peptidase
E Lyase

37. Some infectious diseases caused by bacteria are treated with sulfanilamides which block the synthesis of bacteria growth factor. What is the mechanism of their action?
A They are antivitamins of para-amino benzoic acid
B They inhibit the absorption of folic acid
C They are allosteric enzyme inhibitors
D They are involved in redox processes
E They are allosteric enzymes

38. A patient presents high activity of LDH1,2, aspartate aminotransferase, creatine phosphokinase. In what organ (organs) is the development of a pathological process the most probable?
A In the heart muscle (initial stage of myocardium infarction)
B In skeletal muscles (dystrophy, atrophy)
C In kidneys and adrenals
D In connective tissue
E In liver and kidneys

39. A13-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

40. Aspirin has antiinflammatory effect due to inhibition of the cyclooxygenase activity. Level of what biological active acids will decrease?
A Prostaglandins
B Leucotriens
C Catecholamines
D Biogenic amines
E Iodinethyronyns

41. Marked increase of activity of MB-forms of CPK (creatinephosphokinase) and LDH1 were revealed on the examination of the patient's blood. What is the most likely pathology?
A Miocardial infarction
B Hepatitis
C Rheumatism
D Pancreatitis
E Cholecystitis

42. 12 hours after an accute attack of retrosternal pain a patient presented a jump of aspartate minotransferase activity in blood serum. What pathology is this deviation typical for?
A Myocardium infarction
B Viral hepatitis
C Collagenosis
D Diabetes mellitus
E Diabetes insipidus

43. 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 Renin
B Pepsin
C Gastrin
D Secretin
E Lipase

44. In a patient's blood the activities of lactate dehydrogenase (LDH4,LDH5), alanine aminotransferase, carbamoyl ornithine transferase are increased. What organ is the pathological process developing in?
A In the liver (hepatitis is possible)
B In the myocardium (myocardial infarction is possible).
C In skeletal muscles
D In kidneys
E In connective tissue CoQ

45. A 47-year-old patient was brought to an emergency department with the diagnosis of myocardial infarction. What lactate dehydrogenase (LDH) fractions activity would prevail in the patient's blood serum during the first two days after hospitalization?
A. LDH1.
B. LDH2
C. LDH3
D. LDH4
E. LDH5

46. A 50-year-old woman was brought to an emergency clinic with the diagnosis of myocardial infarction. The activity of what enzyme will prevail in her blood plasma during the first two days after hospitalization?
A. Aspartate aminotransferase.
B. g-Glutamyl transpeptidase.
C. Alkaline phosphatase.
D. Acidic phosphatase.
E. Hexokinase.

47. Researchers isolated 5 isoenzymic forms of lactate dehydrogenase from the human blood serum and studied their properties. What property indicates that the isoenzymic forms were isolated from the same enzyme?
A. Catalyzation of the same reaction.
B. The same molecular weight.
C. The same physicochemical properties.
D. Tissue localization.
E. The same electrophoretic mobility.

48. A 46-year-old female patient has a continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?
A. Creatine phosphokinase.
B. Lactate dehydrogenase.
C. Pyruvate dehydrogenase.
D. Glutamate dehydrogenase.
E. Adenylate cyclase.

49. A patient presents high activity of LDH1,2, aspartate aminotransferase, creatine Phosphokinase. In what organ (organs) is the development of a pathological process the most probable?
A. In the heart muscle (initial stage of myocardium infarction).
B. In skeletal muscles (dystrophy, atrophy).
C. In kidneys and adrenals.
D. In connective tissue.
E. In liver and kidneys.

50. Marked increase of activity of MB-forms of CPK (creatinephosphokinase) and LDH-1 were revealed on the examination of the patient's blood. What is the most likely pathology?
A. Miocardial infarction.
B. Hepatitis.
C. Rheumatism.
D. Pncreatitis.
E. Cholecystitis.

51. 12 hours after an accute attack of retrosternal pain a patient presented a jump

of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
A. Myocardium infarction.
B. Viral hepatitis.
C. Collagenosis.
D. Diabetes mellitus.
E. Diabetes insipidus.

52. A 49-year-old driver complains about unbearable constricting pain behind the breastbone irradiating to the neck. The pain arose 2 hours ago. Objectively: the patient's condition is grave, he is pale, heart tones are decrease Laboratory studies revealed high activity of creatine kinase and LDH What disease are these symptoms typical for?
A. Acute myocardial infarction.
B. Acute pancreatitis.
C. Stenocardia.
D. Cholelithiasis.
E. Diabetes mellitus.

53. Desulfiram is widely used in medical practice to prevent alcocholism. It inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcochol?
A. Acetaldehyde.
B. Methanol.
C. Malonyl aldehyde.
D. Ethanol.
E. Propionic aldehyde.

54. There are several groups of molecular mechanisms playing important part in pathogenesis of insult to cells which contributes to the pathology development. What processes are stimulated by proteinic damage mechanisms?
A. Enzyme inhibition.
B. Acidosis.
C. Phospholipase activation.
D. Osmotic membrane distension.
E. Lipid peroxidation.

55. 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. Tripsin.
B. Dipeptidase.
C. Amylase.
D. Pepsin.
E. Lipase.

56. At the patient with a acute pancreatitis at the analysis of blood and urine activity of one of the specified enzymes which confirms the diagnosis of disease is sharply raised:
A. Alfa-amylase
B. Pepsin
C. Dipeptidase
D. Saccharase
E. Lactase

VITAMINS

1. One of the causes of pernicious anemia is disturbed synthesis of transcorrin - Castle's intrinsic factor - by the parietal cells of the stomach. What substance is called Castle's extrinsic factor?
A. Cobalamin
B. Riboflavin
C. Folic acid
D. Biotin
E. Pyridoxine

2. Patients with bile duct obstruction typically present with inhibited blood clotting and develop hemorrhages due to insufficient assimilation of vitamin:
A. K
B. C
C. D
D. A
E. E

3. A hereditary disease - homocystinuria - is caused by disturbed transformation of homocysteine into methionine. Accumulated homocysteine forms its dimer (homocystine) that can be found in urine. What vitamin preparation can decrease homocysteine production?
A. Vitamin B12
B. Vitamin B2
C. Vitamin B1
D. Vitamin PP
E. Vitamin C

4. A 25-year-old young man came to the doctor complaining of general weakness, rapid fatigability, irritability, reduced working ability, and bleeding gums. What vitamin is likely to be deficient in this case?
A. Ascorbic acid
B. Riboflavin
C. Thiamine
D. Folic acid
E. Retinol

5. An 8-year-old girl presents with signs of disturbed twilight vision. This condition is caused by the deficiency of vitamin:
A. A
B. E
C. K
D. D
E. F

6. A pregnant woman with several miscarriages in anamnesis is prescribed a therapy that includes vitamin preparations. What vitamin facilitates carrying of a pregnancy?
A. Alpha-tocopherol
B. Folic acid
C. Cyanocobalamin
D. Pyridoxal phosphate
E. Rutin

7. During regular check-up a child is determined to have interrupted mineralization of the bones. What vitamin deficiency can be the cause?
A. Calciferol
B. Riboflavin
C. Tocopherol
D. Folic acid
E. Cobalamin

8. An infant, who was on synthetic formula feeding, developed signs of vitamin B1 deficiency. What reactions does this vitamin take part in?
A. Keto acid oxidative decarboxylation
B. Amino acids transamination
C. Amino acids decarboxylation
D. Proline hydroxylation
E. Redox reactions

9. A 10-year-old girl has a history of repeated acute respiratory viral infection. After recovering she presents with multiple petechial hemorrhages on the sites of friction from clothing rubbing the skin. What kind of hypovitaminosis has this girl?
A. C
B. B6
C. B1

D. A
E. B2

10. A doctor recommends a patient with duodenal ulcer to drink cabbage and potato juice after the therapy course. Which substances contained in these vegetables help to heal and prevent the ulcers?
A. Vitamin U
B. Pantothenic acid
C. Vitamin C
D. Vitamin B1
E. Vitamin K

11. 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. B1
B. E
C. B3
D. B6
E. B2

12. Vitamin B1 deficiency causes disturbance of oxidative decarboxylation of α-ketoglutaric acid. This leads to the impaired synthesis of the following coenzyme:
A. Thiamine pyrophosphate
B. Nicotinamide adenine dinucleotide
C. Flavine adenine dinucleotide
D. Lipoic acid
E. Coenzyme A

13. Examination of a child who hasn't got fresh fruit and vegetables during winter revealed numerous subcutaneous hemorrhages, gingivitis, carious cavities in teeth. What vitamin combination should be prescribed in this case?
A. Ascorbic acid and rutin
B. Thiamine and pyridoxine
C. Folic acid and cobalamin
D. Riboflavin and nicotinamide
E. Calciferol and ascorbic acid

14. Vitamin A together with specific cytoreceptors penetrates through the nuclear membranes, induces transcription processes that stimulate growth and differentiation of cells. This biological function is realized by the following form of vitamin A:
A. Trans-retinoic acid
B. Trans-retinal
C. Cis-retinal
D. Retinol
E. Carotin

15. To prevent postoperative bleeding a 6-year-old child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A. Carboxylation of glutamic acid
B. Phosphorylation of serine radicals
C. Partial proteolysis
D. Polymerization
E. Glycosylation

16. Blood test of a patient suffering from atrophic gastritis gave the following results: RBCs - 2,0 • 1012/l, Hb- 87 g/l, colour index - 1,3, WBCs - 4, 0 • 109/l, thrombocytes - 180 • 109/l. Anaemia migh have been caused by the following substance deficiency:
A. Vitamin B12
B. Vitamin A
C. Vitamin K
D. Iron
E. Zinc

17. A 64 year old woman has impairment of twilight vision (hemeralopy). What vitamin should be recommended in the first place?
A. A
B. B2
C. E
D. C
E. B6

18. A 4 year old child with hereditary renal lesion has signs of rickets, vitamin D concentration in blood is normal. What is the most probable cause of rickets development?
A. Impaired synthesis of calcitriol
B. Increased excretion of calcium

C. Hyperfunction of parathyroid glands
D. Hypofunction of parathyroid glands
E. Lack of calcium in food

19. A patient diagnosed with focal tuberculosis of the upper lobe of the right lung had been taking isoniazid as a part of combination therapy. After some time, the patient reported of muscle weakness, decreased skin sensitivity, blurred vision, impaired motor coordination. Which vitamin preparation should be used to address these phenomena?
A. Vitamin B6
B. Vitamin A
C. Vitamin D
D. Vitamin B12
E. Vitamin C

20. A number of diseases can be diagnosed by evaluating activity of blood transaminases. What vitamin is one of cofactors of these enzymes?
A. B6
B. B2
C. B1
D. B8
E. B5

21. A 20-year-old male patient complains of general weakness, rapid fatigability, irritability, decreased performance, bleeding gums, petechiae on the skin. What vitamin deficiency may be a cause of these changes?
A. Ascorbic acid
B. Riboflavin
C. Thiamine
D. Retinol
E. Folic acid

22. Malaria is treated with structural analogs of vitamin B2 (riboflavin). These drugs disrupt the synthesis of the following enzymes in plasmodium:
A. FAD-dependent dehydrogenase
B. Cytochrome oxidase
C. Peptidase
D. NAD-dependent dehydrogenase
E. Aminotransferase

23. It has been found out that one of a pesticide components is sodium arsenate that blocks lipoic acid. Which enzyme activity is impaired by this pesticide?
A. Pyruvate dehydrogenase complex
B. Microsomal oxidation
C. Methemoglobin reductase
D. Glutathione peroxidase
E. Glutathione reductase

24. Steatosis is caused by the accumulation of triacylglycerols in hepatocytes. One of the mechanisms of this disease development is a decrease in the utilization of VLDL neutral fat. What lipotropics prevent the development of steatosis?
A. Methionine, B6, B12
B. Arginine, B2, B3
C. Alanine, B1, PP
D. Valine, B3, B2
E. Isoleucine, B1, B2

25. Symptoms of pellagra (vitamin PP deficiency) is particularly pronounced in patients with low protein diet, because nicotinamide precursor in humans is one of the essential amino acids, namely:
A. Tryptophan
B. Threonine
C. Arginine
D. Histidine
E. Lysine

26. A 36-year-old female patient has a history of B2-hypovitaminosis. The most likely cause of specific symptoms (epithelial, mucosal, cutaneous, corneal lesions) is the deficiency of:
A. Flavin coenzymes
B. Cytochrome A1
C. Cytochrome oxidase
D. Cytochrome B
E. Cytochrome C

27. A patient complains of photoreception disorder and frequent acute viral diseases. He has been prescribed a vitamin that affects photoreception processes by producing

rhodopsin, the photosensitive pigment. What vitamin is it?
A. Retinol acetate
B. Tocopherol acetate
C. Pyridoxine hydrochloride
D. Cyanocobalamin
E. Thiamine

28. It has been found out that one of a pesticide components is sodium arsenate that blocks lipoic acid. Which enzyme acti¬vity is impaired by this pesticide?
A. Pyruvate dehydrogenase complex
B. Glutathione reductase
C. Glutathione peroxidase
D. Methemoglobin reductase
E. Microsomal oxidation

29. During regular check-up a child is detected with interrupted mineralization of bones. What vitamin deficiency can be the cause?
A. Calciferol
B. Cobalamin
C. TocopherоI
D. Folic acid
E. Riboflavin

30. A patient, who has been suffering for a long time from intestine disbacteriosis, has increased hemorrhaging caused by disruption of posttranslational modification of blood-coagulation factors II, VII, IX, and X in the liver. What vitamin deficiency is the cause of this condition?
A. K
B. P
C. B12
D. C
E. B9

31. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of the teeth. What can be the cause?
A. Vitamin D deficiency
B. Decreased glucagon production
C. Vitamin C deficiency
D. Hyperthyroidism
E. Insulin deficiency

32. A patient is diagnosed with chronic atrophic gastritis attended by deficiency of Castle's intrinsic factor. What type of anemia does the patient have?
A. B12-deficiency anemia
B. Iron-deficiency anemia
C. Hemolytic anemia
D. Iron refractory anemia
E. Protein-deficiency anemia

33. It has been determined that one of pesticide components is sodium arsenate that blocks lipoic acid. Enzyme activity can be impaired by this pesticide. Name this enzyme:
A. Pyruvate dehydrogenase complex
B. Glutathione reductase
C. Methemoglobin reductase
D. Microsomal oxidation
E. Glutathione peroxidase

34. A patient, who has been subsisting exclusively on polished rice, has developed polyneuritis due to thiamine deficiency. What substance is an indicator of such avitaminosis, when it is excreted with urine?
A. Pyruvic acid
B. Uric acid
C. Malate
D. Phenyl pyruvate
E. Methyl malonic acid

35. After an extended treatment with sulfonamides a patient has developed macrocytic anemia. Production of active forms of the following vitamin is disrupted in such a condition:
A. Folic acid
B. Pyridoxine
C. Thiamine
D. Cyanocobalamin
E. Riboflavin

36. A patient presents with dry peeling skin, frequent cases of acute respiratory diseases, xerophthalmia. What vitamin preparation should prescribed in this case?
A. Retinol acetate

B. Thiamine
C. Ergocalciferol
D. Menadione (Vikasolum)
E. Cyanocobalamine

37. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of the teeth. What can be the cause?
A. Vitamin D deficiency
B. Vitamin C deficiency
C. Decreased glucagon production
D. Hyperthyroidism
E. Insulin deficiency

38. Coenzyme A participates in numerous important metabolic reactions. It is a derivative of the following vitamin:
A. Pantothenic acid
B. Calciferol
C. Thiamine
D. Niacin
E. Ubiquinone

39. Pain along large nervous stems and increased amount of pyruvate in the blood were revealed in the patient. Insufficiency of what vitamin can cause such change?
A B_1
B B_2
C PP
D Pantothenic acid
E Biotin

40. In case of enterobiasis acrihine - the structural analogue of vitamin B_2 - is administered. The synthesis disorder of which enzymes does this medicine cause in microorganisms?
A FAD-dependent dehydrogenases
B Cytochromeoxidases
C Peptidases
D NAD-dependet dehydrogenases
E Aminotransferases

41. A 10-year-old girl often experiences acute respiratory infections with multiple spotty haemorrages in the places of clothes friction. Hypovitaminosis of what vitamin is present at the girl?
A C
B B_6
C B_1
D A
E B_2

42. Hydroxylation of endogenous substrates and xenobiotics requires a donor of protons. Which of the following vitamins can play this role?
A Vitamin C
B Vitamin P
C Vitamin B_6
D Vitamin E
E Vitamin A

43. Tere is observed inhibited fibrillation in the patients with bile ducts obstruction, bleeding due to low level of absorbtion of some vitamin. What vitamin is in deficit?
A K
B A
C D
D E
E Carotene

44. A 35-year-old man under the treatment for pulmonary tuberculosis has acute-onset of right big toe pain, swelling, and low-grade fever. The gouty arthritis was diagnosed and high serum uric acid level was found. Which of the following antituberculosis drugs are known for causing high uric acid levels?
A Pyrazinamide
B Cycloserine
C Thiacetazone
D Rifampicin
E Aminosalicylic acid

45. While examining the child the doctor revealed symmetric cheeks roughness, diarrhea, disfunction of the nervous system. Lack of what food components caused it?
A Nicotinic acid, tryptophane
B Lysine, ascorbic acid
C Threonine, pantothenic acid
D Methionine, lipoic acid
E Phenylalanine, pangamic acid

46. Increased breaking of vessels, enamel

and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A Hydroxylation of proline
B Formation of polypeptide chains
C Glycosylation of hydroxylysine residues
D Removal of C-ended peptide from procollagen
E Detaching of N-ended peptide

47. Examination of a patient suffering from frequent haemorrhages in the inner organs and mucous membranes revealed proline and lysine being included in collagen fibers. Impairment of their hydroxylation is caused by lack of the following vitamin:
A C
B E
C K
D A
E D

48. A patient has an increased pyruvate concentration in blood. A large amount of it is excreted with the urine. What vitamin is lacking in this patient?
A B_1
B E
C B_3
D B_6
E B_2

49. 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 Tyrosine
C Proline
D Alanine
E Histidine

50. A patient consulted a doctor about symmetric dermatitis of open skin areas. It was found out that the patient lived mostly on cereals and ate too little meat, milk and eggs. What vitamin deficiency is the most evident?
A Nicotinamide
B Calciferol
C Folic acid
D Biotin
E Tocopherol

51. Examination of a child who hasn't got fresh fruit and vegetables during winter revealed numerous subcutaneous hemorrhages, gingivitis, carious cavities in teeth. What vitamin combination should be prescribed in this case?
A Ascorbic acid and rutin
B Thiamine and pyridoxine
C Folic acid and cobalamin
D Riboflavin and nicotinamide
E Calciferol and ascorbic acid

52. A newborn child has convulsions that have been observed after prescription of vitamin B_6. This most probable cause of this effect is that vitamin B_6 is a componet of the following enzyme:
A Glutamate decarboxylase
B Pyruvate dehydrostase
C Netoglubarate dehydromine
D Aminolevulinate synthase
E Glycogen phosphorylase

53. Concentration of pyruvate is increased in the patient's blood, the most of which is excreted with urine. What avitaminosis is observed in the patient?
A Avitaminosis B_1
B Avitaminosis E
C Avitaminosis B_3
D Avitaminosis B_6
E Avitaminosis B_2

54. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beriberi). What vitamin deficit results in development of this disease?
A Thiamine
B Ascorbic acid
C Pyridoxine
D Folic acid

E Riboflavin

55. Removal of gall bladder of a patient has disturbed processes of Ca absorption through the intestinal wall. What vitamin will stimulate this process?
A D_3
B PP
C C
D B_{12}
E K

56. Examination of a man who hadn't been consuming fats but had been getting enough carbohydrates and proteins for a long time revealed dermatitis, poor wound healing, vision impairment. What is the probable cause of metabolic disorder?
A Lack of linoleic acid, vitamins A, D, E, K
B Lack of palmitic acid
C Lack of vitamins PP, H
D Low caloric value of diet
E Lack of oleic acid

57. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagene fibers. What vitamin absence caused disturbance of their hydroxylation?
A Vitamin C
B Vitamin K
C Vitamin A
D Thiamine
E Vitamin E

58. A patient with continious bronchopneumonia was admitted to the therapeutic department. Antibiotic therapy didn't give much effect. What medication for improvement of immune state should be added to the complex treatment of this patient?
A Timaline
B Analgin
C Sulfocamphocaine
D Benadryl
E Paracetamol

59. Vitamin A together with specific cytoreceptors penetrates through the nuclear membranes, induces transcription processes that stimulate growth and differentiation of cells. This biological function is realized by the following form of vitamin A:
A Trans-retinoic acid
B Trans-retinal
C Cis-retinal
D Retinol
E Carotin

60. To prevent postoperative bleeding a 6 y.o. child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A Carboxylation of glutamin acid
B Phosphorylation of serine radicals
C Partial proteolysis
D Polymerization
E Glycosylation

61. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A Cholecalciferol
B Thiamin
C Pantothenic acid
D Bioflavonoids
E Riboflavin

62. Vitamin B_1 deficiency results in disturbance of oxidative decarboxylation of α-ketoglutaric acid. This will disturb synthesis of the following coenzyme:
A Thiamine pyrophosphate
B Nicotinamide adenine dinucleotide (NAD)
C Flavine adenine dinucleotide (FAD)
D Lipoic acid
E Coenzyme A

63. According to clinical indications a patient was administered pyridoxal phosphate. What processes is this medication intended to correct?
A Transamination and decarboxylation of

aminoacids
B Oxidative decarboxylation of ketonic acids
C Desamination of purine nucleotide
D Synthesis of purine and pyrimidine bases
E Protein synthesis

64. As a result of posttranslative modifications some proteins taking part in blood coagulation, particularly prothrombin, become capable of calcium binding. The following vitamin takes part in this process:
A K
B C
C A
D B_1
E B_2

65. A 3 year old child with symptoms of stomatitis, gingivitis and dermatitis of open skin areas was delivered to a hospital. Examination revealed inherited disturbance of neutral amino acid transporting in the bowels. These symptoms were caused by the deficiency of the following vitamin:
A Niacin
B Pantothenic acid
C Vitamin A
D Cobalamin
E Biotin

66. A doctor examined a child and revealed symptoms of rachitis. Development of this desease was caused by deficiency of the following compound:
A 1,25 [OH]-dichydroxycholecalciferol
B Biotin
C Tocopherol
D Naphtaquinone
E Retinol

67. A 9-month-old infant is fed with artificial formulas with unbalanced vitamin B_6 concentration. The infant presents with pellagral dermatitis, convulsions, anaemia. Convulsion development might be caused by the disturbed formation of:
A GABA
B Histamine
C Serotonin
D DOPA
E Dopamine

68. Surgical removal of a part of stomach resulted in disturbed absorption of vitamin B_{12}, it is excreted with feces. The patient was diagnosed with anemia. What factor is necessary for absorption of this vitamin?
A Gastromucoprotein
B Gastrin
C Hydrochloric acid
D Pepsin
E Folic acid

69. A 4 year old child with hereditary renal lesion has signs of rickets, vitamin D concentration in blood is normal. What is the most probable cause of rickets development?
A Impaired synthesis of calcitriol
B Increased excretion of calcium
C Hyperfunction of parathyroid glands
D Hypofunction of parathyroid glands
E Lack of calcium in food

70. In clinical practice tuberculosis is treated with izoniazid preparation - that is an antivitamin able to penetrate into the tuberculosis bacillus. Tuberculostatic effect is induced by the interference with replication processes and oxidation-reduction reactions due to the buildup of pseudo-coenzyme:
A NAD
B FAD
C FMN
D TDP
E CoQ

71. Plasmic factors of blood coagulation are exposed to post-translational modification with the participation of vitamin K. It is necessary as a cofactor in the enzyme system of γ-carboxylation of protein factors of blood coagulation due to the increased affinity of their molecules with calcium ions. What amino acid is carboxylated in these proteins?
A Glutamic
B Valine

C Serine
D Phenylalanine
E Arginine

72. A number of diseases can be diagnosed by evaluating activity of blood transaminases. What vitamin is one of cofactors of these enzymes?
A B6
B B2
C B1
D B8
E B5

73. A 20-year-old male patient complains of general weakness, rapid fatigability, irritability, decreased performance, bleeding gums, petechiae on the skin. What vitamin deficiency may be a cause of these changes?
A Ascorbic acid
B Riboflavin
C Thiamine
D Retinol
E Folic acid

74. Pain along large nervous stems and increased amount of pyruvate in the blood were revealed in the patient. Insufficiency of what vitamin can cause such change?
A B1
B B2
C PP
D Pantothenic acid
E Biotin

75. In case of enterobiasis acrihine - the structural analogue of vitamin B2 - is administered. The synthesis disorder of which enzymes does this medicine cause in microorganisms?
A FAD-dependent dehydrogenases
B Cytochromeoxidases
C Peptidases
D NAD-dependet dehydrogenases
E Aminotransferases

76. A 10-year-old girl often experiences acute respiratory infections with multiple spotty haemorrages in the places of clothes friction. Hypovitaminosis of what vitamin is present at the girl?
A C
B B6
C B1
D A
E B2

77. There is observed inhibited fibrillation in the patients with bile ducts obstruction, bleeding due to low level of absorbtion of some vitamin. What vitamin is in deficit?
A K
B A
C D
D E
E Carotene

78. While examining the child the doctor revealed symmetric cheeks roughness, diarrhea, disfunction of the nervous system. Lack of what food components caused it?
A Nicotinic acid, tryptophane
B Lysine, ascorbic acid
C Threonine, pantothenic acid
D Methionine, lipoic acid
E Phenylalanine, pangamic acid

79. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A Hydroxylation of proline
B Formation of polypeptide chains
C Glycosylation of hydroxylysine residues
D Removal of C-ended peptide from procollagen
E Detaching of N-ended peptide

80. Examination of a patient revealed typical presentations of collagenosis. This pathology is characterized by increase of the following urine index:
A Hydroxyproline
B Arginine
C Glucose
D Mineral salts
E Ammonium salts

81. Examination of a patient suffering from frequent haemorrhages in the inner organs and mucous membranes revealed proline and lysine being included in collagen fibers. Impairment of their hydroxylation is caused by lack of the following vitamin:
A C
B E
C K
D A
E D

82. A patient has an increased pyruvate concentration in blood. A large amount of it is excreted with the urine. What vitamin is lacking in this patient?
A B1
B E
C B3
D B6
E B2

83. A patient consulted a doctor about symmetric dermatitis of open skin areas. It was found out that the patient lived mostly on cereals and ate too little meat, milk and eggs. What vitamin deficiency is the most evident?
A Nicotinamide
B Calciferol
C Folic acid
D Biotin
E Tocopherol

84. A newborn child has convulsions that have been observed after prescription of vitamin B6. This most probable cause of this effect is that vitamin B6 is a cofactor of the following enzyme:
A Glutamate decarboxylase
B Pyruvate dehydrostase
C Netoglubarate dehydromine
D Aminolevulinate synthase
E Glycogen phosphorylase

85. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beriberi). What vitamin deficit results in development of this disease?
A Thiamine
B Ascorbic acid
C Pyridoxine
D Folic acid
E Riboflavin

86. Removal of gall bladder of a patient has disturbed processes of Ca absorption through the intestinal wall. What vitamin will stimulate this process?
A D3
B PP
C C
D B12
E K

87. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagene fibers. What vitamin absence caused disturbance of their hydroxylation?
A Vitamin C
B Vitamin K
C Vitamin A
D Thiamine
E Vitamin E

88. Vitamin A together with specific cytoreceptors penetrates through the nuclear membranes, induces transcription processes that stimulate growth and differentiation of cells. This biological function is realized by the following form of vitamin A:
A Trans-retinoic acid
B Trans-retinal
C Cis-retinal
D Retinol
E Carotin

89. To prevent postoperative bleeding a 6 y.o. child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A Carboxylation of glutamin acid
B Phosphorylation of serine radicals

C Partial proteolysis
D Polymerization
E Glycosylation

90. According to clinical indications a patient was administered pyridoxal phosphate. What processes is this medication intended to correct?
A Transamination and decarboxylation of aminoacids
B Oxidative decarboxylation of ketoacids
C Desamination of purine nucleotide
D Synthesis of purine and pyrimidine bases
E Protein synthesis

91. As a result of posttranslative modifications some proteins taking part in blood coagulation, particularly prothrombin, become capable of calcium binding. The following vitamin takes part in this process:
A K
B C
C A
D B1
E B2

92. A 3 year old child with symptoms of stomatitis, gingivitis and dermatitis of open skin areas was delivered to a hospital. Examination revealed inherited disturbance of neutral amino acid transporting in the bowels. These symptoms were caused by the deficiency of thefollowing vitamin:
A Niacin
B Pantothenic acid
C Vitamin A
D Cobalamin
E Biotin

93. Surgical removal of a part of stomach resulted in disturbed absorption of vitamin B12, it is excreted with feces. The patient was diagnosed with anemia. What factor is necessary for absorption of this vitamin?
A Gastromucoprotein
B Gastrin
C Hydrochloric acid
D Pepsin
E Folic acid

94. In clinical practice tuberculosis is treated with izoniazid preparation - that is an antivitamin able to penetrate into the tuberculosis bacillus. Tuberculostatic effect is induced by the interference with replication processes and oxidation-reduction reactions due to the buildup of pseudo-coenzyme:
A NAD
B FAD
C FMN
D TDP
E CoQ

95. An ophthalmologist found that an outpatient had the increase of the time of sight adaptation for darkness. What kind of vitamin deficiency can be the cause of the symptom?
A. A.
B. E
C. C.
D. K
E. D.

96. A patient was diagnosed with megaloblastic anemia. The lack of which substance in the human organism can cause this disease"
A. Cobalamine.
B. Glycine.
C. Copper
D Cholecalciferol.
E. Magnesium.

97. There is an increase of the pyruvate level in the patient's blood and urine. What kind of avitaminosis developed in this case?
A. B1 avitaminosis.
B. E avitaminosis.
C. B3 avitaminosis.
D. B6 avitaminosis.
E. B2 avitaminosis.

98. A 2-year-old child developed intestinal dysbacteriosis with a hemorrage syndrome. The most probable cause of this syndrome is:
A. Vitamin K deficiency.
B. Activation of tissue thromboplastin.

C. Vitamin PP deficiency.
D. Fibrinogen deficiency.
E. Hypocalcemia.

99. Under different pathological states the level of active forms of oxygen rises, which results in the destruction of cellular membranes. In order to prevent the damage of membranes, antioxidants are used. The most powerful natural antioxidant is:
A. a-Tocoferol.
B. Glucose.
C. Vitamin A.
D. Fatty acids.
E. Glycerol.

100. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A Cholecalciferol
B Thiamin
C Pantothenic acid
D Bioflavonoids
E Riboflavin

101. In case of enterobiasis acrihine - the structural analogue of vitamin B_2 - is administered. The synthesis disorder of which enzymes does this medicine cause in microorganisms?
A. FAD-dependent dehydrogenases.
B. Cytochromeoxidases.
C. Peptidases.
D. NAD-dependent dehydrogenases.
E. Aminotransferases.

102. In order to speed up healing of the thermal injury it is required to prescribe a drug that facilitates epithelization of skin and mucous membranes. What drug is it?
A. Retinol acetate.
B. Tocopherol acetate
C. Nicotinic acid
D. Ergocalciferol
E. Ascorbic acid

103. The patient has the diagnosis of beriberi. What enzyme activity is broken at the patient?
A. Pyruvate dehydrogenase
B. Citrate synthase
C. Malate dehydrogenase
D. Succinate dehydrogenase
E. Fumarase

104. At the patient of 36 years old with chronic alcoholism, in blood pyruvate accumulation is developed, in erythrocytes - decrease in activity transketolase takes place. Name the coenzyme form of vitamin which insufficiency the specified changes are caused?
A. Thiamine pyrophosphate
B. Carboxybiotin
C. Methyl cobalamin
D. Phospho pyridoxal
E. Tetrahydrofolate

105. Pain along large nervous stems and increased amount of pyruvate in the blood were revealed in the patient. Insufficiency of what vitamin can cause such change?
A. B1.
B. B2.
C. PP.
D. Pantothenic acid.
E. Biotin.

106. A 9-month-old infant is fed with artificial formulas with unbalanced vitamin B6 concentration. The infant presents with pellagral dermatitis, convulsions, anaemia. Convulsion development might be caused by the disturbed formation of:
A. GABA.
B. Histamine.
C. Serotonin.
D. DOPA.
E. Dopamine.

107. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beriberi). What vitamin deficit results in development of this disease?

A. Thiamine.
B. Ascorbic acid.
C. Pyridoxine.
D. Folic acid.
E. Riboflavin.

108. In case of enterobiasis acrihine - the structural analogue of vitamin B2 - is administere The synthesis disorder of which enzymes does this medicine cause in microorganisms?
A. FAD-dependent dehydrogenases.
B. Cytochromeoxidases.
C. Peptidases.
D. NAD-dependet dehydrogenases.
E. Aminotransferases.

109. A 10-year-old girl often experiences acute respiratory infections with multiple spotty haemorrages in the places of clothes friction. Hypovitaminosis of what vitamin is present at the girl?
A. C.
B. B6.
C. B1.
D. A.
E. B2.

110. Hydroxylation of endogenous substrates and xenobiotics requires a donor of protons. Which of the following vitamins can play this role?
A. Vitamin C.
B. Vitamin P.
C. Vitamin B6.
D. Vitamin E.
E. Vitamin A.

111. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagene fibers. What vitamin absence caused disturbance of their hydroxylation?
A. Vitamin C.
B. Vitamin K.
C. Vitamin A.
D. Thiamine.
E. Vitamin E.

112. Examination of a patient suffering from frequent haemorrhages in the inner organs and mucous membranes revealed proline and lysine being included in collagen fibers. Impairment of their hydroxylation is caused by lack of the following vitamin:
A. C.
B. E.
C. K.
D. A.
E. D.

113. A patient consulted a doctor about symmetric dermatitis of open skin areas. It was found out that the patient lived mostly on cereals and ate too little meat, milk and eggs. What vitamin deficiency is the most evident?
A. Nicotinamide.
B. Calciferol.
C. Folic acid.
D. Biotin.
E. Tocopherol.

114. Examination of a child who hasn't got fresh fruit and vegetables during winter revealed numerous subcutaneous hemorrhages, gingivitis, carious cavities in teeth. What vitamin combination should be prescribed in this case?
A. Ascorbic acid and rutin.
B. Thiamine and pyridoxine.
C. Folic acid and cobalamin.
D. Riboflavin and nicotinamide.
E. Calciferol and ascorbic acid.

115. Concentration of pyruvate is increased in the patient's blood, the most of which is excreted with urin What avitaminosis is observed in the patient?
A. Avitaminosis B1.
B. Avitaminosis E.
C. Avitaminosis B3.
D. Avitaminosis B6.
E. Avitaminosis B2.

116. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beriberi). What vitamin

deficit results in development of this disease?
A. Thiamine.
B. Ascorbic acid.
C. Pyridoxine.
D. Folic acid.
E. Riboflavin.

117. While examining the child the doctor revealed symmetric cheeks roughness, diarrhea, disfunction of the nervous system. Lack of what food components caused it?
A. Nicotinic acid, tryptophane
B. Lysine, ascorbic acid.
C. Threonine, pantothenic acid.
D. Methionine, lipoic acid.
E. Phenylalanine, pangamic acid.

118. In clinical practice tuberculosis is treated with izoniazid preparation - that is an antivitamin able to penetrate into the tuberculosis bacillus. Tuberculostatic effect is induced by the interference with replication processes and oxidation-reduction reactions due to the buildup of pseudo-coenzyme:
A. NAD.
B. FAD.
C. FMN.
D. TDP.
E. CoQ.

119. A newborn child has convulsions that have been observed after prescription of vitamin B6. This most probable cause of this effect is that vitamin B6 is a componet of the following enzyme:
A. Glutamate decarboxylase.
B. Pyruvate dehydrogenase.
C. Ketoglutarate dehydrogenase.
D. Aminolevulinate synthase.
E. Glycogen phosphorylase.

120. A 3 year old child with symptoms of stomatitis, gingivitis and dermatitis of open skin areas was delivered to a hospital. Examination revealed inherited disturbance of neutral amino acid transporting in the bowels. These symptoms were caused by the deficiency of the following vitamin:
A. Niacin.
B. Pantothenic acid.
C. Vitamin A.
D. Cobalamin.
E. Biotin.

121. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A. Hydroxylation of proline.
B. Formation of polypeptide chains.
C. Glycosylation of hydroxylysine residues.
D. Removal of C-ended peptide from procollagen.
E. Detaching of N-ended peptide.

122. Vitamin B1 deficiency results in disturbance of oxidative decarboxylation of α-ketoglutaric acid. This will disturb synthesis of the following coenzyme:
A. Thiamine pyrophosphate.
B. Nicotinamide adenine dinucleotide (NAD).
C. Flavine adenine dinucleotide (FAD).
D. Lipoic acid.
E. Coenzyme A.

123. Surgical removal of a part of stomach resulted in disturbed absorption of vitamin B12, it is excreted with feces. The patient was diagnosed with anemia. What factor is necessary for absorption of this vitamin?
A. Gastromucoprotein.
B. Gastrin.
C. Hydrochloric acid.
D. Pepsin.
E. Folic acid.

124. Izoniazid preparation is used in clinical practice to treat tuberculosis. Tuberculostatic effect is induced by the interference with replication processes and oxidation-reduction reactions due to the buildup of pseudo-coenzyme:
A. NAD.

B. TMP.
C. FMN.
D. THF.
E. CoQ.

125. While examining the child the doctor revealed symmetric cheeks roughness, diarrhea, disfunction of the nervous system. Lack of what food components caused it?
A. Nicotinic acid, tryptophane.
B. Lysine, ascorbic acid.
C. Threonine, pantothenic acid.
D. Methionine, lipoic acid.
E. Phenylalanine, pangamic acid.

126. Vitamin B1 deficiency results in disturbance of oxidative decarboxylation of α-ketoglutaric acid. This will disturb synthesis of the following coenzyme:
A. TPP.
B. (NAD).
C. (FAD).
D. THF.
E. CoA.

127. Surgical removal of a part of stomach resulted in disturbed absorption of vitamin B12, it is excreted with feces. The patient was diagnosed with anemi What factor is necessary for absorption of this vitamin?
A. Gastromucoprotein.
B. Gastrin.
C. Hydrochloric acid.
D. Pepsin.
E. Folic acid.

128. Most participants of Magellan expedition to America died from avitominosis. This disease declared itself by general weakness, subcutaneous hemmorhages, falling of teeth, gingival hemmorhages. What is the name of this avitiminosis?
A. Scurvy.
B. Pellagra.
C. Rachitis.
D. Polyneuritis (beriberi).
E. Biermer's anemia.

129. A 3 year old child with symptoms of stomatitis, gingivitis and dermatitis of open skin areas was delivered to a hospital. Examination revealed inherited disturbance of neutral amino acid transporting in the bowels. These symptoms were caused by the deficiency of the following vitamin:
A. Niacin.
B. Cobalamin.
C. Vitamin A.
D. Biotin.
E. Pantothenic acid.

130. A clinic observes a 49 year old patient with significant prolongation of coagulation time, gastrointestinal haemorrhages, subcutaneous hematomas. These symptoms might be explained by the deficiency of the following vitamin:
A. K.
B. H.
C. B6.
D. B1.
E. E

131. Blood test of a patient suffering from atrophic gastritis gave the following results: RBCs - 2,0*1012/l, Hb- 87 g/l, colour index - 1,3, WBCs - 4,0*109/l, thrombocytes – 180*109/l. Anaemia migh have been caused by the following substance deficiency:
A. Vitamin B12.
B. Vitamin K.
C. Zinc.
D. Vitamin A.
E. Iron.

132. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A. Hydroxylation of proline.
B. Formation of polypeptide chains.
C. Glycosylation of hydroxylysine residues.
D. Removal of C-ended peptide from procollagen.
E. Detaching of N-ended peptide.

133. A 9-month-old infant is fed with artificial formulas with unbalanced vitamin B concentration. The infant presents with pellagral dermatitis, convulsions, anaemia. Convulsion development might be caused by the disturbed formation of:
A. GABA.
B. Histamine.
C. Serotonin.
D. DOPA.
E. Dopamine.

134. There is observed inhibited fibrillation in the patients with bile ducts obstruction, bleeding due to low level of absorbtion of some vitamin. What vitamin is in deficit?
A. K.
B. A.
C. D.
D. E.
E. Carotene.

135. Removal of gall bladder of a patient has disturbed processes of Ca absorption through the intestinal wall. What vitamin will stimulate this process?
A. D3.
B. PP.
C. C.
D. B12.
E. K.

136. Vitamin A together with specific cytoreceptors penetrates through the nuclear membranes, induces transcription processes that stimulate growth and differentiation of cells. This biological function is realized by the following form of vitamin A:
A. Trans-retinoic acid.
B. Trans-retinal.
C. Cis-retinal.
D. Retinol.
E. Carotin.

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

138. Examination of a man who hadn't been consuming fats but had been getting enough carbohydrates and proteins for a long time revealed dermatitis, poor wound healing, vision impairment. What is the probable cause of metabolic disorder?
A. Lack of linoleic acid, vitamins A, D, E, K.
B. Lack of palmitic acid.
C. Lack of vitamins PP, H.
D. Low caloric value of diet.
E. Lack of oleic acid.

139. To prevent postoperative bleeding a 6 y.o. child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A. Carboxylation of glutamin acid.
B. Phosphorylation of serine radicals.
C. Partial proteolysis.
D. Polymerization.
E. Glycosylation.

140. As a result of posttranslative modifications some proteins taking part in blood coagulation, particularly prothrombin, become capable of of calcium binding. The following vitamin takes part in this process:
A. K.
B. C.
C. A.
D. B1.
E. B2.

141. Posttranslative modifications of some proteins taking part in blood coagulation, lead to ability of calcium binding. What vitamin takes part in this process:
A. K.
B. C.

C. A.
D. B1.
E. B2.

142. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A. Cholecalciferol.
B. Thiamin.
C. Pantothenic acid.
D. Bioflavonoids.
E. Riboflavin.

143. A doctor examined a child and revealed symptoms of rachitis. Development of this deseasewas caused by deficiency of the following compound:
A. 1,25 [OH]-dichydroxycholecalciferol.
B. Biotin.
C. Tocopherol.
D. Naphtaquinone.
E. Retinol.

144. A patient who was previously ill with mastectomy as a result of breast cancer was prescribed radiation therapy. What vitamin preparation has marked radioprotective action caused by antioxidant activity?
A. Tocopherol acetate.
B. Thiamine chloride.
C. Ergocalciferol.
D. Folic acid.
E. Riboflavin.

145. A patient suffers from vision impairment - hemeralopy (night blindness). What vitamin preparation should be administered the patient in order to restore his vision?
A. Retinol acetate.
B. Pyridoxine.
C. Thiamine chloride.
D. Vicasol.
E. Tocopherol acetate.

146. A patient underwent an operation on account of gall bladder excision that resulted in obstruction of Ca absorption through the bowels wall. What vitamin wil stimulate this process?
A. D3.
B. B12.
C. K.
D. PP.
E. C.

147. A 64 year old woman has impairment of twilight vision (hemeralopy). What vitamin should be recommended in the first place?
A. Vitamin A.
B. Vitamin E.
C. Vitamin C.
D. Vitamin B6.
E. Vitamin B2.

148. The obstruction of Ca absorption through the bowels wall resulted after the operation on account of gall bladder. What vitamin wil stimulate this process?
A. Cholecalciferol.
B. Cobalamine.
C. Niacine.
D. Folic acid.
E. Riboflavine.

149. A 2-year-old child has got intestinal dysbacteriosis, which resulted in hemorrhagic syndrome. What is the most likely cause of hemorrhage of the child?
A. Vitamin K deficiency
B. Fibrinogen deficiency
C. Hypocalcemia
D. Activation of tissue thromboplastin
E. PP hypovitaminosis

150. To the patient with hypoplasia of dental solid tissue the dentist has appointed vitamins A and D by oral introduction. On what tactics of treatment is based?
A. These vitamins adjust an exchange a dental heteropolysaccharide and promote adjournment of calcium salt
B. These vitamins promote transformation of procollagen into collagen

C. These vitamins activate a power exchange in fabrics of a tooth
D. Promote replacement of strontic apatite by hydroxyapatite
E. –

151. The child has the delay of eruptions and wrong position of teeth. He has complaints about dryness in a mouth, occurrence of cracks in corners of a mouth with the subsequent suppuration. To what lack of vitamin it can be?
A. A
B. D
C. E
D. C
E. K

152. A girl of 10 years old frequently is ill with respiratory infections after which plural hemorrhages in places of friction of clothes are observed. Which hypovitaminosis takes place at the girl?
A. C
B. B6
C. B1
D. A
E. B2

153. At the woman of 35 years with chronic disease of kidneys the osteoporosis has developed. Specify what deficiency from below listed substances is a principal cause of this complication.
A. 1.25 (OH) 2 D3
B. 25 OH D3
C. D3
D. D2
E. Cholesterol

154. Pediatrist has examined the baby after an epileptiform fit, which receives artificial feeding. The baby has dermatitis also. At laboratory inspection decrease alanine-and aspartate aminotransferase activity of erythrocytes is established. What vitamin deficiency can be assumed?
A. Pyridoxine
B. Ascorbic acid
C. Cobalamin
D. Riboflavin
E. Calciferol

155. To the pregnant woman, which had in the anamnesis some stillborn foetus, the therapy is prescripted which contains vitamins. Indicate vitamin, which promotes carrying of a pregnancy.
A. Alfa-tocopherol.
B. Folic acid.
C. Cyanocobalamin
D. Pyridoxal phosphate
E. Rutin.

