

**Taras Shevchenko National University of Kyiv
The Institute of Biology and Medicine**

**THE TEST BASE
for the preparation of the exam
on discipline “Biological and bioorganic chemistry”
(2nd semester)
for the students of a 2nd course
with English of educating**

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It is ratified to printing by meeting of scientific advice of The Institute of Biology and Medicine (“___” _____ 2018, protocol №___)

Kyiv-2018

1. Cyanide is a poison that causes instant death of the organism. What enzymes found in mitochondria are affected by cyanide?

- A. Flavin enzymes
- B. Cytochrome oxidase (aa3)
- C. Cytochrome b5
- D. NAD-dependent dehydrogenase
- E. Cytochrome P-450

2. 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

3. The central intermediate which is common for the catabolic pathways of proteins, carbohydrates and lipids is:

- A. Succinyl-CoA.
- B. Oxaloacetate.
- C. Lactate.
- D. Acetyl-CoA.
- E. Citrate.

4. 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. Malate dehydrogenase.
- B. Heme synthase.
- C. Cytochrome oxidase.
- D. Aspartate aminotransferase.
- E. Carbamoyl phosphate synthetase.

5. Pain along large nervous stems and increased amount of pyruvate in the blood were revealed in the patient. Insufficiency of which vitamin can cause such change?

- A. B2.
- B. PP.
- C. Pantothenic acid.
- D. Biotin
- E. B1.

6. 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. Histamine.
- B. Serotonin.
- C. DOPA.
- D. GABA.
- E. Dopamine.

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

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

8. In case of enterobiasis acridine - the structural analogue of vitamin B2 - is administered. The disorder of the synthesis of which enzymes does this medicine cause in microorganisms?

- A. Cytochrome oxidases.
- B. Peptidases.
- C. NAD-dependet dehydrogenases.
- D. FAD-dependent dehydrogenases.
- E. Aminotransferases.

9. A 10-year-old girl often experiences acute respiratory infections with multiple spotty haemorrhages in the places of clothes friction. Hypovitaminosis of which vitamin is present at the girl?

- A. B6.
- B. B1.
- C. C.
- D. A.
- E. B2.

10. Hydroxylation of endogenous substrates and xenobiotics requires a donor of protons. Which of the following vitamins can play this role?

- A. Vitamin P.
- B. Vitamin B6.
- C. Vitamin E.
- D. Vitamin A.
- E. Vitamin C.

11. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of

collagen fibers. Which vitamin absence caused disturbance of their hydroxylation?

- A. Vitamin C.
- B. Vitamin K.
- C. Vitamin A.
- D. Thiamine.
- E. Vitamin E.

12. 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. E.
- B. K.
- C. C.
- D. A.
- E. D.

13. 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. Which vitamin deficiency is the most evident?

- A. Calciferol.
- B. Folic acid.
- C. Biotin.
- D. Nicotinamide.
- E. Tocopherol.

14. Examination of a child who hasn't got fresh fruit and vegetables during winter revealed numerous subcutaneous hemorrhages, gingivitis, carious cavities in teeth. Which vitamin combination should be prescribed in this case?

- A. Thiamine and pyridoxine.
- B. Folic acid and cobalamin.
- C. Riboflavin and nicotinamide.
- D. Calciferol and ascorbic acid.
- E. Ascorbic acid and rutin.

15. Concentration of pyruvate is increased in the patient's blood, the most of which is excreted with urine. Which avitaminosis is observed in the patient?

- A. Avitaminosis E.
- B. Avitaminosis B1.
- C. Avitaminosis B3.
- D. Avitaminosis B6.

E. Avitaminosis B2.

16. While examining the child the doctor revealed symmetric cheeks roughness, diarrhea, disfunction of the nervous system. Lack of which food components caused it?

- A. Lysine, ascorbic acid.
- B. Threonine, pantothenic acid.
- C. Methionine, lipoic acid.
- D. Nicotinic acid, tryptophane
- E. Phenylalanine, pangamic acid.

17. 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. FAD.
- B. FMN.
- C. NAD.
- D. TDP.
- E. CoQ.

18. 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 component of the following enzyme:

- A. Pyruvate dehydrogenase.
- B. Glutamate decarboxylase.
- C. Ketoglutarate dehydrogenase.
- D. Aminolevulinatase synthase.
- E. Glycogen phosphorylase.

19. 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. Pantothenic acid.
- B. Niacin.
- C. Vitamin A.
- D. Cobalamin.
- E. Biotin.

20. Increased breaking of vessels, enamel and dentine destruction in scurvy patients are caused by disorder of collagen maturing. Which stage of modification of procollagen is disordered in this avitaminosis?

- A. Formation of polypeptide chains.
- B. Glycosylation of hydroxylysine residues.
- C. Removal of C-ended peptide from procollagen.
- D. Detaching of N-ended peptide.
- E. Hydroxylation of proline.

21. 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.
- C. Flavine adenine dinucleotide.
- D. Lipoic acid.
- E. Coenzyme A.

22. 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. Which factor is necessary for absorption of this vitamin?

- A. Gastrin.
- B. Hydrochloric acid.
- C. Pepsin.
- D. Gastromucoprotein.
- E. Folic acid.

23. Isoniazid 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. TMP.
- B. NAD.
- C. FMN.
- D. THF.
- E. CoQ.

24. Vitamin B1 deficiency results in disturbance of oxidative decarboxylation of α -ketoglutaric acid. This will disturb synthesis of the following coenzyme:

- NAD.
- FAD.
- TPP.
- THF.
- CoA.

25. Most participants of Magellan expedition to America died from avitaminosis. This disease declared itself by general weakness,

subcutaneous hemorrhages, falling of teeth, gingival hemorrhages. What is the name of this avitaminosis?

- A. Pellagra.
- B. Rachitis.
- C. Scurvy.
- D. Polyneuritis (beriberi).
- E. Biermer's anemia.

26. A patient with hypochromic anemia has splitting hair and loss of hair, increased nail brittling and taste alteration. Which is the mechanism of the development of these symptoms?

- A. Decreased production of parathyrin.
- B. Deficiency of vitamin A.
- C. Deficiency of vitamin B12.
- D. Decreased production of thyroid hormones.
- E. Deficiency of iron-containing enzymes.

27. 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.

28. 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. H.
- B. B6.
- C. B1.
- D. K.
- E. E

29. Blood test of a patient suffering from atrophic gastritis gave the following results: RBCs - $2,0 \cdot 10^{12}/l$, Hb- 87 g/l, color index - 1,3, WBCs - $4,0 \cdot 10^9/l$, thrombocytes - $180 \cdot 10^9/l$. Anemia might have been caused by the following substance deficiency:

- A. Vitamin K.
- B. Vitamin B12.
- C. Zinc.

- D. Vitamin A.
- E. Iron.

30. Removal of gall bladder of a patient has disturbed processes of Ca absorption through the intestinal wall. Which vitamin will stimulate this process?

- A. D3.
- B. PP.
- C. C.
- D. B12.
- E. K.

31. Vitamin A together with specific cytochrome receptors 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-retinal.
- B. Cis-retinal.
- C. Trans-retinoic acid.
- D. Retinol.
- E. Carotin.

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

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

33. 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 palmitic acid.
- B. Lack of linoleic acid, vitamins A, D, E, K.
- C. Lack of vitamins PP, H.
- D. Low caloric value of diet.
- E. Lack of oleic acid.

34. 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. Phosphorylation of serine radicals.

- B. Partial proteolysis.
- C. Carboxylation of glutamic acid.
- D. Polymerization.
- E. Glycosylation.

35. As a result of posttranslational modifications some proteins taking part in blood coagulation, particularly prothrombin, become capable of calcium binding. The following vitamin takes part in this process:

- A. C.
- B. A.
- C. B1.
- D. K.
- E. B2.

36. Posttranslational modifications of some proteins taking part in blood coagulation, lead to ability of calcium binding. Which vitamin takes part in this process?

- A. C.
- B. A.
- C. B1.
- D. B2.
- E. K.

37. 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. Thiamine.
- C. Pantothenic acid.
- D. Bioflavonoids.
- E. Riboflavin.

38. A doctor examined a child and revealed symptoms of rachitis. Development of this disease was caused by deficiency of the following compound:

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

39. A patient who was previously ill with mastectomy as a result of breast cancer was prescribed radiation therapy. Which vitamin preparation has marked radioprotective action caused by antioxidant activity?

- A. Thiamine chloride.
- B. Ergocalciferol.
- C. Tocopherol acetate.
- D. Folic acid.
- E. Riboflavin.

40. A patient suffers from vision impairment - hemeralopy (night blindness). Which vitamin preparation should be administered the patient in order to restore his vision?

- A. Pyridoxine.
- B. Thiamine chloride.
- C. Vicasol.
- D. Retinol acetate.
- E. Tocopherol acetate.

41. A patient underwent an operation on account of gall bladder excision that resulted in obstruction of Ca absorption through the bowels wall. Which vitamin will stimulate this process?

- A. B12.
- B. K.
- C. PP.
- D. C.
- E. D3.

42. A 64 year old woman has impairment of twilight vision (hemeralopy). Which vitamin should be recommended in the first place?

- A. Vitamin A.
- B. Vitamin E.
- C. Vitamin C.
- D. Vitamin B6.
- E. Vitamin B2.

43. The obstruction of Ca absorption through the bowels wall resulted after the operation on account of gall bladder. What vitamin will stimulate this process?

- A. Cobalamine.
- B. Niacine.
- C. Folic acid.
- D. Riboflavine.
- E. Cholecalciferol.

44. 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. Fibrinogen deficiency

- B. Vitamin K deficiency
- C. Hypocalcemia
- D. Activation of tissue thromboplastin
- E. PP hypovitaminosis

45. 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

46. 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. 25OH-D3
- B. D3
- C. D2
- D. 1,25(OH)₂D3
- E. Cholesterol

47. Pediatricist has examined the baby after an epileptiform fit, which receives artificial feeding. The baby has dermatitis also. At laboratory inspection decrease alanine- and aspartate aminotransferases activities of erythrocytes is established. Which vitamin deficiency can be assumed?

- A. Ascorbic acid
- B. Cobalamin
- C. Riboflavin
- D. Calciferol
- E. Pyridoxine

48. To the pregnant woman, which had in the anamnesis some stillborn foetus, the therapy is prescribed which contains vitamins. Indicate vitamin, which promotes carrying of a pregnancy.

- A. Folic acid.
- B. Cyanocobalamin
- C. Alfa-tocopherol.
- D. Pyridoxal phosphate
- E. Rutin.

49. Patients complained of the general weakness and a bleeding from gum. Insufficiency of which vitamin can be assumed?

- A. Vitamin E

- B. Vitamin PP
- C. Vitamin D
- D. Vitamin B1
- E. Vitamin C

50. At inspection of the patient dermatitis, diarrhea, dementia are revealed. The absence of which vitamin is the reason of this condition?

- A. Ascorbic acid.
- B. Folic acid.
- C. Biotin.
- D. Nicotinamide.
- E. Rutin.

51. 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 tyrosine in corn.
- B. Deficiency of proline in corn
- C. Deficiency of tryptophan in corn
- D. Deficiency of alanine in corn
- E. Deficiency of histidine in corn

52. At the patient after removal of a gall-bladder process of Ca intestinal absorption through a wall of intestines is complicated. Which vitamin will stimulate this process?

- A. Vitamin D3
- B. Vitamin PP
- C. Vitamin C
- D. Vitamin B12
- E. Vitamin K

53. Institute of gerontology advises to people of old age to use a complex of vitamins which contains vitamin E. What main function it carries out?

- A. Antihemorrhagic.
- B. Antioxidant.
- C. Antiscorbutic.
- D. Antineuritis.
- E. Antidermatitis.

54. Doctor-dietician advises the patient during treatment of the pernicious anemia to use in a diet a half-baked liver. The presence of which vitamin in this product promotes treatment of an anemia?

- A. Vitamin B1
- B. Vitamin B12.
- C. Vitamin B2.

- D. Vitamin C
- E. Vitamin H.

55. 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 B
- B. Vitamin C
- C. Vitamin D
- D. Vitamin A
- E. Vitamin B12

56. 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. C
- B. P
- C. B12
- D. B6
- E. PP

57. To patient with recurrent thromboembolism, artificial anticoagulant pelentan is appointed. What vitamin antagonist is it?

- A. Vitamin E
- B. Vitamin K
- C. Vitamin A
- D. Vitamin D
- E. Vitamin C

58. At the patient of 43 years with chronic atrophic gastritis, megaloblastic anemia observes. Urinalysis shows increasing of methylmalonic acid. Which type of hypovitaminosis occurrence of the specified infringement caused?

- A. Vitamin B2
- B. Vitamin B3
- C. Vitamin B5
- D. Vitamin B12
- E. Vitamin B1

59. For diagnostics of some diseases activity of the transaminases in the blood is defined. Which vitamin is a cofactor part of these enzymes?

- A. B2
- B. B1
- C. B8
- D. B5

E. B6

60. 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

61. Hepatic dysfunctions accompanied by insufficient inflow of bile to the bowels result in coagulation failure. This phenomenon can be explained by:

- A. Iron deficiency
- B. Vitamin K deficiency.
- C. Thrombocytopenia
- D. Erythropenia
- E. Leukopenia

62. A patient has increased permeability of blood-vessel walls, increased gingival hemorrhage, small punctate hematomas on his skin, falling of teeth. What disturbance of vitamin metabolism can account for these symptoms?

- A. Hypervitaminosis D
- B. Hypervitaminosis C
- C. Hypovitaminosis D
- D. Hypovitaminosis C.
- E. Hypovitaminosis A

63. A patient has the following 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

64. Preoperative examination revealed prothrombin deficiency in the blood of the patient. What drug should be preliminarily prescribed to mitigate blood loss in the patient during the surgery?

