

PROTEINS

*STRUCTURE AND FUNCTIONS OF
CARBOHYDRATES AND LIPIDS*

CONJUGATED PROTEINS

NUCLEOPROTEINS

VITAMINS

ENZYMES

BIOENERGETICS

PHARMACEUTICAL BIOCHEMISTRY

HORMONES

CARBOHYDRATE METABOLISM

LIPID METABOLISM

PROTEIN METABOLISM

METABOLISM OF CONJUGATED PROTEINS

PROTEIN BIOSYNTHESIS

PROTEINS

- 1) Proteinogenous amino acids form proteins. In what position the amino group is to be?
- A. α -position
 - B. γ -position
 - C. β -position
 - D. δ -position
 - E. ε -position
- 2) Point to obligatory components of parenteral protein feeding in a form of solution:
- A. Essential amino acids
 - B. Mixture of any amino acids
 - C. Plant proteins
 - D. Non-essential amino acids
 - E. Sulfur-containing amino acids
- 3) A patient with the damaged esophagus was recommended a parenteral feeding. Point, which from the listed preparations belongs to such a group?
- A. Hydrolysine
 - B. Asparkam
 - C. Rheopolyglucin
 - D. Polyglucin
 - E. Panangin
- 4) At forming a tertiary structure of most globular proteins non-polar radicals of the amino acids are plunged into internal hydrophobic phase of a molecule. Name one of such hydrophobic amino acids.
- A. Valine
 - B. Lysine
 - C. Arginine
 - D. Glutamic acid
 - E. Aspartic acid
- 5) In medical practice preparations of protein hydrolyzate are used for parenteral nutrition. Value of the hydrolyzates is determined by presence of the essential amino acids in them. Point, which from the listed amino acids is essential:
- A. Methionine
 - B. Tyrosine
 - C. Alanine
 - D. Glycine
 - E. Cysteine

6) One of the amino acids active form serves as a methyl group donator for pharmaceutical [drug] substance methylation. Choose it:

- A. Methionine
- B. Glutamine
- C. Glutamate
- D. Cysteine
- E. Glycine

7) Patient D. complains about the liver disorders. Simultaneously with drug administration and diet, the doctor suggested D. to eat cottage cheese more often. What is the compound in the cottage cheese that is involved in normalizing the function of the liver?

- A. Methionine
- B. Tryptophan
- C. Glutamate
- D. Aspartate
- E. Alanine

8) Basis of the amino acid structural classification is the structure of their side chain. Which of the listed amino acids is basic?

- A. Lysine
- B. Proline
- C. Alanine
- D. Leucine
- E. Methionine

9) Some proteins in the human organism show buffer properties. With the help of what amino acid hemoglobin shows the buffer properties in the blood?

- A. Histidine
- B. Threonine
- C. Valine
- D. Isoleucine
- E. Alanine

10) For determination of sulfur-containing α -amino acids the reaction ... is used.

- A. With $\text{Pb}(\text{NO}_3)_2$
- B. Xanthoproteinic
- C. With $\text{Cu}(\text{OH})_2$
- D. With ninhydrin
- E. Biuret test

11) What specific reaction allows us to find out aromatic amino acids which are included in composition of native proteins?

- A. Xanthoproteic test
- B. Ninhydrin test

- c. Fehling's reaction
- D. Fohl's reaction
- E. Biuret test

12) Level of blood total protein is one of the metabolism indices in the human organism. A quantitative determination in clinicodiagnostic laboratories is based on:

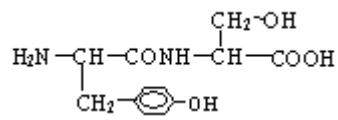
- A. Biuret test
- B. Ninhydrin test
- C. Xanthoprotein test
- D. Fole reaction
- E. Nitroprusside test

13) Point to the main kind of chemical bond which is typical for the primary structure of protein molecule:

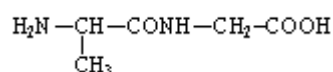
- A. Peptide
- B. Hydrophobic
- C. Hydrogen
- D. Disulfide
- E. Ionic interactions

14) When analyzing the dipeptide, it was found that the N-terminal α -amino acid is tyrosine, and the C-terminal - serine. Choose the dipiphide formula among the following:

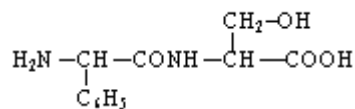
A



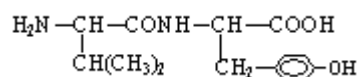
B



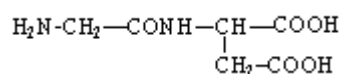
C



D



E



15) Dipeptide carnosine increases the effectiveness of the muscle cell pumps. Point the amino acids from which it is synthesized.

- A. Histidine, L-alanine

- B. Histidine , D-alanine
- C. Histidine, glycine
- D. Histidine, valine
- E. Histidine, cysteine

16) Different biologically active compounds are involved in the regulation of arterial pressure. What peptides that enter the bloodstream can affect the vascular tone?

- A. Kinins
- B. Enkephalins
- C. Iodtyronines
- D. Leukotrienes
- E. Endorphins

17) Natural peptides can carry out various functions. What biologically active peptide is one of the main antioxidants and performs coenzyme function?

- A. Glutathione
- B. Bradykinins
- C. Oxytocin
- D. Liberine
- E. Unserine

18) Some oxidative reactions result in formation of hydrogen peroxide, which is a toxic compound for the human organism. Glutathione plays an important role in its reduction. Name amino acids which are included into the glutathione composition.

- A. Glutamic acid, cysteine, glycine
- B. Aspartic acid, valine, serine
- C. Lysine, methionine, tryptophan
- D. Phenylalanine, lysine, tyrosine
- E. Isoleucine, histidine, alanine

19) Proteins have several levels of the three-dimensional structure. What bonds take part in the formation of the secondary structure?

- A. Hydrogen
- B. Van der Waals forces
- C. Ether
- D. Hydrophobic
- E. Ionic

20) Point the bonds involved in the formation and supporting of the protein secondary structure.

- A. Hydrogen
- B. Peptide
- C. Hydrophobic interaction
- D. Ionic

E. Disulphide

21) Alpha-helix is one of the protein secondary structure forms. Point, what bonds stabilize this structure?

- A.* Hydrogen
- B.* Intramolecular interactions
- C.* Ionic
- D.* Hydrophobic
- E.* Peptide

22) Hemoglobin in the erythrocytes joins and transports oxygen from lungs to the tissues. What level of the structural organization of hemoglobin supports the respiratory function?

- A.* Quaternary
- B.* No importance
- C.* Tertiary
- D.* Secondary
- E.* Primary

23) Many proteins have a quaternary structure, i.e. consist of some polypeptide chains, each of them has its own specific well-ordered conformation. Point one of such proteins.

- A.* Hemoglobin
- B.* Myoglobin
- C.* Albumin
- D.* α_1 -globulin
- E.* Prealbumin

24) A structural specificity of fibrillar proteins is in forming of multimolecular filiform complexes – fibrils that consist of some parallel polypeptide chains. Name a fibrillar protein that is included in the composition of hair, skin, nails.

- A.* Alpha-keratin
- B.* Albumin
- C.* Prothrombin
- D.* Globulin
- E.* Histone

25) Biosynthesis of collagen – main protein of the connective tissue – includes co- and post-translational modifications that lead to the mature collagen fibril formation. In the basis of collagen formation is the process of:

- A.* Hydroxylation
- B.* Proteolysis
- C.* Phosphorylation
- D.* Carboxylation
- E.* Glycosilation

26) A patient has increased vascular permeability. Point the connective tissue protein, which synthesis disorders lead to this state.

- A. Collagen
- B. Myoglobin
- C. Albumin
- D. Globulins
- E. Ceruloplasmin

27) Investigation of three-dimensional protein conformation is carried out with help of the named method. Point it:

- A. X-ray structure analysis
- B. Electrophoresis
- C. Dialysis
- D. Salting-out
- E. Isoelectric focusing

28) Give example of an oligomeric protein which has a supramolecular structure.

- A. Tobacco mosaic virus
- B. Globulin
- C. Albumin
- D. Myoglobin
- E. Insulin

29) In pharmaceutical industry some proteins, which are used as preparations for treatment, are isolated from the biological liquids. Point what method is used for this purpose:

- A. Salting-out
- B. Denaturation
- C. Electrophoresis
- D. Sequencing
- E. Dialysis

30) Method of salting-out is used in clinico-biochemical laboratories to separate albumins and globulins. Which of the listed compounds cause the salting-out?

- A. Neutral salts
- B. Organic vehicles
- C. Alkaloids
- D. Acids
- E. Alkalies

31) It is known that one of the functions of blood proteins is water retention. What is the protein fraction that performs this function?

- A. Albumins
- B. α -Globulins

- C.* Prothrombin
- D.* Fibrinogen
- E.* γ -Globulins

32) Hemorrhagic syndrome developed in a 59-year-old patient suffering from cirrhosis of the liver. What is the function of the liver is lowered, and is the cause of this condition?

- A.* Synthesis of protein
- B.* Conjugation
- C.* Bile formation
- D.* Hemopoietic
- E.* Detoxification

33) Salting-out is used in clinical practice for fractionating blood serum proteins and proteins of other biological fluids. What compounds are used for this purpose?

- A.* Alkali element salts
- B.* Acids
- C.* Detergents
- D.* Heavy metal salts
- E.* Alkalies

34) Salting-out is used in a technology of pharmaceutical protein preparations production. What method we can use to purify protein from low-molecular admixtures?

- A.* Dialysis
- B.* Denaturation
- C.* Sequencing
- D.* Centrifugation
- E.* Electrophoresis

35) Name a method of investigation by which it is possible to free an enzyme solution from low molecular weight admixtures.

- A.* Dialysis
- B.* X-ray analysis
- C.* Salting-out
- D.* Electrophoresis
- E.* Isoelectric focusing

36) Ammonium sulfate is used for the separation of enzymes from homogenates. Point, what method can be used for purification of an enzyme from ammonium sulfate?

- A.* Dialysis
- B.* Filtering
- C.* Ultracentrifugation
- D.* Chromatography

E. Electrophoresis

37) A sick person is in a hospital department - “artificial kidney”. Point the method that is used for purification of his blood from low-molecular compounds:

- A.* Dialysis
- B.* Denaturation
- C.* Electrophoresis
- D.* Hydrolysis
- E.* Salting-out

38) Under various diseases in support of diagnosis analysis of the protein blood fractions is carried out in biochemical laboratories with the help of electrophoresis. What protein feature is this method based on?

- A.* Availability of charge
- B.* Big molecular weight
- C.* Optical activity
- D.* Ability to swell
- E.* High viscosity

39) Among the methods used in the practice for the metabolism study is one that gives the opportunity to carry out separation, identification and quantitative determination of substances. Name it.

- A.* Electrophoresis
- B.* Spectrophotometry
- C.* X-ray analysis
- D.* Manometria
- E.* Ultracentrifuge

40) Albumins show the most electronegative properties under electrophoretic division of the blood serum proteins. What amino acid that is contained in molecules of albumins determines their acidic properties?

- A.* Glutamic acid
- B.* Leucine
- C.* Lysine
- D.* Alanine
- E.* Tryptophan

41) Albumins are blood serum proteins that are synthesized in the liver and fulfil certain functions. Point one of them:

- A.* Pharmaceutical substances transportation
- B.* Thrombi formation
- C.* Carbon dioxide (gas) transportation
- D.* Oxygen transportation
- E.* Antibody production

42) Edemas are discovered in a patient with kidney chronic disease during investigation. Biochemical analysis pointed to hypoproteinemia. This condition is most probable when the following blood protein fraction decreases:

- A. Albumin
- B. Transferrin
- C. Globulines
- D. Fibrinogen
- E. Ceruloplasmin

43) Interferon was revealed under electrophoretic separation of the ill person blood serum. What fraction does this protein belong to?

- A. Gamma-globulins
- B. Albumins
- C. Beta-globulins
- D. Alpha-2-globulins
- E. Alpha-1-globulins

44) One of protein functions is a protection of the organism from infectious diseases. What preventive antiviral preparation of nonspecific defence is recommended at the time of influenza epidemic?

- A. Interferon
- B. Thymosin
- C. Thymolin
- D. Albumin
- E. Sulfacetamide

45) Irreversible changes of the protein conformation are observed during heat treatment of food. This process is named:

- A. Denaturation
- B. Renaturation
- C. Salting-out
- D. Dialysis
- E. Aquation

46) Point to the structural level of protein molecule which remains native after the action of denaturants.

- A. Primary
- B. Quaternary
- C. Tertiary
- D. Secondary and tertiary
- E. Secondary

47) Preparation tannin is used in practical medicine as an astringent under acute and chronic sicknesses of the intestines. The astringent action of tannin is connected with its ability to:

- A. Denature proteins
- B. Hydrolyze proteins
- C. Renature proteins
- D. Salting-out proteins
- E. Oxidize proteins

STRUCTURE AND FUNCTIONS OF CARBOHYDRATES AND LIPIDS

- 1) The extract from the yeast was added to the sample with unknown substrate. After 10 minutes of incubation the mixture in the test-tube gave a positive Felling's reaction. What substrate was in the test-tube?
- A. Sucrose
 - B. Starch
 - C. Glycogen
 - D. Lactose
 - E. Cellulose
- 2) The main glucose storage in humans and higher animals is a certain polysaccharide, which is accumulated predominantly in the liver and muscles. Name it.
- A. Glycogen
 - B. Starch
 - C. Cellulose
 - D. Agar-agar
 - E. Inulin
- 3) The medication "Linetol" is used in medical practice for the correction of lipid metabolism. What essential fatty acid (polyunsaturated) is a part of it?
- A. Linoleic acid
 - B. Caproic acid
 - C. Butyric acid
 - D. Palmitic acid
 - E. Stearic acid
- 4) Liver fatty degeneration can be prevented by lipotropic substances. Which of the substances listed below belongs to them?
- A. Methionine
 - B. Cholesterol
 - C. Bilirubin
 - D. Glycine
 - E. Glucose
- 5) During recovering from acute viral hepatitis a patient should be administered a lipotropic preparation for prevention from fatty [adipose] degeneration of the liver. Point one of them:
- A. Choline
 - B. Vikasol
 - C. Tryptophan
 - D. Contrical

E. Allopurinol

6) There is a number of conditions that are necessary for lipid digestion. What compounds from the listed below provide fat emulsification, lipase activation, and absorption of fatty acids?

- A. Bile acids
- B. Amino acids
- C. Bilirubin
- D. Carbohydrates
- E. Cholesterol

7) The bile acids are a part of bile. Choose one of them:

- A. Cholyc
- B. Lactic
- C. Glutamic
- D. Arachidonic
- E. Pyruvic

8) Bile acid preparations are sometimes recommended with the preparation “Festal” (contains the pancreatic enzymes) for the improvement of digestion under pancreas secretory insufficiency. What is the purpose of their usage?

- A. For emulsification of fats
- B. For activation of the proteolytic enzymes
- C. For activation of α - amylase
- D. For stimulation of the pancreatic juice secretion
- E. For stimulation of intestinal peristalsis

9) Inhibition of the bile acid synthesis from cholesterol in the liver of experimental animals led to lipid digestion abnormalities. What role do the bile acids play in lipid digestion?

- A. Emulsify food lipids
- B. Take part in the lipid resynthesis
- C. Is part of LDL
- D. Keep an alkaline medium in the intestine
- E. Activate the chylomicron formation

10) What liquid of the digestive system participates in the process of fat emulsification?

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

11) In case of insufficient uptake or abnormality in formation of lipotropic factors in the human organism fatty degeneration of the liver appears. Which of the listed compounds is lipotropic?

- A. Choline
- B. Cholesterol
- C. Cholic acid
- D. Pyridoxine
- E. Nicotinamide

12) In a 60-year-old man with atherosclerosis some plasma membrane function abnormalities were observed because of the increasing of their harshness. What membrane compound content increase can lead to this?

- A. Cholesterol
- B. Phosphatidylcholin
- C. Glycolipids
- D. Phosphatidylethanolamine
- E. Proteins

13) In the human organism triacylglycerols and glycerophospholipids are synthesized from a common precursor. Point it.

- A. Phosphatidic acid
- B. Orotic acid
- C. Acetic acid
- D. Lipoic acid
- E. Malonic acid

14) A patient went to the hospital with liver function abnormalities. A doctor recommended him to use home-made cheese as a food source. What organic compound is present in home-made cheese and participates in the phospholipid synthesis and hepatocyte membrane recovery?

- A. Methionine
- B. Methanol
- C. Arginine
- D. Phosphatidylcholin
- E. Glycerol

15) A patient with ischemic cardiomyopathy was recommended to use fats which contain polyunsaturated fatty acids in the diet. Which of the listed fatty acids is polyunsaturated?

- A. Arachidonic acid
- B. Oleic acid
- C. Palmitic acid
- D. Stearic acid
- E. Myristic acid

16) Doctor recommended use fats containing polyunsaturated higher fatty acids to the patient with ischemic heart disease. What biomembrane components are synthesized using these substances?

- A. Phospholipids
- B. Cholesterol
- C. Proteins
- D. Glycolipids
- E. Lipoproteins

17) A patient with liver fatty infiltration was recommended the amino acid which is a methyl group donor for choline synthesis that determines its lipotropic effect. Point this amino acid.

- A. Methionine
- B. Cysteine
- C. Alanine
- D. Valine
- E. Glycine

18) A patient for improving of food fat digestion was administered a preparation of bile. What components of this preparation take part in fat emulsification?

- A. Bile acids
- B. Cholesterol and its esters
- C. Diglycerides
- D. Bilirubin glucuronides
- E. High fatty acids

19) The cottage cheese usage in diet was recommended for elderly patient In order to prevent the fatty liver infiltration development. What essential amino acid, which is necessary for the phospholipid synthesis, is contained in the cottage cheese?

- A. Methionine
- B. Arginine
- C. Lysine
- D. Valine
- E. Proline

20) The patient was appointed to make blood test for determining hyperlipoproteinemia in the morning. The laboratory technician noticed that the patient's blood had a whitish shade, and after 1 hour a white layer appeared on the surface. It turned out that the patient consumed fatty food 10 hours ago. What lipoprotein fraction was increased in the patient?

- A. Chylomicrons
- B. Very low density lipoproteins
- C. Low density lipoproteins
- D. Intermediate density lipoproteins

E. High density lipoproteins

21) Lecithin of different origin is used as a surface-active compound for the food production (as an emulsifier). By classification it refers to:

- A.* Phospholipids
- B.* Glycolipids
- C.* Triglycerides
- D.* Steroids
- E.* Sulpholipids

22) A doctor prescribed an anti-inflammatory drug to a patient with ulcer. This drug is a derivative of prostaglandin E₁. What compound is the metabolic source for that substance?

- A.* Arachidonic acid
- B.* Butyric acid
- C.* Oleic acid
- D.* Palmitic acid
- E.* Stearic acid

23) What compound is the final product of starch hydrolysis?

- A.* D-glucose
- B.* Maltose
- C.* D-fructose
- D.* D-galactose
- E.* Sucrose

24) What compound deficiency in the GIT can be a reason for fat absorption impairment?

- A.* Bile acids
- B.* Bile pigments
- C.* Lecithin
- D.* Cholesterol
- E.* Hydrocarbonates

25) A doctor recommended a patient diagnosed with atherosclerosis to restrict animal fat consumption, and replace them by plant oils that are rich in essential fatty acids. One of such compounds is:

- A.* Linoleic acid
- B.* Oleic acid
- C.* Ascorbic acid
- D.* Palmitic acid
- E.* Stearic acid

26) Food fibers that are components of the plant cell wall fulfil an important part in prophylaxis of GIT diseases. What main polysaccharide is present in the plant cell

wall?

- A. Cellulose
- B. Starch
- C. Glycogen
- D. Inulin
- E. Chondroitin sulfate

27) Main structural component of the plant cell wall is the homopolysaccharide cellulose. Like starch it contains glucose, but in contrast to the latter cellulose is not digested in the human GIT. Why?

- A. Because glucose residues in cellulose are connected by β -1,4-glycosidic bonds
- B. Because glucose residues in cellulose are connected by α -1,4-glycosidic bonds
- C. Because cellulose is not branched
- D. Because it contains galactose residues also
- E. Because cellulose contains L-glucose

28) Primarily, high-quality diet for patients should include compounds that are not synthesized in the human body. Including:

- A. Linoleic acid
- B. Pyruvic acid
- C. Asparaginic acid
- D. Palmitic acid
- E. Glutamic acid

CONJUGATED PROTEINS

- 1) A 30-year-old man is under hypoenergetic condition that is connected with functional abnormalities of the electron transport chain cytochromes, which are by their chemical nature:
 - A. Hemoproteins
 - B. Glycoproteins
 - C. Flavoproteins
 - D. Lipoproteins
 - E. Retinalproteins

- 2) A driver was in a car with the working engine in the closed garage. Later he felt a headache and vomit began. Formation of what compound has led to this state?
 - A. Carboxyhemoglobin
 - B. Methemoglobin
 - C. Cyanmethemoglobin
 - D. Deoxyhemoglobin
 - E. Oxyhemoglobin

- 3) A patient after operation was prescribed a glycosaminoglycan with an anticoagulating action. Point this compound:
 - A. Heparin
 - B. Chondroitin-6-sulfate
 - C. Chondroitin-4-sulfate
 - D. Hyaluronic acid
 - E. Keratan sulfate

- 4) Natural anticoagulant is prescribed for clotting system reduction. Name it:
 - A. Heparin
 - B. Vicasol
 - C. Ascorbic acid
 - D. Vitamin B₁₂
 - E. Allopurinol

- 5) Simple and conjugated proteins exist in the human organism. What is the difference between conjugated and simple proteins?
 - A. Existence of non-protein part in the protein
 - B. Absence of non-protein part in the protein
 - C. Sequence of the amino acids in the protein
 - D. Quantity of the amino acids in the protein
 - E. Protein molecular conformation

- 6) Prosthetic group of conjugated proteins joins to the polypeptide by different bonds. The residuum of phosphoric acid is joined to the protein part of

phosphoproteins by:

- A. OH-group of serine
- B. COOH-group of glutamine
- C. CH-group of methionine
- D. NH-group of lysine
- E. SH-group of cysteine

7) Structural changes of the erythrocytes and hemoglobin were discovered during blood investigation. Replacement of which amino acid (from β -chain of hemoglobin) can lead to this?

- A. Glutamic acid by valine
- B. Aspartic acid by valine
- C. Aspartic acid by leucine
- D. Glutamic acid by serine
- E. Glutamic acid by alanine

8) Concentration of carbon monoxide in the air increased because of nonobservance of the safety standards. What type of hemoglobin will be formed?

- A. Carboxyhemoglobin
- B. Cyanmethemoglobin
- C. Oxyhemoglobin
- D. Methemoglobin
- E. Carbhemooglobin

9) Chylomicrons are formed in the wall of the small intestine after the absorption of fat components. What lipids are transported in the chylomicrons?

- A. Triglycerides, phospholipids, cholesterol and its esters
- B. Only triglycerides
- C. Triglycerides and phospholipids
- D. Cholesterol and its esters
- E. Phospholipids, cholesterol and its esters

10) Carbohydrate component of proteoglycans is represented by glycosaminoglycans (GAGs). Which from the glycosaminoglycans is localized mainly in the liver, lungs and vascular wall?

- A. Heparin
- B. Hyaluronic acid
- C. Keratan sulfate
- D. Dermatan sulfate
- E. Chondroitin sulfate

11) Changes in the blood lipoprotein level is an evidence of lipid metabolism pathology. Increase of which lipoprotein level can lead to the atherosclerosis development?

- A. Low density lipoproteins (β - LP)

- B. Chylomicrons
- C. High density lipoproteins (α - LP)
- D. Structural lipoproteins
- E. Intermediate density lipoproteins

12) Hemoglobin has the property to form with carbon monoxide a very stable, life-threatening compound. How does it called?

- A. Carboxyhemoglobin
- B. Methemoglobin
- C. Carbihemoglobin
- D. Oxyhemoglobin
- E. Myoglobine

13) Sickle-cell disease is caused by a mutation of the gene that is responsible for the synthesis of the protein part of hemoglobin. Under that abnormality polar amino acid is replaced by non-polar and this leads to a decrease of hemoglobin and erythrocyte solubility. Point, what replacement occurred in the hemoglobin molecule?

- A. Glutamic acid by valine
- B. Alanine by phenylalanine
- C. Glutamic acid by aspartic acid
- D. Valine by serine
- E. Glutamic acid by lysine

14) Secretion of the ionized copper with urine and deposit of it in the tissues and organs is observed in a patient. Point the protein which synthesis abnormalities lead to these consequences.

- A. Ceruloplasmin
- B. Transferrin
- C. Properdin
- D. Haptoglobin
- E. Cryoglobulin

15) Cyanides are strong poisons for the human organism. Point, what compound would be the best to bind them?

- A. Methemoglobin
- B. Carboxyhemoglobin
- C. Carbihemoglobin
- D. Oxyhemoglobin
- E. Heme

16) Heparin is a typical representative of proteoglycans that has several polysaccharide chains joined to the protein core. Point, what tissue synthesizes it?

- A. Liver
- B. Bone

- C.* Mitral valves
- D.* Cartilage
- E.* Connective tissue

17) Pathological types of hemoglobin can exist along with the normal types in the adult organism. Point one of them.

- A.* HbS
- B.* HbA₂
- C.* HbF
- D.* HbCO₂
- E.* HbO₂

18) Levels of low-density lipoproteins and very low-density lipoproteins are increased in the blood plasma of a patient. Existence of what pathology these changes are evidence of?

- A.* Atherosclerosis
- B.* Leucosis
- C.* Gastritis
- D.* Gout
- E.* Arthrosis

19) Hemoglobin is a conjugated protein that transports oxygen to tissues and takes out carbon dioxide (gas). Point, what class of the compounds it belongs to?

- A.* Chromoproteins
- B.* Lipoproteins
- C.* Glycoproteins
- D.* Nucleoproteins
- E.* Metalloproteins

20) Features of the atherosclerotic involvement of the cardiovascular system are in a man who is 58 years old. What biochemical index increasing is mainly typical for this condition?

- A.* Level of LDL
- B.* Activity of LDH₅
- C.* Level of chylomicrons
- D.* Level of HDL
- E.* Activity of pancreatic lipase

21) Nitric oxide can oxidize Fe²⁺ in hemoglobin molecules to Fe³⁺ with formation of its derivative that can't bind oxygen. Point this compound:

- A.* Methemoglobin
- B.* Deoxyhemoglobin
- C.* Carboxyhemoglobin
- D.* Carbinhemoglobin
- E.* Ohemoglobinxy

22) Preparation “Lidase” is used after burns, operations and also haematomas for the resolution of scars. This preparation contains an enzyme that decomposes:

- A. Hyaluronic acid
- B. Keratan sulfate
- C. Chondroitin-4-sulfate
- D. Heparin
- E. Dermatan sulfate

23) Cytochrome C is used for improvement of tissue respiration under postnatal asphyxia and renewal of oxidative processes in the organism. What class of the substances does this compound belongs to?

- A. Hemoproteins
- B. Glycoproteins
- C. Phosphoproteins
- D. Nucleoproteins
- E. Lipoproteins

24) A 40-year-old man is hospitalized in consequence of carbon monoxide poisoning. Which of the listed hemoglobin fractions is increased in this patient?

- A. Carboxyhemoglobin
- B. Carbhemoalbumin
- C. Methemoglobin
- D. Oxyhemoglobin
- E. Glycated hemoglobin

25) Which gas forms a steady compound with hemoglobin in the blood?

- A. CO
- B. O₂
- C. N₂
- D. CO₂
- E. NO

26) The transport forms of lipids in the blood are lipoproteins. Which of the lipoprotein fractions transport cholesterol from peripheral tissues to the liver?

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

27) The basic substance of the connective tissue extracellular matrix are proteoglycans, which the carbohydrate component are glycosaminoglycans. What glycosaminoglycan plays an important role in regulating tissue permeability?

- A. Hyaluronic acid

- B. Heparin
- C. Hemoglobin
- D. Keratan sulfate
- E. Heparan sulfate

28) To a patient who suffers from joint disease, a doctor perscribed an ointment which active substance was a glycosaminoglycan – an important component of cartilage. What was this substance?

- A. Chondroitin sulfate
- B. Heparin
- C. Glycogen
- D. Arabinose
- E. Vitellin

29) Choose a hemoprotein in the list.

- A. Catalase
- B. Chondroitin sulfate
- C. Hyaluronic acid
- D. Ichthullin
- E. Vitellin

30) A patient with acute myocardial infarction has been subjected to anticoagulant therapy by an activator of antithrombin III that counteracts intravessel blood clotting. Choose this medical preparation.

- A. Heparin
- B. Hyaluronic acid
- C. Chondroitin sulfate
- D. Tetracycline
- E. Histamine

31) In a patient sickle-cell disease was diagnosed which is one of hemoglobinopathies. What amino acid substitute in the polypeptide chain of hemoglobin to amino acid valine causes this disease?