156. Patients complained of the general weakness and a bleeding from gum. What insufficiency of vitamin can be assumed?
A. Vitamin C
B. Vitamin E
C. Vitamin PP
D. Vitamin D
E. Vitamin B1

157. At inspection of the patient dermatitis, diarrhea, dementia are revealed. Specify, what absence of vitamin is the reason of this condition.
A. Nicotinamide.
B. Ascorbic acid.
C. Folic acid.
D. Biotin.
E. Rutin.

158. The patient has pellagra. At interrogation it became known, that for a long time he ate mainly corn, not enough using meat. What became the reason of pellagra?
A. Deficiency of tryptophan in corn
B. Deficiency of tyrosine in corn.
C. Deficiency of proline in corn
D. Deficiency of alanine in corn
E. Deficiency of histidine in corn

159. During home nursing the doctor has revealed at the child a symmetric roughness of cheeks, diarrhea, infringement of nervous activity. What lack of food factors is the reason of such condition?

A. Nicotinic acid, tryptophan
B. Lysine, ascorbic acid.
C. Threonine, pantothenic acid
D. Methionine, lipoic acid
E. Phenylalanine, pangamic acid.
E. Cysteine, folic acid

160. At the patient after removal of a gall-bladder process of Ca intestinal absorption through a wall of intestines is complicated. What vitamin will stimulate this process?
A. Vitamin D3
B. Vitamin PP
C. Vitamin C
D. Vitamin B12
E. Vitamin K

170. Institute of gerentology advises to people of old age to use a complex of vitamins which contains vitamin E. What main function it carries out?
A. Antioxidant.
B. Antihemorrhagic.
C. Antiscorbutic.
D. Antineuritis.
E. Antidermatitis.

171. Doctor - dietician advises the patient during treatment of the pernicious anemia to use in a diet a half-baked liver. What presence of vitamin in this product promotes treatment of an anemia?
A. Vitamin B12.
B. Vitamin B1
C. Vitamin B2.
D. Vitamin C
E. Vitamin H.

172. Vitamin A in a complex with specific cytoreceptors will penetrate through nuclear membranes, induces processes of a transcription, stimulates growth and a differentiation of cells. This biological function is realized by the following form of vitamin A:
A. Trans retinoic acid
B. Trans retinal
C. Cys retinal
D. Retinol
E. Carotin

173. At the patient such changes are marked: infringement of sight in twilight, dryness of the conjunctiva and a cornea. Such infringements can be at shortage of:
A. Vitamin A
B. Vitamin B
C. Vitamin C
D. Vitamin D
E. Vitamin B12

174. After removal 2/3 of the stomach the amount of erythrocytes has decreased in blood, the level of hemoglobin has decreased. What deficiency of vitamin leads to such changes of a picture of blood?
A. B12
B. C
C. P
D. B6
E. PP

175. To patient with recurrent thromboembolism, artificial anticoagulant pelentan is appointed. What vitamin antagonist is it?
A. Vitamin K
B. Vitamin E
C. Vitamin A
D. Vitamin D
E. Vitamin C

176. At the patient of 43 years with chronic atrophic gastritis, megaloblastic anemia observes. Urinalysis shows increasing of methylmalonic acid. What hypovitaminosis occurrence of the specified infringement caused?
A. Vitamin B12
B. Vitamin B2
C. Vitamin B3
D. Vitamin B5
E. Vitamin B1

177. For diagnostics of some diseases activity of the transaminases in the blood is defined. What vitamin is a cofactor part of these enzymes?
A. B6

B. B2
C. B1
D. B8
E. B5

178. A patient has enamel erosion. What vitamin should be administered for its treatment? A. D3
B. B1
C. PP
D. C
E. K

179. Ionizing radiation or vitamin E deficiency may increase the permeability of lysosome membranes. What consequences may arise from this pathology?
A. Partial or complete cell disintegration
B. Intensive protein synthesis
C. Intense energy synthesis
D. Restoration of the cytoplasmic membrane
E. Formation of cleavage spindle

180. Certain infections caused by bacteria are treated with sulphanilamides that block the synthesis of bacterial growth factor. What is the mechanism of these drugs action?
A. They are antivitamins of p-aminobenzoic acid.
B. They inhibit the folic acid absorption
C. They are allosteric enzyme inhibitors
D. They are involved in redox processes
E. They are allosteric enzymes

181. Hepatic disfunctions accompanied by insufficient inflow of bile to the bowels result in coagulation failure. This phenomenon can be explained by:
A. Vitamin K deficiency.
B. Iron deficiency
C. Thrombocytopenia
D. Erythropenia
E. Leukopenia

182. A patient has increased permeability of blood-vessel walls, increased gingival hemorrhage, small punctate hematomas on his skin, falling of teeth. What disturbance of vitamun metabolism can account for these symptoms?
A. Hypovitaminosis C.
B. Hypervitaminosis D
C. Hypervitaminosis C
D. Hypovitaminosis D
E. Hypovitaminosis A

183. A patient has the folowing changes: disorder of twilight vision, drying out of conjunctiva and cornea. Such disorders may be caused by deficiency of vitamin:
A.Vitamin A.
B. Vitamin B
C. Vitamin C
D. Vitamin D
E. Vitamin B12

184. A 2 year old child suffers from intestinal dysbacteriosis that lead to the development hemorrhagic syndrome. The most probable cause of hemorrhage is:
A. Vitamin K deficiency.
B. Activation of tissue thromboplastin
C. Hypovitaminosis PP
D. Fibrinogen deficiency
E. Hypocalcemia

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

BIOLOGICAL OXIDATION

1. Cytochrome oxidase is a hemeprotein that is an end component of the mitochondrial respiratory chain. What reaction is catalyzed with this enzyme?
A. Transfer of reduced equivalents to molecular oxygen
B. Cytochrome synthesis
C. Transfer of reduced equivalents to ubiquinone
D. Cytochrome splicing
E. Adenosine triphosphate synthesis

2. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotic takes place only in one phase - microsomal oxydation. Name a component of this phase:
A. Cytochrome P-450
B. Cytochrome B
C. Cytochrome C
D. Cytochrome A
E. Cytochrome oxidase

3. From the group of children who were eating sweet sappy watermelon two kids developed the signs of poisoning: rapid weakness, dizziness, headache, vomiting, edema, tachycardia, cyanosis of mouth, ears, tips of the fingers cyanosis. High concentration of nitrates was detected. What is the leading mechanism of the pathogenesis of the poisoning in the two children?
A. Insufficiency of met-Hb-reductase
B. Insufficiency of superoxiddismutase
C. Block cytochrome oxidase
D. Insufficiency glutathione pyroxidase
E. Insufficiency of catalase

4. Cyanide is a poison that causes instant death of the organism. What enzymes found in mitochondria are affected by cyanide?
A. Cytochrome oxidase (aa3)
B. Flavin enzymes
C. Cytochrome b5
D. NAD+-dependent dehydrogenase
E. Cytochrome P-450

5. Those organisms which in the process of evolution failed to develop protection from H2O2 can exist only in anaerobic conditions. Which of the following enzymes can break hydrogen peroxide down?
A. Peroxidase and catalase
B. Oxygenase and hydroxylase
C. Cytochrome oxidase, cytochrome B5
D. Oxygenase and catalase
E. Flavin-dependent oxidase

6. Biochemical analysis of an infant's erythrocytes revealed evident glutathione peroxidase deficiency and low concentration of reduced glutathione. What pathological condition can develop in this infant?
A. Hemolytic anemia
B. Iron-deficiency anemia
C. Megaloblastic anemia
D. Pernicious anemia
E. Sicklemia

7. The process of metabolism in the human body produces active forms of oxygen, including superoxide anion radical O -2. This anion is inactivated by the following enzyme:
A. Superoxide dismutase
B. Glutathione reductase
C. Catalase
D. Peroxidase
E. Glutathione peroxidase

8. During metabolic process active forms of the oxygen including superoxide anion radical are formed in the human body. With help of what enzyme is this anion activated?
A Superoxide dismutase
B Catalase
C Peroxidase
D Glutathioneperoxidase
E Glutathionereductase

9. Profuse foam appeared when dentist put hydrogen peroxide on the mucous of the oral cavity. What enzyme caused such activity?
A Catalase
B Cholinesterase
C Acetyltransferase

D Glucose-6-phosphatdehydrogenase
E Methemoglobinreductase

10. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotic takes place only in one phase - microsomal oxydation. Name a component of this phase:
A Cytochrome P-450
B Cytochrome B
C Cytochrome C
D Cytochrome A
E Cytochrome oxidase

11. During endotoxemia active forms of the oxygen including superoxide anion radical are formed in the human body. With help of what enzyme is this anion activated?
A Superoxide dismutase
B Catalase
C Peroxidase
D Glutathioneperoxidase
E Glutathionereductase

12. Increased production of thyroidal hormones T_3 and T_4, weight loss, tachycardia, psychic excitement and so on present on thyrotoxicosis. How do thyroidal hormones effect energy metabolism in the mitochondrion of cells?
A Disconnect oxidation and oxidated phosphorylation
B Activates phosphorylation of substance
C Stops phosphorylation of substance
D Stops respiratory chain
E Activates oxidated phosphorylation

13. Profuse foam appeared when dentist put hydrogen peroxide on the mucous of the oral cavity. What enzyme caused such activity?
A Catalase
B Cholinesterase
C Acetyltransferase
D Glucose-6-phosphatdehydrogenase
E Methemoglobin reductase

14. Pathological processes associated with the development of hypoxia can be caused by incomplete reduction of an oxygen molecule in the electron transport chain and accumulation of hydrogen peroxide. Choose the enzyme which breaks the hydrogen peroxide.
A. Catalase.
B. Cytochrome oxidase.
C. Succinate dehydrogenase.
D. a-Ketoglutarate dehydrogenase.
E. Aconitase.

15. Potassium cyanide is a very dangerous poison that causes instantaneous death of a human organism. What mitochondrial enzyme is affected by potassium cyanide?
A. Cytochrome oxidase (cytochrome aa3).
B. Flavine enzymes.
C. Cytochrome b.
D. NAD+-dependent dehydrogenases.
E. Cytochrome P450.

16. The living organisms that did develop the system of defence against the unfavorable action of H2O2 during the evolution can exist only in anaerobic conditions. Which of the enzymes can destroy hydrogen peroxide?
A. Peroxidase and catalase.
B. Oxygenases and hydroxylases
C. Cytochrome oxidase, cytochrome b.
D. Oxygenase and catalase.
E. Flavin-linked oxidases.

17. The central intermediate which is common for the catabolic pathways of proteins, carbohydrates and lipids is:
A. Acetyl-CoA
B. Succinyl-CoA.
C. Oxaloacetate.
D. Lactate.
E. Citrate.

18. During the necropsy of a 20-year old girl a pathologist concluded that the death of the patient had resulted from poisoning by cyanides. The activity of what enzyme is mostly inhibited by cyanides?
A. Cytochrome oxidase.
B. Malate dehydrogenase
C. Heme synthase.

D. Aspartate aminotransferase.
E. Carbamoyl phosphate synthetase.

19. Oral mucosa of a patient was treated with hydrogen peroxide. Instead of foaming, the blood turned brown. That is possible in case of reduced concentration of the following enzyme:
A. Catalase.
B. Pseudocholinesterase
C. Glucose-6-phosphate dehydrogenase
D. Acetyltransferase
E. Methemoglobin reductase

20. Profuse foam appeared when dentist put hydrogen peroxide on the mucous of the oral cavity. What enzyme caused such activity?
A. Catalase.
B. Cholinesterase.
C. Acetyltransferase.
D. Glucose-6-phosphat dehydrogenase.
E. Methemoglobinreductase .

21. ATP synthesis is totaly blocked in a cell. How will the value of membrane rest potential change?
A. It will disappear.
B. It will be slightly increase.
C. It will be considerably increase.
D. First it will increase, then decrease.
E. First it will decrease, then increase.

22. During metabolic process active forms of the oxygen including superoxide anion radical are formed in the human body. With help of what enzyme is this anion activated?
A. Superoxide dismutase.
B. Catalase.
C. Peroxidase.
D. Glutathioneperoxidase.
E. Glutathionereductase.

23. Increased production of thyroidal hormones T3 and T4, weight loss, tachycardia,
psychic excitement and so on present on thyrotoxicosis. How do thyroidal hormones effect energy metabolism in the mitochondrion of cells?
A. Disconnect oxidation and oxidated phosphorylation.
B. Activates phosphorylation of substance.
C. Stops phosphorylation of substance.
D. Stops respiratory chain.
E. Activates oxidated phosphorylation.

24. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotic takes place only in one phase - microsomal oxydation. Name a component of this phase:
A. Cytochrome P-450.
B. Cytochrome B.
C. Cytochrome C.
D. Cytochrome A.
E. Cytochrome oxidase.

25. Examination of a patient revealed II grade obesity. It is known that he consumes a lot of sweets and rich food, has sedentary way of life.That's why anabolic metabolism has the priority in his organism. Which of the following pathways is amphibolic?
A. Cycle of tricarboxylic acids.
B. Glyconeogenesis.
C. Lipolysis.
D. Glycolysis.
E. Fatty acids oxidation.

26. A patient suffering from stenocardia was taking nitroglycerine which caused restoration of blood supply of myocardium and relieved pain in the cardiac area. What intracellular mechanism provides restoration of energy supply of insulted cells?
A. Intensification of ATP resynthesis.
B. Increased permeability of membranes.
C. Reduction of ATP resynthesis.
D. Intensification of oxygen transporting into the cell.
E. Intensification of RNA generation.

27. During post-mortem examination medical examiner has established 40-years old woman, the death has come as a result of a cyanide poisoning. What process blocking by cyanide is the most possible reason of death?

A. Tissue respiration
B. Glycogen disassimilation
C. Glycolysis
D. Tricarboxylic acids cycle
E. Gluconeogenesis

28. For a normal metabolism of cells high-energy compounds are necessary. What belongs to high-energy compounds?
A. Phosphocreatine.
B. Kreatine.
C. Creatinine.
D. Glucose 6-phosphate.
E. Adenosine monophosphate.

29. What quantity of ATP molecules can be synthesized at full oxidation of Acetyl CoA in a tricarboxylic acids cycle?
A. 12
B. 1
C. 5
D. 8
E. 3

30. Cyanides are extremely powerful cellular poisons which at receipt in an organism can cause death. What enzyme blocking of tissue respiration underlies such their action:
A. Cytochrome oxidase
B. Pherochelatease
C. Catalase
D. MetHemoglobin reductase
E. Glucose 6-phosphate dehydrogenase

31. Reduced activity of antioxidant enzymes enhances peroxidation of cell membrane lipids. The reduction of glutathione peroxidase activity is caused by the following microelement deficiency:
A. Selenium
B. Copper
C. Cobalt
D. Molybdenum
E. Manganese

32. Cyanide poisoning causes immediate death. What is the mechanism of cyanide effect at the molecular level?
A. They inhibit cytochromoxidase.
B They bind substrates of tricarboxylic acid cycle
C They block succinate dehydrogenase
D They inactivate oxygene
E They inhibit cytochrome B

METABOLISM OF CARBOHYDRATES

1. A child with point mutation presents with absence of glucose 6-phosphatase, hypoglycemia, and hepatomegaly. What pathology are these signs characteristic of?
A. Von Gierke's disease (Glycogen storage disease type I)
B. Cori's disease (Glycogen storage disease type III)
C. Addison's disease (Primary adrenal insufficiency)
D. Parkinson's disease
E. McArdle's disease (Glycogen storage disease type V)

2. A 40-year-old woman with Cushing's disease presents with steroid diabetes. On biochemical examination she has hyperglycemia and hypochloremia. What process activates in the first place in such patients?
A. Gluconeogenesis
B. Glycogenolysis
C. Glucose reabsorption
D. Glucose transportation into a cell
E. Glycolysis

3. It is known that pentose-phosphate pathway actively functions in the erythrocytes. What is the main function of this metabolic pathway in the erythrocytes?
A. Counteraction to lipid peroxidation
B. Activation of microsomal oxidation
C. Neutralization of xenobiotics
D. Oxidation of glucose into lactate
E. Increase of lipid peroxidation

4. Inherited diseases, such as mucopolysaccharidoses, manifest in metabolic disorders of connective tissue, bone and joint pathologies. The sign of this disease is the excessive urinary excretion of the following substance:
A. Glycosaminoglycans
B. Amino acids
C. Glucose
D. Lipids
E. Urea

5. During starvation muscle proteins break up into free amino acids. These compounds will be the most probably involved into the following process:
A. Gluconeogenesis in liver
B. Gluconeogenesis in muscles
C. Synthesis of higher fatty acids
D. Glycogenolysis
E. Decarboxylation

6. 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. Glycolysis
B. Gluconeogenesis
C. Pentose-phosphate cycle
D. Lipolysis
E. Glycogeny

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

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. Glucose 6-phosphate dehydrogenase
C. Alpha amylase
D. Gamma amylase
E. Lysosomal glycosidase

9. A nurse accidentally injected a nearly double dose of insulin to a patient with diabetes mellitus. The patient lapsed into a

hypoglycemic coma. What drug should be injected in order to help him out of coma?
A. Glucose
B. Lidase
C. Insulin
D. Somatotropin
E. Noradrenaline

10. A 60 year old patient was found to have a dysfunction of main digestive enzyme of saliva. This causes the disturbance of primary hydrolysis of:
A. Carbohydrates
B. Fats
C. Proteins
D. Cellulose
E. Lactose

11. Examination of a patient revealed II grade obesity. It is known that he consumes a lot of sweets and rich food, has sedentary way of life. That's why anabolic metabolism has the priority in his organism. Which of the following pathways is amphibolic?
A. Cycle of tricarboxylic acids
B. Glyconeogenesis
C. Lipolysis
D. Glycolysis
E. Fatty acids oxidation

12. A 60-year-old male patient has a 9-year history of diabetes and takes insulin Semilente for the correction of hyperglycemia. 10 days ago he began taking anaprilin for hypertension. One hour after administration of the antihypertensive drug the patient developed hypoglycemic coma. What is the mechanism of hypoglycemia in case of anaprilin use?
A. Inhibition of glycogenolysis
B. Reduction of glucagon half-life
C. Increase of insulin Semilente half-life
D. Increase of bioavailability of insulin Semilente
E. Decrease in glucose absorption

13. Glycogen polysaccharide is synthesized from the active form of glucose. The immediate donor of glucose residues during the glycogenesis is:
A. UDP-glucose
B. Glucose-1-phosphate
C. ADP-glucose
D. Glucose-6-phosphate
E. Glucose-3-phosphate

14. Diseases of the respiratory system and circulatory disorders impair the transport of oxygen, thus leading to hypoxia. Under these conditions the energy metabolism is carried out by anaerobic glycolysis. As a result, the following substance is generated and accumulated in blood:
A. Lactic acid
B. Pyruvic acid
C. Glutamic acid
D. Citric acid
E. Fumaric acid

15. A 50-year-old patient with food poisoning is on a drip of 10% glucose solution. It not only provides the body with necessary energy, but also performs the function of detoxification by the production of a metabolite that participates in the following conjugation reaction:
A. Glucuronidation
B. Sulfation
C. Methylation
D. Glycosylation
E. Hydroxylation

16. The genetic defect of pyruvate carboxylase deficiency is the cause of delayed physical and mental development and early death in children. This defect is characterized by lacticemia, lactaciduria, disorder of a number of metabolic pathways. In particular, the following process is inhibited:
A. Citric acid cycle and gluconeogenesis
B. Glycolysis and glycogenolysis
C. Glycogenesis and glycogenolysis
D. Lipolysis and lipogenesis
E. Pentose phosphate pathway and glycolysis

17. In a young man during exercise, the minute oxygen uptake and carbon dioxide emission equalled to 1000 ml. What substrates are oxidized in the cells of his body?
A. Carbohydrates
B. Proteins
C. Fats
D. Carbohydrates and fats
E. Carbohydrates and proteins

18. It has been found out that one of a pesticide components is sodium arsenate that blocks lipoic acid. Which enzyme activity is impaired by this pesticide?
A. Pyruvate dehydrogenase complex
B. Microsomal oxidation
C. Methemoglobin reductase
D. Glutathione peroxidase
E. Glutathione reductase

19. Human red blood cells do not contain mitochondria. What is the main pathway for ATP production in these cells?
A. Anaerobic glycolysis
B. Aerobic glycolysis
C. Oxidative phosphorylation
D. Creatine kinase reaction
E. Cyclase reaction

20. A patient has a critical impairment of protein, fat and hydrocarbon digestion. Most likely it has been caused by low secretion of the following digestive juice:
A. Pancreatic juice
B. Saliva
C. Gastric juice
D. Bile
E. Intestinal juice

21. Prolonged fasting causes hypoglycemia which is amplified by alcohol consumption, as the following process is inhibited:
A. Gluconeogenesis
B. Glycolysis
C. Glycogenolysis
D. Lipolysis
E. Proteolysis

22. A 39-year-old female patient with a history of diabetes was hospitalized in a precomatose state for diabetic ketoacidosis. This condition had been caused by an increase in the following metabolite level:
A. Acetoacetate
B. Citrate
C. Alpha-ketoglutarate
D. Malonate
E. Aspartate

23. A child has a history of hepatomegaly, hypoglycemia, seizures, especially on an empty stomach and in stressful situations. The child is diagnosed with Gierke disease. This disease is caused by the genetic defect of the following enzyme:
A. Glucose-6-phosphatase
B. Amyloid-1,6-glycosidase
C. Phosphoglucomutase
D. Glycogen phosphorylase
E. Glucokinase

24. Pancreas is known as a mixed gland. Endocrine functions include production of insulin by beta cells. This hormone affects the metabolism of carbohydrates. What is its effect upon the activity of glycogen phosphorylase (GP) and glycogen synthase (GS)?
A. It inhibits GP and activates GS
B. It activates both GP and GS
C. It inhibits both GP and GS
D. It activates GP and inhibits GS
E. It does not affect the activity of GP and GS

25. Characteristic sign of glycogenosis is muscle pain during physical work. Blood examination usually reveals hypoglycemia. This pathology is caused by congenital defi¬ciency of the following enzyme:
A. Glycogen phosphorylase
B. Lysosomal glycosidase
C. Glucose 6-phosphate dehydrogenase
D. a-amylase
E. γ -amylase

26. Untrained people often have muscle pain after sprints as a result of lactate accumulation. This can be caused by intensification of the following biochemical process:
A. Glycolysis
B. Gluconeogenesis
C. Pentose phosphate pathway
D. Lipogenesis
E. Glycogenesis

27. It has been found out that one of a pesticide components is sodium arsenate that blocks lipoic acid. Which enzyme acti¬vity is impaired by this pesticide?
A. Pyruvate dehydrogenase complex
B. Glutathione reductase
C. Glutathione peroxidase
D. Methemoglobin reductase
E. Microsomal oxidation

28. According to the results of glucose tolerance test a patient has no disorder of carbohydrate tolerance. Despite that glucose is detected in the patients's urine (5 mmol/1). The patient has been diagnosed wi¬th renal diabetes. What renal changes cause glucosuria in this case?
A. Decreased activity of glucose reabsorption enzymes
B. Increased glucose secretion
C. Increased glucose filtration
D. Increased activity of glucose reabsorption pnyymes
E. Exceeded glucose reabsorption threshold

29. When blood circulation in the damaged tissue is restored, lactate accumulation stops and glucose consumption decelerates. These metabolic changes are caused by activation of the following process:
A. Aerobic glycolysis
B. Glycogen biosynthesis
C. Anaerobic glycolysis
D. Gluconeogenesis
E. Lipolysis

30. Diseases of respiratory system and ci¬rculatory disorders impair the transport of oxygen, thus causing hypoxia. Under these conditions the energy metabolism is carri¬ed out by anaerobic glycolysis. As a result, the following substance is generated and accumulated in blood:
A. Lactic acid
B. Fumaric acid
C. Glutamic acid
D. Citric acid
E. Pyruvic acid

31. Prior to glucose utilization in cells it is transported inside cells from extracellular space through plasmatic membrane. This process is stimulated by the following hormone:
A. Insulin
B. Aldosterone
C. Glucagon
D. Adrenalin
E. Thyroxin

32. A 15-year-old patient has fasting plasma glucose level 4,8 mmol/1, one hour after glucose challenge it becomes 9,0 mmol/1, in 2 hours it is 7,0 mmol/1, in 3 hours it is 4,8 mmol/1. Such parameters are characteristic of:
A. Subclinical diabetes mellitus
B. Diabetes mellitus type 1
C. Diabetes mellitus type 2
D. Healthy person
E. Cushing's disease

33. Characteristic sign of glycogenosis is muscle pain during physical work. Blood examination usually reveals hypoglycemia. This pathology is caused by congenital deficiency of the following enzyme:
A. Glycogen phosphorylase
B. Glucose-6-phosphate dehydrogenase
C. α-Amylase
D. Lysosomal glycosidase
E. γ-Amylase

34. Human red blood cells contain no mitochondria. What is the main pathway for ATP production in these cells?
A. Anaerobic glycolysis
B. Oxidative phosphorylation
C. Cyclase reaction
D. Aerobic glycolysis
E. Creatine kinase reaction

35. When blood circulation in the damaged tissue is restored lactate accumulation stops and glucose consumption decelerates. These metabolic changes are caused by activation of the following process:
A. Aerobic glycolysis
B. Gluconeogenesis
C. Lipolysis
D. Anaerobic glycolysis
E. Glycogen biosynthesis

36. When investigating human saliva it is necessary to assess its hydrolytic properties. What substance should be used as a substance in the process?
A. Starch
B. Amino acids
C. Proteins
D. Fiber
E. Fats

37. Fructosuria is known to be connected with inherited deficiency of fructose 1-phosphate aldolase. Which product of fructose metabolism will accumulate in the organism resulting in toxic action?
A. Fructose1-phosphate
B. Fructose 1,6-biphosphate
C. Glucose 1-phosphate
D. Fructose 6-phosphate
E. Glucose 6-phosphate

38. Pancreas in knows as a mixed gland. Endocrine functions include production of insulin by beta cells. This hormone affects metabolism of carbohydrates. What is its effect on the activity of glycogen phosphorylase (GP) and glycogen synthase (GS)?
A. It inhibits GP and activates GS
B. It activates both GP and GS
C. It inhibits both GP activates GS
D. It does not affect the activity of GP and GS
E. It activates GP and inhibits GS

39. Galactosemia is revealed in the child. Concentration of glucose in the blood is not considerably changed. Deficiency of what enzyme caused this illness?
A Galactose-1-phosphate uridyltransferase
B Amylo-1,6-glucosidase
C Phosphoglucomutase
D Galactokinase
E Hexokinase

40. 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 Glucose 6-phosphate dehydrogenase
C Alpha amylase
D Gamma amylase
E Lysosomal glycosidase

41. A patient is ill with diabetes mellitus that is accompanied by hyperglycemia of over 7,2 millimole/l on an empty stomach. The level of what blood plasma protein allows to estimate the glycemia rate retrospectively (4-8 weeks before examination)?
A Glycated hemoglobin
B Albumin
C Fibrinogen
D C-reactive protein
E Ceruloplasmin

42. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of what acid substance to the blood can this state be explained?
A Lactate
B Pyruvate
C 1,3-bisphosphoglycerate
D α-ketoglutarate

E 3-phosphoglycerate

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

44. As a result of exhausting muscular work a worker has largely reduced buffer capacity of blood. What acidic substance that came to blood caused this phenomenon?
A Lactate
B Pyruvate
C 1,3-bisphosphoglycerate
D 3-phosphoglycerate
E -

45. A child is languid, apathetic. Liver is enlarged and liver biopsy revealed a significant excess of glycogene. Glucose concentration in the blood stream is below normal. What is the cause of low glucose concentration?
A Low (absent) activity of glycogene phosphorylase in liver
B Low (absent) activity of hexokinase
C High activity of glycogen synthetase
D Low (absent) activity of glucose 6-phosphatase
E Deficit of a gene that is responsible for synthesis of glucose 1-phosphaturidine transferase

46. A nurse accidentally injected a nearly double dose of insulin to a patient with diabetes mellitus. The patient lapsed into a hypoglycemic coma. What drug should be injected in order to help him out of coma?
A Glucose
B Lidase
C Insulin
D Somatotropin
E Noradrenaline

47. After a sprint an untrained person develops muscle hypoxia. This leads to the accumulation of the following metabolite in muscles:
A Lactate
B Ketone bodies
C Acetyl CoA
D Glucose 6-phosphate
E Oxaloacetate

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

49. A child's blood presents high content of galactose, glucose concentration is low. There are such presentations as cataract, mental deficiency, adipose degeneration of liver. What disease is it?
A Galactosemia
B Diabetes mellitus
C Lactosemia
D Steroid diabetes
E Fructosemia

50. 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

51. When blood circulation in the damaged tissue is restored, then lactate accumulation comes to a stop and glucose consumption decelerates. These metabolic changes are caused by activation of the following process:

A Aerobic glycolysis
B Anaerobic glycolysis
C Lipolysis
D Gluconeogenesis
E Glycogen biosynthesis

52. During starvation muscle proteins break up into free amino acids. These compounds will be the most probably involved into the following process:
A Gluconeogenesis in liver
B Gluconeogenesis in muscles
C Synthesis of higher fatty acids
D Glycogenolysis
E Decarboxylation

53. Examination of a patient revealed II grade obesity. It is known that he consumes a lot of sweets and rich food, has sedentary way of life. That's why anabolic metabolism has the priority in his organism. Which of the following pathways is amphibolic?
A Cycle of tricarboxylic acids
B Glyconeogenesis
C Lipolysis
D Glycolysis
E Fatty acids oxidation

54. 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 Lactase
B Invertase
C Maltase
D Amylase
E Isomaltase

55. Glycogen polysaccharide is synthesized from the active form of glucose. The immediate donor of glucose residues during the glycogenesis is:
A UDP-glucose
B Glucose-1-phosphate
C ADP-glucose
D Glucose-6-phosphate
E Glucose-3-phosphate

56. Galactosemia is revealed in the child. Concentration of glucose in the blood is not considerably changed. Deficiency of what enzyme caused this illness?
A Galactose-1-phosphate uridyltransferase
B Amylo-1,6-glucosidase
C Phosphoglucomutase
D Galactokinase
E Hexokinase

57. 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. Glucose 6-phosphate dehydrogenase
C. Alpha amylase
D. Gamma amylase
E. Lysosomal glycosidase

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

59. A patient is ill with diabetes mellitus that is accompanied by hyperglycemia of over 7,2 millimole/l on an empty stomach. The level of what blood plasma protein allows to estimate the glycemia rate retrospectively (4-8 weeks before examination)?
A. Glycated hemoglobin
B. Albumin
C. Fibrinogen
D. C-reactive protein
E. Ceruloplasmin

60. A 62-year-old female patient has developed a cataract (lenticular opacity) secondary to the diabetes mellitus. What

type of protein modification is observed in case of diabetic cataract?
A. Glycosylation
B. Phosphorylation
C. ADP-ribosylation
D. Methylation
E. Limited proteolysis

61. The B cells of endocrine portion of pancreas are selectively damaged by alloxan poisoning. How will it be reflected in blood plasma?
A. The content of sugar increases
B. The content of fibrinogen decrease
C. The level of sugar decreases
D. The content of globulins decreases
E. The content of albumins decreases

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

63. A patient was delivered to the hospital by an emergency team. Objectively: grave condition, unconscious, adynamy. Cutaneous surfaces are dry, eyes are sunken, face is cyanotic. There is tachycardia and smell of acetone from the mouth. Analysis results: blood glucose - 20,1 micromole/l, urine glucose - 3,5% . What is the most probable diagnosis?
A. Hyperglycemic coma
B. Hypoglycemic coma
C. Acute heart failure
D. Acute alcoholic intoxication
E. Anaphylactic shock

64. Patient with diabetes mellitus experienced loss of consciousness and convulsions after injection of insulin. What is the result of biochemical blood analysis for concentration of the sugar?
A. 1,5 mmol/L
B. 8,0 mmol/L
C. 10,0 mmol/L
D. 3,3 mmol/L
E. 5,5 mmol/L

65. 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 thyrotoxicosis

66. A child is languid, apathetic. Liver is enlarged and liver biopsy revealed a significant excess of glycogene. Glucose concentration in the blood stream is below normal. What is the cause of low glucose concentration?
A. Low (absent) activity of glycogene phosphorylase in liver
B. Low (absent) activity of hexokinase
C. High activity of glycogen synthetase
D. Low (absent) activity of alfa-1,4-glucosidase
E. Deficit of glucose 1-phosphaturidine transferase

67. After a sprint an untrained person develops muscle hypoxia. This leads to the accumulation of the following metabolite in muscles:
A. Lactate
B. Ketone bodies
C. Acetyl CoA
D. Glucose 6-phosphate
E. Oxaloacetate

68. Myocyte cytoplasm contains a big number of dissolved metabolites of glucose oxidation. Name one of them that turns directly into a lactate:
A. Pyruvate

B. Oxaloacetate
C. Glycerophosphate
D. Glucose 6-phosphate
E. Fructose 6-phosphate

69. A child's blood presents high content of galactose, glucose concentration is low. There are such presentations as cataract, mental deficiency, adipose degeneration of liver. What disease is it?
A. Galactosemia
B. Diabetes mellitus
C. Lactosemia
D. Steroid diabetes
E. Fructosemia

70. 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

71. The patient with complaints of permanent thirst applied to the doctor. Hyperglycemia,polyuria and increased concentration of 17-ketosteroids in the urine were revealed. What disease is the most likely?
A. Steroid diabetes
B. Insulin-dependent diabetes mellitus
C. Myxoedema
D. Type I glycogenosis
E. Addison's disease

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

73. During starvation muscle proteins break up into free amino acids. These compounds will be the most probably involved into the following process:
A. Cori cycle
B. Gluconeogenesis in muscles
C. Synthesis of higher fatty acids
D. Glycogenolysis
E. Decarboxylation

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

75. After taking sulfonamides and aspirin by a 38-year-old patient, hemolysis of erythrocytes caused by the insufficiency of glucose-6-phosphate dehydrogenase developed. The disturbance of what coenzyme formation does this pathology result from?
A. NADPH
B. FADH2
C. Pyridoxal phosphate
D. FMNH2.
E. Ubiquinone.

76. A child with point mutation has the absence of glucose- 6- phosphate 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.

77. The concentration of glucose in the blood plasma of a healthy man varies within the following limits:
A. 3.3-5.5 mM/L
B.. 2.0-4.0 mM/L.
C. 10.0-25.0 mM/L.
D. 6.0-9.5 mM/L.
E. 1.0-2.0 mM/L.

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

79. 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. Lactase.
B. Amylase.
C. Saccharase.
D.lsomaltase.
E. Maltase.

80. 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. Galactose
B. Fructose.
C. Glucose.
D. Maltose.
E. Saccharose.

81. 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. Oxaloacetate
B. 2-0xoglutarate.
C. Glutamate.
D. Aspartate.
E. Succinate.

82. A 38-year-old man is receiving treatment for schizophrenia in hospital. The initial levels of glucose, ketone bodies and urea in the blood are within the normal range. Shock therapy put into practice by regular insulin injections resulted in the development of the comatose state which improved the clinical status of the patient. What is the most probable cause of insulin coma?
A. Hypoglycemia.
B. Dehydratation of tissues.
C. Metabolic acidosis.
D. Ketonemia.
E. Hyperglycemia.

83. A 7-year-old girl manifests obvious signs of anemia. Laboratory tests showed the deficiency of pyruvate kinase activity in erythrocytes. The disorder of what biochemical process is a major factor in the development of anemia?
A. Anaerobic glycolysis.
B. Oxidative phosphorylation.
C. Tissue respiration.
D. Breaking up of peroxides.
E. Deamination of amino acid.

84. A 45-year-old woman does not have any symptoms of insulin dependent diabetes mell itus but testing on an empty stomach showed the increase of the blood glucose level (7.5 mM/l). What additional laboratory test needs to be done to substantiate the diagnosis?
A. Determination of tolerance to glucose on an empty stomach.
B. Determination of ketone bodies concentration in the urine.

C. Determination of rest nitrogen level in the blood.
D. Determination of tolerance to glucose.
E. Determination of glycosylated hemoglobin level.

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

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

87. One of the means of regulating enzyme activity in a human body is the covalent modification Glycogen phosphorylase and glycogen synthetase activity is regulated by the following type of covalent modification:?
A. Phosphorylation-dephosphorylation.
B. ADP-ribosylation
C. Methylation
D. Hydrolysis
E. Sulfonation

88. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of what acid substance to the blood can this state be explained?
A. Lactate.
B. Pyruvate.
C. 1,3-bisphosphoglycerate.
D. α-ketoglutarate.
E. 3-phosphoglycerate.

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

90. As a result of exhausting muscular work a worker has largely reduced buffer capacity of blood. What acidic substance that came to blood caused this phenomenon?
A. Lactate.
B. Pyruvate.
C. 1,3-bisphosphoglycerate.
D. 3-phosphoglycerate.
E. -.

91. After a sprint an untrained person develops muscle hypoxi This leads to the accumulation of the following metabolite in muscles:
A. Lactate.
B. Ketone bodies.
C. Acetyl CoA.
D. Glucose 6-phosphate.
E. Oxaloacetate.

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

93. During starvation muscle proteins break up into free amino acids. These compounds will be the most probably involved into the following process:
A. Gluconeogenesis in liver.
B. Gluconeogenesis in muscles.
C. Synthesis of higher fatty acids.
D. Glycogenolysis.

E. Decarboxylation.

94. Characteristic sign of glycogenosis is muscle pain during physical work. Blood examination reveals usually hypoglycemi This pathology is caused by congenital deficiency of the following enzyme:
A. Glycogen phosphorylase.
B. Glucose 6-phosphate dehydrogenase.
C. Alpha amylase.
D. Gamma amylase.
E. Lysosomal glycosidase.

95. A child is languid, apathetic Liver is enlarged and liver biopsy revealed a significant excess of glycogen Glucose concentration in the blood stream is below normal. What is the cause of low glucose concentration?
A. Low (absent) activity of glycogene phosphorylase in liver.
B. Low (absent) activity of hexokinase.
C. High activity of glycogen synthetase.
D. Low (absent) activity of glucose 6-phosphatase.
E. Deficit of a gene that is responsible for synthesis of glucose 1-phosphaturidine transferase.

96. Galactosemia is revealed in the child Concentration of glucose in the blood is not considerably change Deficiency of what enzyme caused this illness?
A. Galactose-1-phosphate uridyltransferase.
B. Amylo-1,6-glucosidase.
C. Phosphoglucomutase.
D. Galactokinase.
E. Hexokinase.

97. 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.

98. A child's blood presents high content of galactose, glucose concentration is low. There are such presentations as cataract, mental deficiency, adipose degeneration of liver. What disease is it?
A. Galactosemia.
B. Diabetes mellitus.
C. Lactosemia.
D. Steroid diabetes.
E. Fructosemia.

99. To prevent long-term effects of 4-day malaria a 42-year-old patient was prescribed primaquine. On the 3-rd day from the begin of treatment there appeared stomach and heart pains, dyspepsia, general cyanosis, hemoglobinuria. What caused side effects of the preparation?
A. Genetic insufficiency of glucose 6-phosphate dehydrogenase.
B. Delayed urinary excretion of the preparation.
C. Cumulation of the preparation.
D. Decreased activity of microsomal liver enzymes.
E. Drug potentiation by other preparations.

100. A child has got galactosemia. Concentration of glucose in blood has not considerably changed. Deficiency of what enzyme caused this illness?
A. Galactose-1-phosphate uridyltransferase.
B. Phosphoglucomutase.
C. Amylo-1,6-glucosidase.
D. Galactokinase.
E. Hexokinase.

101. 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. Gluconeogenesis activation.
B. Inhibition of glycogen synthesis.
C. Intensification of glucose absorption in the bowels.
D. Glycogenogenesis activation.

E. Activation of insulin decomposition.

102. 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. Glycolysis.
B. Gluconeogenesis.
C. Glycogenolysis.
D. Pentose-phosphate cycle.
E. Lipolysis.

103. A nontrained 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. -

104. 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

105. 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

106. 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

107. 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

108. 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 Pathway
C. Gluconeogenesis
D. Aerobic glycolysis
E. Glucose alanine cycle

109. A 22 year old woman has been taking sulfanilamides for a long time that led to symptoms of hemolytic anaemia caused by hereditary disturbance of synthesis of glucose 6-phosphate dehydrogenase. This enzyme of pentose-phosphate cycle is responsible for generation of:
A. NADP-H2.
B. NAD
C. FAD
D. FMN
E. ATP.

110. It has been revealed that intense physical exercise causes activation of gluconeogenesis in liver of experimantal rats. Which substance is glucose precursor in this case?
A. Pyruvate
B. Glycogen
C. Urea
D. Stearate
E. Palmitate.