- A. Thrombin
- B. Aminocapronic acid
- C. Vicasol (Menadione)

- D. Phenylin (Phenindione)
- E. Contrykal (Aprotinin)

65. 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 C
- B. Vitamin B1
- C. Vitamin B2
- D. Vitamin B12
- E. Vitamin PP

66. One of the causes of pernicious anemia is disturbed synthesis of transcobalamin - Castle's intrinsic factor - by the parietal cells of the stomach.

Which substance is called Castle's extrinsic factor?

- A. Folic acid
- B. Cobalamin
- C. Pyridoxine
- D. Riboflavin
- E. Biotin

67. Researchers isolated 5 isoenzymic forms of lactate dehydrogenase from the human blood serum and studied their properties. Which property indicates that the isoenzymic forms were isolated from the same enzyme?

- A. The same molecular weight.
- B. The same physico-chemical properties.
- C. Tissue localization.
- D. The same electrophoretic mobility.
- E. Catalyzation of the same reaction.**

68. Profuse foam appeared when dentist put hydrogen peroxide on the mucous of the oral cavity. Which enzyme caused such activity?

- A. Catalase.
- B. Cholinesterase.
- C. Acetyltransferase.
- D. Glucose-6-phosphate dehydrogenase.
- E. Methemoglobin reductase.

69. 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. Lactate dehydrogenase.
- B. Creatine phosphokinase.

- C. Pyruvate dehydrogenase.
- D. Glutamate dehydrogenase.
- E. Adenylate cyclase.

70. A patient presents high activity of LDH_{1,2}, aspartate aminotransferase, creatine phosphokinase. In which 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.

71. Marked increase of activity of MB-forms of CPK (creatin phosphokinase) and LDH-1 were revealed on the examination of the patient's blood. What is the most likely pathology?

- A. Hepatitis.
- B. Rheumatism.
- C. Pncreatitis.
- D. Cholecystitis.
- E. Myocardium infarction.

72. 12 hours after an acute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. Which pathology is this deviation typical for?

- A. Viral hepatitis.
- B. Myocardium infarction.
- C. Collagenosis.
- D. Diabetes mellitus.
- E. Diabetes insipidus.

73. 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. Which disease are these symptoms typical for?

- A. Acute pancreatitis.
- B. Stenocardia.
- C. Cholelithiasis.
- D. Diabetes mellitus.
- E. Acute myocardium infarction.

74. Desulfiram is widely used in medical practice to prevent alcoholism. It inhibits aldehyde dehydrogenase. Increased level of which metabolite causes aversion to alcohol?

- A. Acetaldehyde.
- B. Methanol.
- C. Malonyl aldehyde.
- D. Ethanol.
- E. Propionic aldehyde.

75. There are several groups of molecular mechanisms playing important part in pathogenesis of insult to cells which contributes to the pathology development. Which process is stimulated by mechanisms of protein damage?

- A. Acidosis.
- B. Phospholipase activation.
- C. Enzyme inhibition.
- D. Osmotic membrane distension.
- E. Lipid peroxidation.

76. A 30-year-old male patient with acute pancreatitis has been found to have a disorder of digestion of protein in the gut cavity. The reason for such condition can be the hyposynthesis and hyposecretion of the following enzyme:

- A. Dipeptidase.
- B. Amylase.
- C. Trypsin.
- D. Pepsin.
- E. Lipase.

77. At the patient with an 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. Pepsin
- B. Dipeptidase
- C. Saccharase
- D. Alfa-amylase
- E. Lactase

78. The patient has the diagnosis of beriberi. What enzyme activity is broken at the patient?

- A. Citrate synthase
- B. Malate dehydrogenase
- C. Succinate dehydrogenase
- D. Fumarase
- E. Pyruvate dehydrogenase

79. 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. Methylcobalamin
- D. Pyridoxal phosphate
- E. Tetrahydrofolate

80. 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. Pseudocholinesterase
- B. Glucose-6-phosphate dehydrogenase
- C. Catalase.
- D. Acetyltransferase
- E. Methemoglobin reductase

81. 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. ADP-ribosylation
- B. Methylation
- C. Phosphorylation-dephosphorylation.
- D. Hydrolysis
- E. Sulfonation

82. 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

83. Malaria is treated with structural analogs of vitamin B2 (riboflavin). These drugs disrupt the synthesis of the following enzymes in plasmodium:

- A. Cytochrome oxidase
- B. Peptidase
- C. FAD-dependent dehydrogenase
- D. NAD-dependent dehydrogenase
- E. Aminotransferase

84. 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 deactivated?

- A. Catalase
- B. Peroxidase
- C. Glutathioneperoxidase
- D. Glutathionereductase
- E. Superoxide dismutase

85. The living organisms that did develop the system of defence against the unfavorable action of H_2O_2 during the evolution can exist only in anaerobic conditions. Which of the enzymes can destroy hydrogen peroxide?

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

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. Anaerobic glycolysis
- B. Aerobic glycolysis
- C. Lipolysis
- D. Gluconeogenesis
- E. Glycogen biosynthesis

87. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of which acid substance to the blood can this state be explained?

- A. Pyruvate
- B. 1,3-bisphosphoglycerate
- C. α -ketoglutarate
- D. Lactate
- E. 3-phosphoglycerate

88. As a result of exhausting muscular work a worker has largely reduced buffer capacity of blood. Which acidic substance that came to blood caused this phenomenon?

- A. Pyruvate
- B. Lactate
- C. 1,3-bisphosphoglycerate
- D. 3-phosphoglycerate

E. -

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

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

90. A child has got galactosemia. Concentration of glucose in blood has not considerably changed. Deficiency of which enzyme caused this illness?

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

91. 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

92. A nontrained man has usually muscular hypoxia after a sprint. Which metabolite accumulates in the muscles as a result of it?

- A. Ketone bodies
- B. Glucose-6-phosphate
- C. Oxaloacetate
- D. Lactate
- E. -

93. Chronic overdosage of glucocorticoids leads to the development of hyperglycemia. Which process of carbohydrate metabolism is responsible for this effect?

- A. Glycogenolysis
- B. Aerobic glycolysis
- C. Pentose-phosphate cycle
- D. Gluconeogenesis
- E. Glycogenesis

94. 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

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

96. 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. Pentose Phosphate Pathway
- B. Gluconeogenesis
- C. Aerobic glycolysis
- D. Anaerobic glycolysis
- E. Glucose alanine cycle

97. A 22 year old woman has been taking sulfanilamides for a long time that led to symptoms of hemolytic anemia caused by hereditary disturbance of synthesis of glucose-6-phosphate dehydrogenase. This enzyme of pentose phosphate cycle is responsible for generation of:

- A. NADPH
- B. NAD
- C. FAD
- D. FMN
- E. ATP

98. It has been revealed that intense physical exercise causes activation of gluconeogenesis in liver of experimental rats. Which substance is glucose precursor in this case?

- A. Glycogen
- B. Urea
- C. Stearate

- D. Palmitate
- E. Pyruvate

99. It is known that the pentose phosphate pathway that occurs in the adipocytes of adipose tissue acts as a cycle. Which is the main function of this cycle in the adipose tissue?

- A. Xenobiotic detoxification
- B. Energy generation
- C. Glucose oxidation to end products
- D. Ribose-phosphate production
- E. NADPH generation

100. A blood sample is taken from a 40-year-old man has been fasting completely for a week, drinking only water. Which of the following will be at a higher concentration than after a normal overnight fast?

- A. Glucose
- B. Insulin
- C. Ketone bodies
- D. Nonesterified fatty acids
- E. Triacylglycerol

101. A 25-year-old man visits his hospital complaining of abdominal cramps and diarrhea after drinking milk. What is the most likely cause of his problem?

- A. Bacterial and yeast overgrowth in the large intestine
- B. Infection with the intestinal parasite *Giardia lamblia*
- C. Lack of small intestinal lactase
- D. Lack of pancreatic amylase
- E. Lack of small intestinal sucrase-isomaltase

102. Which of the following will provide the main fuel for muscle contraction during short-term maximum exertion?

- A. Muscle reserves of triacylglycerol
- B. Plasma glucose
- C. Plasma nonesterified fatty acids
- D. Muscle glycogen
- E. Triacylglycerol in plasma very low density lipoprotein

103. 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

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

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

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

106. A patient is ill with diabetes mellitus that is accompanied by hyperglycemia of over 7,2 mmol/l on an empty stomach. The level of what blood plasma protein allows estimating the glycemia rate retrospectively (4-8 weeks before examination)?

- A. Albumin
- B. Fibrinogen
- C. C-reactive protein
- D. Glycated hemoglobin
- E. Ceruloplasmin

107. 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

108. 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 fibrinogen decrease
- B. The content of sugar increases
- C. The level of sugar decreases
- D. The content of globulins decreases

E. The content of albumins decreases

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

110. 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 mmol/l, urine glucose - 3,5% . What is the most probable diagnosis?

- A. Hypoglycemic coma
- B. Acute heart failure
- C. Acute alcoholic intoxication
- D. Hyperglycemic coma
- E. Anaphylactic shock

111. Patient with diabetes mellitus experienced loss of consciousness and convulsions after injection of insulin. Which is the result of biochemical blood analysis for concentration of the sugar?

- A. 8,0 mmol/L
- B. 10,0 mmol/L
- C. 3,3 mmol/L
- D. 5,5 mmol/L
- E. 1,5 mmol/L

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

113. 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 alfa-1,4- glucosidase
- E. Deficit of glucose 1-phosphaturidine transferase

114. After a sprint an untrained person develops muscle hypoxia. This leads to the accumulation of the following metabolite in muscles:

- A. Ketone bodies
- B. Lactate
- C. Acetyl CoA
- D. Glucose-6-phosphate
- E. Oxaloacetate

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

116. 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. Glycogenolysis
- B. Glucose reabsorption
- C. Gluconeogenesis
- D. Glucose transport to the cell
- E. Glycolysis

117. 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. Insulin-dependent diabetes mellitus
- B. Myxoedema
- C. Type I glycogenosis
- D. Steroid diabetes
- E. Addison's disease

118. 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. Invertase
- B. Maltase

- C. Lactase
- D. Amylase
- E. Isomaltase

119. 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. Ubiquinone
- B. FADH₂
- C. Pyridoxal phosphate
- D. FMNH₂
- E. NADPH

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

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

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

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

122. Some hours after an intensive physical training a sportsman showed activated gluconeogenesis. Which of the following is the basic substrate of gluconeogenesis?

- A. Serine
- B. Lactate
- C. Aspartate
- D. Glutamate
- E. α -Ketoglutarate

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

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

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

- A. Glucose
- B. Galactose
- C. Fructose
- D. Maltose
- E. Saccharose

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

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

126. 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. Hyperglycemia
- C. Dehydration of tissues
- D. Metabolic acidosis
- E. Ketonemia

127. 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. Deamination of amino acid
- B. Oxidative phosphorylation
- C. Tissue respiration

- D. Breaking up of peroxides
- E. Anaerobic glycolysis

128. A 45-year-old woman does not have any symptoms of insulin dependent diabetes mellitus 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
- B. Determination of tolerance to glucose on an empty stomach
- C. Determination of ketone bodies concentration in the urine
- D. Determination of rest nitrogen level in the blood
- E. Determination of glycosylated hemoglobin level

129. What biochemical process is stimulated in the liver and kidneys of a patient exhausted by starvation?

- A. Synthesis of bilirubin
- B. Gluconeogenesis
- C. Synthesis of urea
- D. Formation of hippuric acid
- E. Synthesis of uric acid

130. 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. Brain
- B. Lungs
- C. Muscles
- D. Liver
- E. Stomach

131. 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. Proteins
- B. Fats
- C. Carbohydrates and fats
- D. Carbohydrates
- E. Carbohydrates and proteins

132. 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

133. 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. Amyloid-1,6-glycosidase
- B. Phosphoglucomutase
- C. Glucose-6-phosphatase
- D. Glycogen phosphorylase
- E. Glucokinase

134. Which of the following is NOT a hemoprotein?

- A. Albumin
- B. Myoglobin
- C. Cytochrome c
- D. Catalase
- E. Cytochrome P450

135. A 30-year-old man presented at clinic with a history of intermittent abdominal pain and episodes of confusion and psychiatric problems. Laboratory tests revealed increases of urinary δ -aminolevulinate and porphobilinogen. Mutational analysis revealed a mutation in the gene for uroporphyrinogen I synthase (porphobilinogen deaminase). The probable diagnosis was:

- A. X-linked sideroblastic anemia.
- B. Congenital erythropoietic porphyria.
- C. Porphyria cutanea tarda.
- D. Variegate porphyria.
- E. Acute intermittent porphyria.

136. Select the one of the following statements that is NOT CORRECT:

- A. Bilirubin is a cyclic tetrapyrrole.
- B. Albumin-bound bilirubin is transported to the liver.
- C. High levels of bilirubin can cause damage to the brains of newborn infants.
- D. Bilirubin contains methyl and vinyl groups.
- E. Bilirubin does not contain iron.

137. Patient with encephalopathy was admitted to the neurological inpatient department. Correlation of increasing of encephalopathy and substances absorbed by the bloodstream from the intestines was revealed. Which substances that are created in the intestines can cause endotoxemia?

- A. Butyrate

- B. Indole
- C. Acetacetate
- D. Biotin
- E. Ornithine

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

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

139. 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 globulins
- B. Reduced synthesis of hemoglobin
- C. Reduced synthesis of lipoproteins
- D. Reduced synthesis of albumins
- E. Reduced synthesis of glycoproteins

140. The concentration of albumins in human blood sample is lower than normal. This leads to edema of tissues. Which 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

141. Ammonia is a very toxic substance, especially for nervous system. Which substance takes the most active part in ammonia detoxication in brain tissues?

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

142. 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

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

- A. Galactose
- B. Methionine
- C. Cholesterine
- D. Tryptophane
- E. Tyrosine

144. 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 alterations are typical for the following pathology of the amino acid metabolism:

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

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

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

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

147. Albinos can't stand sun impact - they don't acquire sun-tan but get sunburns. Disturbed metabolism of which amino acid underlies this phenomenon?