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

32) Heparin was prescribed to a patient with the aim of thrombosis prophylaxis. Non-protein part of this proteoglycan is represented by:

- A. Heteropolysaccharide
- B. Homopolysaccharide
- C. Oligosaccharide
- D. Monosaccharide

E. Lipid

33) Iron that released in the process of hemoglobin catabolism enters the bone marrow bound to transport protein and again used for hemoglobin synthesis. This transport protein is

- A.* Transferrin (siderifilin)
- B.* Transcobalamin
- C.* Haptoglobin
- D.* Ceruloplasmin
- E.* Albumin

34) What hemoglobin derivative will prevail in the blood of the patient that has hypercapnia symptoms?

- A.* Carbhemoglobin
- B.* Oxyhemoglobin
- C.* Carboxyhemoglobin
- D.* Methemoglobin
- E.* Glycosylated hemoglobin

35) In a patient with atherosclerosis, a blood plasma biochemical analysis revealed an increase in blood plasma:

- A.* Low density lipoproteins
- B.* Chylomicrons
- C.* Intermediate density lipoproteins
- D.* High density lipoproteins
- E.* Triacylglycerols

36) The blood protein fibrinogen by classification belongs to the certain group of conjugated proteins. That is:

- A.* Glycoproteins
- B.* Metalloproteins
- C.* Lipoproteins
- D.* Nucleoproteins
- E.* Phosphoproteins

37) Atherosclerosis is a disease that is associated with disorders in cholesterol metabolism, which is transported by lipoproteins. Indicate which changes in lipoproteins lead to the development of this disease?

- A.* LDLP
- B.* HDLP
- C.* VHDLP
- D.* Chylomicrons
- E.* Triglycerides

38) Heparin and its derivatives are used as anticoagulants. What group according

to its chemical structure heparin belongs to?

- A. Glycosaminoglycans
- B. Homopolysaccharides
- C. Lipids
- D. Amino acids
- E. Phenols

39) In order to prevent thrombosis, an anticoagulant heparin was prescribed. The non-protein part of this proteoglycan is represented by:

- A. Heteropolysaccharides
- B. Homopolysaccharides
- C. Oligosaccharides
- D. Monosaccharides
- E. Lipids

40) In the pharmaceutical practice, one of the natural anticoagulants, which belongs to heteropolysaccharides, is widely used. Point it:

- A. Heparin
- B. Hyaluronic acid
- C. Keratan sulfate
- D. Dermatan sulfate
- E. Chondroitin sulfate

41) One of the main anticoagulants is anti-thrombin III (AT). It is activated at the formation of complex with:

- A. Heparin
- B. Vitamin K
- C. Fibrinogen
- D. Plasmin
- E. TDP

42) A doctor prescribed dicumarol to a patient with myocardial infarction in acute period. Blood analysis on day 2 revealed an increased blood clotting. What drug should have been prescribed by the doctor in this case?

- A. Heparin
- B. Vitamin K
- C. Pelentan
- D. Vikasol
- E. γ -Globulin

43) Most of the protein blood clotting factors chemically are:

- A. Glycoproteins
- B. Hemoproteins
- C. Flavoproteins
- D. Phosphoproteins

E. Metalloproteins

44) The patient consulted with a physician about weakness, frequent dizziness and reduced ability to work. According to the laboratory analysis, the patient has iron deficiency anemia. What was decisive when making a diagnosis?

- A.* Transferrin decreased level
- B.* Erythrocyte increased number
- C.* Erythrocyte decreased number
- D.* Catalase increased activity
- E.* Peroxidase increased activity

45) Production of abnormal hemoglobin forms is the result of mutation of the gene which controls α - and β -chain synthesis. Choose the mutant form of hemoglobin.

- A.* HbS
- B.* HbF
- C.* HbA₁
- D.* HbA₂
- E.* HbA_{1c}

46) Detoxification of heavy metals in the human organism is on molecular level the consequence of:

- A.* Activation of metallothionein biosynthesis
- B.* Microsomal oxidation
- C.* Formation of complex with the active form of glucuronic acid
- D.* Formation of complex with the active form of sulfuric acid
- E.* Interaction with ceruloplasmin

47) The examination of a patient with atherosclerosis of heart and brain vessels revealed changes in the lipid blood spectrum. Which increased lipoprotein fraction is particularly significant in the pathogenesis of atherosclerosis?

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

48) What fraction is not revealed at electrophoretic separation of blood lipoproteins in a healthy human?

- A.* Chylomicrons
- B.* Lipoproteins of intermediate density
- C.* VLDL
- D.* LDL
- E.* HDL

49) Function of each class of lipoproteins that transport insoluble or slightly

soluble in water fats, cholesterol and its esters, is specific. Which class of lipoproteins transports fats from the intestine to tissues?

- A. Chylomicrons
- B. Pre- β -lipoproteins
- C. VLDL
- D. LDL
- E. HDL

50) Point to lipids which transport is mostly fulfilled by blood chylomicrons.

- A. Exogenous triglycerides
- B. Cholesterol and its esters
- C. Endogenous triglycerides
- D. Cholesterol
- E. Phospholipids

51) Point to a blood protein which contains copper in the composition:

- A. Ceruloplasmin
- B. Fibrinogen
- C. Thrombin
- D. Albumin
- E. Fibrinolysin

52) During disturbance of exploitation of stove heating people often poisoned by carbon monoxide. The formation of which compound in the blood causes carbon monoxide poisoning?

- A. Carboxyhemoglobin
- B. Methemoglobin
- C. Oxyhemoglobin
- D. Deoxyhemoglobin
- E. Carbhemooglobin

NUCLEOPROTEINS

1) DNA in the eukaryotic organism cells is present in a protein conjugated form. Name the proteins which are connected with a DNA double strand and stabilize it:

- A. Histones
- B. Prolamines
- C. Globulins
- D. Albumins
- E. Glutelins

2) Nowadays in the tRNA structure more than 50 minor nitrogenous bases except 4 major types were found out. Name one of them.

- A. Dihydrouracyl
- B. Cytosine
- C. Uracyl
- D. 5-methyluracyl
- E. Adenine

3) We can determine the biochemical function of biologically active compounds in the organism when we know their structure. What class of the biologically active compounds does polynucleotide (from deoxyribonucleotides) belong to?

- A. DNA
- B. RNA
- C. Proteins
- D. Polysaccharides
- E. Lipids

4) Nucleotides are monomers of the nucleic acids. What compounds can be found after complete hydrolysis of the ribonucleotides?

- A. Orthophosphoric acid, ribose, uracyl
- B. Cytosine, thymine, orthophosphoric acid
- C. Guanine, deoxyribose, orthophosphoric acid
- D. Orthophosphoric acid, adenine, deoxyribose
- E. Ribose, thymine, cytosine

5) Histones that have a positive charge are a part of chromatin. Which amino acid from the listed is the most prevalent in histones and carries a positive charge?

- A. Lysine
- B. Threonine
- C. Valine
- D. Alanine
- E. Serine

6) A patient with a diagnosis of stomach cancer was prescribed a preparation that was a pyrimidine base derivative, i.e. its antimetabolite. Point such preparation.

- A. 5-Fluorouracyl
- B. Guanine
- C. Adenine
- D. 5-Methyluracyl
- E. Cytosine

7) Compositions of the DNA and RNA nitrogenous bases are different. What heterocyclic nitrogenous base does not belong to DNA?

- A. Uracyl
- B. Cytosine
- C. Guanine
- D. Thymine
- E. Adenine

8) In the composition of nucleoproteins a noticeable quantity of simple proteins which stabilize their structure and have basic feature is included. Point, which are those proteins?

- A. Protamins and histones
- B. Albumins and globulins
- C. Prolamins and glutelins
- D. Proteinoids
- E. Lipoproteins

9) In the nucleus chromosomes DNA is connected with proteins histones, forming structures that have been named nucleosomes. The core of the nucleosome is composed of eight molecules of histones. Which amino acid from pointed below is included to these proteins in a great amount?

- A. Lysine
- B. Valine
- C. Leucine
- D. Serine
- E. Methionine

10) Nucleic acids provide storage and transmission of the hereditary information to progeny, and the mechanism of its realization. Which nucleic acid contains the information about quantity and order of amino acid residue interchange in the protein molecule?

- A. mRNA
- B. tRNA
- C. 28S rRNA
- D. 18S rRNA
- E. lnRNA

11) Primary structure of the nucleic acids is a linear polynucleotide chain that has a certain composition and order of mononucleotide arrangement. What linkages stabilize that structure?

- A. 3',5'- phosphodiester
- B. Peptide
- C. Glycosidic
- D. Disulfide
- E. Hydrogen

12) The analogue of dUMP-5 – fluorouracil, which blocked the synthesis of thymidine, was used to treat a cancer patient. Which enzyme is blocked by this drug?

- A. thymidylate synthesis
- B. thymidine phosphorylase
- C. thymidine kinases
- D. dihydroorotate dehydrogenase
- E. ribonucleotide reductase

13) What is mechanism of the 5-fluorouracil anti-tumor effect?

- A. With the 5-fluorouracil to 5-fluoro-UMF conversion
- B. With inhibition of carbamoyl-phosphate-synthetase II activity
- C. With the dihydrouratsil dehydrogenase activation
- D. With dihydrothymine superfluous formation
- E. With thioredoxin reductase activity inhibition

14) Some synthetic pyrimidine and purine derivatives are used as medicinal preparations acting as antimetabolites. Point the following:

- A. 5-fluorouracil
- B. Adenine
- C. Guanine
- D. Cytosine
- E. Thymine

15) What proteins stabilize the nucleic acids in the cell and take part in the regulation of copying of genetic information from DNA molecules?

- A. Histones
- B. Albumins
- C. Globulins
- D. Prolamins
- E. Myosins

16) Oncologists have been prescribed fluorouracil, which is a competitive inhibitor of thymidine synthase. With the oppression of which process is its effect?

- A. Pyrimidine nucleotide synthesis
- B. Carbohydrate degradation

- c.* Purine nucleotide synthesis
- D.* Purine nucleotide degradation
- E.* Lipid synthesis

17) The man was given the courses of radiation therapy and chemotherapy. 5-Fluorodeoxyuridine, an inhibitor of thymidylate synthase, was part of the complex therapy. Synthesis of which compound is blocked by this drug?

- A.* DNA
- B.* iRNA
- C.* rRNA
- D.* tRNA
- E.* Protein

18) Antitumor drugs can suppress the division of cancer cells. Synthesis of what compound was blocked by 5-fluorouracil?

- A.* DNA
- B.* tRNA
- C.* rRNA
- D.* iRNA
- E.* Protein

VITAMINS

1) Coumarins are antivitamins of vitamin K; they act like anticoagulating agents. Synthesis of what protein do they block?

- A. Prothrombin
- B. γ -globulin
- C. Albumin
- D. Transferrin
- E. Ceruloplasmin

2) In the last month of pregnancy a doctor prescribed “Vicasol” to a woman. Which vitamin analogue is it?

- A. Vitamin K
- B. Vitamin B₆
- C. Vitamin B₅
- D. Vitamin A
- E. Vitamin B₁₂

3) Plant oils are an essential part of human diet. Point the vitamin which is their component:

- A. Vitamin F
- B. Vitamin C
- C. Vitamin B₃
- D. Vitamin B₆
- E. Vitamin P

4) Introduction of dicumarol preparation into the organism causes a sharp lowering of the blood clotting factors. What vitamin is dicumarol an antivitamin of?

- A. Vitamin K
- B. Vitamin C
- C. Vitamin B₂
- D. Vitamin E
- E. Vitamin P

5) A patient has trombophlebitis. What vitamin, intensifying the synthesis of the coagulation proteins in the liver, can provoke an acute condition?

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

- 6) What vitamin is synthesized in the human organism from β -carotene?
- A. Vitamin A₁
 - B. Vitamin D
 - C. Vitamin B₁
 - D. Vitamin B₁₂
 - E. Vitamin C
- 7) In a patient with cirrhosis an impairment in dark adaptation was observed. What can be the most likely reason of that?
- A. Abnormalities of vitamin A absorption in the intestines
 - B. Lack of vitamin A in the diet
 - C. Excess of vitamin A in the diet
 - D. Abnormalities of trans-retinal transformation into cis-retinal
 - E. Abnormalities of rhodopsin synthesis
- 8) Vitamin A is oxidized very quickly in an open air and loses its biological activity. Which component in food products prevents vitamin A from oxidation?
- A. Vitamin E
 - B. Sugar
 - C. Protein
 - D. Fat
 - E. Vitamin PP
- 9) For stimulation of the blood coagulation system activity vitamin K is used. Its action is based on participation in the process of :
- A. Amino-acid residue carboxylation of blood coagulation proteins II, VII, IX and X
 - B. Amino-acid residue glycosylation of blood coagulation proteins II, VII, IX and X
 - C. Amino-acid residue phosphorylation of blood coagulation proteins II, VII, IX and X
 - D. Amino-acid residue deamination of blood coagulation proteins II, VII, IX and X
 - E. Limited proteolysis of blood coagulation proteins II, VII, IX and X
- 10) Blood clotting process in norm can't be realized without presence of some vitamins. Which vitamin takes part in this process?
- A. Vitamin K
 - B. Vitamin B₆
 - C. Vitamin C
 - D. Vitamin E
 - E. Vitamin D

- 11) Dicumarol is prescribed for prophylaxis of thrombosis. It is an antivitamin of:
- A. Vitamin K
 - B. Vitamin C
 - C. Vitamin A
 - D. Vitamin PP
 - E. Vitamin D
- 12) A patient with symptoms of enlarged blood coagulation had been taking anticoagulant drugs for a long time. In consequence of this the signs of bleeding sickness appeared. What vitamin prescribing rapidly and effectively prevents the negative complications?
- A. Vitamin K
 - B. Vitamin A
 - C. Vitamin D
 - D. Vitamin C
 - E. Vitamin E
- 13) In a patient suffering from chronic hepatitis stomatorrhagia and hemorrhage even under slight injury were observed. What vitamin metabolism abnormalities could be the most probable reason for it?
- A. Vitamin K
 - B. Vitamin PP
 - C. Vitamin E
 - D. Vitamin D
 - E. Vitamin B₂
- 14) A child had been prescribed vitamin D in a dose of 50 mg/day to prevent rickets. It provoked the development of symptoms of the vitamin intoxication. Select a feature of vitamin D hypervitaminosis.
- A. Demineralization of bones
 - B. Abnormalities of blood coagulation
 - C. "Blindness "
 - D. Anemia
 - E. Gout
- 15) Vitamins regulate different biochemical processes. What vitamin provides the conversion of prothrombin into thrombin?
- A. Vitamin K
 - B. Vitamin A
 - C. Vitamin E
 - D. Vitamin B₁
 - E. Vitamin D

16) Under action of ultraviolet and ionizing radiation free radicals are generated in the human body. For stabilization of the oxidative reactions substances with antioxidant properties are used. Point one of them.

- A. Vitamin E
- B. Vitamin B₁₂
- C. Vitamin B₂
- D. Vitamin B₆
- E. Vitamin B₁

17) Which vitamin deficiency would stimulate the lipid peroxidation?

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

18) An aged woman has impairment in dark adaptation. Which of the pointed vitamins should be prescribed in this case?

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

19) A 35-year-old patient in a pre-surgical period was prescribed vicasol (a synthetic analogue of vitamin K). What mechanism of action has this drug?

- A. Prothrombin synthesis stimulation
- B. Plasminogen activation
- C. Tissue thromboplastin synthesis stimulation
- D. Hageman's factor activation
- E. Complement system activation

20) Antivitamins are substances with different chemical structure which limits using of vitamins in the organism and display an opposite action. Point an antivitamin for vitamin K.

- A. Dicumarol
- B. Aminopyrine
- C. Deoxypyridoxine
- D. Sulfapyridoxine
- E. Isoniazid

21) Vitamin F is a complex of biologically active polyunsaturated fatty acids which are essential components of food. Point the fatty acids which belong to this complex.

- A. Linoleic acid, linolenic acid, arachidonic acid
- B. Oleic acid, stearic acid, palmitooleic acid
- C. Oleic acid, stearic acid, palmitic acid
- D. Butyric acid, palmitooleic acid, caproic acid
- E. Crotonic acid, oleic acid, myristic acid

22) Certain vitamin is essential for normal development and functioning of the reproductive system. Point it.

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

23) A patient went to the hospital with intestinal bleeding. What drug has to be included in a treatment regimen?

- A. Vicasol
- B. Riboflavin
- C. Ascorutin
- D. Cocarboxylase
- E. Sulfanilamide

24) During pre-natal development vitamin D obtaining is necessary for the bone formation. What chemical compound is the precursor of this vitamin?

- A. Cholesterol
- B. Ethanol
- C. Sphingosine
- D. Inositol
- E. Glycerol

25) Patient's antioxidative system status was estimated on basis of determination of one of the endogenous antioxidants. What was it?

- A. Alpha-tocopherol
- B. Trivalent ferrum
- C. Ornithine
- D. Hydrogen peroxide
- E. Cholecalciferol

26) Oculist has determined a prolongation of eye adaptation time to darkness in a patient. What vitamin lack may be a cause of such symptom?

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

27) A woman took paediatricist's advice about a bad state of health of her 8-month-old child: hyperhidrosis, increase of the fontanelle dimensions, delay in teeth eruption. What preparation should be administered first of all?

- A. Cholecalciferol
- B. Cobalamin
- C. Calcium gluconate
- D. Thiamine bromide
- E. Calcium pangamate

28) A child didn't get vitamin D on time. After some time all the symptoms of rachitis appeared. What blood enzyme activity decrease took place in this case?

- A. Basic (alkaline) phosphatase
- B. Acidic phosphatase
- C. Alpha-amylase
- D. Choline esterase
- E. Creatine kinase

29) During one-year-old child survey the doctor paid attention to the late eruption of teeth, the wrong placement. Lack of which vitamin is the cause of this state?

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

30) In 20 minutes after the skin had been cut a woman paid attention that the wound didn't stop bleeding. What vitamin absence causes that state?

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

31) A patient has appetite loss, headache, sleep disturbance. It was observed inflammation of the eyes, loss of hair and general weakness. It's known that the patient took a cod liver oil. What imbalance can be suspected?

- A. Vitamin A hypervitaminosis
- B. Vitamin D hypovitaminosis
- C. Vitamin D hypervitaminosis
- D. Vitamin A hypovitaminosis
- E. Vitamin F hypovitaminosis

32) Except protein factors some cations take part in the blood clotting. Point, what cation is of the key significance for that process?

- A. Ca²⁺
- B. K⁺
- C. Na⁺
- D. Mn²⁺
- E. Mg²⁺

33) After the gall bladder removal in a patient blood clotting impaired. What vitamin deficiency takes place in this patient?

- A. Vitamin K
- B. Vitamin B₁
- C. Vitamin C
- D. Vitamin H
- E. Vitamin B₁₂

34) In patients with general bile duct obstruction hemorrhages appear, and the latter is caused by bad uptake of the vitamin:

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

35) A 3-month-old child for rickets prophylaxis a preparation of 1, 25-dihydroxycholecalciferol was prescribed. The latter in the human organism regulates:

- A. Calcium and phosphorous ions metabolism
- B. High fatty acids metabolism
- C. Water metabolism
- D. Carbohydrate metabolism
- E. Amino acid metabolism

36) Point the vitamin should be assigned in the case of the disruption of the normal development and function of the reproductive system in the body.

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

37) A 6-year-old girl was taken to department of gastroenterology. At check-up dysbiosis of the gut and blood clotting impairment were detected. What vitamin deficiency these abnormalities were caused by?

- A. Vitamin K

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

38) In a 40-year-old woman with chronic kidney disease osteoporosis has developed. What compound deficiency is the main reason for this pathology?

- A. 1,25 (OH)₂ D₃
- B. 1(OH) D₃
- C. Vitamin D₂
- D. 25 (OH) D₃
- E. Vitamin D₃

39) As a result of imbalanced feeding in a 52-year-old man a disorder of twilight vision with the “night blindness” development took place. Which vitamin lack leads to the development of such pathological process?

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

40) Isoniazid was prescribed to a 30-year-old man who was consumptive. Which vitamin hypovitaminosis would develop under a protracted course of therapy?

- A. Pyridoxine
- B. Thiamine
- C. Cobalamin
- D. Biotin
- E. Riboflavin

41) A patient has lip cracks, angular fissure, ruby tongue, seborrheic dermatitis of nasolabial folds, photophobia and conjunctivitis. Which vitamin hypovitaminosis can cause those abnormalities?

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

42) A patient has a neurasthenic syndrome, diarrhea and dermatitis. Which vitamin hypovitaminosis can cause this?

- A. Nicotinic acid
- B. Folic acid

- C. Vitamin B₁₂
- D. Vitamin K
- E. Vitamin D

43) Thiamine pyrophosphate is the coenzyme synthesized from vitamin B₁. Point out the process which this coenzyme participates in:

- A. Oxidative decarboxylation of pyruvate
- B. Lipolysis
- C. Gluconeogenesis
- D. Glycolysis
- E. Alcoholic fermentation

44) A structural analogue of vitamin PP (nicotinic acid) is used as an antituberculous drug. Point it:

- A. Isoniazid
- B. Tetracycline
- C. Riboflavin
- D. Streptocide
- E. Pyriithiamine

45) Preparation "Coccarboxylase" is used for treatment of the great number of diseases for providing cells with energy. Point, what metabolic process is activated?

- A. Oxidation of pyruvate
- B. Glutamate deamination
- C. Histidine decarboxylation
- D. Aspartate transamination
- E. Substrate phosphorylation

46) In a patient with abdominal pains, after a biochemical analysis decreasing of stomach secretory function along with anemia were detected. Point, which vitamin has an antianemic action:

- A. Cobalamin
- B. Tocopherol
- C. Nicotinic acid
- D. Thiamine
- E. Retinol

47) Enzyme hyaluronidase hydrolyzes hyaluronic acid, and as a result of this the intercellular permeability increases. Which vitamin inhibits the hyaluronidase activity promoting the strengthening of vascular wall?

- A. Vitamin P
- B. Vitamin B₂
- C. Vitamin A

- D. Vitamin B₅
- E. Vitamin D

48) Ascorbic acid hypovitaminosis leads to scurvy. Synthesis of what protein is damaged under this pathology?

- A. Collagen
- B. Albumin
- C. Fibrinogen
- D. Prothrombin
- E. Ceruloplasmin

49) "Cocarboxylase" (a coenzyme preparation) is used for treatment of heart diseases. Which vitamin derivative is it of?

- A. Vitamin B₁
- B. Vitamin C
- C. Vitamin P
- D. Vitamin B₆
- E. Vitamin B₁₂

50) Increased excitability of the nervous system, which can be observed during B₆hypovitaminosis, is associated with insufficient biogenic amine formation, which has a suppressive effect on the central nervous system. Point this biogenic amine:

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

51) "Cocarboxylase" (thiamine diphosphate) is used for improving energy supply at the expense of intensification of oxidative processes under some cardiovascular diseases. Point the metabolic reaction that it activates.

- A. Oxidative decarboxylation of pyruvate
- B. Citrate dehydrogenation
- C. Glutamate deamination
- D. Aspartate transamination
- E. Substrate phosphorylation

52) Vitamin and vitamin-like compounds are required for activation and transport FFA through the mitochondrial membrane. Point one of them.

- A. Carnitine
- B. Ubiquinone
- C. Riboflavin
- D. Biotin

E. Thiamin

53) Vitamin derivatives act as coenzymes. Coenzyme form of which vitamin is thiamine pyrophosphate?

- A.* Vitamin B₁
- B.* Vitamin B₂
- C.* Vitamin B₅
- D.* Vitamin B₃
- E.* Vitamin B₆

54) A patient eats every day some raw eggs which contain an antivitamin for biotin – avidin. What stage of lipid metabolism can be impaired in this case?

- A.* Fatty acid biosynthesis
- B.* Lipid transport in blood
- C.* Cholesterol biosynthesis
- D.* Glycerol oxidation
- E.* Lipid absorption

55) Bacterial cells use folic acid for synthesis of a certain vitamin which derivatives are coenzymes of a series important bacterial enzymes. Sulfonamide preparations block the formation of these coenzymes because they are antivitamins of:

- A.* Para-aminobenzoic acid
- B.* Choline
- C.* Pyridoxine
- D.* Nicotinic acid
- E.* Riboflavin

56) Water-soluble vitamins in the organism are converted into coenzyme forms. The coenzyme form of which vitamin is thiamine pyrophosphate (TPP)?

- A.* Vitamin B₁
- B.* Vitamin B₁₂
- C.* Vitamin B₂
- D.* Vitamin PP
- E.* Vitamin B₆

57) Vitamins under their simultaneous application can increase the action of each other. Which of the vitamins supports antihyaluronidase activity of vitamin P?

- A.* Vitamin C
- B.* Vitamin D
- C.* Vitamin B₂
- D.* Vitamin B₁
- E.* Vitamin A

58) Biochemical functions of water-soluble vitamins depend on their ability to be converted into coenzyme forms. What coenzyme form vitamin B₂ (riboflavin) is converted into?

- A. FMN (flavin mononucleotide)
- B. Pyridoxal phosphate
- C. TPP (thiamine pyrophosphate)
- D. NAD⁺
- E. TMP (thiamine monophosphate)

59) For vitamin absorption certain conditions are necessary. An intrinsic factor (a glycoprotein secreted by the oxyntic cells of the stomach) is needed for the absorption of:

- A. Vitamin B₁₂
- B. Vitamin B₅
- C. Vitamin C
- D. Vitamin B₆
- E. Vitamin B₂

60) Microorganisms in the human gut synthesize some vitamins. Point them:

- A. Vitamins K and B₁₂
- B. Vitamins B₁ and D
- C. Vitamins B₆ and E
- D. Vitamins E and H
- E. Vitamins D and C

61) Lack of which vitamin leads to decreasing of the aminotransferase and decarboxylase activities?

- A. Vitamin B₆
- B. Vitamin B₃
- C. Vitamin B₁₂
- D. Vitamin B₂
- E. Vitamin B₁

62) Vitamin assimilation depends on different factors. What substance provokes biotin assimilation abnormalities?

- A. Avidin
- B. Transferrin
- C. Globulin
- D. Albumin
- E. Ferritin

63) Sulfanilamides depress growth and development of bacteria. The mechanism of their action is based on inhibition of the synthesis of:

- A. Folic acid
- B. Lipoic acid
- C. nicotinic acid
- D. Pantothenic acid
- E. Ascorbic acid

64) Sulphanilamides are widely used as bacteriostatic agents. The mechanism of antimicrobial action of sulfanilamide drugs is based on their structural similarities with:

- A. Para-aminobenzoic acid
- B. Glutamic acid
- C. Folic Acid
- D. Nucleic acid
- E. Antibiotics

65) A patient has pernicious anemia. It is expedient to prescribe vitamin B₁₂ in a combination with:

- A. Folic acid
- B. Pantothenic acid
- C. Lipoic acid
- D. Ascorbic acid
- E. Nicotinic acid

66) As a result of gastric juice analysis it was obtained that its total acidity equaled 25 mM/L, free HCl – 5 mM/L. At the same time blood testing showed the state of megalocytic anemia. What gastric juice component deficiency takes place?

- A. Gastromucoprotein (Castle's factor)
- B. Pepsin
- C. Free HCl
- D. Gastriksin
- E. Mucin

67) First acceptor of hydrogen in the process of tissue respiration is a pyridine-dependent dehydrogenase. What vitamin is essential for the corresponding coenzyme (NAD⁺) formation?

- A. Vitamin PP
- B. Vitamin C
- C. Vitamin B₁
- D. Vitamin B₂
- E. Vitamin Bc

68) A patient has stomatorrhagia and hemorrhage. Deficiency of which vitamins these symptoms can be caused by and what drug can be recommended in this case?

- A. Ascorutin

- B. Thiamine hydrochloride
- C. Cyanocobalamin
- D. Nicotinic acid
- E. Pyridoxine hydrochloride

69) Corresponding coenzymes are synthesized from some water-soluble vitamins. Which vitamin from the listed below is necessary for the formation of FMN and FAD?

- A. Vitamin B₂
- B. Vitamin B₃
- C. Vitamin B₅
- D. Vitamin B₁
- E. Vitamin B₆

70) A patient has appetite loss, sickness, pain in the stomach, diarrhea, headache, memory impairment. Dermatitis is observed on the areas of neck and face. What vitamin deficiency takes place?

- A. Vitamin PP
- B. Vitamin B₁
- C. Vitamin B₃
- D. Vitamin B₂
- E. Vitamin B₆

71) A patient complains about weight loss, general weakness, breathlessness, chest pain, petechial hemorrhage, gingival hemorrhage, coming out of teeth. Which vitamin deficiency occurs?

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

72) In the patient's blood a hemoglobin quantity is decreased. Lack of which vitamin can be a reason for the anemia development?

- A. Vitamin B₁₂
- B. Vitamin A
- C. Vitamin E
- D. Vitamin B₂
- E. Vitamin PP

73) A patient with sore throat was prescribed with sulfanilamide preparation; its antimicrobial action is based on a folic acid synthesis violation. What substance

does compete for the active center of the enzyme with sulfanilamides?

- A. Para-aminobenzoic acid
- B. Glutamic acid
- C. Ubiquinone
- D. Succinate
- E. Citric acid

74) A patient with impaired immunity, susceptibility to catarrhal illness was recommended to take ascorutin as more effective medicine compared with ascorbic acid. What substance in this medicine enhances the vitamin C action?