111. It is known that the pentose phosphate pathway occuring in the adipocytes of adipose tissue acts as a cycle. What is the main function of this cycle in the adipose tissue?
A. NADPH2 generation
B. Energy generation
C. Glucose oxidation to end products
D. Xenobiotic detoxification
E. Ribose-phosphate production

112. A patient is diagnosed with glucocerebroside lipidosis (Gaucher's disease) that manifests as splenomegaly, liver enlargement, affected bone tissue, and neuropathies. What enzyme of complex lipid catabolism is deficient, thus causing this disease?
A. Glucocerebrosidase
B. Hyaluronidase
C. Sphingomyelinase
D. β-galactosidase
E. Hexosaminidase

METABOLISM OF LIPIDS

1. Blood of the patients with diabetes mellitus shows increased content of free fatty acids. Name the most likely cause of this:
A. Increased activity of adipose triglyceride lipase
B. Accumulation of palmitoyl-CoA in cytosol
C. Activation of ketone bodies utilization
D. Activation of apoA1, apoA2, and apoA4 apolipoprotein synthesis
E. Decreased activity of plasma phosphatidylcholine-cholesterolacyltransferase

2. A 2-year-old child presents with acute psychomotor retardation, vision and hearing impairment, sharp enlargement of the liver and spleen. The child is diagnosed with hereditary Niemann-Pick disease. What genetic defect is the cause of this disease?
A. Sphingomyelinase deficiency
B. Glucose 6-phosphatase deficiency
C. Amylo-1,6-glucosidase deficiency
D. Acid lipase deficiency
E. Xanthine oxidase deficiency

3. A patient presents with steatorrhea. This disorder can be linked to disturbed supply of the intestine with the following substances:
A. Bile acids
B. Carbohydrates
C. Tripsin
D. Chymotrypsin
E. Amylase

4. A 67-year-old man consumes eggs, pork fat, butter, milk andmeat.Blood test results: cholesterol - 12,3 mmol/l, total lipids - 8,2 g/l, increased low-density lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
A. Hyperlipoproteinemia type IIa
B. Hyperlipoproteinemia type I
C. Hyperlipoproteinemia type IIb
D. Hyperlipoproteinemia type IV
E. Cholesterol, hyperlipoproteinemia

5. 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. Choline
B. DOPA
C. Cholesterol
D. Acetoacetate
E. Linoleic acid

6. A patient has normally coloured stool including a large amount of free fatty acids. The reason for this is a disturbance of the following process:
A. Fat absorption
B. Fat hydrolysis
C. Biliary excretion
D. Choleresis
E. Lipase secretion

7. One of the factors that cause obesity is the inhibition of fatty acids oxidation due to:
A. Low level of carnitine
B. Impaired phospholipid synthesis
C. Excessive consumption of fatty foods
D. Choline deficiency
E. Lack of carbohydrates in the diet

8. Deficiency of linoleic and linolenic acids in the body leads to the skin damage, hair loss, delayed wound healing, thrombocytopenia, low resistance to infections. These changes are most likely to be caused by the impaired synthesis of the following substances:
A. Eicosanoids
B. Interleukins
C. Interferons
D. Catecholamines
E. Corticosteroids

9. A 67-year-old male patient consumes eggs, pork fat, butter, milk and meat. Blood test results: cholesterol - 12,3 mmol/l, total lipids - 8,2 g/l, increased lowdensity

lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
A. Hyperlipoproteinemia type IIa
B. Hyperlipoproteinemia type I
C. Hyperlipoproteinemia type IIb
D. Hyperlipoproteinemia type IV
E. Cholesterol, hyperlipoproteinemia

10. Due to the blockage of the common bile duct (which was radiographically confirmed), the biliary flow to the duodenum was stopped.We should expect the impairment of:
A. Fat emulsification
B. Protein absorption
C. Carbohydrate hydrolysis
D. Secretion of hydrochloric acid
E. Salivation inhibition

11. A patient underwent a course of treatment for atherosclerosis. Laboratory tests revealed an increase in the antiatherogenic lipoprotein fraction in the blood plasma. The treatment efficacy is confirmed by the increase in:
A. HDL
B. VLDL
C. IDL
D. LDL
E. Chylomicrons

12. Increased HDL levels decrease the risk of atherosclerosis. What is the mechanism of HDL anti-atherogenic action?
A. They remove cholesterol from tissues
B. They supply tissues with cholesterol
C. They are involved in the breakdown of cholesterol
D. They activate the conversion of cholesterol to bile acids
E. They promote absorption of cholesterol in the intestine

13. A drycleaner's worker has been found to have hepatic steatosis. This pathology can be caused by the disruption of synthesis of the following substance:
A. Phosphatidylcholine
B. Tristearin
C. Urea
D. Phosphatidic acid
E. Cholic acid

14. A patient has a critical impairment of protein, fat and hydrocarbon digestion. Most likely it has been caused by low secretion of the following digestive juice:
A. Pancreatic juice
B. Saliva
C. Gastric juice
D. Bile
E. Intestinal juice

15. A 67-year-old male patient consumes eggs, pork fat, butter, milk and meat. Blood test results: cholesterol - 12,3 mmol/l, total lipids - 8,2 g/l, increased low-density lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
A. Hyperlipoproteinemia type IIa
B. Hyperlipoproteinemia type I
C. Hyperlipoproteinemia type IIb
D. Hyperlipoproteinemia type IV
E. Cholesterol, hyperlipoproteinemia

16. Steatosis is caused by the accumulation of triacylglycerols in hepatocytes. One of the mechanisms of this disease development is a decrease in the utilization of VLDL neutral fat. What lipotropics prevent the development of steatosis?
A. Methionine, B6, B12
B. Arginine, B2, B3
C. Alanine, B1, PP
D. Valine, B3, B2
E. Isoleucine, B1, B2

17. A patient has symptoms of atherosclerosis. What plasma lipid transport forms should have an increased concentration?
A. LDL.
B. Chylomicrons
C. IDL
D. HDL

E. VLDL

18. Disruption of nerve fiber myelinogenesis causes neurological disorders and mental retardation. These symptoms are typical for hereditary and acquired alterations in the metabolism of:
A. Sphingolipids
B. Neutral fats
C. Higher fatty acids
D. Cholesterol
E. Phosphatidic acid

19. Increased HDL levels decrease the risk of atherosclerosis. What is the mechanism of HDL anti-atherogenic action?
A. They remove cholesterol from tissues
B. They supply tissues with cholesterol
C. They activate the conversion of cholesterol to bile acids
D. They promote absorption of cholesterol in the intestine
E. They are involved in the breakdown of cholesterol

20. A drycleaner's worker has been found to have hepatic steatosis. This pathology can be caused by the disruption of synthesis of the following substance:
A. Phosphatidylcholine
B. Phosphatidic acid
C. Tristearin
D. Urea
E. Cholic acid

21. One of the factors that cause obesity is inhibition of fatty acids oxidation due to:
A. Low level of carnitine
B. Choline deficiency
C. Excessive consumption of fatty foods
D. Impaired phospholipid synthesis
E. Lack of carbohydrates in the diet

22. Cholesterol content in blood serum of a 12-year-old boy is 25 mmol/1. Anamnesis states hereditary familial hypercholesterolemia caused by synthesis disruption of receptor-related proteins for:
A. Low-density lipoproteins
B. Middle-density lipoproteins
C. Chylomicrons
D. Very low-density lipoproteins
E. High-density lipoproteins

23. Obesity is a common disease. The aim of its treatment is to lower content of neutral fats in the body. What hormone-sensitive enzyme is the most important for intracellular lipolysis?
A. Triacylglycerol lipase
B. Diacylglycerol lipase
C. Monoacylglycerol lipase
D. Adenylate kinase
E. Protein kinase

24. The key reaction of fatty acid synthesis is production of malonyl-CoA. What metabolite is the source of malonyl-CoA synthesis?
A. Acetyl-CoA
B. Citrate
C. Succinyl-CoA
D. Malonate
E. Acyl-CoA

25. Cholesterol content in blood serum of 12-year-old is 25 mmol/l. Anamnesis states hereditary familial hypercholesterolemia caused by synthesis disruption of receptor-related proteins for:
A. Low-density lipoproteins
B. High-density lipoproteins
C. Middle-density lipoproteins
D. Very low-density lipoproteins
E. Chylomicrons

26. Fatty of phospholipids is disordered due to fat infiltration of the liver. Indicate which of the presented substances can enhance the process of methylation during phospholipids synthesis?
A Methionine
B Ascorbic acid
C Glucose
D Glycerin
E Citrate

27. Increased amount of free fat acids is observed in the blood of the patients with diabetes mellitus. It can be caused by:

A Increased activity of triglyceridelipase adipocytes
B Storage of palmitatoil-CoA
C Activation of the ketone bodies utilization
D Activation of the synthesis of the apolipoproteins
E Decreased activity of phosphatidylcholine-cholesterol-acyltransferase blood plasma

28. 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 Transport of FFA (free fatty acids) from cytosol to the mitochondria
B Transport of FFA from fat depots to the tissues
C It takes part in one of reactions of FFA beta-oxidation
D FFA activation
E Activation of intracellular lipolysis

29. Utilization of arachidonic acid via cyclooxigenase pathway results in formation of some bioactive substances. Name them:
A Prostaglandins
B Thyroxine
C Biogenic amins
D Somatomedins
E Insulin-like growth factors

30. Carnitine including drug was recomended to the sportsman for improving results. What process is activated most of all with help of carnitine?
A Transport of fatty acids to the mitochondria
B Synthesis of steroid hormones
C Synthesis of ketone bodies
D Synthesis of lipids
E Tissue respiration

31. 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 Fat emulsification
B Protein digestion
C Carbohydrate digestion
D Glycerin absorption
E Amino acid absorption

32. A sportsman was recommended to take a medication that contains carnitine in order to improve his results. What process is activated by carnitine the most?
A Fatty acids transport to mitochondrions
B Synthesis of steroid hormones
C Synthesis of ketone bodies
D Synyhesis of lipids
E Tissue respiration

33. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?
A Cyclic adenosine monophosphate
B Cyclic guanosine monophosphate
C Adenosine monophosphate
D Diacylglycerol
E Ions of Ca^{2+}

34. Desulfiram is widely used in medical practice to prevent alcocholism. It inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcochol?
A Acetaldehyde
B Ethanol
C Malonyl aldehyde
D Propionic aldehyde
E Methanol

35. A 1-year-old child with symptoms of muscle involvement was admitted to the hospital. Examination revealed carnitine deficiency in his muscles. What process disturbance is the biochemical basis of this pathology?
A Transporting of fatty acids to mitochodrions
B Regulation of Ca^{2+} level in mitochondrions
C Substrate phosphorylation
D Lactic acid utilization
E Actin and myosin synthesis

36. 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 Wilson's syndrome
C Turner's syndrome
D Niemann-Pick disease
E MacArdle disease

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

38. 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

39. 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

40. After consumption of rich food a patient has nausea and heartburn, steatorrhea. Thiscondition might be caused by:
A Bile acid deficiency
B Increased lipase secretion
C Disturbed tripsin synthesis
D Amylase deficiency
E Disturbed phospholipase synthesis

41. Fatty of phospholipids is disordered due to fat infiltration of the liver. Indicate which of the presented substances can enhance the process of methylation during phospholipids synthesis?
A Methionine
B Ascorbic acid
C Glucose
D Glycerin
E Citrate

42. Increased amount of free fatty acids is observed in the blood of the patients with diabetes mellitus. It can be caused by:
A Increased activity of triglyceridelipase adipocytes
B Storage of palmitatoil-CoA
C Activation of the ketone bodies utilization
D Activation of the synthesis of the apolipoproteins
E Decreased activity of phosphatidylcholine-cholesterol-acyltransferase blood plasma

43. 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 Transport of FFA (free fatty acids) from cytosol to the mitochondria
B Transport of FFA from fat depots to the tissues
C It takes part in one of reactions of FFA beta-oxidation
D FFA activation
E Activation of intracellular lipolysis

44. 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 Choline

B DOPA
C Cholesterol
D Acetoacetate
E Linoleic acid

45. Carnitine including drug was recomended to the sportsman for improving results. What process is activated most of all with help of carnitine?
A Transport of fatty acids to the mitochondria
B Synthesis of steroid hormones
C Synthesis of ketone bodies
D Synthesis of lipids
E Tissue respiratio

46. After intake of rich food a patient feels nausea and sluggishness; with time there appeared signs of steatorrhea. Blood cholesterine concentration is 9,2 micromole/l. This condition was caused by lack of:
A Bile acids
B Triglycerides
C Fatty acids
D Phospholipids
E Chylomicrons

47. Examination of a man who hadn't been consuming fats but had been getting enough carbohydrates and proteins for a long time revealed dermatitis, poor wound healing, vision impairment. What is the probable cause of metabolic disorder?
A Lack of linoleic acid, vitamins A, D, E, K
B Lack of palmitic acid
C Lack of vitamins PP, H
D Low caloric value of diet
E Lack of butiric acid

48. 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

49. A sportsman was recommended to take a medication that contains carnitine in order to improve his results. What process is activated by carnitine the most?
A Fatty acids transport to mitochondrions
B Synthesis of steroid hormones
C Synthesis of ketone bodies
D Synyhesis of lipids
E Tissue respiration

50. 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 Fats emulsification
B Protein digestion
C Carbohydrate digestion
D Glycerin absorption
E Amino acid absorption

51. 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 Wilson's syndrome
C Turner's syndrome
D Niemann-Pick disease
E MacArdle disease

52. NSAID blockade the utilization of arachidonic acid via cyclooxigenase pathway, which results in formation of some bioactive substances. Name them:
A Prostaglandins
B Thyroxine
C Biogenic amins
D Somatomedins
E Insulin-like growth factors

53. Arachidonic acid, an essential component of a human diet, acts as a precursor of the vitally important physiologically active biomolecules. Which

substances are synthesized via cyclooxigenase pathway from arachidonic acid?
A. Prostaglandins
B. Choline.
C. Noradrenaline.
D. Ethanolamine.
E. Triiodothyronine.

54. A 1-year-old child with symptoms of muscle involvement was admitted to the hospital. Examination revealed carnitine deficiency in his muscles. What process disturbance is the biochemical basis of this pathology?
A Transporting of fatty acids to mitochodrions
B Regulation of Ca2+ level in mitochondrions
C Substrate phosphorylation
D Lactic acid utilization
E Actin and myosin synthesis

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

56. 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

57. 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 complex are TAG transported from the liver into the adipose tissue?
A. VLDL.
B. Chylomicrons.
C. LDL.
D. HDL.
E. Complexes with albumin.

58. Laboratory investigation of a patient revealed a high level of plasma LDL. What disease can be diagnosed?
A. Atherosclerosis
B. Nephropathy.
C. Acute pancreatitis.
D. Gastritis.
E. Pneumonia.

59. Aerobic oxidation of substrates is typical for cardiac myocytes. Which of the following is the major oxidation substrate of cardiac muscles?
A. Fatty acids.
B. Triacylglycerols.
C. Glycerol.
D. Glucose.
E. Amino acids.

60. Which of the following enzymes accelerates the lipolysis under the action of epinephrine in stress situations?
A. Triacylglycerol lipase.
B. Lypoprotein lipase.
C. Phospholipase A2
D. Phospholi pase C.
E. Cholesterol esterase.

61. Clinical signs and laboratory testing of a patient allow make the assumption of gall-bladder inflammation, colloid properties of bile disorder and occurrence of gall-stones. Which substances can underlie the formation of gall-stones?
A. Cholesterol.
B. Urates.
C. Oxalates.
D. Chlorides.

E. Phosphates.

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

A Cyclic adenosine monophosphate
B Cyclic guanosine monophosphate
C Adenosine monophosphate
D Diacylglycerol
E Ions of Ca2+

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

64. A sportsman was recommended to take a medication that contains carnitine in order to improve his results. What process is activated by carnitine the most?

A. Fatty acids transport to mitochondrions.
B. Synthesis of steroid hormones.
C. Synthesis of ketone bodies.
D. Synyhesis of lipids.
E. Tissue respiration.

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

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B. Fatty acids.
C. Unsaturated fatty acids.
D. Triacylglycerols.
E. Cholesterol.

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B. Transport of FFA from fat depots to the tissues.
C. It takes part in one of reactions of FFA beta-oxidation.
D. FFA activation.
E. Activation of intracellular lipolysis.

67. A 1-year-old child with symptoms of muscle involvement was admitted to the hospital. Examination revealed carnitine deficiency in his muscles. What process disturbance is the biochemical basis of this pathology?

A. Transporting of fatty acids to mitochodrions.
B. Regulation of Ca2+ level in mitochondrions.
C. Substrate phosphorylation.
D. Lactic acid utilization.
E. Actin and myosin synthesis

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

A. Cyclic adenosine monophosphate.
B. Diacylglycerol.
C. Adenosine monophosphate.
D. Ions of Ca2+.
E. Cyclic guanosine monophosphate.

69. Increased amount of free fat acids is observed in the blood of the patients with diabetes mellitus. It can be caused by:

A. Increased activity of triglyceridelipase adipocytes.
B. Storage of palmitatoil-CoA.
C. Activation of the ketone bodies utilization.
D. Activation of the synthesis of the apolipoproteins.
E. Decreased activity of phosphatidylcholine-cholesterol-acyltransferase in blood plasma.

70. A 70 year old man is ill with vascular atherosclerosis of lower extremities and

coronary heart disease. Examination revealed disturbance of lipidic blood composition. The main factor of atherosclerosis pathogenesis is the excess of the following lipoproteins:
A. Low-density lipoproteins.
B. Intermediate density lipoproteins.
C. Cholesterol.
D. High-density lipoproteins.
E. Chylomicrons.

71. 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. Methionin.
C. Vitamin A.
D. Cholin.
E. Arachidonic acid.

72. Fatty of phospholipids is disordered due to fat infiltration of the liver. Indicate which of the presented substances can enhance the process of methylation during phospholipids synthesis?
A. Methionine
B. Ascorbic acid.
C. Glucose.
D. Glycerin.
E. Citrate.

73. 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 glycometid What congenital disease is the child ill with?
A. Tay-Sachs disease.
B. Wilson's syndrome.
C. Turner's syndrome.
D. Niemann-Pick disease.
E. MacArdle disease.

74. 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 generationof the following metabolite:
A. Choline.
B. DOPA.
C. Cholesterol.
D. Acetoacetate.
E. Linoleic acid.

75. Examination of cell culture got from a patient with lysosomal pathology revealed accumulation of great quantity of lipids in the lysosomes. What of the following diseases is this disturbance typical for?
A. Tay-Sachs disease.
B. Galactosemia.
C. Wilson disease.
D. Phenylketonuria.
E. Gout.

76. 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. Methionine.
B. Glucose.
C. Glycerin.
D. Ascorbic acid.
E. Citrate.

77. A sportsman needs to improve his sporting results. He was recommended to take a preparation that contains carnitin What process is activated the most by this compound?
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C. Calcium ions transporting.
D. Glucose transporting.
E. Vitamin K transporting.

78. Carnitine including drug was recomended to the sportsman for improving results. What is activated most of all with help of carnitine?
A. Transport of fatty acids to the mitochondria
B. Synthesis of steroid hormones.

C. Synthesis of ketone bodies.
D. Synthesis of lipids.
E. Tissue respiration.

79. 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

80. 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

81. A 1-year-old child with the symptoms of affection of limb and trunk muscles had been admitted to a hospital. Examination revealed muscle carnitine deficiency. The biochemical basis of this pathology is a disruption of the following process:
A. Transport of fatty acids to mitochondria.
B. Regulation of Ca2+ level in mitochondria
C. Substrate phosphorylation
D. Utilization of lactic acid
E. Oxidative phosphorylation

82. A 3-year-old girl with mental retardation has been diagnosed with sphingomyelin lipidosis (Niemann-Pick disease). In this condition the synthesis of the following substance is disturbed:
A. Sphingomyelinase
B. Sphingosine
C. Gangliosides
D. Ceramides
E. Glycosyltransferase

METABOLISM OF AMINO ACIDS

1. Nitrogen is being excreted from the body mainly as urea. When activity of a certain enzyme in the liver is low, it results in inhibition of urea synthesis and nitrogen accumulation in blood and tissues. Name this enzyme:
A. Carbamoyl phosphate synthetase
B. Aspartate aminotransferase
C. Urease
D. Amylase
E. Pepsin

2. Depression and emotional disturbances result from the lack of noradrenaline, serotonin, and other biogenic amines in the brain. Their content in the synapses can be increased through administration of antidepressants that inhibit the following enzyme:
A. Monoamine oxidase
B. Diamine oxidase
C. L-amino acids oxidase
D. D-amino acid oxidase
E. Phenylalanine 4-monooxygenase

3. 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. Tyrosine
C. Proline
D. Alanine
E. Histidine

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

5. 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. Alkaptonuria
C. Cystitis
D. Phenylketonuria
E. Hartnup disease

6. 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. Tripsin
B. Pepsin
C. Lipase
D. Dipeptidase
E. Amylase

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

8. 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. Ornithinic cycle
B. Tricarboxylic acid cycle
C. Glycolysis
D. Glyconeogenesis
E. Cori cycle

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

10. A patient has been diagnosed with alkaptonuria. Choose an enzyme whose deficiency can be the reason for this pathology:
A. Homogentisic acid oxidase
B. Phenylalanine hydroxylase
C. Glutamate dehydrogenase
D. Pyruvate dehydrogenase
E. Dioxyphenylalanine decarboxylase

11. 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-oxytryptophan
B. Tyrosine
C. Histidine
D. Phenylalanine
E. Serine

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

13. A 46-year-old female patient consulted a doctor about pain in the small joints of the upper and lower limbs. The joints are enlarged and shaped like thickened nodes. Serum test revealed an increase in urate concentration. This might be caused by a disorder in metabolism of:
A. Purines
B. Carbohydrates
C. Lipids
D. Pyrimidines
E. Amino acids

14. A patient has a critical impairment of protein, fat and hydrocarbon digestion. Most likely it has been caused by low secretion of the following digestive juice:
A. Pancreatic juice
B. Saliva
C. Gastric juice
D. Bile
E. Intestinal juice

15. A patient with homogentisuria has signs of arthritis, ochronosis. In this case, the pain in the joints is associated with the deposition of:
A. Homogentisates
B. Urates
C. Phosphates
D. Oxalates
E. Carbonates

16. A patient with hereditary hyperammonemia due to a disorder of ornithine cycle has developed secondary orotaciduria. The increased synthesis of orotic acid is caused by an increase in the following metabolite of ornithine cycle:
A. Carbamoyl phosphate
B. Citrulline
C. Ornithine
D. Urea
E. Argininosuccinate

17. In case of alkaptonuria, homogentisic acid is excreted in urine in large amounts. The development of this disease is associated

with a disorder of metabolism of the following amino acid:
A. Tyrosine
B. Phenylalanine
C. Alanine
D. Methionine
E. Asparagine

18. Symptoms of pellagra (vitamin PP deficiency) is particularly pronounced in patients with low protein diet, because nicotinamide precursor in humans is one of the essential amino acids, namely:
A. Tryptophan
B. Threonine
C. Arginine
D. Histidine
E. Lysine

19. Decarboxylation of glutamate induces production of gamma aminobutyric acid (GABA) neurotransmitter. After breakdown, GABA is converted into a metabolite of the citric acid cycle, that is:
A. Succinate
B. Citric acid
C. Malate
D. Fumarate
E. Oxaloacetate

20. A patient has been diagnosed with alkaptonuria. Choose an enzyme that can cause this pathology when deficient:
A. Homogentisic acid oxidase
B. Glutamate dehydrogenase
C. Pyruvate dehydrogenase
D. Dioxyphenylalanine decarboxylase
E. Phenylalanine hydroxylase

21. An unconscious patient was delivered by ambulance to the hospital. On objecti¬ve examination the patient was found to present no reflexes, periodical convulsi¬ons, irregular breathing. After laboratory examination the patient was diagnosed wi¬th hepatic coma. Disorders of the central nervous system develop due to accumulati¬on of the following metabolite:
A. Ammonia
B. Histamine
C. Glutamine
D. Bilirubin
E. Urea

22. In case of alkaptonuria, homogentisic acid is excreted in urine in large amounts. The development of this disease is associated with metabolic disorder of the followi¬ng amino acid:
A. Tyrosine
B. Asparagine
C. Methionine
D. Alanine
E. Phenylalanine

23. It is knows that in catecholamine metabolism a special role belongs to monoamine oxidase (MAO). This enzyme inactivates mediators (noradrenalin, adrenalin, dopamine) by:
A. Oxidative deamination
B. Removing methyl groups
C. Adjoining amino groups
D. Hydrolysis
E. Carboxylation

24. Fatty of phospholipids is disordered due to fat infiltration of the liver. Indicate which of the presented substances can enhance the process of methylation during phospholipids synthesis?
A Methionine
B Ascorbic acid
C Glucose
D Glycerin
E Citrate

25. Patient with encephalopathy was admitted to the neurological in-patient department. Correlation of increasing of encephalopathy and substances absorbed by the bloodstream from the intestines was revealed. Whatsubstances that are created in the intestines can cause endotoxemia?
A Indole
B Butyrate
C Acetacetate
D Biotin

E Ornithine

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 Tryptophan
B Alanine
C Histidine
D Methionine
E Tyrosine

27. A mother consulted a doctor about her 5-year-old child who develops erythemas, vesicular rash and skin itch under the influence of sun. Laboratory studies revealed decreased iron concentration in the blood serum, increased uroporphyrinogen I excretion with the urine. What is the most likely inherited pathology in this child?
A Erythropoietic porphyria
B Methemoglobinemia
C Hepatic porphyria
D Coproporphyria
E Intermittent porphyria

28. A13-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

29. Ammonia is a very toxic substance, especially for nervous system. What substance takes the most active part in ammonia detoxication in brain tissues?
A Glutamic acid
B Lysine
C Proline
D Histidine
E Alanine

30. 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 Tyrosine
C Proline
D Alanine
E Histidine

31. Patient experienced increased susceptibility of the skin to the sunlight. His urine after some time became dark-red. What is the most likely cause of this?
A Porphyria
B Hemolytic jaundice
C Albinism
D Pellagra
E Alkaptonuria

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

33. 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

34. 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 Phenylketonuria
B Alkaptonuria
C Tyrosinosis
D Albinism
E Xanthinuria

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

36. 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 indices of this child?
A Disorder of ammonia neutralization in ornithinic cycle
B Activated processes of aminoacids decarboxylation
C Disorder of biogenic amines neutralization
D Increased purtefaction of proteins in intestines
E Inhibited activity of transamination enzymes

37. A patient has been diagnosed with alkaptonuria. Choose an enzyme whose deficiency can be the reason for this pathology:
A Homogentisic acid oxidase
B Phenylalanine hydroxylase
C Glutamate dehydrogenase
D Pyruvate dehydrogenase
E Dioxyphenylalanine decarboxylase

38. 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 of tryptophane aminooacid. What biochemical mechanism underlies this process?
A Decarboxylation
B Desamination
C Microsomal oxydation
D Transamination
E Formation of paired compounds

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

40. 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 transformation of the following histidine amino acid:
A Decarboxylation
B Methylation
C Phosphorylation
D Isomerization
E Deaminization

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

42. 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 Aminotransferase
C Glucose-6-phosphatase
D Phosphofructokinase
E Phosphofructomutase

43. 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 Ornithinic cycle
B Tricarboxylic acid cycle
C Glycolysis
D Glyconeogenesis
E Cori cycle

44. 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-oxytryptofane
B Tyrosine
C Histidine
D Phenylalanine
E Serine

45. It is known that the monoamine oxidase (MAO) enzyme plays an important part in the metabolism of catecholamine neurotransmitters. In what way does the enzyme inactivate these neurotransmitters (norepinephrine, epinephrine, dopamine)?
A Oxidative deamination
B Addition of an amino group
C Removal of a methyl group
D Carboxylation
E Hydrolysis

46. A hospital has admitetd a patient complaining of abdominal bloating, diarrhea, flatulence after eating protein foods. These signs are indicative of the impaired digestion of proteins and their increased degradation. Which of the following compounds is the product of this process?
A Indole
B Bilirubin
C Cadaverine
D Agmatine
E Putrescine

47. Patient with encephalopathy was admitted to the neurological in-patient department. Correlation of increasing of encephalopathy and substances absorbed by the bloodstream from the intestines was revealed. What substances that are created in the intestines can cause endotoxemia?
A Indole
B Butyrate
C Acetacetate
D Biotin
E Ornithine

48. 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 Tryptophan
B Alanine
C Histidine
D Methionine
E Tyrosine

49. Ammonia is a very toxic substance, especially for nervous system. What substance takesthe most active part in ammonia detoxication in brain tissues?
A Glutamic acid
B Lysine
C Proline
D Histidine
E Alanine

50. 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 Tyrosine
C Proline
D Alanine
E Histidine

51. A patient with serious damage of muscular tissue was admitted to the traumatological department. What biochemical urine index will be increased in this case?
A Creatinine
B Common lipids
C Glucose
D Mineral salts
E Uric acid

52. 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
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D Cholesterine
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A Carbamoyl phosphate synthetase
B Aspartate aminotransferase
C Urease
D Amylase
E Pepsin

55. 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 indices of this child?
A Disorder of ammonia neutralization in ornithinic cycle
B Activated processes of aminoacids decarboxylation
C Disorder of biogenic amines neutralization
D Increased purtefaction of proteins in intestines
E Inhibited activity of transamination enzymes

56. Albinos can't stand sun impact - they don't aquire sun-tan but get sunburns. Disturbed metabolism of what aminoacid underlies this phenomenon?
A Phenilalanine
B Methionine
C Tryptophan
D Glutamic acid
E Histidine

57. Glutamate decarboxylation results in formation of inhibitory transmitter in CNS. Name it:
A GABA
B Glutathione
C Histamine
D Serotonin
E Asparagine

58. 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

59. 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 of tryptophane aminooacid. What biochemical mechanism underlies this process?
A Decarboxylation
B Desamination
C Microsomal oxydation
D Transamination
E Formation of paired compounds

60. 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 transformation of the following histidine amino acid:
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C Phosphorylation
D Isomerization
E Deaminization

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A GABA
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D ATP
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A Dehydrogenase of branched amino acids
B Aminotransferase
C Glucose-6-phosphatase
D Phosphofructokinase
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A Ornithinic cycle
B Tricarboxylic acid cycle
C Glycolysis
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64. Plasmic factors of blood coagulation are exposed to post-translational modification with the participation of vitamin K. It is necessary as a cofactor in the enzyme system of gammacarboxylation of protein factors of blood coagulation due to the increased affinity of their molecules with calcium ions. What amino acid is carboxylated in these proteins?
A Glutamate
B Valine
C Serine
D Phenylalanine
E Arginine

65. Pharmacological effects of antidepressants are connected with inhibition of an enzyme catalyzing biogenic amines noradrenaline and serotonine in the mitochondrions of cerebral neurons. What enzyme participates in this process?
A Monoamine oxidase
B Transaminase
C Decarboxylase
D Peptidase
E Lyase

66. A child manifests epileptic seizures caused by vitamin B6 deficiency. This is conditioned by the decrease of the gamma-aminobutyrate level in the nervous tissue which acts as an inhibiting neurotransmitter. The activity of which enzyme is decreased in this case?
A. Glutamate decarboxylase.
B. Alanine aminotransferase.
C. Glutamate dehydrogenase.

D. Pyridoxal kinase.
E. Glutamate synthetase.

67. Patient experienced increased susceptibility of the skin to the sunlight. His urine after some time became dark-red. What is the most likely cause of this?
A Porphyria
B Hemolytic jaundice
C Albinism
D Pellagra
E Alkaptonuria

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

69. Ammonia is a very toxic substance, especially for nervous system. What substance takes the most active part in ammonia detoxication in brain tissues?
A. Glutamic acid.
B. Lysine.
C. Proline.
D. Histidine.
E. Alanine.

70. A child has an acute renal failure. What biochemical factor found in saliva can confirm this diagnosis?
A. Increase in urea concentration.
B. Increase in glucose concentration.
C. Decrease in glucose concentration.
D. Increase in concentration of higher fatty acids.
E. Decrease in nucleic acid concentration.

71. After severe viral hepatitis a 4 year old boy presents with vommiting, occasional loss of consciousness, convulsions. Blood test revealed hyperammoniemi 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.

72. A 4 y.o. boy has had recently serious viral hepatitis. Now there are such clinical presentations as vomiting, loss of consciousness, convulsions. Blood analysis revealed hyperammoniemia. Disturbunce of which biochemical process caused such pathological condition of the patient?
A. Disturbed neutralization of ammonia in liver.
B. Disturbed neutralization of biogenic amines.
C. Increased putrefaction of proteins in bowels.
D. Activation of aminoacid decarboxylation.
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73. 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:
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A. Disorder of ammonia neutralization in ornithinic cycle.
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A. Ornithinic cycle.
B. Tricarboxylic acid cycle.
C. Glycolysis.
D. Glyconeogenesis.
E. Cori cycle.

76. Cerebral trauma caused increase of ammonia formation. What aminoacid takes part in removal of ammonia from cerebral tissue?
A. Glutamic.
B. Tryptophan.
C. Lisine.
D. Valine.
E. Tyrosine.

77. A 9-month-old infant is fed with artificial formulas with unbalanced vitamin B6 concentration. The infant presents with pellagral dermatitis, convulsions, anaemia. Convulsion development might be caused by the disturbed formation of:
A. GABA.
B. Histamine.
C. Serotonin.
D. DOPA.
E. Dopamine.

78. A patient presents with dysfunction of cerebral cortex accompanied by epileptic seizures. He has been administered a biogenic amine synthetized from glutamate and responsible for central inhibition. What substance is it?
A. Gamma-amino butyric acid.
B. Serotonin.
C. Dopamine.
D. Acetylcholine.
E. Histamine.

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C. Phosphorylation.
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82. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine teste. What compound will confirm this diagnosis if found in urine?
A. Creatine.
B. Collagen.
C. Porphyrin.
D. Myoglobin.
E. Calmodulin.

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85. In course of histidine catabolism a biogenic amine is formed that has powerful vasodilatating effect. Name it:
A. Histamine.
B. Serotonin.
C. Dioxyphenylalanine.
D. Noradrenalin.
E. Dopamine.

86. A newborn child has convulsions that have been observed after prescription of vitamin B6. This most probable cause of this effect is that vitamin B6 is a componet of the following enzyme:
A. Glutamate decarboxylase.
B. Pyruvate dehydgenase.
C. Ketoglutarate dehydrogenase.
D. Aminolevulinate synthase.
E. Glycogen phosphorylase.

87. A patient with serious damage of muscular tissue was admitted to the traumatological department. What biochemical urine index will be increased in this case?
A. Creatinine.
B. Common lipids.
C. Glucose.
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B. Desamination.
C. Microsomal oxidation.
D. Transamination.
E. Formation of paired compounds.

89. According to clinical indications a patient was administered pyridoxal phosphate. What processes is this medication intended to correct?
A. Transamination and decarboxylation of aminoacids.
B. Oxidative decarboxylation of ketonic acids.
C. Desamination of purine nucleotide.
D. Synthesis of purine and pyrimidine bases.
E. Protein synthesis.

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A. Monoamine oxidase.
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Correlation of increasing of encephalopathy and substances absorbed by the blood stream from the intestines was reveale What substances that are created in the intestines can cause endotoxemia?
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B. Butyrate.
C. Acetacetate.
D. Biotin.
E. Ornithine.

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103. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine test. What compound will confirm this diagnosis if found in urine?
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B. Calmodulin.
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D. Myoglobin.
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A. Tryptophan.
B. Proline.
C. Tyrosine.
D. Histidine.
E. Alanine.

105. 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's disease.

106. Reason of disease pellagra can be a primary feed by corn and decrease of products of an animal origin in a diet. Absence in a diet what amino acid leads to this pathology?
A. Tryptophan
B. Isoleucine
C. Phenylalanine
D. Methionine
E. Histidine

107. Glycogenous amino acids belongs to those that are transformed into :
A. Pyruvic acid
B. Acetyl-CoA
C. Acetoacetate
D. Glycerin
E. Glucoronic acid

108. A patient suffers hyperammoniemia . name the enzyme which decrease activity is the reason for this condition
A. Ornithine carbomoyl phosphate transferase of the liver
B. Creatine phosphokinase of the skeletal muscle
C. Aspatate aminotransferase of the myocardium
D. Alanine aminotransferase of the liver
E. Leucine aminopeptidase of the liver

109. The urine of a newborn baby is observed to have citrulline and high level of

ammonia.Which substance formation leads to the disturbance of the child?
A. Urea
B. Uric acid
C. Ammonia
D. Creatinine
E. Creatine

110. Name the amino acid that participate in heme synthesis:
A. Glycine
B. Serine
C. Alanine
D. threonine
E. Valine

111. Which amino acid participates in toxic substances deactivation in the liver ?
A. Glycine
B. Serine
C. Threonine
D. Tryptophan
E. Histidine

112. Which amino acid participates in purine bases synthesis of nucleotides?
A. Glycine
B. Threonine
C. Alanine
D. Serine
E. Tryptophan

113. As boiling water appeared on the skin, the injured part of it turned red , swelled and started to hurt.What substance can lead to such reaction :
A. Histamine
B. Lysine
C. Thiamine
D. Glutamine
E. Asparagine

114. Glutathione is a component of the human organism antioxidant system. Which of the amino acids included in its composition :
A. Glycine
B. Threonine
C. Serine
D. Aspartic acid
E. Tyrosine

115. For muscle functioning , a very important role is given to creatine phosphate which is formed from creatine and ATP. Name the amino acids necessary for creatine synthesis:
A. Glycine
B. Cystine
C. Threonine
D. Serine
E. Alanine

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A. Glycine, Arginine, Methionine
B. Glycine, Proline, Cystine
C. Methionine, Leucine, phenylalanine
D. Arginine, Tryptophan, Lysine
E. Valine, leucine, isoleucine

117. Methyl groups (-CH3) are used by organism to synthesize important compounds such creatine, choline, adrenalin etc. Which amino acid has it?
A. Methionine
B. Valine
C. Leucine
D. Isoleucine
E. Tryptophan

118. What biogenic amine relaxes vessels and formed during histidine catabolism :
A. Histamine
B. Serotonin
C. Dopa
D. Noradrenalin
E. Dopamine

119. With a repeated action of the ultra violet rays, the skin gets dark because of the melanine synthesis which protects cells from lesion .The main mechanism of this defense introduction is:
A. Tyrosinase activation
B. Tyrosinase suppression
C. Activation of homogentisic acid oxidase

D. Suppression of homogentisic acid oxidase
E. Phenylalanine hydroxylase suppression

120. In psychiatry , to treat various CMS disease biogenic amines are used. Name the medicine of this group that is an inhibition mediator :
A. Gamma-aminobutyric acid
B. Histamine
C. Serotonin
D. Dopamine
E. Taurine

121. Under the influence of ultra-violet irradiation, human skin gets dark, which defense substance is synthesized in cells under the influence of ultra-violet ?
A. Melanin
B. Glycine
C. Serine
D. Aspartic acid
E. Tyrosin

122. With alkaptonuria, patients urine contain high amount of homogentisic acid. (urine get dark in an open air). The inborn deficiency of which enzyme takes place ?
A. Homogentisinate oxidase
B. Phenylalanine hydroxylase
C. Glutamic transaminase
D. Asparate aminotransferase
E. Glutamate decarboxylase

123. An infant is noticed to have dimness of sclera, mucous membranes , auricle: the executed urine gets dark in an open air. The blood and urine are seen to contain homogentisic acid. What is the most probably symptom ?
A. Alkaptonuria
B. Albinism
C. Cystinuria
D. Porphyria
E. Hemolytic anemia

124. A 10months old child whose parents are black-haired , has fair hair, very light skin and blue eyes , at birth she had a regular appearance , but for 3 months she has developed cranial blood circulation disturbance and mental retardation . What is the reason for this condition ?
A. Phenylketonuria
B. Galactosemia
C. Glycogenosis
D. Acute porphyria
E. Histidinemia

125. A 6-day old infant has phenyl pyruvate and phenyl acetate redundancy in his urine. What amino acid metabolism is disturbed in the child's organism ?
A. Phenylalanine
B. Tryptophan
C. Methionine
D. Histidine
E. Argenine

126. A hospital admits a 9 year old boy with mental and physical retardation . The biochemical blood analysis revealed the elevated amount of phenylalanine . The blocking of which enzyme can lead to this situation ?
A. Phenylalanine 4- monooxigenase
B. Homogentisic acid oxidase
C. Glutamine transaminase
D. Aspartate aminotransferase
E. Glutamate decarboxylase

127. A child has dark spots on his nappies , which shows presence of homogentisic acid. The disturbance of which exchange of substance is connected with it ?
A. Tyrosine
B. Galactose
C. Tryptophan
D. Cholesterol
E. Methionine

128. What is the main form of ammonia transportation from the majority of peripheral tissue to the liver ?
A. Glutamine
B. Asparagine
C. Citrulline
D. Ornithine
E. Urea

129. In which form is ammonia transmitted from the muscles from the liver ?
A. As alanine
B. As asparagines
C. As Urea
D. As arginine
E. As ammonia salt

130. Ammonia is very poisonous substance especially for nerves system. What substance actively participates in ammonia deactivation in brain tissue ?
A. Glutamate acid
B. Lysine
C. Proline
D. Histidine
E. Alamine

131. An unconscious patient had been delivered to a hospital by the ambulance. Objectively: absent reflexes, occasional convulsions, irregular breathing. After a laboratory examination he was diagnosed with hepatic coma. What metabolite accumulation is essential for the development of the central nervous system disorders?
A. Ammonia
B. Histamine
C. Bilirubin
D. Urea
E. Glutamine.

132. Inhibitory effect of GABA is due to the increased permeability of the postsynaptic membrane for chloride ions. This mediator is produced as a result of decarboxylation of the following amino acid:
A. Glutamate.
B. Asparagine
C. Glutamine
D. Aspartate
E. Arginine

133. Laboratory examination of a child revealed high content of leucine, valine, isoleucine and their ketoderivates in blood and urine. Urine had the typical smell of maple syrup. This disease was caused by deficiency of the following enzyme:
A. Dehydrogenase of branched amino acids.
B. Aminotransferase
C. Glucose-6-phosphatase
D.Phosphofructokinase
E. Phosphofructomutase

134. 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. Ornithinic cycle.
B. Tricarboxylic acid cycle
C. Glycolysis
D. Glyconeogenesis
E. Cori cycle

135. During intensive muscle work there is a large amount of ammonia produced in the muscles. What amino acid plays the main role in the transportation of ammonia to the liver and participates in gluconeogenesis reactions?
A. Alanine
B. Aspartate
C. Ornithine
D. Lysine
E. Arginine

136. A sick child presents with high content of phenyl pyruvate in urine (normally it is practically absent). Blood phenylalanine level is 350 mg/L (norm - 15 mg/L). What disease are these symptoms characteristic of?
A. Phenylketonuria
B. Alkaptonuria
C. Albinism
D. Tyrosinosis
E. Gout

137. Nitrogen is being excreted from the body mainly as urea. When activity of a certain enzyme in the liver is low, it results in inhibition of urea synthesis and nitrogen accumulation in blood and tissues. Name this enzyme:

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

138. A newborn presents with weak suckling, frequent vomiting, and hypotonia. Blood and urine citrulline are very high. What metabolic process is disturbed?
A. Ornithine cycle
B. Cori cycle
C. Glycolysis
D. Gluconeogenesis
E. Tricarboxylic acid cycle

139. During hypersensitivity skin test a patient received an allergen subcutaneously, after which the patient developed skin redness, edema, and pain due to histamine action. This biogenic amine is produced as the result of the following transformation of histidine amino acid:
A. Decarboxylation
B. Methylation
C. Phosphorilation
D. Isomerization
E. Deaminization

140. Vascular endothelium is characterized by high metabolic activity and synthesizes vasoactive substances. Among these substances there is a potent vasodilator synthesized from L-arginine. Name this vasodilator:
A. Nitrogen oxide
B. Acetylcholine
C. Adrenaline
D. Histamine
E. Bradykinin

METABOLISM OF NUCLEOTIDES

1. A patient suffering from gout was prescribed allopurinol. What pharmacological property of allopurinol provides therapeutic effect in this case?
A. Competitive inhibition of xanthine oxidase
B. Acceleration of nitrogen-containing substances excretion
C. Acceleration of pyrimidine nucleotides catabolism
D. Deceleration of pyrimidine nucleotides salvage
E. Acceleration of nucleic acids synthesis

2. A 52-year-old man presents with fever and pain in the joints. Both of his first metatarsophalangeal articulations are deformed, swollen, and reddened. Blood urea is high. The patient is diagnosed with gout. What is the main developmental factor in the pathogenesis of this disease?
A. Hyperuricemy
B. Argininosuccinic aciduria
C. Hyperazotemia
D. Hyperaminoacidemia
E. Citrullinuria

3. A 42-year-old male patient with gout has an increased blood uric acid concentration. In order to reduce the level of uric acid the doctor administered him allopurinol. Allopurinol is the competitive inhibitor of the following enzyme:
A. Xanthine oxidase
B. Adenosine deaminase
C. Adenine phosphoribosyltransferase
D. Hypoxanthinephosphoribosyltransferase
E. Guanine deaminase

4. Children with Lesch-Nyhan syndrome have a severe form of hyperuricemia accompanied by the formation of tophi, urate calculi in the urinary tracts, as well as serious neuro-psychiatric disorders. The cause of this disease is the reduced activity of the following enzyme:
A. Hypoxanthine-guanine phosphoribosyltransferase
B. Xanthine oxidase
C. Dihydrofolate reductase
D. Thymidylate synthase
E. Karbamoyl phosphate synthetase

5. A therapeutist has an appointment wi¬th a 40-year-old patient complaining of recurrent pain attacks in his hallux joints and their swelling. Urine analysis revealed its marked acidity and pink colour. What substances can cause such changes in the urine?
A. Uric acid salt
B. Calcium phosphate
C. Magnesium sulfate
D. Ammonium salts
E. Chlorides

6. A therapeutist has an appointment with a 40-year-old patient complaining of recurrent pain attacks in his hallux joints and their swelling. Urine analysis revealed its marked acidity and pink color. What substrances can cause such changes in urine?
A. Uric acid salt
B. Chlorides
C. Calcium phosphate
D. Magnesium sulfate
E. Ammonium salts

7. Blood of a 12 year old boy presents low concentration of uric acid and accumulation of xanthine and hypoxanthine. This child has genetic defect of the following enzyme:
A Xanthine oxidase
B Arginase
C Urease
D Ornithine carbamoyltransferase
E Glycerylkinase

8. A 48 year old patient complained about intense pain, slight swelling and reddening of skin over the joints, temperature rise up to 38°C. Blood analysis revealed high concentration of urates. This condition might be caused by disturbed metabolism of:
A Purines

B Collagen
C Cholesterol
D Pyrimidines
E Carbohydrates

9. A 46 year old patient applied to a doctor complaining about joint pain that becomes stronger the day before weather changes. Blood examination revealed strengthened concentration of uric acid. The most probable cause of the disease is the intensified disintegration of the following substance:
A Adenosine monophosphate
B Cytidine monophosphate
C Uridine triphosphate
D Uridine monophosphate
E Thymidine monophosphate

10. A 42-year man suffering from gout has increased level of urinary acid in the blood. Allopurinol was prescribed to decrease the level of urinary acid. Competitive inhibitor of what enzyme is allopurinol?
A Xanthinoxidase
B Adenosinedeaminase
C Adeninephosphoribosiltransferase
D Hypoxantinphosphoribosiltransferase
E Guaninedeaminase

11. A 65 year old man suffering from gout complains of kidney pain. Ultrasound examination revealed renal calculi. The most probable cause of calculi formation is the strengthened concentration of the following substance:
A Uric acid
B Cholesterol
C Bilirubin
D Urea
E Cystine

12. A 65-year-old suffering from the gout man complains of the pain in the kidney's region. On ultrasonic examination the renal calculi were revealed. As a result of what process were they formed?
A Decay of purine nucleotides
B Protein catabolism
C Ornithine cycle
D Heme decay
E Restoration of cysteine

13. A 42-year-old male patient with gout has an increased blood uric acid concentration. In order to reduce the level of uric acid the doctor administered him allopurinol. Allopurinol is the competitive inhibitor of the following enzyme:
A Xanthine oxidase
B Adenosine deaminase
C Adenine phosphoribosyltransferase
D Hypoxanthine-phosphoribosyltransferase
E Guanine deaminase

14. A 48 year old patient complained about intense pain, slight swelling and reddening of skin over the joints, temperature rise up to 38oC. Blood analysis revealed high concentration of urates. This condition might be caused by disturbed metabolism of:
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B Collagen
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E Carbohydrates

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C Urease
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B Adenosinedeaminase
C Adeninephosphoribosiltransferase
D Hypoxantinphosphoribosiltransferase

E Guaninedeaminase

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A Uric acid
B Cholesterol
C Bilirubin
D Urea
E Cystine

18. A doctor administered Allopurinol to a 26-year-old young man with the symptoms of gout. What pharmacological action of Allopurinol ensures therapeutical effect?
A. By inhibiting uric acid synthesis.
B. By inhibiting leucocyte migration into the joint.
C. By general analgetic effect.
D. By general anti-inflammatory effect.
E. By increasing uric acid excretion.