- A. Phenylalanine
- B. Methionine
- C. Tryptophan
- D. Glutamic acid
- E. Histidine

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

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

149. In course of histidine catabolism a biogenic amine is formed that has powerful vasodilatory effect. Name it:

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

150. 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 tryptophan amino acid. What biochemical mechanism underlies this process?

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

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

- A. Methylation
- B. Decarboxylation
- C. Phosphorylation
- D. Isomerization
- E. Deamination

152. 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

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

154. A newborn child was found to have reduced intensity of sucking, frequent vomiting, hypotonia. In urine and blood exhibit increased concentration of citrulline. Which metabolic process is disturbed?

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

155. 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 gamma-carboxylation of protein factors of blood coagulation due to the increased affinity of their molecules with calcium ions. Which amino acid is carboxylated in these proteins?

- A. Glutamate
- B. Valine
- C. Serine
- D. Phenylalanine
- E. Arginine

156. Pharmacological effects of antidepressants are connected with inhibition of an enzyme catalyzing biogenic amines noradrenaline and serotonin in the mitochondrion of cerebral neurons. Which enzyme participates in this process?

- A. Transaminase

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

157. 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. Pyridoxal kinase
- B. Alanine aminotransferase
- C. Glutamate decarboxylase
- D. Glutamate dehydrogenase
- E. Glutamate synthetase

158. A child has an acute renal failure. Which biochemical factor found in saliva can confirm this diagnosis?

- A. Increase in glucose concentration.
- B. Increase in urea concentration.
- C. Decrease in glucose concentration.
- D. Increase in concentration of higher fatty acids.
- E. Decrease in nucleic acid concentration.

159. After severe viral hepatitis a 4 year old boy presents with vomiting, occasional loss of consciousness, convulsions. Blood test revealed hyperammonemia. 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.

160. 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 hyperammonemia. Disturbance of which biochemical process causes such pathological condition of the patient?

- A. Disturbed neutralization of biogenic amines.
- B. Disturbed neutralization of ammonia in liver.
- C. Increased putrefaction of proteins in bowels.
- D. Activation of amino acid decarboxylation.
- E. Inhibition of transamination enzymes.

161. Cerebral trauma caused increase of ammonia formation. Which amino acid takes part in removal of ammonia from cerebral tissue?

- A. Tryptophan.
- B. Lysine.
- C. Glutamic acid.
- D. Valine.
- E. Tyrosine.

162. A patient presents with dysfunction of cerebral cortex accompanied by epileptic seizures. He has been administered a biogenic amine synthesized from glutamate and responsible for central inhibition. What substance is it?

- A. Serotonin.
- B. Dopamine.
- C. Acetylcholine.
- D. Histamine.
- E. Gamma-amino butyric acid.

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

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

164. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine test. What compound will confirm this diagnosis if found in urine?

- A. Collagen.
- B. Creatine.
- C. Porphyrin.
- D. Myoglobin.
- E. Calmodulin.

165. According to clinical indications a patient was administered pyridoxal phosphate. Which processes is this medication intended to correct?

- A. Transamination and decarboxylation of amino acids.
- B. Oxidative decarboxylation of keto acids.
- C. Desamination of purine nucleotides.
- D. Synthesis of purine and pyrimidine bases.
- E. Protein synthesis.

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

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

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

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

168. 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. Lipid metabolism.
- B. Carbohydrate metabolism.
- C. Amino acid metabolism.
- D. Water-salt metabolism.
- E. Phosphoric calcium metabolism.

169. 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.

170. 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. Phenylketonuria.
- B. Alkaptonuria.

- C. Cystitis.
- D. Cystinuria.
- E. Hartnup's disease.

171. 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

172. Glycogenous amino acids belong to those that are transformed into:

- A. Acetyl-CoA
- B. Acetoacetate
- C. Glycerin
- D. Glucuronic acid
- E. Pyruvic acid

173. A patient suffers hyperammonemia. Name the enzyme which decrease activity is the reason for this condition

- A. Creatine phosphokinase of the skeletal muscle
- B. Aspartate aminotransferase of the myocardium
- C. Alanine aminotransferase of the liver
- D. Leucine aminopeptidase of the liver
- E. Ornithine carbomoyl phosphate transferase of the liver

174. 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

175. Name the amino acid which participates in heme synthesis:

- A. Serine
- B. Glycine
- C. Alanine
- D. threonine
- E. Valine

176. Which amino acid participates in toxic substances deactivation in the liver?

- A. Serine
- B. Threonine
- C. Tryptophan
- D. Glycine
- E. Histidine

177. Which amino acid participates in purine bases synthesis of nucleotides?

- A. Glycine
- B. Threonine
- C. Alanine
- D. Serine
- E. Tryptophan

178. As boiling water appeared on the skin, the injured part of it turned red, swelled and started to hurt. Which substance can lead to such reaction?

- A. Lysine
- B. Thiamine
- C. Glutamine
- D. Histamine
- E. Asparagine

179. Glutathione is a component of the human organism antioxidant system. Which of the amino acids included in its composition:

- A. Threonine
- B. Serine
- C. Aspartic acid
- D. Tyrosine
- E. Glycine

180. 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. Cystine
- B. Threonine
- C. Serine
- D. Glycine
- E. Alanine

181. For muscle functioning, a very important role is given creatine phosphate which is formed from creatine and ATP. Name the amino acids necessary for creatine synthesis:

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

182. 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

183. What biogenic amine relaxes vessels and formed during histidine catabolism:

- A. Serotonin
- B. Histamine
- C. Dopa
- D. Noradrenalin
- E. Dopamine

184. 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 suppression
- B. Activation of homogentisic acid oxidase
- C. Tyrosinase activation
- D. Suppression of homogentisic acid oxidase
- E. Phenylalanine hydroxylase suppression

185. In psychiatry, to treat various CMS disease biogenic amines are used. Name the medicine of this group that is an inhibition mediator:

- A. Histamine
- B. Serotonin
- C. Dopamine
- D. Taurine
- E. Gamma-aminobutyric acid

186. 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. Glycine
- B. Serine

- C. Aspartic acid
- D. Melanin
- E. Tyrosin

187. 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. Phenylalanine hydroxylase
- B. Glutamic transaminase
- C. Homogentisinate oxidase
- D. Asparate aminotransferase
- E. Glutamate decarboxylase

188. 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. Albinism
- B. Cystinuria
- C. Porphyria
- D. Hemolytic anemia
- E. Alkaptonuria

189. A 10-months 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

190. A 6-day old infant has phenylpyruvate and phenylacetate redundancy in his urine. Which amino acid metabolism is disturbed in the child's organism?

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

191. 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. Homogentisic acid oxidase
- B. Glutamine transaminase
- C. Aspartate aminotransferase
- D. Phenylalanine 4-monooxygenase
- E. Glutamate decarboxylase

192. A child has dark spots on his nappies, which shows presence of homogentisic acid. The disturbance of metabolism of which substance is connected with it?

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

193. What is the main form of ammonia transport from the majority of peripheral tissue to the liver?

- A. Glutamine
- B. Asparagine
- C. Citrulline
- D. Ornithine
- E. Urea

194. In which form is ammonia transmitted from the muscles from the liver?

- A. As asparagine
- B. As urea
- C. As arginine
- D. As ammonia salt
- E. As alanine

195. 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.

196. 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. Aminotransferase
- B. Glucose-6-phosphatase
- C. Phosphofruktokinase
- D. Dehydrogenase of branched amino acids.
- E. Phosphofruktomutase

197. A 50-year-old woman with myocardium infarction has been delivered to the intensive care unit. Which enzyme's activity will be most increased during the first two days?

- A. LDH4
- B. Aspartate aminotransferase
- C. LDH5
- D. Alanine aminotransferase
- E. Alanine aminopeptidase

198. A lab rat has subcutaneously received mercury (II) chloride in the amount of 5 mg/kg. 24 hours later the plasma creatinine concentration increased several times. What mechanism of retention azotemia is observed in this case?

- A. Increased creatinine production in the muscles
- B. Increased creatinine reabsorption
- C. Increased glomerular filtration
- D. Increased creatinine production in the renal tubules
- E. Decreased glomerular filtration

199. 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. Fats
- B. Carbohydrates
- C. Proteins
- D. Vitamins
- E. Minerals

200. 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. Arginine
- B. Lysine
- C. Ornithine

- D. Aspartate
- E. Alanine

201. 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. Bilirubin-albumin complex
- C. Bilirubin glucuronide
- D. Verdohemoglobin
- E. Bile acids

202. 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. Histamine
- B. Nitrogen oxide
- C. Bradykinin
- D. Acetylcholine
- E. Adrenaline

203. A patient, who suffers from congenital erythropoietic porphyria, has skin photosensitivity. The accumulation of what compound in the skin can cause it?

- A. Uroporphyrinogen 1
- B. Protoporphyrin
- C. Uroporphyrinogen 2
- D. Coproporphyrinogen 3
- E. Heme

204. 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. Citrulline
- B. Ornithine
- C. Urea
- D. Argininosuccinate
- E. Carbamoyl phosphate

205. A patient has yellow skin colour, dark urine, achromatic feces. What substance will have strengthened concentration in the blood serum?

- A. Conjugated bilirubin
- B. Unconjugated bilirubin
- C. Mesobilirubin

- D. Verdoglobin
- E. Biliverdin

206. A 46 year old woman suffering from cholelithiasis developed jaundice. Her urine became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:

- A. Unconjugated bilirubin
- B. Biliverdin
- C. Conjugated bilirubin
- D. Mesobilirubin
- E. Urobilinogen

207. 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. Hemolytic jaundice
- B. Porphyria
- C. Albinism
- D. Pellagra
- E. Alkaptonuria

208. 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. Cholesterol
- B. Bilirubin
- C. Urea
- D. Uric acid
- E. Cystine

209. 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.

210. 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. Intermediate density lipoproteins.

- B. Cholesterol.
- C. High-density lipoproteins.
- D. Chylomicrons.
- E. Low-density lipoproteins.

211. An experimental 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. DOPA.
- B. Cholesterol.
- C. Choline.
- D. Acetoacetate.
- E. Linoleic acid.

212. 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.

213. 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 alkalosis.
- B. Any changes wouldn't happen.
- C. Respiratory acidosis.
- D. Respiratory alkalosis.
- E. Metabolic acidosis.

214. 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. Glucose.
- B. Glycerin.
- C. Methionine.
- D. Ascorbic acid.
- E. Citrate.

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

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

216. A patient has symptoms of atherosclerosis. Which plasma lipid transport forms should have an increased concentration?

- A. Chylomicrons
- B. IDL
- C. HDL
- D. LDL.
- E. VLDL

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

- A. Glycosidase
- B. Lipoprotein lipase.
- C. Proteinase
- D. Heme synthetase
- E. Phenylalanine hydroxylase

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

- A. Pyruvate decarboxylase
- B. Alcohol dehydrogenase
- C. Acetyl-CoA-carboxylase.
- D. Amino transferase
- E. Carbomoyl phosphate synthetase

219. 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. Regulation of Ca^2 level in mitochondria
- B. Substrate phosphorylation
- C. Utilization of lactic acid
- D. Oxidative phosphorylation
- E. Transport of fatty acids to mitochondria.

220. 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 trypsin synthesis
- D. Amylase deficiency
- E. Disturbed phospholipase synthesis

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

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

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

- A. Choline
- B. DOPA
- C. Cholesterol
- D. Acetoacetate
- E. Linoleic acid

223. Carnitine including drug was recommended to the sportsman for improving results. What process is activated most of all with help of carnitine?

- A. Synthesis of steroid hormones
- B. Transport of fatty acids to the mitochondria
- C. Synthesis of ketone bodies
- D. Synthesis of lipids
- E. Tissue respiration

224. 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. Triglycerides
- B. Fatty acids
- C. Bile acids
- D. Phospholipids
- E. Chylomicrons

225. 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

226. 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. Synthesis of steroid hormones
- B. Synthesis of ketone bodies
- C. Synthesis of lipids
- D. Tissue respiration
- E. Fatty acids transport to mitochondrion

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

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

229. NSAID blockade the utilization of arachidonic acid via cyclooxygenase pathway, which results in formation of some bioactive substances. They are:

- A. Thyroxine
- B. Biogenic amines
- C. Prostaglandins
- D. Somatomedins
- E. Insulin-like growth factors

230. 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 cyclooxygenase pathway from arachidonic acid?

- A. Ethanolamine
- B. Choline
- C. Noradrenaline
- D. Prostaglandins
- E. Triiodothyronine

231. 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. Regulation of Ca^2 level in mitochondrion
- B. Substrate phosphorylation
- C. Lactic acid utilization
- D. Actin and myosin synthesis
- E. Transporting of fatty acids to mitochondrion

232. 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

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

234. 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. Chylomicrons
- B. LDL
- C. HDL
- D. VLDL

E. Complexes with albumin

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

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

236. Aerobic oxidation of substrates is typical for cardiac myocytes. Which of the following is the major oxidation substrate of cardiac muscles?

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

237. 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. Phospholipase C
- E. Cholesterol esterase

238. 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. Oxalates
- B. Urates
- C. Chlorides
- D. Phosphates
- E. Cholesterol

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

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

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

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

241. Which one of the following is NOT a phospholipid?

- A. Sphingomyelin
- B. Plasmalogen
- C. Galactosylceramide
- D. Cardiolipin
- E. Lysolecithin

242. After they are produced from acetyl-CoA in the liver, ketone bodies are mainly used for which one of the following processes?