- A. Vitamin P
- B. Vitamin A
- C. Vitamin D
- D. Glucose
- E. Lactose

75) Coenzyme preparations “Flavin mononucleotide” and “Flavinat” are used for treatment of dermatosis, wounds and ulcers. They are the active forms of:

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

76) Deficit of ascorbic acid in the diet provokes some diseases. Point the main of them.

- A. Scurvy
- B. Rickets
- C. Beri-beri
- D. Pellagra
- E. Gout

77) To a patient with a severe form of diarrhea, dermatitis and dementia vitamin PP was prescribed. Point out the functions of vitamin PP in metabolism.

- A. Participation in red-ox processes
- B. Participation in isomerization reactions
- C. Participation in peptide bond hydrolysis
- D. Participation in oxygen transport
- E. Participation in peptide bond formation

78) Vitamins can be part of the coenzymes of the electron transport chain. What vitamin is included in NAD⁺?

- A. Vitamin PP
- B. Vitamin B₂

- C.* Vitamin B₆
- D.* Vitamin B₁
- E.* Vitamin B₁₂

79) Conjugated proteins have a lot of different functions in the human body. What glycoprotein from a white of raw eggs prevents vitamin H from absorption in the intestine and provokes an acute deficiency of biotin?

- A.* Avidin
- B.* Hemoglobin
- C.* Fibrinogen
- D.* Interferon
- E.* Caseinogen

80) Vitamins must be included in the dietary intake. Which from the following vitamins is prescribed for prevention and treatment of pellagra?

- A.* Vitamin B₃
- B.* Vitamin C
- C.* Vitamin A
- D.* Vitamin B₁
- E.* Vitamin D

81) In the human organism most vitamins undergo some conversions. What vitamin takes part in the formation of the coenzyme of acylation (CoASH)?

- A.* Pantothenic acid
- B.* Vitamin D
- C.* Vitamin C
- D.* Vitamin A
- E.* Vitamin K

82) The collagen synthesis in human organism requires a proline hydroxylation, which is fulfilled by proline hydroxylase. What substance activates this process?

- A.* Ascorbic acid
- B.* FAD
- C.* NAD⁺
- D.* Biotin
- E.* Pyridoxine phosphate

83) Determination of certain amino transferase activity is widely used in medicine for diagnostics of some injuries of internal organs. Coenzyme of these enzymes is the active form of vitamin:

- A.* Vitamin B₆
- B.* Vitamin B₁₂
- C.* Vitamin B₁

- D. Vitamin B₂
- E. Vitamin PP

84) The patient has been diagnosed with redness of the mouth mucose, cracks on lips and their corners, peeling skin, dryness and inflammation on the face skin, of the conjunctiva, intergrowth of vascular network in the cornea. The probable cause of this pathology is the lack of:

- A. Vitamin B₂
- B. Antioxidants
- C. Hypovitaminosis K.
- D. Hypovitaminosis S.
- E. Hypovitaminosis D.

85) A 50-year-old patient has hypovitaminosis of vitamin C (scurvy) connected with the imbalanced food. Decreasing activity of which enzyme is a basis of the conjunctive tissue lesion under these pathology conditions?

- A. Proline hydroxylase
- B. Pyruvate carboxylase
- C. Thryptophan hydroxylase
- D. Alanine aminotransferase
- E. Glutaminase

86) Some abnormalities in protein metabolism take place as a consequence of decreased content of vitamin B₆ in the diet. What biochemical process decreasing takes place in this case?

- A. Transamination
- B. Methylation
- C. Phosphorylation
- D. Oxidation
- E. Hydrolysis

87) To prevent fatty liver infiltration, a number of lipotropic factors are used. Which of the listed vitamin-like substances reveals a lipotropic effect:

- A. Cholin
- B. Orotic acid
- C. Biotin
- D. Vitamin U
- E. Para-aminobenzoic acid

88) In a patient pernicious anemia was diagnosed. Point the vitamin which lack the disease can be connected with.

- A. Vitamin B₁₂
- B. Vitamin B₂
- C. Vitamin B₃

- D. Vitamin C
- E. Vitamin E

89) Patients with tuberculosis take a drug that is an antivitamin of nicotinic acid. Point this preparation.

- A. Isoniazid
- B. Sulfanilamide
- C. Akrichin
- D. Isoriboflavin
- E. Oxytyamine

90) Amide of nicotinic acid plays an important role in metabolism. What disease appears under its hypovitaminosis?

- A. Pellagra
- B. Rickets
- C. Anemia
- D. Xerophthalmia
- E. Beri-Beri

91) In medical practice sulfonamide preparations are widely used as antimetabolites of paraaminobenzoic acid, which is synthesized by microorganisms. Point synthesis of what vitamin is blocked in such situation?

- A. Folic acid
- B. Pangamic acid
- C. Orotic acid
- D. Nicotinic acid
- E. Ascorbic acid

92) Parents of a 10-year-old boy appealed to a physician with a complaint about growth stop. During checkup the physician found the changes in mucous membranes and suspected cancerous anemia. He suggested that this pathology had been connected with a vitamin deficiency. Point, what vitamin deficiency might cause development of this state?

- A. Folic acid
- B. Nicotinic acid
- C. Orotic acid
- D. Choline
- E. Arachidonic acid

93) In the composition of collagen fibers of a patient with often bleedings into intrinsic organs and mucous membranes proline and lysine have been found. What vitamin absence causes abnormality in their hydroxylation?

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

- D. Vitamin A
- E. Vitamin B₁

94) The patient who is suffering from acute respiratory illness has been prescribed sulfanilamides - structural analogs of para-aminobenzoic acid (PABA), which is necessary for the synthesis of the growth factor of microorganisms - folic acid. Point the synthesis of what compounds is inhibited:

- A. Purine nucleotides
- B. Pyrimidine nucleotides
- C. Arginine
- D. Tryptophan
- E. Hystidine

95) In a patient some signs of skin affection (dermatitis), gastrointestinal tract (diarrhea), nerve system dysfunction (dementia) have been diagnosed. The cause of these abnormalities is:

- A. PP avitaminosis
- B. A hypervitaminosis
- C. D hypervitaminosis
- D. Gout
- E. B₆ avitaminosis

96) What biochemical reaction abnormality results in the appearance of hemorrhages under having scurvy?

- A. Proline hydroxylation
- B. Glucose phosphorylation
- C. Isocitrate dehydrogenation
- D. Dihydroxyacetone phosphate isomerization
- E. Glutamic acid deamination

97) An ill man with tuberculosis had been treated with isoniazid (tuberculostatic). Later he had signs of dermatitis, diarrhea, CNS affection. What vitamin is worthwhile administering to this patient?

- A. Vitamin PP
- B. Vitamin C
- C. Lipoic acid
- D. Vitamin A
- E. Vitamin B₁

98) In a 38-year-old patient, which suffers from chronic alcoholism, oedemata, muscle atrophy and cardio-vascular collapse, pains along peripheral nerves are observed. What vitamin deficiency in the organism caused such symptoms?

- A. Vitamin B₁
- B. Vitamin A

- C.* Vitamin E
- D.* Vitamin B₆
- E.* Vitamin K

99) In the patient's urine a certain compound that has an isoalloxazine ring in its structure have been found. What this compound is?

- A.* Vitamin B₂
- B.* Vitamin B₅
- C.* Vitamin B₆
- D.* Vitamin B₁
- E.* Vitamin B₃

100) At checkup of the patient's oral cavity a doctor-stomatologist observed dryness of mucosa tunic and a lot of erosions. What vitamin deficiency caused such symptoms?

- A.* Vitamin A
- B.* Vitamin K
- C.* Vitamin P
- D.* Vitamin H
- E.* Vitamin PP

101) Some vitamins inhibit the process of lipid peroxide formation in the cell membranes and ensure stability of biological membranes. Point one of the vitamins that has such effect.

- A.* Ascorbic acid
- B.* Naphthoquinone
- C.* Cholecalciferol
- D.* Pantothenic acid
- E.* Folic acid

102) In test animals a vitamin influence on citric acid cycle rate was investigated. What vitamin absence did not decrease the rate of the CAC reactions?

- A.* Cobalamin
- B.* Thiamin
- C.* Riboflavin
- D.* Nicotinamide
- E.* Pantothenic acid

103) Which vitamin is needed to maintain the conversion of pyruvic acid into acetyl-CoA?

- A.* B₁
- B.* B₁₂
- C.* B₆

- D. C
- E. D₂

104) A patient suffered from a total weakness and gum bleeding. What vitamin deficiency one may suppose?

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

105) Patient A. was prescribed a remedy that had antibacterial action in regard to micobacteria of tuberculosis, and was antivitamin to pyridoxine. Name that preparation.

- A. Isoniazid
- B. Heparin
- C. Biseptol
- D. Streptomycin
- E. Streptocid

106) Antivitamin to what organic compound that is used by a bacterial cell for the folic acid biosynthesis (part of bacterial enzymes) sulfanilamide preparations are?

- A. Para-aminobenzoic acid
- B. Nicotinic acid
- C. Choline
- D. Riboflavin
- E. Pyridoxine

107) To a patient isonicotinic acid hydrazide (antivitamin to vitamin PP) was prescribed. What biosynthesis impairment from the listed coenzymes will be observed in the patient?

- A. NAD⁺
- B. FAD
- C. FMN
- D. CoA-SH
- E. TPP

108) A 43-year-old patient has psychic abnormalities because of γ -aminobutyric acid synthesis impairment in the brain. What vitamin deficiency can cause such pathological changes?

- A. Pyridoxine
- B. Thiamine
- C. Cobalamin
- D. Folic acid

E. Riboflavin

109) In a patient small (petechial) hemorrhages in the skin and mucosa, gum bleeding, teeth destruction, total weakness, edemata of legs are observed. What vitamin deficiency one may suspect?

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

110) A patient visited a doctor and complained about sensitivity loss and pains along peripheral nerves. Blood analysis revealed an increased quantity of pyruvic acid. What vitamin deficiency could cause such changes?

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

111) Lipotropic factors are used to prevent a fatty infiltration of the liver. Which of the pointed compounds has a lipotropic effect?

- A.* Choline
- B.* Biotin
- C.* Vitamin U
- D.* Para-aminobenzoic acid
- E.* Orotic acid

112) What coenzyme contains nicotinic acid?

- A.* Nicotinamide adenine dinucleotide phosphate (NADP⁺)
- B.* Coenzyme-A (CoA-SH)
- C.* Thiamine pyrophosphate (TPP)
- D.* Flavin adenine dinucleotide (FAD)
- E.* Pyridoxal phosphate (PALP)

113) PP avitaminosis causes a disorder in biosynthesis of such coenzymes:

- A.* NAD⁺, NADP⁺
- B.* Thiamine pyrophosphate
- C.* Pantothenate
- D.* Ascorbate
- E.* FAD, FMN

114) Vitamin B₂ is included in the composition of flavin-related dehydrogenase coenzymes. Point out such a coenzyme.

- A. FMN
- B. NAD^+
- C. NADP^+
- D. Coenzyme-A
- E. TPP

115) Preparations isoniazid, ftivazid, salyuzid and others as isonicotinic acid derivatives are competitive inhibitors of pyridine-related dehydrogenases because they resemble a vitamin in structure. Name the vitamin.

- A. PP
- B. B_1
- C. B_2
- D. B_6
- E. B_{12}

116) Anti-tuberculosis drugs isoniazid, ftivazid, salyuzid inhibit the action of NAD-related dehydrogenases, and therefore - tissue respiration in cells of microorganisms. The latter leads to their death. These preparations are antagonists of the vitamin:

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

117) Isoniazid is used as anti-tuberculosis drug. Point, what vitamin structural analogue this preparation is?

- A. PP
- B. B_2
- C. B_1
- D. C
- E. D

118) Dicumarol that is a structural analogue of vitamin K is prescribed under increased rate of blood clotting. What biochemical process is blocked by this preparation?

- A. Carboxylation of prothrombin
- B. Phosphorylation of fibrinogen
- C. Methylation of fibrin
- D. Dephosphorylation of thrombin
- E. Splitting calcium off

119) Toxicoses quite often develop during pregnancy. These states are

characterized by noticeable increase of histamine in urine. What vitamin takes part in the production of histamine?

- A. B₆
- B. B₁₂
- C. C
- D. B_C
- E. B₃

120) A patient who suffered from cirrhosis of the liver was operated for appendix removal. The operation was complicated by bleeding. What was the reason for that complication?

- A. Prothrombin synthesis impairment
- B. Hepatocuprein synthesis impairment
- C. Disbalance in γ -globulin production
- D. Hypoalbuminemia
- E. Microsomal oxidation impairment

121) In a 40-year-old patient who works a seasonal worker at a construction site symmetric dermatitis on the back of the hands was observed. What vitamin deficiency may cause such symptom?

- A. Nicotinic acid
- B. Cobalamin
- C. Ascorbic acid
- D. Folic acid
- E. Cholecalciferol

122) Point the active form of vitamin D which functions in the system of homeostatic regulation of calcium metabolism and osteogenesis:

- A. 24,25-Dihydroxycholecalciferol
- B. Ergosterol
- C. Ergocalciferol
- D. Dehydrocholesterol
- E. Cholecalciferol

123) Antivitamins of what vitamin from the listed below have a tuberculostatic effect and are used for tuberculosis treatment?

- A. Nicotinic acid
- B. Pantotenic acid
- C. Ascorbic acid
- D. Riboflavin
- E. Pyridoxin

124) Vitamin K is known to be a factor for blood clotting. It fulfills its function being a coenzyme of:

- A. Glutamate carboxylase
- B. Pyruvate carboxylase
- C. Pyruvate decarboxylase
- D. Alpha-ketoglutarate decarboxylase
- E. Decarboxylase of amino acids

125) It is known that under certain pathologic states erythroblastic blood type in bone marrow may be changed to megaloblastic. It is typical for:

- A. B₁₂-deficiency anemia
- B. Blood loss
- C. Insufficient production of erythropoietin
- D. Acute porphyria
- E. Fe-deficiency anemia

126) A patient was diagnosed with hypoacidic gastritis and gastroduodenitis. The result of blood analysis – megaloblastic anemia. What substance deficiency caused the development of anemia?

- A. Gastromucoprotein
- B. Ferrum
- C. Mucin
- D. Gastricsin
- E. Trypsin

127) A 9-month-old child is artificially fed. For the feeding some formulas were used which had not been balanced for vitamin B₆ content. In the child pellagra-like dermatitis, periodic cramps and anemia have developed. The development of cramps might be connected with abnormality in formation of:

- A. Gamma-aminobutyric acid (GABA)
- B. Serotonin
- C. Histamine
- D. Dopamine
- E. Beta-alanine

128) Tumor of the pancreatic head was revealed in a patient. Steatorrhea was also found. Skin hemorrhages recently appeared. What is the mechanism of their appearance?

- A. K hypovitaminosis
- B. C hypovitaminosis
- C. Trypsin deficiency
- D. Increased secretion of bile
- E. Ferrum deficit

129) In a 5-year-old child the skin began to get rough and scaly because of

prolonged diarrhea. Very often there were also observed inflammation of mucosal membranes of the mouth and conjunctivitis. That may specify of the development of hypovitaminosis:

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

130) For treatment of cancer tumors methotrexate – a structural analogue of folic acid – is administered. This preparation is a competitive inhibitor of dihydrofolate reductase, that is why it inhibits the biosynthesis of:

- A. dTMP
- B. dAMP
- C. AMP
- D. TMP
- E. UMP

131) Scurvy is accompanied by symptoms of connective tissue structure destruction, loss and brittle of teeth, fragility of blood vessels, bleeding. This pathology is the result of what protein synthesis violation:

- A. Collagen
- B. Elastin
- C. Albumin
- D. Globulin
- E. Fibrinogen

132) A man has detected hypovitaminosis of vitamin PP. The use of amino acids with food partly compensates needs of the patient's body in vitamin PP?

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

133) Antitumor drug methotrexate is a structural analogue of folic acid. The mechanism of action of this drug is to inhibit the enzyme:

- A. Dihydrofolate reductase
- B. Creatine kinase
- C. Xanthine oxidase
- D. Lactate dehydrogenase
- E. Hexokinase

134) Some vitamins provide the stability of biological membranes. Specify one of

the following vitamins:

- A. tocopherol
- B. cholecalciferol
- C. naphthoquinone
- D. pantothenic acid
- E. riboflavin

135) Hyperchromic anemia - Birmer's disease - arises due to lack of vitamin B12. What bioelement is part of this vitamin?

- A. Cobalt
- B. Iron
- C. Magnesium
- D. Molybdenum
- E. Zinc

136) After removing part of the stomach the number of red cells and hemoglobin in the blood is decreases. Violation of the absorption of what vitamin leads to such changes in the blood?

- A. B12
- B. B2
- C. PP
- D. B1
- E. C

137) The patient who has been diagnosed with thrombosis of the lower extremities, the doctor prescribed to uptake sinkumar, which is antivitamin K. What process is inhibited by the action of this drug?

- A. Carboxylation of glutamate residues
- B. Phosphorylation of serine residues
- C. Methylation of radicals of amino acids
- D. Prolin hydroxylation
- E. Lysine hydroxylation

138) Gluconeogenesis is activated during fasting. What is called vitamin, which is involved in the process of carboxylation of pyruvic acid:

- A. biotin
- B. retinol
- C. calciferol
- D. nicotinamide
- E. folatin

139) A worker of a poultry farm who ate 5 or more raw eggs daily, appeared lethargy, drowsiness, muscle aches, hair loss, seborrhea. What vitamin deficiency is observed in this condition?

- A. H (biotin)

- B. B1 (thiamine)
- C. A (retinol)
- D. C (ascorbic acid)
- E. B2 (riboflavin)

140) It is known that malonyl-CoA is formed from acetyl-CoA and carbon dioxide under the influence of acetyl-CoA carboxylase. What vitamin is a coenzyme of this enzyme?

- A. Biotin
- B. Ascorbate
- C. Pantothenic acid
- D. Folic acid
- E. Thiamine

141) During B1 avitaminosis a number of processes are violated. With a violation of the functioning of which enzyme it is connected?

- A. Pyruvate dehydrogenase complex
- B. Glutamate dehydrogenase
- C. Succinate dehydrogenase
- D. Lactate dehydrogenase
- E. Aminotransferase

142) The megaloblastic anemia was developed in a man against the background of alcoholic liver cirrhosis. What vitamin deficiency is the main cause of anemia in this patient?

- A. Folic Acid
- B. Pantothenic acid
- C. Lipoic acid
- D. Thiamine
- E. Biotin

143) In patients with alcoholism disorders of the central nervous system - memory loss, psychoses are often observed. These symptoms are caused by lack of vitamin B1 in the body. Disturbance of formation of which coenzyme can cause these symptoms?

- A. Thiamine pyrophosphate
- B. Coenzyme A
- C. FAD
- D. NADP
- E. Pyridoxal phosphate

144) A patient has hyperchromic B12-deficiency anemia. The drug of what vitamin should be prescribed?

- A. Cyanocobalamin
- B. Thiamine chloride

- C.* Vikasol
- D.* Retinol acetate
- E.* Riboflavin

145) Ultraviolet irradiation is used in medicine for various physiotherapy procedures. Which of the above mechanisms is the basis of the therapeutic effect of ultraviolet rays on the body?

- A.* Activation of vitamin D synthesis
- B.* Activating the action of drugs
- C.* Strengthening cell division
- D.* Reduction of melanin skin synthesis
- E.* Activation of lipid peroxidation

ENZYMES

- 1) Competitive inhibitor of acetylcholinesterase is prescribed to sick persons on myasthenia, under paralysis, motive damages after trauma. Point it:
- A. Proserin
 - B. Indometacin
 - C. Sarin
 - D. Aspirin
 - E. Allopurinol
- 2) Bandages with immobilized enzyme on them are used for treatment of festering wounds. Point this enzyme:
- A. Trypsin
 - B. Arginase
 - C. Catalase
 - D. Alkaline phosphatase
 - E. Acidic phosphatase
- 3) Enzyme carries out transportation of a structural fragment from one substrate to another with the formation of two products. Point the class of such enzymes:
- A. Transferases
 - B. Hydrolases
 - C. Ligases
 - D. Oxidoreductases
 - E. Isomerases
- 4) The most informative test for early diagnostics of muscular dystrophy is increasing in the blood serum of:
- A. Creatine kinase
 - B. Aspartate aminotransferase
 - C. Alanine aminotransferase
 - D. Lactate dehydrogenase
 - E. Hexokinase
- 5) Enzymes catalyze proceeding of biochemical processes in the organism. What is the optimal temperature for their action?
- A. 37 °C – 40 °C
 - B. 0 °C – 4 °C
 - C. 28 °C – 30 °C
 - D. 2 °C – 4 °C
 - E. °C – 20 °C
- 6) Acetylcholinesterase inhibition occurs under usage of proserin, which is the pharmaceutical preparation. Point the type of inhibition:

- A. Competitive
- B. Uncompetitive
- C. Noncompetitive
- D. Allosteric
- E. Reversible

7) Enzyme preparations are used in medical practice for treatment of festering wounds. What enzyme from the listed below is used in these cases?

- A. Trypsin
- B. Acid phosphatase
- C. Alkaline phosphatase
- D. Amylase
- E. Arginase

8) A patient complains about pains behind the sternum at the left side, excessive sweating and tachycardia. What enzymes from the listed below should be determined in the blood for confirmation of myocardial infarction?

- A. AST, CK, LDH-1
- B. Acidic phosphatase, LDH-5, LDH-4
- C. ALT, aldolase, LDH-4
- D. Amylase, alkaline phosphatase, ALT
- E. α -Fetoprotein, aldolase, CK

9) Immobilized on bandage material trypsin preparations are used for purification of festering wounds and their fast cicatrization. What is their advantage over a free enzyme?

- A. Longer period of action
- B. Stronger activity
- C. Higher specificity of action
- D. Higher sensitivity to temperature
- E. Higher sensitivity to pH changes

10) New antibiotics are synthesized by enzymatic transformations of the natural antibiotics. What type of such enzymes became widely used in pharmaceutical industry?

- A. Immobilized enzymes
- B. Native enzymes
- C. Denaturated enzymes
- D. Complexes of enzymes and coenzymes
- E. Complexes of enzymes and activators

11) Method of affine chromatography with a ligand fixed on the carrier is used for getting from animal pancreas of a purified enzyme – amylase. What compound from the following is used as a ligand?

- A. Starch

- B. Cellulose
- C. Lactose
- D. Sucrose
- E. Glucose

12) The preparation proserine is a reversible inhibitor of acetylcholinesterase. What is the mechanism of proserine inhibitory action?

- A. Competition with acetylcholine for the enzyme active site
- B. Enzyme denaturation
- C. Covalent binding to the enzyme active site
- D. Covalent binding out of the enzyme active site
- E. Ferrum ion oxidation in the enzyme active site

13) Specific antidotes are used under poisoning by organophosphorous compounds because they reactivate the enzyme:

- A. Acetylcholinesterase
- B. Choline acetyl transferase
- C. Cytochrome oxidase
- D. Succinate dehydrogenase
- E. Lactate dehydrogenase

14) Enzyme activity depends on a number of factors. How does pH influence on enzyme activity?

- A. Influences on ionization of the acidic and basic groups
- B. Stabilizes the enzyme secondary structure
- C. Depolarization of the enzyme molecule occurs
- D. Influences on the enzyme active site
- E. Polarizes the enzyme molecules

15) Enzymes have a high specificity. What factor is the specificity conditioned by?

- A. Conformational and electrostatic complementary character between the substrate and enzyme
- B. Apoenzyme unique structure
- C. Coenzyme unique structure
- D. Cofactor unique structure
- E. Conformational and electrostatic complementary character between the coenzyme and apoenzyme

16) Transformation of succinate to fumarate is catalyzed by succinate dehydrogenase. What competitive inhibitor inhibits the enzyme activity?

- A. Malonic acid
- B. Succinate
- C. Malic acid
- D. Fumaric acid
- E. Pyruvic acid

17) Pharmaceutical enzyme preparations are used for purification of festering wounds. Point, what compound will be effective both for the wound purification and cicatrization?

- A. Bandage with trypsin
- B. Abstersion by glucose oxidase
- C. Abstersion by hydrogen peroxide
- D. Application of sterile dressing
- E. Application of dressing with physiological solution

18) Acute pancreatitis was diagnosed in a patient during biochemical examination. For avoiding pancreas autolysis the following preparations should be used:

- A. Proteolytic enzyme inhibitors
- B. Insulin
- C. Pancreatic enzyme complexes
- D. Antibiotics
- E. Sulfanilamide preparations

19) Increasing of the LDH₁, LDH₂, AST, and creatine phosphokinase (MB isozyme) activity was determined in the patient's blood. Diagnose, what organ the abnormalities of biochemical processes are taking place in?

- A. Heart
- B. Skeletal muscles
- C. Kidneys
- D. Liver
- E. Pancreas

20) Increasing of the LDH activity was determined during patient's examination. This is typical for heart, kidney and liver diseases. What additional biochemical analysis should be done for differential diagnostics?

- A. LDH isozyme determination
- B. Blood sugar determination
- C. Ketone bodies level determination
- D. Cholesterol level determination
- E. Blood amylase determination

21) A pharmaceutical preparation of asparaginase is used for leukosis treatment. Point its action mechanism.

- A. Destroys asparagine
- B. Stimulates protein synthesis
- C. Synthesizes asparagine
- D. Synthesizes glutamine
- E. Destroys glutamine

22) Acetylcholinesterase competitive inhibitor is administered to patients sick in myasthenia, under paralyses and moving abnormalities after traumas. Point it:

- A. Proserin
- B. Platifillin
- C. Dopamine
- D. Reserpine
- E. Ephedrine

23) A patient with myocardial infarction was prescribed the fibrinolytic preparation "Streptodecase" that was made of a water-soluble matrix of polysaccharide nature using the method of:

- A. Enzyme immobilization
- B. Autolysis
- C. Ultracentrifugation
- D. Electrophoresis
- E. Extraction

24) Energetic metabolism in a 2-year-old boy is abnormal – slowing down the processes of oxidation and ATP synthesis, decrease of the Krebs cycle metabolites in the blood. What metabolite is a competitive inhibitor of succinate dehydrogenase?

- A. Malonate
- B. Aspartate
- C. Glutamate
- D. Malate
- E. Citrate

25) Myocardial infarction was preliminary diagnosed in a patient. Activity of what enzyme is necessary to determine for more accurate diagnosis?

- A. Creatine kinase
- B. Alkaline phosphatase
- C. Aldolase
- D. Choline esterase
- E. Glutamate dehydrogenase

26) A person sick with tonsillitis was prescribed sulfanilamide preparation which antimicrobial action was based on a damage of the folic acid synthesis. What compound do sulfanilamides compete for the enzyme active site with?

- A. Para-aminobenzoic acid
- B. Glutamic acid
- C. Ubiquinone
- D. Succinate
- E. Citric acid

27) An increased amount of the enzymes: CK (MB-isozyme), AST, LDH_{1,2} was determined in the blood of a sick person during investigation. What diagnosis we could suppose in this case?

- A. Cardiac infarction
- B. Pancreatitis
- C. Myocardial inflammation
- D. Liver cirrhosis
- E. Central nervous system affection

28) Preparations that contain mercury and arsenic are used in pharmaceutical practice. Point, what type of the inhibitors do these compounds belong to?

- A. Uncompetitive
- B. Allosteric
- C. Competitive
- D. Noncompetitive
- E. Reversible

29) Heavy metal ions are very toxic. They block the SH-groups that are part of the enzyme active site. What is the inhibition type?

- A. Noncompetitive
- B. Uncompetitive
- C. Competitive
- D. Allosteric
- E. Substrate

30) Preparation armine from a group of POC (organophosphorous compounds) that has a strong anticholinesterase activity was used as antiglaucomic substance during last years. Point the type of acetylcholinesterase inhibition:

- A. Noncompetitive
- B. Uncompetitive
- C. Allosteric
- D. Substrate
- E. Competitive

31) A patient with glaucoma was prescribed pyrophos (organophosphorous compound) that oppresses acetylcholinesterase activity by the type of:

- A. Noncompetitive inhibition
- B. Allosteric inhibition
- C. Uncompetitive inhibition
- D. Competitive inhibition
- E. Enzyme synthesis inhibition

32) Dehydrogenases are enzymes that split hydrogen atoms off a substrate. What class of enzymes does lactate dehydrogenase belong to?

- A. Oxidoreductases

- B. Transferases
- C. Lyases
- D. Hydrolases
- E. Isomerases

33) Choose a substance that can not function as a substrate for human body enzymes:

- A. Nitric acid
- B. Higher fatty acid
- C. Glucose
- D. Acetic acid in active form
- E. Glycogen

34) The lipase enzyme cleaves the ester bonds in the triacylglycerol molecules. What class does this enzyme belong to?

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

35) Sulfanilamides are widely used as bacteriostatic substances. The mechanism of antimicrobial action of sulfanilamide preparations is based on the structural similarity with:

- A. Para-aminobenzoic acid
- B. Glutamic acid
- C. Folic acid
- D. Nucleic acid
- E. Antibiotics

36) Acute pancreatitis was diagnosed in a patient. Determination of what from the listed below blood enzymes could be a diagnostic criterion?