19. Blood of a 12 year old boy presents low concentration of uric acid and accumulation of xanthine and hypoxanthine. This child has genetic defect of the following enzyme:
A. Xanthine oxidase.
B. Arginase.
C. Urease.
D. Ornithine carbamoyltransferase.
E. Glycerylkinase.

20. A 48 year old patient complained about intense pain, slight swelling and reddening of skin over the joints, temperature rise up to 38o.Blood analysis revealed high concentration of urates. This condition might be caused by disturbed metabolism of:
A. Purines.
B. Collagen.
C. Cholesterol.
D. Pyrimidines.
E. Carbohydrates.

21. A 46 year old patient applied to a doctor complaining about joint pain that becomes stronger the day before weather changes. Blood examination revealed strengthened concentration of uric acid. The most probable cause of the disease is the intensified disintegration of the following substance:
A. Adenosine monophosphate.
B. Cytidine monophosphate.
C. Uridine triphosphate.
D. Uridine monophosphate.
E. Thymidine monophosphate.

22. A 42-year man suffering from gout has increased level of urinary acid in the blood. Allopurinol was prescribed to decrease the level of urinary acid. Competitive inhibitor of what enzyme is allopurinol?
A. Xanthine oxidase.
B. Adenosine deaminase.
C. Adenine phosphoribosil transferase.
D. Hypoxantin phosphoribosil transferase.
E. Guaninedeaminase.

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B. Protein catabolism.
C. Ornithine cycle.
D. Heme decay.
E. Restoration of cysteine.

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A. Uric acid.
B. Cholesterol.
C. Bilirubin.
D. Urea.
E. Cystine.

25. Methotrexate (structural analogue of the folic acid which is competitive inhibitor of the dihydrofolatreductase) is prescribed for treatment of the malignant tumour. On which level does methotrexate inhibit synthesis of the nucleic acids?
A. Mononucleotide synthesis.
B. Replication.
C. Transcription.
D. Reparation.
E. Processing.

26. An oncological patient had been administered methotrexate. With time target cells of the tumour lost sensitivity to this drug. At the same time the change in gene expression of the following enzyme is observed:
A. Dehydropholate reductase.
B. Thiaminase.
C. Deaminase.
D. Pholate oxidase.
E. Pholate decarboxylase.

27. The boy of 8 years old has Lesh-Nyhan disease. In blood concentration of a uric acid is increased. Specify, what process infringement is the reason of this hereditary disease.
A. Decay of purine nucleotides
B. Synthesis of purine nucleotides
C. Synthesis of pyrimidine nucleotides
D. Dissociation of pyrimidine nucleotides
E. Formation of deoxynucleotids

28. For treatments of malignant tumours prescribed metatrexate - structural analogue of a folic acid which is competitive inhibitor of dehydrofolicreductase and consequently suppresses synthesis of:
A. Nucleotides
B. Monosaccharides
C. Fatty acids
D. Glycerophosphatides
E. Glycogen

29. A 46-year-old patient consulted a doctor complaining about joint pain that becomes stronger the day before the weather changes. Blood examination revealed an increased concentration of uric acid. The most probable cause of the disease is the intensified disintegration of the following substance:
A. Adenosine monophosphate
B. Cytidine monophosphate
C. Uridine triphosphate
D. Uridine monophosphate
E. Thymidine monophosphate

30. The person of 58 years old has addressed to the doctor with the complaint to a pain in joints. At inspection increase of concentration of a uric acid in blood and urine is revealed. Specify, at what disintegration of substances the uric acid is formed?
A. Purines nucleotide
B. Pyrimidine nucleotide
C. Amino acids
D. Proteins
E. chromoproteins

31. A patient has increased content of uric acid in his blood that is clinically presented by pain syndrome as a result of urate deposition in the joints. What process does this acid result from?
A. Lysis of purine nucleotides.
B. Lysis of pyrimidine nucleotides
C. Heme catabolism
D. Proteolysis
E .Reutilization of purine bases.

32. Continuous treatment of cancer patients with methotrexate over time reduces the target cell's sensitivity to the drug. In this case gene amplification of the following enzyme is observed:
A. Dihydrofolate reductase
B. Thioredoxin reductase
C. Thiaminase
D. Deaminase
E. -

33. A 46 year old patient applied to a doctor complaining about joint pain that becomes stronger the day before weather

changes. Blood examination revealed strengthened concentration of uric acid. The most probable cause of the disease is the intensified disintegration of the following substance:

A Adenosine monophosphate
B Cytidine monophosphate
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D Uridine monophosphate
E Thymidine monophosphate

34. A 52-year-old man presents with fever and pain in the joints. Both of his first metatarsophalangeal articulations are deformed, swollen, and reddened. Blood uric acid is high. The patient is diagnosed with gout. What is the main developmental factor in the pathogenesis of this disease?

A. Hyperuricemy
B. Hyperazotemia
C. Hyperaminoacidemia
D. Argininosuccinic aciduria
E. Citrullinuria

35. A 42-year-old man with gout presents with high content of uric acid in blood. The patient was prescribed allopurinol to lower the concentration of uric acid. Allopurinol is a competitive inhibitor of the following enzyme:

A. Xanthine oxidase
B. Hypoxanthine phosphoribosyltransferase
C. Adenine phosphoribosyltransferase
D. Guanine deaminase
E. Adenosine deaminase

BIOSYNTHESIS OF NUCLEIC ACIDS AND PROTEINS

1. A patient has decreased concentration of magnesium ions that are required for ribosomes connection to granular endoplasmic reticulum. This condition is known to disturb the process of protein biosynthesis. Disturbance occurs at the following stage:
A. Translation
B. Transcription
C. Replication
D. Amino acids activation
E. Processing

2. T-lymphocytes are determined to be affected with HIV. In this case viral enzyme reverse transcriptase (RNA-dependent DNA-polymerase) catalyzes the synthesis of:
A. DNA based on the viral RNA matrix
B. Viral RNA based on the DNA matrix
C. Viral protein based on the viral RNA matrix
D. Viral DNA based on the DNA matrix
E. Informational RNA based on the viral protein matrix

3. Streptomycin and other aminoglycosides prevent the joining of formylmethionyl- tRNA by bonding with the 30S ribosomal subunit. This effect leads to disruption of the following process:
A. Translation initiation in prokaryotes
B. Translation initiation in eukaryotes
C. Transcription initiation in prokaryotes
D. Transcription initiation in eukaryotes
E. Replication initiation in prokaryotes

4. A young family came for a genetic counseling to identify the father of their child. The husband insists that the child does not resemble him at all and cannot possibly be his. Polymerase chain reaction method for person identification is based on the following:
A. Gene amplification
B. Nucleotide deletion
C. Genetic recombination
D. Missense mutation
E. Transduction

5. It was found out that some compounds, for instance fungi toxins and some antibiotics can inhibit activity of RNA-polymerase. What process will be disturbed in a cell in case of inhibition of this enzyme?
A. Transcription
B. Processing
C. Replication
D. Translation
E. Reparation

6. Pterin derivatives (aminopterin and methotrexate) are the inhibitors of dihydrofolate reductase, so that they inhibit the regeneration of tetrahydrofolic acid from dihydrofolate. These drugs inhibit the intermolecular tranfer of monocarbon groups, thus suppressing the synthesis of the following polymer:
A. DNA
B. Protein
C. Homopolysaccharides
D. Gangliosides
E. Glycosaminoglycans

7. Infectious diseases are treated with antibiotics (streptomycin, erythromycin, chloramphenicol). They inhibit the following stage of protein synthesis:
A. Translation
B. Transcription
C. Replication
D. Processing
E. Splicing

8. An experiment proved that UVirradiated skin cells of patients with xeroderma pigmentosum restore the native structure of DNA slower than the cells of healthy people due to the defect in repair enzyme. What enzyme takes part in this process?
A. Endonuclease
B. RNA ligase
C. Primase

D. DNA polymerase
E. DNA gyrase

9. At the stage of translation in the rough endoplasmic reticulum, the ribosome moves along the mRNA. Amino acids are joined together by peptide bonds in a specific sequence, and thus polypeptide synthesis takes place. The sequence of amino acids in a polypeptide corresponds to the sequence of:
A. mRNA codons
B. tRNA nucleotides
C. tRNA anticodons
D. rRNA nucleotides
E. rRNA anticodons

10. A patient has low rate of magnesium ions that are necessary for affixion of ribosomes to the endoplasmic reticulum. It is known that it causes disturbance of protein biosynthesis. At what stage is protein biosynthesis impaired?
A. Translation.
B. Amino acid activation.
C. Replication.
D. Transcription.
E. Termination.

11. During cell division, DNA replication occurs by a signal from the cytoplasm, and a certain portion of the DNA helix unwinds and splits into two individual strains. What enzyme facilitates this process?
A. Helicase
B. RNA polymerase
C. Ligase
D. Restrictase
E. DNA polymerase

12. In cancer patients who have been continuously receiving methotrexate, the target cells of tumor with time become insensitive to this drug. In this case, gene amplification of the following enzyme is observed:
A. Dihydrofolate reductase
B. Thiaminase
C. Deaminase
D. Thioredoxin reductase
E. -

13. A patient has decreased concentrati¬on of magnesium ions that are required for ribosomes connection to granular endoplasmic reticulum. This condition is known to disrupt the process of protein bi¬osynthesis. Disruption occurs at the followi¬ng stage:
A. Translation
B. Replication
C. Processing
D. Amino acids activation
E. Transcription

14. A doctor was addressed by a 30-year-old man. There is a probability of the patient being HIV-positive. To clarify the diagnosis the doctor proposed to perform polymerase chain reaction. The basic process in this kind of investigation is:
A. Gene amplification
B. Transcription
C. Genetic recombination
D. Genomic mutation
E. Chromosome mutation

15. During cell division DNA replication occurs after a signal is received from the cytoplasm, then a certain portion of the DNA helix unwinds and splits into two individual strains. What enzyme facilitates this process?
A. Helicase
B. RNA polymerase
C. Ligase
D. Restrictase
E. DNA polymerase

16. Cells of a person working in the Chornobyl Exclusion Zone have undergone a mutation in DNA molecule. However, with time the damaged interval of DNA molecule has been restored to its initial structure with a specific enzyme. In this case the following occurred:
A. Repair
B. Translation
C. Transcription

D. Reverse transcription
E. Replication

17. Methotrexate (structural analogue of the folic acid which is competitive inhibitor of the dihydrofolatreductase) is prescribed for treatment of the malignant tumour. On which level does methotrexate inhibit synthesis of the nucleic acids?
A Mononucleotide synthesis
B Replication
C Transcription
D Reparation
E Processing

18. RNA-polymeraseB(II) is blocked due to amanitine poisoning (poison of death-cup). It disturbes:
A Synthesis of m-RNA
B Synthesis of t-RNA
C Reverse transcription
D Primers synthesis
E Maturation of m-RNA

19. An experiment proved that UV-radiated cells of patients with xeroderma pigmentosum restore the native DNA structure slower than cells of healthy individuals as a result of reparation enzyme defection. What enzyme helps this process?
A Endonuclease
B RNA ligase
C Primase
D DNA polymerase III
E DNA gyirase

20. The study of the genealogy of a family with hypertrichosis (helix excessive pilosis) has demonstrated that this symptom is manifested in all generations only in men and is inherited by son from his father. What is the type of hypertrichosis inheritance?
A Y-linked chromosome
B Autosome-recessive
C Autosome-dominant
D X-linked recessive chromosome
E X-linked dominant chromosome

21. A genetics specialist analyzed the genealogy of a family and found that both males and females may have the illness, not across all the generations, and that healthy parents may have ill children. What is the type of illness inheritance?
A Autosomal recessive
B Autosomal dominant
C X-linked dominant
D X-linked recessive
E Y-linked

22. A woman with 0 (I) bllod group has born a child with AB blood group. This woman's husband has A blood group. What genetic interaction explains this phenomenon?
A Recessive epistasis
B Codominance
C Polymery
D Incomplete dominance
E Complementation

23. Cytogenetic examination of a patient with dysfunction of the reproductive system revealed normal karyotype 46,XY in some cells, but most cells have Klinefelter's syndrome karyotype - 47,XXY. Such phenomenon of cell inhomogeneity is called:
A Mosaicism
B Inversion
C Transposition
D Duplication
E Heterogeneity

24. It was found out that some compounds, for instance fungi toxins and some antibiotics can inhibit activity of RNA-polymerase. What process will be disturbed in a cell in case of inhibition of this enzyme?
A Transcription
B Processing
C Replication
D Translation
E Reparation

25. An oncological patient was prescribed methotrexate. With the lapse of time target cells of the tumour lost susceptibility to this drug. There is change of gene expression of the folowing enzyme:

A Dehydrofolate reductase
B Thiaminase
C Deaminase
D Folate oxidase
E Folate decarboxylase

26. Pterin derivatives (aminopterin and methotrexate) are the inhibitors of dihydrofolate reductase, so that they inhibit the regeneration of tetrahydrofolic acid from dihydrofolate. These drugs inhibit the intermolecular tranfer of monocarbon groups, thus suppressing the synthesis of the following polymer:
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B Replication
C Transcription
D Reparation
E Processing

28. An experiment proved that UV-radiated cells of patients with xeroderma pigmentosum restore the native DNA structure slower than cells of healthy individuals as a result of reparation enzyme defect. What enzyme helps this process?
A Endonuclease
B RNA ligase
C Primase
D DNA polymerase III
E DNA gyirase

29. A 20 year old patient complains of general weakness, dizziness, quick fatigability. Blood analysis results: Hb- 80 g/l. Microscopical examination results: erythrocytes are of modified form. This condition might be caused by:
A Sickle-cell anemia
B Hepatocellular jaundice
C Acute intermittent porphyria
D Obturative jaundice
E Addison's disease

30. It was found out that some compounds, for instance fungi toxins and some antibiotics can inhibit activity of RNA-polymerase. What process will be disturbed in a cell in case of inhibition of this enzyme?
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A Dehydrofolate reductase
B Thiaminase
C Deaminase
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32. DNA replication occurs during the cell division when a signal is received from the cytoplasm, and a certain portion of the DNA helix is unwound and divided into two chains. The helix is unwound by the following enzyme:
A. Helicase
B. RNA polymerase
C. Ligase
D. Restrictase
E. DNA polymerase

33. RNA-polymeraseB(II) is blocked due to amanitine poisoning (poison of death-cup). It disturbes:
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B. Synthesis of t-RNA.
C. Reverse transcription.
D. Primers synthesis.
E. Maturation of m-.RNA.

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A. Transcription.
B. Processing.
C. Replication.
D. Translation.
E. Reparation.

36. Tuberculosis can be treated by means of combined chemotherapy that includes substances with different mechanisms of action.What antituberculous medication inhibits transcription of RNA into DNA in mycobacteria?
A. Rifampicin.
B. Streptomycin.
C. Isoniazid.
D. Ethionamide.
E. Para-aminosalicylic acid.

37. It was revealed that T-lymphocytes were affected by HIV. Virus enzyme - reverse transcriptase (RNA-dependent DNA-polymerase) - catalyzes the synthesis of:
A. DNA on the template of virus RNA. .
B. Virus informational RNA on the template of DNA
C. DNA on virus ribosomal RNA.
D. Viral DNA on DNA template.
E. mRNA on the template of virus protein.

38. A doctor prescribed a cephalosporin antibiotic to the patient after appendectomy for infection prevention. Antimicrobial activity of this group of antibiotics is based upon the disturbance of the following process:
A. Microbial wall formation.
B. Choline esterase block.
C. Ribosome protein synthesis.
D. Energy metabolism.
E. Nucleic acid synthesis.

39. A man is a carrier of HIV that is an RNA virus. The cells of this patient synthesize viral DNA. This process is based on:
A. Reverse transcription
B. Replication
C. Translation
D. Repair
E. Transcription

HORMONES

1. During removal of the hyperplastic thyroid gland of a 47-year-old woman, the parathyroid gland was damaged. One month after the surgery the patient developed signs of hypoparathyroidism: frequent convulsions, hyperreflexia, laryngospasm. What is the most likely cause of the patient's condition?
A. Hypocalcemia
B. Hyponatremia
C. Hyperchlorhydria
D. Hypophosphatemia
E. Hyperkalemia

2. On examination the patient presents with hirsutism, moon-shaped face, stretch marks on the abdomen. BP is 190/100 mm Hg, blood glucose is 17,6 mmol/l. What pathology is such clinical presentation characteristic of?
A. Adrenocortical hyperfunction
B. Hyperthyroidism
C. Hypothyroidism
D. Gonadal hypofunction
E. Hyperfunction of the insular apparatus

3. Examination of a 56-year-old woman with a history of type 1 diabetes revealed a disorder of protein metabolism that is manifested by aminoacidemia in the laboratory blood test values, and clinically by the delayed wound healing and decreased synthesis of antibodies. Which of the following mechanisms causes the development of aminoacidemia?
A. Increased proteolysis
B. Albuminosis
C. Decrease in concentration of blood amino acids
D. Increase in plasma oncotic pressure
E. Increase in low-density lipoproteins level

4. A 30-year-old woman developed the signs of virilism (body hair growth, balding temples, disturbed menstrual cycle). What hormone can cause this condition when hyperproduced?
A. Testosterone
B. Estriol
C. Relaxin
D. Oxytocin
E. Prolactin

5. Corticosteroid hormones regulate the adaptation processes of the body as a whole to environmental changes and ensure the maintenance of internal homeostasis. What hormone activates the hypothalamopituitary-adrenal axis?
A. Corticoliberin
B. Somatoliberin
C. Somatostatin
D. Corticostatin
E. Thyroliberin

6. On examination the patient is found to have low production of adrenocorticotropic hormone. How would this affect production of the other hormones?
A. Decrease adrenal cortex hormones synthesis
B. Decrease hormone synthesis in the adrenal medulla
C. Decrease insulin synthesis
D. Increase sex hormones synthesis
E. Increase thyroid hormones synthesis

7. A 46-year-old patient suffering from the diffuse toxic goiter underwent resection of the thyroid gland. After the surgery the patient presents with appetite loss, dyspepsia, increased neuromuscular excitement. The body weight remained unchanged. Body temperature is normal. Which of the following has caused such a condition in this patient?
A. Reduced production of parathormone
B. Increased production of thyroxin
C. Increased production of calcitonin
D. Increased production of thyroliberin
E. Reduced production of thyroxin

8. The secretion of which hypophysial hormones will be inhibited after taking the

oral contraceptives containing sex hormones?
A. Gonadotropic hormone
B. Vasopressin
C. Thyrotrophic hormone
D. Somatotropic hormone
E. Ocytocin

9. A 12-year-old teenager has significantly put off weight within 3 months; glucose concentration rose up to 50 millimole/l. He fell into a coma. What is the main mechanism of its development?
A. Hyperosmolar
B. Hypoglycemic
C. Ketonemic
D. Lactacidemic
E. Hypoxic

10. A concentrated solution of sodium chloride was intravenously injected to an animal. This caused decreased reabsorption of sodium ions in the renal tubules. It is the result of the following changes of hormonal secretion:
A. Aldosterone reduction
B. Aldosterone increase
C. Vasopressin reduction
D. Vasopressin increase
E. Reduction of atrial natriuretic factor

11. The patient with complaints of permanent thirst applied to the doctor. Hyperglycemia, polyuria and increased concentration of 17-ketosteroids in the urine were revealed. What disease is the most likely?
A. Steroid diabetes
B. Insulin-dependent diabetes mellitus
C. Myxoedema
D. Type I glycogenosis
E. Addison's disease

12. A 32-year-old patient consulted a doctor about the absence of lactation after parturition. Such disorder might be explained by the deficit of the following hormone:
A. Prolactin
B. Somatotropin
C. Vasopressin
D. Thyrocalcitonin
E. Glucagon

13. Tissue inosytol triphosphates are generated as a result of the phosphatidylinositol diphosphate hydrolysis and act as secondary agents (mediators) in the mechanism of hormone action. Their effect in cells is directed at:
A. Calcium ion liberation from cellular depot
B. Adenylate cyclase activation
C. Protein kinase A activation
D. Phosphodiesterase inhibition
E. Protein kinase A inhibition

14. A 30 year old woman has subnormal concentration of enzymes in the pancreatic juice. This might be caused by the hyposecretion of the following gastrointestinal hormone:
A. Cholecystokinin-pancreozymin
B. Somatostatin
C. Secretin
D. Gastro-inhibiting peptide
E. Vaso-intestinal peptide

15. A month after surgical constriction of rabbit's renal artery the considerable increase of systematic arterial pressure was observed. What of the following regulation mechanisms caused the animal's pressure change?
A. Angiotensin-II
B. Vasopressin
C. Adrenaline
D. Noradrenaline
E. Serotonin

16. A child has abnormal formation of tooth enamel and dentin as a result of low concentration of calcium ions in blood. Such abnormalities might be caused by deficiency of the following hormone:
A. Parathormone
B. Thyrocalcitonin
C. Thyroxin
D. Somatotropic hormone
E. Triiodothyronine

17. A man has a considerable decrease in diuresis as a result of 1,5 l blood loss. The primary cause of such diuresis disorder is the hypersecretion of the following hormone:
A. Vasopressin
B. Corticotropin
C. Natriuretic
D. Cortisol
E. Parathormone

18. Before the cells can utilize the glucose, it is first transported from the extracellular space through the plasmatic membrane inside them. This process is stimulated by the following hormone:
A. Insulin
B. Glucagon
C. Thyroxin
D. Aldosterone
E. Adrenalin

19. Parodontitis is treated with calcium preparations and a hormone that stimulates tooth mineralization and inhibits tissue resorption. What hormone is it?
A. Calcitonin
B. Parathormone
C. Adrenalin
D. Aldosterone
E. Thyroxine

20. A 20 year old patient complains of morbid thirst and huperdiuresis (up to 10 l daily). Glucose concentration in blood is normal but it is absent in urine. The patient has been diagnosed with diabetes insipidus. What hormonal drug is the most appropriate for management of this disorder?
A. Vasopressin
B. Cortisol
C. Thyroxin
D. Oxytocin
E. Insulin

21. Atria of an experimental animal were superdistended by blood that resulted in decreased reabsorption of Na+ and water in renal tubules. This can be explained by the influence of the following factor upon kidneys:
A. Natriuretic hormone
B. Aldosterone
C. Renin
D. Angiotensin
E. Vasopressin

22. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?
A. Cyclic adenosine monophosphate
B. Cyclic guanosine monophosphate
C. Adenosine monophosphate
D. Diacylglycerol
E. Ions of Ca2+

23. A 5-month-old boy was hospitalized for tonic convulsions. He has a lifetime history of this disease. Examination revealed coarse hair, thinned and fragile nails, pale and dry skin. In blood: calcium - 1,5 millimole/l, phosphor - 1,9 millimole/l. These changes are associated with:
A. Hypoparathyroidism
B. Hyperparathyroidism
C. Hyperaldosteronism
D. Hypoaldosteronism
E. Hypothyroidism

24. Examination of a 42 year old patient revealed a tumour of adenohypophysis. Objectively: the patient's weight is 117 kg, he has moon-like hyperemic face, redblue striae of skin distension on his belly. Osteoporosis and muscle dystrophy are present. AP is 210/140 mm Hg. What is the most probable diagnosis?
A. Cushing's disease
B. Cushing's syndrome
C. Conn's disease
D. Diabetes mellitus
E. Essential hypertension

25. A 19-year-old male was found to have an elevated level of potassium in the secondary urine. These changes might have

been caused by the increase in the following hormone level:
A. Aldosterone
B. Oxytocin
C. Adrenaline
D. Glucagon
E. Testosterone

26. A 26-year-old woman at 40 weeks pregnant has been delivered to the maternity ward. Objectively: the uterine cervix is opened, but the contractions are absent. The doctor has administered her a hormonal drug to stimulate the labor. Name this drug:
A. Oxytocin
B. Hydrocortisone
C. Estrone
D. Testosterone
E. ACTH

27. A patient with signs of osteoporosis and urolithiasis has been admitted to the endocrinology department. Blood test revealed hypercalcemia and hypophosphatemia. These changes are associated with abnormal synthesis of the following hormone:
A. Parathyroid hormone
B. Calcitonin
C. Cortisol
D. Aldosterone
E. Calcitriol

28. A 30-year-old female exhibits signs of virilism (growth of body hair, balding temples, menstrual disorders). This condition can be caused by the overproduction of the following hormone:
A. Testosterone
B. Oestriol
C. Relaxin
D. Oxytocin
E. Prolactin

29. A patient who had been continuously taking drugs blocking the production of angiotensin II developed bradycardia and arrhythmia. A likely cause of these disorders is:
A. Hyperkalemia
B. Hypokalemia
C. Hypernatremia
D. Hypocalcemia
E. Hypercalcemia

30. As a result of a home injury, a patient suffered a significant blood loss, which led to a fall in blood pressure. Rapid blood pressure recovery after the blood loss is provided by the following hormones:
A. Adrenaline, vasopressin
B. Cortisol
C. Sex hormones
D. Oxytocin
E. Aldosterone

31. A 39-year-old female patient with a history of diabetes was hospitalized in a precomatose state for diabetic ketoacidosis. This condition had been caused by an increase in the following metabolite level:
A. Acetoacetate
B. Citrate
C. Alpha-ketoglutarate
D. Malonate
E. Aspartate

32. A patient has insufficient blood supply to the kidneys, which has caused the development of pressor effect due to the constriction of arterial resistance vessels. This is the result of the vessels being greately affected by the following substance:
A. Angiotensin II
B. Angiotensinogen
C. Renin
D. Catecholamines
E. Norepinephrine

33. In the course of an experiment adenohypophysis of an animal has been removed. The resulting atrophy of thyroid gland and adrenal cortex has been caused by deficiency of the following hormone:
A. Tropic hormones
B. Thyroid hormones
C. Somatotropin
D. Cortisol

E. Thyroxin

34. A patient with signs of osteoporosis and urolithiasis has been admitted to the endocrinology department. Blood test has revealed hypercalcemia and hypophosphatemia. These changes are associated with abnormal synthesis of the following hormone:
A. Parathyroid hormone
B. Calcitonin
C. Cortisol
D. Aldosterone
E. Calcitriol

35. Pancreas is known as a mixed gland. Endocrine functions include production of insulin by beta cells. This hormone affects the metabolism of carbohydrates. What is its effect upon the activity of glycogen phosphorylase (GP) and glycogen synthase (GS)?
A. It inhibits GP and activates GS
B. It activates both GP and GS
C. It inhibits both GP and GS
D. It activates GP and inhibits GS
E. It does not affect the activity of GP and GS

36. Prior to glucose utilization in cells it is transported inside cells from extracellular space through plasmatic membrane. This process is stimulated by the following hormone:
A. Insulin
B. Aldosterone
C. Glucagon
D. Adrenalin
E. Thyroxin

37. A 41-year-old man has a history of recurrent attacks of heartbeats (paroxysms), profuse sweating, headaches. Examination revealed hypertension, hyperglycemia, increased basal metabolic rate, and tachycardia. These clinical presentations are typical for the following adrenal pathology:
A. Hyperfunction of the medulla
B. Hypofunction of the medulla
C. Hyperfunction of the adrenal cortex
D. Hypofunction of the adrenal cortex
E. Primary aldosteronism

38. Atria of an experimental animal were superdistended with blood, which resulted in decreased reabsorption of Na+ and water in renal tubules. This can be explained by the influence of the following factor on ki¬dneys:
A. Natriuretic hormone
B. Angiotensin
C. Renin
D. Vasopressin
E. Aldosterone

39. A patient with hypertensic crisis has increased content of angiotensin II in blood. Angiotensin pressor effect is based on:
A. Contraction of arteriole muscles
B. Activation of biogenic amine synthesis
C. Prostaglandin hyperproduction
D. Vasopressin production stimulation
E. Activation of kinin–kallikrein system

40. For people adapted to high external temperatures profuse sweating is not accompanied by loss of large volumes of sodium chloride. This is caused by the effect the following hormone has on the perspiratory glands:
A. Aldosterone
B. Vasopressin
C. Cortisol
D. Thyroxin
E. Natriuretic

41. Emotional stress causes activation of hormone-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?
A. Cyclic adenosine monophosphate
B. Cyclic guanosine monophosphate
C. Ions of Ca2+
D. Adenosine monophosphate
E. Diacylglycerol

42. A patient has insufficient blood supply to the kidneys, which has caused the development of pressor effect due to

constriction of arterial resistance vessels. This condition results from the vessels being strongly affected by the following substance:
A. Angiotensin II
B. Renin
C. Norepinephrine
D. Catecholamines
E. Angiotensinogen

43. Examination of a 42-year-old patient revealed a tumour of adenohypophysis. Objectively: the patient's weight is 117kg, he has moon-like hyperemic face, red-blue striae of skin distension on his belly. Osteoporosis and muscle dystrophy are present. AP is 210/140 mm Hg. What is the most probable diagnosis?
A. Cushing's disease
B. Diabetes mellitus
C. Conn's disease
D. Cushing's syndrome
E. Essential hypertension

44. A 4-year-old child with hereditary, renal lesion has signs of rickets; vitamin D concentration in blood is normal. W Impaired synthesis of calcitriol hat is the most probable cause of rickets development?
A. Impaired synthesis of calcitriol
B. Hyperfunction of parathyroid gland
C. Hypofunction of parathyroid glands
D. Increased excretion of calcium
E. Lack of calcium in food

45. A 15-year-old patient has fasting plasma glucose level 4,8 mmol/1, one hour after glucose challenge it becomes 9,0 mmol/1, in 2 hours it is 7,0 mmol/1, in 3 hours it is 4,8 mmol/1. Such parameters are characteristic of:
A. Subclinical diabetes mellitus
B. Diabetes mellitus type 1
C. Diabetes mellitus type 2
D. Healthy person
E. Cushing's disease

46. Prolonged treatment of hypothyroidism has caused general dystrophy, dental caries,tachycardia, tremor of extremities. What drug is the cause of these side effects?
A. L-thyroxin
B. Parathyreoidinum
C. Thyrocalcitonin
D. Prednisolone
E. Humulin (Human insulin)

47. A 41-year-old man has a history of recurrent attacks of heartbeats (paroxysms), profuse sweating, headaches. Examination revealed hypertension, hyperglycemia, increased basal metabolic rate, and tachycardia. These clinical presentations are typical of the following adrenal pathology:
A. Hyperfunction of medulla
B. Hypofunction of medulla
C. Hypofunction of the adrenal cortex
D. Hyperfunction of the adrenal cortex
E. Primary aldosteronism

48. Atria of an experimental animal were superdistended with blood, which resulted in decreased reabsorption of Na+ and water in influence of the following factor on kidneys:
A. Natriuretic hormone
B. Renin
C. Aldosterone
D. Vasopressin
E. Angiotensin

49. A patient with insulin-dependent diabetes mellitus has been administered insulin. After a certain period of time the patient developed fatigue, irritability, excessive sweating. What is the main mechanism of such presentations developing?
A. Carbohydrate starvation of the brain
B. Increased lipogenesis
C. Increased ketogenesis
D. Increased glycogenolysis
E. Decreased glyconeogenesis

50. Examination of a 56-year-old woman with a history of type 1 diabetes mellitus revealed a disorder of protein metabolism that is manifested by aminoacidemia in the laboratory blood test values, and clinically

by the delayed wound healing and decreased synthesis of antibodies. Which of the following mechanisms causes the development of aminoacidemia?
A. Increased proteolysis
B. Decrease in the concentration of amino acids in blood
C. Increase in the oncotic pressure in the blood plasma
D. Increase in low-density lipoprotein level
E. Albuminosis

51. A patient with signs of osteoporosis and urolithiasis has been admitted to an endocrinology department. Blood test revealed hypercalcemia and hypophosphatemia. These changes are associated with abnormal synthesis of the following hormone:
A. Parathyroid hormone
B. Aldosterone
C. Calcitriol
D. Calcitonin
E. Cortisol

52. A 30-year-old woman exhibits signs of virilism (growth of body hair, balding temples, menstrual disorders). This condition can be caused by overproduction of the following hormone:
A. Testosterone
B. Oestriol
C. Prolactin
D. Oxytocin
E. Relaxin

53. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of the teeth. What can be the cause?
A. Vitamin D deficiency
B. Vitamin C deficiency
C. Decreased glucagon production
D. Hyperthyroidism
E. Insulin deficiency

54. Pancreas in knows as a mixed gland. Endocrine functions include production of insulin by beta cells. This hormone affects metabolism of carbohydrates. What is its effect on the activity of glycogen phosphorylase (GP) and glycogen synthase (GS)?
A. It inhibits GP and activates GS
B. It activates both GP and GS
C. It inhibits both GP activates GS
D. It does not affect the activity of GP and GS
E. It activates GP and inhibits GS

55. Increased amount of free fat acids is observed in the blood of the patients with diabetes mellitus. It can be caused by:
A Increased activity of triglyceridelipase adipocytes
B Storage of palmitatoil-CoA
C Activation of the ketone bodies utilization
D Activation of the synthesis of the apolipoproteins
E Decreased activity of phosphatidylcholine-cholesterol-acyltransferase blood plasma

56. A patient is ill with diabetes mellitus that is accompanied by hyperglycemia of over 7,2 millimole/l on an empty stomach. The level of what blood plasma protein allows to estimate the glycemia rate retrospectively (4-8 weeks before examination)?
A Glycated hemoglobin
B Albumin
C Fibrinogen
D C-reactive protein
E Ceruloplasmin

57. The formation of a secondary mediator is obligatory in membrane-intracellular mechanism of hormone action. Point out the substance that is unable to be a secondary mediator:
A Glycerol
B Diacylglycerol
C Inositol-3,4,5-triphosphate
D CAMP
E Ca^{2+}

58. On some diseases it is observed aldosteronism with hypertension and edema

due to sodium retention in the organism. What organ of the internal secretion is affected on aldosteronism?
A Adrenal glands
B Testicle
C Ovaries
D Pancreas
E Hypophysis

59. A 52 year-old patient with bronchial asthma was treated with glucocorticoids. Fever reaction appeared as a result of postinjective abscess. The patient had subfebrile temperature, which didn't correspond to latitude and severity of inflammatory process. Why did patient have low fever reaction?
A Inhibited endogen pyrogens production
B Violation of heat loss through lungs
C Inflammatory barrier formation in injection place
D Violation of heat-producing mechanisms
E Thermoregulation center inhibition

60. A 62-year-old female patient has developed a cataract (lenticular opacity) secondary to the diabetes mellitus. What type of protein modification is observed in case of diabetic cataract?
A Glycosylation
B Phosphorylation
C ADP-ribosylation
D Methylation
E Limited proteolysis

61. Aspirin has antiinflammatory effect due to inhibition of the cyclooxygenase activity. Level of what biological active acids will decrease?
A Prostaglandins
B Leucotriens
C Catecholamines
D Biogenic amines
E Iodinethyronyns

62. Increased production of thyroidal hormones T_3 and T_4, weight loss, tachycardia, psychic excitement and so on present on thyrotoxicosis. How do thyroidal hormones effect energy metabolism in the mitochondrion of cells?
A Disconnect oxidation and oxidated phosphorylation
B Activates phosphorylation of substance
C Stops phosphorylation of substance
D Stops respiratory chain
E Activates oxidated phosphorylation

63. A patient was delivered to the hospital by an emergency team. Objectively: grave condition, unconscious, adynamy. Cutaneous surfaces are dry, eyes are sunken, face is cyanotic. There is tachycardia and smell of acetone from the mouth. Analysis results: blood glucose - 20,1 micromole/l (standard is 3,3-5,5 micromole/l), urine glucose - 3,5% (standard is - 0). What is the most probable diagnosis?
A Hyperglycemic coma
B Hypoglycemic coma
C Acute heart failure
D Acute alcoholic intoxication
E Anaphylactic shock

64. Parodontitis is treated with calcium preparations and a hormone that stimulates tooth mineralization and inhibits tissue resorption. What hormone is it?
A Calcitonin
B Parathormone
C Adrenalin
D Aldosterone
E Thyroxine

65. A 50-year-old patient complains about general weakness, appetite loss and cardiac arrhythmia. The patient presents with muscle hypotonia, flaccid paralyses, weakened peristaltic activity of the bowels. Such condition might be caused by:
A Hypokaliemia
B Hypoproteinemia
C Hyperkaliemia
D Hypophosphatemia
E Hyponatremia

66. Patient with diabetes mellitus experienced loss of consciousness and

convulsions after injection of insulin. What is the result of biochemical blood analysis for concentration of the sugar?
A 1,5 mmol/L
B 8,0 mmol/L
C 10,0 mmol/L
D 3,3 mmol/L
E 5,5 mmol/L

67. 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

68. Albinos can't stand sun impact - they don't aquire sun-tan but get sunburns. Disturbed metabolism of what aminoacid underlies this phenomenon?
A Phenilalanine
B Methionine
C Tryptophan
D Glutamic acid
E Histidine

69. Products of some proteins hydrolysis and modification are the biologically active substances called hormones. Lipotropin, corticotropin, melanotropin and endorphins are synthesized in the hypophysis of the following protein:
A Proopiomelanocortin (POMC)
B Neuroalbumin
C Neurostromin
D Neuroglobulin
E Thyreoglobulin

70. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A Cholecalciferol
B Thiamin
C Pantothenic acid
D Bioflavonoids
E Riboflavin

71. 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

72. Utilization of arachidonic acid via cyclooxigenase pathway results in formation of some bioactive substances. Name them:
A Prostaglandins
B Thyroxine
C Biogenic amins
D Somatomedins
E Insulin-like growth factors

73. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?
A Cyclic adenosine monophosphate
B Cyclic guanosine monophosphate
C Adenosine monophosphate
D Diacylglycerol
E Ions of Ca^{2+}

74. The patient with complaints of permanent thirst applied to the doctor. Hyperglycemia, polyuria and increased concentration of 17-ketosteroids in the urine were revealed. What disease is the most likely?
A Steroid diabetes
B Insulin-dependent diabetes mellitus
C Myxoedema
D Type I glycogenosis
E Addison's disease

75. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may

be caused by excessive accumulation of ketone bodies in blood?
A Metabolic acidosis
B Metabolic alcalosis
C Any changes woun't happen
D Respiratory acidosis
E Respiratory alcalosis

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

77. A 5-month-old boy was hospitalized for tonic convulsions. He has a life-time history of this disease. Examination revealed coarse hair, thinned and fragile nails, pale and dry skin. In blood: calcium - 1,5 millimole/l, phosphor - 1,9 millimole/l. These changes are associated with:
A Hypoparathyroidism
B Hyperparathyroidism
C Hyperaldosteronism
D Hypoaldosteronism
E Hypothyroidism

78. A doctor examined a child and revealed symptoms of rachitis. Development of this desease was caused by deficiency of the following compound:
A 1,25 [OH]-dichydroxycholecalciferol
B Biotin
C Tocopherol
D Naphtaquinone
E Retinol

79. 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

80. A 4 year old child with hereditary renal lesion has signs of rickets, vitamin D concentration in blood is normal. What is the most probable cause of rickets development?
A Impaired synthesis of calcitriol
B Increased excretion of calcium
C Hyperfunction of parathyroid glands
D Hypofunction of parathyroid glands
E Lack of calcium in food

81. It is known that the monoamine oxidase (MAO) enzyme plays an important part in the metabolism of catecholamine neurotransmitters. In what way does the enzyme inactivate these neurotransmitters (norepinephrine, epinephrine, dopamine)?
A Oxidative deamination
B Addition of an amino group
C Removal of a methyl group
D Carboxylation
E Hydrolysis

82. Products of some proteins hydrolysis and modification are the biologically active substances called hormones. Lipotropin, corticotropin, melanotropin and endorphins are synthesized in the hypophysis of the following protein:
A Proopiomelanocortin (POMC)
B Neuroalbumin
C Neurostromin
D Neuroglobulin
E Thyreoglobulin

83. A 4 year old child with hereditary renal lesion has signs of rickets, vitamin D concentration in blood is normal. What is the most probable cause of rickets development?
A Impaired synthesis of calcitriol
B Increased excretion of calcium
C Hyperfunction of parathyroid glands
D Hypofunction of parathyroid glands
E Lack of calcium in food

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A 1,25 [OH]-dichydroxycholecalciferol
B Biotin
C Tocopherol
D Naphtaquinone
E Retinol

85. The patient with complaints to constant thirst has addressed to the doctor. It is revealed hyperglycemia, polyuria and 17-ketosteroids concentration in urine is raised. What disease is probable?
A. Steroid diabetes
B. Insulin-dependent diabetes
C. Myxedema
D. Glycogen disease, I type
E. Addison's disease

86. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may be caused by excessive accumulation of ketone bodies in blood?
A. Metabolic acidosis.
B. Metabolic alkalosis.
C. Any changes woun't happen.
D. Respiratory acidosis.
E. Respiratory alkalosis.

87. The formation of a secondary mediator is obligatory in membrane-intracellular mechanism of hormone action. Point out the substance that is unable to be a secondary mediator:
A. Glycerol.
B. Diacylglycerol.
C. Inositol-3,4,5-triphosphate.
D. CAMP.
E. Ca2

88. Aspirin has its effects due to inhibition of the cyclooxygenase activity. Level of what biological active substances will decrease?
A. Prostaglandins.
B. Leucotriens.
C. Catecholamines.
D. Biogenic amines.
E. Iodinethyronyns.

89. Increased production of thyroidal hormones T3 and T4, weight loss, tachycardia, psychic excitement and so on present on thyrotoxicosis. How do thyroidal hormones effect energy metabolism in the mitochondrion of cells?
A. Disconnect oxidation and oxidated phosphorylation.
B. Activates phosphorylation of substance.
C. Stops phosphorylation of substance.
D. Stops respiratory chain.
E. Activates oxidated phosphorylation.

90. Products of some proteins hydrolysis and modification are the biologically active substances called hormones. Lipotropin, corticotropin, melanotropin and endorphins are synthesized in the hypophysis of the following protein:
A. Proopiomelanocortin (POMC).
B. Neuroalbumin.
C. Neurostromin.
D. Neuroglobulin.
E. Thyreoglobulin.

91. Utilization of arachidonic acid via cyclooxigenase pathway results in formation of some bioactive substances. Name them:
A. Prostaglandins.
B. Thyroxine.
C. Biogenic amins.
D. Somatomedins.
E. Insulin-like growth factors.

92. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary mediator takes part in this process?
A. Cyclic adenosine monophosphate.
B. Cyclic guanosine monophosphate.
C. Adenosine monophosphate.
D. Diacylglycerol.
E. Ions of Ca2+.

93. A 40-year-old patient complains of intensive heartbeats, sweating, nausea, visual

impairment, arm tremor, hypertension. From his anamnesis: 2 years ago he was diagnosed with pheochromocytoma. Hyperproduction of what hormones causes the given pathology?
A. Catecholamines.
B. Aldosterone.
C. Glucocorticoids.
D. Thyroidal hormones.
E. ACTH.

94. A patient is ill with diabetes mellitus that is accompanied by hyperglycemia of over 7,2 millimole/l on an empty stomach. The level of what blood plasma protein allows to estimate the glycemia rate retrospectively (4-8 weeks before examination)?
A. Glycated hemoglobin.
B. Albumin.
C. Fibrinogen.
D. C-reactive protein.
E. Ceruloplasmin.