- A. Excretion as waste products
- B. Generation of energy in the tissues
- C. Energy generation in the liver
- D. Conversion to fatty acids for storage of energy
- E. Generation of energy in red blood cells

243. The subcellular site of the breakdown of long chain fatty acids to acetyl-CoA via β -oxidation is:

- A. The matrix of the mitochondria
- B. The cytosol
- C. The endoplasmic reticulum
- D. The mitochondrial intermembrane space
- E. The Golgi apparatus

244. The breakdown of one molecule of a C16 fully saturated fatty acid (palmitic acid) by β -oxidation lead to the formation of:

- A. 8 FADH₂, 8 NADH and 8 acetyl CoA molecules
- B. 7 FADH₂, 7 NADH and 7 acetyl CoA molecules
- C. 8 FADH₂, 8 NADH and 7 acetyl CoA molecules
- D. 7 FADH₂, 8 NADH and 8 acetyl CoA molecules
- E. 7 FADH₂, 7 NADH and 8 acetyl CoA molecules

245. Which one of the following enzymes is inhibited by the nonsteroidal anti-inflammatory drug (NSAID) aspirin?

- A. Lipoxygenase
- B. Thromboxane synthase

- C. Prostacyclin synthase
- D. Cyclooxygenase
- E. $\Delta 6$ desaturase

246. Which one of the following is the major product of fatty acid synthase?

- A. Acetyl-CoA
- B. Oleate
- C. Palmitate
- D. Palmitoyl-CoA
- E. Acetoacetate

247. Which one of the following best describes the action of phospholipase C?

- A. It releases the fatty acyl chain from the sn-2 position of a phospholipid.
- B. It releases the head group of a phospholipid, leaving phosphatidic acid.
- C. It releases the fatty acyl chain from the sn-1 position of a phospholipid.
- D. It cleaves a phospholipid into its phosphate-containing head group and a diacylglycerol.
- E. It releases the fatty acyl chains from the sn-1 and sn-2 positions of a phospholipid.

248. Tay-Sachs disease is a lipid storage disease caused by a genetic defect in deficiency which one of the following enzymes:

- A. Hexosaminidase A
- B. β -Galactosidase
- C. Sphingomyelinase
- D. Ceramidase
- E. β -Glucosidase

249. Which of the plasma lipoproteins is best described as follows: synthesized in the intestinal mucosa, containing a high concentration of triacylglycerol and responsible for the transport of dietary lipids in the circulation?

- A. High-density lipoprotein
- B. Intermediate density lipoprotein
- C. Low-density lipoprotein
- D. Very low density lipoprotein
- E. Chylomicrons

250. Which of the plasma lipoproteins is best described as follows: synthesized in the liver, containing a high concentration of triacylglycerol and mainly cleared from the circulation by adipose tissue and muscle?

- A. Very low density lipoprotein

- B. Chylomicrons
- C. High-density lipoprotein
- D. Intermediate density lipoprotein
- E. Low-density lipoprotein

251. Which of the plasma lipoproteins is best described as follows: formed in the circulation by removal of triacylglycerol from very low density lipoprotein, contains cholesterol taken up from high-density lipoprotein delivers cholesterol to extrahepatic tissues?

- A. Chylomicrons
- B. High-density lipoprotein
- C. Low-density lipoprotein
- D. Intermediate density lipoprotein
- E. Very low density lipoprotein

252. Which of the following will be elevated in the bloodstream about 2 hours after eating a high-fat meal?

- A. High-density lipoprotein
- B. Chylomicrons
- C. Ketone bodies
- D. Nonesterified fatty acids
- E. Very low density lipoprotein

253. Which of the following will be elevated in the bloodstream about 4 hours after eating a high-fat meal?

- A. Chylomicrons
- B. High-density lipoprotein
- C. Ketone bodies
- D. Very low density lipoprotein
- E. Nonesterified fatty acids

254. Which one of the following statements concerning the biosynthesis of cholesterol is CORRECT?

- A. All the carbon atoms in the cholesterol synthesized originate from acetyl-CoA.
- B. The rate-limiting step is the formation of 3-hydroxy 3-methylglutaryl-CoA (HMG-CoA) by the enzyme HMG-CoA synthase.
- C. Synthesis occurs in the cytosol of the cell.
- D. Squalene is the first cyclic intermediate in the pathway.
- E. The initial substrate is mevalonate.

255. The class of drugs called statins have proved very effective against hypercholesterolemia, a major cause of atherosclerosis and associated cardiovascular disease. These drugs reduce plasma cholesterol levels by:

- A. Preventing absorption of cholesterol from the intestine.

- B. Increasing the excretion of cholesterol from the body via conversion to bile acids.
- C. Increasing the rate of degradation of 3-hydroxy-3-methylglutaryl CoA reductase.
- D. Stimulating the activity of the LDL receptor in the liver.
- E. Inhibiting the conversion of 3-hydroxy-3-methylglutaryl-CoA to mevalonate in the pathway for cholesterol biosynthesis.

256. Which of the following statements about bile acids (or bile salts) is INCORRECT?

- A. Primary bile acids are synthesized in the liver from cholesterol.
- B. Secondary bile acids are produced by modification of primary bile acids in the liver.
- C. Bile acids are needed for the breakdown of fats by pancreatic lipase.
- D. Bile acids facilitate the absorption of the products of lipid digestion in the jejunum.
- E. Bile acids are recirculated between the liver and the small intestine in the enterohepatic circulation.

257. A 35-year-old man with severe hypercholesterolemia has a family history of deaths at a young age from heart disease and stroke. Which of the following genes is likely to be defective?

- A. Apolipoprotein E
- B. The LDL receptor
- C. Lipoprotein lipase
- D. PCSK9
- E. LCAT

258. Stool test detects in the patient's feces a large amount of undigested fats. This patient is the most likely to have disturbed secretion of the following enzymes:

- A. Pancreatic amylase
- B. Pancreatic proteases
- C. Pancreatic lipases
- D. Bile lipase
- E. Gastric protease

259. 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. Hexosaminidase
- B. Sphingomyelinase
- C. β -galactosidase
- D. Glucocerebrosidease

E. Hyaluronidase

260. 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. Glycosyltransferase
- C. Sphingosine
- D. Ceramides
- E. Gangliosides

261. 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. Tristearin
- B. Urea
- C. Phosphatidic acid
- D. Cholic acid
- E. Phosphatidylcholine

262. Increased HDL levels decrease the risk of atherosclerosis. What is the mechanism of HDL anti-atherogenic action?

- A. They supply tissues with cholesterol
- B. They are involved in the breakdown of cholesterol
- C. They activate the conversion of cholesterol to bile acids
- D. They remove cholesterol from tissues
- E. They promote absorption of cholesterol in the intestine

263. 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. Citrate
- B. Acetoacetate
- C. Alpha-ketoglutarate
- D. Malonate
- E. Aspartate

264. 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. Neutral fats
- B. Higher fatty acids
- C. Sphingolipids
- D. Cholesterol

E. Phosphatidic acid

265. 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 leukocyte migration into the joint.
- C. By general analgesic effect.
- D. By general anti-inflammatory effect.
- E. By increasing uric acid excretion.

266. Blood of a 12 year old boy has a low concentration of uric acid and accumulation of xanthine and hypoxanthine. This child has genetic defect of the following enzyme:

- A. Arginase.
- B. Urease.
- C. Ornithine carbamoyltransferase.
- D. Glycerolkinase.
- E. Xanthine oxidase.

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

- A. Collagen.
- B. Cholesterol.
- C. Pyrimidines.
- D. Purines.
- E. Carbohydrates.

268. 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. Cytidine monophosphate.
- B. Uridine triphosphate.
- C. Adenosine monophosphate.
- D. Uridine monophosphate.
- E. Thymidine monophosphate.

269. 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 which enzyme is allopurinol?

- A. Adenosine deaminase.

- B. Xanthine oxidase.
- C. Adenine phosphoribosil transferase.
- D. Hypoxantin phosphoribosil transferase.
- E. Guaninedeaminase.

270. 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.

271. Methotrexate (structural analogue of the folic acid which is competitive inhibitor of the dihydrofolatreductase) is prescribed for treatment of the malignant tumor. On which level does methotrexate inhibit synthesis of the nucleic acids?

- A. Replication.
- B. Transcription.
- C. Mononucleotide synthesis.
- D. Reparation.
- E. Processing.

272. An oncological patient had been administered methotrexate. With time target cells of the tumor lost sensitivity to this drug. At the same time the change in gene expression of the following enzyme is observed:

- A. Thiaminase.
- B. Dehydropholate reductase.
- C. Deaminase.
- D. Pholate oxidase.
- E. Pholate decarboxylase.

273. The boy of 8 years old has Lesh-Nyhan disease. In blood concentration of a uric acid is increased. Which 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

274. 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. Monosaccharides
- B. Fatty acids
- C. Glycerophosphatides
- D. Glycogen
- E. Nucleotides

275. 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. Pyrimidine nucleotide
- B. Purines nucleotide
- C. Amino acids
- D. Proteins
- E. chromoproteins

276. 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 pyrimidine nucleotides
- B. Heme catabolism
- C. Lysis of purine nucleotides.
- D. Proteolysis
- E. Reutilization of purine bases.

277. 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. Thioredoxin reductase
- B. Thiaminase
- C. Deaminase
- D. Dihydrofolate reductase
- E. -

278. 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

279. RNA-polymerase B (II) is blocked due to amanitine poisoning (poison of death-cup). It disturbs:

- A. Synthesis of tRNA.
- B. Synthesis of mRNA.
- C. Reverse transcription.
- D. Primers synthesis.
- E. Maturation of mRNA.

280. 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. RNA ligase.
- B. Primase.
- C. Endonuclease.
- D. DNA polymerase III.
- E. DNA gyrase.

281. 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. Processing.
- B. Replication.
- C. Translation.
- D. Transcription.
- E. Reparation.

282. Tuberculosis can be treated by means of combined chemotherapy that includes substances with different mechanisms of action. Which antituberculous medication inhibits transcription of RNA into DNA in mycobacteria?

- A. Streptomycin.
- B. Isoniazid.
- C. Ethionamide.
- D. Para-aminosalicylic acid.
- E. Rifampicin.

283. 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 which stage is protein biosynthesis impaired?

- A. Translation.
- B. Amino acid activation.
- C. Replication.
- D. Transcription.

E. Termination.

284. It was revealed that T-lymphocytes were affected by HIV. Virus enzyme - reverse transcriptase (RNA-dependent DNA-polymerase) - catalyzes the synthesis of:

- A. Virus informational RNA on the template of DNA
- B. DNA on the template of virus RNA. .
- C. DNA on virus ribosomal RNA.
- D. Viral DNA on DNA template.
- E. mRNA on the template of virus protein.

285. 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. Choline esterase block.
- B. Ribosome protein synthesis.
- C. Microbial wall formation.
- D. Energy metabolism.
- E. Nucleic acid synthesis.

286. General structure of eukaryotic genes is as follows: exon-intron-exon. Such functional structure of a gene leads to certain specifics of the transcription process. Which sequence will correspond with precursor mRNA (immature)?

- A. Exon-exon-intron
- B. Exon-exon
- C. Exon-intron-exon
- D. Intron-exon
- E. Exon-intron

287. A mutation has occurred in a cell in the first exon of the structural gene. The number of nucleotide pairs changed from 290 to 250. Name this type of mutation:

- A. Insertion
- B. Deletion
- C. Duplication
- D. Translocation
- E. Nullisomy

288. 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. Replication
- B. Transcription
- C. Reverse transcription

- D. Repair
- E. Translation

289. 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. Argininosuccinic aciduria
- B. Hyperazotemia
- C. Hyperaminoacidemia
- D. Hyperuricemy
- E. Citrullinuria

290. Part of the DNA chain turned about 180 degrees due to gamma radiation. What type of mutation took place in the DNA chain?

- A. Deletion
- B. Doubling
- C. Translocation
- D. Replication
- E. Inversion

291. 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

292. 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. Thiaminase
- B. Dihydrofolate reductase
- C. Deaminase
- D. Thioredoxin reductase
- E. -

293. Examination of a patient revealed reduced contents of magnesium ions that are necessary for attachment of ribosomes to the granular endoplasmic reticulum. It is known that it causes disturbance of protein biosynthesis. What stage of protein biosynthesis will be disturbed?

- A. Transcription

- B. Translation
- C. Replication
- D. Aminoacid activation
- E. Termination

294. Labeled aminoacids alanine and tryptophane were introduced to a mouse in order to study localization of protein biosynthesis in its cells. Around what organelles will the accumulation of labeled amino acids be observed?

- A. Agranular endoplasmic reticulum
- B. Cell centre
- C. Ribosomes
- D. Lysosomes
- E. Golgi apparatus

295. RNA that contains AIDS virus penetrated into a leukocyte and by means of reverse transcriptase forced a cell to synthesize a viral DNA. This process is based upon:

- A. Operon repression
- B. Reverse translation
- C. Operon depression
- D. Reverse transcription
- E. Convariant replication

296. A patient has a disturbed absorbtion of fat hydrolysates. It might have been caused by a deficit in the small intestine cavity:

- A. Of sodium ions
- B. Of liposoluble vitamins
- C. Of bile pigments
- D. Of lipolytic enzymes
- E. Of bile acids

297. It was proved that a molecule of immature mRNA (precursor mRNA) contained more triplets than amino acids found in the synthesized protein. The reason for that is that translation is normally preceded by:

- A. Initiation
- B. Reparation
- C. Mutation
- D. Processing
- E. Replication

298. Labelled amino acids alanine and tryptophane were injected to a mouse in order to study localization of protein synthesis in its cells. The labelled amino acids will be accumulated near the following organelles:

- A. Smooth endoplasmic reticulum

- B. Ribosomes
- C. Cell centre
- D. Lysosomes
- E. Golgi apparatus

299. 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. Methemoglobinemia
- B. Hepatic porphyria
- C. Erythropoietic porphyria
- D. Coproporphyria
- E. Intermittent porphyria

300. According to the model of double DNA helix that was suggested by Watson and Creek, it was established that one of chains would not be lost during replication and the second chain would be synthesized complementary to the first one. What way of replication is it?

- A. Analogous
- B. Identical
- C. Dispersed
- D. Semiconservative
- E. Conservative

301. 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

302. On an electron micrograph a scientist has identified a structure formed by eight histone proteins and a part of DNA molecule which makes about 1,75 revolutions around the molecules. Which structure has been identified?