- A. Amylase
- B. Aldolase
- C. LDH
- D. Creatine kinase
- E. Alanine amino peptidase

37) In *E. coli* cells, the synthesis of pyrimidine nucleotides is carried out according to the scheme of the metabolic path: $\text{CO}_2 + \text{NH}_3 + 2\text{ATP} \rightarrow \text{P}_1 \rightarrow \text{P}_2 \rightarrow \text{UTP} \rightarrow \text{CTP}$. With an increase in the cell concentration of CTP, the synthesis of pyrimidine nucleotides stops. What kind of regulation is described?

- A. Allosteric regulation
- B. Partial proteolysis
- C. Phosphorylation of the enzyme molecule

- D. Joining protein inhibitors
- E. Cleavage protein inhibitors

38) Pancreatic juice contains a large number of various enzymes, some of them are secreted in an inactive form. Name these enzymes?

- A. Trypsinogen, chymotrypsinogen
- B. Nucleases, pepsin
- C. Sucrose, amylase
- D. Amylase, lipase
- E. Nucleases, peptidase

39) During a patient's operation after a drug that causes muscle relaxation, a long stasis of breathing (more than 5 minutes) was observed. The deficiency of which of the following enzymes was observed?

- A. Acetylcholinesterase
- B. Monoamine oxidase
- C. Acetyltransferase
- D. Catalase
- E. Glucose-6-phosphate dehydrogenase

40) In myocardial infarction in plasma an increase in the level of LDH1, LDG2 - isoenzymetric forms of lactate dehydrogenase is observed. What does isoenzymes characterize?

- A. Differ in primary structure and physico-chemical and catalytic properties
- B. They differ in physical and chemical properties and have the same catalytic properties
- C. Identical in structure of proteins, localized in different organs
- D. Identical to the original structure, differ in catalytic properties
- E. Catalyze different reactions

41) Fibrinolytic drugs are able to dissolve already formed thrombi in the human body. Which of the following pharmacological agents belongs to the fibrinolytic system?

- A. Streptokinase
- B. Phenobarbital
- C. Vikasol
- D. Riboflavin
- E. Isoniazid

42) One of the methods of methanol poisoning treatment is the introduction into the body (per os or intravenously) of ethanol in amounts that cause an intoxication in a healthy person. Why this treatment is effective?

- A. Ethanol displaces methanol from the active site of alcohol dehydrogenase
- B. Ethanol inactivates allosteric site of alcohol dehydrogenase
- C. Ethanol blocks coenzyme of alcohol dehydrogenase

- D. Ethanol is more likely to be cleaved with the formation of less toxic compounds than methanol
- E. Ethanol suppresses the diffusion of methanol

43) In the plasma of the patient, an increase of activity of LDG4, LDH5, alanine aminotransferase, gamma-glutamyltransferase, carbamoylornithine transtransferase was observed. What pathology of an organ is shown by these results?

- A. Liver
- B. Heart
- C. Lenses
- D. Kidney
- E. Pancreas

44) Dehydrogenases cleave hydrogen atoms from different substrates and belong to the class:

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

45) The use of paints in the children's toys manufacture is substantially limited due to the plumbum content, which inhibits enzymes by mechanism:

- A. Uncompetitive
- B. Competitive
- C. Uncompetitive
- D. Alosteric
- E. Reverse

46) Immobilized enzymes are widely used in medical practice as part of pharmaceutical preparations. Point the drug has thrombolytic activity.

- A. "Streptodecase"
- B. "Dysphlatyl"
- C. Visken
- D. Pentoxyl
- E. Spasmalgin

47) Substances in the digestive system undergo certain changes. What class of enzymes mainly carry out enteral transformations?

- A. Hydrolases
- B. Oxidoreductases
- C. Transferases
- D. Lyases
- E. Lifases

48) Enzymes (biological catalysts) are used as pharmacological agents. What is the mechanism of enzymes action in biochemical reactions?

- A. Reduce the activation energy of the reaction
- B. Change the order of the reaction
- C. Inhibit the reaction process
- D. Increase the activation energy of the reaction
- E. Change the constant of the reaction rate

49) Leading majority of cell enzymes has the maximum of activity in the range of pH 6-8. But there is an enzyme which optimum lies in the interval of pH 9.5 -10. This enzyme is:

- A. Arginase
- B. Pepsin
- C. Trypsin
- D. Papain
- E. Urease

50) Proteolytic enzymes (pepsin, trypsin) are synthesized in inactive form as the pro-enzymes (pepsinogen, trypsinogen), and activated during food digestion by restricted proteolysis. The mechanism of their activation is:

- A. Splitting the inhibiting peptide off pro-enzyme
- B. Phosphorylation
- C. Dephosphorylation
- D. Action of allosteric effector
- E. Activation by substrate

51) A worker of sanitary-epidemic station has poisoned with phosphor-organic insecticide when treating the equipment. Detect the mechanism of action of the group substances on the human organism.

- A. Irreversible inhibition of acetylcholine esterase
- B. Hydrolysis of acetylcholine
- C. Irreversible inhibition of tryptophanyl pyrrolase
- D. Competitive inhibition of acetylcholine esterase
- E. Allosteric inhibition of acetylcholine esterase

52) The pharmacological preparations proserine, physostigmine are used under myasthenia, paralyses, intestinal atonia. Such preparations prolong the action of neurotransmitter in the synaptic cleft as they are competitive inhibitors of the enzyme:

- A. Acetylcholine esterase
- B. Monoamine oxidase
- C. Saccharase
- D. Diamino oxidase
- E. Histidine decarboxylase

53) Point to a distinctive feature of enzyme action as compared with mineral catalysts:

- A. They are highly specific to the substrate
- B. They lower activation energy of chemical reaction
- C. They increase activation energy of chemical reaction
- D. They increase affinity of the substrate to product
- E. They do not possess selectivity of action

54) The enzyme urease is able to destroy the structure of urea only. Point to the type of its specificity.

- A. Absolute
- B. Stereo-chemical
- C. Absolute group
- D. Relative group
- E. Classic

55) Name a metal cation unable to make a co-factor function for enzymes in the human organism:

- A. Pb²⁺
- B. Na⁺
- C. Ca²⁺
- D. Zn²⁺
- E. Mg²⁺

56) Point to the substrate which is digested by the enzymes of the class hydrolases:

- A. Proteins
- B. Higher fatty acids
- C. Glucose
- D. Pyruvic acid
- E. Carbon dioxide

57) Name a fragment in the enzyme structure in which the substrate is converted to product of reaction:

- A. Catalytic plot of the active site
- B. Contact plot of the active site
- C. Allosteric site
- D. Co-factor
- E. Hydrophobic center

58) Choose the term which is used to characterize ability of the enzyme active form to catalyze its own production from pro-enzyme:

- A. Autocatalysis
- B. Retro inhibition
- C. Chemical modification
- D. Phosphorylation

E. Dephosphorylation

59) A burn scar has left in a patient. For its resolution an electrophoresis with enzyme has been appointed to the patient. Name the enzyme.

- A.* Hyaluronidase
- B.* Arginase
- C.* Asparaginase
- D.* ATP-synthase
- E.* Glycine oxidase

60) Pathogenic microorganisms produce various enzymes in order to penetrate body tissues and spread there. Point out these enzymes among those named below.

- A.* Hyaluronidase, lecithinase
- B.* Lyase, ligase
- C.* Transferase, nuclease
- D.* Oxydase, catalase
- E.* Esterase, protease

61) The amino acids that contain hydroxyl group in the radical are quite often included in the enzyme active site. Name one of such amino acids.

- A.* Serine
- B.* Alanine
- C.* Valine
- D.* Cysteine
- E.* Phenylalanine

62) Acetyl salicylic acid (aspirin) after per os intake is easily converted into salicylate and acetic acid in the liver, kidneys and other tissues. The enzyme that cleaves aspirin belongs to the class:

- A.* Hydrolases
- B.* Oxidoreductases
- C.* Ligases
- D.* Transferases
- E.* Isomerases

63) What substances are usually determined in duodenal juice to assess functions of the pancreas?

- A.* Activity of amylase and trypsin
- B.* Activity of pepsin
- C.* HCl level
- D.* Cholesterol level
- E.* Concentration of antibodies to secretin

64) Immobilized enzymes are used in surgeon practice for cleaning of festering wounds and necrotic tissues. Which enzymes from the listed below are used for this purpose?

- A. Trypsin, chymotrypsin
- B. Pepsin
- C. Enterokinase
- D. Amylase
- E. Glycosidase

65) It is known that the determination of LDH isoenzymes is used in the differential diagnosis of pathological conditions. What is the property of isoforms of lactate dehydrogenase provides the possibility of their separation?

- A. for electrophoretic mobility
- B. for hydrophilicity
- C. for hydrophobic
- D. by solution
- E. for non-protein component

66) To cancer cells grow requires a certain growth factor. In the leukemia treatment used an enzyme that destroys this irreplaceable factor, namely:

- A. Asparaginase
- B. Glutaminase
- C. Succinate dehydrogenase
- D. Citrate synthetase
- E. Aspartate aminotransferase

67) Many mucous membranes in humans produce an enzyme that causes lysis of bacteria. It is detected in the eyes, saliva and mucus intestines. How is it called?

- A. Lysozyme
- B. Fibrinolysin
- C. Opsonini
- D. Complement
- E. Hyaluronidase

68) Prozeryn is used to treat myasthenia and other diseases of the muscular system. What enzyme is competitively inhibited by this drug?

- A. acetylcholinesterase
- B. succinate dehydrogenase
- C. lactate dehydrogenase
- D. citrate synthase
- E. arginase

BIOENERGETICS

1) Patient has accidentally taken a big dose of sleeping-draught from the barbiturate series (amytal), which is an inhibitor of NAD-related dehydrogenase of the mitochondrial respiration. What process will be stopped in the organism?

- A. ATP synthesis
- B. Lipid synthesis
- C. Amino acid synthesis
- D. Melanin synthesis
- E. Ammonia synthesis

2) Biological oxidation of xenobiotics takes place by means of microsomal oxidation, the most important enzyme in which is cytochrome P-450. What metal is an obligatory part of this enzyme?

- A. Fe
- B. Zn
- C. Na
- D. Mg
- E. K

3) To a patient, who suffers from insomnia, some somnolent preparations from the barbiturates were prescribed. Name the mitochondrial enzyme to which those medicines are inhibitors.

- A. NADH - dehydrogenase
- B. Cytochrome oxidase
- C. Isocitrate dehydrogenase
- D. α -Ketoglutarate dehydrogenase
- E. Succinate dehydrogenase

4) Under intoxication by carbon monoxide the tissue respiration in man is inhibited. Name the enzyme of the respiratory chain, which activity is sharply lowering at such conditions.

- A. Cytochrome oxidase
- B. Succinate dehydrogenase
- C. NADH - dehydrogenase
- D. ATP-synthase
- E. Coenzyme Q

5) A consumptive patient was prescribed antibiotic oligomycine. Point the process that is inhibited by this preparation during the reproduction of the tubercle [Koch's] bacillus.

- A. Oxidative phosphorylation
- B. Transamination
- C. Transmethylation
- D. Decarboxylation
- E. Deamination

6) The universal system of nonpolar compound biological oxidation (many of therapeutic agents, toxic substances, steroid hormones, and cholesterol) is a microsomal oxidation. Point the cytochrom that is a part of the microsomal oxidative system.

- A. Cytochrome P-450
- B. Cytochrome a_3
- C. Cytochrome a
- D. Cytochrome c
- E. Cytochrome c_1

7) A number of enzymes takes part in the ATP synthesis in the cell. Enzymes of the electron transport chain, which provide ATP synthesis, are localized in:

- A. Mitochondrion
- B. Lysosome
- C. Nucleus
- D. Peroxisome
- E. Ribosome

8) Antibiotic antimycin A blocks electron transport by the electron transport chain. Mark what point does it affect on?

- A. Between cytochromes b and c_1
- B. Between FADH_2 and CoQ
- C. Between cytochromes c_1 and c
- D. Between nucleotides NADH and FADH_2
- E. Between CoQ and cytochrome b

9) Monooxygenase system of the endoplasmic reticulum membranes in hepatocytes includes flavoprotein NADPH-cytochrome P-450 reductase and cytochrome P-450. It promotes inactivation of biologically active substances or detoxification of the toxic substances by catalyzing the reactions of:

- A. Hydroxylation
- B. Oxidation
- C. Methylation
- D. Acetylation
- E. Reduction

10) The biggest part of biochemical processes in the human organism is closely related with the use of energy. What compound is the unique accumulator, donor, and transformer of the energy in the organism?

- A. Adenosine triphosphate
- B. Phosphoenolpyruvate
- C. Creatinephosphate
- D. Acetyl -KoA
- E. Succinyl-CoA

11) The formation of foam due to hydrogen peroxide decomposition is observed under treatment of bleeding wounds by 3% hydrogen peroxide solution. This is the action of one of the blood enzymes. Choose this enzyme from listed below:

- A. Catalase
- B. Monoaminoxidase
- C. Cytochrome oxidase
- D. Carbonic anhydrase
- E. Lactate dehydrogenase

12) A patient with psychosis was prescribed a neuroleptic aminazine. The main way of its biotransformation in the organism is the microsomal oxidation induction. Point the main component of this system:

- A. Cytochrome P-450
- B. NADH-dehydrogenase
- C. Cytochrome oxidase
- D. CoQ-reductase
- E. Cytochrome c

13) Poisoning by carbon monoxide leads to inhibition of one of the electron transport chain enzymes. Point this enzyme:

- A. Cytochrome oxidase
- B. Cytochrome P-450
- C. Cytochrome b
- D. Cytochrome c₁
- E. Cytochrome c

14) The body temperature of a patient increased after administration of a high dose of thyroxine. The hyperthermia, in this case, was caused by uncoupling of the processes of biological oxidation and:

- A. Oxidative phosphorylation
- B. Lipid peroxidation
- C. Beta-oxidation of fatty acids
- D. Oxidative decarboxylation of pyruvate
- E. Oxidative deamination of amino acids

15) The arterial blood analysis of a patient with diagnosis of barbiturate poisoning showed blood pH lowering to 7.18. What metabolic disturbances under this preparation overdosing could cause the acidosis?

- A. Blocking of the electron transfer via NADH-CoQ-reductase
- B. Uncoupling of the respiration and oxidative phosphorylation
- C. Oxygen uptake stimulation
- D. Inhibition of the ATP-synthase function
- E. Inhibition of the respiratory chain cytochrome oxidase

16) A patient with the cyanide poisoning was taken to emergency in the grave condition. What preparation should be immediately administered to the patient?

- A. Cytochrome oxidase
- B. Thiamine
- C. Glucose
- D. Ascorbic acid
- E. Nicotinamide

17) It is well-known that some chemical compounds uncouple tissue respiration and oxidative phosphorylation. Name this compound.

- A. 2,4-dinitrophenol
- B. CO
- C. Antimycin A
- D. Lactic acid
- E. Acetyl-CoA

18) Till recently the antibiotic oligomycin was used for treatment of tuberculosis. Name the process that is inhibited by this preparation in Koch's bacillus.

- A. Oxidative phosphorylation
- B. Translation
- C. Active transport of compounds through the membranes
- D. Phagocytosis
- E. Anaerobic glycolysis

19) Choose the organ in which microsomal oxidation processes occur most intensively:

- A. Liver
- B. Kidneys
- C. Heart
- D. Spleen
- E. Lungs

20) Monooxygenases (enzyme systems of microsomal fraction) are also called hydroxylases. Such a name is caused by the fact that those enzymes catalyze:

- A. Reactions of introducing of hydroxyl groups into substrate
- B. Reactions of attaching of H₂O to substrate
- C. Reactions of dehydration
- D. Reactions of dehydratation
- E. Reactions of attaching of hydrogen to substrate

21) Point enzyme of the class Oxidoreductases that takes part in the microsomal oxidation process.

- A. Cytochrome P-450
- B. Cytochrome b
- C. Cytochrome c

- D. Cytochrome c₁
- E. Cytochrome a/a₃

22) In medical practice the pharmaceutical preparation isoniazid is used which is competitively introduced into a co-enzyme structure that cannot take part in processes of oxidation and reduction, and this leads to termination of the Koch's bacillus growth. Point, which enzyme systems are inhibited?

- A. NAD-related enzymes
- B. FAD-related enzymes
- C. Co-enzyme Q
- D. Cytochrome c
- E. Cytochrome a

23) Under some compound's action the blocking of oxidative phosphorylation occurs in the mitochondria, however oxygen consumption takes place and substrates are being oxidized. Point compound that uncouples those processes.

- A. Thyroxine
- B. Adrenalin
- C. Progesterone
- D. Oestradiol
- E. Somatostatin

24) Status of the patient's antioxidant system was estimated on basis of determination of one endogenous antioxidant content. What namely?

- A. Alpha-tocopherol
- B. Trivalent ferrum
- C. Ornithine
- D. Hydrogen peroxide
- E. Cholecalciferol

25) Investigation of transformation of a food colourant in the liver of the experimental animal has shown that this xenobiotic detoxication includes two phases. Name the first phase.

- A. Microsomal oxidation
- B. Peroxidation
- C. Conjugation
- D. Phosphorylation
- E. Dephosphorylation

26) Saliva analysis of a patient with parodontosis showed a decrease of the catalase activity. What process activation has been ascertained in this patient?

- A. Free radical oxidation
- B. Microsomal oxidation
- C. Substrate phosphorylation
- D. Mitochondrial oxidation

E. Anaerobic oxidation

27) Xenobiotics that enter into the human organism are detoxicated in the liver. Which process takes part in it?

- A.* Microsomal oxidation
- B.* Oxidative phosphorylation
- C.* Substrate phosphorylation
- D.* Peroxide oxidation
- E.* Oxidative deamination

28) Detoxification of xenobiotics and active endogenous metabolites is often fulfilled by means of the introduction of oxygen atom into a substrate molecule. Point the process such detoxification is realized in?

- A.* Hydroxylation
- B.* Decarboxylation
- C.* Transamination
- D.* Deamination
- E.* Phosphorylation

29) Active oxygen species initiate free radical chain reactions, which activate the lipid peroxidation. Choose vitamin, which have the ability to stop the chain of free radical reactions development.

- A.* Retinol
- B.* Thiamin
- C.* Riboflavin
- D.* Biotin
- E.* Routine

30) Hypoxia of tissues accompanies a number of pathological conditions. What process will result from the effects of oxygen starvation on the respiratory tract?

- A.* Reduced synthesis of ATP
- B.* Irreversible inhibition of cytochromes
- C.* Activation of electron transport
- D.* Formation of endogenous water
- E.* Increase in the synthesis of ATP

31) Some drugs can cause induction – stimulate the liver enzyme systems synthesis that are involved in the drugs metabolism and toxic substances. Which of the organic compounds stimulate drugs metabolism in the liver microsomes?

- A.* Phoenobarbitalum
- B.* Heparin
- C.* Vikasol
- D.* Streptocide
- E.* Vitamin E

32) The main role in the bactericidal action of leukocytes (neutrophils) belongs to:

- A. Hydrogen peroxide and hypochlorite
- B. Hydrogen peroxide and nitrogen oxide (II)
- C. Hypochlorite and singlet oxygen
- D. Hypochlorite and peroxynitrite
- E. Peroxynitrite and nitric oxide (II)

33) In pharmacology use barbiturates like hypnotic agent. These substances, like rotenone, are inhibitors of tissue respiration at the level:

- A. NADH: Coenzyme Q-Reductase
- B. Cytochrome oxidase
- C. Cytochrome b
- D. Cytochrome c1
- E. Succinate dehydrogenase

34) What reaction catalyzes superoxide dismutase?

- A. Reaction of superoxidanion radical recombination
- B. Tyrosine hydroxylation reaction
- C. The reaction of induction cytochrome P450 molecules synthesis
- D. Reaction of dopamine hydroxylation
- E. Reaction of lysine and proline residues hydroxylation in procologen

35) After treatment with phenobarbital, which is an inducer of cytochrome P450, the patient has heightened of:

- A. Microsomal oxidation
- B. Peroxidation of lipids
- C. Oxidative phosphorylation
- D. Substrate phosphorylation
- E. Cyclooxygenase oxidation

36) Patients with tuberculosis take a prescription with oligomycin antibiotic. What process inhibits this drug in mitochondria?

- A. Oxidative phosphorylation
- B. Substrate phosphorylation
- C. Microsomal oxidation
- D. Peroxidation of lipids
- E. Oxidative decarboxylation

37) One of the methods of effort hypoxia is hyperbaric oxygenation. However, high doses of oxygen cause acute poisoning with "oxygen" court appearance. Which reaction activation is dangerous for brain tissues in this procedure?

- A. Free radical oxidation of biopolymers
- B. Mitochondrial oxidation
- C. Microsomal oxidation

- D. Substrate phosphorylation
- E. Oxidation phosphorylation

38) Nucleoside triphosphates are macroergic compounds. What is considered to be the universal energy "currency" of cells?:

- A. ATP
- B. UTF
- C. GTP
- D. CTF
- E. TTP

39) The process of oxidative phosphorylation - is the main path of ATP biosynthesis in the human body. It occurs with the participation of ATP-synthetase, which is localized in:

- A. Mitochondria
- B. Lysosomes
- C. Core
- D. Golgi apparatus
- E. Microsomes

40) The elimination of xenobiotics and active endogenous metabolites often takes place due to the inclusion of an oxygen atom in the substrate molecule. Specify by which process this happens:

- A. Hydroxylation
- B. Phosphorylation
- C. Decarboxylation
- D. Desamination
- E. Redemption

41) The patient has an elevated concentration of 17-ketosteroids in the urine. The enzymes of which system are involved in 17-ketosteroids hydroxylation?

- A. Microsomal oxidation
- B. Ornithine cycle
- C. Pathophosphate path
- D. Krebs Cycle
- E. Protein synthesis system

42) In a patient with stomatitis and necrotic alterations in the oral cavity an inborn catalase deficiency (acatalasia) was revealed. This enzyme (catalase) catalyzes the reaction:

- A. Cleavage of H_2O_2 to H_2O and O_2
- B. Cleavage of H_2O_2 to H_2O and O
- C. Synthesis of H_2O_2
- D. Synthesis of ATP
- E. Decarboxylation of α -ketoacids

43) Lipid peroxidation activation is one of the mechanisms of biostructure damage and development of cell pathology. Name the compound that takes part in detoxification of organic peroxides.

- A. Glutathione
- B. Taurine
- C. Glycine
- D. Cysteine
- E. Methionine

44) Hereditary defects of glutathione peroxidase in erythrocytes lead to hemolytic anemia. What violation is taking place under these conditions?

- A. neutralization of active forms of oxygen
- B. citric acid cycle
- C. glycolysis
- D. oxidation of fatty acids
- E. the metabolism of purine nucleotides

45) In many cases of biological oxidation abnormality some vitamins and coenzymes are used. These compounds are included in the composition of the respiratory chain complexes, for instance:

- A. Riboflavin (FMN and FAD)
- B. Thiamine (TDP)
- C. Pyridoxine (PALP)
- D. Pantothenic acid (Coenzyme A)
- E. Folic acid (THF)

46) Among tissue respiration and oxidative phosphorylation uncouplers a certain hormone-protonophore fulfils an important part. Name it.

- A. Thyroxine
- B. Insulin
- C. Adrenalin
- D. Parathyrin
- E. Calcitonin

47) In experiments it was found out that 1 molecule of substrate of NAD^+ -related dehydrogenase is potent to initiate biosynthesis of 3 ATP molecules, but molecules of FAD-related dehydrogenases – just 2 ATP molecules. Why the FAD.H_2 oxidation gives 2 ATP molecules only?

- A. FAD.H_2 enters into the electron transport chain later than $\text{NAD.H (H}^+)$
- B. 2 hydrogen atoms of FAD.H_2 are directly used for ATP synthesis
- C. $\text{NAD.H (H}^+)$ is produced in metabolism in greater amount than FAD.H_2
- D. FAD.H_2 is important for fatty acid oxidation only
- E. FAD.H_2 in contrast to $\text{NAD.H (H}^+)$ is tightly bound to dehydrogenase apoenzyme

48) Barbituric acid derivatives are used in pharmacology as sleeping drafts because they are active inhibitors of tissue respiration. At what stage of the tissue respiration the blockage is fulfilled?

- A. NAD.H \rightarrow Co.Q
- B. Succinate \rightarrow Co.Q
- C. Cytochrome b \rightarrow cytochrome c₁
- D. Cytochrome a/a₃
- E. Cytochrome c

49) Cytochrome P 450 is an active component of the microsomal oxidation chain, and according to its chemical structure this cytochrome is:

- A. Hemoprotein
- B. Flavoprotein
- C. Pyridinoprotein
- D. Lipoprotein
- E. Nucleoprotein

50) In a patient with heavily damaged liver testosterone concentration in the blood has significantly increased. What process abnormality in the liver was the cause for such alteration?

- A. Microsomal oxidation
- B. Tissue respiration
- C. Ammonia detoxification
- D. Protein biosynthesis
- E. Hydrolytic cleavage of hormones

51) In the cell the enzymes of medical substances metabolism which demand the monooxygenase reactions of biotransformation are localized primarily in:

- A. Microsomes of endoplasmic reticulum
- B. Mitochondria
- C. Lysosomes
- D. Cytosol
- E. Nucleus

52) Direct participation in substrate oxidation in monooxygenase oxidation reaction of the microsomal oxidation chain has the compound:

- A. Cytochrome P 450
- B. Cytochrome b₅
- C. NADP⁺
- D. NADP.H+H⁺
- E. FAD.H₂

53) During recent decades amount of people which suffer from dependence on alcohol has significantly risen as a result of its increased consumption. What enzymes functioning impairment in ethanol metabolism leads to the

development of alcoholism?

- A. Alcohol dehydrogenase, cytochrome P 450
- B. Microsomal ethanol oxidative system, catalase
- C. Alcohol dehydrogenase, superoxide dismutase
- D. Alcohol dehydrogenase, peroxidase
- E. Microsomal ethanol oxidative system, superoxide dismutase

54) Substrate-linked phosphorylation occurs in the cycle of tricarboxylic acids.

What compound takes part in this reaction?

- A. Succinyl coenzyme A
- B. α -ketoglutarate
- C. Acetyl coenzyme A
- D. Succinate
- E. Malate

PHARMACEUTICAL BIOCHEMISTRY

- 1) Choose the right definition to the term “xenobiotics”:
 - A. Alien substances that enter the human organism and aren't used in it
 - B. Low molecular weight organic substances that interact with enzyme and modulate its activity
 - C. Protein catalysts that accelerate reactions in the cell
 - D. Allosteric effectors
 - E. Substances that regulate metabolism and development of the organism

- 2) A process of conjugation in phase II of toxic compound neutralization is fulfilled by means of joining of certain chemical compounds to their functional groups. Choose one of such compounds:
 - A. Glucuronic acid
 - B. Higher fatty acids
 - C. Cholesterol
 - D. Glucose
 - E. Pyruvate

- 3) Cleavage of acetylsalicylic acid (aspirin) in the human organism to salicylic and acetic acids is by type a reaction of:
 - A. Hydrolysis
 - B. Isomerization
 - C. Conjugation
 - D. Reduction
 - E. Oxidation

- 4) A process of interaction of para-amino salicylic acid with uridine diphosphoglucuronic acid (UDPGA) in the human organism belongs to reactions of:
 - A. Conjugation
 - B. Oxidation
 - C. Reduction
 - D. Hydrolysis
 - E. Isomerization

- 5) One of the end products of glutathione conjugation in hepatocytes of humans is:
 - A. Phenyl mercapturic acid
 - B. Salicylic acid
 - C. Phenol
 - D. Benzene
 - E. Anilin

- 6) For drug passage through the plasma membrane into the cell it is necessary to expend some energy for:

- A. Active transport
 - B. Filtration
 - C. Diffusion
 - D. Pinocytosis
 - E. Facilitated diffusion
- 7) To drugs of biogenic origin such a preparation belongs:
- A. Insulin from animals
 - B. Phenobarbital
 - C. Aspirin
 - D. Penicillin
 - E. Isoniazid
- 8) Active transport of substances through the plasma membrane means that:
- A. Transport facilitated by transporters and ATP
 - B. Filtration through the membrane pores
 - C. Endocytosis
 - D. Simple diffusion
 - E. Facilitated diffusion
- 9) Xenobiotics are alien compounds for the human organism. They most actively metabolize in cells of:
- A. Liver
 - B. Brain
 - C. Kidneys
 - D. Myocardium
 - E. Lungs
- 10) Process of conjugation occurs in phase II of detoxification of xenobiotics and endogenous toxins. This process belongs to the type of reactions of:
- A. Synthesis
 - B. Hydrolysis
 - C. Isomerization
 - D. Oxidation
 - E. Reduction
- 11) In reactions of peptide conjugation in hepatocytes in detoxification of endogenous toxins and xenobiotics a compound takes part:
- A. Glycine
 - B. Glucose
 - C. Glycerol
 - D. Glutathione
 - E. Fatty acids

12) Stage I of medicine intake into the organism is characterized by:

- A. Liberation of active substance from the medicine and passage to the place of absorption
- B. Absorption
- C. Distribution between blood and tissues
- D. Metabolism
- E. Interaction with receptors

13) Premature baby has a high level of bilirubin. The child was given phenobarbital in a dose of 5 mg to reduce hyperbilirubinemia. What process does phenobarbital affect?