95. The B cells of endocrine portion of pancreas are selectively damaged by alloxan poisoning.How will it be reflected in blood plasma?
A. The content of sugar increases.
B. The content of fibrinogen decrease.
C. The level of sugar decreases.
D. The content of globulins decreases.
E. The content of albumins decreases.

96. A 62-year-old female patient has developed a cataract (lenticular opacity) secondary to the diabetes mellitus. What type of protein modification is observed in case of diabetic cataract?
A. Glycosylation.
B. Phosphorylation.
C. ADP-ribosylation.
D. Methylation.
E. Limited proteolysis.

97. A patient was delivered to the hospital by an emergency team. Objectively: grave condition, unconscious, adynamy. Cutaneous surfaces are dry, eyes are sunken, face is cyanotic. There is tachycardia and smell of acetone from the mouth. Analysis results: blood glucose – 20,1 micromole/l (standard is 3,3-5,5 micromole/l), urine glucose – 3,5% (standard is – 0). What is the most probable diagnosis?
A. Hyperglycemic coma.
B. Hypoglycemic coma.
C. Acute heart failure.
D. Acute alcoholic intoxication.
E. Anaphylactic shock.

98. Patient with diabetes mellitus experienced loss of consciousness and convulsions after injection of insulin. What is the result of biochemical blood analysis for concentration of the sugar?
A. 1,5 mmol/L.
B. 8,0 mmol/L.
C. 10,0 mmol/L.
D. 3,3 mmol/L.
E. 5,5 mmol/L.

99. 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.

100. A nurse accidentally injected a nearly double dose of insulin to a patient with diabetes mellitus. The patient lapsed into a hypoglycemic coma. What drug should be injected in order to help him out of coma?
A. Glucose.
B. Lidase.
C. Insulin.
D. Somatotropin.
E. Noradrenalin

101. A 45 y.o. woman suffers from Cushing's syndrome - steroid diabetes.

Biochemical examination revealed: hyperglycemia, hypochloremia. Which of the undermentioned processes is the first to be activated?
A. Gluconeogenesis.
B. Glycogenolysis.
C. Glucose reabsorption.
D. Glucose transport to the cell.
E. Glycolysis.

102. Inhabitants of territories with cold climate have high content of an adaptive thermoregulatory hormone. What hormone is meant?
A. Thyroxin.
B. Insulin.
C. Somatotropin.
D. Glucagon.
E. Cortisol.

103. The patient with complaints of permanent thirst applied to the doctor. Hyperglycemia, polyuria and increased concentration of 17-ketosteroids in the urine were reveale What disease is the most likely?
A. Steroid diabetes.
B. Insulin-dependent diabetes mellitus.
C. Myxoedem.
D. Type I glycogenosis.
E. Addison's disease

104. Patients suffering from severe diabetes and don't receive insulin have ketoacidosis. Ketone bodies are formed from:
A. AcetylCoA.
B. SuccinylCoA.
C. PropionylCoA.
D. MethylmalonylCoA.
E. MalonylCoA.

105. 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.

106. A nurse accidentally injected a nearly double dose of insulin to a patient with diabetes mellitus. The patient lapsed into a hypoglycemic coma. What drug should be injected in order to help him out of coma?
A. Glucose.
B. Noradrenaline.
C. Somatotropin.
D. Lidase.
E. Insulin.

107. Before the cells can utilize the glucoze, it is first transported from the extracellular space through the plasmatic membrane inside them. This process is stimulated by the following hormone:
A. Insulin.
B. Glucagon.
C. Aldosterone.
D. Thyroxin.
E. Adrenalin.

108. A 44-year-old woman complains of common weakness, heart pain, considerable increase of body weigt. Objectively: moon-like face, hirsutism, AP- 165/100 mm Hg, height - 164 cm, weight - 103 kg; fat is mostly accumulated in the region of neck, upper shoulder girdle, stomach. What is the main pathogenetic mechanism of obesity?
A. Increased production of glucocorticoids.
B. Decreased production of thyroidal hormones.
C. Increased production of insulin.
D. Decreased production of glucagon.
E. Increased production of mineralocorticoids.

109. A patient with diabetes mellitus has been delivered in hospital in the state of unconsciousness. Arterial pressure is low. The patient has acidosis. Point substances, which accumulation in the blood results in these manifestations:
A. Ketone bodies.

B. Monosaccharides.
C. Amino acids.
D. High fatty acids.
E. Cholesterol esters.

110. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may be caused by excessive accumulation of ketone bodies in blood?
A. Metabolic acidosis.
B. Metabolic alkalosis.
C. Any changes woun't happen.
D. Respiratory acidosis.
E. Respiratory alkalosis.

111. Aspirin has antiinflammatory effect due to inhibition of the cyclooxygenase activity. Level of what biological active acids will decrease?
A. Prostaglandins.
B. Leucotriens.
C. Catecholamines.
D. Biogenic amines.
E. Iodinethyronyns.

112. Increased amount of free fat acids is observed in the blood of the patients with diabetes mellitus. It can be caused by:
A. Increased activity of triglyceridelipase adipocytes.
B. Storage of palmitatoil-CoA.
C. Activation of the ketone bodies utilization.
D. Activation of the synthesis of the apolipoproteins.
E. Decreased activity of phosphatidylcholine-cholesterol-acyltransferase blood plasma.

113. The patient with complaints of permanent thirst applied to the doctor. Hyperglycemia, polyuria and increased concentration of 17-ketosteroids in the urine were revealed. What disease is the most likely?
A. Steroid diabetes.
B. Myxoedema.
C. Type I glycogenosis.
D. Addison's disease.
E. Insulin-dependent diabetes mellitus

114. Increased production of thyroidal hormones T3 and T4, weight loss, tachycardia, psychic excitement and so on present on thyrotoxicosis. How do thyroidal hormones effect energy metabolism in the mitochondrion of cells?
A. Disconnect oxidation and oxidated phosphorylation.
B. Activates phosphorylation of substance.
C. Stops phosphorylation of substance.
D. Stops respiratory chain.
E. Activates oxidated phosphorylation.

115. Parodontitis is treated with calcium preparations and a hormone that stimulates tooth
mineralization and inhibits tissue resorption. What hormone is it?
A. Calcitonin.
B. Parathormone.
C. Adrenalin.
D. Aldosterone.
E. Thyroxine.

116. A 50-year-old patient complains about general weakness, appetite loss and cardiac arrhythmi The patient presents with muscle hypotonia, flaccid paralyses, weakened peristaltic activity of the bowels. Such condition might be caused by:
A. Hypokaliemia.
B. Hypoproteinemia.
C. Hyperkaliemia.
D. Hypophosphatemia.
E. Hyponatremia.

117. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A. Cholecalciferol.
B. Thiamin.
C. Pantothenic acid.
D. Bioflavonoids.

E. Riboflavin.

118. Utilization of arachidonic acid via cyclooxigenase pathway results in formation of some bioactive substances. iabetesenas
A. Prostaglandins.
B. Thyroxine.
C. Biogenic amins.
D. Somatomedins.
E. Insulin-like growth factors.

119. Emotional stress causes activation of hormon-sensitive triglyceride lipase in the adipocytes. What secondary messenger takes part in this process?
A. Cyclic adenosine monophosphate.
B. Cyclic guanosine monophosphate.
C. Adenosine monophosphate.
D. Diacylglycerol.
E. Ions of Ca2+.

120. Emotional stress causes activation of Glycogen phosphosrylase in the miocytes. What secondary messenger takes part in this process?
A. cAMP.
B. cGMP.
C. AMP.
D. DAG.
E. Ions of Ca2+.

121. A 5-month-old boy was hospitalized for tonic convulsions. He has a life-time history of this diseas Examination revealed coarse hair, thinned and fragile nails, pale and dry skin. In blood: calcium - 1,5 millimole/l, phosphor - 1,9 millimole/l. These changes are associated with:
A. Hypoparathyroidism.
B. Hyperparathyroidism.
C. Hyperaldosteronism.
D. Hypoaldosteronism.
E. Hypothyroidism.

122. A doctor examined a child and revealed symptoms of rachitis. Development of this desease was caused by deficiency of the following compound:
A. 1,25 [OH]-dichydroxycholecalciferol.
B. Biotin.
C. Tocopherol.
D. Naphtaquinon
E. Retinol.

123. People adapted to high external temperatures have such pecularity: profuse sweating isn't accompanied by loss of large volumes of sodium chloride. This is caused by the effect of the following hormone upon the perspiratory glands:
A. Aldosterone.
B. Natriuretic.
C. Cortisol.
D. Thyroxin.
E. Vasopressin.

124. A 4 year old child with hereditary renal lesion has signs of rickets, vitamin D concentration in blood is normal. What is the most probable cause of rickets development?
A. Impaired synthesis of calcitriol.
B. Increased excretion of calcium.
C. Hyperfunction of parathyroid glands.
D. Hypofunction of parathyroid glands.
E. Lack of calcium in food.

125. Cardinal symptoms of primary hyperparathyroidism are osteoporosis and renal lesion along with development of urolithiasis. What substance makes up the basis of these calculi in this disease?
A. Calcium phosphate.
B. Uric acid.
C. Cystine.
D. Bilirubin.
E. Cholesterol.

126. On some diseases it is observed aldosteronism with hypertension and edema due to sodium retention in the organism. What organ of the internal secretion is affected on aldosteronism?
A. Adrenal glands.
B. Testicle.
C. Ovaries.
D. Pancreas.
E. Hypophysis.

127. A person has reduced diuresis, hypernatremia, hypokalemia. Hypersecretion of what hormone can cause such changes?
A. Aldosterone.
B. Parathormone.
C. Auricular sodiumuretic factor.
D. Adrenalin.
E. Vasopressin.

128. A concentrated solution of sodium chloride was intravenously injected to an animal. This caused decreased reabsorption of sodium ions in the renal tubules. It is the result of the following changes of hormonal secretion:
A. Aldosterone reduction.
B. Aldosterone increase.
C. Reduction of atrial natriuretic factor.
D. Vasopressin increase.
E. Vasopressin reduction.

129. Tissue inosytol triphosphates are generated as a result of the phosphatidylinositol diphosphate hydrolysis and act as secondary agents (mediators) in the mechanism of hormone action. Their effect in cells is directed at:
A. Calcium ion liberation from cellular depot.
B. Protein kinase A activation.
C. Adenylate cyclase activation.
D. Protein kinase A inhibition.
E. Phosphodiesterase inhibition.

130. Examination of a patient revealed glycosuria and hyperglycemia. He complains of dry mouth, itchy skin, frequent urination, thirst. He has been diagnosed with diabetes mellitus. What is the cause of polyuria in this patient?
A. Increased plasma oncotic pressure
B. Decreased cardiac output
C. Increased filtration pressure
D. Increased urine osmotic pressure
E. Decreased plasma oncotic pressure

131. It is known that many hormones act through the adenylate cyclase system causing the enzyme activation by phosphorylation. What enzyme is activated by hormonal signals and catalyzes glycogen breakdown?
A. Phosphorylase
B. Tyrosinase.
C. Phosphotransferase
D. Glucomutase
E. Phosphatase.

132. Degeneration of glycogen in liver is stimulated by glucagon. What secondary messenger (mediator) is thus formed in the cell?
A. c-AMP
B. CO
C. NO
D. c-GMP
E. Triacylglycerol

133. A child has abnormal formation of tooth enamel and dentin as a result of low concentration of calcium ions in blood. Such abnormalities might be caused by deficiency of the following hormone:
A. Parathormone.
B. Thyrocalcitonin
C. Thyroxin
D. Somatotropic hormone
E. Triiodothyronine

134. A patient has the sudden decrease of Ca2+ content in blood. What hormone secretion will increase?
A. Parathormone.
B. Thyrocalcitonin
C. Aldosterone
D. Vasopressin
E. Somatotropin

135. A patient with diabetes mellitus had an insuline injection. It caused loss of consciousness and convulsions. What was the result of biochemic blood analysis on glucose content?
A. 2,5 mmole/l.
B. 3,3 mmole/l
C. 8,0 mmole/l
D. 10 mmole/l
E. 5,5 mmole/l

136. Hormonal form of a certain vitamin induces genome level synthesis of Ca-binding proteins and enterocytes thus regulating the intestinal absorption of Ca2+ ions required for dental tissue development. What vitamin is it?
A. D3.
B. A
C. B1
D. E
E. K.

137. A child has disturbed enamel and dentine formation as a result of decreased content of calcium ions in his blood. What hormone deficiency may cause such changes?
A. Parathormone
B. Somatotropin
C. Thyroxin
D. Thyreocalcitonin.
E. Triiodothyronine

138. A 42 year old woman diagnosed with diabetes mellitus was admitted to the endocrinological department with complaints of thirst, excessive appetite. What pathological components are revealed in course of laboratory examination of the patient's urine?
A. Glucose, ketone bodies.
B. Protein, aminoacids
C. Protein, creatine
D. Bilirubin, urobilin
E. Blood

139. A 49-year-old patient was found to have a disproportionate enlargement of hands, feet, nose, ears, superciliary arches and cheek bones. Blood test revealed hyperglycemia, impaired glucose tolerance. What is the most likely cause of this pathology development?
A. Hypersecretion of growth hormone.
B. Posterior pituitary hormone hypersecretion
C. Insulin hyposecretion
D. Vasopressin hyposecretion
E. Glucocorticoid hypersecretion

140. A 36-year-old patient with diabetes mellitus had seizures with loss of consciousness after an insulin injection. What was the result of blood glucose test?
A. 2,5 mmol/l.
B. 3,3 mmol/l
C. 8,0 mmol/l
D. 10 mmol/l
E. 5,5 mmol/l

141. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
A. Cholecalciferol.
B. Thiamin
C. Pantothenic acid
D. Bioflavonoids
E. Riboflavin

142. Analysis of urine from a 24-year-old man revealed the following changes: daily diuresis - 10 l, relative density - 1,001, qualitative alterations are absent. A patient complains of excessive thirst, frequent urination. What is the most likely cause of this disease?
A. Vasopressin hyposecretion.
B. Glucocorticoid hypersecretion
C. Vasopressin hypersecretion
D. Relative insulin insufficiency
E. Aldosteron hypersecretion

143. A child has abnormal formation of tooth enamel and dentin as a result of low concentration of calcium ions in blood. Such abnormalities might be caused by deficiency of the following hormone:
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B. Thyrocalcitonin
C. Thyroxin
D. Somatotropic hormone
E. Triiodothyronine

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B. Thyrocalcitonin
C. Aldosterone
D. Vasopressin
E. Somatotropin

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E. 5,5 mmole/l

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C. B1
D. E
E. K.

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B. Protein, aminoacids
C. Protein, creatine
D. Bilirubin, urobilin
E. Blood

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B. 3,3 mmol/l
C. 8,0 mmol/l
D. 10 mmol/l
E. 5,5 mmol/l.

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B. Thiamin
C. Pantothenic acid
D. Bioflavonoids
E. Riboflavin.

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A. Vasopressin hyposecretion.
B. Glucocorticoid hypersecretion
C. Vasopressin hypersecretion
D. Relative insulin insufficiency
E. Aldosteron hypersecretion

152. Due to prolonged stay in the mountains at the altitude of 3000 m above the sea level, a person developed increased

oxygen capacity of blood, which was directly caused by intensified production of:
A. Erythropoietins
B. Catecholamines
C. Carbaminohemoglobin
D. 2,3-bisphosphoglycerate
E. Leukopoietins

153. A patient has undergone surgical removal of the pylorus. Decreased secretion of the following hormone can be expected:
A Gastrin
B. Secretin
C. Gastric inhibitory polypeptide
D. Cholecystokinin
E. Histamine

154. Blood of the patients with diabetes mellitus shows increased content of free fatty acids. Name the most likely cause of this:
A. Increased activity of adipose triglyceride lipase
B. Accumulation of palmitoyl-CoA in cytosol
C. Decreased activity of plasma phosphatidylcholine-cholesterol-acyltransferase
D. Activation of ketone bodies utilization
E. Activation of apoAl, apoA2, and apoA4 apolipoprotein synthesis

155. A 40-year-old woman suffers from Cushing's disease - steroid diabetes. On biochemical examination she has hyperglycemia and hypochloremia. What process activates in the first place in such patients?
A. Gluconeogenesis
B. Glucose transport to the cells
C. Glycogenolysis
D. Glycolysis
E. Glucose reabsorption

156. After a case of sepsis a 27-year- old woman developed "bronzed" skin discoloration characteristic of Addison's disease. Hyperpigmentation mechanism in this case is based on increased secretion of:
A. Melanocyte-stimulating hormone
B. Thyroid-stimulating hormone
C. Somatotropin
D. β-lipotropin
E. Gonadotropin

157. In human organism significant blood loss leads to decreased blood pressure, tachycardia, and weakness. Eventually the sensation of thirst appears. What hormone participates in the development of this sensation?
A. Angiotensin 2
B. Adrenalin
C. Cortisol
D. Dopamine
E. Serotonin

158. A 16-year-old girl presents with no hair on the pubis and in the armpits, her mammary glands are underdeveloped, no menstruations. What hormone imbalance can it be indicative of?
A. Ovarian failure
B. Hyperthyroidism
C. Pancreatic islet failure
D. Adrenal medulla hyperfunction
E. Hypothyroidism

159. During removal of the hyperplastic thyroid gland of a 47-year-old woman, the parathyroid gland was damaged. One month after the surgery the patient developed signs of hypoparathyroidism: frequent convulsions, hyperreflexia, laryngospasm. What is the most likely cause of the patient's condition?
A. Hypocalcemia
B. Hyperchlorhydria
C. Hyponatremia
D. Hypophosphatemia
E. Hyperkalemia

160. On examination the patient presents with hirsutism, moon-shaped face, stretch marks on the abdomen. BP is 190/100 mm Hg, blood glucose is 17.6 mmol/L. What pathology is such clinical presentation characteristic of?
A. Adrenocortical hyperfunction

B. Gonadal hypofunction
C. Hyperthyroidism
D. Hyperfunction.of the insular apparatus
E. Hypothyroidism

161. Atria of a test animal were superdistended with blood, which resulted in decreased reabsorption of Na+ and water in renal tubules. This can be explained by the effect of the following factor on the kidneys:
A. Natriuretic hormone
B. Vasopressin
C. Aldosterone
D. Angiotensin
E. Renin

162. A 40-year-old woman on examination presents with intensified basal metabolic rate. What hormone present in excess leads to such condition?
A. Triiodothyronine
B. Thyrocalcitonin
C. Somatostatin
D. Aldosterone
E. Glucagon

163. A 19-year-old young man was examined in the nephrology clinic. High Potassium was detected in his secondary urine. What hormone is likely to cause such change, if it is produced in excess?
A. Aldosterone
B. Testosterone
C. Glucagon
D. Oxytocin
E. Adrenaline

FUNCTIONAL BIOCHEMISTRY

1. Protective function of saliva is based on several mechanisms, including the presence of enzyme that has bactericidal action and causes lysis of complex capsular polysaccharides of staphylococci and streptococci. Name this enzyme:
A. Lysozyme
B. Alpha-amylase
C. Oligo-1,6-glucosidase
D. Collagenase
E. Beta-glucuronidase

2. A 3-year-old boy with pronounced hemorrhagic syndrome has no antihemophilic globulin A (factor VIII) in the blood plasma. Hemostasis has been impaired at the following stage:
A. Internal mechanism of prothrombinase activation
B. External mechanism of prothrombinase activation
C. Conversion of prothrombin to thrombin
D. Conversion of fibrinogen to fibrin
E. Blood clot retraction

3. A 46-year-old woman suffering from cholelithiasis developed jaundice. Her urine became dark yellow, while feces are lightcolored. What substance will be the most increased in concentration in the blood serum in this case?
A. Conjugated bilirubin
B. Unconjugated bilirubin
C. Biliverdine
D. Mesobilirubin
E. Urobilinogen

4. A traumatology unit received a patient with crushed muscular tissue. What biochemical indicator of urine will be raised in this case?
A. Creatinine
B. Total lipids
C. Glucose
D. Mineral salts
E. Uric acid

5. A 30-year-old woman first developed pain, swelling, and skin redness in the area of joints about a year ago. Provisional diagnosis is rheumatoid arthritis. One of the likely causes of this disease is change in the structure of the following connective tissue protein:
A. Collagen
B. Mucin
C. Myosin
D. Ovalbumin
E. Troponin

6. A patient with jaundice has high total bilirubin that is mainly indirect (unconjugated), high concentration of stercobilin in the feces and urine. The level of direct (conjugated) bilirubin in the blood plasma is normal. What type of jaundice can be suspected?
A. Hemolytic
B. Parenchymal (hepatic)
C. Mechanical
D. Neonatal
E. Gilbert's disease

7. To lose some weight a woman has been limiting the amount of products in her diet. 3 months later she developed edemas and her diuresis increased. What dietary component deficiency is the cause of this?
A. Proteins
B. Fats
C. Carbohydrates
D. Vitamins
E. Minerals

8. A 5-year-old child is diagnosed with Bruton syndrome (X-linked agammaglobulinemia) that manifests itself in severe clinical course of bacterial infections and absence of B lymphocytes and plasma cells. What changes of immunoglobulin content can be observed in blood serum of the child with immunodeficiency?
A. Decreased IgA, IgM
B. Increased IgA, IgM
C. Decreased IgD, IgE

D. Increased IgD, IgE
E. No changes

9. An unconscious patient was delivered by ambulance to the hospital. On objective examination the patient was found to have no reflexes, periodical convulsions, irregular breathing. After laboratory examination the patient was diagnosed with hepatic coma. Disorders of the central nervous system develop due to the accumulation of the following metabolite:
A. Ammonia
B. Urea
C. Glutamine
D. Bilirubin
E. Histamine

10. A 30-year-old man with diabetes mellitus type I was hospitalized. The patient is comatose. Laboratory tests revealed hyperglycemia and ketonemia. What metabolic disorder can be detected in this patient?
A. Metabolic acidosis
B. Metabolic alkalosis
C. Respiratory acidosis
D. Respiratory alkalosis
E. Acid-base balance is normal

11. A 50-year-old inpatient during examination presents with glucosuria and blood glucose of 3,0 mmol/l, which are the most likely to be caused by:
A. Renal disorder
B. Diabetes insipidus
C. Myxedema
D. Essential hypertension
E. Pellagra

12. A 46-year-old female patient has a continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?
A. Creatine phosphokinase
B. Lactate dehydrogenase
C. Pyruvate dehydrogenase
D. Glutamate dehydrogenase
E. Adenylate cyclase

13. 12 hours after an accute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
A. Myocardium infarction
B. Viral hepatitis
C. Collagenosis
D. Diabetes mellitus
E. Diabetes insipidus

14. 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. Tripsin
B. Pepsin
C. Lipase
D. Dipeptidase
E. Amylase

15. A 36-year-old female patient has a history of collagen disease. Urine analysis is likely to reveal an increased concentration of the following metabolite:
A. Oxyproline
B. Indican
C. Creatinine
D. Urea
E. Urobilinogen

16. Jaundice treatment involves administration of barbiturates inducing the synthesis of UDP-glucuronyl transferase. A medicinal effect is caused by the production of:
A. Direct reacting (conjugated) bilirubin
B. Indirect reacting (unconjugated) bilirubin
C. Biliverdin
D. Protoporphyrin
E. Heme

17. A newborn child with pylorostenosis has often repeating vomiting accompanied by apathy, weakness, hypertonicity,

sometimes convulsions. What disorder form of acid-base balance is it?
A. Nongaseous alkalosis
B. Gaseous alkalosis
C. Gaseous acidosis
D. Metabolic acidosis
E. Excretory acidosis

18. A concentrated solution of sodium chloride was intravenously injected to an animal. This caused decreased reabsorption of sodium ions in the renal tubules. It is the result of the following changes of hormonal secretion:
A. Aldosterone reduction
B. Aldosterone increase
C. Vasopressin reduction
D. Vasopressin increase
E. Reduction of atrial natriuretic factor

19. An infant has pylorospasm, weakness, hypodynamia, convulsions as a result of frequent vomiting.What kind of acid-base disbalance is it?
A. Excretory alkalosis
B. Excretory acidosis
C. Metabolic acidosis
D. Exogenous nongaseous acidosis
E. Gaseous alkalosis

20. A patient with acute myocardial infarction has been administered heparin as a part of complex therapy. Some time after heparin injection the patient developed hematuria. What heparin antagonist should be injected in order to manage the complication?
A. Protamine sulfate
B. Vicasol
C. Aminocaproic acid
D. Neodicumarin
E. Fibrinogen

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

22. A patient with enteritis accompanied by massive diarrhea has low water rate in the extracellular space, high water rate inside the cells and low blood osmolarity. What is such disturbance of waterelectrolytic metabolism called?
A. Hypo-osmolar hypohydration
B. Hyperosmolar hypohydration
C. Osmolar hypohydration
D. Hypo-osmolar hyperhydration
E. Hyperosmolar hyperhydration

23. A child has mental and physical retardation, grave damage of internal connective tissue. Urine analysis reveals keratan sulfates. What metabolic process is disturbed?
A. Glycosaminoglycans
B. Collagen
C. Elastin
D. Fibronectin
E. Hyaluronic acid

24. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotic takes place only in one phase - microsomal oxydation. Name a component of this phase:
A. Cytochrome P-450
B. Cytochrome B
C. Cytochrome C
D. Cytochrome A
E. Cytochrome oxidase

25. During an operation a patient got injection of muscle relaxant dithylinum. Relaxation of skeletal muscles and inhibition of respiration lasted two hours. This condition was caused by absence of the following enzyme in blood serum:
A. Butyrylcholin esterase
B. Catalase
C. Acetylcholinesterase
D. Glucose 6-phosphatase

E. Glutathione peroxidase

26. A46 year old female patient has a continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?

A. Creatine phosphokinase
B. Lactate dehydrogenase
C. Pyruvate dehydrogenase
D. Glutamate dehydrogenase
E. Adenylate cyclase

27. A 30 year old woman has subnormal concentration of enzymes in the pancreatic juice. This might be caused by the hyposecretion of the following gastrointestinal hormone:

A. Cholecystokinin-pancreozymin
B. Somatostatin
C. Secretin
D. Gastro-inhibiting peptide
E. Vaso-intestinal peptide

28. A month after surgical constriction of rabbit's renal artery the considerable increase of systematic arterial pressure was observed. What of the following regulation mechanisms caused the animal's pressure change?

A. Angiotensin-II
B. Vasopressin
C. Adrenaline
D. Noradrenaline
E. Serotonin

29. A patient complains about dyspnea provoked by the physical activity. Clinical examination revealed anaemia and presence of the paraprotein in the zone of gamma-globulins. To confirm the myeloma diagnosis it is necessary to determine the following index in the patient's urine:

A. Bence Jones protein
B. Bilirubin
C. Haemoglobin
D. Ceruloplasmin
E. Antitrypsin

30. A 62 year old woman complains of frequent pain attacks in the area of her chest and backbone, rib fractures. Her doctor suspected myeloma (plasmocytoma). What of the following laboratory characteristics will be of the greatest diagnostic importance?

A. Paraproteinemia
B. Hyperalbuminemia
C. Proteinuria
D. Hypoglobulinemia
E. Hypoproteinemia

31. A child has an acute renal failure. What biochemical factor found in saliva can confirm this diagnosis?

A. Increase in urea concentration
B. Increase in glucose concentration
C. Decrease in glucose concentration
D. Increase in concentration of higher fatty acids
E. Decrease in nucleic acid concentration

32. After implantation of a cardiac valve a young man constantly takes indirect anticoagulants. His state was complicated by hemorrhage. What substance content has decreased in blood?

A. Prothrombin
B. Haptoglobin
C. Heparin
D. Creatin
E. Ceruloplasmin

33. 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

34. A patient suffering from chronic hyperacidic gastritis takes an antacid drug for heartburn elimination. After its ingestion

the patient feels better but at the same time he has a sensation of stomach swelling. Which of the following drugs might be the cause of such side effect?
A. Sodium hydrocarbonate
B. Magnesium oxide
C. Magnesium trisilicate
D. Aluminium hydrooxide
E. Pepsin

35. A 36 year old female patient has a history of collagen disease. Urine analysis is likely to reveal an increased concentration of the following metabolite:
A. Oxyproline
B. Indican
C. Creatinine
D. Urea
E. Urobilinogen

36. From the group of children who were eating sweet sappy watermelon two kids developed the signs of poisoning: rapid weakness, dizziness, headache, vomiting, edema, tachycardia, cyanosis of mouth, ears, tips of the fingers cyanosis. High concentration of nitrates was detected. What is the leading mechanism of the pathogenesis of the poisoning in the two children?
A. Insufficiency of met-Hb-reductase
B. Insufficiency of superoxiddismutase
C. Block cytochrome oxidase
D. Insufficiency glutathione pyroxidase
E. Insufficiency of catalase

37. To prevent postoperative bleeding a 6-year-old child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A. Carboxylation of glutamic acid
B. Phosphorylation of serine radicals
C. Partial proteolysis
D. Polymerization
E. Glycosylation

38. Blood analysis of a patient with jaundice reveals conjugated bilirubinemia, increased concentration of bile acids. There is no stercobilinogen in urine. What type of jaundice is it?
A. Obstructive jaundice
B. Hepatocellular jaundice
C. Parenchymatous jaundice
D. Hemolytic jaundice
E. Cythemolytic jaundice

39. A 60 year old patient was found to have a dysfunction of main digestive enzyme of saliva. This causes the disturbance of primary hydrolysis of:
A. Carbohydrates
B. Fats
C. Proteins
D. Cellulose
E. Lactose

40. Osteolaterism is charcterized by a decrease in collagen strength caused by much less intensive formation of crosslinks in collagen fibrils. This phenomenon is caused by the low activity of the following enzyme:
A. Lysyl oxidase
B. Monoamino-oxidase
C. Prolyl hydroxylase
D. Lysyl hydroxylase
E. Collagenase

41. A patient suffering from stenocardia was taking nitroglycerine which caused restoration of blood supply of myocardium and relieved pain in the cardiac area. What intracellular mechanism provides restoration of energy supply of insulted cells?
A. Intensification of ATP resynthesis
B. Reduction of ATP resynthesis
C. Increased permeability of membranes
D. Intensification of oxygen transporting into the cell
E. Intensification of RNA generation

42. An infectious disease unit admitted a patient with signs of jaundice caused by hepatitis virus. Select an indicator that is specific only for parenchymatous jaundice:
A. Increase in ALT and AST rate

B. Hyperbilirubinemia
C. Bilirubinuria
D. Cholaemia
E. Urobilinuria

43. A patient presents with dysfunction of cerebral cortex accompanied by epileptic seizures. He has been administered a biogenic amine synthetized from glutamate and responsible for central inhibition. What substance is it?
A. Gamma-amino butyric acid
B. Serotonin
C. Dopamine
D. Acetylcholine
E. Histamine

44. Toxic affection of liver results in dysfunction of protein synthesis. It is usually accompanied by the following kind of dysproteinemia:
A. Absolute hypoproteinemia
B. Relative hypoproteinemia
C. Absolute hyperproteinemia
D. Relative hyperproteinemia
E. Paraproteinemia

45. Hemoglobin catabolism results in release of iron which is transported to the bone marrow by a certain transfer protein and used again for the synthesis of hemoglobin. Specify this transfer protein:
A. Transferrin (siderophilin)
B. Transcobalamin
C. Haptoglobin
D. Ceruloplasmin
E. Albumin

46. A 60-year-old patient with a long history of stenocardia takes coronarodilator agents. He has also been administered acetylsalicylic acid to reduce platelet aggregation. What is the mechanism of antiplatelet action of acetylsalicylic acid?
A. It reduces the activity of cyclooxygenase
B. It reduces the activity of phosphodiesterase
C. It enhances the activity of platelet adenylate cyclase
D. It enhances the synthesis of prostacyclin
E. It has membrane stabilizing effect

47. A patient with diabetes developed a diabetic coma due to the acid-base imbalance. Specify the kind of this imbalance:
A. Metabolic acidosis
B. Metabolic alkalosis
C. Respiratory acidosis
D. Gaseous alkalosis
E. Non-gaseous alkalosis

48. A patient with respiratory failure has blood pH of 7,35. pCO2 test revealed hypercapnia. Urine pH test revealed an increase in the urine acidity. What form of acid-base imbalance is the case?
A. Compensated respiratory acidosis
B. Compensated metabolic acidosis
C. Decompensated metabolic acidosis
D. Compensated respiratory alkalosis
E. Decompensated respiratory alkalosis

49. A patient with jaundice has high total bilirubin that is mainly indirect (unconjugated), high concentration of stercobilin in the stool and urine. The level of direct (conjugated) bilirubin in the blood plasma is normal. What kind of jaundice can you think of?
A. Hemolytic
B. Parenchymal (hepatic)
C. Mechanical
D. Neonatal jaundice
E. Gilbert's disease

50. By the decarboxylation of glutamate in the CNS an inhibitory mediator is formed. Name it:
A. GABA
B. Glutathione
C. Histamine
D. Serotonin
E. Asparagine

51. An unconscious patient was taken by ambulance to the hospital. On objective examination the patient was found to have no reflexes, periodical convulsions, irregular

breathing. After laboratory examination the patient was diagnosed with hepatic coma. Disorders of the central nervous system develop due to the accumulation of the following metabolite:
A. Ammonia
B. Urea
C. Glutamine
D. Bilirubin
E. Histamine

52. Enzymatic jaundices are accompanied by abnormal activity of UDPglucuronyl transferase. What compound is accumulated in blood serum in case of these pathologies?
A. Unconjugated bilirubin
B. Conjugated bilrubin
C. Dehydrobilirubin
D. Hydrobilirubin
E. Choleglobin

53. For the study of serum proteins various physical and physicochemical methods can be used. In particular, serum albumins and globulins can be separated by this method:
A. Electrophoresis
B. Polarography
C. Dialysis
D. Spectrography
E. Refractometry

54. Inherited diseases, such as mucopolysaccharidoses, are manifested in metabolic disorders of connective tissue, bone and joint pathologies. The sign of this disease is the excessive urinary excretion of the following substance:
A. Glycosaminoglycans
B. Amino acids
C. Glucose
D. Lipids
E. Urea

55. A 50-year-old patient with food poisoning is on a drip of 10% glucose solution. It not only provides the body with necessary energy, but also performs the function of detoxification by the production of a metabolite that participates in the following conjugation reaction:
A. Glucuronidation
B. Sulfation
C. Methylation
D. Glycosylation
E. Hydroxylation

56. 6 hours after the myocardial infarction a patient was found to have elevated level of lactate dehydrogenase in blood. What isoenzyme should be expected in this case?
A. LDH1
B. LDH2
C. LDH3
D. LDH4
E. LDH5

57. A patient has been administered an anti-inflammatory drug that blocks the action of cyclooxygenase. Specify this anti-inflammatory agent:
A. Aspirin
B. Analgene
C. Allopurinol
D. Thiamin
E. Creatine

58. One of the factors that cause obesity is the inhibition of fatty acids oxidation due to:
A. Low level of carnitine
B. Impaired phospholipid synthesis
C. Excessive consumption of fatty foods
D. Choline deficiency
E. Lack of carbohydrates in the diet

59. Deficiency of linoleic and linolenic acids in the body leads to the skin damage, hair loss, delayed wound healing, thrombocytopenia, low resistance to infections. These changes are most likely to be caused by the impaired synthesis of the following substances:
A. Eicosanoids
B. Interleukins
C. Interferons
D. Catecholamines
E. Corticosteroids

60. A 67-year-old male patient consumes eggs, pork fat, butter, milk and meat. Blood test results: cholesterol - 12,3 mmol/l, total lipids - 8,2 g/l, increased lowdensity lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
A. Hyperlipoproteinemia type IIa
B. Hyperlipoproteinemia type I
C. Hyperlipoproteinemia type IIb
D. Hyperlipoproteinemia type IV
E. Cholesterol, hyperlipoproteinemia

61. A hypertensive patient had been keeping to a salt-free diet and taking antihypertensive drugs together with hydrochlorothiazide for a long time. This resulted in electrolyte imbalance. What disorder of the internal environment occurred in the patient?
A. Hypochloremic alkalosis
B. Metabolic acidosis
C. Hyperkalemia
D. Hypermagnesemia
E. Increase in circulating blood volume

62. A patient underwent a course of treatment for atherosclerosis. Laboratory tests revealed an increase in the antiatherogenic lipoprotein fraction in the blood plasma. The treatment efficacy is confirmed by the increase in:
A. HDL
B. VLDL
C. IDL
D. LDL
E. Chylomicrons

63. A 12-year-old patient was found to have blood serum cholesterol at the rate of 25 mmol/l. The boy has a history of hereditary familial hypercholesterolemia, which is caused by the impaired synthesis of the following protein receptors:
A. Low density lipoproteins
B. High density lipoproteins
C. Chylomicrons
D. Very low density lipoproteins
E. Intermediate density lipoproteins

64. A 53-year-old male patient is diagnosed with Paget's disease. The concentration of oxyproline in daily urine is sharply increased, which primarily means intensified disintegration of:
A. Collagen
B. Keratin
C. Albumin
D. Hemoglobin
E. Fibrinogen

65. Increased HDL levels decrease the risk of atherosclerosis. What is the mechanism of HDL anti-atherogenic action?
A. They remove cholesterol from tissues
B. They supply tissues with cholesterol
C. They are involved in the breakdown of cholesterol
D. They activate the conversion of cholesterol to bile acids
E. They promote absorption of cholesterol in the intestine

66. A biochemical urine analysis has been performed for a patient with progressive muscular dystrophy. In the given case muscle disease can be confirmed by the high content of the following substance in urine:
A. Creatine
B. Porphyrin
C. Urea
D. Hippuric acid
E. Creatinine

67. A patient has a critical impairment of protein, fat and hydrocarbon digestion. Most likely it has been caused by low secretion of the following digestive juice:
A. Pancreatic juice
B. Saliva
C. Gastric juice
D. Bile
E. Intestinal juice

68. A 49-year-old male patient with acute pancreatitis was likely to develop pancreatic necrosis, while active pancreatic proteases were absorbed into the blood stream and

tissue proteins broke up.What protective factors of the body can inhibit these processes?
A. α2-macroglobulin, α1-antitrypsin
B. Immunoglobulin
C. Cryoglobulin, interferon
D. Ceruloplasmin, transferrin
E. Hemoplexin, haptoglobin

69. A 53-year-old male patient complains of acute pain in the right hypochondrium. Objective examination revealed scleral icterus. Laboratory tests revealed increased ALT activity, and stercobilin was not detected in the stool. What disease is characterized by these symptoms?
A. Cholelithiasis
B. Hemolytic jaundice
C. Hepatitis
D. Chronic colitis
E. Chronic gastritis

70. A patient who had been taking diclofenac sodium for arthritis of mandibular joint developed an acute condition of gastric ulcer. Such side effect of this medicine is caused by inhibition of the following enzyme:
A. Cyclooxygenase-1 (COX-1)
B. Cyclooxygenase-2 (COX-2)
C. Lipoxygenase
D. Phosphodiesterase
E. Monoamine oxidase

71. Patients with erythropoietic porphyria (Gunther's disease) have teeth that fluoresce with bright red color when subjected to ultraviolet radiation; their skin is light-sensitive, urine is red-colored. What enzyme can cause this disease, when it is deficient?
A. Uroporphyrinogen III cosynthase
B. Uroporphyrinogen I synthase
C. Delta-aminolevulinate synthase
D. Uroporphyrinogen decarboxylase
E. Ferrochelatase

72. For biochemical diagnostics of myocardial infarction it is necessary to measure activity of a number of enzymes and their isoenzymes. What enzymatic test is considered to be the best to prove or disprove the diagnosis of infarction in the early period after the chest pain is detected?
A. Creatine kinase isoenzyme CK-MB
B. Creatine kinase isoenzyme CK-MM
C. LDH1 lactate dehydrogenase isoenzyme
D. LDH2 lactate dehydrogenase isoenzyme
E. Aspartate aminotransferase cytoplasmic isoenzyme

73. A newborn baby has numerous hemorrhages. Blood coagulation tests reveal increased prothrombin time. The child is most likely to have a disorder of the following biochemical process:
A. Production of gammacarboxyglutamate
B. Conversion of homocysteine to methionine
C. Conversion of methylmalonyl CoA to succinyl CoA
D. Degradation of glutathione
E. Hydroxylation of proline

74. A 67-year-old male patient consumes eggs, pork fat, butter, milk and meat. Blood test results: cholesterol - 12,3 mmol/l, total lipids - 8,2 g/l, increased low-density lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
A. Hyperlipoproteinemia type IIa
B. Hyperlipoproteinemia type I
C. Hyperlipoproteinemia type IIb
D. Hyperlipoproteinemia type IV
E. Cholesterol, hyperlipoproteinemia

75. A patient has severe blood loss caused by an injury. What kind of dehydration will be observed in this particular case?
A. Iso-osmolar
B. Hyposmolar
C. Hyperosmolar
D. Normosmolar
E. -

76. Apatient has been admitted to the contagious isolation ward with signs of jaundice caused by hepatitis virus. Which of

the symptoms given below is strictly specific for hepatocellular jaundice?
A. Increase of ALT, AST level
B. Hyperbilirubinemia
C. Bilirubinuria
D. Cholemia
E. Urobilinuria

77. Disruption of nerve fiber myelinogenesis causes neurological disorders and mental retardation. These symptoms are typical for hereditary and acquired alterations in the metabolism of:
A. Sphingolipids
B. Neutral fats
C. Higher fatty acids
D. Cholesterol
E. Phosphatidic acid

78. A 28-year-old patient undergoing treatment in the pulmonological department has been diagnosed with pulmonary emphysema caused by splitting of alveolar septum by tissular tripsin. The disease is cased by the congenital deficiency of the following protein:
A. α1-proteinase inhibitor
B. α2-macroglobulin
C. Cryoglobulin
D. Haptoglobin
E. Transferrin

79. A 46-year-old female patient has continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?
A. Creatine phosphokinase
B. Lactate dehydrogenase
C. Pyruvate dehydrogenase
D. Glutamate dehydrogenase
E. Adenylate cyclase

80. A 35-year-old man with peptic ulcer disease has undergone antrectomy. After the surgery secretion of the following gastro¬intestinal hormone will be disrupted the most:
A. Gastrin
B. Histamine
C. Secretin
D. Neurotensin
E. Cholecystokinin

81. A 16-year-old adolescent is di¬agnosed with hereditary UDP (uridine di¬phosphate) glucuronyltransferase defici¬ency. Laboratory tests revealed hyperbili¬rubinemia caused mostly by increased blood content of the following substance:
A. Unconjugated bilirubin
B. Stercobilinogen
C. Biliverdine
D. Urobilinogen
E. Conjugated bilirubin

82. After implantation of a cardiac valve a young man systematically takes indirect anticoagulants. His state was complicated by hemorrhage. What substance content has decreased in blood?
A. Prothrombin
B. Haptoglobin
C. Creatin
D. Heparin
E. Ceruloplasmin

83. To an emergency ward a 7-year-old child was delivered in the condition of allergic shock caused by a bee sting. High concentration of histamine is observed in blood. Production of this amine is the result of the following reaction:
A. Decarboxylation
B. Reduction
C. Deamination
D. Dehydrogenation
E. Hydroxylation

84. A 65-year-old man suffering from gout complains of pain in his kidneys. Ultrasonic examination revealed kidney stones. A certain substance in increased concentration can cause kidney stones formation. Name this substance:
A. Uric acid
B. Bilirubin

C. Urea
D. Cystine
E. Cholesterol

85. Along with normal hemoglobin types there can be pathological ones in the organism of an adult. Name one of them:
A. HbS
B. HbA2
C. Hb02
D. BbA1
E. HbF

86. An infant has pylorospasm, weakness, hypodynamia, convulsions as a result of frequent vomiting. What kind of acid-base disbalance is it?
A. Excretory alkalosis
B. Excretory acidosis
C. Metabolic acidosis
D. Exogenous nongaseous acidosis
E. Gaseous alkalosis

87. Monoamine oxidase inhibitors are widely used as psychopharmacological drugs. They change the level of nearly all neurotransmitters in synapses, with the following neurotransmitter being the exception:
A. Acetylcholine
B. Serotonin
C. Noradrenaline
D. Adrenaline
E. Dopamine

88. An unconscious patient was delivered by ambulance to the hospital. On objecti¬ve examination the patient was found to present no reflexes, periodical convulsi¬ons, irregular breathing. After laboratory examination the patient was diagnosed wi¬th hepatic coma. Disorders of the central nervous system develop due to accumulati¬on of the following metabolite:
A. Ammonia
B. Histamine
C. Glutamine
D. Bilirubin
E. Urea