- A. Elementary fibril
- B. Half-chromatid
- C. Nucleosoma
- D. Chromatid
- E. Chromosome

303. 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 transfer of monocarbon groups, thus suppressing the synthesis of the following polymer:

- A. Protein
- B. DNA
- C. Homopolysaccharides
- D. Gangliosides
- E. Glycosaminoglycans

304. Glycogen polysaccharide is synthesized from the active form of glucose. The immediate donor of glucose residues during the glycogenesis is:

- A. Glucose-1-phosphate
- B. UDP-glucose
- C. ADP-glucose
- D. Glucose-6-phosphate
- E. Glucose-3-phosphate

305. 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

306. 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. Interleukins
- B. Eicosanoids
- C. Interferons
- D. Catecholamines
- E. Corticosteroids

307. 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. Xanthine oxidase

- B. Hypoxanthine-guanine phosphoribosyltransferase
- C. Dihydrofolate reductase
- D. Thymidylate synthase
- E. Karbamoyl phosphate synthetase

308. 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. Protein absorption
- B. Fat emulsification
- C. Carbohydrate hydrolysis
- D. Secretion of hydrochloric acid
- E. Salivation inhibition

309. 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. tRNA nucleotides
- B. tRNA anticodons
- C. rRNA nucleotides
- D. mRNA codons
- E. rRNA anticodons

310. 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. High density lipoproteins
- B. Chylomicrons
- C. Very low density lipoproteins
- D. Intermediate density lipoproteins
- E. Low density lipoproteins

311. 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. Saliva
- B. Pancreatic juice
- C. Gastric juice
- D. Bile
- E. Intestinal juice

312. 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 I synthase
- B. Delta-aminolevulinate synthase
- C. Uroporphyrinogen III cosynthase
- D. Uroporphyrinogen decarboxylase
- E. Ferrochelatase

313. 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. Increased excretion of calcium
- B. Impaired synthesis of calcitriol
- C. Hyperfunction of parathyroid glands
- D. Hypofunction of parathyroid glands
- E. Lack of calcium in food

314. Diseases of respiratory system and circulatory disorders impair the transport of oxygen, thus causing 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. Pyruvic acid
- B. Glutamic acid
- C. Lactic acid
- D. Citric acid
- E. Fumaric acid

315. A 15-year-old patient has fasting plasma glucose level 4,8 mmol/l, one hour after glucose challenge it becomes 9,0 mmol/l, in 2 hours it is 7,0 mmol/l, in 3 hours it is 4,8 mmol/l. Such parameters are characteristic of:

- A. Diabetes mellitus type 1
- B. Diabetes mellitus type 2
- C. Subclinical diabetes mellitus
- D. Healthy person
- E. Cushing's disease

316. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of the teeth. What can be the cause?

- A. Decreased glucagon production
- B. Insulin deficiency
- C. Hyperthyroidism
- D. Vitamin D deficiency

E. Vitamin C deficiency

317. 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. Protein kinase
- B. Triacylglycerol lipase
- C. Adenylate kinase
- D. Diacylglycerol lipase
- E. Monoacylglycerol lipase

318. A woman complains of visual impairment. Examination revealed obesity in the patient and her fasting plasma glucose level is hyperglycemic. What diabetes complication can cause visual impairment/blindness?

- A. Macroangiopathy
- B. Microangiopathy
- C. Atherosclerosis
- D. Neuropathy
- E. Glomerulopathy

319. 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. Iron refractory anemia
- B. B₁₂-deficiency anemia
- C. Hemolytic anemia
- D. Iron-deficiency anemia
- E. Protein-deficiency anemia

320. The process of metabolism in the human body produces active forms of oxygen, including superoxide anion radical O₂^{•-}. This anion is inactivated by the following enzyme:

- A. Catalase
- B. Peroxidase
- C. Superoxide dismutase
- D. Glutathione peroxidase
- E. Glutathione reductase

321. Parents of a sick 5-year-old girl visited a genetic consultation. Karyotype investigation revealed 46 chromosomes. One chromosome of the 15th pair was abnormally long, having a part of the chromosome belonging to the 21st pair attached to it. What mutation occurred in this girl?

- A. Translocation

- B. Deletion
- C. Insertion
- D. Deficiency
- E. Duplication

322. 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. Hydroxylation
- B. Dehydrogenation
- C. Deamination
- D. Decarboxylation
- E. Reduction

323. 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. Malate
- B. Methylmalonic acid
- C. Pyruvic acid
- D. Uric acid
- E. Phenyl pyruvate

324. Cells of a person working in the Chernobyl 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. Replication
- B. Transcription
- C. Reverse transcription
- D. Translation
- E. Repair

325. After an extended treatment with sulfanilamides a patient has developed macrocytic anemia. Production of active forms of the following vitamin is disrupted in such a condition:

- A. Thiamine
- B. Riboflavin
- C. Folic acid
- D. Pyridoxine
- E. Cyanocobalamin

326. A therapist 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 substances can cause such changes in urine?

- A. Chlorides
- B. Ammonium salts
- C. Uric acid salt
- D. Calcium phosphate
- E. Magnesium sulfate

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

- A. Thiamine
- B. Cyanocobalamin
- C. Menadione (Vikasolum)
- D. Retinol acetate
- E. Ergocalciferol

328. Fructosuria is known to be connected with inherited deficiency of fructose 1- phosphate aldolase. What product of fructose metabolism will accumulate in the organism resulting in toxic action?

- A. Glucose 1-phosphate
- B. Fructose 1-phosphate
- C. Glucose 6-phosphate
- D. Fructose 1,6-biphosphate
- E. Fructose 6-phosphate

329. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of the teeth. What can be the cause?

- A. Decreased glucagon production
- B. Insulin deficiency
- C. Hyperthyroidism
- D. Vitamin D deficiency
- E. Vitamin C deficiency

330. Coenzyme A participates in numerous important metabolic reactions. It is a derivative of the following vitamin:

- A. Thiamine
- B. Pantothenic acid
- C. Niacin
- D. Calciferol
- E. Ubiquinone

331. When investigating human saliva it is necessary to assess its hydrolytic properties. What substance should be used as a substrate in the process?

- A. Proteins
- B. Fats
- C. Fiber
- D. Amino acids
- E. Starch

332. A patient suffering from gout was prescribed allopurinol. What pharmacological property of allopurinol provides therapeutic effect in this case?

- A. Acceleration of nitrogen-containing substances excretion
- B. Competitive inhibition of xanthine oxidase
- C. Acceleration of pyrimidine nucleotides catabolism
- D. Deceleration of pyrimidine nucleotides salvage
- E. Acceleration of nucleic acids synthesis

333. Blood of the patients with diabetes mellitus shows increased content of free fatty acids. Name the most likely cause of this:

- A. Accumulation of palmitoyl-CoA in cytosol
- B. Activation of ketone bodies utilization
- C. Activation of apoA1, apoA2, and apoA4 apolipoprotein synthesis
- D. Increased activity of adipose triglyceride lipase
- E. Decreased activity of plasma phosphatidylcholine-cholesterolacyltransferase

334. During regular check-up a child is determined to have interrupted mineralization of the bones. What vitamin deficiency can be the cause?

- A. Riboflavin
- B. Tocopherol
- C. Folic acid
- D. Cobalamin
- E. Calciferol

335. Cytochrome oxidase is a heme protein that is an end component of the mitochondrial respiratory chain. What reaction is catalyzed with this enzyme?

- A. Cytochrome synthesis
- B. Transfer of reduced equivalents to molecular oxygen
- C. Transfer of reduced equivalents to ubiquinone
- D. Cytochrome splicing
- E. Adenosine triphosphate synthesis

336. 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

337. 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 eukaryotes
- B. Transcription initiation in prokaryotes
- C. Translation initiation in prokaryotes
- D. Transcription initiation in eukaryotes
- E. Replication initiation in prokaryotes

338. An infant, who was on synthetic formula feeding, developed signs of vitamin B1 deficiency. What reactions does this vitamin take part in?

- A. Amino acids transamination
- B. Keto acids oxidative decarboxylation
- C. Amino acids decarboxylation
- D. Proline hydroxylation
- E. Redox reactions

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

340. 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. Albinism
- B. Phenylketonuria
- C. Tyrosinosis
- D. Alkaptonuria
- E. Gout

341. A newborn presents with weak suckling, frequent vomiting, and hypotonia. Blood and urine citrulline are very high. What metabolic process is disturbed?

- A. Tricarboxylic acid cycle

- B. Glycolysis
- C. Gluconeogenesis
- D. Ornithine cycle
- E. Cori cycle

342. 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. Glycolysis and glycogenolysis
- C. Glycogenesis and glycogenolysis
- D. Lipolysis and lipogenesis
- E. Pentose-phosphate pathway and glycolysis

343. 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. Riboflavin
- B. Thiamine
- C. Retinol
- D. Folic acid
- E. Ascorbic acid

344. Dehydrogenases are enzymes that detach hydrogen atoms from the substrate. What enzyme class is lactate dehydrogenase related to?

- A. Isomerases
- B. Oxidoreductases
- C. Lipases
- D. Transferases
- E. Hydrolases

345. Low rate of vitamin B6 in the dietary intake leads to disturbance of protein metabolism. What biochemical processes in the patient's organism will become less active?

- A. Hydrolysis
- B. Phosphorilation
- C. Transamination
- D. Reduction-oxidation
- E. Methylation

346. It is known, that some compounds are uncouplers for tissue respiration and oxidative phosphorylation find out those one:

- A. Carbon monoxide
- B. Lactate

- C. Antimycin A
- D. Acetyl-CoA
- E. 2,4-dinitrophenol

347. To what total ATP quantity is the full glucose oxidation and its linking with phosphorylation equivalent?

- A. 38
- B. 8
- C. 12
- D. 52
- E. 58

348. Formation of ribosome subunits in a cell was disturbed in course of an experiment (by means of activated mutagenic factors). This will have an effect on the following metabolic process:

- A. Carbohydrate biosynthesis
- B. Protein biosynthesis
- C. ATP synthesis
- D. Photosynthesis
- E. Biological oxidation

349. Low level of albumins and fibrinogen was detected in the patient's blood. Decreased activity of what organelle of the liver hepatocytes can most probably cause it?

- A. Agranular endoplasmatic reticulum
- B. Mitochondrions
- C. Golgi complex
- D. Granular endoplasmatic reticulum
- E. Lysosomes

350. In evolution, molecular mechanism for correction of damaged DNA molecules developed. This process is called:

- A. Transcription
- B. Translation
- C. Replication
- D. Processing
- E. Repair

351. Genetic information is stored in DNA but does not participate directly in protein synthesis within DNA cells. What process ensures transfer of genetic information into polypeptide chain?

- A. DNA replication
- B. Formation of tRNA
- C. Formation of iRNA
- D. Translation

E. Formation of rRNA

352. Infectious diseases are treated with antibiotics (streptomycin, erythromycin, chloramphenicol). They inhibit the following stage of protein synthesis:

- A. Transcription
- B. Replication
- C. Processing
- D. Translation
- E. Splicing

353. Inside a human cell the informational RNA containing both exons and introns was delivered to the granular endoplasmic reticulum to the ribosomes. What process does NOT take place?

- A. Replication
- B. Processing
- C. Transcription
- D. Translation
- E. Prolongation

354. 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

355. In some areas of South Africa many people have sickle cell disease characterized by red blood cells that assume an abnormal sickle shape due to the substitution of glutamic acid for valine in the hemoglobin molecule. What is the cause of this disease?

- A. Disturbances of the mechanisms of genetic information transmission
- B. Crossing-over
- C. Gene mutation
- D. Genomic mutation
- E. Transduction

356. Mother had noticed her 5-year-old child's urine to become dark in colour. Bile pigments in urine were not detected. The diagnosis of alkaptonuria was made. What pigment is deficient?

- A. Phenylpyruvate decarboxylase

- B. Phenylalanine hydroxylase
- C. Homogentisic acid oxidase
- D. Tyrosinase
- E. Oxyphenylpyruvate oxidase

357. A 1,5 year old child was taken to the hospital. The examination revealed dementia, disorder of motor functions regulation, hypopigmentation of skin, high rate of phenylalanine in blood. What is the most probable diagnosis?

- A. Galactosemia
- B. Tyrosinosis
- C. Phenylketonuria
- D. Down's syndrome
- E. Mucoviscidosis

358. 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. Phenylalanine
- B. Alanine
- C. Methionine
- D. Tyrosine
- E. Asparagine

359. A 2-year-old child experienced convulsions because of lowering calcium ions concentration in the blood plasma. Function of what structure is decreased?

- A. Thymus
- B. Hypophysis
- C. Adrenal cortex
- D. Pineal gland
- E. Parathyroid glands

360. The alternate usage of dichlotiazide, etacrin acid and lasex did not cause marked diuretic effect in the patient with marked peripheral edema. The aldosterone level in the blood is increased. Indicate which medicine should be prescribed:

- A. Urea
- B. Mannit
- C. Clopamid
- D. Spironolacton
- E. Amilorid

361. The action of electric current on the excitable cell caused depolarization of its membrane. Movement of what ions through the membrane caused depolarization?

- A. HCO_3^-
- B. Na^+
- C. Cl^-
- D. Ca^{2+}
- E. K^+

362. There is only one hormone among the neurohormones which refers to the derivatives of amino acids according to classification. Point it out:

- A. Oxytocin
- B. Thyrotropin
- C. Vasopressin
- D. Melatonin
- E. Somatotropin

363. Some diseases reveal symptoms of aldosteronism with hypertension and edema due to sodium retention in the organism. What organ of the internal secretion is affected on aldosteronism?

- A. Testicle
- B. Adrenal glands
- C. Ovaries
- D. Pancreas
- E. Hypophysis

364. There is an inhibited coagulation in the patients with bile ducts obstruction, bleeding due to the low level of absorption of a vitamin. What vitamin is in deficiency?