- A. induction of cytochrome P-450 synthesis
- B. insulin synthesis
- C. erythropoiesis
- D. activation of proteolytic enzymes
- E. inhibition of hemoglobin decay

14) It is known that prolonged use of many drugs leads to a decrease in their pharmacological action. What is the mechanism of this effect?

- A. Induction of cytochrome P-450
- B. Activation of glycogen phosphorylase
- C. Activation of hexokinase
- D. Induction of NO synthase
- E. Induction of alcohol dehydrogenase

HORMONES

1) Hormones regulate a lot of processes in the body. Point a hormone which has an anabolic action.

- A. Insulin
- B. Oxytocin
- C. Vasopressin
- D. Glucagon
- E. Adrenalin

2) At biochemical examination of a patient hyperglycemia, glucosuria, high closeness of urine, increased amount of glucocorticoids in the blood were found out. At the same time in the blood and urine an increased amount of 17-ketosteroids was detected. Define, what type of diabetes has developed:

- A. Steroid diabetes
- B. Renal diabetes
- C. Diabetes insipidus
- D. Non- insulin-dependent diabetes mellitus
- E. Insulin-dependent diabetes mellitus

3) A 12-year-old boy was of small stature, however mentally he did not differ from the yearlings. Point the hormone, which deficit had resulted in this pathology:

- A. Growth hormone
- B. Vasopressin
- C. Adrenocorticotrophic hormone
- D. Insulin
- E. Adrenalin

4) A patient suffered from permanent feelings of thirst, fatigueability. Day's diuresis was of 3 – 4 L, concentration of glucose in the blood was normal. Lack of what hormone had resulted in the indicated changes in the organism?

- A. Vasopressin
- B. Thyroxine
- C. Insulin
- D. Glucagon
- E. Adrenalin

5) Vasopressin - a hormone which expresses a powerful antidiuretic action, stimulating a return current of water through the membranes of renal tubules. What is its chemical nature?

- A. Peptide
- B. Carbohydrate
- C. Amino acid derivative
- D. Steroid
- E. Lipid

- 6) Injection of adrenalin to the organism results in the increase of glucose level in the blood. What process is mainly activated in this case?
- A. Glycogen degradation
 - B. Alcoholic fermentation
 - C. Pentose phosphate pathway
 - D. Citric acid cycle
 - E. Glycogen synthesis
- 7) Interaction of catecholamines with b-adrenoreceptors provokes cAMP level increasing in the cells. Point the enzyme which is activated in this case.
- A. Adenylate cyclase
 - B. Phosphatase
 - C. Phosphodiesterase
 - D. Creatin kinase
 - E. Glucokinase
- 8) Under emotional stress triglyceride lipase is activated in adipocytes. Point out, concentration of what second messenger increases at that situation.
- A. cAMP
 - B. cGMP
 - C. Diacylglycerol
 - D. AMP
 - E. Ca^{2+}
- 9) Acetyl salicylic acid is used for rheumatism treatment. What process does acetyl salicylic acid influence on?
- A. Prostaglandin biosynthesis
 - B. Glucose degradation
 - C. Glycogen biosynthesis
 - D. Amino acid biosynthesis
 - E. Lipid degradation
- 10) The hormones of adenohypophysis are referred to as trophic hormones. Which from the listed hormones will stimulate production of glucocorticoids?
- A. Adrenocorticotrophic hormone
 - B. Thyroid-stimulating hormone
 - C. Growth hormone
 - D. Luteinizing hormone
 - E. Prolactin
- 11) In a patient level of glucose in the blood has increased. What hormone surplus could lead to such an effect?
- A. Adrenalin
 - B. Testosterone
 - C. Noradrenalin

- D. Insulin
- E. Oxytocin

12) A patient was prescribed a steroid anabolic medicine. What hormones synthetic analogues have been found an application in medicine as preparations with anabolic action?

- A. Androgens
- B. Mineralocorticoids
- C. Gestagens
- D. Clucocorticoids
- E. Estrogens

13) As medical products some derivatives of amino acids are widely used. Which of the listed hormones belong to derivatives of amino acids?

- A. Thyroid hormones
- B. Trophic hormones of hypophysis
- C. Androgens
- D. Clucocorticoids
- E. Estrogens

14) Some pathological processes are a basis of improper endocrine gland function. What hormone hypersecretion leads to development of hyperglycemia?

- A. Glucagon
- B. Vasopressin
- C. Insulin
- D. Melanotropin
- E. Growth hormone

15) A patient suffers from polyuria (5L of urine during a day) and thirst. Biochemical indices: concentration of glucose in the blood - 5,1 mmol/L, specific closeness of urine - 1,010. Glucose and keton bodies in the urine were absent. What state is characterized by the indicated parameters?

- A. Diabetes insipidus
- B. Hyperthyroidism
- C. Diabetes mellitus
- D. Steroid diabetes
- E. Myxedema

16) At what disease it was observed in a patient: hyperglycemia, glucosuria, high closeness of urine; in the blood - increased amount of glucocorticoids and increased concentration of 17-ketosteroids in the blood and urine?

- A. Steroid diabetes
- B. Diabetes mellitus
- C. Diabetes insipidus
- D. Renal diabetes

E. Liver diabetes

17) Information transfer from peptide hormones to intracellular second messengers occurs involving adenylate cyclase. What reaction is catalyzed by adenylate cyclase?

- A.* Cyclic adenosine monophosphate production
- B.* ATP breakdown into ADP and inorganic phosphate
- C.* ATP synthesis from adenosine monophosphate and pyrophosphate
- D.* ADP breakdown with adenosine monophosphate and inorganic phosphate production
- E.* ATP breakdown into adenosine monophosphate and pyrophosphate

18) Cyclic nucleotides (cAMP and cGMP) are second messengers in the transfer of information. What is the way of their regulatory function?

- A.* Specific protein kinase activation
- B.* Histone phosphorylation
- C.* Neurotransmitter activation
- D.* CNS stimulation
- E.* Transcription and translation stimulation

19) Patient H. who had been diagnosed with diabetes mellitus was prescribed insulin injections. What blood biochemical index dynamics change specifies on treatment effectiveness?

- A.* Glucose
- B.* Galactose
- C.* Fructose
- D.* Ribose
- E.* Lactose

20) Increase of insulin secretion by the pancreas takes place after using of carbohydrate meal. Activity of what enzymes of glycolysis is regulated by insulin?

- A.* Glucokinase, phosphofructokinase, pyruvate kinase
- B.* Aldolase, lactate dehydrogenase, enolase
- C.* Phosphoglyceromutase, lactate dehydrogenase, phosphoglucomutase
- D.* Enolase, aldolase, hexokinase
- E.* Phosphoglycerol kinase, pyruvate kinase, enolase

21) Introduction of glucocorticoids to a patient resulted in the increase of glucose blood level. Which from the listed processes is activated in this case?

- A.* Gluconeogenesis
- B.* Glycolysis
- C.* Glycogenolysis
- D.* Ketogenesis
- E.* Glycogen degradation

22) A patient K suffers from a permanent thirst and dryness in a company with hyperglycemia, polyuria and increased content of 17-ketosteroids in the urine, which are probable for:

- A. Steroid diabetes
- B. Insulin-dependent diabetes mellitus
- C. Diabetes insipidus
- D. Addison's disease
- E. Myxedema

23) A patient has hyperglycemia, glucosuria, polyuria. The urine had an increased closeness. What is a possible reason of such state?

- A. Insulin synthesis inhibition
- B. Glucagon synthesis inhibition
- C. Glucocorticoids synthesis inhibition
- D. Thyroxine synthesis inhibition
- E. Vasopressin synthesis inhibition

24) A patient without consciousness was delivered to reanimation. Marked smell of acetone from the mouth, acute hyperglycemia and ketonemia were observed. Which complications of diabetes mellitus took place in that case?

- A. Diabetic coma
- B. Hypoglycemic coma
- C. Cataract
- D. Acetone acute poisoning
- E. Nephrite

25) What endocrine gland hormones express influence on energy metabolism due to increasing of oxidative phosphorylation rate in the mitochondria that is accompanied by increased oxygen consumption by the organism and calorogenic effect?

- A. Thyroid gland
- B. Pancreatic gland
- C. Parathyroid gland
- D. Adenohypophysis
- E. Adrenal medullary gland

26) At insufficient consumption of carbohydrates with food the need in them for organism is compensated due to gluconeogenesis. Which of the listed hormones express a stimulating influence on gluconeogenesis?

- A. Glucocorticoids
- B. Mineralocorticoids
- C. Insulin
- D. Calcitonin
- E. Vasopressin

27) Many hormones have stimulating influence on the protein biosynthesis. Which of the listed hormones reveal an expressed anabolic activity?

- A. Androgens
- B. Gestagens
- C. Thyroid hormones
- D. Prostaglandins
- E. Catecholamines

28) The thyroid gland produces a hormone which lowers level of Ca^{2+} in the blood, promoting its storing in the bone tissue. What hormone expresses this action?

- A. Calcitonin
- B. Thyroxine
- C. Triiodothyronine
- D. Parathyroid hormone
- E. Adrenalin

29) Adrenal cortex glands produce some hormones revealing an anti-inflammatory effect. Point the main hormone which is carrying out this function?

- A. Hydrocortisone
- B. Aldosterone
- C. Testosterone
- D. Estrone
- E. Progesterone

30) Hormones in the human organism are synthesized in different organs and tissues, and then secreted into the blood. Specify the way of transportation of the iodine-containing hormones in the blood.

- A. Bound to α -globulins
- B. Bound to albumins
- C. In a free state
- D. Bound to γ -globulins
- E. Bound to β -globulins

31) Cholecalciferol (vitamin D₃) in the liver and kidneys is activated and converted to the active form – 1,25-dihydroxycholecalciferol. Name a hormone which regulates this process.

- A. Insulin
- B. Parathyroid hormone
- C. Calcitonin
- D. Adrenocorticotrophic hormone
- E. Aldosterone

32) Sulfanilurea derivatives (e.g. butamide) are commonly used at non-insulin dependent diabetes treatment. What is a biochemical mechanism of their hypoglycemic action?

- A. Strengthening of the insulin hypoglycemic action
- B. Reduction of the glucocorticoid hypoglycemic action
- C. Reduction of the insulin hypoglycemic action
- D. Strengthening of the glucocorticoid hyperglycemic action
- E. Reveal a diuretic action

33) Substantial increasing of diurnal diuresis without glycosuria is observed in a patient. What hormonal preparation of replacement therapy may be recommended for the treatment?

- A. Antidiurecrin (vasopressin)
- B. Adrenalin
- C. Insulin
- D. Thyroidin
- E. Aldosterone

34) Endemic goiter was diagnosed in a patient who lives on the specific geochemical territory. What microelement insufficiency leads to the appearance of this pathology?

- A. I
- B. F
- C. Cl
- D. Br
- E. At

35) A patient with rheumatism was prescribed prednisolone. Anti-inflammatory action of this preparation is realized by inhibiting the liberation of arachidonic acid. Predecessor of what biologically active substances this acid is?

- A. Prostaglandins
- B. Heme
- C. Urea
- D. Uric acid
- E. Cholesterol

36) Amino acid tyrosine is a predecessor of some hormones. Point one of them, produced in the adrenal medulla glands.

- A. Adrenaline
- B. Histamine
- C. Gastrine
- D. Serotonin
- E. Glucagon

37) Tyrosine is used for the thyroxine synthesis. What atoms from microelements take part in this process?

- A. I
- B. Fe
- C. Cu
- D. Ca
- E. Zn

38) Methionine has a labile methyl group which is necessary for biosynthesis of some important substances. Point one of them.

- A. Adrenalin
- B. Thyroxine
- C. Insulin
- D. Histamine
- E. GABA

39) At utilization of arachidonic acid in the cyclooxygenase way certain biologically active substances are formed. Point them.

- A. Prostaglandins
- B. Interferons
- C. Biogenic amines
- D. Somatomedines
- E. Insulin-like growth factors

40) Metabolism of arachidonic acid is accompanied by formation of biologically active derivatives. Point one of them, the end products of the lipooxygenase pathway.

- A. Leicotrienes
- B. Steroids
- C. Catecholamines
- D. Bile acids
- E. Kinines

41) In therapy of chronic inflammation processes a series of medical preparations is used. Point out, which of the preparations reversibly inhibits cyclooxygenase (COX) of arachidonic acid.

- A. Indomethacin
- B. Carnitine
- C. Antimycin
- D. Vikasol
- E. Cholecalciferol

42) Cyclooxygenase activity may be inhibited by use of some medicines. Which of them irreversibly inhibits this enzyme?

- A. Aspirin

- B. Allopurinol
- C. Insulin
- D. Oligomycin
- E. Aminalol

43) A patient with diabetes mellitus who takes insulin for a long time complains about gain of weight. Point a possible mechanism of the insulin side effect development.

- A. Oppress fat mobilization from depot
- B. Oppress glycolysis
- C. Oppress lipid absorption
- D. Activate protein degradation
- E. Contribute to protein conversion into fats

44) A patient is very tall and has the disproportionately big hands. What hormone increased secretion this patient has?

- A. Somatotrophic hormone
- B. Thyroxine
- C. Antidiuretic hormone
- D. Adrenalin
- E. Melanostimulative hormone

45) A patient was prescribed cortisol with a cure purpose for a long period of time. Point, what compound derivative this hormone is?

- A. Cholesterol
- B. Glucose
- C. Albumin
- D. Glycerol
- E. Sphingosine

46) Thyroid hormones are derivatives of amino acids. Which of the amino acids is a basic structure for these hormones?

- A. Tyrosine
- B. Proline
- C. Tryptophan
- D. Serine
- E. Glutamin

47) There are constantly occurring processes of synthesis of various biologically active steroid native compounds in the organism. What is the predecessor for the synthesis of steroid hormones?

- A. Cholesterol
- B. Uric acid
- C. Urea
- D. Bilirubin

E. Chondroitin sulphates

48) Insulin - a hormone of the pancreas with a hypoglycemic action. To what group does it belong by a chemical nature?

- A.* Polypeptide
- B.* Steroid
- C.* Nucleotide
- D.* Carbohydrate
- E.* Lipid

49) Hormones of a protein-peptide nature reveal their influence on the regulation of biochemical processes in the cell by the adenylate cyclase activation. Point, what compound is synthesized as a result of this enzyme action?

- A.* cAMP
- B.* cCMP
- C.* cGMP
- D.* cTMP
- E.* cUMP

50) Hormone glucagon is synthesized by α -cells of the pancreas and takes part in carbohydrate metabolism. Point, what process in the liver does it influence on?

- A.* Activates glycogenolysis
- B.* Activates alcohol fermentation
- C.* Inhibits glycogenolysis
- D.* Inhibits glycolysis
- E.* Activates lipogenesis

51) Steroid hormones activate the phospholipase A2 inhibitor biosynthesis, and having this their anti-inflammatory effect is fulfilled via the inhibition of biosynthesis of:

- A.* Prostaglandines
- B.* Histamine
- C.* Kallikrein
- D.* Bradykinin
- E.* Kininogens

52) Name a compound which fulfils the function of second messenger at membrane-intercellular mechanism of hormone action:

- A.* Cyclic AMP
- B.* Oleic acid
- C.* Uridylic acid
- D.* Arachidonic acid
- E.* GTP

53) Under diabetes mellitus deep imbalance takes place not only in carbohydrate metabolism, but also in lipid one. So, an active stimulation of lipolysis occurs in adipose tissue. What hormone stimulates this process?

- A. Adrenalin
- B. Melanotropin
- C. Follitropin
- D. Oxytocin
- E. Calcitonin

54) A patient had diuresis increasing (5-6 liters in 24 hours). What hormone deficiency is mostly real under such conditions?

- A. Vasopressin
- B. Thyroxine
- C. Somatotrophic hormone
- D. Oxytocin
- E. Glucagon

55) Under stress conditions glucose level in the blood rises. What hormone causes such a change via the glycogenolysis activation?

- A. Adrenalin
- B. Parathyroid hormone
- C. Progesterone
- D. Aldosterone
- E. Vasopressin

56) As a result of adenohypophysis tumor an impairment of trophic hormones biosynthesis appears, and acromegaly is observed. Point out, what hormone level rises?

- A. Somatotrophic hormone
- B. Corticotrophic hormone
- C. Luteinizing hormone
- D. Follitropin
- E. Melanocyte-stimulating hormone

57) During childbirth a preparation was used that activated the contraction of uterus smooth muscles. Name the hormone which is included in the composition of this preparation?

- A. Oxytocin
- B. Angiotensin
- C. Secretin
- D. Gastrin
- E. Bradykinin

58) Steroid hormone biosynthesis is fulfilled from the predecessor which contains the ring of cyclopentane pergidrofenantren. Name that predecessor.

- A. Cholesterol
- B. Levulinic acid
- C. Malonyl-CoA
- D. Acetyl-CoA
- E. Tyrosine

59) A patient took medical advice with complaints of constant thirst, general weakness and it was determined hyperglycemia (16 mmol/L), polyuria and an increased content of 17-ketosteroids in the urine. What disease is characterized by such features?

- A. Steroid diabetes
- B. Insulin-dependent diabetes
- C. Myxedema
- D. Addison's disease
- E. Glomerulonephritis

60) It is known that a disease of endemic goiter is spread in some biogeochemical areas. What bioelement deficiency causes this disease?

- A. Iodine
- B. Cobalt
- C. Ferrum
- D. Cuprum
- E. Fluorine

61) In a 45-year-old woman that was delivered to hospital, dryness in the mouth, thirst, excessive diuresis, general weakness were observed. During a biochemical investigation hyperglycemia and hyperketonemia were found. There were also found glucose and the ketone bodies in the urine. The electrocardiogram has shown some diffuse changes in the myocardium. A doctor has diagnosed:

- A. Diabetes mellitus
- B. Diabetes insipidus
- C. Steroid diabetes
- D. Alimentary hyperglycemia
- E. Infarction of myocardium

62) 40-year-old patient with schizophrenia has normal blood glucose, ketone and urea contents. Shock therapy with regular injections of insulin has led to the development of insulin coma, after which the patient's mental condition improved. What was the most likely cause of insulin coma?

- A. Hypoglycemia
- B. Hyperglycemia
- C. Glucosuria
- D. Dehydration of tissues
- E. Metabolic acidosis

63) A 65-year-old woman complains of constant thirst, increased diuresis. After investigation it was diagnosed – type II. diabetes mellitus A doctor prescribed biguanidinemethformin. What biochemical process this preparation can inhibit?

- A. Gluconeogenesis
- B. Glycolysis
- C. Glycogen degradation
- D. Pentose phosphate pathway
- E. Glycogen biosynthesis

64) In a patient with Itsenko-Cushing's syndrome a steady hyperglycemia and glucosuria are observed. What hormone synthesis and secretion are increased in this case?

- A. Cortisol
- B. Epinephrine
- C. Glucagon
- D. Thyroxine
- E. Aldosterone

65) Indometacin is an active nonsteroid antiphlogistic mean that is used in medical practice for treatment of rheumatoid joint inflammation, osteoarthritis, inflammatory diseases of connective tissue. What process is inhibited by indometacin?

- A. Prostaglandin biosynthesis
- B. Kinin formation
- C. Angiotensin II formation
- D. Amino acid biosynthesis
- E. Purine biosynthesis

66) Calcium ions are one of the secondary messengers that take part in a membrane-intracellular mechanism of hormone action. Name the protein calcium ions bind in the cytoplasm with.

- A. Calmodulin
- B. Albumin
- C. Gamma-globulin
- D. Ceruloplasmin
- E. Casein

67) cAMP level increases in the cell under activation of the enzyme Adenylate cyclase. Point another enzyme which regulates a cAMP content in the cell too.

- A. Phosphodiesterase
- B. Pyruvate kinase
- C. Ribonuclease
- D. Protein kinase
- E. Guanylate cyclase

68) In a patient hypertension, glucosuria, increase of free fatty acid content as well as epinephrine and norepinephrine (100 fold) in the blood plasma were observed. What pathology causes appearance of the mentioned symptoms?

- A. Pheochromocytoma
- B. Hyperthyroidism
- C. Itsenko-Cushing's syndrome
- D. Diabetes mellitus
- E. Hyperparathyroidism

69) A patient has complaints of polyuria. The urea analysis showed no pathological components but the density of urea was lower than normal. What hormone secretion abnormality could this patient have?

- A. Vasopressin
- B. Oxytocin
- C. Insulin
- D. Somatotrophin
- E. Cortisol

70) A tumor of the adrenal medulla gland has been diagnosed in a patient as pheochromocytoma. What hormone signal second messenger concentration increases under this disease?

- A. c-AMP
- B. c-TMP
- C. Ca-calmodulin
- D. Leukotrienes
- E. Prostaglandins

71) A patient in a hyperglycemic coma condition was delivered to hospital. An insulin injection did not normalize the concentration of blood glucose. What was the most probable reason for the patient's hyperglycemia?

- A. Cell receptor abnormality
- B. Hyperfunction of adrenal cortex gland hormones
- C. Tumor of adrenal medulla gland
- D. Decrease of insulin production
- E. Destruction of β -cells

72) Corticosteroids are known to have 21 atoms of carbon in their structure. Name the compound which is synthesized in the first step of the biosynthesis of these adrenal gland hormones from cholesterol.

- A. Pregnenalon
- B. Progesterone
- C. Estrone
- D. Cortisone
- E. Vitamin D3

73) A patient was prescribed aspirin as anti-inflammatory mean that inhibits production of prostaglandins. What enzyme is blocked under this?

- A. Cyclooxygenase
- B. Monooxygenase
- C. Dioxygenase
- D. Lipooxygenase
- E. Peroxidase

74) During a prophylactic checkup an increase of the thyroid gland, exophthalmus, rise of body temperature, increase of heart contraction rate to 110 per minute have been ascertained. What hormone content is worth checking in the blood?

- A. Thyroxine
- B. Sex hormones
- C. Catecholamines
- D. Insulin
- E. Cortisol

75) A special procedure of feeding has resulted in a decrease of calcium ion concentration in the blood of the experimental animal. What hormone secretion will rise in this case?

- A. Parathyroid hormone
- B. Calcitonin
- C. Aldosterone
- D. Vasopressin
- E. Somatotropin

76) Under the influence of certain substances, oxidative phosphorylation is blocked in mitochondria but oxygen consumption continues and the substrate is oxidized. Specify the compound that separates this process.

- A. Thyroxine
- B. Adrenalin
- C. Progesterone
- D. Estradiol
- E. Somatostatin

77) Phosphatidylinositol 4,5-bisphosphate which is one of the main components of the cell membrane, during a signal transmission is cleaved to inositol 1,4,5-trisphosphate and diacylglycerol. Point, what enzyme takes part in this process?

- A. Phospholipase C
- B. Lipase A1
- C. Lipase A2
- D. Lipase D
- E. Phospholipase P

78) Regulation of insulin secretion from β -cells occurs under participation of many substances. What substance concentration change is the main signal for the synthesis and secretion of insulin?

- A. Glucose
- B. Glycogen
- C. Lactose
- D. Sucrose
- E. Starch

79) In the patient's blood a glucose concentration at empty stomach was 5,30 mmol/L; in 1 hour after a sugar load the level was 8,55 mmol/L, and in 2 hours – 7,10 mmol/L. Such data are typical for:

- A. Patient with a latent diabetes mellitus
- B. Healthy man
- C. Patient with insulin-dependent diabetes mellitus
- D. Patient with insulin-independent diabetes mellitus
- E. Patient with thyrotoxicosis

80) What fatty acid derivatives prostaglandins are of?

- A. Arachidonic acid
- B. Palmitic acid
- C. Stearic acid
- D. Linoleic acid
- E. Linolenic acid

81) In hormonal signal transfer a second messenger synthesized under the action of adenylate cyclase takes part. Choose it.

- A. cAMP
- B. AMP
- C. cTMP
- D. ATP
- E. ADP

82) Hyperthyroidism – a pathological state which typical manifestation is intensification of basal metabolism and body temperature rising. What is the reason for this phenomenon?

- A. Uncoupling of oxidation and phosphorylation in the respiratory chain of mitochondria
- B. Activation of ATP production
- C. Lowering of ATP production
- D. Inhibition of the respiratory chain dehydrogenases
- E. Activation of the respiratory chain dehydrogenases

83) A patient diagnosed with an adrenal medulla tumor was taken to hospital with hyperglycemia caused by catecholamine hyperproduction. What compound introduction inhibits these hormones action on target-tissues?

- A. Phosphodiesterase activators
- B. Activators of calcium channels
- C. Inhibitors of calcium channels
- D. Prostaglandins
- E. Leukotrienes

84) After introduction of caffeine that inhibits 3',5'-phosphodiesterase to a patient in his organism level of an intercellular hormonal messenger significantly increased. Which was this messenger?

- A. cAMP
- B. cGMP
- C. Ca²⁺ ions
- D. Inositol-3-phosphate
- E. Diacylglycerol

85) It is known that aspirin and other non-steroid antiinflammatory remedies inhibit biosynthesis of a mediator of inflammation. What is that mediator?

- A. Prostaglandin E₂
- B. Histamine
- C. Serotonin
- D. Bradykinin
- E. Interleikin-6

86) A patient with thyrotoxicosis after a course of treatment was directed to laboratory testing of hormones. What compound from the listed below is not synthesized in the thyroid gland?

- A. Thyrotropin
- B. Calcitonin
- C. Thyroglobulin
- D. Thyroxine
- E. Triiodothyronine

87) Under thyroid hormones hyperfunction a doctor prescribed merkazolil. What iodothyronine synthesis enzyme inhibition takes place?

- A. Iodideperoxidase
- B. Aromatase
- C. Reductase
- D. Decarboxylase
- E. Amino transferase

88) A doctor prescribed paracetamol – an inhibitor of cyclooxygenase (COX) - to a patient with arthritis. What mediator biosynthesis is inhibited in this case?

- A. Prostaglandin
- B. Histamine
- C. Serotonin
- D. Bradykinin
- E. Leukotriene

89) Non-steroid anti-inflammatory remedies, e.g. aspirin, inhibit cyclooxygenase which converts arachidonic acid into:

- A. Prostaglandins
- B. Leukotrienes
- C. Biogenic amines
- D. Endorphins
- E. Catecholamines

90) Prostaglandin derivatives (e.g. Dinoprost) are used as means to induce childbirth. Name the acid from which these active compounds are produced.

- A. Arachidonic acid
- B. Stearic acid
- C. Palmitic acid
- D. Malonic acid
- E. Mevalonic acid

91) In a patient with Parkinson's disease with the help of biochemical analysis of the blood a lowered quantity of Dopamine was obtained. The latter is produced from dihydroxyphenylalanine (DOPA). What enzyme such conversion is fulfilled under?

- A. Decarboxylase
- B. Deaminase
- C. Hydrolase
- D. Amino transferase
- E. Carboxypeptidase

92) It is known that in some biogeochemical zones a disease of endemic goiter is common. Lack of which bioelement does cause this disease.

- A. Iodum
- B. Iron
- C. Zinc
- D. Copper
- E. Cobalt

93) A patient was in a stress condition before operation. What hormone concentration rising in the blood accompanied that state?

- A. Adrenalin
- B. Insulin
- C. Prolactin

- D. Progesterone
- E. Glucagon

94) Langerhans islets' function impairment leads to lowering of production of:

- A. Insulin and glucagon
- B. Thyroxine and calcitonin
- C. Insulin and adrenalin
- D. Kallikreins and angiotensin
- E. Parathyroid hormone and cortisol

95) What compound is the predecessor for the biosynthesis of prostaglandins in the human organism?

- A. Arachidonic acid
- B. Palmitic acid
- C. Linoleic acid
- D. Oleic acid
- E. Linolenic acid

96) Patient A. has been diagnosed with pancreatitis. What medicines – inhibitors of the kinin system (together with others) - should be prescribed to the patient?

- A. Contrycal
- B. Vikasol
- C. Isoniazid
- D. Streptokinase
- E. Riboflavin

97) Acetyl salicylic acid is used for treatment of rheumatism. What biochemical processes this acid influences on?

- A. Inhibits prostaglandin synthesis
- B. Stimulates prostaglandin synthesis
- C. Stimulates gluconeogenesis
- D. Inhibits glycogen biosynthesis
- E. Stimulates FFA synthesis

98) The molecular mechanism of anti-inflammatory action of glucocorticoids is connected with their participation in the synthesis of specific proteins which inhibit phospholipase A2 – an enzyme that catalyses the liberation from membrane phospholipids of:

- A. Arachidonic acid
- B. Diacylglycerol
- C. Inositol phosphates
- D. Phosphatidic acid
- E. Choline phosphate

99) Glucose content in the blood of a healthy patient after consumption of the carbohydrate food had increased to 8,09 mmol/L, and in 2 hours returned to norm due to secretion of:

- A. Insulin
- B. Glucagon
- C. Parathyroid hormone
- D. Calcitonin
- E. Corticotropin

100) Caffeine inhibits activity of phosphodiesterase which converts cAMP into AMP. What biochemical changes are typical for caffeine poisoning?

- A. Glycogen synthetase activity lowering in the liver
- B. Protein kinase A lowering in the liver
- C. Glucose-6-phosphate dehydrogenase activity lowering
- D. Kinase phosphorylase activity lowering
- E. Triacylglycerol lipase activity lowering

101) A 52-year-old patient which resides on the geochemical zone with iodine deficiency was diagnosed with endemic goiter. What biochemical changes in the organism are typical for this pathology?