89. A 4-year-old child with hereditary, renal lesion has signs of rickets; vitamin D concentration in blood is normal. W Impaired synthesis of calcitriol hat is the most probable cause of rickets development?
A. Impaired synthesis of calcitriol
B. Hyperfunction of parathyroid gland
C. Hypofunction of parathyroid glands
D. Increased excretion of calcium
E. Lack of calcium in food

90. Due to the use of poor-quality measles vaccine for preventive vaccination, a 1-year-old child developed an autoimmune renal injury. The urine was found to contain macromolecular proteins. What process of urine formation was disturbed?
A. Filtration
B. Secretion and filtration
C. Secretion
D. Reabsorption
E. Reabsorption and secretion

91. A 30-year-old man with diabetes mellitus type I was hospitalised. The patient is comatose. Laboratory tests revealed hyperglycemia and ketonemia. What metabolic disorder can be detected in this patient?
A. Metabolic acidosis
B. Respiratory acidosis
C. Normal acid-base balance
D. Respiratory alkalosis
E. Metabolic alkalosis

92. A 28-year-old patient undergoing treatment in a pulmonological department has been diagnosed with pulmonary emphysema caused by splitting of alveolar septum by tissular tripsin. The disease is caused by the congenital deficiency of the following protein:
A. α1-proteinase inhibitor
B. α2-macroglobulin
C. Cryoglobulin
D. Haptoglobin
E. Transferrin

93. A patient, who has been suffering for a long time from intestine disbacteriosis, has increased hemorrhaging caused by disruption of posttranslational modification of blood-coagulation factors II, VII, IX, and X in the liver. What vitamin deficiency is the cause of this condition?
A. K
B. P
C. B12
D. C
E. B9

94. A 43-year-old patient suffers from acute pancreatitis with disrupted common bile duct patency. What condition can develop in this case?
A. Mechanical jaundice
B. Hemolytic jaundice
C. Hepatocellular jaundice
D. Hepatic coma
E. Portal hypertension

95. Lymphocytes and other cells of our body synthesize universal antiviral agents as a response to viral invasion. Name these protein factors:
A. Interferon
B. Interleukin - 2
C. Cytokines
D. Interleukin - 4
E. Tumor necrosis factor

96. Cholesterol content in blood serum of a 12-year-old boy is 25 mmol/1. Anamnesis states hereditary familial hypercholesterolemia caused by synthesis disruption of receptor-related proteins for:
A. Low-density lipoproteins
B. Middle-density lipoproteins
C. Chylomicrons
D. Very low-density lipoproteins
E. High-density lipoproteins

97. A patient visited a dentist to extract a tooth. After the tooth had been extracted, bleeding from the tooth socket continued for 15 minutes. Anamnesis states that the patient suffers from active chronic hepatitis. What phenomenon can extend the time of hemorrhage?
A. Decrease of fibrinogen content in blood
B. Hypocalcemia
C. Increased activity of anticoagulation system
D. Decrease of albumin content in blood
E. Thrombocytopenia

98. A patient suffers from disrupted patency of the airways at the level of small and medium – sized bronchial tubes. What changes of acid-base balance can occur in the patient?
A. Respiratory acidosis
B. Metabolic acidosis
C. Respiratory alkalosis
D. Acid-base balance remains unchanged
E. Metabolic alkalosis

99. Upon toxic damage of hepatic cells resulting in disruption of liver function the patient developed edemas. What change of blood plasma is the main cause of edema development?
A. Decrease of albumin content
B. Decrease of fibrinogen content
C. Increase of globulin content
D. Decrease of globulin content
E. Increase of albumin content

100. A 15-year-old boy has been diagnosed with acute viral hepatitis. What blood value should be determined to confirm acute affection of hepatic cells?
A. Aminotransferase activity (AST, ALT)
B. Cholesterol content
C. Protein fraction content
D. Unconjugated and conjugated bilirubin content
E. Erythrocytes sedimentation rate (ESR)

101. A 53-year-old man is diagnosed with Paget's disease. Concentration of hydroxyproline in daily urine is sharply increased, which primarily means intensified disintegration of:
A. Collagen
B. Keratin

C. Albumin
D. Hemoglobin
E. Fibrinogen

102. An infant born prematurely 2 days ago presents with yellow coloring of skin and mucosa. Such a condition in the infant is caused by temporary deficiency of the following enzyme:
A. UDP-glucuronyl transferase
B. Aminolevulinate synthase
C. Biliverdine reductase
D. Heme oxygenase
E. Heme synthetase

103. A 50-year-old woman diagnosed with cardiac infarction has been delivered into an intensive care ward. What enzyme will be the most active during the first two days?
A. Aspartate aminotransferase
B. Alanine aminotransferase
C. LDH4
D. Alanine aminopeptidase
E. LDH5

104. A patient consulted a doctor with complaints of dyspnea occurring after physical exertion. Physical examination revealed anemia, paraprotein was detected among gamma globulin. What value should be determined in the patient's urine to confirm the diagnosis of myeloma?
A. Bence Jones protein
B. Ceruloplasmin
C. Hemoglodin
D. Antitrypsin
E. Bilirubin

105. A dry-cleaner's worker has been found to have hepatic steatosis. This pathology can be caused by disruption of synthesis of the following substance:
A. Phosphatidylcholine
B. Tristearin
C. Phosphatidic acid
D. Urea
E. Cholic acid

106. A 35-year-old man with peptic ulcer disease has undergone antrectomy. After the surgery secretion of the following gastrointestinal hormone will be disrupted the most:
A. Gastrin
B. Histamine
C. Secretin
D. Cholecystokinin
E. Neurotensin

107. A 16-year-old adolescent is diagnosed with hereditary UPD (uridine diphosphate) glucuronyl transferase deficiency. Laboratory tests revealed hyperbilirubinemia caused mostly by increased blood content of the following substance:
A. Unconjugated bilirubin
B. Conjugated bilirubin
C. Urobilinogen
D. Biliverdine
E. Stercobilinogen

108. A 16-year-old adolescent is diagnosed with hereditary UPD (uridine diphosphate) glucuronyl transferase deficiency. Laboratory tests revealed hyperbilirubinemia caused mostly by increased blood content of the following substance:
A. Unconjugated bilirubin
B. Conjugated bilirubin
C. Urobilinogen
D. Biliverdine
E. Stercobilinogen

109. A 7-year-old child in the state of allergic shock caused by a bee sting has been delivered into an emergency ward. High concentration of histamine was observed in blood. Production of this amine was the result of the following reaction:
A. Decarboxylation
B. Dehydrogenation
C. Hydroxylation
D. Deamination
E. Reduction

110. Along with normal hemoglobin types there can be pathological ones in the organism of an adult. Name one of them:
A. HbS
B. HbA2
C. HbA1
D. HbF
E. HbO2

111. Monoamine oxidase inhibitors are widely used as psychopharmacological drugs. They change the level of nearly all neurotransmitters in synapses, with the following neurotransmitter being the exception:
A. Acetylcholine
B. Serotonin
C. Dopamine
D. Adrenaline
E. Noradrenaline

112. In investigation of serum proteins various physical and physicochemical methods can be used. In particular, serum albumins and globulins can be separated by the method of:
A. Electrophoresis
B. Dialysis
C. Refractometry
D. Spectrography
E. Polarography

113. A 60-year-old man suffering from chronic hepatitis frequently observes nasal and gingival hemorrhages, spontaneous hemorrhagic rashes on the skin and mucosa. Such presentations result from:
A. Decreased synthesis of prothrombin and fibrinogen
B. Increased blood content of aminotransferases
C. Decreased synthesis of serum albumins
D. Increased blood content of macroglobulins and cryoglobulins
E. Decreased blood content of cholinesterase

114. A 3-year-old girl with mental retardation has been diagnosed with sphingomyelin lipidosis (Niemann-Pick disease). In this condition synthesis of the following substance is disrupted:
A. Sphingomyelinase
B. Gangliosides
C. Ceramides
D. Glycosyltransferase
E. Sphingosine

115. Exophthalmus observed during thyrotoxicosis is caused by accumulation of highly water-binding substances within the retrobulbar tissues. Name these substances:
A. Glycosaminoglycans
B. ATP
C. Creatine
D. Cholesterol
E. Phospholipids

116. Activation of a number of hemostatic factors occurs through their joining with calcium ions. What structural component allows for adjoining of calcium ions?
A. Gamma-carboxyglutamic acid
B. Gamma-aminobutyric acid
C. Monoamine-dicarboxylic acids
D. Hydroxyproline
E. Gamma-oxybutyric acid

117. Cholesterol content in blood serum of 12-year-old is 25 mmol/l. Anamnesis states hereditary familial hypercholesterolemia caused by synthesis disruption of receptor-related proteins for:
A. Low-density lipoproteins
B. High-density lipoproteins
C. Middle-density lipoproteins
D. Very low-density lipoproteins
E. Chylomicrons

118. Leading symptoms of primary hyperparathyroidism are osteoporosis and renal damage resulting in urolithiasis development. What substances are the basis of uroliths in such cases?
A. Calcium phosphate
B. Cholesterol
C. Bilirubin
D. Uric acid
E. Cystine

119. After consumption of rich food a patient has nausea and heartburn, steatorrhea. This condition might be caused by:
A Bile acid deficiency
B Increased lipase secretion
C Disturbed tripsin synthesis
D Amylase deficiency
E Disturbed phospholipase synthesis

120. An infant has apparent diarrhea resulting from improper feeding. One of the main diarrhea effects is plentiful excretion of sodium bicarbonate. What form of acid-base balance disorder is the case?
A Metabolic acidosis
B Metabolic alkalosis
C Respiratory acidosis
D Respiratory alkalosis
E No disorders of acid-base balance will be observed

121. A mother consulted a doctor about her 5-year-old child who develops erythemas, vesicular rash and skin itch under the influence of sun. Laboratory studies revealed decreased iron concentration in the blood serum, increased uroporphyrinogen I excretion with the urine. What is the most likely inherited pathology in this child?
A Erythropoietic porphyria
B Methemoglobinemia
C Hepatic porphyria
D Coproporphyria
E Intermittent porphyria

122. 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

123. A 46-year-old female patient has a continuous history of progressive muscular (Duchenne's) dystrophy. Which blood enzyme changes will be of diagnostic value in this case?
A Creatine phosphokinase
B Lactate dehydrogenase
C Pyruvate dehydrogenase
D Glutamate dehydrogenase
E Adenylate cyclase

124. Hydroxylation of endogenous substrates and xenobiotics requires a donor of protons. Which of the following vitamins can play this role?
A Vitamin C
B Vitamin P
C Vitamin B_6
D Vitamin E
E Vitamin A

125. A 4 y.o. child with signs of durative proteinic starvation was admitted to the hospital. The signs were as follows: growth inhibition, anemia, edemata, mental deficiency. Choose a cause of edemata development:
A Reduced synthesis of albumins
B Reduced synthesis of globulins
C Reduced synthesis of hemoglobin
D Reduced synthesis of lipoproteins
E Reduced synthesis of glycoproteins

126. Tere is observed inhibited fibrillation in the patients with bile ducts obstruction, bleeding due to low level of absorbtion of some vitamin. What vitamin is in deficit?
A K
B A
C D
D E
E Carotene

127. A patient presents high activity of $LDH_{1,2}$, aspartate aminotransferase, creatine phosphokinase. In what organ (organs) is the development of a pathological process the most probable?
A In the heart muscle (initial stage of myocardium infarction)
B In skeletal muscles (dystrophy, atrophy)

C In kidneys and adrenals
D In connective tissue
E In liver and kidneys

128. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of what acid substance to the blood can this state be explained?
A Lactate
B Pyruvate
C 1,3-bisphosphoglycerate
D α-ketoglutarate
E 3-phosphoglycerate

129. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A Hydroxylation of proline
B Formation of polypeptide chains
C Glycosylation of hydroxylysine residues
D Removal of C-ended peptide from procollagen
E Detaching of N-ended peptide

130. Aspirin has antiinflammatory effect due to inhibition of the cyclooxygenase activity. Level of what biological active acids will decrease?
A Prostaglandins
B Leucotriens
C Catecholamines
D Biogenic amines
E Iodinethyronyns

131. Examination of a patient revealed typical presentations of collagenosis. This pathology is characterized by increase of the following urine index:
A Hydroxyproline
B Arginine
C Glucose
D Mineral salts
E Ammonium salts

132. Marked increase of activity of MB-forms of CPK (creatinephosphokinase) and LDH-1 were revealed on the examination of the patient's blood. What is the most likely pathology?
A Miocardial infarction
B Hepatitis
C Rheumatism
D Pancreatitis
E Cholecystitis

133. The concentration of albumins in human blood sample is lower than normal. This leads to edema of tissues. What blood function is damaged?
A Maintaining the oncotic blood pressure
B Maintaining the Ph level
C Maintaining the body temperature
D Maintaining the blood sedimentation system
E All answers are correct

134. A 20 year old patient complains of general weakness, dizziness, quick fatigability. Blood analysis results: Hb- 80 g/l. Microscopical examination results: erythrocytes are of modified form. This condition might be caused by:
A Sickle-cell anemia
B Hepatocellular jaundice
C Acute intermittent porphyria
D Obturative jaundice
E Addison's disease

135. A patient has yellow skin colour, dark urine, dark-yellow feces. What substance will have strengthened concentration in the blood serum?
A Unconjugated bilirubin
B Conjugated bilirubin
C Mesobilirubin
D Verdoglobin
E Biliverdin

136. Ammonia is a very toxic substance, especially for nervous system. What substance takes the most active part in ammonia detoxication in brain tissues?
A Glutamic acid
B Lysine
C Proline
D Histidine
E Alanine

137. 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 Transport of FFA (free fatty acids) from cytosol to the mitochondria
B Transport of FFA from fat depots to the tissues
C It takes part in one of reactions of FFA beta-oxidation
D FFA activation
E Activation of intracellular lipolysis

138. 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 Choline
B DOPA
C Cholesterol
D Acetoacetate
E Linoleic acid

139. A 46 year old woman suffering from chololithiasis developed jaundice. Her urine became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:
A Conjugated bilirubin
B Unconjugated bilirubin
C Biliverdin
D Mesobilirubin
E Urobilinogen

140. A 38 year old patient suffers from rheumatism in its active phase. What laboratory characteristic of blood serum is of diagnostic importance in case of this pathology?
A C-reactive protein
B Uric acid
C Urea
D Creatinine
E Transferrin

141. Patient experienced increased susceptibility of the skin to the sunlight. His urine after some time became dark-red. What is the most likely cause of this?
A Porphyria
B Hemolytic jaundice
C Albinism
D Pellagra
E Alkaptonuria

142. A patient with serious damage of muscular tissue was admitted to the traumatological department. What biochemical urine index will be increased in this case?
A Creatinine
B Common lipids
C Glucose
D Mineral salts
E Uric acid

143. 12 hours after an accute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
A Myocardium infarction
B Viral hepatitis
C Collagenosis
D Diabetes mellitus
E Diabetes insipidus

144. A 30 y.o. woman had been ill for a year when she felt pain in the area of joints for the first time, they got swollen and skin above them became reddened. Provisional diagnosis is rheumatoid arthritis. One of the most probable causes of this disease is a structure alteration of a connective tissue protein:
A Collagen
B Mucin
C Myosin
D Ovoalbumin
E Troponin

145. Examination of a 27-year-old patient revealed pathological changes in liver and brain. Blood plasma analysis revealed an

abrupt decrease in the copper concentration, urine analysis revealed an increased copper concentration. The patient was diagnosed with Wilson's degeneration. To confirm the diagnosis it is necessary to study the activity of the following enzyme in blood serum:
A Ceruloplasmin
B Carbonic anhydrase
C Xanthine oxidase
D Leucine aminopeptidase
E Alcohol dehydrogenase

146. A patient complains about dyspnea provoked by the physical activity. Clinical examination revealed anaemia and presence of the paraprotein in the zone of gamma-globulins. To confirm the myeloma diagnosis it is necessary to determine the following index in the patient's urine:
A Bence Jones protein
B Bilirubin
C Haemoglobin
D Ceruloplasmin
E Antitrypsin

147. The concentration of albumins in human blood sample is lower than normal. This leads to edema of tissues. What blood function is damaged?
A Maintaining the oncotic blood pressure
B Maintaining the Ph level
C Maintaining the body temperature
D Maintaining the blood sedimentation system
E All answers are correct

148. A 62 y.o. woman complains of frequent pains in the area of her chest and backbone, rib fractures. A doctor assumed myelomatosis (plasmocytoma). What of the following laboratory characteristics will be of the greatest diagnostical importance?
A Paraproteinemia
B Hyperalbuminemia
C Proteinuria
D Hypoglobulinemia
E Hypoproteinemia

149. Pathological changes of the liver and brain were revealed in a 27-year-old patient.The copper concentration is abruptly decreased in blood plasma and increased in the urine. Wilson's disease was diagnosed. Activity of what enzyme in the blood serum should be examined to prove diagnisis?
A Ceruloplasmin
B Carboanhydraze
C Xanthioxidase
D Leucinamineopeptidaze
E Alcoholdehydrogenaze

150. A child has an acute renal failure. What biochemical factor found in saliva can confirm this diagnosis?
A Increase in urea concentration
B Increase in glucose concentration
C Decrease in glucose concentration
D Increase in concentration of higher fatty acids
E Decrease in nucleic acid concentration

151. After implantation of a cardiac valve a young man constantly takes indirect anticoagulants. His state was complicated by hemorrhage. What substance content has decreased in blood?
A Prothrombin
B Haptoglobin
C Heparin
D Creatin
E Ceruloplasmin

152. After severe viral hepatitis a 4 year old boy presents with vommiting, 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

153. Removal of gall bladder of a patient has disturbed processes of Ca absorption through the intestinal wall. What vitamin will stimulate this process?

A D_3
B PP
C C
D B_{12}
E K

154. A 63-year-old woman developed signs of rheumatoid arthritis. Increase of which indicated blood values level could be helpful in proving diagnosis?
A Additive glycosaminoglycans
B Lipoproteids
C Acid phosphatase
D General cholesterol
E R-glycosidase

155. A patient complains of frequent diarrheas, especially after consumption of fattening food, and of body weight loss. Laboratory examination revealed steatorrhea; hypocholic feces. What can be the cause of this condition?
A Obturation of biliary tracts
B Mucous membrane inflammation of small intestine
C Lack of pancreatic lipase
D Lack of pancreatic phospholipase
E Unbalanced diet

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

157. A 35 y.o. patient who often consumes alcohol was treated with diuretics. There appeared serious muscle and heart weakness, vomiting, diarrhea, AP- 100/60 mm Hg, depression. This condition is caused by intensified excretion with urine of:
A Potassium
B Sodium
C Chlorine
D Calcium
E Phosphates

158. After intake of rich food a patient feels nausea and sluggishness; with time there appeared signs of steatorrhea. Blood cholesterine concentration is 9,2 micromole/l. This condition was caused by lack of:
A Bile acids
B Triglycerides
C Fatty acids
D Phospholipids
E Chylomicrons

159. Examination of a man who hadn't been consuming fats but had been getting enough carbohydrates and proteins for a long time revealed dermatitis, poor wound healing, vision impairment. What is the probable cause of metabolic disorder?
A Lack of linoleic acid, vitamins A, D, E, K
B Lack of palmitic acid
C Lack of vitamins PP, H
D Low caloric value of diet
E Lack of oleic acid

160. A 44-year-old woman complains of common weakness, heart pain, considerable increase of body weigt. Objectively: moon-like face, hirsutism, AP- 165/100 mm Hg, height - 164 cm, weight - 103 kg; fat is mostly accumulated in the region of neck, upper shoulder girdle, stomach. What is the main pathogenetic mechanism of obesity?
A Increased production of glucocorticoids
B Decreased production of thyroidal hormones
C Increased production of insulin
D Decreased production of glucagon
E Increased production of mineralocorticoids

161. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagene fibers. What vitamin absence caused disturbance of their hydroxylation?

A Vitamin C
B Vitamin K
C Vitamin A
D Thiamine
E Vitamin E

162. A 36-year-old female patient has a history of collagen disease. Urine analysis is likely to reveal an increased concentration of the following metabolite:
A Oxyproline
B Indican
C Creatinine
D Urea
E Urobilinogen

163. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?
A Hippuric acid
B Ammonium salts
C Kreatinine
D Uric acid
E Aminoacids

164. 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 K
B A
C D
D E
E C

165. 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 Renin
B Pepsin
C Gastrin
D Secretin
E Lipase

166. A 4 y.o. boy has had recently serious viral hepatitis. Now there are such clinical presentations as vomiting, loss of consciousness, convulsions. Blood analysis revealed hyperammoniemia. Disturbunce of which biochemical process caused such pathological condition of the patient?
A Disturbed neutralization of ammonia in liver
B Disturbed neutralization of biogenic amines
C Increased putrefaction of proteins in bowels
D Activation of aminoacid decarboxylation
E Inhibition of transamination enzyms

167. 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 Fat emulsification
B Protein digestion
C Carbohydrate digestion
D Glycerin absorption
E Amino acid absorption

168. The energy inputs of a healthy man have been measured. In what position was the patient if his energy inputs were less than the main exchange?
A Sleep
B Rest
C Easy work
D Nervous exertion
E Calmness

169. Glutamate decarboxylation results in formation of inhibitory transmitter in CNS. Name it:
A GABA
B Glutathione
C Histamine
D Serotonin
E Asparagine

170. 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

171. Desulfiram is widely used in medical practice to prevent alcocholism. It inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcochol?
A Acetaldehyde
B Ethanol
C Malonyl aldehyde
D Propionic aldehyde
E Methanol

172. Index of pH of the blood changed and became 7,3 in the patient with diabetus mellitus. Detecting of the components of what buffer system is used while diagnosing disorder of the acid-base equilibrium?
A Bicarbonate
B Phosphate
C Hemoglobin
D Oxyhemoglobin
E Protein

173. A man got poisoned with mushrooms. They contain muscarine that stimulates muscarinic cholinoreceptors. What symptom is typical for poisoning with inedible mushrooms?
A Miosis
B Mydriasis
C Bronchi dilation
D Heart rate rise
E Arterial pressure rise

174. As a result of posttranslative modifications some proteins taking part in blood coagulation, particularly prothrombin, become capable of calcium binding. The following vitamin takes part in this process:
A K
B C
C A
D B_1
E B_2

175. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may be caused by excessive accumulation of ketone bodies in blood?
A Metabolic acidosis
B Metabolic alcalosis
C Any changes woun't happen
D Respiratory acidosis
E Respiratory alcalosis

176. Osteolaterism is charcterized by a decrease in collagen strength caused by much less intensive formation of cross-links in collagen fibrils. This phenomenon is caused by the low activity of the following enzyme:
A Lysyl oxidase
B Monoamino-oxidase
C Prolyl hydroxylase
D Lysyl hydroxylase
E Collagenase

177. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine tested. What compound will confirm this diagnosis if found in urine?
A Kreatine
B Collagen
C Porphyrin
D Myoglobin
E Calmodulin

178. An oncological patient had been administered methotrexate. With time target cells of the tumour lost sensitivity to this drug. At the same time the change in gene expression of the following enzyme is observed:
A Dehydropholate reductase
B Thiaminase
C Deaminase
D Pholate oxidase
E Pholate decarboxylase

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

180. Surgical removal of a part of stomach resulted in disturbed absorption of vitamin B_{12}, it is excreted with feces. The patient was diagnosed with anemia. What factor is necessary for absorption of this vitamin?
A Gastromucoprotein
B Gastrin
C Hydrochloric acid
D Pepsin
E Folic acid

181. A patient presents with dysfunction of cerebral cortex accompanied by epileptic seizures. He has been administered a biogenic amine synthetized from glutamate and responsible for central inhibition. What substance is it?
A Gamma-amino butyric acid
B Serotonin
C Dopamine
D Acetylcholine
E Histamine

182. Toxic affection of liver results in dysfunction of protein synthesis. It is usually accompanied by the following kind of dysproteinemia:
A Absolute hypoproteinemia
B Relative hypoproteinemia
C Absolute hyperproteinemia
D Relative hyperproteinemia
E Paraproteinemia

183. 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 Ornithinic cycle
B Tricarboxylic acid cycle
C Glycolysis
D Glyconeogenesis
E Cori cycle

184. Dietary intake of a 30 year old nursing woman contains 1000 mg of calcium, 1300 mg of phosphorus and 20 mg of iron per day. It is necessary to change content of these mineral substances in the following way:
A To increase phosphorus content
B To increase calcium content
C To reduce fluorine content
D To increase iron content
E To reduce iron content

185. Cardinal symptoms of primary hyperparathyroidism are osteoporosis and renal lesion along with development of urolithiasis. What substance makes up the basis of these calculi in this disease?
A Calcium phosphate
B Uric acid
C Cystine
D Bilirubin
E Cholesterol

186. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotic takes place only in one phase - microsomal oxydation. Name a component of this phase:
A Cytochrome P-450
B Cytochrome B
C Cytochrome C
D Cytochrome A
E Cytochrome oxidase

187. A patient had hemorrhagic stroke. Blood examination revealed strengthened kinin concentration.The patient was prescribed contrical. It was administered in order to inhibit the following proteinase:
A Kallikrein
B Pepsin
C Trypsin
D Chemotrypsin
E Collagenase

188. A 49-year-old driver complains about unbearable constricting pain behind the breastbone irradiating to the neck. The pain

arose 2 hours ago. Objectively: the patient's condition is grave, he is pale, heart tones are decreased. Laboratory studies revealed high activity of creatine kinase and LDH_1. What disease are these symptoms typical for?
A Acute myocardial infarction
B Acute pancreatitis
C Stenocardia
D Cholelithiasis
E Diabetes mellitus

189. An oncological patient was prescribed methotrexate. With the lapse of time target cells of the tumour lost susceptibility to this drug. There is change of gene expression of the folowing enzyme:
A Dehydrofolate reductase
B Thiaminase
C Deaminase
D Folate oxidase
E Folate decarboxylase

190. Hemoglobin catabolism results in release of iron which is transported to the bone marrow by a certain transfer protein and used again for the synthesis of hemoglobin. Specify this transfer protein:
A Transferrin (siderophilin)
B Transcobalamin
C Haptoglobin
D Ceruloplasmin
E Albumin

191. Electrophoretic study of a blood serum sample, taken from the patient with pneumonia, revealed an increase in one of the protein fractions. Specify this fraction:
A γ-globulins
B Albumins
C α1-globulins
D α2-globulins
E β-globulins

192. Some infectious diseases caused by bacteria are treated with sulfanilamides which block the synthesis of bacteria growth factor. What is the mechanism of their action?
A They are antivitamins of para-amino benzoic acid
B They inhibit the absorption of folic acid
C They are allosteric enzyme inhibitors
D They are involved in redox processes
E They are allosteric enzymes

193. A patient with jaundice has high total bilirubin that is mainly indirect (unconjugated), high concentration of stercobilin in the stool and urine. The level of direct (conjugated) bilirubin in the blood plasma is normal. What kind of jaundice can you think of?
A Hemolytic
B Parenchymal (hepatic)
C Mechanical
D Neonatal jaundice
E Gilbert's disease

194. By the decarboxylation of glutamate in the CNS an inhibitory mediator is formed. Name it:
A GABA
B Glutathione
C Histamine
D Serotonin
E Asparagine

195. To prevent attacks of acute pancreatitis a doctor prescribed the patient trasylol (contrycal, gordox), which is an inhibitor of:
A Trypsin
B Elastase
C Carboxypeptidase
D Chymotrypsin
E Gastricsin

196. A hospital has admitetd a patient complaining of abdominal bloating, diarrhea, flatulence after eating protein foods. These signs are indicative of the impaired digestion of proteins and their increased degradation. Which of the following compounds is the product of this process?
A Indole
B Bilirubin
C Cadaverine

D Agmatine
E Putrescine

197. A 20-year-old male patient complains of general weakness, rapid fatigability, irritability, decreased performance, bleeding gums, petechiae on the skin. What vitamin deficiency may be a cause of these changes?
A Ascorbic acid
B Riboflavin
C Thiamine
D Retinol
E Folic acid

198. Enzymatic jaundices are accompanied by abnormal activity of UDP-glucuronyl transferase. What compound is accumulated in blood serum in case of these pathologies?
A Unconjugated bilirubin
B Conjugated bilrubin
C Dehydrobilirubin
D Hydrobilirubin
E Choleglobin

199. Desulfiram is widely used in medical practice to prevent alcocholism. It inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcochol?
A Acetaldehyde
B Ethanol
C Malonyl aldehyde
D Propionic aldehyde
E Methanol

200. Index of pH of the blood changed and became 7,3 in the patient with diabetus mellitus. Detecting of the components of what buffer system is used while diagnosing disorder of the acidbase equilibrium?
A Bicarbonate
B Phosphate
C Hemoglobin
D Oxyhemoglobin
E Protein

201. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may be caused by excessive accumulation of ketone bodies in blood?
A Metabolic acidosis
B Metabolic alcalosis
C Any changes woun't happen
D Respiratory acidosis
E Respiratory alcalosis

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

203. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine tested. What compound will confirm this diagnosis if found in urine?
A Kreatine
B Collagen
C Porphyrin
D Myoglobin
E Calmodulin

204. Dietary intake of a 30 year old nursing woman contains 1000 mg of calcium, 1300 mg of phosphorus and 20 mg of iron per day. It is necessary to change content of these mineral substances in the following way:
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B To increase calcium content
C To reduce fluorine content
D To increase iron content
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B Cytochrome B
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A Kallikrein
B Pepsin
C Trypsin
D Chemotrypsin
E Collagenase

208. A 42-year-old man was hospitalized to a cardiologic department with the diagnosis of stenocardia. The inhibitor of phosphodiesterase was included in the medicinal treatment of the patient The concentration of what substance will be increased in the cardiac muscle?
A. cAMP
B.GMP.
C.AMP
D. ADP.
E. ATP.

209. An infant has apparent diarrhea resulting from improper feeding. One of the main diarrhea effects is plentiful excretion of sodium bicarbonate. What form of acid-base balance disorder is the case?
A Metabolic acidosis
B Metabolic alkalosis
C Respiratory acidosis
D Respiratory alkalosis
E No disorders of acid-base balance will be observed

210. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of what acid substance to the blood can this state be explained?
A Lactate
B Pyruvate
C 1,3-bisphosphoglycerate
D alpha-ketoglutarate
E 3-phosphoglycerate

211. A 38 year old patient suffers from rheumatism in its active phase. What laboratory characteristic of blood serum is of diagnostic importance in case of this pathology?
A C-reactive protein
B Uric acid
C Urea
D Creatinine
E Transferrin

212. A 30 y.o. woman had been ill for a year when she felt pain in the area of joints for the first time, they got swollen and skin above them became reddened. Provisional diagnosis is rheumatoid arthritis. One of the most probable causes of this disease is a structure alteration of a connective tissue protein:
A Collagen
B Mucin
C Myosin
D Ovoalbumin
E Troponin

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A Ceruloplasmin
B Carbonic anhydrase

C Xanthine oxidase
D Leucine aminopeptidase
E Alcohol dehydrogenase

214. A patient complains about dyspnea provoked by the physical activity. Clinical examination revealed anaemia and presence of the paraprotein in the zone of gamma-globulins. To confirm the myeloma diagnosis it is necessary to determine the following index in the patient's urine:
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B Bilirubin
C Haemoglobin
D Ceruloplasmin
E Antitrypsin

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B Hyperalbuminemia
C Proteinuria
D Hypoglobulinemia
E Hypoproteinemia

216. Pathological changes of the liver and brain were revealed in a 27-year-old patient.The copper concentration is abruptly decreased in blood plasma and increased in the urine. Wilson's disease was diagnosed. Activity of what enzyme in the blood serum should be examined to prove diagnisis?
A Ceruloplasmin
B Carboanhydraze
C Xanthioxidase
D Leucinamineopeptidaze
E Alcoholdehydrogenaze

217. A 50-year-old patient complains about general weakness, appetite loss and cardiac arrhythmia. The patient presents with muscle hypotonia, flaccid paralyses, weakened peristaltic activity of the bowels. Such condition might be caused by:
A Hypopotassemia
B Hypoproteinemia
C Hyperkaliemia
D Hypophosphatemia
E Hyponatremia

218. A 63-year-old woman developed signs of rheumatoid arthritis. Increase of which indicated blood values level could be helpful in proving diagnosis?
A Additive glycosaminoglycans
B Lipoproteids
C Acid phosphatase
D General cholesterol
E R-glycosidase

219. A 35 y.o. patient who often consumes alcohol was treated with diuretics. There appeared serious muscle and heart weakness, vomiting, diarrhea, AP- 100/60 mm Hg, depression. This condition is caused by intensified excretion with urine of:
A Potassium
B Sodium
C Chlorine
D Calcium
E Phosphates

220. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?
A Hippuric acid
B Ammonium salts
C Kreatinine
D Uric acid
E Aminoacids

221. A patient has yellow skin colour, dark urine, achromatic feces. What substance will have strengthened concentration in the blood serum?
A Unconjugated bilirubin
B Conjugated bilirubin
C Mesobilirubin
D Verdoglobin
E Biliverdin

222. A 46 year old woman suffering from chololithiasis developed jaundice. Her urine

became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:
A Conjugated bilirubin
B Unconjugated bilirubin
C Biliverdin
D Mesobilirubin
E Urobilinogen

223. A 12-year-old patient was found to have blood serum cholesterol at the rate of 25 mmol/l. The boy has a history of hereditary familial hypercholesterolemia, which is caused by the impaired synthesis of the following protein receptors:
A. Low density lipoproteins
B. High density lipoproteins
C. Chylomicrons
D. Very low density lipoproteins
E. Intermediate density lipoproteins

224. A 4 y.o. child with signs of durative protein starvation was admitted to the hospital. The signs were as follows: growth inhibition, anemia, edema, mental deficiency. Choose a cause of edema development:
A Reduced synthesis of albumins
B Reduced synthesis of globulins
C Reduced synthesis of hemoglobin
D Reduced synthesis of lipoproteins
E Reduced synthesis of glycoproteins

225. The concentration of albumins in human blood sample is lower than normal. This leads to edema of tissues. What blood function is damaged?
A Maintaining the oncotic blood pressure
B Maintaining the Ph level
C Maintaining the body temperature
D Maintaining the blood sedimentation system
E All answers are correct

226. According to the results of glucose tolerance test, the patient has no disorder of carbohydrate tolerance. Despite that, glucose is detected in the patients's urine (5 mmol/l). The patient has been diagnosed with renal diabetes. What renal changes cause glucosuria in this case?
A. Decreased activity of glucose reabsorption enzymes
B. Increased activity of glucose reabsorption enzymes
C. Exceeded glucose reabsorption threshold
D. Increased glucose secretion
E. Increased glucose filtration

227. On the third day of life an infant's skin got icteric colouring. The child was born with body weight of 3,200 kg, body length of 52 cm. The child is active. There is puerile respiration above the lungs. Respiratory rate is 36/min, heart sounds are rhythmic, heart rate is 130/min. Abdomen is soft, liver comes out from the edge of costal arch by 2 cm, spleen is not palpable. Feces are in form of meconium. What is the most probable diagnosis?
A. Physiologic jaundice.
B. Biliary tracts atresia.
C. Neonatal sepsis.
D. Minkowsky-Shauffard disease.
E. Hemolytic disease of newborn.

228. After consumption of rich food a patient has nausea and heartburn, steatorrhea. This
condition might be caused by:
A. Bile acid deficiency.
B. Increased lipase secretion.
C. Disturbed tripsin synthesis.
D. Amylase deficiency.
E. Disturbed phospholipase synthesis.

229. A patient has yellow skin colour, dark urine, dark-yellow feces. What substance will have strengthened concentration in the blood serum?
A. Unconjugated bilirubin.
B. Conjugated bilirubin.
C. Mesobilirubin.
D. Verdoglobin.
E. Biliverdin.

230. A 46 year old woman suffering from chololithiasis developed jaundic Her urine became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:
A. Conjugated bilirubin.
B. Unconjugated bilirubin.
C. Biliverdin.
D. Mesobilirubin.
E. Urobilinogen.

231. A patient complains of frequent diarrheas, especially after consumption of fattening food, and of body weight loss. Laboratory examination revealed steatorrhea; hypocholic feces. What can be the cause of this condition?
A. Obturation of biliary tracts.
B. Mucouse membrane inflammation of small intestine.
C. Lack of pancreatic lipase.
D. Lack of pancreatic phospholipase.
E. Unbalanced diet.

232. After intake of rich food a patient feels nausea and sluggishness; with time there appeared signs of steatorrhe Blood cholesterine concentration is 9,2 micromole/l. This condition was caused by lack of:
A. Bile acids.
B. Triglycerides.
C. Fatty acids.
D. Phospholipids.
E. Chylomicrons.

233. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?
A. Hippuric acid.
B. Ammonium salts.
C. Creatinine.
D. Uric acid.
E. Aminoacids.

234. Study of conversion of a food colouring agent revealed that neutralization of this xenobiotictakes place only in one phase - microsomal oxydation. Name a component of this phase:
A. Cytochrome P-450.
B. Cytochrome B.
C. Cytochrome C.
D. Cytochrome A.
E. Cytochrome oxidase.

235. A 48 y.o. patient was admitted to the hospital with complaints about weakness, irritability, sleep disturbance. Objectively: skin and scleras are yellow. In blood: conjugated bilirubin, cholalemia. Feces are acholic. Urine is of dark colour (bilirubin). What jaundice is it?
A. Mechanic.
B. Gilbert's syndrome.
C. Parenchymatous.
D. Hemolytic.
E. Crigler-Najjar syndrome.

236. A 4 y.o. boy has had recently serious viral hepatitis. Now there are such clinical presentations as vomiting, loss of consciousness, convulsions. Blood analysis revealed hyperammoniemia. Disturbunce of which biochemical process caused such pathological condition of the patient?
A. Disturbed neutralization of ammonia in liver.
B. Inhibition of transamination enzymes.
C. Activation of aminoacid decarboxylation.
D. Increased putrefaction of proteins in bowels.
E. Disturbed neutralization of biogenic amines.

237. A full-term newborn child has yellowish skin and mucous membranes. This might be probably caused by temporary deficiency of the following enzyme:
A. UDP-glucoronyltransferase.
B. Heme synthetase.
C. Uridine transferase.
D. Heme oxygenase.

E. Biliverdin reductase.

238. Jaundice treatment involves administration of barbiturates inducing the synthesis of UDP-glucuronyl transferase. A medicinal effect is caused by the production of:
A. Direct reacting (conjugated) bilirubin
B. Protoporphyrin.
C. Biliverdin.
D. Indirect reacting (unconjugated) bilirubin.
E. Heme.

239. Blood analysis of a patient with jaundice reveals conjugated bilirubinemia, increased concentration of bile acids. There is no stercobilinogen in urine. What type of jaundice is it?
A. Obstructive jaundice.
B. Parenchymatous jaundice.
C. Cythemolytic jaundice.
D. Hemolytic jaundice.
E. Hepatocellular jaundice.

240. For assessment of the neutralizing function of liver a patient with chronic hepatitis went through a test with natrium benzoate load. The excretion of what acid with urine will characterize the neutrolizing function of liver?
A. Hippuric acid.
B. Phenylacetic acid
C. Citric acid
D. Valeric acid
E. Oxalic acid

241. A 25-year-old patient with a hereditary enzymopathy (Gilbert's disease) has a disorder of bilirubin conjugation in liver. What enzyme is not synthesized in this patient?
A. UDP-glucuronyl transferase.
B. UDP-glucose pyrophosphorylase
C. UDP-glycogen transferase
D. Ornithine carbomoyltransferase
E. Amidophosphoribosyltransferase

242. For several days a 55-year-old female patient has had pain attacks in the right upper quadrant after eating fatty foods. Visually, there is yellowness of sclera and skin. The patient has acholous stool, beer-colored urine. What substance present in the patient's urine causes its dark color?
A. Conjugated bilirubin.
B. Ketone bodies
C. Unconjugated bilrubin
D. Stercobilin
E. Bilirubin glucuronides

243. After consumption of rich food a patient has nausea and heartburn, steatorrhea. This condition might be caused by:
A. Bile acid deficiency.
B. Increased lipase secretion.
C. Disturbed tripsin synthesis.
D. Amylase deficiency.
E. Disturbed phospholipase synthesis.

244. An infant has apparent diarrhea resulting from improper feeding. One of the main diarrhea effects is plentiful excretion of sodium bicarbonat What form of acid-base balance disorder is the case?
A. Metabolic acidosis.
B. Metabolic alkalosis.
C. Respiratory acidosis.
D. Respiratory alkalosis.
E. No disorders of acid-base balance will be observe.

245. Patient with encephalopathy was admitted to the neurological in-patient department. Correlation of increasing of encephalopathy and substances absorbed by the bloodstream from the intestines was reveale What substances that are created in the intestines can cause endotoxemia?
A. Indole.
B. Butyrate.
C. Acetacetate.
D. Biotin.
E. Ornithine.

246. A 4 y.o. child with signs of durative proteinic starvation was admitted to the hospital. The signs were as follows: growth inhibition, anemia, edemata, mental

deficiency. Choose a cause of edemata development:
A. Reduced synthesis of albumins.
B. Reduced synthesis of globulins.
C. Reduced synthesis of hemoglobin.
D. Reduced synthesis of lipoproteins.
E. Reduced synthesis of glycoproteins.

247. A patient complains of frequent diarrheas, especially after consumption of fattening food, and of body weight loss. Laboratory examination revealed steatorrhea; hypocholic feces. What can be the cause of this condition?
A. Obturation of biliary tracts.
B. Mucous membrane inflammation of small intestine.
C. Lack of pancreatic lipas.
D. Lack of pancreatic phospholipase
E. Unbalanced diet.

248. After intake of rich food a patient feels nausea and sluggishness; with time there appeared signs of steatorrhea. Blood cholesterine concentration is 9,2 micromole/l. This condition was caused by lack of:
A. Bile acids.
B. Triglycerides.
C. Fatty acids.
D. Phospholipids.
E. Chylomicrons.

249. 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. Renin.
B. Pepsin.
C. Gastrin.
D. Secretin.
E. Lipas.

250. 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 ofthe following enzyme:
A. Lactase.
B. Invertase.
C. Maltase.
D. Amylase.
E. Isomaltase.

251. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?
A. Hippuric acid.
B.Ammonium salts.
C. Creatinine.
D. Uric acid.
E. Aminoacids.

252. 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. Fat emulsification.
B. Protein digestion.
C. Carbohydrate digestion.
D. Glycerin absorption.
E. Amino acid absorption.

253. Examination of a man who hadn't been consuming fats but had been getting enough
carbohydrates and proteins for a long time revealed dermatitis, poor wound healing, vision impairment. What is the probable cause of metabolic disorder?
A. Lack of linoleic acid, vitamins A, D, E, K.
B. Lack of palmitic acid.
C. Lack of vitamins PP, H.
D. Low caloric value of diet.
E. Lack of oleic acid.

254. A 30-year-old woman was diagnosed with insufficiency of exocrinous function of pancreas. Hydrolisis of what nutrients will be disturbed?
A. Proteins, fats, carbohydrates.

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

255. A 1-year-old child with symptoms of muscle involvement was admitted to the hospital. Examination revealed carnitine deficiency in his muscles. What process disturbance is the biochemical basis of this pathology?
A. Transporting of fatty acids to mitochodrions.
B. Substrate phosphorylation.
C. Lactic acid utilization.
D. Actin and myosin synthesis.
E. Regulation of Ca2+ level in mitochondrions.

256. A patient has a disturbed absorbtion of fat hydrolysates. It might have been caused by a deficit in the small intestine cavity:
A. Of bile acids.
B. Of lipolytic enzymes.
C. Of bile pigments.
D. Of sodium ions.
E. Of liposoluble vitamins.

257. A 60 year old patient was found to have a dysfunction of main digestive enzyme of saliva. This causes the disturbance of primary hydrolysis of:
A. Carbohydrates.
B. Fats.
C. Cellulose.
D. Proteins.
E. Lactose.

258. A patient with hypochromic anemia has splitting hair and loss of hair, increased nail brittling and taste alteration. What is the mechanism of the development of these symptoms?
A. Deficiency of iron-containing enzymes.
B. Decreased production of parathyrin.
C. Deficiency of vitamin A.
D. Deficiency of vitamin B12.
E. Decreased production of thyroid hormones.

259. A 50-year-old woman with myocardial infarction has been delivered to the intensive care unit. Which enzyme's activity will be most increased during the first two days?
A. Aspartate aminotransferase
B. LDH4
C. LDH5
D. Alanine aminotransferase
E. Alanine aminopeptidase

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

261. 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. L-amino acid oxidase
C. Diamine oxidase
D. Phenylalanine-4-monooxigenase
E. D-amino acid oxidase

262. A mother consulted a doctor about her 5-year-old child who develops erythemas, vesicular rash and skin itch under the influence of sun. Laboratory studies revealed decreased iron concentration in the blood serum, increased uroporphyrinogen I excretion with the urine. What is the most likely inherited pathology in this child?
A. Erythropoietic porphyria.