- A. A
- B. D
- C. K
- D. E
- E. Carotene

365. Substitution of the glutamic acid on valine was revealed while examining initial molecular structure. For what inherited pathology is this symptom typical?

- A. Minkowsky-Shauffard disease
- B. Sickle-cell anemia
- C. Thalassemia
- D. Favism
- E. Hemoglobinosis

366. A worker has decreased buffer capacity of blood due to exhausting muscular work. The influx of what acid substance in the blood can cause this symptom?

- A. 3-phosphoglycerate
- B. Pyruvate
- C. 1,3-bisphosphoglycerate
- D. α -ketoglutarate
- E. Lactate

367. A 19-year-old female suffers from tachycardia in rest condition, weight loss, excessive sweating, exophthalmos and irritability. What hormone would you expect to find elevated in her serum?

- A. ACTH
- B. Cortisol
- C. Mineralocorticoids
- D. Thyroxine
- E. Insulin

368. 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 body temperature
- B. Maintaining the Ph level
- C. Maintaining the oncotic blood pressure
- D. Maintaining the blood sedimentation system
- E. All answers are correct

369. The low specific gravity of the secondary urine (1,002) was found out in the sick person. What is THE MOST DISTANT part of nephron where concentration of secondary urine takes place?

- A. In the collecting duct
- B. In the nephron's glomerulus
- C. In proximal tubule of nephron
- D. In ascending part of loop of Henle
- E. In distal tubule of nephron

370. Periodic renal colics attacks are observed in a woman with primary hyperparathyroidism. Ultrasonic examination revealed small stones in the kidneys. What is the most plausible reason of the stones's formation?

- A. Hyperphosphatemia
- B. Hypercalcemia
- C. Hypercholesterinemia
- D. Hyperuricemia
- E. Hyperkalemia

371. A man after 1,5 litre blood loss has suddenly reduced diuresis. The increased secretion of what hormone caused such diuresis alteration?

- A. Corticotropin
- B. Natriuretic
- C. Vasopressin
- D. Cortisol
- E. Parathormone

372. A 2-year-old child has got intestinal dysbacteriosis, which results in hemorrhagic syndrome. What is the most likely cause of hemorrhage of the child?

- A. Fibrinogen deficiency
- B. Activation of tissue thromboplastin
- C. PP hypovitaminosis
- D. Vitamin K insufficiency
- E. Hypocalcemia

373. Intake of oral contraceptives containing sex hormones inhibits secretion of the hypophysiae hormones. Secretion of which of the indicated hormones is inhibited while taking oral contraceptives with sex hormones?

- A. Vasopressin
- B. Thyrotropic
- C. Somatotropic
- D. Oxytocin
- E. Follicle-stimulating

374. 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. Amino acids
- B. Monosaccharides
- C. Ketone bodies
- D. High fatty acids
- E. Cholesterol esters

375. Testosterone and it's analogs increase the mass of skeletal muscles that allows to use them for treatment of dystrophy. Due to interaction of the hormone with what cell substrate is this action caused?

- A. Membrane receptors
- B. Nuclear receptors
- C. Ribosomes
- D. Chromatin
- E. Proteins-activators of transcription

376. Increased fragility of vessels, enamel and dentine destruction resulting from scurvy are caused by disorder of collagen maturation. What stage of procollagen modification is disturbed under this avitaminosis?

- A. Removal of C-ended peptide from procollagen
- B. Hydroxylation of proline
- C. Formation of polypeptide chains
- D. Glycosylation of hydroxylysine residues
- E. Detaching of N-ended peptide

377. A person has reduced diuresis, hypernatremia, hypokalemia. Hypersecretion of what hormone can cause such changes?

- A. Auricular sodiumuretic factor
- B. Vasopressin
- C. Adrenalin
- D. Aldosterone
- E. Parathormone

378. A considerable increase of activity of MB-forms of CPK (creatine phosphokinase) and LDH-1 was revealed on the examination of patient's blood. What is the most likely pathology?

- A. Hepatitis
- B. Rheumatism
- C. Pancreatitis
- D. Cholecystitis
- E. Miocardial infarction

379. 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. Glucose
- B. Common lipids
- C. Creatine
- D. Mineral salts
- E. Uric acid

380. A pregnant woman had been having toxicosis with severe repeated vomiting for 24 hours. In the end of the day there appeared tetanic convulsions and fluid loss. What shift of acid-base state caused these changes?

- A. Gaseous alkalosis
- B. Gaseous acidosis
- C. Excretory alkalosis
- D. Metabolic acidosis
- E. Excretory acidosis

381. 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. ACTH
- E. Thyroidal hormones

382. A 58-year-old patient with acute cardiac insufficiency has decreased volume of daily urine - oligouria. What is the mechanism of this phenomenon?

- A. Decreased number of functioning glomeruli
- B. Drop of oncotic blood pressure
- C. Rise of hydrostatic blood pressure in capillaries
- D. Decreased glomerular filtration
- E. Reduced permeability of renal filter

383. Cerebral trauma caused increase of ammonia formation. What amino acid takes part in removal of ammonia from cerebral tissue?

- A. Tyrosine
- B. Valine
- C. Glutamic acid
- D. Tryptophan
- E. Lysine

384. Kidneys of a man under examination show increased resorption of calcium ions and decreased resorption of phosphate ions. What hormone causes this phenomenon?

- A. Thyrocalcitonin
- B. Hormonal form *D3*
- C. Aldosterone
- D. Parathormone
- E. Vasopressin

385. 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. Any changes won't happen
- B. Metabolic alkalosis
- C. Metabolic acidosis
- D. Respiratory acidosis
- E. Respiratory alkalosis

386. 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 skeletal muscles (dystrophy, atrophy)
- B. In the heart muscle (initial stage of myocardium infarction)
- C. In kidneys and adrenals
- D. In connective tissue
- E. In liver and kidneys

387. In some regions of South Africa there is a spread sickle-shaped cell anemia, in which erythrocytes have shape of a sickle as a result of substitution of glutamin by valine in the hemoglobin molecule. What is the cause of this disease?

- A. Disturbance of mechanisms of genetic information realization
- B. Crossingover
- C. Transduction
- D. Genomic mutations
- E. Gene mutation

388. 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

389. 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. Pyruvate
- B. 1,3-bisphosphoglycerate
- C. Lactate
- D. 3-phosphoglycerate
- E. -

390. A patient complains of frequent diarrheas, especially after consumption of fattening food, and of body weight loss. Laboratory examination revealed steatorrhea; hypocholelic feces. What can be the cause of this condition?

- A. Mucous membrane inflammation of small intestine

- B. Obturation of biliary tracts
- C. Lack of pancreatic lipase
- D. Lack of pancreatic phospholipase
- E. Unbalanced diet

391. A 35 y.o. patient who often consumes alcohol was treated with powerful 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. Sodium
- B. Chlorine
- C. Calcium
- D. Potassium
- E. Phosphates

392. Analysis of blood serum of a patient revealed increase of alanine aminotransferase and aspartate aminotransferase level. What cytological changes can cause such a situation?

- A. Disorder of enzyme systems of cells
- B. Cellular breakdown
- C. Disturbed function of energy supply of cells
- D. Disturbance of genetic apparatus of cells
- E. Disturbance of cellular interrelations

393. 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. Ammonium salts
- B. Hippuric acid
- C. Kreatinine
- D. Uric acid
- E. Aminoacids

394. A 2 y.o. child has convulsions as a result of lowered concentration of calcium ions in blood plasma. It is caused by reduced function of:

- A. Hypophysis
- B. Adrenal cortex
- C. Pineal gland
- D. Thymus
- E. Parathyroid glands

395. Parents of a 10 y.o. boy consulted a doctor about extension of hair-covering, growth of beard and moustache, low voice. Intensified secretion of which hormone must be assumed?

- A. Of progesterone

- B. Of somatotropin
- C. Of oestrogen
- D. Of testosterone
- E. Of cortisol

396. 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, cholemia. Feces are acholic. Urine is of dark colour (bilirubin). What jaundice is it?

- A. Parenchymatous
- B. Mechanic
- C. Hemolytic
- D. Gilbert's syndrome
- E. Crigler-Najjar syndrome

397. 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. Phosphorylation of serine radicals
- B. Partial proteolysis
- C. Polymerization
- D. Glycosylation
- E. Carboxylation of glutamic acid

398. Examination of a patient revealed hyperkalemia and hyponatremia. Low secretion of which hormone may cause such changes?

- A. Vasopressin
- B. Cortisol
- C. Aldosterone
- D. Parathormone
- E. Natriuretic

399. 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 hyperammonemia. Disturbance of which biochemical process causes such pathological condition of the patient?

- A. Disturbed neutralization of biogenic amines
- B. Increased putrefaction of proteins in bowels
- C. Activation of aminoacid decarboxylation
- D. Inhibition of transamination enzymes
- E. Disturbed neutralization of ammonia in liver

400. Inhabitants of territories with cold climate have high content of an adaptive thermoregulatory hormone. What hormone is meant?

- A. Insulin
- B. Glucagon
- C. Thyroxin
- D. Somatotropin
- E. Cortisol

401. Examination of a 43 y.o. anephric patient revealed anemia symptoms. What is the cause of these symptoms?

- A. Reduced synthesis of erythropoietins
- B. Enhanced destruction of erythrocytes
- C. Iron deficit
- D. Vitamin B12 deficit
- E. Folic acid deficit

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

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

403. Osmotic pressure of a man's blood plasma is 350 mosmole/l (standard pressure is 300 mosmole/l). First of all it will result in high secretion of the following hormone:

- A. Aldosteron
- B. Cortisol
- C. Adrenocorticotropin
- D. Vasopressin
- E. Natriuretic

404. A patient was ill with burn disease that was complicated by disseminated intravascular coagulation syndrome (DIC syndrome). Which stage of DIC syndrome can be suspected if it is known that the patient's blood coagulates in less than 3 minutes?

- A. Hypocoagulation
- B. Hypercoagulation
- C. Transition phase
- D. Fibrinolysis
- E. Terminal

405. A patient who had been working hard under conditions of elevated temperature of the environment, has now a changed quantity of blood plasma proteins. What phenomenon is the case?

- A. Disproteinemia

- B. Absolute hypoproteinemia
- C. Absolute hyperproteinemia
- D. Relative hyperproteinemia
- E. Paraproteinemia

406. 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 alkalosis
- B. Respiratory acidosis
- C. Respiratory alkalosis
- D. Metabolic acidosis
- E. No disorders of acid-base balance will be observed

407. 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. Obstructive jaundice
- B. Hepatocellular jaundice
- C. Acute intermittent porphyria
- D. Sickle-cell anemia
- E. Addison's disease

408. As a result of long-term starvation the glomerular filtration of a man was accelerated by 20%. The most probable cause of filtration changes under such conditions is:

- A. Rise of systemic arterial pressure
- B. Increased permeability of renal filter
- C. Fall of oncotic pressure of blood plasma
- D. Growth of filtration coefficient
- E. Increase of renal plasma flow

409. 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. Uric acid
- B. Urea
- C. Creatinine
- D. C-reactive protein
- E. Transferrin

410. 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. Cholesterol
- B. Bilirubin
- C. Uric acid
- D. Urea
- E. Cystine

411. A 44 year old woman complains of general weakness, heart pain, and significant increase of body weight. Objectively: moon face, hirsutism, AP is 165/100 mm Hg, height - 164 cm, weight - 103 kg; the fat is mostly accumulated on her neck, thoracic girdle, belly. What is the main pathogenetic mechanism of obesity?

- A. Reduced production of thyroid hormones
- B. Increased production of glucocorticoids
- C. Increased insulin production
- D. Reduced glucagon production
- E. Increased mineralocorticoid production

412. A patient is ill with hepatocirrhosis. State of antitoxic liver function can be characterized by examination of the following substance excreted by urine:

- A. Hippuric acid
- B. Ammonium salts
- C. Creatinine
- D. Uric acid
- E. Amino acids

413. 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. Vasopressin reduction
- B. Vasopressin increase
- C. Aldosterone reduction
- D. Aldosterone increase
- E. Reduction of atrial natriuretic factor

414. A patient has a decreased vasopressin synthesis that causes polyuria and as a result of it evident organism dehydration. What is the mechanism of polyuria development?

- A. Reduced tubular reabsorption of Na ions
- B. Reduced tubular reabsorption of protein
- C. Reduced tubular reabsorption of water
- D. Reduced glucose reabsorption

E. Acceleration of glomerular filtration

415. 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. C
- B. K
- C. A
- D. B1
- E. B2

416. A patient ill with essential hypertension was recommended a drug that prevents thrombosis. It is to be taken parenterally. What drug is it?

- A. Heparin
- B. Amben
- C. Protamine sulfate
- D. Neodicumarin
- E. Syncumar

417. A patient being treated for viral hepatitis type B got symptoms of hepatic insufficiency. What blood changes indicative of protein metabolism disorder will be observed in this case?

- A. Absolute hypoalbuminemia
- B. Absolute hyperalbuminemia
- C. Absolute hyperfibrinogenemia
- D. Proteinic blood composition is unchanged
- E. Absolute hyperglobulinemia

418. A patient with suspected diagnosis "progressing muscular dystrophy" got his urine tested. What compound will confirm this diagnosis if found in urine?

- A. Calmodulin
- B. Creatine
- C. Collagen
- D. Porphyrin
- E. Myoglobin

419. A driver who got a trauma in a road accident and is shocked has reduction of daily urinary output down to 300 ml. What is the main pathogenetic factor of such diuresis change?

- A. Drop of oncotic blood pressure
- B. Increased vascular permeability
- C. Decreased number of functioning glomerules
- D. Drop of arterial pressure
- E. Secondary hyperaldosteronism

420. A patient takes digoxin for treatment of cardiac insufficiency. What diuretic may increase digoxin toxicity due to the intensified excretion of *K* ions?

- A. Spironolactone
- B. Panangine
- C. Siliborum
- D. Lisinopril
- E. Hydrochlorothiazide

421. Ultramicroscopical examination of "dark" hepatocyte population in the cell cytoplasm detected a developed granular endoplasmic reticulum. What function has this organelle in these cells?