- A. Thyrotropic hormone secretion rising
- B. Thyrotropin releasing factor production lowering
- C. Heat production rising
- D. Thyroglobulin synthesis intensification on ribosomes
- E. Thyroid hormone level rising in the blood

102) A patient came to a doctor with complaints of heartbeat, muscle weakness, high appetite and increased amount of food that is consumed. Increased dimensions of thyroid are objectively observed. What hormone hyperfunction takes place?

- A. T3 and T4
- B. Calcitonin
- C. Glucagon
- D. Aldosterone
- E. Cortisol

103) To maternity ward a woman was taken which had been diagnosed with weakening of childbirth activity. A doctor made an injection of the preparation which activated smooth muscle contraction of the uterus. Name the hormone that was included in the composition of the preparation.

- A. Oxytocin
- B. Gastrin
- C. Secretin
- D. Angiotensin
- E. Bradykinin

104) Which from the listed compounds possesses blocking characteristics for the hormone production in thyroid?

- A. Thiouracyl
- B. Iodine intake in large amount
- C. Insufficient iodine intake
- D. Iodine intake to the organism by small portions
- E. Thyrotropin

105) Under introduction of a physiological concentration of adrenalin to an animal after 30 min an increased amount of the cyclic AMP (cAMP) was revealed in the liver cell cytosol. What factor caused such effect?

- A. Adenylate cyclase activation
- B. ATP synthesis inhibition
- C. Uncoupling of oxidation and phosphorylation
- D. Arterial pressure lowering
- E. Proteinkinase A inhibition

106) In a patient under starvation ketoacidosis has developed as a consequence of the intensive degradation of fatty acids that is slowed down by:

- A. Insulin
- B. Glucagon
- C. Adrenalin
- D. Thyroxine
- E. Somatotropin

107) A 40-year-old man came to department of endocrinology with disproportional increase of limbs, lower jaw, nose. What hormone hyperproduction takes place?

- A. Somatotropin
- B. Corticotropin
- C. Adrenalin
- D. Aldosterone
- E. Vasopressin

108) Hormones regulate a lot of processes of metabolism. Point out, which from the listed hormones activates glycogen biosynthesis.

- A. Insulin
- B. Vasopressin
- C. Oxytocin
- D. Thyroxine
- E. Adrenalin

109) Non-steroid anti-inflammatory preparations are used in medical practice for treatment of rheumatoid arthritis, osteoarthritis, inflammatory diseases of connective tissue. What enzyme activity is blocked by such preparations?

- A. Cyclooxygenase
- B. Hexokinase
- C. Succinate dehydrogenase
- D. Amino transferase
- E. Xanthine oxidase

110) After consuming food enriched with carbohydrates, glucose levels in the blood increases first, and then decreases under the action of insulin. What process is activated by the action of this hormone?

- A. Synthesis of glycogen
- B. Decomposition of glycogen
- C. Decomposition of lipids
- D. Disintegration of proteins
- E. Gluconeogenesis

111) A patient was diagnosed with an adrenal medulla tumor – pheochromocytoma. What hormone concentration rises in the blood sharply under this pathology?

- A. Adrenalin
- B. Glucagon
- C. Insulin
- D. Cortisol
- E. Progesterone

112) A patient with the signs of feminization (evnuhoidizme) was prescribed the most active male sex hormone. Point to it.

- A. Dihydrotestosterone
- B. Testosterone
- C. Progesterone
- D. Androsterone
- E. Pregnenolone

113) A patient was delivered to hospital in state of a hypoglycemic coma. The patient had not been treated with insulin. What was the most reasonable cause of hypoglycemia in this patient?

- A. Excessive biosynthesis of insulin by β -cells of the pancreatic islets (under insuloma)
- B. Excessive biosynthesis of adrenalin in adrenal medulla
- C. Excessive biosynthesis of glucagon by α -cells of the pancreatic islets
- D. Excessive biosynthesis of cortisol in adrenal cortex
- E. Excessive biosynthesis of thyroxine in thyroid

114) Name a hormone-synchronizer of biogenic rhythms in the organism which is the derivative of an amino acid.

- A. Melatonin

- B.* Adrenalin
- C.* Dopamine
- D.* Noradrenalin
- E.* Thyroxine

115) A 65-year-old woman was taken to hospital with fracture of the shin bone. Osteoporosis was revealed at examination. Point to a hormone which is not a regulator of calcium homeostasis.

- A.* Glucagon
- B.* Parathyroid hormone
- C.* Calcitonin
- D.* Calcitriol
- E.* Calcidiol

116) A gynecologist used a neurohypophysis hormone for the stimulation of child birth activity. Name it.

- A.* Oxytocin
- B.* Vasopressin
- C.* Intermedin
- D.* Chorionic gonadotropin
- E.* Serum gonadotropin

117) The medical preparation “Adiurecrin” which contains vasopressin is used for treatment of:

- A.* Diabetes insipidus
- B.* Diabetes mellitus
- C.* Steroid diabetes
- D.* Itsenko-Cushing’s syndrome
- E.* Itsenko-Cushing’s disease

118) For retrospective assessment of glycemia level a determination of the following substance concentration in the blood is used:

- A.* Glycosylated hemoglobin
- B.* Glucose
- C.* Transferrin
- D.* Glucagon
- E.* Insulin

119) What compound concentration is worth detecting for assessment of the pancreatic β -cells secretory function?

- A.* Insulin
- B.* Glucagon
- C.* C-peptide
- D.* C reactive protein
- E.* B-peptide

120) Aspirin is used as a resolvent because it blocks cyclooxygenase. Specify the way by which this preparation fulfills its inhibitory action.

- A. By acetylation of the OH-group of serine in the active site of the enzyme
- B. By phosphorylation of the OH-group of serine in the active site of the enzyme
- C. By methylation of its prosthetic group
- D. By carboxylation of the glutamate radicals in the active site of the enzyme
- E. By phosphorylation of the OH-group of tyrosine in the active site of the enzyme

121) To improve childbirth activity oxytocin was injected to a pregnant woman. What is the mechanism of this hormone action realization?

- A. Activation of adenylate cyclase system
- B. ATP synthesis stimulation
- C. K^+ - Na^+ -ATPase activation
- D. Dephosphorylation of glycogen synthase
- E. Glycogen synthesis activation

122) A doctor prescribed to a patient with ulcer a resolvent which was a derivative of prostaglandin E1. What compound is a metabolic source of this substance?

- A. Arachidonic acid
- B. Butyric acid
- C. Oleic acid
- D. Palmitic acid
- E. Stearic acid

123) Aspirin belongs to anti-inflammatory preparations that inhibit prostaglandin production. What way does this medicine act?

- A. Blocks cyclooxygenase
- B. Activates cyclooxygenase
- C. Inhibits lipoxygenase
- D. Activates lipoxygenase
- E. Blocks arginase

124) Water-soluble polypeptide hormone and adrenalin effects are realized due to second messenger appearance in the cell. Choose one of them.

- A. Ca^{2+}
- B. UTP
- C. GTP
- D. ATP
- E. CTP

125) Catabolism of the hormone of the pancreas (insulin) occurs mostly in liver under the action of the insulinase enzyme. What is its specificity?

- A. Absolute
- B. Relative
- C. Group
- D. Spatial
- E. Stereospecificity

126) To initiate analgesia a peptide that reveals the morphine effect, but is synthesized in the CNS may be used. Name it.

- A. β -Endorphin
- B. Oxytocin
- C. Somatoliberin
- D. Vasopressin
- E. Calcitonin

127) Renin is an enzyme produced by kidney juxtaglomerular cells in response to blood pressure lowering. Its action is directed to:

- A. Angiotensinogen – a protein secreted by the liver
- B. Natriuretic peptides that are synthesized by the heart and brain
- C. Decrease availability of arachidonic acid for prostaglandin and leukotriene synthesis
- D. Stimulate glucose transport into cells
- E. Widen smooth muscle walls of arteries and arterioles

128) Inhibitors of phosphodiesterase have a positive inotropic influence and are used along with heart glycosides and β -adrenoceptor agonists under heart failure. They increase heart rate and widen peripheral blood vessels. What intercellular messenger concentration change do they provide?

- A. cAMP
- B. Phosphatidylinositol
- C. cGMP
- D. ADP
- E. DAG

129) Atriopeptin, aurikulin and cardionatrin are peptides that have diuretic action which in 20 times exceeds the action of the pharmaceutical preparation Furosemide. What hormone synthetic analogues are they?

- A. Atrial natriuretic peptide
- B. Anti-diuretic hormone
- C. Insulin
- D. Somatostatin
- E. Aldosterone

130) Hormones are divided into 2 groups depending on their receptors localization in the cell. Which hormones have influence directly on the nucleus initiating physiological effects?

- A. Estradiol
- B. Growth hormone
- C. Insulin
- D. Dopamine
- E. Calcitonin

131) *L*-DOPA is used for the treatment of Parkinson's disease. This compound is converted to Dopamine and its concentration rises. What amino acid is the predecessor for its synthesis?

- A. Tyrosine
- B. Arginine
- C. Glycine
- D. Alanine
- E. Asparagine

132) Point to eicosanoid which is synthesized in vessel endothelium cells and prevents blood from clotting inhibiting platelet aggregation.

- A. Prostacyclin
- B. Thromboxane
- C. Leukotriene C4
- D. Leukotriene D4
- E. Leukotriene E4

133) A 21-year-old sportsman has been taking anabolic steroids in for three months. How it can affect the total protein content in blood serum?

- A. Total protein content will rise
- B. Total protein content will lower
- C. Will not affect
- D. Immunoglobulin level will rise
- E. Cholesterol level will be decreased

134) Calcium concentration in the blood of a 24-year-old man equals to 3.2 mmol/L. What hormones excessive amount could apparently lead to such Ca^{2+} level?

- A. Anabolic hormones
- B. Thyroid hormones
- C. Adrenalin and noradrenalin
- D. Insulin
- E. Calcitonin

135) After injection of adrenalin to a patient a glucose concentration rise is observed in blood serum. What metabolic effect of adrenalin did this rising happen to?

- A. Adrenalin activates glycogen phosphorylase
- B. Adrenalin activates glycogen synthase

- c. Adrenalin increases membrane permeability to glucose
- D. Adrenalin decreases membrane permeability to glucose
- E. Adrenalin accelerates heart rate

136) After injection of adrenalin to a patient a glucose concentration rise is observed in blood serum. This phenomenon occurs due to adrenalin stimulation of glycogen cleavage as it activates glycogen phosphorylase by the way of:

- A. Its cAMP-dependent phosphorylation
- B. Its acetylation
- C. Restricted proteolysis
- D. Changes of medium pH
- E. Transcription signal

137) A human did not use food during 20 hours. What changes of endocrine gland functioning are most typical for such period of fasting?

- A. Glucagon secretion intensification
- B. Insulin secretion increasing
- C. Glucocorticoid secretion lowering
- D. Catecholamine secretion intensification
- E. Thyroxine secretion decreasing

138) A man lost much blood because of the car crash. His consciousness is not clear, the blood pressure is low. Under such conditions renin-angiotensin system is being compensatory activated in his organism that leads to:

- A. Hyperproduction of aldosterone
- B. Blood clotting rise
- C. Erythropoiesis intensification
- D. Hyperproduction of vasopressin
- E. Heart rate increasing

139) A doctor prescribed diuretics to a patient who suffers from hypertonic disease. After some time the patient felt total weakness, appetite loss, muscle hypotension, tachycardia, lowering of intestinal peristalsis. Such state was stipulated by:

- A. Hypokalaemia
- B. Hyperkalaemia
- C. Hyponatraemia
- D. Hypoglycemia
- E. Hypocalcaemia

140) In a 58-year-old woman with body weight of 96 kg a steady hyperglycemia and glucosuria were revealed. These manifestations are characteristics of diabetes mellitus. Attempts to limit carbohydrate consumption were not effective enough. Development of this pathology seems to be the result of:

- A. Lowering of cell susceptibility to insulin
- B. Insulin biosynthesis impairment

- c.* Insulin decomposition by plasma proteases
- D.* Conjugation of insulin with plasma proteins
- E.* Insulinase activation by somatomedin

141) Parents noticed that their 6-year-old boy lagged behind in physical and psychic development. The boy became inattentive, indifferent, incapable to memorize simple educational actions. A doctor suspected in the child's organism the lack of:

- A.* Iodine
- B.* Somatotropin
- c.* Vitamin B1
- D.* Ferrum
- E.* Calcium

142) After prolonged usage of one of hormone preparations there were revealed in a patient: an osteoporosis phenomenon, erosion of the stomach lining, hyperglycemia, ACTH lowering in the blood. Preparation of what group of hormones could cause these changes?

- A.* Glucocorticoids
- B.* Iodine-containing hormones
- c.* Mineralocorticoids
- D.* Calcitonin
- E.* Sex hormones

143) During thyroid surgery in a patient the parathyroid glands were injured. After several hours in the post-operational patient face twitching appeared. The cause of the latter was:

- A.* Hypocalcaemia
- B.* Hypercalcaemia
- c.* ypophosphatemia
- D.* Hypertension
- E.* Hypoglycemia

144) In the process of hormone thyroxine biosynthesis the amino acid takes part:

- A.* Tyrosine
- B.* Glutamin
- c.* Arginine
- D.* Cysteine
- E.* Histidine

145) Proceeding of carbohydrate metabolism reactions is not influenced by the hormone:

- A.* Oxytocin
- B.* Glucagon
- c.* Adrenalin

- D.* Hydrocortisone
- E.* Insulin

146) Sex hormones are derivatives of sterane – steroids. The compound does not belong to them:

- A.* Thyroxine
- B.* Testosterone
- C.* Estrone
- D.* Estradiol
- E.* Androsterone

147) Releasing factors – hormones of hypothalamus that stimulate liberation of the hormones of:

- A.* Adenohypophysis
- B.* Thyroid gland
- C.* Pancreas
- D.* Adrenal glands
- E.* Gastro-intestinal tract

148) Active stimulation of catabolic processes in the organism is initiated by the hormone:

- A.* Thyroxine
- B.* Testosterone
- C.* Progesterone
- D.* Insulin
- E.* Estrone

149) In the middle lobe of the pituitary the hormone is produced:

- A.* Melanocyte-stimulating hormone
- B.* Insulin
- C.* Vasopressin
- D.* Oxytocin
- E.* Somatotropin

150) An intermediate metabolite of steroid hormone biosynthesis in the adrenal glands and gonads is:

- A.* Cholesterol
- B.* Nucleic acids
- C.* Bile acids
- D.* Vitamin D3
- E.* Amino acids

151) Choose the hormone which regulates calcium ion level in the blood.

- A.* Parathyroid hormone
- B.* Glucagon

- C. Insulin
- D. Adrenalin
- E. Testosterone

152) Name the hormones which are produced by endocrine part of the pancreas:

- A. Insulin and glucagon
- B. Testosterone and aldosterone
- C. Thyroxine
- D. Somatotropin
- E. Gonadotrophin

153) Biosynthesis of steroid hormones – derivatives of sterane – takes place in:

- A. Cortex of adrenal glands
- B. Adenohypophysis
- C. Neurohypophysis
- D. Pancreas
- E. Thyroid gland

154) Peptide hormones which are released from the neurohypophysis are:

- A. Vasopressin, oxytocin
- B. Adrenalin, glucagon
- C. Insulin, testosterone
- D. Glucocorticoids, thyrotropin
- E. Somatotropin, cortisol

155) Male sex hormones are derivatives of sterane – steroids. The hormone which belongs to them is:

- A. Adrenalin
- B. Noradrenalin
- C. Testosterone
- D. Somatotropin
- E. Vasopressin

156) Adrenalin is synthesized from phenylalanine or tyrosine, and chemically it belongs to:

- A. Fatty acid derivative
- B. Amino acid derivative
- C. Sterane derivative
- D. Carbohydrate derivative
- E. Nucleic acid derivative

157) Caffeine inhibits phosphodiesterase activity, that convertes cAMP to AMP. During poisoning by caffeine the most characteristic is reduced activity of this process:

- A. Glycogen synthesis

- B.* Glycolysis
- C.* Pentose phosphate pathway
- D.* Lipolysis
- E.* Phosphorylation of proteins

158) A man of 70 years asked to the doctor with complaints of increased hands, feet, tongue, change in appearance (facial features have become larger). The examination revealed a significant increase in the concentration of growth hormone in the blood. What caused this state of the patient?

- A.* Hyperfunction of adenohypophysis
- B.* Hyperfunction of parathyroid glands
- C.* Hyperfunction of adrenal cortex
- D.* Hypofunction of thyroid
- E.* Hypofunction of adenohypophysis

159) In a patient of 40 years with a lesion of the hypothalamic-pituitary conductor path polyuria (10-20 liters per day) and polydipsia emerged. Deficiency of which hormone caused these disorders?

- A.* Vasopressin
- B.* Somatotropin
- C.* Tirotropin
- D.* Oxytocin
- E.* Corticotropin

160) The earliest pregnancy can be diagnosed using appropriate test. Positive pregnancy test is based on the presence of this hormone in the urine:

- A.* Chorionic gonadotropin
- B.* Prolactin
- C.* Progesterone
- D.* Oxytocin
- E.* Estradiol

161) What hormone substances from eicosanoids are used for induction of labor and as contraceptives?

- A.* Prostaglandins
- B.* Interleukins
- C.* Endorphins
- D.* angiotensin
- E.* Enkephalins

162) Research of urine composition found a decrease of sodium ions concentration. Which of hormones provides strengthening of sodium reabsorption in the convoluted tubules of the nephron?

- A.* Aldosterone
- B.* Acetylcholine

- C.* Somatostatin
- D.* Adrenaline
- E.* Vasopressin

163) In a patient after mechanical damage to a finger of the hand redness, swelling, pain, and fever are observed. Derivatives of which acid are the leading mediators in the pathogenesis of this inflammation?

- A.* Arachidonic acid
- B.* Lactate
- C.* Uric acid
- D.* Ascorbic acid
- E.* Hydroxybutyric acid

164) In patients with severe depression serotonin levels in the brain and cerebrospinal fluid are decreased. What amino acid is the precursor to serotonin?

- A.* Tryptophan
- B.* Tyrosine
- C.* Treonin
- D.* Aspartic acid
- E.* Glutamic acid

165) The molecular mechanism of anti-inflammatory action of glucocorticoids is connected with their participation in the synthesis of specific proteins which inhibit phospholipase A2 – an enzyme that catalyses the liberation from membrane phospholipids of:

- A.* Arachidonic acid
- B.* Diacylglycerol
- C.* Inositol phosphates
- D.* Phosphatidic acid
- E.* Choline phosphate

CARBOHYDRATE METABOLISM

1) Inherited genetic defects lead to the abnormalities in synthesis of some enzymes in the human organism. Point the enzyme which defect leads to derangements in lactose hydrolysis:

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

2) A newborn has diarrhea, vomit, and since some time lenticular opacity (cataract) is developed. This disease is connected with the abnormalities in the synthesis of the enzyme:

- A. Galactose 1-phosphate uridyl transferase
- B. Hexokinase
- C. Glucose 6-phosphatase
- D. Glycogen synthetase
- E. Glucose phosphate isomerase

3) The examined child found poor appetite and nausea. The intake of milk causes vomiting, and periodically - diarrhea. There is lag in growth, weight loss, delay in mental development. What enzyme deficiency causes this pathology?

- A. Galactose-1-phosphate-uridylyltransferase
- B. Xanthine oxidase
- C. Catalase
- D. Tyrosinase
- E. Glucokinases

4) Amylolytic enzymes catalyze a polysaccharide and oligosaccharide hydrolysis. What linkage do they act on?

- A. Glycosidic
- B. Amide
- C. Ester
- D. Peptide
- E. Phosphodiester

5) Influence of some hormones on carbohydrate metabolism express in stimulation of the glycogen degradation. What enzyme catalyzes the first step of the glycogen degradation with glucose 1-phosphate formation?

- A. Glycogen phosphorylase
- B. Glycogen synthetase
- C. Phosphofructokinase
- D. Aldolase
- E. Pyruvate kinase

6) Important catabolic processes are localized in the mitochondrion matrix. Choose the catabolic process that is absent in the mitochondria

- A. Glycolysis
- B. The Krebs cycle
- C. Oxidative decarboxylation of pyruvate
- D. Oxidative decarboxylation of alpha-ketoglutarate
- E. Oxidation of FFA to acetyl-CoA

7) The order and localization in the cell of the glycolysis fermentative reactions are determined at present time. Point this localization.

- A. Cytosol
- B. Mitochondria
- C. Golgi apparatus
- D. Lysosomes
- E. Nucleus

8) It is known that some carbohydrates are not digested in the GIT of the human organism. Choose such carbohydrate

- A. Cellulose
- B. Sucrose
- C. Lactose
- D. Starch
- E. Glycogen

9) Accumulation of lactate in the tissues is occurred under hypoxic conditions. Point the process which activation is connected with this.

- A. Glycolysis
- B. Krebs cycle
- C. Pentose-phosphate pathway
- D. Gluconeogenesis
- E. Glycogenolysis

10) In the cell glucose undergoes a series of conversions to lactic acid in anaerobic conditions. How is this process called?

- A. Glycolysis
- B. Glycogenolysis
- C. Lipogenesis
- D. Lipolysis
- E. Gluconeogenesis

11) Digestion of different food components is occurred in the duodenum under the influence of the pancreatic enzymes. Which from the listed enzymes hydrolyzes the o-glycosidic bonds?

- A. α -Amylase

- B. Elastase
- C. Carboxypeptidase
- D. Tripsin
- E. Lipase

12) Muscle hexokinase is an allosteric enzyme. Point what compound is an inhibitor of its activity

- A. Glucose 6-phosphate
- B. ADP
- C. GTP
- D. AMP
- E. ATP

13) When a child eats milk we observe vomit and diarrhea, intellectual development lagging, lenticular opacity, and galactose-1-phosphate is discovered in the blood, the glucose concentration is decreased and substantially increased the reducing sugars concentration. Galactose is found in the urine. The pointed symptoms are connected with deficiency of:

- A. Galactose-1-phosphate uridyl transferase
- B. UDP-galactose 4 –epimerase
- C. Lactase
- D. UDP-glucose pyrophosphorylase
- E. Galactokinase

14) The milk in which with help of an enzyme the content of lactose is decreased is used for dietotherapy under milk intolerance in children. Which of the enzymes is used for this purpose?

- A. β -Galactosidase
- B. β -Glucosidase
- C. α -Glucosidase
- D. α -Amylase
- E. β -Amylase

15) Alimentary hyperglycemia is observed after the use of carbohydrate food. What hepatocyte enzyme activity is induced substantially?

- A. Glucokinase
- B. Hexokinase
- C. Phosphorylase
- D. Phosphofructokinase
- E. Glucose 6-phosphatase

16) Anaerobic degradation is one of the ways of carbohydrate transformation in the organism. Glycolysis begins from the glucose conversion under the influence of glucokinase to:

- A. Glucose 6-monophosphate

- B. Glucose 1-monophosphate
- C. Glucose 5-monophosphate
- D. Glucose 2-monophosphate
- E. Glucose 3-monophosphate

17) Acute pancreatitis was diagnosed in a patient. Determination of what enzyme in the blood may serve a diagnostic criterion?

- A. α -Amylase
- B. Aldolase
- C. LDH
- D. Creatine kinase
- E. Alanine aminopeptidase

18) A sportsman finished the training. What process activation gives the result in increasing of lactate in the blood?

- A. Glycolysis
- B. Gluconeogenesis
- C. Tricarboxylic acid cycle
- D. Glycogen synthesis
- E. Pentose-phosphate pathway

19) The main source of energy for erythrocytes is glycolysis. What is the energy output of glycolysis?

- A. 2 ATP molecules
- B. 7 ATP molecules
- C. 5 ATP molecules
- D. 3 ATP molecules
- E. 4 ATP molecules

20) Under anaerobic conditions synthesis of ATP in glycolysis is occurred due to a substrate phosphorylation, during this process the energy from other compounds with high-energy bonds is used. Point one of such compounds:

- A. Phosphoenolpyruvate
- B. Lactate
- C. Glucose 6-phosphate
- D. Pyruvate
- E. Glucose

21) The process of glycolysis starts from an irreversible reaction of conversion of glucose to glucose-6-phosphate. What enzyme catalyzes this reaction?

- A. Hexokinase
- B. Lipase
- C. Catalase
- D. Aldolase
- E. Creatine kinase

22) Carbohydrate consumption by the human organism was decreased and that caused an increased glycogen degradation. What enzyme activity in the liver rises in such conditions?

- A. Glycogen phosphorylase
- B. Aldolase
- C. Amylo-1,6-glycosidase
- D. Glucose-6-phosphatase
- E. Pyruvate kinase

23) Pancreas excretes an enzyme which can split alpha-1,4-glycosidic linkages in glycogen molecules. Point this enzyme.

- A. Alpha-Amylase
- B. Enterokinase
- C. Chymotrypsin
- D. Lysozyme
- E. Phosphatase

24) Point the enzyme which activity is necessary to determine in patient's urine at acute pancreatitis.

- A. Amylase
- B. Protein kinase
- C. Cholinesterase
- D. Leucine aminopeptidase
- E. Alkaline phosphatase

25) Name the compound that is involved into the substrate phosphorylation reaction during glycolysis.

- A. Phosphoenolpyruvate
- B. Glucose-6-phosphate
- C. Fructose-1,6-bisphosphate
- D. Glyceraldehyde-3-phosphate
- E. 2-phosphoglycerate

26) Under decomposing of glucose during glycolysis a certain range of transformations occurs. Point, to what compound glucose is transformed under the action of enzyme glucose-6-phosphate isomerase?

- A. Fructose-6-phosphate
- B. Galactose-6-phosphate
- C. Fructose-1-phosphate
- D. Galactose-1-phosphate
- E. Mannose-1-phosphate

27) The most important stage of starch and glycogen digestion takes place in the duodenum by pancreatic enzymes action. Point the enzyme that hydrolyzes α -1,4-glycosidic linkages in these molecules.

- A. α -Amylase
- B. Amylo-1,6-glycosidase
- C. Aldolase
- D. Hexokinase
- E. Maltase

28) There is an enzyme that can split α -1,4-glycosidic linkages in glycogen molecules in the liver. Point this enzyme.

- A. α -Glucan phosphorylase
- B. Hexokinase
- C. Phosphofructokinase
- D. Glucose-6-phosphatase
- E. Glucokinase

29) The glycolytic pathway of glucose oxidation is an energy generator. Name the compounds which are synthesized in this process, play a part of energy source for biosynthesis.

- A. ATP
- B. GTP
- C. Ketone bodies
- D. Glycogen
- E. Triacylglycerols

30) In a 22-year-old woman after aspirin treatment the signs of hemolytic anemia were observed. It was due to hereditary deficiency of the pentose phosphate pathway enzyme – glucose-6-phosphate dehydrogenase which supplies the organism with:

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

31) In a 52-year-old woman a cataract (opacity of crystalline lens) has developed because of *Diabetes mellitus*. What process intensification is the reason for such opacity of the crystalline lens?

- A. Protein glycosylation
- B. Lipolysis
- C. Ketogenesis
- D. Protein proteolysis
- E. Gluconeogenesis

32) A patient diagnosed with type I *Diabetes mellitus* was hospitalized. One of metabolic changes of the disease is a decline in oxaloacetate production rate. What metabolic process is broken as a result of this?

- A. Citric acid cycle
- B. Glycolysis
- C. Cholesterol biosynthesis
- D. Glycogen breakdown
- E. Urea synthesis

33) During laboratory work *in vitro* students were investigating a malonate influence on the citric acid cycle enzymes. What metabolite accumulation in a test tube did they reveal?

- A. Succinate
- B. Malate
- C. Isocitrate
- D. Fumarate
- E. Succinyl-CoA

34) A 2-year-old child which has hepatomegaly lags behind in physical and psychic development. At deep biochemical analysis this child was diagnosed with von Gierke's disease. What metabolic process disorder is the cause of this disease?

- A. Glycogen breakdown
- B. Glucose breakdown
- C. Fatty acid breakdown
- D. Heme breakdown
- E. Tyrosine breakdown

35) The final oxidation of "fuel" molecules (carbohydrates, amino acids and fatty acids) occurs in the chemical reactions of:

- A. Tricarboxylic acid cycle
- B. Glycolysis
- C. Glycogenolysis
- D. Pentose phosphate pathway
- E. Oxidative deamination

36) What dangerous disease consequences are hyperglycemia, glycosuria, ketonemia, ketonuria, blood acidosis, acetone odour from the mouth cavity and so on?

- A. Diabetes mellitus
- B. Diabetes insipidus
- C. Hepatitis
- D. Jaundice
- E. Pyelonephritis

37) In sportsmen in some time after physical activity the process of gluconeogenesis is activated. Point the substrate which is used for this process.

- A. Lactate
- B. Serine
- C. α -Ketoglutarate
- D. Aspartic acid
- E. Glutamic acid

38) Under aerobic conditions pyruvate is converted to acetyl-CoA by the pyruvate dehydrogenase complex which contains 5 coenzymes. Which of the citric acid cycle enzymes contains the same coenzymes?

- A. α -Ketoglutarate dehydrogenase
- B. Isocitrate dehydrogenase
- C. L-malate dehydrogenase
- D. Succinate dehydrogenase
- E. Fumarate hydratase

39) Under starvation the normal blood glucose level is maintained at the expense of gluconeogenesis. Which of the listed molecules can be used as precursor for the glucose synthesis?