B. Methemoglobinemia.
C. Hepatic porphyria.
D. Coproporphyria.
E. Intermittent porphyria.

263. A 4 y.o. child with signs of durative proteinic starvation was admitted to the hospital. The signs were as follows: growth inhibition, anemia, edemata, mental deficiency. Choose a cause of edemata development:
A. Reduced synthesis of albumins.
B. Reduced synthesis of globulins.
C. Reduced synthesis of hemoglobin.
D. Reduced synthesis of lipoproteins.
E. Reduced synthesis of glycoproteins.

264. During metabolic process active forms of the oxygen including superoxide anion radical are formed in the human body. With help of what enzyme is this anion activated?
A. Superoxide dismutase.
B. Catalase.
C. Peroxidase.
D. Glutathioneperoxidase.
E. Glutathionereductase.

265. A 20 year old patient complains of general weakness, dizziness, quick fatigability. Blood analysis results: Hb- 80 g/l. Microscopical examination results: erythrocytes are of modified form. This condition might be caused by:
A. Sickle-cell anemia.
B. Hepatocellular jaundice.
C. Acute intermittent porphyria.
D. Obturative jaundice.
E. Addison's disease.

266. A patient has yellow skin colour, dark urine, dark-yellow feces. What substance will have strengthened concentration in the blood serum?
A. Unconjugated bilirubin.
B. Conjugated bilirubin.
C. Mesobilirubin.
D. Verdoglobin.
E. Biliverdin.

267. A 46 year old woman suffering from chololithiasis developed jaundice. Her urine became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:
A. Conjugated bilirubin.
B. Unconjugated bilirubin.
C. Biliverdin.
D. Mesobilirubin.
E. Urobilinogen.

268. Patient experienced increased susceptibility of the skin to the sunlight. His urine after some time became darker. What is the most likely cause of this?
A. Porphyria.
B. Hemolytic jaundice.
C. Albinism.
D. Pellagra.
E. Alkaptonuria.

269. A patient, who suffers from congenital erythropoietic porphyria, has skin photosensitivity. The accumulation of what compound in the skin cells can cause it?
A. Uroporphyrinogen 1.
B. Uroporphyrinogen 2.
C. Coproporphyrinogen 3.
D. Protoporphyrin.
E. Heme.

270. Examination of initial molecular structure revealed substitution of the glutamic acid by valine. What inherited pathology is it typical for?
A. Sickle-cell anemia.
B. Favism.
C. Hemoglobinosis.
D. Thalassemia.
E. Minkowsky-Shauffard disease.

271. A 7-year-old girl has signs of anemia. Laboratory examination revealed pyruvate kinase deficiency in erythrocytes. What process disturbance plays the main role in anemia development?
A. Anaerobic glycolysis.
B. Peroxide decomposition.

C. Tissue respiration.
D. Aminoacids desamination.
E. Oxidative phosphorylation.

272. An infant has apparent diarrhea resulting from improper feeding. One of the main diarrhea effects is plentiful excretion of sodium bicarbonate. What form of acid-base balance disorder is the case?
A. Metabolic acidosis.
B. Metabolic alkalosis.
C. Respiratory acidosis.
D. Respiratory alkalosis.
E. No disorders of acid-base balance will be observed.

273. Durative proteinic starvation leads to growth inhibition, anemia, edemata, mental deficiency. Choose a cause of edemata development:
A. Reduced synthesis of albumins.
B. Reduced synthesis of haemoglobin.
C. Reduced synthesis of lipoproteins.
D. Reduced synthesis of globulins.
E. Reduced synthesis of glycoproteins.

274. Hyperglycemia rate in a patient with diabetes mellitus can be retrospectively estimated (over the last 4-8 weeks before the examination) on the ground of the rate of the following blood plasma protein:
A. Glycated haemoglobin.
B. Fibrinogen.
C. Ceruloplasmin.
D. Albumin.
E. C-reactive protein.

275. The concentration of albumins in human blood sample is lower than normal. This leads to edema of tissues. What blood function is damaged?
A. Maintaining the oncotic blood pressure.
B. Maintaining the pH level.
C. Maintaining the body temperature.
D. Maintaining the blood sedimentation system.
E. All answers are correct.

276. A 38 year old patient suffers from rheumatism in its active phase. What laboratory
characteristic of blood serum is of diagnostic importance in case of this pathology?
A. C-reactive protein.
B. Uric acid.
C. Urea.
D. Creatinin.
E. Transferrin.

277. Examination of a 27-year-old patient revealed pathological changes in liver and brain. Blood plasma analysis revealed an abrupt decrease in the copper concentration, urine analysis revealed an increased copper concentration. The patient was diagnosed with Wilson's degeneration. To confirm the diagnosis it is necessary to study the activity of the following enzyme in blood serum:
A. Ceruloplasmin.
B. Carbonic anhydrase.
C. Xanthine oxidase.
D. Leucine aminopeptidase.
E. Alcohol dehydrogenase.

278. A patient complains about dyspnea provoked by the physical activity. Clinical examination revealed anaemia and presence of the paraprotein in the zone of gamma-globulins. To confirm the myeloma diagnosis it is necessary to determine the following index in the patient's urine:
A. Bence Jones protein.
B. Bilirubin.
C. Haemoglobin.
D. Ceruloplasmin.
E. Antitrypsin.

279. From the group of children who were eating sweet sappy watermelon two kids developed the signs of poisoning: rapid weakness, dizziness, headache, vomiting, edeama, tachycardia, cyanosis of mouth, ears, tips of the fingers. High concentration of nitrates was detected. What is the leading mechanism of the pathogenesis of the poisoning in the two children?

A. Insufficiency of met-Hb-reductase
B. Insufficiency glutathione pyroxidase
C. Insufficiency of catalase
D. Insufficiency of superoxiddismutase
E. Block cytochrome oxidase

280. A 62 y.o. woman complains of frequent pains in the area of her chest and backbone, rib fractures. A doctor assumed myelomatosis (plasmocytoma). What of the following laboratory characteristics will be of the greatest diagnostical importance?
A. Paraproteinemia.
B. Hyperalbuminemia.
C. Proteinuria.
D. Hypoglobulinemia.
E. Hypoproteinemia.

281. Pathological changes of the liver and brain were revealed in a 27-year-old patient.The copper concentration is abruptly decreased in blood plasma and increased in the urine. Wilson's disease was diagnose. Activity of what enzyme in the blood serum should be examined to prove diagnisis?
A. Ceruloplasmine.
B. Carboanhydrase.
C. Xanthioxidase.
D. Leucinamineopeptidase.
E. Alcoholdehydrogenase.

282. Post-translational modification of plasmic factors of blood coagulation are formed with the participation of vitamin K. It is used as a cofactor in the enzyme system of carboxylation of protein factors of blood coagulation due to the increased affinity of their molecules with calcium ions. What amino acid is carboxylated in these proteins?
A. Glutamate.
B. Aspartate.
C. Alanine.
D. Serine.
E. Methionine.

283. After implantation of a cardiac valve a young man constantly takes indirect anticoagulants. His state was complicated by hemorrhag What substance content has decreased in blood?
A. Prothrombin.
B. Haptoglobin.
C. Heparin.
D. Creatin.
E. Ceruloplasmin.

284. To prevent postoperative bleeding a 6 y.o. child was administered vicasol that is a synthetic analogue of vitamin K. Name post-translational changes of blood coagulation factors that will be activated by vicasol:
A. Carboxylation of glutamin acid
B. Phosphorylation of serine radicals.
C. Partial proteolysis.
D. Polymerization.
E. Glycosylation.

285. Toxic affection of liver results in dysfunction of protein synthesis. It is usually accompanied by the following kind of dysproteinemia:
A. Absolute hypoproteinemia.
B. Relative hypoproteinemia.
C. Absolute hyperproteinemia.
D. Relative hyperproteinemia.
E. Paraproteinemia.

286. Plasmic factors of blood coagulation are exposed to post-translational modification with the participation of vitamin K. It is necessary as a cofactor in the enzyme system of carboxylation of protein factors of blood coagulation due to the increased affinity of their molecules with calcium ions. What amino acid is carboxylated in these proteins?
A. Glutamic.
B. Serine.
C. Arginine.
D. Valine.
E. Phenylalanine.

287. A patient had hemorrhagic stroke. Blood examination revealed strengthened kinine concentration.The patient was prescribed contrical. It was administered in order to inhibit the following proteinase:

A. Kallikrein.
B. Pepsin.
C. Trypsin.
D. Chemotrypsin.
E. Collagenase.

288. A patient with acute myocardial infarction has been administered heparin as a part of complex therapy. Some time after heparin injection the patient developed hematuria. What heparin antagonist should be injected in order to manage the complication?
A. Fibrinogen.
B. Aminocaproic acid.
C. Vicasol.
D. Protamine sulphate.
E. Neodicumarin.

289. A 50-year-old patient complains about general weakness, appetite loss and cardiac arrhythmia. The patient presents with muscle hypotonia, flaccid paralyses, weakened peristaltic activity of the bowels. Such condition might be caused by:
A. Hypokaliemia.
B. Hypoproteinemia.
C. Hyperkaliemia.
D. Hypophosphatemia.
E. Hyponatremia.

290. Blood plasma analysis revealed an abrupt decrease in the copper concentration, urine analysis revealed an increased copper concentration. The patient was diagnosed with Wilson's degeneration. To confirm the diagnosis it is necessary to study the activity of the following enzyme in blood serum:
A. Ceruloplasmin.
B. Carbonic anhydrase.
C. Xanthine oxidase.
D. Leucine aminopeptidase.
E. Alcohol dehydrogenase.

291. A 15 year old girl has pale skin, glossitis, gingivitis. Blood count: erythrocytes - 3,3*1012/l, hemoglobin - 70 g/l, colour index - 0,5. Examination of blood smear revealed hypochromia, microcytosis, poikilocytosis. What type of anemia is it?
A. Iron-deficient.
B. Thalassemia.
C. B12-folic acid-deficient.
D. Hemolytic.
E. Sickle-cell.

292. A tooth extraction in a patient with chronic persistent hepatitis was complicated with prolonged hemorrhage. What is the reason for the haemorrhagic syndrome?
A. Decrease in thrombin production.
B. Fibrinolysis intensification.
C. Increase in thromboplastin production.
D. Increase in fibrinogen synthesis.
E. Decrease in fibrin production.

293. At the patient bubbles and amplified pigmentation after action of ultraviolet rays are visually revealed. Urine after upholding gets red color. Checking of what in urine from the listed parameters will help to diagnose Hunter disease?
A. Uroporphyrinogen
B. Hemoglobin
C. Bilirubin
D. Creatinin
E. Acetone

294. Biochemical analysis of blood of the patient with a cerebral dystrophy (Wilson – Konovalov disease) has shown decrease in the contain of ceruloplasmin. What concentration of ions will be raised in the blood?
A. Cooper
B. Calcium
C. Phosphorus
D. Potassium
E. Sodium

295. For treatments of malignant tumours prescribed metatrexate - structural analogue of a folic acid which is competitive inhibitor of dehydrofolicreductase and consequently suppresses synthesis of:
A. Nucleotides
B. Monosaccharides

C. Fatty acids
D. Glycerophosphatides
E. Glycogen

296. 40-years old patient during last several days is disturbed with attacks of a pain in the right hypochondrium after the use of fat food. Urine of " color of beer " and scleras and skin yellowing is visually defined, acholic stool presents. What substance presence in urine of the patient has caused dark painting urine ?
A. Bilirubin diglucuronide
B. Ketone bodies
C. Urobilin
D. Stercobilin
E. Glucose

297. During metabolism in the organism there are active forms of oxygen, including superoxide anion-radical. This anion is inactivated with the help of enzyme:
A. Superoxide dismutase
B. Catalase
C. Peroxidase
D. Glutathione peroxidase
E. Glutathione reductase

298. The patient has the sickle-cell anemia. Replacement of what amino acid in polypeptide chain of Hb for valine leads to this disease?
A. Glutamic acid
B. Aspartic acid
C. Leucine
D. Arginine
E. Threonine

299. The electrophoretic research of blood serum of the patient with a pneumonia has shown increase in one of protein fractions. Specify it.
A. Gamma-globulins
B. Albumin
C. α -1-globulins.
D. α-2-globulins.
E. β-globulins.

300. Prolonged action of some antibiotics and sulfonamides is caused by that they circulate in bloodfor a long time in a complex with
A. Albumin
B. Transferrin
C. Hemoglobin
D. Haptoglobin
E. –

301. The patient of 20 years old complains of the general weakness, fast fatigue. At inspection it is revealed: hemoglobin of blood 80g/l, by microscopic changed formed erythrocytes are revealed. The reason can be:
A. Sickle-cell anemia
B. Hepatocellular jaundice
C. Acute intermittent porphyria
D. Obturative jaundice
E. Addison's disease

302. The patient C. has myelomatosis. The general protein of blood - 180 g/l. Such level of protein is probable for the account:
A. Bence Jones protein
B. Albumin
C. Haptoglobin
D. Antibodies
E. Transferrin

303. At the patient, suffering a streptococcal infection, hemorrhagic diathesis has developed. What reason raised hemorrhagic diathesis?
A. Increase of fibrinolysis
B. Lack of vitamin A
C. Increase of contain of kallikrein blood plasma
D. Increase of contain of haparine in blood plasma
E. Lack of vitamin C

304. At the woman of 46 years old who suffers cholelithiasis, urine began dark yellow color, and stool - decoloured. Specify, what concentration of substance in the blood will increase in the greatest measure.
A. Conjugated bilirubin
B. Free bilirubin

C. Biliverdine
D. Mesobiirubin
E. Urobilinogen

305. At the baby who was born 2 days ago prematurely born, yellow painting of a skin and mucous membranes is observed. Specify, what temporary lack of enzyme is the reason of this condition of the kid.
A. UDP-glucuronyl transferase
B. Aminolevulinic acid
C. Heme oxygenase
D. Heme synthetase
E. Biliverdine reductase

306. Molecular analysis of hemoglobin of the patient which suffers an anemia, has shown replacement 6 glu for 6 val in a beta-chain. What molecular mechanism of a pathology?
A. Gene mutation
B. Chromosomal mutation
C. Duplication of genes
D. Amplification of genes
E. Transduction of genes

307. At the patient of 27 years old pathological changes of the liver and the brain are revealed. In plasma of blood sharp decrease, and in urine - increase of the maintenance of copper is revealed. The diagnosis - Wilson's diseases is put. What enzyme activity in the blood is necessary for investigating for putting of the diagnosis?:
A. Ceruloplasmin
B. Carbonic anhydrase
C. Xanthine oxidase
D. Leucinaminopeptidase
E. Alcohol dehydrogenase

308. What proteins of blood are responsible for maintenance of colloid osmotic pressure and constant volume of blood?
A. Albumines
B. α1-globulines
C. α2-globulines
D. γ-globulines
E. β-globulines

309. Woman of 62 years old complains of an often pain in the field of a thorax and a backbone, crises of edges. The doctor has assumed myelomatosis. Which from the provided laboratory parameters will have the greatest diagnostic value?
A. Paraproteinemia
B. Hyperalbuminemia
C. Proteinuria
D. Hypoglobulinemia
E. Hypoproteinemia

310. Consumption of the polluted vegetables and fruit during long time has led to a poisoning of the patient with nitrates and formation in blood of hemoglobin derivative:
A. Hb-OH
B. Hb Co
C. Hb O2
D. Hb CN
E. Hb NHCOOH

311. The woman of 43 years old, working at the paint and varnish enterprise, complains of the general weakness, weight reduction, apathy. The chronic lead intoxication is confirmed in the laboratory - the hypochromic anemia is revealed. In blood the protoporphyrin level and the level of delta - aminolevulinic acid are raised which testifies the infringement of synthesis of:
A. Heme
B. DNA
C. RNA
D. Proteins
E. Mevalonic acid

312. Erythrocytes for the ability to live requires energy as ATP. What process provides this cell with necessary quantity of ATP?
A. Anaerobic glycolysis
B. Aerobic oxidation of glucose
C. Pentosyl cycle
D. Beta-oxidation of fatty acids
E. Tricarboxylic acid cycle

313. As anticoagulants various substances, including polysaccharide of a natural origin are used, namely:
A. Heparin
B. Hyaluronic acid
C. Dermatan sulfate
D. Chondroitin sulfate
E. Dextran

314. During increase of concentration of carbonic monooxide in air there can come a poisoning. Thus transportation of oxygen by hemoglobin from lungs to tissues is reduced. What hemoglobin derivative thus is it formed?
A. Carboxyhemoglobin
B. Oxyhemoglobin
C. Hemiglobin
D. Carhemoglobin
E. Hemochromagen

315. After car repairs in a garage the driver has got in hospital with symptoms of a poisoning with exhaust gases. What hemoglobin derivative concentration in blood will be raised?
A. Carboxyhemoglobin
B. Oxyhemoglobin
C. Methemoglobin
D. Carbhemoglobin
E. Glycated hemoglobin

316. Erythrocytes does not contain mitochondrions. What is the basic way of ATP formation in these cells?
A. Anaerobic glycolysis
B. Aerobic glycolysis
C. Oxidative phosphorylation
D. Creatine kinase reaction
E. Adenylate kinase reaction

317. The newborn has a physiological jaundice. The level of free bilirubin in blood considerably exceeds the norma. By what lack of enzyme it is caused?
A. UDP-glucuronyl transferase
B. Transaminase
C. Xanthine oxidase
D. Adenosine deaminase
E. Heme- oxygenase

318. For treatment of a jaundice barbiturates are prescribed which induce synthesis UDP-glucuronyl transferase. The medical effect thus is caused by formation of:
A. Direct bilirubin.
B. Indirect bilirubin.
C. Biliverdine.
D. Protoporphyrin.
E. Heme.

319. Alongside with normal types of hemoglobin in an organism of the adult person can be presented pathological types. Specify one of them.
A. HbS.
B. HbA1
C. HbCO2.
D. HbF.
E. HbA2.

320. Hemoglobin of the adult person (Hb) - protein-tetramer which will consist from two alpha and two beta-peptides chain. What name such structure of this protein has?
A. Quartery.
B. Tertiary.
C. Secondary.
D. Primary.
E. –

321. Those organisms which during evolution have not created protection from H2O2, can live only in anaerobic conditions. What from the listed enzymes can destroy hydrogen peroxide?
A. Peroxidase and catalase
B. Oxygenase and hydroxylase
C. Cytochrome oxidase, cytochrome B5
D. Oxygenase and catalase
E. Flavin dependened oxydase.

322. Wilson's disease is a disorder of copper transport which leads to the accumulation of this metal in brain and liver cells. It is associated with a disturbance in the synthesis of the following protein:
A. Ceruloplasmin

B. Siderophilin
C. Transcobalamin
D. Metallothionein
E. Haptoglobin.

323. 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. Creatinuria
C. Glycosuria
D. Bilirubinuria
E. Hyperuricuria.

324. Oral mucosa of a patient was treated with hydrogen peroxide. Instead of foaming, the blood turned brown. That is possible in case of reduced concentration of the following enezyme:
A. Catalase
B. Glucose-6-phosphate dehydrogenase
C. Acetyltransferase
D. Methemoglobin reductase
E. Pseudocholinesterase.

325. Cationic glycoproteins are the major components of parotid saliva. What amino acids are responsible for their positive charge?
A. Lysine, arginine, histidine
B. Aspartate, glutamate, glycine
C. Cysteine, glycine, proline
D. Aspartate, arginine, glutamate
E. Glutamate, valine, leucine

326. Tooth extraction in a patient with chronic persistent hepatitis was complicated by a prolonged bleeding. What is the cause of hemorrhagic syndrome?
A. Decreased production of thrombin
B. Decreased production of fibrin
C. Increased production of thromboplastin
D. Increased synthesis of fibrinogen
E. Increased fibrinolysis

327. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. What stage of modification of procollagen is disordered in this avitaminosis?
A. Hydroxylation of proline.
B. Formation of polypeptide chains.
C. Glycosylation of hydroxylysine residues.
D. Removal of C-ended peptide from procollagen.
E. Detaching of N-ended peptid.

328. A child has mental and physical retardation, grave damage of internal connective tissue. Urine analysis reveals keratan sulfates. What metabolic process is disturbed?
A. Glycosaminoglycans.
B. Hyaluronic acid.
C. Fibronectin.
D. Elastin.
E. Collagen.

329. Examination of a patient revealed typical presentations of collagenosis. This pathology is characterized by increase of the following urine index:
A. Hydroxyproline.
B. Arginine.
C. Glucose.
D. Mineral salts.
E. Ammonium salts.

330. A 63-year-old woman developed signs of rheumatoid arthritis. Increase of which indicated blood values level could be helpful in proving diagnosis?
A. Additive glycosaminoglycans.
B. Lipoproteids.
C. Acid phosphatase.
D. General cholesterol.
E. R-glycosidase.

331. A 36-year-old female patient has a history of collagen disease. Urine analysis is likely to reveal an increased concentration of the following metabolite:
A. Oxyproline.
B. Indican.
C. Creatinine.
D. Urea.
E. Urobilinogen.

332. Osteolaterism is charcterized by a decrease in collagen strength caused by much less intensive formation of cross-links in collagen fibrils. This phenomenon is caused by the low activity of the following enzyme:
A. Lysyl oxidase.
B. Monoamino-oxidase.
C. Prolyl hydroxylase.
D. Lysyl hydroxylase.
E. Collagenase.

333. A 30 y.o. woman had been ill for a year when she felt pain in the area of joints for the first time,they got swollen and skin above them became reddene Provisional diagnosis is rheumatoid arthritis. One of the most probable causes of this disease is a structure alteration of a connective tissue protein:
A. Collagen.
B. Mucin.
C. Myosin.
D. Ovoalbumin.
E. Troponin.

334. Examination of a patient suffering from frequent haemorrhages in the inner organs and mucous membranes revealed proline and lysine being included in collagen fibers. Impairment of their hydroxylation is caused by lack of the following vitamin:
A. C.
B. K.
C. D.
D. E.
E. -

335. A chiled was diagnosed with acute renal failure. What biochemic saliva indices can confirm this diagnosis?
A. Increased level of rest nitrogen.
B Increase of immunoglobuline A
C Reduction of alkaline phosphatase
D Increase of alpha amylase
E Decreased level of phosphate

336. Cationic glycoproteins are the major components of parotid saliva. What amino acids are responsible for their positive charge?
A. Lysine, arginine, histidine.
B Aspartate, glutamate, glycine
C Aspartate, arginine, glutamate
D Glutamate, valine, leucine
E Cysteine, glycine, proline

337. A child has disturbed processes of ossification and "punctate" enamel. What microelement metabolism is disturbed?
A. Fluorine.
B. Iron
C. Zinc
D. Chromium
E. Copper

338. Periodontitis is accompanied by activation of proteolysis in the periodontium tissues. The evidence of proteolysis activation is increase of the following component of oral liquid:
A. Amino acids.
B. Organic acids
C. Glucose
D. Biogenic amines
E. Cholestero

339. The activity of parotides reduces with age. Activity of what enzyme in saliva will be reducing?
A. Amylase.
B. Lysozime
C. Phosphatase
D. Hexokinase
E. Maltase

340. Up to 50% of world population aged above thirty is affected by paradontosis. The leading part in pathogenesis of this disease is played by:
A. Neurodystrophic factor.
B. Parodontium tissues damaged by kallikrein
C. Parodontium damaged by active cells
D. Dental calculus caused by microflora
E. Immune damage of tissues

341. Some proteins of saliva have a protective function. Which of them protects

the oral mucosa from the mechanical damage?
A. Mucin.
B. Lysozyme
C. Catalase
D. Peroxidase
E. Renin.

342. Periodontitis induces the development of lipid peroxidation in the periodontal tissues, as well as an increase in malondialdehyde and hydrogen peroxide concentration in the oral cavity. Which of the following enzymes provides antioxidant protection?
A. Catalase
B. Invertase
C. Maltase
D. Lactase
E. Amylase.

343. A patient has symptoms of atherosclerosis. What plasma lipid transport forms should have an increased concentration?
A. LDL
B. Chylomicrons
C. IDL
D.VLDL
E. HDL

344. When a wound heals, a scar takes its place. What substance is the main component of its connective tissue?
A. Collagen
B. Hyaluronic acid
C. Elastin
D. Chondroitin sulfate
E. Keratan sulfate

345. A patient who is ill with scurvy displays disturbed processes of connective tissue formation that leads to loosening and falling of teeth. Disturbed activity of what enzyme causes these symptomps?
A. Lisilhydroxylase.
B. Glycosiltransferase
C. Elastase
D. Procollagenpeptidase of N-terminal peptide
E. Procollagenpeptidase of C-terminal peptide

346. A patient with hypochromic anemia has hair with split ends and suffers from hair loss. The nails are brittle. Gustatory sensations are affected. What is the mechanism of development of these symptoms?
A. Iron enzymes deficiency
B. Vitamin B12 deficiency
C. Low production of thyroid hormones
D. Low production of parathyroid hormone
E. Vitamin A deficiency

347. The first-aid center has received a victim of a traffic accident diagnosed with closed displaced fracture of the middle third of the thigh. For repositioning of bone fragments the patient received 10 ml of 2% dithylinum solution intravenously, which resulted in prolonged period of apnoea and muscle relaxation. What enzyme is deficient, resulting in such pharmacogenetic enzymopathy?
A. Pseudocholinesterase
B. N-acetyltransferase
C. Methemoglobin reductase
D. Uridine diphosphate glucuronyltransferase
E. Glucose 6-phosphate dehydrogenase

348. Stool test detects in the patients feces a large amount of undigested fats. This patient is the most likely to have disturbed secretion of the following enzymes:
A. Pancreatic lipases
B. Bile lipase
C. Pancreatic proteases
D. Gastric protease
E. Pancreatic amylase

349. A patient suffers from hepatic cirrhosis. What substance excreted in urine should be analyzed to characterize the antitoxic function of liver?
A. Hippuric acid

B. Ammonium salts
C. Creatinine
D. Amino acids
E. Uric acid

350. A woman with hypophyseal diabetes insipidus developed a water-mineral imbalance. What type of water-mineral imbalance develops in such cases?
A. Hyperosmolar dehydration
B. Hyperosmolar hyperhydration
C. Isoosmolar dehydration
D. Hypoosmolar dehydration
E. Hypoosmolar hyperhydration

351. Encephalopathy has developed in a child with hemolytic disease of the newborn. What substance had increased in the child's blood, resulting in damage to the CNS?
A. Unconjugated bilirubin
B. Bile acids
C. Bilirubin glucuronide
D. Verdohemoglobin
E. Bilirubin-albumin complex

352. A 5-year-old child is diagnosed with Bruton syndrome (X-linked agammaglobulinemia) that manifests itself as severe clinical course of bacterial infections and absence of B lymphocytes and plasma cells. What changes of immunoglobulin content can be observed in blood serum of the child with immunodeficiency?
A. Decreased IgA, IgM
B. Increased IgA, IgM
C. No changes
D. Increased IgD, IgE
E. Decreased IgD, IgE

353. Monoamine oxidase inhibitors are widely used as psychopharmacological drugs. They change the level of nearly all neurotransmitters in synapses, with the following neurotransmitter being the exception:
A. Acetylcholine
B. Adrenaline
C. Serotonin
D. Dopamine
E. Noradrenaline

354. Collagenosis patients typically present with connective tissue destruction processes. The presence of these processes can be confirmed by the increase in:
A. Blood oxyproline and oxylysine
B. Blood urates
C. Blood creatine and creatinine
D. LDH-isoenzyme activity in the blood
E. Transaminase activity in the blood

355. During intensive physical exertion, one of the energy sources for the working muscles is glucose produced as the result of gluconeogenesis. This process is the most intensive in the following organ:
A. Liver
B. Muscles
C. Lungs
D. Brain
E. Stomach

356. Neutralization of xenobiotics and active endogenous metabolites often occurs via introduction of an oxygen atom into the substrate molecule. What process occurs as the result?
A. Hydroxylation
B. Phosphorilation
C. Transamination
D. Decarboxylation
E. Deaminization

357. Protective function of saliva is based on several mechanisms, including the presence of enzyme that has bactericidal action and causes lysis of complex capsular polysaccharides of staphylococci and streptococci. Name this enzyme:
A. Lysozyme
B. 01igo-l,6-glucosidase
C. α-amylase
D. Collagenase
E. β-glucuronidase

358. A 7-year-old child presents with marked signs of hemolytic anemia. Biochemical analysis of erythrocytes determined low concentration of NADPH

and reduced glutathione. What enzyme is deficient in this case leading to the biochemical changes and their clinical manifestations?
A. Glucose-6-phosphate dehydrogenase
B. Pyruvate kinase
C. Fructokinase
D. Lactate dehydrogenase
E. Hexokinase

359. A woman has been limiting the amount of products in her diet to lose some weight. 3 months later she developed edemas and her diuresis increased. What dietary component deficiency is the cause of this?
A. Proteins
B. Fats
C. Carbohydrates
D. Minerals
E. Vitamins

360. A 50-year-old inpatient during examination presents with glucosuria and blood glucose of 3.0 mmol/L, which are the most likely to be caused by:
A. Renal disorder
B. Myxedema
C. Diabetes insipidus
D. Pellagra
E. Essential hypertension

361. Congenital pyruvate carboxylase deficiency causes physical and mental retardation in children and leads to early death. It is characterized by lactic acidemia, lactaciduria, and a number of metabolic disorders. Among others, inhibition of the following occurs:
A. Citric acid cycle and gluconeogenesis
B. Pentose-phosphate pathway and glycolysis
C. Glycogenesis and glycogenolysis
D. Lipolysis and lipogenesis
E. Glycolysis and glycogenolysis

362. Ketosis develops in the patients with diabetes mellitus, as the result of activation of fatty acids oxidation processes. What acid-base imbalance can result from accumulation of excessive ketone bodies in the blood?
A. Metabolic acidosis
B. Metabolic alkalosis
C. No imbalance occurs
D. Respiratory acidosis
E. Respiratory alkalosis

363. In the process of hemoglobin catabolism iron is released and then as a part of special transport protein is returned to the bone marrow, to be used again for hemoglobin synthesis. Name this transport protein:
A. Transferrin
B. Albumin
C. Ceruloplasmin
D. Transcobalamin
E. Haptoglobin

364. People, who for a long time remained in hypodynamic state, develop intense pain in the muscles after a physical exertion. What is the most likely cause of this pain?
A. Accumulation of lactic acid in muscles
B. Accumulation of creatinine in muscles
C. Intensive breakdown of muscle proteins
D. Decreased content of lipids in muscles
E. Increased content of ADP in muscles

365. A woman with enteritis accompanied by severe diarrhea presents with loss of water in the extracellular space, increased water content in the cells, and decreasing blood osmolarity. Name this type of water-electrolyte imbalance:
A. Hypoosmolar hypohydration
B. Hyperosmolar hypohydration
C. Isoosmolar hypohydration
D. Hyperosmolar hyperhydration
E. Hypoosmolar hyperhydration

Biochemistry MCQs
(USMLE™ Step 1 Qbook 2008 by Kaplan, Inc.)

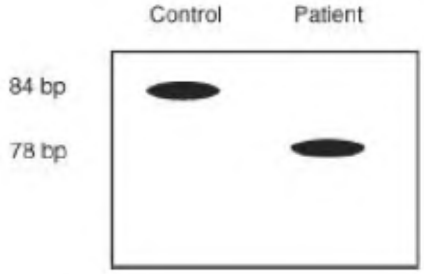
1. A newborn presents with severe acidosis, vomiting, hypotonia, and neurologic deficits. Laboratory analysis reveals elevated levels of lactate and alanine. These observations suggest a deficiency of which of the following enzymes?
(A) Alanine aminotransferase
(B) Glutamate dehydrogenase
(C) Lactate dehydrogenase
(D) Phenylethanolamine N-methyltransferase
*(E) Pyruvate dehydrogenase

2. Several members of a family have an autosomal recessive disease characterized by intellectual deterioration, weakness, ataxia, seizures, and death at a young age. Special studies demonstrate a deficiency of cytochrome C oxidase activity. Which of the following subcellular organelles is defective in affected members of this family?
(A) Golgi apparatus
(B) Lysosomes
*(C) Mitochondria
(D) Ribosomes
(E) Smooth endoplasmic reticulum

3. A 17-year-old high-school student comes to the school health clinic. She has missed her last menstrual period and is worried about being pregnant. In the past history, it is noted that she has sickle-cell trait and mild asthma but is otherwise healthy. She has never been pregnant before and is sexually active with one boyfriend. They use barrier contraception on an irregular basis. She reports that her boyfriend once told her that he too had sickle-cell trait. She is determined to continue with the pregnancy if the urine pregnancy test turns out to be positive. Her main concern is whether her child will have sickle-cell anemia. At this stage, it is appropriate to counsel her that in cases where both parents have sicklecell trait the risk of having a baby born with sickle-cell anemia is which of the following?
(A) 5%
*(B) 25%
(C) 50%
(D) 75%
(E) 100%

4. A prokaryotic operon codes for two enzymes and one regulatory protein. The operon is expressed only in the presence of a particular sugar. Initial mapping of the operon has differentiated the nontranscribed sequences from the transcribed sequences. Deletion of 10 nucleotides from one of the nontranscribed sequences results in transcription of the operon in both the presence and absence of the sugar. Which of the following sequences was most likely affected?
(A) Activator binding site
(B) Activator gene
*(C) Operator
(D) Promoter
(E) Repressor gene

5. Genomic DNA from a child with pyruvate kinase deficiency identifies a mutation in the 3'-splice site of intron 3. The mRNA from the child's reticulocytes is used to produce cDNA. Primers flanking the exon 3/exon 4 border are used to amplify this region from the cDNA (RT-PCR). The products are separated by electrophoresis and compared to the RT-PCR products from normal reticulocytes (control). The results are shown below. Which of the following mechanisms best accounts for the results of the splice mutation?



(A) Exon skipping
(B) Frameshift mutation
(C) Missense mutation
(D) Trinucleotide expansion
*(E) Two codon deletion

6. A 36-year-old Greek man with viral pneumonia has a selflimiting episode of hemolysis. Over the next week, he has an increased rate of reticulocytosis. Which of the following compounds serves as a precursor to heme in the reticulocytes?
(A) α-Ketoglutarate
(B) Fumarate
(C) Isocitrate
(D) Oxaloacetate
*(E) Succinyl-CoA

7. A 22-year-old woman presents with a fusiform swelling of the Achilles tendon, which, when biopsied, shows cholesterol-laden macrophages (foam cells) dispersed among the collagen fibers. She had been troubled with joint pains for several years. Both her mother and father developed arthritis associated with production of xanthomas, but their first symptoms occurred in middle age. She was referred to a nutritionist and treated with an enzyme inhibitor. Which of the following is most likely elevated in the blood of this woman?
(A) Chylomicron remnants
(B) Chylomicrons
(C) High density lipoproteins (HDL)
*(D) Low density lipoproteins (LDL)
(E) Very low density lipoproteins (VLDL)

8. A 23-year-old, single, unemployed woman in her eighth month of pregnancy is seen in a volunteer-staffed obstetrics clinic. Her first child, born at home and exclusively breast-fed, had prolonged diarrhea and died from an intracranial hemorrhage at 1 month of age. To help prevent a similar problem in this pregnancy, the resident gives her a free prescription for a vitamin and advises her to take one 20-mg tablet each day. He also informs her that the infant should receive an injection of this vitamin soon after birth. The vitamin prescribed is required as a coenzyme by which of the following enzymes?
(A) δ-Aminolevulinate synthase
*(B) γ-Glutamyl carboxylase

(C) Homocysteine methyltransferase
(D) Prolyl hydroxylase
(E) Thrombin

9. A 26-year-old pregnant woman complains of persistent, dry, ulcerated skin over her knees and elbows. Examination of her eyes reveals small, gray plaques on the conjunctiva. Which of the following is the most likely diagnosis?
(A) Ascorbic acid deficiency
(B) Excessive α-tocopherol intake
(C) Excessive cholecalciferol intake
*(D) Retinol deficiency
(E) Thiamine deficiency

10. The pregnant mother of a 6-year-old son with glucose-6- phosphate dehydrogenase deficiency is very worried that her female fetus will have the disease. The father and mother are clinically normal. Which of the following is true about her baby?
(A) The baby has a 25% chance of clinical disease
*(B) The baby has a 50% chance of being a carrier
(C) The baby has a 50% chance of clinical disease
(D) The baby will be a carrier
(E) The baby will have clinical disease

11. A genetics researcher is trying to identify a potential gene from a gene signature/motif that encodes a sevenhelix transmembrane domain. Which of the following is an example of a glycosylated, integral membrane protein with seven transmembrane segments?
(A) Adenylate cyclase
*(B) Beta-adrenergic receptor for epinephrine
(C) Cystic fibrosis transmembrane conductance regulator channel
(D) Glucose transporter
(E) Na+/K+ ATPase

12. A previously normal child begins deteriorating developmentally at about 6 months of age. She is seen by an ophthalmologist because she no longer responds to visual stimuli. A cherry-red spot on the macula is noted on ophthalmologic examination. The enzyme that is deficient in this child normally carries out which of the following functions?
(A) Degradation of glycogen in muscle
*(B) Degradation of glycolipids in the brain
(C) Degradation of mucopolysaccharides in bone marrow
(D) Synthesis of glycoproteins in the liver
(E) Synthesis of peptides in the spleen

13. A 30-year-old vegetarian presents to his physician complaining of diminished sensation in his lower extremities. He has not eaten meat for the past 15 years. A complete blood count reveals hypersegmented neutrophils and elevated mean corpuscular volume. Which of the following findings would be expected on urinalysis?
(A) Argininosuccinic aciduria
(B) Cystinuria
(C) Hemoglobinuria
*(D) Methylmalonic aciduria
(E) Propionic aciduria

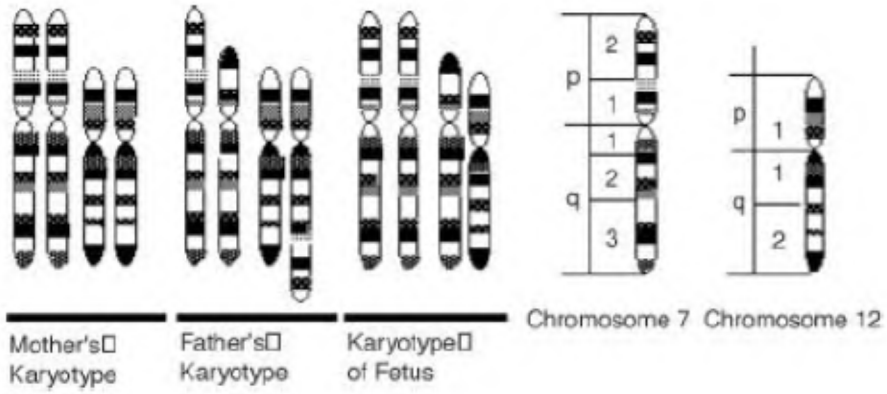
14. A 12-year-old boy has a particular genetic disease. His mother is a carrier of the mutated gene, but his father is not clinically affected and is not a carrier. The man has four siblings: a sister and a brother who are not clinically affected and are not carriers; a sister who is a carrier but is not clinically affected; and a brother who is clinically affected. This inheritance pattern is consistent with which of the following diseases?
(A) Alpha1-antitrypsin deficiency
(B) Cystic fibrosis
*(C) Duchenne muscular dystrophy
(D) Phenylketonuria
(E) Tay-Sachs disease

15. A newborn vomits after each feeding of milk-based formula and does not gain weight. Biochemical testing reveals a severe deficiency of galactose-1-phosphate uridyltransferase, consistent with homozygosity. If this condition goes untreated, which of the following is the likely outcome for this patient?
(A) Benign disease except for cataract formation
(B) Chronic emphysema appearing in early adulthood
(C) Chronic renal failure appearing in adolescence
*(D) Death in infancy
(E) Gastrointestinal symptoms that remit with puberty

16. Following the ingestion of glyburide, a type 2 diabetic patient begins to experience anxiety, diaphoresis, and hunger. The patient subsequently ingests a health food bar containing glucose. The glycolytic degradation of the ingested glucose commences with the action of which of the following enzymes?
(A) Aldolase
*(B) Hexokinase
(C) Phosphofructokinase
(D) Phosphoglucose isomerase
(E) Pyruvate kinase

17. A 24-year-old woman with phenylketonuria (PKU) gives birth to her first child. Although there is no history of PKU in the father's family, the couple could not afford genetic testing of the father or consistent prenatal care. At birth, the child is small, microcephalic, and has elevated blood phenylalanine. What is the most likely explanation for this neonate's symptoms?
(A) Father is a carrier of PKU
(B) Maternal translocation with unbalanced segregation in meiosis I
(C) Maternal translocation with unbalanced segregation in meiosis II
(D) Maternal uniparental disomy
*(E) Phenylalanine was not adequately restricted.from the mother's diet during pregnancy

18. A 26-year-old woman and her 29-year-old husband have been trying to have a child for the past 3 years. During this time the woman has had five spontaneous abortions. The karyotypes of the mother, father, and the most recently aborted fetus all contained 46 chromosomes, and all pairs were normal except for the pairs shown below.



Which of the following events during spermatogenesis in the father is most likely to have produced the abdominal karyotype in the fetus?

*(A) Adjacent segregation during meiosis

(B) Alternate segregation during meiosis

(C) A recombination event with paracentric inversion

(D) A reciprocal translocation

(E) A Robertsonian translocation

19. A 30-year-old man has been fasting for religious reasons for several days. His blood glucose level is now about 60% of its normal value, but he does not feel lightheaded because his brain has reduced its need for serum glucose by using which of the following substances as an alternate energy source?

(A) Apoprotein B

(B) Beta-carotene

*(C) Beta-hydroxybutyrate

(D) C-reactive protein

(E) Coenzyme A

20. A lethal mutation occurs in a bacterium, rendering it incapable of replicating its chromosome. Because of this mutation, DNA synthesis produces many short fragments of DNA that have RNA sequences at their 5 ends. The mutation is most likely in a gene encoding which of the following?

(A) DNA gyrase

(B) DNA helicase

(C) DNA ligase

*(D) DNA polymerase I

(E) Primase

21. A 2-year-old boy has a past medical history significant for mental retardation, hepatosplenomegaly, foam cells in the bone marrow, and neurologic deficits. The boy dies by the age of 3. Which of the following enzymes was most likely deficient in this child?

(A) Alpha-galactosidase

(B) Beta-glucocerebrosidase

(C) Ceramidase

(D) HMG-CoA reductase

*(E) Sphingomyelinase

22. A 58-year-old woman is admitted to the hospital with fever, abdominal cramps, and severe watery diarrhea. The symptoms began one day after attending a banquet. She was treated with ciprofloxacin, but her condition did not improve. PCR amplification and

analysis of a gene region in the bacteria isolated from the patient revealed a missense mutation that conferred resistance to ciprofloxacin. The missense mutation is most likely in the gene encoding an enzyme essential for which of the following functions?
*(A) DNA replication
(B) Folate synthesis
(C) mRNA translocation on a ribosome
(D) Peptide bond formation
(E) Reduction of folate to tetrahydrofolate

23. A 62-year-old man is prescribed a pharmaceutical agent that inhibits the activity of the enzyme HMG-CoA reductase. This patient most likely has which of the following conditions?
(A) Chronic inflammation
*(B) Familial hypercholesterolemia
(C) Hypertension
(D) Hyperuricemia
(E) Type 2 diabetes

24. A 5-year-old, mentally retarded boy is brought to the city from a rural community for evaluation. A careful history reveals mental retardation in a number of other family members, especially the males. Physical examination is remarkable for a long face with large ears, a large jaw, and bilateral enlargement of the testes. This presentation is suggestive of
(A) Down syndrome
(B) Edwards syndrome
*(C) Fragile X syndrome
(D) Klinefelter syndrome
(E) Turner syndrome

25. Liver cells in culture were kept at 0 C (32.0 F) and treated with trypsin to digest the receptors on the cell surface. The temperature was then raised to 37.0 C (98.6 F), and radioactive LDL was added to the culture media. Several hours later, the labeled LDL was found to be inside the cells. This specific process of LDL uptake is
(A) active transport
(B) facilitated diffusion
(C) phagocytosis
(D) pinocytosis
*(E) receptor-mediated endocytosis

26. On physical examination, a newborn is found to have micrognathia, a prominent occiput, low-set ears, and rocker-bottom feet. There is very little mental development during the first months of life, and the infant dies of cardiac complications after 8 months. A complete karyotype of this child would show which of the following?
(A) XO
(B) XXY
(C) Trisomy 13
*(D) Trisomy 18
(E) Trisomy 21

27. A college student goes to a fraternity party and consumes large quantities of beer. The alcohol in the beer is metabolized by the liver, with almost half the alcohol being oxidized to acetaldehyde. In which of the following sites does this reaction occur?
(A) Golgi bodies
(B) Lysosomes
(C) Mitochondrial matrix
*(D) Peroxisomes
(E) Ribosomes

28. A patient has an enlarged liver and kidneys, gout, and xanthomas. Studies show that he has a genetic deficiency of glucose 6-phosphatase. Additional studies would most likely show which of the following sets of laboratory results?