- A. Carbohydrate synthesis
- B. Deintoxicative function
- C. Bile production
- D. Synthesis of blood plasma proteins
- E. Calcium ion depositing

422. A patient came to the hospital complaining about quick fatigability and apparent muscle weakness. Examination revealed an autoimmune disease that causes disorder of functional receptor condition in neuromuscular synapses. What transmitter will be blocked?

- A. Noradrenalin
- B. Dopamine
- C. Acetylcholine
- D. Serotonin
- E. Glycine

423. 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. Valine
- B. Arginine
- C. Serine
- D. Phenylalanine
- E. Glutamic acid

424. Pharmacological effects of antidepressants are connected with inhibition of an enzyme catalyzing inactivation of biogenic amines such as noradrenaline and serotonin. What enzyme participates in this process?

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

425. A patient underwent a surgery for excision of a cyst on pancreas. After this he developed haemorrhagic syndrome with apparent disorder of blood coagulation. Development of this complication can be explained by:

- A. Activation of fibrinolytic system
- B. Insufficient fibrin production
- C. Reduced number of thrombocytes
- D. Activation of anticoagulation system
- E. Activation of Christmas factor

426. 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. Carbonic anhydrase
- B. Ceruloplasmin
- C. Xanthine oxidase
- D. Leucine aminopeptidase
- E. Alcohol dehydrogenase

427. Examination of a patient with frequent haemorrhages from the internal organs and mucous membranes revealed proline and lysine within the collagen fibers. Disorder of their hydroxylation is caused by lack of the following vitamin:

- A. Vitamin K
- B. Vitamin A
- C. Vitamin C
- D. Vitamin B1
- E. Vitamin E

428. 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. Neuroalbumin
- B. Proopiomelanocortin (POMC)
- C. Neurostromin
- D. Neuroglobulin

E. Thyroglobulin

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

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

430. A patient suffering from coronary artery disease had taken a certain drug many times a day in order to arrest stenocardia attacks. Overdose of this drug finally caused intoxication. Objectively: cyanotic skin and mucous membranes, dramatic fall in the arterial pressure, tachycardia, respiration inhibition. Blood has increased concentration of methemoglobin. The drug the patient had taken relates to the following group:

- A. Organic nitrates
- B. α -adrenoceptor blockers
- C. Calcium channel blockers
- D. Adenosine drugs
- E. Myotropic spasmolytics

431. A middle-aged man went to a foreign country because he had been offered a job there. However he had been unemployed for quite a long time. What endocrine glands were exhausted most of all in this man?

- A. Parathyroid glands
- B. Adrenal glands
- C. Seminal glands
- D. Substernal gland
- E. Thyroid gland

432. After a sprint an untrained person develops muscle hypoxia. This leads to the accumulation of the following metabolite in muscles:

- A. Ketone bodies
- B. Lactate
- C. Acetyl CoA
- D. Glucose 6-phosphate
- E. Oxaloacetate

433. Examination of a patient revealed overgrowth of facial bones and soft tissues, tongue enlargement, wide interdental spaces in the enlarged dental arch. What changes of the hormonal secretion are the most likely?

- A. Hyposecretion of the somatotropic hormone

- B. Hypersecretion of insulin
- C. Hyposecretion of thyroxin
- D. Hypersecretion of the somatotropic hormone
- E. Hyposecretion of insulin

434. 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. Somatotropin
- B. Vasopressin
- C. Prolactin
- D. Thyrocalcitonin
- E. Glucagon

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

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

436. 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. DOPA
- B. GABA
- C. Histamine
- D. Serotonin
- E. Dopamine

437. After a disease a 16-year-old boy is presenting with decreased function of protein synthesis in the liver as a result of vitamin K deficiency. This may cause disorder of:

- A. Erythrocyte sedimentation rate
- B. Blood coagulation
- C. Anticoagulant production
- D. Erythropoietin production
- E. Osmotic blood pressure

438. As a result of a road accident a driver has gotten a trauma. Now he is in shock condition and presents with a decrease in daily diuresis down to

300 ml. What is the main pathogenetic factor of such alteration in the diuresis?

- A. Oncotic blood pressure drop
- B. Increase in vascular permeability
- C. Decrease in number of the functioning glomerules
- D. Arterial pressure drop
- E. Secondary hyperaldosteronism

439. A patient suffers from the haemorrhagic syndrome that shows itself in frequent nasal bleedings, posttraumatic and spontaneous intracutaneous and intra-articular haemorrhages. After a laboratory study a patient was diagnosed with the type B haemophilia. This disease is provoked by the deficit of the following factor of blood coagulation:

- A. VIII
- B. XI
- C. V
- D. VII
- E. IX

440. A full-term newborn child has yellowish skin and mucous membranes. This might be probably caused by temporary deficiency of the following enzyme:

- A. Uridine transferase
- B. UDP-glucuronyltransferase
- C. Heme synthetase
- D. Heme oxygenase
- E. Biliverdin reductase

441. Examination of a patient revealed typical presentations of collagenosis. This pathology is characterized by increase of the following urine index:

- A. Arginine
- B. Glucose
- C. Mineral salts
- D. Hydroxyproline
- E. Ammonium salts

442. 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

443. A 46 year old woman suffering from cholelithiasis developed jaundice. Her urine became dark-yellow and feces became colourless. Blood serum will have the highest concentration of the following substance:

- A. Unconjugated bilirubin
- B. Biliverdin
- C. Conjugated bilirubin
- D. Mesobilirubin
- E. Urobilinogen

444. Atria of an experimental animal were super-distended 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. Aldosterone
- B. Vasopressin
- C. Renin
- D. Angiotensin
- E. Natriuretic hormone

445. 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. B1
- B. B6
- C. H
- D. K
- E. E

446. Hepatitis has led to the development of hepatic failure. Mechanism of edemata formation is activated by the impairment of the following liver function:

- A. Protein-synthetic
- B. Barrier
- C. Chologenic
- D. Antitoxic
- E. Glycogen-synthetic

447. A viral infection has damaged cells that form walls of bile capillaries. This stimulated conditions for inflow of bile into the blood of sinusoidal capillaries. What cells are damaged?

- A. Kupffer's cells
- B. Ito cells
- C. Hepatocytes

- D. Pit-cells
- E. Endotheliocytes

448. 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 A
- B. Cytochrome B
- C. Cytochrome C
- D. Cytochrome P-450
- E. Cytochrome oxidase

449. A patient with hip fracture was prescribed a narcotic analgetic such as morphine. Its anesthetic action is determined by interaction with the following receptors:

- A. Adrenoreceptors
- B. Opiate receptors
- C. Cholinoreceptors
- D. Benzodiazepine receptors
- E. GABA-ergic receptors

450. 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 (ultrasound examination) of kidneys revealed kidney concrements. What is the most likely pathology?

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

451. 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. Indican
- B. Creatinine
- C. Urea
- D. Oxyproline
- E. Urobilinogen

452. The secretion of which pituitary hormones will be inhibited after taking the oral contraceptives containing sex hormones?

- A. Vasopressin
- B. Gonadotropic hormone
- C. Thyrotrophic hormone

- D. Somatotrophic hormone
- E. Ocytocin

453. Which of the listed diuretic agents WILL NOT have diuretic effect on a patient with Addison's disease?

- A. Furosemide
- B. Spironolactone
- C. Hydrochlorothiazide
- D. Triamterene
- E. Ethacrynic acid

454. Jaundice treatment involves administration of barbiturates inducing the synthesis of UDP-glucuronyl transferase. A medicinal effect is caused by the production of:

- A. Indirect reacting (unconjugated) bilirubin
- B. Direct reacting (conjugated) bilirubin
- C. Biliverdin
- D. Protoporphyrin
- E. Heme

455. 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. Hepatocellular jaundice
- B. Parenchymatous jaundice
- C. Obstructive jaundice
- D. Hemolytic jaundice
- E. Cythemolytic jaundice

456. A female patient presents with endocrine dysfunction of follicular cells of the ovarian follicles resulting from an inflammation. The synthesis of the following hormone will be inhibited:

- A. Progesterone
- B. Estrogen
- C. Lutropin
- D. Follicle stimulating hormone
- E. Follistatine

457. A patient complains of polyuria (7 liters per day) and polydipsia. Examination reveals no disorders of carbohydrate metabolism. These abnormalities might be caused by the dysfunction of the following endocrine gland:

- A. Adenohypophysis (anterior pituitary gland)
- B. Islets of Langerhans (pancreatic islets)
- C. Neurohypophysis (posterior pituitary gland)

- D. Adrenal cortex
- E. Adrenal medulla

458. Blood plasma of a healthy man contains several dozens of proteins. During an illness new proteins can originate, namely the protein of "acute phase". Select such protein from the listed below:

- A. Prothrombin
- B. Fibrinogen
- C. C-reactive protein
- D. G immunoglobulin
- E. A immunoglobulin

459. A tooth extraction in a patient with chronic persistent hepatitis was complicated with prolonged hemorrhage. What is the reason for the haemorrhagic syndrome?

- A. Increase in thromboplastin production
- B. Decrease in fibrin production
- C. Increase in fibrinogen synthesis
- D. Fibrinolysis intensification
- E. Decrease in thrombin production

460. 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. Lactate dehydrogenase
- B. Pyruvate dehydrogenase
- C. Glutamate dehydrogenase
- D. Creatine phosphokinase
- E. Adenylate cyclase

461. 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. Thyrocalcitonin
- B. Thyroxin
- C. Somatotropic hormone
- D. Triiodothyronine
- E. Parathormone

462. Vegetative abnormalities in the sleep, heat regulation, all kinds of metabolism, diabetes insipidus are developing in the patient due to growth of the tumour in the III ventricle of brain. Irritation of the nucleus of what part of the brain can cause these symptoms?

- A. Cerebral peduncles (crura cerebri)
- B. Mesencephalic tegmentum

- C. Pons cerebelli
- D. Hypothalamus
- E. Medulla

463. 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. Glucagon
- B. Thyroxin
- C. Insulin
- D. Aldosterone
- E. Adrenalin

464. 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

465. A 20 year old patient complains of morbid thirst and hyperdiuresis (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. Cortisol
- B. Thyroxin
- C. Oxytocin
- D. Insulin
- E. Vasopressin

466. 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

467. 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. Phosphorylation of serine radicals
- B. Partial proteolysis
- C. Carboxylation of glutamic acid
- D. Polymerization
- E. Glycosylation

468. A patient presented to a hospital with complaints about quick fatigability and significant muscle weakness. Examination revealed an autoimmune disease that causes functional disorder of receptors in the neuromuscular synapses. This will result in the disturbed activity of the following mediator:

- A. Noradrenaline
- B. Acetylcholine
- C. Dopamine
- D. Serotonin
- E. Glycine

469. Toxic affection of liver results in dysfunction of protein synthesis. It is usually accompanied by the following kind of dysproteinemia:

- A. Relative hypoproteinemia
- B. Absolute hyperproteinemia
- C. Relative hyperproteinemia
- D. Absolute hypoproteinemia
- E. Paraproteinemia

470. After taking poor-quality food a patient developed repeated episodes of diarrhea. On the next day he presented with decreased arterial pressure, tachycardia, extrasystole. Blood pH is 7,18. These abnormalities were caused by the development of:

- A. Gaseous acidosis
- B. Nongaseous alkalosis
- C. Nongaseous acidosis
- D. Gaseous alkalosis
- E. Metabolic alkalosis

471. 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. Transcobalamin
- B. Haptoglobin
- C. Ceruloplasmin

- D. Transferrin
- E. Albumin

472. A patient with diabetes developed a diabetic coma due to the acid-base imbalance. Specify the kind of this imbalance:

- A. Metabolic alkalosis
- B. Metabolic acidosis
- C. Respiratory acidosis
- D. Gaseous alkalosis
- E. Non-gaseous alkalosis

473. 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. Albumins
- B. α 1-globulins
- C. γ -globulins
- D. α 2-globulins
- E. β -globulins

474. A patient with respiratory failure has blood pH of 7,35. $p\text{CO}_2$ test revealed hypercapnia. Urine pH test revealed an increase in the urine acidity. What form of acid-base imbalance is the case?

- A. Compensated metabolic acidosis
- B. Decompensated metabolic acidosis
- C. Compensated respiratory alkalosis
- D. Compensated respiratory acidosis
- E. Decompensated respiratory alkalosis

475. 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. Parenchymal (hepatic)
- B. Mechanical
- C. Hemolytic
- D. Neonatal jaundice
- E. Gilbert's disease

476. Curariform substances introduced into a human body cause the relaxation of all skeletal muscles. What changes in the neuromuscular synapse cause this phenomenon?

- A. Impaired acetylcholine release
- B. Blockade of Ca^{2+} channels of the presynaptic membrane
- C. Impaired cholinesterase synthesis

- D. Depolarization of the postsynaptic membrane
- E. Blockade of cholinergic receptors of the synaptic membrane

477. By the decarboxylation of glutamate in the CNS an inhibitory mediator is formed. Name it:

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

478. A comatose patient was taken to the hospital. He has a history of diabetes mellitus. Objectively: Kussmaul breathing, low blood pressure, acetone odor of breath. After the emergency treatment the patient's condition improved. What drug had been administered to the patient?

- A. Adrenaline
- B. Isadrinum
- C. Glibenclamide
- D. Insulin
- E. Furosemide

479. 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. Addition of an amino group
- B. Oxidative deamination
- C. Removal of a methyl group
- D. Carboxylation
- E. Hydrolysis

480. Enzymatic jaundices are accompanied by decreased activity of UDP-glucuronyl transferase. What compound is accumulated in blood serum in case of these pathologies?