- A. Alanine
- B. Nicotinamide
- C. Ammonia
- D. Urea
- E. Adenine

40) The second event of aerobic degradation of glucose in the cell is the oxidative decarboxylation of pyruvate. Point the main product of this process.

- A. Acetyl-CoA
- B. Oxaloacetate
- C. Citrate
- D. Pyruvate
- E. Succinate

41) A man rests after intense physical work. Which of the following ways of carbohydrate metabolism in his liver is the most active at this time?

- A. Gluconeogenesis from lactate
- B. Gluconeogenesis from amino acids
- C. Glycogenolysis
- D. Glycolysis
- E. Decomposition of glycogen to glucose

42) Under decreasing of carbohydrates in dietary intake the processes of their metabolism are changed. At the expense of what process the blood glucose level is maintained?

- A. Gluconeogenesis
- B. Glycolysis
- C. Glycogenesis
- D. Lipogenesis
- E. Ketogenesis

43) Under long-term starvation the blood glucose level is decreased. Which organ is the most sensitive to hypoglycemia?

- A. Brain
- B. Muscles
- C. Kidney
- D. Heart
- E. Liver

44) Liver glycogen is the main source of free energy for the organism since the enzyme is found in the liver which catalyzes the reaction of glucose-6-phosphate hydrolysis to yield free glucose:

- A. Glucose-6-phosphatase
- B. Phosphorylase
- C. Hexokinase
- D. Glucokinase
- E. Glucose-6-phosphate dehydrogenase

45) A suffer from diabetes mellitus got a high dose of insulin. It caused giddiness, loss of consciousness and spasms. What glucose blood level can be observed under these conditions?

- A. 2,3 mmol/l
- B. 3,5 mmol/l
- C. 6,5 mmol/l
- D. 8,0 mmol/l
- E. 12,5 mmol/l

46) Low level of what metabolite in hepatocytes determines a citric acid cycle inhibition and ketogenesis activation?

- A. Oxaloacetate
- B. Fatty acids
- C. ATP
- D. ADP
- E. Acetyl-CoA

47) NADPH(H⁺) is an important source of the reduced equivalents for biological active substance synthesis. Which of the carbohydrate metabolism processes is the main supplier of this reduced coenzyme?

- A. Pentose phosphate pathway
- B. Glycolysis

- c.* The citric acid cycle
- D.* Glycogen synthesis
- E.* Gluconeogenesis

48) The fatty acid synthesis requires a reduced coenzyme - NADPH(H⁺). Point the process, which supplies this substrate for the cells.

- A.* Pentose phosphate pathway
- B.* Glycolysis
- c.* Glycogenolysis
- D.* Glycogenesis
- E.* Gluconeogenesis

49) The first reaction of the citric acid cycle is a condensation of acetyl-CoA with oxaloacetate to citrate. What role does oxaloacetate play in the citric acid cycle?

- A.* Substrate
- B.* Inhibitor
- c.* Repromoter
- D.* Modifier
- E.* Repressor

50) Hyperglycemic coma has been diagnosed in a patient. What is a blood glucose level possible for these conditions?

- A.* 18,0 mmol/l
- B.* 3,0 mmol/l
- c.* 9,0 mmol/l
- D.* 5,3 mmol/l
- E.* 7,5 mmol/l

51) Important role in the glucose blood level maintaining plays the process of glucose formation from other metabolites. Point this process.

- A.* Gluconeogenesis
- B.* Aerobic glycolysis
- c.* Anaerobic glycolysis
- D.* Glycogenesis
- E.* Glycogenolysis

52) Under starvation the key role in the glucose blood level maintaining plays gluconeogenesis. Point the main substrate for this process.

- A.* Amino acids
- B.* Acetone
- c.* Nucleic acids
- D.* Bile acids
- E.* Cholesterol

53) During the glucose-6-phosphatase content testing in the liver and muscles it was ascertained that the enzyme is contained in the hepatocytes only. In what metabolic pathway this enzyme is present?

- A. Gluconeogenesis
- B. Aerobic glycolysis
- C. Anaerobic glycolysis
- D. Glycogenesis
- E. Pentose phosphate pathway

54) During intensive physical work when the system of blood circulation does not have time to supply oxygen, muscles get energy due to reactions of substrate phosphorylation. What metabolic pathways include such reactions?

- A. Glycolysis and the CAC
- B. Tissue respiration and oxidative decarboxylation of pyruvate
- C. Gluconeogenesis and alcohol fermentation
- D. Pentose phosphate pathway and gluconeogenesis
- E. Pentose phosphate pathway and tissue respiration

55) During a long-distance race the muscles of sportsman use glucose for ATP producing to provide muscle activity. Point the process of glucose utilization under these conditions.

- A. Aerobic glycolysis
- B. Anaerobic glycolysis
- C. Lipolysis
- D. Gluconeogenesis
- E. Glycogenesis

56) Point a localization of the process of pyruvate oxidative decarboxylation in the cell.

- A. Mitochondria
- B. Cytoplasm
- C. Nucleus
- D. Ribosome
- E. Endoplasmatic reticulum

57) Maintenance of blood glucose level is of paramount importance for survival of the human organism. Point the enzyme which has a regulatory function for the blood glucose level maintenance.

- A. Glucokinase
- B. Aldolase
- C. Pyruvate kinase
- D. Phosphotase
- E. Hydratase

58) The citric acid cycle is a common final pathway of energy rich molecules oxidation (carbohydrates, fatty acids, amino acids). Point the molecule which acetyl-CoA reacts with during the first CAC reaction:

- A. Oxaloacetate
- B. Citrate
- C. Isocitrate
- D. Fumarate
- E. L-malate

59) In a 4-year-old boy with acute respiratory disease after aspirin treatment hemolysis was observed. Hereditary deficiency of what enzyme could be the reason of hemolytic anemia?

- A. Glucose-6-phosphate dehydrogenase
- B. Glucose-6-phosphatase
- C. Glycerolphosphokinase
- D. Glycogen phosphorylase
- E. Glucokinase

60) In a 4-year-old boy with acute respiratory disease after aspirin treatment hemolysis was observed. The reason for hemolysis was a hereditary deficiency of an enzyme glucose-6-phosphate dehydrogenase. Which metabolic carbohydrate pathway is defective in the child?

- A. Pentose phosphate pathway
- B. Glycogenolysis
- C. Glycogenesis
- D. Gluconeogenesis
- E. Aerobic glucose oxidation

61) In patients with glycogen storage disease 1 (von Gierke's disease) the formation of glucose from glucose-6-phosphate is defective, that's why glycogen accumulates in the liver and kidneys. What enzyme is hereditary defective in these conditions?

- A. Glucose-6-phosphatase
- B. Glycogen phosphorylase
- C. Glycogen synthetase
- D. Hexokinase
- E. Glucokinase

62) In patients with glycogen storage disease 1 (Girke's disease) the yielding of glucose from glucose-6-phosphate is defective, that's why glycogen accumulates in the liver and kidneys. It connects with a hereditary deficiency of glucose-6-phosphatase synthesis. What biochemical pathway is blocked under these conditions?

- A. Pentose phosphate pathway
- B. Glycogenolysis

- C. Glycogenesis
- D. Glucuronic acid synthesis
- E. Gluconeogenesis

63) A one-year-old baby was brought to hospital with such symptoms: diarrhea, vomit, development abnormality, dementia, cataract. Galactosemia was diagnosed. Which enzyme is defective under these conditions in the baby?

- A. Hexose-1-phosphate uridyltransferase
- B. Glucokinase
- C. UDP-glucose-4-epimerase
- D. UDP-glucose pyrophosphorylase
- E. Glucose-6-phosphate dehydrogenase

64) A 47-year-old woman complains of bad state of health which is accompanied by an increased glucose level in the blood on an empty stomach – 7.5 mmol/L. Other symptoms of *Diabetes mellitus* are absent. What test should be carried out to confirm a diagnosis?

- A. Detect tolerance to glucose in the blood
- B. Detect glucose level in the blood
- C. Detect amylase activity in the blood
- D. Detect galactose level in the blood
- E. Detect fructose level in the blood

65) A 40-year-old man had the fasting blood glucose level of 5,6 mmol/l. In an hour after oral glucose tolerance test the blood glucose level was 8,0 mmol/l and in two hours – 4,5 mmol/l. It is typical for:

- A. Healthy man
- B. Insulin-dependent diabetes mellitus
- C. Non-insulin-dependent diabetes mellitus
- D. Diabetes insipidus
- E. Steroid diabetes

66) A 5-year-old boy is diagnosed cataract, fat degeneration of the liver. Biochemical analysis revealed the increase of blood galactose level and decrease of blood glucose level. What metabolic disorder takes place in the patient?

- A. Galactosemia
- B. Fructosemia
- C. Glycogen storage disease
- D. Diabetes mellitus
- E. Porphyria

67) In a 60-year-old man suffered from diabetes mellitus ketoacidosis is diagnosed. The biochemical reason for this condition is decrease of Acetyl-CoA utilization by the cells because of the deficiency of:

- A. Oxaloacetate

- B. 2-Oxyglutarate
- C. Glutamate
- D. Aspartate
- E. Succinate

68) In aerobic conditions pyruvic acid undergoes an oxidative decarboxylation under the action of pyruvate dehydrogenase complex. Point to one of the coenzymes that is part of this enzymatic complex.

- A. FAD
- B. PALP
- C. FMN
- D. Methyl cobalamin
- E. N-carboxybiotin

69) Parents of a 2-year-old girl complain of her inertia and tiredness. During examination a liver dimension increase has shown. Liver biopsy has revealed a presence of glycogen excess. The blood glucose concentration was lower than normal. What was the reason for lowering of glucose concentration in the blood of this patient?

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

70) A 47-year old patient has a high blood total lipid level (16 g/l) and raised blood glucose level (8,0 mmol/l). What pathology it may witness about?

- A. Diabetes mellitus
- B. Atherosclerosis
- C. Ischemic cardiomyopathy
- D. Gastritis
- E. Myocardial infarction

71) A 65-year-old woman complains of a constant thirsty, raised diuresis. After examination it was diagnosed type 2 diabetes. A doctor prescribed a biguanide metformin. What process such a preparation can inhibit?

- A. Gluconeogenesis
- B. Glycolysis
- C. Glycogen degradation
- D. Pentose phosphate pathway
- E. Glycogen biosynthesis

72) In a 5-year-old child with an increased body temperature after aspirin treatment an intensive erythrocyte haemolysis was observed. What enzyme inherited deficiency could cause hemolytic anemia in the child?

- A. Glucose-6-phosphate dehydrogenase
- B. Glucose-6-phosphatase
- C. Glycogen phosphorylase
- D. Glucokinase
- E. Gamma-glutamyl transferase

73) In a 40-year-old patient with schizophrenia normal levels of glucose, ketone bodies and urea in the blood were observed. Shock therapy by regular insulin injections led to an insulin coma development. After that a psychic state of the patient became better. What was the most probable reason for the insulin coma?

- A. Hypoglycemia
- B. Hyperglycemia
- C. Tissue dehydration
- D. Metabolic acidosis
- E. Glucosuria

74) In a patient who suffers from Diabetes mellitus ketoacidosis has developed. Biochemical cause of such a state is lowering of Acetyl-CoA utilization by the cells because of the inhibition of:

- A. Tricarboxylic acid cycle
- B. Glycolysis
- C. Pentose phosphate pathway
- D. β -Oxidation of fatty acids
- E. Ornithine cycle

75) What amount of glucose in blood in 2 hours after sugar loading is a criterion for diagnostics of possible Diabetes mellitus?

- A. More or equals to 11,1 mmol/L
- B. Equals to 7,8 mmol/L
- C. Equals to 6,6 mmol/L
- D. Equals to 5,5 mmol/L
- E. Equals to 4,4 mmol/L

76) In a man after use of honey on an empty stomach hypoglycemia has developed. What inherited disease this may specify of?

- A. Fructose intolerance
- B. Diabetes mellitus
- C. Galactosemia
- D. Glycogen storage disease
- E. Milk intolerance

77) In a child hypotrophy, hepatomegaly, bleeding, “look like a Chinese doll” take place. A doctor supposed that the child had inherited von Gierke’s disease (glycogen storage disease). What indexes will be a laboratory confirmation of the diagnosis?

- A. Hypoglycemia, hyperlactatemia, hypertriglyceridemia, hyperuricemia
- B. Hypoglycemia, hyperlactatemia, hypotriglyceridemia, hyperuricemia
- C. Hypoglycemia, hypolactatemia, hypertriglyceridemia, hyperuricemia
- D. Hyperglycemia, hyperlactatemia, hypertriglyceridemia, hyperuricemia
- E. Hyperglycemia, hypolactatemia, hypertriglyceridemia, hyperuricemia

78) One of the stages of aerobic oxidation of glucose is the oxidative decarboxylation of pyruvate. What vitamins take part in this process?

- A. PP, B₁, B₂, B₃
- B. A, D, C
- C. H, K, P
- D. B_c, B₁₂, B₆
- E. B₅, B_c, B₁₂

79) What process is the only one source of energy in erythrocytes?

- A. Glycolysis
- B. Tissue respiration
- C. Gluconeogenesis
- D. Glycogenolysis
- E. Fatty acid oxidation

80) In a patient who suffers from enterocolitis diarrhea, cramps, flatulence have appeared after milk intake. What enzyme deficiency these abnormalities are connected with?

- A. Lactase
- B. Maltase
- C. Saccharase
- D. Amylase
- E. Glycogen synthetase

81) A patient who suffers from Diabetes mellitus couldn’t have meal on time after the insulin injection. His state became much worse at work. A doctor of ambulance at examination noted paleness and skin moisture, inhibition of reflexes. Blood glucose level was 2.8 mmol/L. What must be immediately injected to the patient?

- A. Glucose
- B. Adrenalin
- C. Insulin
- D. Nitroglycerol
- E. Thyroxine

82) Choose a compound which can be a substrate in the process of gluconeogenesis.

- A. Pyruvate
- B. Glycogen
- C. Glucose
- D. Fructose
- E. Galactose

83) Point the end product of anaerobic glycolysis.

- A. Lactate
- B. CO_2 & H_2O
- C. Oxaloacetate
- D. Malate
- E. Pyruvate

84) Point a high-energy compound which is used in glycolysis in the reactions of phosphorylation.

- A. ATP
- B. GTP
- C. UTP
- D. TTP
- E. CTP

85) Under inherited galactosemia a defect of the enzyme Galactose-1-phosphate uridyltransferase is observed. What compounds are accumulated in the blood and tissues of a suffering child?

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

86) Under prolonged starvation a rise in ketone bodies concentration is observed. What is the reason for ketonemia at such conditions?

- A. Lowered concentration of oxaloacetate
- B. Decreasing of Acetyl-CoA synthesis
- C. Cholesterol concentration increase
- D. Decrease of ketone bodies excretion with urine
- E. Oxaloacetate concentration rise

87) To maintain the work of kidneys processes of aerobic carbohydrate oxidation are actively carried in the cortex, and in the medulla – anaerobic processes. What product is mostly produced in the medulla?

- A. Lactate
- B. Pyruvate

- c. Oxaloacetate
- D. Malate
- E. Citrate

88) A 38-year-old woman complains of acute girdle pain in the stomach region with irradiation to the left hypochondrium. During 3 days in the patient temperature rise to 38°C, vomit, and diarrhea took place. It was known from anamnesis that the woman had suffered infectious parotitis. What biochemical index determination in urine will indicate a localization of the pathological process?

- A. Amylase-diastase
- B. Alkali phosphatase
- c. Creatine phosphokinase
- D. Level of HCl & pepsin
- E. LDH 4 and LDH 5

89) Avidin – a hen egg protein - is a mighty specific inhibitor of the vitamin H-containing enzymes. What conversion from the listed below will be blocked after avidin introduction?

- A. Pyruvate-oxaloacetate
- B. Glucose-pyruvate
- c. Pyruvate-Glucose
- D. Oxaloacetate-Glucose
- E. Glucose-Ribose-5-phosphate

90) Cleavage of starch and glycogen starts in the oral cavity due to the action of amylase that is excreted by salivary glands. What bonds are hydrolyzed by the enzyme in question?

- A. α - 1,4-glycosidic
- B. α - 1,6-glycosidic
- c. β - 1,4-glycosidic
- D. β - 1,2-glycosidic
- E. α - 1,3-glycosidic

91) A 5-month-old breastfed child does not gain weight, lags behind in development. Mother notices merely constant diarrhea and abdominal distention in the child, and these abnormalities become more intensive after feeding. What pathology might be supposed in the child?

- A. Inherited lactase insufficiency
- B. Phenylketoneuria
- c. Sepsis
- D. Acute enteritis
- E. Inherited glycogen storage disease

92) A 5-month-old breastfed child does not gain weight, lags behind in development. Mother notices merely constant diarrhea and abdominal distention in the child, and these abnormalities become more intensive after feeding. The mother herself and her husband do not consume whole milk, complaining of milk intolerance. Inherited digestion abnormality of what carbohydrate one may first of all suppose in the child?

- A. Lactose
- B. Starch
- C. Galactose
- D. Sucrose
- E. Fructose

93) Rescuers on day 5 after building collapse took a 45-year-old man out of the debris, and that man died soon because of the heavy traumas. A pathologist investigated glycogen content in different organs. The lowest level of glycogen was revealed in:

- A. Liver
- B. Heart
- C. Skeletal muscles
- D. Kidneys
- E. Lungs

94) A 43-year-old patient was subjected to a rate of treatment for alcoholism. A doctor used a mechanism of ethanol predilection inhibition according to the principle “alcohol toxic action increase”, that was fulfilled with the help of means which facilitate accumulation in the organism:

- A. Acetic aldehyde
- B. Malate aldehyde
- C. Acetone
- D. Acetic acid
- E. Ammonia

95) In a patient after multiple blood analyses sharp vibrations of glucose content were revealed: a significant rise in the period of absorption, and noticed lowering in the postabsorptive period. What pathology can cause such a situation?

- A. Aglycogenesis
- B. Type I Diabetes
- C. Type II Diabetes
- D. Acromegaly
- E. Endemic goiter

96) In a patient chronic inflammatory process of the tonsils takes place. What biochemical process maintains NADPH concentration in the site of inflammation? NADPH is necessary for phagocytosis mechanism realization.

- A. Pentose phosphate pathway

- B.* Cori cycle
- C.* Krebs cycle
- D.* Ornithine cycle
- E.* Glycolysis

97) Man can survive without food during 30-40 days. Which from the listed compounds can be converted in glucose to maintain energy needs of the brain at such conditions?

- A.* Oxaloacetate
- B.* Beta-hydroxybutyrate
- C.* Acetoacetate
- D.* Ammonia
- E.* Palmitate

98) In a patient glucoseuria was revealed; glucose content in the blood stayed within the normal range of values. What abnormality this state could be the result of?

- A.* Damaged function of renal tubules
- B.* Kidney glycogen degradation
- C.* Damaged function of pancreas
- D.* Disorder in gluconeogenesis
- E.* Disorder in glycolysis

99) A doctor recommended to sportsman K for training effectiveness rise to intake citric acid or products that contain it, because it is:

- A.* Substrate of the citric acid cycle
- B.* Source of the predecessor for fatty acid biosynthesis
- C.* Gluconeogenesis activator
- D.* Activator of fatty acid biosynthesis
- E.* Glycolysis inhibitor

100) Increase of insulin secretion by the pancreas occurs after consumption of carbohydrate food. What enzyme activity is regulated by insulin?

- A.* Glucokinase
- B.* Pyruvate kinase
- C.* Lactate dehydrogenase
- D.* Aldolase
- E.* Enolase

101) A patient was admitted to hospital in a severe condition of hypoglycemic coma. At what glucose level in the blood does it appear?

- A.* 2.5 mmol/L and lower
- B.* 4.5 mmol/L
- C.* 3.3 mmol/L
- D.* 5.5 mmol/L

E. 4.0 mmol/L

102) In a 49-year-old woman who suffers from *Diabetes mellitus* for a long time, after an insulin injection weakness, face paleness, heart beating, confusion, blurring in the eyes, numbness of the lips and tongue tip were observed. Glucose level in the blood was 2.5 mmol/L. What complication has developed in the woman?

- A. Hypoglycemic coma
- B. Uremic coma
- C. Hyperketonemia coma
- D. Hyperglycemic coma
- E. Hyperosmolar coma

103) Red blood cells use for their life energy in the form of ATP. Specify the metabolic process that provides erythrocytes the necessary quantity of ATP.

- A. Anaerobic glycolysis
- B. Gluconeogenesis
- C. Pentose phosphate cycle
- D. Beta-oxidation of fatty acids
- E. Citric acid cycle

104) At the child at the use of milk bloating, cramp pain and diarrhea are often noted. These symptoms occur 1-4 hours after consumption of a single dose of milk. Deficiencies of what enzymes are mentioned symptoms caused by?

- A. Lactose splitting
- B. Maltose splitting
- C. Fructose splitting
- D. Sucrose splitting
- E. Glucose splitting

105) Glucose was detected in the urine of the animal, which was given floridzin during the experiment. In this case, the glucose content in the blood is within normal limits. What is the most likely mechanism of glucosuria development in this case?

- A. Bloc of glucose transporter in renal tubules
- B. Increase in insulinase activity
- C. Damage to the cells of the pancreas
- D. Formation of antibodies to insulin
- E. Strengthening of glucose filtration in renal glomeruli

106) The patient found urine sugar. The content of glucose in the blood is normal. Blood pressure is normal. What is the mechanism of glucosuria in this case?

- A. Disruption of glucose reabsorption in the nephron tubules
- B. Hyperfunction of the cerebral part of the adrenal gland
- C. Hyperfunction of the adrenal cortical substance

- D.* Hyperfunction of the thyroid gland
- E.* Insulin deficiency

LIPID METABOLISM

- 1) Chylomicron content in the blood of a patient increased especially after eating of food fortified by lipids. Type I hyperlipoproteinemia was diagnosed. This abnormality had been caused by damage in the synthesis of
- A. Lipoprotein lipase
 - B. Prostaglandin synthetase
 - C. Protein kinase
 - D. Phospholipase C
 - E. Adenylate cyclase
- 2) Fatty degeneration of the liver occurs in the case of insufficient intake of lipotropic factors into the human body. Which of the following substances is used in the treatment of this disease:
- A. Methionine
 - B. pyridoxine
 - C. triglycerides
 - D. cholesterol
 - E. fatty acid
- 3) Lipolytic enzymes of the GIT catalize lipid hydrolysis. Point the linkage that is broken up by lipases:
- A. Ester bond
 - B. Glycosidic bond
 - C. Peptide bond
 - D. Hydrogen bond
 - E. Amide bond
- 4) Increased keton body content was determined in the blood of a patient with diabetes mellitus. Point a compound that is the precursor for the keton bodies synthesis:
- A. Acetyl-CoA
 - B. Malate
 - C. Citrate
 - D. Alpha-ketoglutarate
 - E. Succinyl-CoA
- 5) The venom of the snake contains a compound that causes erythrocyte hemolysis in the human organism. The great amount of lysolecithin was determined in the blood during analysis. Point, what compound of the venom leads to appearance and accumulation of lysolecithin in the blood.?
- A. Phospholipase A₂
 - B. Neuraminidase
 - C. Phospholipase C
 - D. Phospholipase D

E. Phospholipase A₁

6) The prostaglandin biosynthesis begins with liberation of arachidonic acid from phosphoglycerides. What enzyme catalyses this process?

- A.* Phospholipase A₂
- B.* Cholesterol esterase
- C.* Sphingomyelinase
- D.* Triacylglycerol lipase
- E.* Lipoprotein lipase

7) Some end products of cholesterol metabolism in the liver do play an important part in the process of lipid digestion. Name these products.

- A.* Bile acids
- B.* Catecholamines
- C.* Acetyl-SCoA
- D.* Cholanic acid
- E.* Corticosteroids

8) Vitamins and vitamin-similar compounds are necessary for activation and carrying long-chain fatty acids through the inner mitochondrial membrane. Point one of them:

- A.* Carnitine
- B.* Riboflavin
- C.* Ubiquinone
- D.* Biotin
- E.* Thiamine

9) For improving sports results a sportsman was recommended to use carnitine. What process is activated by carnitine?

- A.* Transport of fatty acids
- B.* Transport of glucose
- C.* Transport of vitamin K
- D.* Transport of calcium ions
- E.* Transport of amino acids

10) In the patient's common bile duct a stone corks up the bile entering to the duodenum. Abnormalities of what class of substances take place under these conditions?

- A.* Fats
- B.* Proteins
- C.* Water-soluble vitamins
- D.* Trace elements
- E.* Carbohydrates

11) One of the main pathogenetic ways of radiation sickness genesis is a free

radical process intensification. What substances are the primary source of free radicals?

- A. Lipids
- B. Carbohydrates
- C. Proteins
- D. Water
- E. Metal ions

12) Venom of some snakes contains lipase which when entering the body can lead to the formation of a substance with a strong hemolytic action. Point this lipase.

- A. A₂
- B. Д
- C. A₁
- D. C
- E. B

13) Transport of acyl-CoA from the cytoplasm to mitochondria is necessary for the β -oxidation. What molecule carries out this function?

- A. Carnitine
- B. Orotic acid
- C. Inositol
- D. Choline
- E. Lipoic acid

14) During one cycle of the beta-oxidation in mitochondria 1 FADH₂ and 1 NADH(H⁺) are produced. They pass atoms of hydrogen to the electron transport chain, where in the oxidative phosphorylation are produced:

- A. 5 ATP
- B. 10 ATP
- C. 8 ATP
- D. 15 ATP
- E. 3 ATP

15) Fatty acid biosynthesis takes place in the body constantly. Which from the listed substances is the main source for the fatty acid biosynthesis?

- A. Acetyl -CoA
- B. Glucose 6-phosphate
- C. Succinyl-CoA
- D. Acyladenylate
- E. Aminoacyladenylate

16) In a patient who went to a doctor increased levels of glucose in the blood and urine were detected. It's suspected of diabetes mellitus. What changes in lipid metabolism this disease can provoke?

- A. Hyperketonemia, ketonuria

- B. Hypercholesterolemia
- C. Hypoketonemia, ketonuria
- D. Hyperphospholipidemia, hypoketonemia
- E. Hypophospholipidemia, hypoketonemia

17) Increased content of chylomicrons was determined in the blood of a patient during checkup. What enzyme activity is decreased under this pathology?

- A. Lipoprotein lipase of the capillaries
- B. Lipase of the pancreas
- C. Pancreatic phospholipase
- D. Tissue triacylglycerol lipase
- E. Tissue diacylglycerol lipase

18) Level of cholesterol in the blood of a patient who has diabetes mellitus is 12 mmol/l. Point a possible complication:

- A. Atherosclerosis
- B. Rickets
- C. Dermatitis
- D. Paralyzes
- E. Diarrhea

19) A patient has cerebral atherosclerosis. Analysis of the blood determines a hyperlipoproteinemia. Content of what lipoproteins is most likely to be increased?

- A. Low-density lipoproteins
- B. Chylomicrons
- C. Intermediate-density lipoproteins
- D. High-density lipoproteins
- E. Complex of fatty acids with albumins

20) The colloidal properties of bile lower under inflammatory process in the gall-bladder. This can lead to the formation of gall-stones. What compound crystallization is the main cause of their formation?

- A. Cholesterol
- B. Biliverdin
- C. Oxalates
- D. Urates
- E. Albumin

21) Glycerol metabolism in the tissues associates with glycolysis. What metabolite from the intermediate metabolism of glycerol enters directly in glycolysis?

- A. Dihydroxyacetone phosphate
- B. Triacylglycerol
- C. Glyceric acid
- D. Diacylglycerol
- E. Phosphoenolpyruvic acid

22) Biological importance of glycolysis is determined not only as a source of energy for the organism but also - a source of the compounds that are used for synthesis of lipids. Point this compound:

- A. Dihydroxyacetone phosphate
- B. Phosphoenolpyruvic acid
- C. Lactic acid
- D. Pyruvic acid
- E. Gluconic acid

23) It is known that fatty acid oxidation occurs in the mitochondria. Point, what compound takes part in their transportation from the cytosol to mitochondria?

- A. Carnitine
- B. Vitamin E
- C. HS-CoA
- D. Carnosine
- E. Biotin

24) The intracellular metabolism of glycerol begins from its activation. What compound is synthesized in the first reaction of its transformation?

- A. α -Glycerolphosphate
- B. Pyruvate
- C. Choline
- D. Lactate
- E. Acetyl-CoA

25) Ultrasonic scanning (US) discovered presence of gall-stones in the gall-bladder of a patient. A cause of this state can be increase in the bile of the concentration of:

- A. Cholesterol
- B. Urea
- C. Creatine
- D. Phospholipids
- E. 25-Hydroxycalciferol

26) The preparation of L-carnitine is administered to a patient. This compound carries out the trans-membrane transfer of:

- A. Higher fatty acids
- B. Glucose
- C. Amino acids
- D. Pyrimidine nucleotides
- E. Purine nucleotides

27) Fat hydrolysis is activated by adrenalin. What enzyme activity increases during this process?