	Serum glucose	Serum lactate	Serum pyruvate
(A)	High	High	High
(B)	High	High	Low
(C)	High	Low	Low
*(D)	Low	High	High
(E)	Low	Low	Low

29. A neonate with ambiguous genitalia and microcephaly is suspected of having a genetic disease characterized by failure to metabolize 7-dehydrocholesterol to cholesterol. Which of the following is the most likely diagnosis?
(A) Down syndrome
(B) Edwards syndrome
(C) Patau syndrome
*(D) Smith-Lemli-Opitz syndrome
(E) WAGR syndrome

30. A researcher is trying to identify a specific protein within a mixture. He subjects the mixture to gel electrophoresis and then transfers the separation to nitrocellulose filters. The filters are incubated with antibody to the specific protein, and the excess antibody is washed off. The antibody-protein complex is then incubated with a radiolabeled protein that binds to the antibody. Autoradiography is performed to detect the presence of the protein. This technique represents
(A) Northern blotting
(B) Southern blotting
(C) Southwestern blotting
*(D) Western blotting

31. A rapid way to purify proteins that are targeted to lysosomes would be to use affinity chromatography. An appropriate antibody to use on an affinity chromatography column would be one directed against
(A) acid hydrolases
(B) clathrin
(C) glucose-6-phosphate
*(D) mannose-6-phosphate
(E) sialic acid

32. When a cloned DNA fragment is used as a probe, a restriction fragment length polymorphism (RFLP) is revealed in the region adjacent to the centromere of chromosome 21. Four haplotypes exist: A, B, C, and D. An AB woman and a CD man have an ACC child with trisomy 21. Nondisjunction occurred in
(A) the child during the first mitotic division
(B) the father during meiosis I
*(C) the father during meiosis II
(D) the mother during meiosis I
(E) the mother during meiosis II

33. A 5-year-old boy has temporary weakness and cramping of skeletal muscle after exercise. He has normal mental development. This child most likely has a deficiency of which of the following enzymes?
(A) α-1,4-Glucan transferase
*(B) Glycogen phosphorylase
(C) Glycogen synthase
(D) Phosphoglucomutase
(E) UDP-glucose pyrophosphorylase

34. A patient with acute lymphocytic leukemia is treated appropriately with antineoplastic therapy. Inhibition of which of the following enzymes will help prevent side effects of this therapy?
(A) Alpha-glucosidase
(B) Angiotensin-converting enzyme
(C) Beta-lactamase
(D) Cyclooxygenase
*(E) Xanthine oxidase

35. A 4-year-old retarded child hurls himself into walls and bites his fingertips so severely that they must be heavily bandaged. This child most likely has a deficiency of which of the following enzymes?
(A) Cystathionine synthase
(B) Hexosaminidase A
(C) Homogentisic acid oxidase
*(D) Hypoxanthine-guanine phosphoribosyltransferase
(E) Phenylalanine hydroxylase

36. A gene product thought to be involved in the downregulation of fetal hemoglobin expression is being investigated. Samples of primary tissue cultures of fetal, neonatal, and adult liver and bone marrow, as well as adequate amounts of a DNA probe believed to contain the studied gene, are provided. The best method for determining which of the tissue culture samples expresses the studied gene is
(A) DNA sequencing
*(B) Northern blot
(C) Polymerase chain reaction (PCR)
(D) Southern blot
(E) Western blot

37. A 28-year-old woman and a 25-year-old man present for genetic counseling. Both are white and have one sibling affected with cystic fibrosis. The most appropriate method to assess the risk of transmitting cystic fibrosis to a potential child would be
(A) biochemical testing
(B) fluorescence in situ hybridization (FISH)
(C) karyotype analysis
*(D) polymerase chain reaction (PCR)
(E) Western blot analysis

38. A 7-year-old girl is brought to the emergency department by her parents with a complaint of severe polyuria and polydipsia. Laboratory examination reveals ketones in her urine. Which of the following is the most likely source of the ketones?
*(A) Free fatty acid breakdown
(B) Gluconeogenesis
(C) Glycogenolysis
(D) Protein breakdown
(E) Triglyceride breakdown

39. An infant receives an exchange blood transfusion due to severe neonatal jaundice. Red blood cell transfusion is required monthly, and at 6 months of age, a splenectomy is performed. Histologic examination of the spleen reveals marked hemosiderosis. Laboratory studies show:

	Patient	Normal
RBC	2.54 × 106/mm3	3.5–5.5 × 106/mm3
Hemoglobin	8.3 g/dL	12–16 g/dL
Hematocrit	23.4%	34–46%
Reticulocytes	27%	0.5–1.5%
Indirect bilirubin (conjugated)	6.1 mg/dL	0.4–3.4 mg/dL

Analysis of red cell glycolytic intermediates indicates markedly elevated concentrations of 2,3-bisphosphoglycerate, 3-phosphoglycerate, 2-phosphoglycerate, and phosphoenolpyruvate. Which of the following is the most likely diagnosis?
(A) Glucose 6-phosphate dehydrogenase (G6PD) deficiency
(B) Lead poisoning
*(C) Pyruvate kinase (PK) deficiency
(D) Sickle cell anemia
(E) β-Thalassemia

40. Pseudogenes are homologues of functional genes that lack promoters and are therefore part of the unexpressed DNA. It is thought that at least some of these pseudogenes were produced by reverse transcription of mRNA and insertion of the resultant cDNA into a chromosome by a virus. In addition to lacking a promoter and other regulatory elements, a pseudogene produced in this manner will also differ from the authentic gene in which one of the following ways?
(A) It will contain an oncogenic mutation
(B) It will contain nested genes for antibiotic resistance
(C) It will have lost some coding regions
*(D) It will lack introns
(E) It will require Shine-Dalgarno sequences

41. Methotrexate is used as therapy for rheumatoid arthritis, but has many side effects related to competitive inhibition of the enzyme dihydrofolate reductase. These side effects can be decreased without interfering with the efficacy of methotrexate by ingestion of additional folate. If patients treated with methotrexate are given sufficient folate, which of the following would most likely occur?
(A) Dihydrofolate reductase will have a higher apparent Km for dihydrofolate
(B) Dihydrofolate reductase will have a higher Vmax than it would in the absence of methotrexate
(C) Dihydrofolate reductase will have a lower apparent Km for dihydrofolate
(D) Dihydrofolate reductase will increase its affinity for methotrexate
*(E) Dihydrofolate reductase will reach the same Vmax as it would in the absence of methotrexate

42. A 69-year-old edentulous alcoholic man, who lives alone, is admitted to the hospital for evaluation of a shoulder wound that is not healing well. On physical examination, numerous ecchymoses are noted on the posterior aspect of his legs and thighs. Careful examination of the man's skin reveals minute hemorrhages around hair follicles and splinter hemorrhages in the nail beds. Laboratory examination is remarkable for a hemoglobin of 10 g/dL; no other hematologic abnormalities are noted. Which of the following is the most appropriate therapy for this disorder?
(A) Factor VIII
(B) Iron
(C) Vitamin B12
*(D) Vitamin C
(E) Vitamin K

43. A 45-year-old man is diagnosed with cancer of the proximal portion of the colon. His father died of colon cancer at the age of 52. He has three siblings. His 55-year-old brother has not been diagnosed with cancer, but his 57-year-old sister has an endometrial carcinoma, and his other sister died of ovarian cancer. A diagnosis of hereditary nonpolyposis colorectal cancer (HNPCC) is made. Which of the following types of mutations most likely occurred in this family?
*(A) A mutation causing defects in the mismatch repair system
(B) A point mutation in the gene coding for an excision exonuclease
(C) A reciprocal translocation between chromosomes 8 and 14, associated with the Epstein-Barr virus
(D) Loss of the retinoblastoma (RB) tumor suppressor gene

44. A 2-year-old boy is diagnosed with a biochemical defect involving hexosaminidase A. The patient's condition would be most appropriately categorized as belonging to which of the following general classes of defects?
(A) Aminoacidopathy
*(B) Gangliosidosis
(C) Lipid metabolism
(D) Mucopolysaccharidosis
(E) Porphyria

45. A 4-year-old boy is brought to the pediatrician because of gastroenteritis for three days, followed by a brief generalized seizure that left him semicomatose. The blood glucose

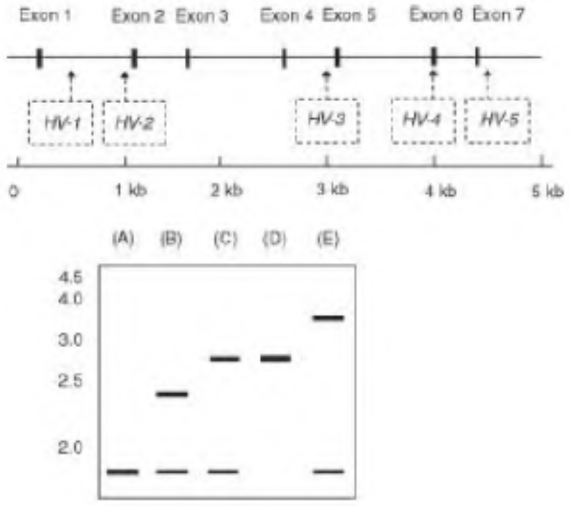
level at admission is 18 mg/dL (0.10 mM) and urine is negative for glucose and ketones, but positive for a variety of organic dicarboxylic acids. Intravenous administration of glucose improves his condition within 10 minutes. Following diagnosis of an enzyme deficiency, his parents are cautioned to make sure he eats frequently. Which of the following is the most likely diagnosis?
(A) Glucose-6-phosphatase deficiency
(B) Hepatic glycogen phosphorylase deficiency
*(C) Medium chain acyl CoA dehydrogenase deficiency
(D) Mitochondrial carbamoyl phosphate synthetase deficiency
(E) Ornithine transcarbamoylase deficiency

46. A patient with short stature presents with hypoglycemia, hepatomegaly, bleeding diathesis, hepatic adenomas, and enlarged kidneys. Laboratory evaluation reveals the presence of increased lactate, cholesterol, triglyceride, and uric acid. This patient most likely has a deficiency of which of the following enzymes?
(A) Brancher enzyme
(B) Debrancher enzyme
*(C) Glucose-6-phosphatase
(D) Hepatic phosphorylase
(E) Muscle phosphorylase

47. A 50-year-old chronic alcoholic presents with dementia, paralysis of lateral gaze, and difficulty walking. The vitamin deficient in this patient is required as a cofactor for which of the following enzymes?
(A) Aspartate aminotransferase
(B) Methylmalonyl-CoA mutase
(C) Prolyl hydroxylase
(D) Pyruvate carboxylase
*(E) Pyruvate dehydrogenase

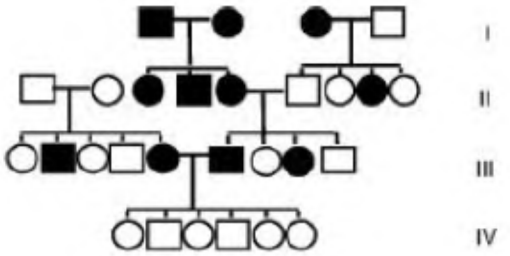
48. A 27-year-old medical student is unable to eat lunch and dinner during her clinical rotation. Which of the following enzymes is responsible for helping to maintain blood glucose levels by releasing glucose from its storage form in the liver?
(A) Acetyl-CoA carboxylase
(B) Glucose-6-phosphate dehydrogenase
*(C) Glycogen phosphorylase
(D) Glycogen synthase
(E) Thiolase

49. A family has a history of genetic disease with an autosomal dominant pattern of inheritance. DNA from the grandfather (who is heterozygous for the disease) is cloned and used to construct a restriction map of the gene region involved in the disease. He has a restriction site polymorphism at EcoHV site 2 (HV-2), which is useful as a marker. His abnormal chromosome lacks the HV-2 site. DNA from his affected grandson is digested with EcoHV, Southern blotted, and probed with 32P-cDNA complementary to exon 2. Which of the following options most likely represents the restriction fragment length polymorphism (RFLP) pattern obtained from the affected grandson?



(A) A
*(B) B
(C) C
(D) D
(E) E

50. In the family shown below, individuals affected with profound deafness are represented by a shaded symbol.



The phenotypes of individuals in the fourth generation can best be explained by
(A) autosomal dominant inheritance
*(B) locus heterogeneity
(C) mitochondrial inheritance
(D) multifactorial inheritance
(E) X-linked dominant inheritance

51. A 3-year-old girl who is small for her age has had multiple hypoglycemic episodes associated with moderate fasting during periods of illness. In her most recent episode associated with influenza, her parents slept late, and at 10 AM were unable to rouse the child from sleep. Blood and urine samples collected at the emergency department reveal marked hypoglycemia, ketonuria, and ketonemia along with an appropriately low insulin level. The blood alanine level is abnormally low; however, infusion of alanine produces a rapid rise in blood glucose. The defect most likely responsible for these symptoms is found in which of the following pathways?
(A) Gluconeogenesis
(B) Glycogenolysis
*(C) Protein catabolism in muscle
(D) Triglyceride hydrolysis in adipose tissue
(E) β-Oxidation of fatty acids

52. A large family has multiple members affected with a form of colorectal cancer. The locus involved is mapped to chromosome 3p. A single nucleotide polymorphism (D3S1298) at 3p21 is informative in this family. The recombination frequency is calculated, and LOD scores for linkage distance between the gene and marker D3S1298 are calculated and displayed in the table below. What is the best conclusion from the data shown?

LOD Scores for Recombination Frequencies with D3S1298

0.00	0.0001	0.001	0.01	0.05	0.10	0.20	0.30	0.40
1.40	1.53	1.69	1.80	1.62	1.52	1.27	0.93	0.50

(A) D3S1298 is not linked to the diseaseproducing gene in this family
(B) Significant linkage is demonstrated at a distance of 0.01 cM
(C) Significant linkage is demonstrated at a distance of 1 cM
(D) Significant linkage is demonstrated at a distance of 40 cM
*(E) The data are suggestive of linkage, but more families will need to be tested before significant linkage can be demonstrated

53. During her internal medicine rotation, a third-year medical student is asked to evaluate a patient with known pyruvate kinase deficiency. While interviewing the patient, the medical student remembers learning about another disease with similar characteristics. This patient's disease is most clinically similar to which of the following diseases?
(A) α-Thalassemia
(B) β-Thalassemia
*(C) Glucose-6-phosphate dehydrogenase deficiency
(D) Hereditary spherocytosis
(E) Iron deficiency anemia

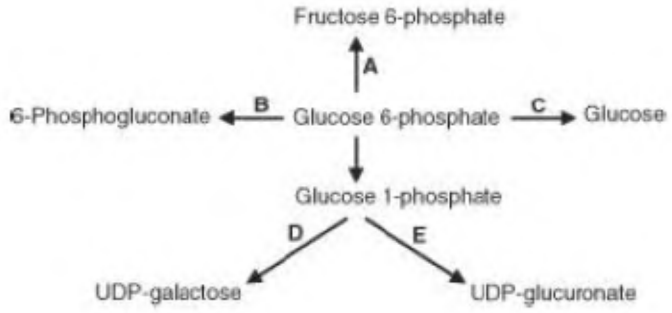
54. A 32-year-old pregnant woman with a history of deep venous thrombosis associated with oral contraceptive use is seen for her first prenatal visit. Her mother also had an episode of deep vein thrombosis during pregnancy. DNA from the woman is tested for a potential mutation in the factor V gene known to cause this condition. The DNA sequence to be amplified by PCR is shown below. The dashed line indicates the internal sequence where the potential mutation is located. Which answer choice represents the pair of primers that should be used in the PCR?

TCCTGAGC——AAATGTGT

(A) AGGACTCG and TTTACACA
(B) GCTCAGGA and AAATGTGT
(C) GCTCAGGA and ACACATTT
*(D) TCCTGAGC and ACACATTT
(E) TCCTGAGC and TTTACACA

55. A 40-year-old, formerly obese woman presents to her physician. She was very proud of having lost 80 lb during the previous 2 years, but has now noticed that her "hair is falling out." On questioning, she reports having followed a strict, fat-free diet. Her alopecia is probably related to a deficiency of which of the following vitamins?
*(A) A
(B) C
(C) D
(D) E

(E) K



56. Which reaction or pathway in the diagram shown above would most likely be stimulated by a decrease in hepatic [NADPH]/[NADP+]?
(A) A
*(B) B
(C) C
(D) D
(E) E

57. An amino-terminal leader sequence is part of a nascent protein being translated on the rough endoplasmic reticulum (RER). Which of the following proteins is being synthesized?
(A) Acetyl CoA carboxylase
*(B) Coagulation factor VIII
(C) Cytochrome oxidase
(D) Myosin
(E) Phosphofructokinase

58. A 25-year old woman with type 1 diabetes mellitus has maintained good glycemic control for several years. Recently she has gained 10 pounds and joined a group exercise program. By the end of her first 1-hour aerobics session, she is dizzy, nauseated, and feels faint. Which underlying mechanism is the most likely explanation for this episode?
(A) Inadequate delivery of oxygen to the muscle
(B) Stimulation of gluconeogenesis in the liver
(C) Stimulation of glycogenolysis in liver
(D) Stimulation of glycogenolysis in muscle
*(E) Translocation of GLUT4 to the cell membranes of myocytes

59. A 10-year-old boy with short stature is being evaluated for progressive neuropathy. Deep tendon reflexes are decreased, and vibratory sensation and proprioception are impaired. He has ataxia and a spastic gait. Ophthalmologic examination reveals decreased vision in dim light and pigmentary retinal degeneration. He has a history of frequent diarrhea with fatty stools. A serum lipid profile shows:

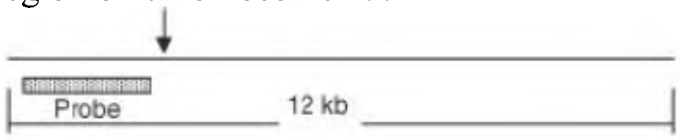
Cholesterol	33 mg/dL (normal: 132–220 mg/dL)
Triglyceride	0 mg/dL (normal: 32–150 mg/dL)
HDL cholesterol	28 mg/dL (normal: 34–86 mg/dL)

Genetic testing reveals a mutation in a gene encoding a protein necessary for normal lipoprotein metabolism. In which of the following genes is this mutation most likely?
*(A) ApoB gene
(B) ApoB100 receptor gene
(C) ApoC2 gene

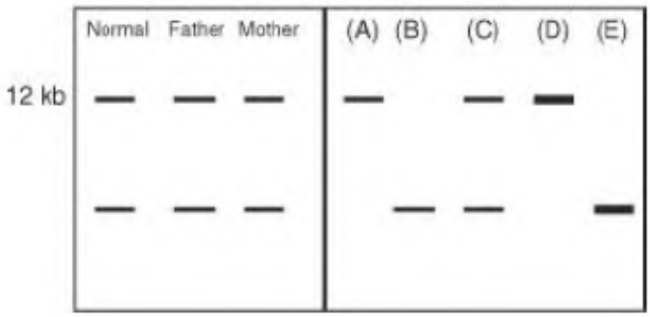
(D) ApoE gene
(E) Lecithin acyl cholesterol transferase (LCAT) gene

60. An infant diagnosed with phenylketonuria would be expected to be deficient in which of the following nonessential amino acids, assuming that it is not obtained from dietary sources?
(A) Asparagine
(B) Cysteine
(C) Glutamine
(D) Proline
*(E) Tyrosine

61. A 2-year-old obese girl with difficulty breathing is admitted to the hospital and given oxygen. She shows signs of developmental delay and has just taken her first steps. At birth, she had generalized hypotonia and fed poorly, although she now has a voracious appetite. Her older brother and sister are both normal. A probe for 15q11–13 reveals a deletion from one of her chromosomes. Prader- Willi syndrome is diagnosed. To confirm the diagnosis, a DNA methylation assay is performed. A sample of her DNA is first cut with EcoRI, releasing a 12-kb fragment, shown below, which is detected by the probe for the involved region on chromosome 15.



This fragment is then treated with a second restriction endonuclease that cuts within a CGCGCG sequence located at the position indicated by the arrow. If the CGCGCG sequence is methylated, the restriction endonuclease will not cut it. Assuming that the results confirm the diagnosis of Prader-Willi, which pattern below represents the girl's DNA? *(A)



62. A cardiovascular researcher is conducting a study to evaluate the relationship between folate levels and cardiovascular disease. The results of the study show that persons with lower folate levels have twice the risk of cardiovascular disease mortality than do those with higher folate levels. Which of the following enzymes is most closely related to the role of folate in lowering the risk of cardiovascular disease?
(A) Dihydrofolate reductase
(B) Glycinamide ribonucleotide transformylase
*(C) Homocysteine methyltransferase
(D) Ribonucleotide reductase
(E) Thymidylate synthase

63. A 9-year-old girl with mild mental retardation was healthy at birth but presented during the first week of life with vomiting, lethargy, seizures, and hypertonia. An amino acid

screen revealed elevated levels of leucine, isoleucine, and valine, so the child was put on a special diet restricted in these amino acids. She has had no medical problems related to her disease since that time. Which of the following enzymes is most likely deficient in this child?
*(A) Branched chain ketoacid dehydrogenase
(B) Cystathionine synthase
(C) Methylmalonyl CoA mutase
(D) Ornithine transcarbamoylase
(E) Propionyl CoA carboxylase

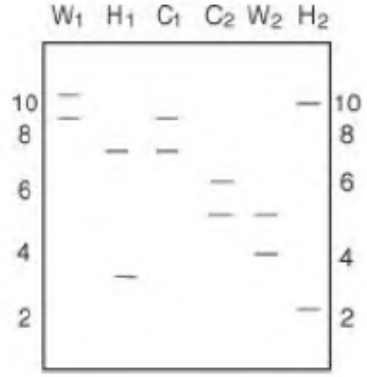
64. A 2-month-old boy is evaluated for failure to thrive. As the pediatrician is examining the patient, she witnesses a seizure. Physical examination is remarkable for hepatomegaly, a finding later confirmed by CT scan, which also reveals renomegaly. Serum chemistries demonstrate severe hypoglycemia, hyperlipidemia, and lactic acidosis. Which of the following enzyme deficiencies best accounts for this clinical presentation?
(A) Glucocerebrosidase
(B) Glycogen phosphorylase
(C) Sphingomyelinase
(D) α-1,4-Glucosidase (acid maltase)
*(E) Glucose 6-phosphatase

65. A 52-year-old woman is diagnosed with breast cancer. After discussing treatment options with her oncologist, she decides to turn to the Internet for advice. In a cancer survival chat room, she learns about laetrile, which is metabolized to cyanide. She begins taking laetrile, against medical advice, and develops progressive neuromuscular weakness of the upper and lower extremities, bilateral ptosis, and hypotension. The toxic effects of this unconventional anticancer agent are probably due to an inhibition of which of the following enzymes?
(A) 2,3-Bisphosphoglycerate mutase
*(B) Cytochrome oxidase
(C) Guanylate cyclase
(D) Na+/K+-ATPase
(E) Phosphofructokinase-2

66. A 2-year-old child is brought to the pediatrician because of hematuria. Examination reveals hypertension and an abdominal mass. A tumor is localized to the right kidney, and biopsy reveals a stroma containing smooth and striated muscle, bone, cartilage, and fat, with areas of necrosis. The gene for this disorder has been localized to which of the following chromosomes?
(A) 5
*(B) 11
(C) 13
(D) 17
(E) 22

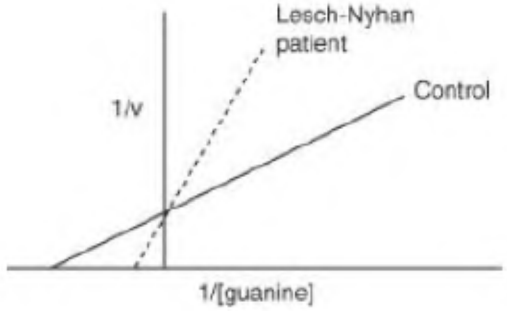
67. A jealous husband is concerned that his wife had an affair with her best friend's husband and that he is not the biologic father of their 7-month-old child. Restriction fragment length polymorphism (RFLP) analysis is performed on DNA samples from the two couples and from their two children (each couple has one child). The ethidium bromide-

stained agarose gel used to separate the fragments is shown below. Which conclusion can be drawn from these results?



W1 = wife 1; H1 = husband 1; C1 = child 1
W2 = wife 2; H2 = husband 2; C2 = child 2
(A) Husband 1 is the father of both children
*(B) Husband 1 is the father of child 1
(C) Husband 1 is the father of child 2
(D) Husband 2 is the father of both children
(E) Husband 2 is the father of child 1
(F) Husband 2 is the father of child 2

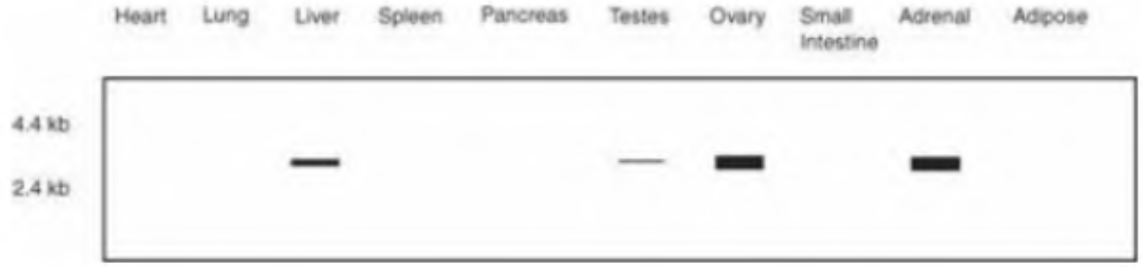
68. The enzyme hypoxanthine guanine phosphoribosyl transferase (HGPRT) isolated from a child with Lesch-Nyhan syndrome is compared with HGPRT isolated from a healthy control individual. The results are shown in the graph below. Which of the following is the best conclusion about the HGPRT from the child with Lesch- Nyhan disease?



(A) A competitive inhibitor was added to the enzyme from the Lesch-Nyhan patient.
*(B) The enzyme has a lower affinity for guanine than the control enzyme.
(C) The gene for HGPRT is repressed in the Lesch-Nyhan patient.
(D) There is an activating mutation in the HGPRT from the Lesch-Nyhan patient.
(E) There is more HGPRT in the Lesch-Nyhan cells.

69. A 25-year-old man and his wife go to a fertility clinic for evaluation. His wife has no significant past medical history and is given a "clean bill of health." He has had bronchiectasis and a history of recurrent sinusitis, and was diagnosed with situs inversus as a child. He is found to be sterile. What is the most likely cause of his infertility?
(A) Abnormal levels of sphingomyelinase
*(B) Abnormal structure of cilia
(C) Fibrillin deficiency
(D) 47,XXY karyotype
(E) Hexosaminidase A deficiency

70. RNA is isolated from the rough endoplasmic reticulum of several tissues, subjected to electrophoresis, blotted, and probed with a 32P-cDNA. The results from the autoradiogram are shown below. The 32P-cDNA probe used on the blot most likely is specific for which of the following genes?

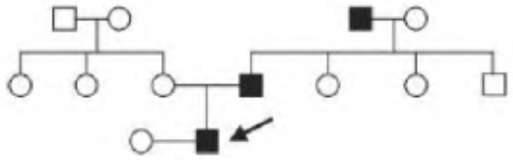


(A) Apoprotein B48
(B) Apoprotein B100
(C) Apoprotein CII
(D) Lipoprotein lipase
*(E) Scavenger receptor SR-B1

71. A 57-year-old alcoholic man is brought to the emergency department in a state of global confusion, psychosis, and ataxia. On examination, ophthalmoplegia and polyneuropathy are also noted. Administration of which of the following would be the most appropriate treatment for this patient?
(A) Biotin
(B) Niacin
(C) Pyridoxine
(D) Riboflavin
*(E) Thiamine

72. A pathologist is examining microscope slides of a skin biopsy from a patient with malignant melanoma. The pathologist notes in the microscopic description of the report that almost all of the melanoma cells have very large, visible nucleoli. This finding specifically suggests that these cells are making large amounts of which of the following?
(A) Cell surface markers
(B) Golgi apparatus
(C) Immunoglobulins
(D) New DNA
*(E) Ribosomes

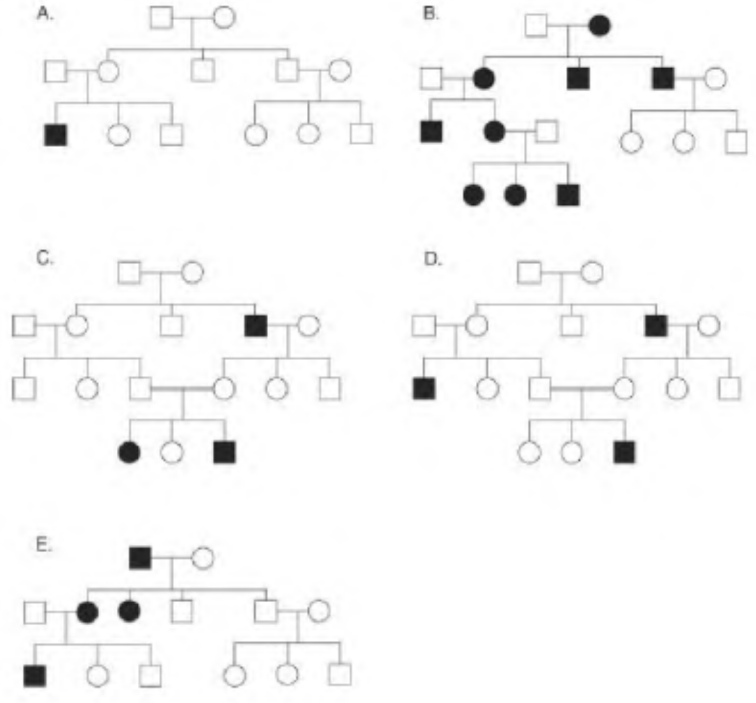
73. A 57-year-old sales representative for a biotechnology firm has a history of alcohol abuse and hyperuricemia. He attends an out-oftown conference and gorges himself on appetizers, including liver pâté, caviar, and sweetbreads before dinner. Early the following morning he develops a painful swelling in his big toe. In addition to the alcohol consumed with his meals, which other component may have contributed to this episode?
(A) Carbohydrate
(B) Cholesterol
*(C) Nucleic acid
(D) Protein
(E) Triglyceride



74. The condition shown in the family above is known to have a prevalence of 1/40,000 in the general population. Assuming the most likely interpretation of the pedigree shown, what is the probability that the proband's first daughter will be affected?
(A) 1/40,000
(B) 1/200
(C) 1/100
(D) 1/4
*(E) 1/2

75. A neonate who initially appears healthy develops vomiting, diarrhea, abdominal pain, and hypoglycemia when weaning is attempted. Other features include a generalized metabolic disturbance with lactic acidosis, hyperuricemia, and hyperphosphatemia. Hereditary fructose intolerance is confirmed with an IV fructose tolerance test, and strict dietary restriction of fructose is ordered to prevent the long-term complications of the condition. In addition to fructose, dietary intake of which of the following substances should also be restricted?
(A) Galactitol
(B) Galactose
(C) Glucose
(D) Lactose
*(E) Sucrose

76. A 10-year-old girl is admitted to the hospital because of a recurrent neurologic disorder. Her right arm and leg have become limp, and she is found to have lactic acidosis. Two months earlier, the girl had a grand mal seizure followed by cortical blindness with slow resolution. Muscle biopsy revealed ragged red muscle fibers and abnormal mitochondria. Which of the following pedigrees is most likely related to her disease? *(B)



77. In the citric acid cycle, succinate thiokinase (succinyl-CoA synthetase) catalyzes the cleavage of the succinyl-CoA thioester bond with formation of a high-energy compound. This compound can then be used by the body in which of the following biochemical pathways?
(A) Cysteine degradation
*(B) Elongation of the polypeptide chain
(C) Epinephrine synthesis from tyrosine
(D) Isopentyl pyrophosphate synthesis
(E) Oxidative phosphorylation

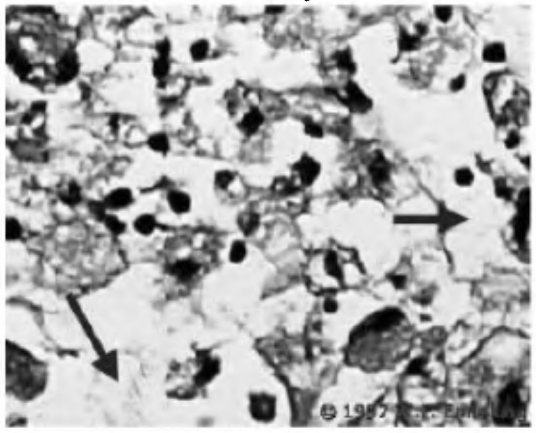
78. A 5-year-old boy with growth retardation and mild mental retardation has an enlarged thyroid. His serum thyroid-stimulating hormone (TSH) level is 4.3 mU/L (normal: 0.1–4.0 mU/L), and his serum thyroglobulin level is <15 pmol/L (normal: 15–50 pmol/L). A biopsy of the thyroid stained with antithyroglobulin antibodies reveals accumulation of thyroglobulin in the rough endoplasmic reticulum. Which of the following underlying defects is most likely in this boy?
(A) A TSH receptor defect
(B) Failure to phosphorylate mannose attached to thyroglobulin
(C) Loss of function mutation in the DNA encoding the hydrophobic signal sequence on thyroglobulin
(D) Loss of function mutation in the ubiquitin gene
*(E) Thyroglobulin monomer misfolding and failure of subunit assembly

79. A 72-year-old man presents to the hospital with a several week history of fatigue. Physical examination is remarkable for severe pallor. Neurologic examination reveals poor short-term memory and decreased vibration sense in his legs. An ECG shows changes consistent with the presence of cardiac ischemia. The hemoglobin level is 4.1 g/dL, with a mean corpuscular volume of 105 μm3, a white-cell count of 3100 per mm3, and a platelet count of 55,000 per mm3. The peripheral blood smear shows hypersegmentation of neutrophils, marked anisocytosis, poikilocytosis with some large oval erythrocytes, and basophilic stippling. Which of the following metabolic responses is most specific for the vitamin deficiency affecting this patient?
(A) Decreased blood δ-aminolevulinic acid (ALA)
(B) Decreased transketolase activity in erythrocytes
(C) Decreased urinary homocysteine
*(D) Increased urinary methylmalonate (MMA)
(E) Lactic acidosis

80. A 22-year-old woman with anorexia nervosa is seen in a specialty clinic that deals with eating disorders. A nutritional nurse estimates the content of the woman's regular diet. She is consuming about 125 g carbohydrate, 15 g protein, and 10 g fat daily. Her daily caloric intake is roughly equal to which of the following values?
(A) 450 kcal/day
*(B) 650 kcal/day
(C) 850 kcal/day
(D) 1050 kcal/day
(E) 1250 kcal/day

81. A scientist exposes a culture of a bacterium with minimal nutritional requirements to a chemical mutagen, then streaks out the bacteria on plates filled with a complex medium supplemented with all necessary nutrients. When the bacteria begin growing, she isolates individual colonies and tests each one for the ability to grow on a minimal medium. Cells derived from colonies unable to grow on a minimal medium are considered mutants, and their genome is sequenced. In one case, she finds that a two-nucleotide segment of DNA has been deleted. This event would most likely give rise to a
(A) conservative mutation
*(B) frameshift mutation
(C) missense mutation
(D) nonsense mutation
(E) silent mutation

82. An 8-year-old girl with a history of progressive hepatosplenomegaly and epistaxis was admitted to the hospital with severe pain in her right thigh of 3 days' duration. A similar episode occurred 5 months earlier. There is no family history of these symptoms, and her two siblings are unaffected. A CT scan reveals flaring of the right distal femur. Results of a neurologic examination are normal. A bone marrow biopsy demonstrates the cells characteristic of her disease (shown below). What is the material accumulating abnormally in these cells most likely to be?



(A) Cholesterol esters
(B) Dermatan sulfate
(C) Fatty acyl carnitines
*(D) Glucocerebroside
(E) Sphingomyelin

83. A female infant (46,XX) with ambiguous genitalia and hyperkalemia is diagnosed with 21-hydroxylase deficiency. The adrenal hormones that cannot be synthesized in this patient
normally bind to receptors with which of the following characteristics?
(A) Guanylate cyclase activity
(B) Helix-loop-helix motif with dyad symmetry
(C) Seven transmembrane helices
(D) Tyrosine kinase activity
*(E) Zinc finger motif

84. An 83-year-old man is brought to the physician because of diarrhea and vomiting for the past month. He is unable to give a clear history, but his daughter reports that he has been

"quite sad" lately and often seems very confused. His diet consists of dried cereal and maize; he never eats milk or eggs. Physical examination shows sharply demarcated plaques on his hands, feet, and around his neck. Which of the following amino acids can substitute for a portion of the vitamin deficient in this patient?
(A) Alanine
(B) Asparagine
(C) Methionine
(D) Proline
*(E) Tryptophan

85. Examination of a late aborted fetus reveals a small head, small eyes, prominent cleft lip and palate, six fingers on each hand, and dextrocardia. The developmental abnormalities noted in this fetus were probably due to
(A) 5p-
(B) 45, XO
*(C) trisomy 13
(D) trisomy 18
(E) trisomy 21

86. A patient has a past medical history significant for multiple infections involving the lungs, liver, and bones, as well as excessive inflammation with granulomas, gingivitis, aphthous ulcers, and seborrheic dermatitis. This patient most likely has a deficiency of which of the following enzymes?
(A) Muscle glycogen phosphorylase
(B) Myeloperoxidase
*(C) NADPH oxidase
(D) Transketolase
(E) Xanthine oxidase

87. A 50-year-old man was admitted into the hospital of a leading research university with a diagnosis of hepatitis and early cirrhosis of the liver. His past medical history is significant for heavy smoking and only occasional consumption of alcohol. He did not use any drugs, and he had no viral infections. DNA studies showed that he was homozygous for the Z allele of α1-antitrypsin, produced by a missense mutation that prevents the proper folding of the protein. A liver biopsy would most likely show accumulation of a proteinaceous substance in which of the following subcellular sites?
*(A) Endoplasmic reticulum
(B) Extracellular matrix
(C) Golgi apparatus
(D) Inclusion bodies
(E) Lysosomes

88. A 20-year-old develops weakness accompanied by difficulty in relaxation that is most pronounced in the hands and feet. Muscle biopsy demonstrates prominent ring fibers, centrally located nuclei, chains of nuclei, and disorganized sarcoplasmic masses. This condition has been associated with a mutation on which of the following chromosomes?
(A) X
(B) Y
(C) 4

(D) 5
*(E) 19

89. A woman whose brother has cystic fibrosis seeks genetic counseling. She is told that she, her brother, and other family members can be tested for the common mutations known to cause this disease. DNA is obtained from her brother, and the relevant regions of the CFTR gene are amplified using a polymerase chain reaction (PCR). The DNA polymerase used in the PCR is highly resistant to which of the following?
(A) Acid
(B) Base
*(C) Heat
(D) High Na+ concentration
(E) Low Ca2+ concentration

90. In a certain population, the frequency of color-blind males is 1 in 100. Assuming that the population is in Hardy-Weinberg equilibrium at this locus, the frequency of color-blind females is approximately
*(A) 0.0001
(B) 0.0005
(C) 0.01
(D) 0.02
(E) 0.025

91. A young woman is doing intense aerobic exercise. Aerobic glycolysis is being used for the source of energy for the muscle activity. In which of the following forms will the carbons derived from glucose enter the citric acid cycle?
*(A) Acetyl-CoA
(B) Citrate
(C) Oxaloacetate
(D) Pyruvate
(E) Succinate

92. An X-linked genetic disease affects a cation-transporting P-type ATPase, resulting in accumulation of copper in the intestinal epithelium because of failure to transport it normally into the blood. Infants with this disease have only 10% of normal blood copper levels. Arteriograms show elongation and tortuosity of major arteries. Bladder diverticula and subdural hematomas are also characteristic findings. These symptoms would most likely be caused by decreased activity of which of the following enzymes?
(A) Cytochrome aa3
*(B) Lysyl oxidase
(C) Prolyl hydroxylase
(D) Tyrosinase
(E) γ-Glutamyl carboxylase

93. An Olympic runner participates in a 100-meter race. During this race, it is estimated that only ½ L oxygen will be consumed by the runner. However, more than 10 L oxygen would be consumed if the metabolism in this interval were entirely aerobic. The majority of ATP generated during this 100-meter race is derived from which of the following?
(A) ATP stores
(B) Creatine phosphate

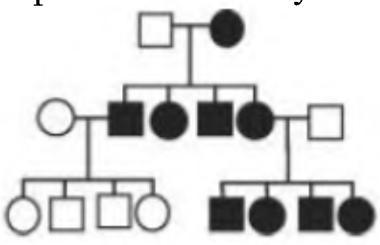
(C) Gluconeogenesis
*(D) Glycolysis
(E) Lipolysis

94. A 57-year-old man with type 1 diabetes mellitus has progressive retinopathy. Ophthalmoscopic examination reveals macular edema and retinal thickening with hard exudates of yellow-white lipid deposits. Which of the following contributes to hyperlipidemia in type 1 diabetes, and thus the risk for lipid deposition in the retina?
(A) Glucose conversion to sorbitol in the lens
(B) Overactive GLUT-2 in liver
(C) Overactive GLUT-4 in adipose
*(D) Overactive hormone-sensitive lipase
(E) Overactive lipoprotein lipase

95. A 34-year old woman presents to her physician complaining of oral ulcers. A careful history reveals that she is a strict vegetarian and does not eat meat, fish, poultry, eggs, or dairy products. She is found to have a severe riboflavin deficiency. The function of which of the following enzymes in the citric acid cycle would be most directly affected by the riboflavin deficiency?
(A) Aconitase
(B) Citrate synthase
(C) Isocitrate dehydrogenase
(D) Malate dehydrogenase
*(E) Succinate dehydrogenase

96. A 23-year-old, HIV-positive woman is treated with dideoxycytidine as part of her antiviral therapy. This drug works by preventing which of the following?
(A) Addition of nucleotides to RNA during transcription of proviral cDNA
(B) Formation of a peptide bond during translation of viral proteins
*(C) Formation of a phosphodiester bond during viral DNA synthesis
(D) Hydrolysis of a peptide bond during posttranslational modification of viral proteins
(E) Viral RNA processing by nucleases

97. A 35-year-old woman and her husband seek genetic counseling before attempting to conceive. The woman suffers from a particular condition and wants to know the chances that her child will be affected. The pedigree is shown below. Based on the mode of inheritance, this patient most likely suffers from which of the following diseases?



(A) Glucose-6-phosphate dehydrogenase deficiency
*(B) Leber hereditary optic neuropathy
(C) Neurofibromatosis
(D) Sickle cell anemia
(E) Tay-Sachs disease

98. A mother is informed that her daughter has an inherited disorder in which the administration of a "sugar-free" product that contains aspartame could be detrimental to her health. This patient most likely has which of the following genetic disorders?
(A) Hyperornithinemia
(B) Hyperuricemia
(C) Hypervalinemia
*(D) Phenylketonuria
(E) Wilson disease

99. A 45-year-old man with a confirmed diagnosis of hemachromatosis tests negative for the two most common mutations in the HFE gene known to cause this disease. The patient and several family members, including an affected brother and uncle, are tested for 5 single nucleotide polymorphisms (SNPs) closely linked to the HFE gene on chromosome 6. No linkage is found in this family to any of these markers. What is the most likely explanation for these results?
(A) Heteroplasmy
(B) Incomplete penetrance
*(C) Locus heterogeneity
(D) Recombination between the SNPs and the HFE gene
(E) A rare HFE allele

100. Concerned parents bring their 3-month-old boy to the physician because of a "white dot" on his left eye that they noticed in pictures. Examination reveals a white pupillary reflex in the left eye. A CT scan of the orbits reveals a tumor in the left eye that does not involve the optic nerve. This condition is associated with an abnormality in which of the following chromosomes?
(A) 5
(B) 8
*(C) 13
(D) 21
(E) X