- A. Conjugated bilirubin
- B. Unconjugated bilirubin
- C. Dehydrobilirubin
- D. Hydrobilirubin
- E. Choleglobin

481. 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. Amino acids

- B. Glucose
- C. Lipids
- D. Urea
- E. Glycosaminoglycans

482. 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. Oxytocin
- B. Aldosterone
- C. Adrenaline
- D. Glucagon
- E. Testosterone

483. 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. Reabsorption
- C. Secretion
- D. Reabsorption and secretion
- E. Secretion and filtration

484. A 46-year-old female is scheduled for a maxillofacial surgery. It is known that the patient is prone to high blood coagulation. What natural anticoagulant can be used to prevent blood clotting?

- A. Hirudin
- B. Sodium citrate
- C. Fibrinolysin
- D. Heparin
- E. None of the above-listed substances

485. 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. Sulfation
- B. Glucuronidation
- C. Methylation
- D. Glycosylation
- E. Hydroxylation

486. 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. Hydrocortisone
- B. Estrone
- C. Testosterone
- D. ACTH
- E. Oxytocin

487. 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. Calcitonin
- B. Cortisol
- C. Aldosterone
- D. Parathyroid hormone
- E. Calcitriol

488. 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

489. 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. Cortisol
- B. Sex hormones
- C. Adrenaline, vasopressin
- D. Oxytocin
- E. Aldosterone

490. 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. Keratin
- B. Albumin
- C. Hemoglobin
- D. Collagen
- E. Fibrinogen

491. Feces of a patient contain high amount of undissociated fats and have grayish-white color. Specify the cause of this phenomenon:

- A. Hypoactivation of pepsin by hydrochloric acid
- B. Obturation of bile duct
- C. Hypovitaminosis
- D. Enteritis
- E. Irritation of intestinal epithelium

492. 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. Hippuric acid
- B. Porphyrin
- C. Urea
- D. Creatine
- E. Creatinine

493. A patient with chronic heart failure with edema has increased level of blood aldosterone. What diuretic would be most effective in this case?

- A. Triamterene
- B. Spironolactone
- C. Acetazolamide
- D. Hydrochlorothiazide
- E. Furosemide

494. Human red blood cells do not contain mitochondria. What is the main pathway for ATP production in these cells?

- A. Aerobic glycolysis
- B. Anaerobic glycolysis
- C. Oxidative phosphorylation
- D. Creatine kinase reaction
- E. Cyclase reaction

495. Urine analysis has shown high levels of protein and erythrocytes in urine. This can be caused by the following:

- A. Hydrostatic blood pressure in glomerular capillaries
- B. Effective filter pressure
- C. Renal filter permeability
- D. Hydrostatic primary urine pressure in capsule
- E. Oncotic pressure of blood plasma

496. A patient is diagnosed with hereditary coagulopathy that is characterized by factor VIII deficiency. Specify the phase of blood clotting during which coagulation will be disrupted in the given case:

- A. Thrombin formation

- B. Fibrin formation
- C. Clot retraction
- D. Prothrombinase formation
- E. -

497. 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. α 2-macroglobulin, α 1-antitrypsin
- B. Immunoglobulin
- C. Cryoglobulin, interferon
- D. Ceruloplasmin, transferrin
- E. Hemoplexin, haptoglobin

498. 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. Hemolytic jaundice
- B. Hepatitis
- C. Chronic colitis
- D. Cholelithiasis
- E. Chronic gastritis

499. 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 greatly affected by the following substance:

- A. Angiotensinogen
- B. Renin
- C. Angiotensin II
- D. Catecholamines
- E. Norepinephrine

500. According to the results of glucose tolerance test, the patient has no disorder of carbohydrate tolerance. Despite that, glucose is detected in the patient's urine (5 mmol/l). The patient has been diagnosed with renal diabetes. What renal changes cause glucosuria in this case?

- A. Increased activity of glucose reabsorption transporter
- B. Exceeded glucose reabsorption threshold
- C. Increased glucose secretion
- D. Decreased activity of glucose reabsorption transporter
- E. Increased glucose filtration

501. In the course of an experiment adenohipophysis (anterior pituitary) 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. Thyroid hormones
- B. Somatotropin
- C. Tropic hormones
- D. Cortisol
- E. Thyroxin

502. 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. Conversion of homocysteine to methionine
- B. Conversion of methylmalonyl CoA to succinyl CoA
- C. Degradation of glutathione
- D. Hydroxylation of proline
- E. Production of gamma-carboxyglutamate

503. 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

504. 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. Hyperbilirubinemia
- B. Bilirubinuria
- C. Increase of ALT, AST level
- D. Cholemia
- E. Urobilinuria

505. 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. Neutral fats
- B. Sphingolipids
- C. Higher fatty acids
- D. Cholesterol
- E. Phosphatidic acid

506. A patient with signs of emotional lability that result in troubled sleep has been prescribed diazepam. Specify the sleep-inducing mechanism of this drug:

- A. Blockade of opiate receptors
- B. Inhibition of stimulating amino acids
- C. H1-histamine receptors stimulation
- D. GABA-ergic system activation
- E. Supression of serotonergic neurotransmission

507. 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 activates both GP and GS
- B. It inhibits GP and activates 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

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

509. A 16-year-old adolescent is diagnosed with hereditary UDP (uridine diphosphate) glucuronyltransferase deficiency. Laboratory tests revealed hyperbilirubinemia caused mostly by increased blood content of the following substance:

- A. Conjugated bilirubin
- B. Unconjugated bilirubin
- C. Urobilinogen
- D. Stercobilinogen
- E. Biliverdine

510. 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. Haptoglobin
- B. Heparin
- C. Prothrombin

- D. Creatin
- E. Ceruloplasmin

511. 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. Hypofunction of the medulla
- B. Hyperfunction of the adrenal cortex
- C. Hypofunction of the adrenal cortex
- D. Hyperfunction of the medulla
- E. Primary aldosteronism

512. Along with normal hemoglobin types there can be pathological ones in the organism of an adult. Name one of them:

- A. HbF
- B. HbA1
- C. HbS
- D. HbA2
- E. HbO2

513. 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. Noradrenaline
- C. Adrenaline
- D. Dopamine
- E. Serotonin

514. 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 alkalosis
- B. Metabolic acidosis
- C. Respiratory acidosis
- D. Respiratory alkalosis
- E. Normal acid-base balance

515. 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. B₁₂
- B. B₁
- C. K
- D. C
- E. P

516. A 43-year-old patient suffers from acute pancreatitis with disrupted common bile duct patency. What condition can develop in this case?

- A. Hemolytic jaundice
- B. Hepatocellular jaundice
- C. Hepatic coma
- D. Mechanical jaundice
- E. Portal hypertension

517. Prolonged treatment of hypothyroidism has caused general dystrophy, dental caries, tachycardia, tremor of extremities. What drug is the cause of these side effects?

- A. Humulin (Human insulin)
- B. Parathyroidinum
- C. Thyrocalcitonin
- D. L-thyroxin
- E. Prednisolone

518. A patient is diagnosed with cardiac infarction. Blood test for cardiospecific enzymes activity was performed. Which of the enzymes has three isoforms?

- A. Lactate dehydrogenase
- B. Aspartate transaminase
- C. Alanine transaminase
- D. Pyruvate kinase
- E. Creatine kinase

519. Parkinson's disease is caused by disruption of dopamine synthesis. What brain structure synthesizes this neurotransmitter?

- A. Substantia nigra
- B. Globus pallidus
- C. Corpora quadrigemina
- D. Red nucleus
- E. Pituitary gland

520. During narcosis a patient developed a risk of cerebral edema. What drug should be administered in this case?

- A. Dopamine
- B. Phenazepam
- C. Triamterene

- D. Furosemide
- E. Sodium bromide

521. 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 alkalosis
- B. Metabolic acidosis
- C. Metabolic alkalosis
- D. Respiratory acidosis
- E. Acid-base balance remains unchanged

522. Upon toxic damage of hepatic cells resulting in disruption of liver function the patient developed edemas. What changes of blood plasma are the main cause of edema development?

- A. Increase of globulin content
- B. Decrease of albumin content
- C. Decrease of fibrinogen content
- D. Increase of albumin content
- E. Decrease of globulin content

523. 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. Unconjugated and conjugated bilirubin content
- B. Erythrocytes sedimentation rate (ESR)
- C. Aminotransferase activity (AST, ALT)
- D. Cholesterol content
- E. Protein fraction content

524. 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. Aminolevulinate synthase
- B. Heme oxygenase
- C. Heme synthetase
- D. Biliverdine reductase
- E. UDP-glucuronyl transferase

525. Autopsy of a 40-year-old woman, who died of cerebral hemorrhage during hypertensive crisis, revealed: upperbody obesity, hypertrichosis, hirsutism, stretchmarks on the skin of thighs and abdomen. Pituitary basophil adenoma is detected in the anterior lobe. What diagnosis is the most likely?

- A. Essential hypertension

- B. Alimentary obesity
- C. Simmonds' disease
- D. Cushing's disease
- E. Hypothalamic obesity

526. A patient suffers from acute cardiopulmonary failure with pulmonary edema. What powerful diuretic should be prescribed in the given case?

- A. Triamterene
- B. Furosemide
- C. Spironolactone
- D. Hydrochlorothiazide (Dichlothiazidum)
- E. Acetazolamide (Diacarb)

527. 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

528. 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. Uric acid
- C. Cystine
- D. Bilirubin
- E. Cholesterol

529. 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-aminobutyric acid
- B. Gamma-carboxyglutamic acid
- C. Gamma-oxybutyric acid
- D. Hydroxyproline
- E. Monoamine-dicarboxylic acids

530. 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. Kidneys
- B. Heart

- C. Lungs
- D. Liver
- E. Spleen

531. 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. Hyponatremia
- B. Hyperchlorhydria
- C. Hypocalcemia
- D. Hypophosphatemia
- E. Hyperkalemia

532. 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

533. A 64-year-old woman presents with disturbed fine motor function of her fingers, marked muscle rigidity, and tremor. The neurologist diagnosed her with Parkinson's disease. What brain structures are damaged resulting in this disease?

- A. Pituitary gland
- B. Red nuclei
- C. Cerebellum
- D. Substantia nigra
- E. Reticular formation

534. 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. Parenchymal (hepatic)
- B. Mechanical
- C. Hemolytic
- D. Neonatal
- E. Gilbert's disease

535. During acute hemorrhage the body loses not only fluid but also electrolytes. What substance solution can be used as a simple blood substitute?

- A. Sodium bromide
- B. Albumin
- C. Sodium nucleotide
- D. Calcium chloride
- E. Sodium chloride

536. 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 hypothalamo-pituitary-adrenal axis?

- A. Somatoliberin
- B. Somatostatin
- C. Corticostatin
- D. Corticoliberin
- E. Thyroliberin

537. 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. Diabetes insipidus
- B. Myxedema
- C. Renal disorder
- D. Essential hypertension
- E. Pellagra

538. 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. Thrombocytopenia
- B. Decrease of fibrinogen content in blood
- C. Hypocalcemia
- D. Increased activity of anticoagulation system
- E. Decrease of albumine content in blood

539. A 40-year-old woman on examination presents with intensified basal metabolic rate. What hormone present in excess leads to such condition?

- A. Thyrocalcitonin
- B. Glucagon
- C. Aldosterone
- D. Somatostatin
- E. Triiodothyronine

540. 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. Transcobalamin
- B. Transferrin
- C. Haptoglobin
- D. Ceruloplasmin
- E. Albumin

541. 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. Somatotropin
- B. Gonadotropin
- C. Melanocyte-stimulating hormone
- D. β -lipotropin
- E. Thyroid-stimulating hormone

542. A lab rat has subcutaneously received mercury(II) chloride in the amount of 5 mg/kg. 24 hours later the plasma creatinine concentration increased several times. What mechanism of retention azotemia is observed in this case?

- A. Increased creatinine production in the muscles
- B. Increased creatinine reabsorption
- C. Increased glomerular filtration
- D. Decreased glomerular filtration
- E. Increased creatinine production in the renal tubules

543. 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 creatine and creatinine
- C. LDH-isoenzyme activity in the blood
- D. Transaminase activity in the blood
- E. Blood urates

544. A patient presents with acute attack of cholelithiasis. Laboratory examination of the patient's feces will show the following in this case:

- A. Positive reaction to stercobilin
- B. Connective tissue
- C. Partially digested cellulose
- D. Negative reaction to stercobilin
- E. Starch granules

545. 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. Intensive breakdown of muscle proteins
- B. Accumulation of creatinine in muscles
- C. Decreased content of lipids in muscles
- D. Increased content of ADP in muscles
- E. Accumulation of lactic acid in muscles

546. 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. Leukopoietins
- B. Carbaminohemoglobin
- C. Erythropoietins
- D. Catecholamines
- E. 2,3-bisphosphoglycerate

547. 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. Arginine
- B. Alanine
- C. Lysine
- D. Ornithine
- E. Aspartate

548. 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. Bilirubin-albumin complex
- B. Bilirubin glucuronide
- C. Verdohemoglobin
- D. Unconjugated bilirubin
- E. Bile acids

549. 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. Decarboxylation
- B. Transamination
- C. Phosphorilation
- D. Hydroxylation

E. Deamination

550. 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. Brain
- C. Lungs
- D. Muscles
- E. Stomach

551. 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 alkalosis
- B. No imbalance occurs
- C. Metabolic acidosis
- D. Respiratory acidosis
- E. Respiratory alkalosis

552. To stimulate the labor activity a parturient woman was prescribed a drug - a posterior pituitary hormone that does not affect the blood pressure. As the pregnancy progresses, the sensitivity to this hormone increases. Name the prescribed drug:

- A. Dinoprostone
- B. Dinoprost
- C. Pituitrin
- D. Oxytocin
- E. Ergotal

553. 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. Argininosuccinic aciduria
- B. Hyperuricemy
- C. Hyperazotemia
- D. Hyperaminoacidemia
- E. Citrullinuria

554. 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. Cortisol

- B. Serotonin
- C. Angiotensin II
- D. Dopamine
- E. Adrenalin

555. 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. Haptoglobin
- B. Siderophilin
- C. Metallothionein
- D. Ceruloplasmin
- E. Transcobalamin