- A. Triacylglycerol lipase

- B. Aldolase
- C. Acetylcholinesterase
- D. Monoamine oxidase
- E. Phospholipase

28) Fat content in the adipose tissue decreases under intensive physical activity. Fat releases from the cell as

- A. Free fatty acids and glycerol
- B. Ketone bodies
- C. Lipoproteins
- D. Chylomicrons
- E. Glucose

29) A patient with arteriosclerosis was recommended statins – the cholesterol synthesis inhibitors for prophylaxis of possible complications. Activity of what enzyme do they inhibit?

- A. HMG-CoA - reductase
- B. 7- Hydroxylase
- C. Lecithin - cholesterol- acyltransferase
- D. Esterase
- E. Oxygenase

30) Point an additional enzyme which is essential for the oxidation of unsaturated fatty acids.

- A. $\Delta 3,4$ -cis- $\Delta 2,3$ - trans- enoyl -CoA- isomerase
- B. Acyl-CoA- dehydrogenase
- C. Enoyl -CoA- hydratase
- D. Oxyacyl-CoA- dehydrogenase
- E. Thiolase

31) Where is the process of fatty acid synthesis localized in the cell?

- A. Cytoplasm
- B. Mitochondrion
- C. Lysosome
- D. Nucleus
- E. Endoplasmic reticulum

32) Fatty acids released from triacylglycerols during hydrolysis or entered the cell from the blood are oxidized. Point, in what cell organelles this process takes place?

- A. Mitochondria
- B. Nucleus
- C. Cytoplasm
- D. Microsomes
- E. Hyaloplasm

33) Under stress conditions in the human organism activation of intracellular lipolysis takes place. It is caused by the adrenaline action on the cells. What enzyme of the intracellular lipolysis does adrenaline affect via a second messenger?

- A. Triacylglycerol lipase
- B. Diacylglycerol lipase
- C. Monoacylglycerol lipase
- D. Amylase
- E. Fructokinase

34) There was an increased level of total lipids [16 g/L] and a raised glucose level [8.0 mmol/L] observed in the blood of a 47-year-old patient. What pathology these figures could be connected with?

- A. Diabetes mellitus
- B. Atherosclerosis
- C. Ischemic heart disease
- D. Gastritis
- E. Myocardial infarction

35) The blood plasma of a patient has milk colour due to high chylomicron content. Defect of an enzyme which catalyzes triacylglycerol hydrolysis and fatty acid enter from the bloodstream chylomicrones to the adipose tissue was observed. The defect of what enzyme activity was observed in that patient?

- A. Lipoprotein lipase
- B. Diacylglycerol lipase
- C. Monoacylglycerol lipase
- D. Cholesterol esterase
- E. β -hydroxy- β -methylglutaryl-CoA reductase

36) Triacylglycerols are resynthesized in the intestinal cells and transported as chylomicrons into the lymphatic system and then to the bloodstream, where they are hydrolyzed to release fatty acids and glycerol. What enzyme catalyzes this hydrolysis reaction?

- A. Lipoprotein lipase
- B. Triacylglycerol lipase
- C. Phospholipase
- D. Protein kinase
- E. Hexokinase

37) A 40-year-old patient was diagnosed with pheochromocytoma. Production of adrenaline and noradrenaline is increased under such pathology. Blood analysis has shown that free fatty acid concentration is 10 times above a normal level. Point out what enzyme activation leads to hyperlipidemia:

- A. Triglyceride lipase
- B. Phospholipase A₂

- c. Phosphokinase
- D. Lipoprotein lipase
- E. Phosphorylase

38) In a 12-year-old child type I hyperlipoproteinemia was diagnosed and characterized by a high content of chylomicrons in the blood plasma. The high concentration of chylomicrons was a consequence of the lack of:

- A. Lipoprotein lipase
- B. Triacylglycerol lipase
- c. Carnitine acyl transferase
- D. Cholesterol esterase
- E. Phosphokinase

39) Ketone bodies are used as energy material. Their concentration in the blood increases in case of disease of diabetes mellitus and fasting. Name the substance from which they are synthesized

- A. Acetyl-CoA
- B. Succinyl-CoA
- c. citrate
- D. malate
- E. ketoglutarate

40) Basic lipolysis means that triglycerides (fats) undergo enzymatic process of hydrolysis to form fatty acids and glycerol. Those fatty acids enter the bloodstream and are transported together with:

- A. Albumins
- B. Globulins
- c. HDL (high density lipoproteins)
- D. LDL (low density lipoproteins)
- E. Chylomicrons

41) For phosphatidylcholine biosynthesis in the liver some physiologically active compounds are needed. Such molecules are called lipotropic compounds. Which of the given below organic compounds belongs to lipotropic?

- A. Methionine
- B. Cholesterol
- c. Fatty acids
- D. Cysteine
- E. Tryptophan

42) A patient was diagnosed with carnitine deficiency. What biochemical index is most likely to rise in patient's blood plasma?

- A. Fatty acids
- B. Acetoacetate
- c. Glucose

- D. β -Hydroxybutyrate
- E. Acetone

43) Absorption of fatty acids in the small intestine depends on their carbon chain length. Fatty acids with more than 14 carbon atoms are capable to form complexes with bile acids:

- A. Choleinic complexes
- B. Bile complexes
- C. Fatty complexes
- D. Acid complexes
- E. Long-chain complexes

44) β -oxidation of carboxylic acids is the main way of their catabolic transformation. For 1 round of this cyclic process, the cell will potentially receive:

- A. 5 ATP
- B. 1 ATP
- C. 2 ATP
- D. 3 ATP
- E. 4 ATP

45) Ischemic heart disease, myocardial infarction, insult, obliterating endarteritis are amongst the most dangerous and widespread complications of atherosclerosis. The main cause of atherosclerosis development is:

- A. Hypercholesterolemia
- B. Hypocholesterolemia
- C. Hyperchylomicronemia
- D. Hyperglycemia
- E. Hyper- β -lipoproteinemia

46) A 38-year-old man, who is obese and consumes fatty meat, eggs and oil, found stones in the bile duct. Increase in the concentration of what substance in bile is associated with this?

- A. Cholesterol
- B. bilirubin
- C. lysozyme
- D. biliverdine
- E. mucin

47) A patient complains of yellowing of the skin, scleras and skin itch. At ultrasonic examination concrements were revealed in the gall bladder. To support a cholestasis syndrome it is needed to determine:

- A. Alkali phosphatase activity
- B. Aminotransferase activity
- C. Choline esterase activity
- D. Residuum assays

E. Glucose in blood

48) A man suffers from cholelithiasis. What process abnormality it may lead to?

- A. Digestion of lipids
- B. Glycogen degradation
- C. TAG synthesis
- D. TAG degradation
- E. Glycogen synthesis

49) A patient was diagnosed with steatorrhea, i.e. abnormality of food fat digestion. What process is damaged in that case?

- A. Emulsification of fats by the bile acid salts in the intestine
- B. Fat hydrolysis by amylase in the oral cavity
- C. Fat digestion in the stomach with the help of the gastric juice acid
- D. Direct transport of TAG into the blood
- E. Denaturation of food fats

50) A patient with chronic pancreatitis was recommended a bile preparation in a course of complex therapy. What bile components take part in lipid digestion?

- A. Bile acids salts
- B. Pancreatic lipase
- C. Pancreatic α -amylase
- D. Cholesterol and its esters
- E. High saturated fatty acids

51) To a patient with a diagnosis of atherosclerosis a doctor recommended to limit consuming of animal fats and replace them with plant oils which are rich in essential fatty acids. To such compounds belong the following:

- A. Linoleic acid
- B. Oleic acid
- C. Ascorbic acid
- D. Palmitic acid
- E. Stearic acid

52) Name a vitamin-like compound that takes part in the fatty acid transport from the cytoplasm to mitochondria.

- A. Carnitine
- B. Coenzyme A
- C. Biotin
- D. Pantothenic acid
- E. Folic acid

53) Point the end product of β -oxidation of fatty acids with odd number of carbonic atoms.

- A. Propionyl-CoA

- B. Succinyl-CoA
- C. Acetyl-CoA
- D. Acetoacetyl-CoA
- E. Hydroxymethylglutaryl-CoA

54) A 69-year-old man suffers from blood vessel wall atherosclerosis. In anamnesis of the patient arterial hypertension and obesity were present. What blood biochemical index determination will allow to assess lipid metabolism abnormalities in the patient?

- A. LDL level
- B. Chylomicron level
- C. Bile acids level
- D. VLDL level
- E. HDL level

55) A patient with acute chest pain and loss of consciousness the day before was taken to hospital. Biochemical analysis of the blood revealed a high level of cholesterol – 13, 9 mmol/L, and the atherogenicity quotient 6-fold raised. What disease the patient is supposed to have?

- A. Myocardium infarction
- B. Pulmonary atelectasis
- C. Gastritis
- D. Acute pancreatitis
- E. Stenocardia

56) In a starving patient general metabolism was reduced by 15%. At examination some disbalances were revealed: hypoglycemia, hyperlipoacidemia, ketonemia, acidosis. Respiration quotient – 0,7. What compounds metabolism maintains life activities of the organism under such conditions?

- A. Fatty acids
- B. Glucose
- C. Amino acids
- D. Keto acids
- E. Disaccharides

57) A 58-year-old patient was taken to hospital for examination: he had the weight of 95 kg and height of 172 cm, complained of hypoxia under physical training, periodic pain in the heart area, rising of blood pressure. Biochemical analysis of the blood showed that HDL/LDL was 16% / 84%. What pathology is thought to take place?

- A. Complicated atherosclerosis
- B. Itsenko-Kushing syndrome
- C. Myxedema
- D. Hyperlipoproteinemia of type I
- E. Diabetes mellitus

58) A 7-year-old boy which eats primarily plant food (allergy to animal products) was diagnosed with signs of fatty infiltration of the liver, and the most real reason for it was abnormality in:

- A. Synthesis of apolipoproteins
- B. Glycogen synthesis
- C. Fatty acid oxidation
- D. Pancreatic lipase secretion
- E. Lipotropin secretion

59) During fasting ketoacidosis is developing. Increased concentration of which metabolite in blood is a symptom of this condition?

- A. Acetoacetate
- B. Oksaloacetate
- C. Malonate
- D. Acetyl-CoA
- E. Beta-hydroxy-beta-methylglutaryl-CoA

60) Blood lipoproteins are separated by electrophoresis, and their path in the electric field depends on the protein content in the fractions. Which lipoproteins contain the least protein and are located on the electrophoregram closest to the start?

- A. Chylomicrons
- B. Lipoproteins of very low density
- C. Lipoproteins of high density
- D. Lipoproteins of intermediate density
- E. Lipoproteins of low density

61) Digestion of lipids requires presence of lipases, emulsifiers and a low-alkaline pH. In what part of the gastrointestinal tract are these conditions formed?

- A. Duodenum
- B. Esophagus
- C. Colon
- D. Stomach
- E. Mouth cavity

PROTEIN METABOLISM

1) A patient has an allergic reaction that is accompanied with itches, edemata, and rednesses. Which biogenic amine concentration increases in the tissues?

- A. Histamine
- B. Taurine
- C. Serotonin
- D. Putrescine
- E. Tryptamine

2) Abnormalities of protein digestion in the stomach and small intestine were discovered in a patient during checkup. The lack of what enzymes leads to these derangements?

- A. Peptidases
- B. Oxidoreductases
- C. Transferases
- D. Amylases
- E. Lipases

3) Proteolytic enzymes of the GI tract catalyze protein hydrolysis. Point the bond that is broken up by these enzymes:

- A. Peptide
- B. Ester
- C. Hydrogen
- D. Phosphodiester
- E. Glycoside

4) Digestion of proteins in the stomach begins under the action of pepsin that is secreted in a form of pepsinogen – inactive precursor. The transformation of pepsinogen to pepsin is fulfilled by means of the N-end peptide removal under the action of:

- A. Hydrochloric acid
- B. Bile acid
- C. Sulphuric acid
- D. Acetic acid
- E. Amino acids

5) Abdominal distension, diarrhea, and wind are observed in a patient after taking protein-containing food. That is the evidence of abnormalities in protein digestion and activation of their putrefaction. Point the compound that is a product of the protein putrefaction:

- A. Indole
- B. Lactic acid
- C. Urea
- D. Bilirubin
- E. Ketone bodies

6) The main mechanism of ammonia utilization in the organism is the urea biosynthesis. What high-energy compound formation in the urea synthesis the cycle begins from?

- A. Carbamoyl phosphate
- B. Citrulline
- C. Arginine
- D. Fumaric acid
- E. Argininosuccinate

7) Protein digestion becomes worse under enteric infection, and this leads to the formation of toxic products. Point, what toxic compound is formed from tyrosine under the action of microorganism enzymes in the large gut:

- A. Phenol
- B. Putrescine
- C. Agmatine
- D. Cadaverine
- E. Ornithine

8) Preparation that inhibits an enzyme, which inactivates biogenic amines, was administered to a patient. Name this enzyme.

- A. MAO (monoamine oxidase)
- B. LDH (lactate dehydrogenase)
- C. AsAT (aspartate aminotransferase)
- D. CK (creatine phosphokinase)
- E. ALAT (alanine aminotransferase)

9) Irritability of the nervous system, which can be observed under a B₆ hypovitaminosis, is connected with the lack of synthesis of a biogenic amine that has an inhibitory effect on the CNS. Name this biogenic amine.

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

10) Ainalon was administered to a patient who complains about impairment of memory and giddiness. This preparation contains the product of the glutamic acid decarboxylation. Name it.

- A. GABA
- B. Coenzyme A
- C. NAD⁺
- D. ATP
- E. PLP

11) Gastric juice pH in children varies in the limits: 4,0-5,0. Name a gastric juice enzyme that is active in these conditions.

- A. Renin
- B. Pepsin
- C. Chymotrypsin
- D. Trypsin
- E. Elastase

12) Biogenic amines undergo deamination by the action of a certain enzyme. Point it.

- A. Monoamine oxidase
- B. Decarboxylase
- C. Amino acid dehydrogenase
- D. Alanine transaminase
- E. L-amino acids oxidase

13) Achlorhydria is diagnosed in a patient. Decreasing of what enzyme activity does it lead to?

- A. Pepsin
- B. Trypsin
- C. Chymotrypsin
- D. Elastase
- E. Aminopeptidase

14) The patient has a abnormality of liver function. Which of the following biochemical indicators should be determined in the blood to assess liver status?

- A. ALT
- B. Creatine phosphokinase
- C. Aldolase
- D. LDH1
- E. Lipase

15) Protein digestion is disturbed in the stomach and small intestine. This process is caused by the deficiency of:

- A. Peptidases
- B. Synthetases
- C. Amylases
- D. Lipases
- E. Transferases

16) Some of the amino acids are decarboxylated with the toxic products formation in the large gut. Point what compound is obtained from ornithine?

- A. Putrescine
- B. Agmatine
- C. Cadaverine

- D. Lysine
- E. Arginine

17) Decreasing of the trypsin synthesis and secretion is observed under a chronic pancreatitis. Digestion and absorption of what compounds are affected?

- A. Breaking up of proteins
- B. Breaking up of nucleic acids
- C. Breaking up of polysaccharides
- D. Breaking up of disaccharides
- E. Breaking up of lipids

18) Ammonia high toxicity for the CNS neurons is connected with the citric acid cycle inhibition and decreasing of tissue respiration, oxidative phosphorylation, and ketonemia as the after-effects. The reason for it is ammonia binding with the following cycle component:

- A. α -Ketoglutarate
- B. Isocitrate
- C. Oxaloacetate
- D. Fumarate
- E. Succinate

19) Decreasing of a hydrochloric acid concentration in the gastric juice was revealed during examination of the stomach secretory function. What enzyme activity should be decreased?

- A. Pepsin
- B. Hexokinase
- C. Amylase
- D. Dipeptidases
- E. Lipase

20) Ammonia is generated in different tissues and organs and neutralized in the liver by converting into urea. What amino acid transports it from the skeletal muscles to liver?

- A. Alanine
- B. Histidine
- C. Glycine
- D. Serine
- E. Aspartate

21) Ammonia is a toxic compound and its increasing in the blood is especially dangerous for neurons. What amino acid from the listed below is used as effective remedy that binds ammonia in the brain?

- A. Glutamic
- B. Succinic
- C. Benzoic

- D. Hippuric
- E. Sulfosalicylic

22) Monoamine oxidase inhibitors are widely used as psychopharmacological remedies. They have influence on all the listed below neuromediators except:

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

23) Proteolytic enzymes exude during the stomach secretion in the form of proenzymes. Point, what enzyme is activated by hydrochloric acid?

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

24) Pancreatic digestive enzymes are produced in inactive state. Shortage of what factor does inhibit the proenzyme conversion into the active form in the intestine?

- A. Enterokinase
- B. Dipeptidase
- C. Lipase
- D. Amylase
- E. Chymotrypsin

25) The main way of ammonia detoxication is the urea synthesis. This biochemical process begins from the formation of:

- A. Carbamoyl phosphate
- B. Citrulline
- C. Arginine
- D. Ornithine
- E. Pyrophosphate

26) Histamine is synthesized as a result of the amino acid histidine decarboxylation in the cells. What enzyme provides the inactivation of this biogenic amine?

- A. Diamine oxidase (DAO)
- B. Monoamine oxidase (MAO)
- C. Catalase
- D. Amino transferase
- E. Amino peptidase

27) Protein digestion in the intestinal tract is a combined process of their hydrolysis to free amino acids and peptides. Name the enzymes that decompose proteins in the stomach

- A. Pepsin, gastricsin
- B. Carboxypeptidase, α - amylase
- C. Trypsin, chymotrypsin
- D. Enterokinase, lipase
- E. Amino peptidase, phospholipase

28) There is a high level of hippuric acid in the patient's urine. This acid is a product of detoxification of benzoic acid in the liver. What amino acid in the human organism is benzoic acid formed from?

- A. Phenylalanine
- B. Succinate
- C. Lactate
- D. Aspartate
- E. Malate

29) Ammonia is a very toxic substance, especially for the central nervous system. What amino acid transfers ammonia from the brain cells to the liver?

- A. Glutamin
- B. Leucine
- C. Valine
- D. Serine
- E. Glycine

30) Products of amino acid decarboxylation are biologically active. What mediator of the central nervous system is produced from glutamic acid?

- A. GABA
- B. Histamine
- C. Cadaverine
- D. Putrescine
- E. Asparagine

31) During the histidine catabolism a biogenic amine with a vasodilatory action is produced. Point this substance.

- A. Histamine
- B. Thyroxin
- C. DOPA
- D. Dopamine
- E. Serotonin

32) A patient has an allergic reaction: eruption, edema and itch. What biogenic amine production is increased in these conditions?

- A. Histamine

- B.* Serotonin
- C.* Adrenalin
- D.* Noradrenalin
- E.* Choline

33) Under some stomach disorders use of pepsin is recommended. Pepsin is a proteolytic enzyme. Point the chemical bonds which this enzyme acts on.

- A.* Peptide bonds
- B.* Glycosidic bonds
- C.* Etheric bonds
- D.* Disulfide bonds
- E.* Hydrogen bonds

34) Biochemical analysis of the blood detected a urea level increase. Disorders of metabolism of what class of molecules it points to?

- A.* Proteins
- B.* Sterines
- C.* Carbohydrates
- D.* Lipids
- E.* Fats

35) A biochemical sense of transamination is in accumulation of amino groups from different amino acids in the form of one amino acid. Point this amino acid.

- A.* Glutamic acid
- B.* Leucine
- C.* Aspartic acid
- D.* Valine
- E.* Arginine

36) Toxic substances are produced in the large gut by the enzymes of microorganisms. One of these substances is cadaverine. Point the way in which cadaverine is produced.

- A.* Lysine decarboxylation
- B.* Lysine deamination
- C.* Arginine deamination
- D.* Arginine transamination
- E.* Aspartic acid transamination

37) Aminotransferases are the enzymes which transfer amino groups from one compound to another. Point the acceptor of amino groups.

- A.* α -Ketoglutaric acid
- B.* Lactic acid
- C.* Succinate
- D.* Acetone
- E.* Butyric acid

38) A biogenic amine histamine is formed in the lungs, digestive system and skin. It is a vasodilator. Point a compound which is the precursor of histamine.

- A. Histidine
- B. Threonine
- C. Valine
- D. Serine
- E. Alanine

39) Under viral and toxic liver injuries activity of some enzymes in the blood serum increases. Point such enzyme.

- A. Alanine aminotransferase
- B. Leucine aminotransferase
- C. Aldolase
- D. Tyrosine aminotransferase
- E. Lipase

40) Under pathological process an ammonia level in the blood serum is increased. Point the main way of ammonia detoxication.

- A. Urea synthesis
- B. Ammonia salts synthesis
- C. Uric acid synthesis
- D. Aspartic acid synthesis
- E. Glutamic acid synthesis

41) A patient has sleep disturbance and memory impairment. It's connected with the lack of GABA production. What substance is the precursor of GABA?

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

42) Determination of alanine aminotransferase and aspartate aminotransferase activities is widely used in medicine for diagnostics of internal injuries. What vitamin derivative the prosthetic group of these enzymes is?

- A. Pyridoxine
- B. Riboflavin
- C. Vit. C
- D. Vit. P
- E. Niacin

43) In the process of 5-hydroxytryptophan decarboxylation a biogenic amine, which has vasoconstrictory action is formed. Point this biogenic amine

- A. Serotonin

- B.* Histamine
- C.* GABA
- D.* Cadaverine
- E.* Putrescine

44) Ammonia is a very toxic substance and its blood level increasing is especially dangerous for the brain. One way of ammonia direct inactivation is to form:

- A.* Glutamine
- B.* Lysine
- C.* Alanine
- D.* Adrenalin
- E.* Leucine

45) In a 60-year-old man suffering from intestine obstruction, the processes of protein putrefaction in the large gut are intensified. What toxic substance is produced from tryptophan in this case?

- A.* Indole
- B.* Glucose
- C.* Creatine
- D.* Bilirubin
- E.* Lactate

46) Serotonin (5-hydroxytryptamine) is a mediator of the central nervous system. It participates in the processes of sleep, mood, emotions and painful sensation. Serotonin is synthesized by the hydroxylation and decarboxylation of an amino acid. Which one is it?

- A.* Tryptophan
- B.* Proline
- C.* Histidine
- D.* Phenylalanine
- E.* Tyrosine

47) In a boy with intestine obstruction the urine indican excretion is increased. Indican is produced in the liver due to indoxyl conjugation with:

- A.* Phosphoadenosine phosphosulphate
- B.* Glycine
- C.* Glutathione
- D.* AcetylCoA
- E.* Taurine

48) In a patient the amino acid transport in the intestine cells is decreased. What substance participates in the amino acid transport?

- A.* Glutathione
- B.* Antiserine
- C.* Amylase

- D. Ornithine
- E. Alanine

49) Pancreatic enzymes are transported to the duodenum in inactive state. Point the enzyme that activates trypsinogen

- A. Enterokinase
- B. Gastricsin
- C. Lipase
- D. Pepsin
- E. Elastase

50) In a patient a hyperacidic state is observed. Point the hormone that activates the HCl and pepsinogen secretion in the stomach.

- A. Gastrin
- B. Insulin
- C. Somatotropin
- D. Secretin
- E. Glucagon

51) A patient with dyspepsia uses a drug – acidine-pepsin. What function has the protein which is a part of this preparation?

- A. Catalytic
- B. Defensive
- C. Regulatory
- D. Receptory
- E. Transport

52) In a patient with Parkinson's disease a deficiency of the dopamine production in the central nervous system takes place. What drugs should be used under these conditions?

- A. MAO inhibitors
- B. MAO activators
- C. Proteolytic enzymes inhibitors
- D. Antihistaminic drugs
- E. Proteolytic enzymes activators

53) A negative nitrogen balance is inherent in

- A. Old-timers
- B. Young persons
- C. Pregnant women
- D. Growing organisms
- E. Overweight persons

54) Point the normal values of gastric juice pH.

- A. 1,5-2,5

- B. 4,0-5,0
- C. 6,8-7,2
- D. 1,0-5,0
- E. 2,0-4,0

55) Point the hormone that activates the HCl secretion in the stomach.

- A. Gastrin
- B. Secretin
- C. Vasopressin
- D. Cholecystokinin
- E. Somatotropin

56) Proteins are polymers of α -amino acids. What structural element we can judge about protein metabolism intensity by?

- A. Nitrogen
- B. Carbon
- C. Hydrogen
- D. Oxygen
- E. Magnesium

57) Aminotransferases transfer an amino group from one compound to another. Now more than 50 aminotransferases are known. Point the substance that is a prosthetic group of these enzymes.

- A. B₆
- B. B₁
- C. B₅
- D. B₁₂
- E. PP

58) The biogenic amines which are formed from amino acids due to their decarboxylation are toxic for the organism. The detoxication of them is carried out by monoamine oxidases. Point the prosthetic group that is part of monoamine oxidase.

- A. FAD
- B. NAD⁺
- C. B₆
- D. B₅
- E. B₁₂

59) Ammonia is produced in different organs of the organism. For detoxication ammonia is transported to the liver. Point the substance that transfers ammonia from the muscles.

- A. Alanine
- B. Valine
- C. Leucine

- D. Serine
- E. Threonine

60) One of the ways of ammonia detoxication in the human organism is connected with its conversion to urea. Point the organ that contains all the enzymes for this process.

- A. Liver
- B. Kidneys
- C. Heart
- D. Lungs
- E. Brain

61) Detoxication of some substances in the human organism is carried out by conjugation. Point the substance that is conjugated with benzoic acid to form hippuric acid.

- A. Glycine
- B. Valine
- C. Leucine
- D. Proline
- E. Methionine

62) In a prolonged experiment rats had a food ration from which certain amino acid had been excluded and the animals then suffered from cataract and cornea vascularisation. What amino acid deficiency resulted in to such abnormalities?

- A. Tryptophan
- B. Lysine
- C. Arginine
- D. Leucine
- E. Histidine

63) In a 25-year-old patient epilepsy was diagnosed. Glutamic acid was administred for treatment. What product of the glutamate metabolism has a therapeutic effect?

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

64) A 18-year-old woman took medical advice with a complaint of appearance of a black colour in the urine after settling. Point, what inherited process abnormality caused this pathology?

- A. Tyrosine metabolism
- B. Abnormality of amino acid cysteine metabolism
- C. Urea synthesis

- D. Purine synthesis
- E. Tryptophan metabolism

65) Ammonia produced in the organism in the deamination process is a toxic substance especially for the CNS cells. Name the compound which makes for ammonia detoxication in the tissues.

- A. Glutamic acid
- B. Buffer systems
- C. Arginine
- D. Norepinephrine
- E. Histamine

66) There are some ways of ammonia detoxication in the human organism, but for some organs certain ways are specific. What way of ammonia detoxication is peculiar to the brain cells?

- A. Formation of glutamic acid amide
- B. Bilirubin formation
- C. Uric acid formation
- D. Creatine formation
- E. Urea formation

67) At alkaptonuria an excessive excretion of homogentisate with the urine takes place. What amino acid metabolism the abnormality of this pathology appearance is connected with?

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

68) A patient warned a surgeon-stomatologist that anaesthetic preparation application may cause an allergic shock. What biogenic amine content increase in the blood could be the reason for such state?

- A. Histamine
- B. GABA
- C. Serotonin
- D. Dopamine
- E. Tryptamine

69) Patients with craniocerebral trauma have epileptomorphic seizures that are regularly repeated. The formation of which biogenic amine is disturbed at this state?

- A. GAMK
- B. Histamine
- C. Adrenalin

- D. Serotonin
- E. Dopamine

70) In a patient with liver damage during Quik's test for detoxification ability, a low level of which compound was observed in urine

- A. Hippuric acid
- B. Oxyproline
- C. Sodium benzoate
- D. Creatinine
- E. Amino acid

71) At examination of the patient T. it was revealed toxic hepatitis, aroused on the background of drug intake. What blood serum enzyme activity do you suggest to identify with other studies to confirm this diagnosis?

- A. Alanine aminotransferase
- B. Creatine phosphokinase
- C. Pyruvate dehydrogenase
- D. Maltase
- E. Malate dehydrogenase

72) The patient has been placed on ranitidine. The drug inhibits the H₂ histamine receptors in the stomach and reduces secretion of:

- A. Hydrochloric acid
- B. Pepsinogen
- C. Renin
- D. Gastromucoid
- E. Gastricsin

73) Which of the following enzymes inactivates biogenic amines?

- A. Monoamine oxidase, coenzyme of which is FAD
- B. Aldehyde dehydrogenase
- C. Catalase
- D. Glutamate Hydrogenase
- E. Glutathione peroxidase

74) What of the following enzymes is inhibited by medicines used to treat depression?

- A. MAO, containing FAD in its composition
- B. Acetylcholinesterase
- C. Formylkinureninase
- D. Kinurenin-3-hydroxylase

E. Imidazolepropionate dihydrolazase

75) Which amino acid is a precursor to the histamine formation.

- A.* Hystidine
- B.* Tryptophan
- C.* Tyrosine
- D.* Aspartic acid
- E.* Glutamic Acids

76) The patient has an increased level of urea and creatinine in the blood and decreased in urine. What is the possible cause of such condition?

- A.* Diseases that lead to kidney failure
- B.* Liver Disease
- C.* Muscle disease
- D.* Violation of binding, transport and excretion of ammonia in urine
- E.* Violation of the acid-base balance

77) In a patient of 60 years due to hemorrhage in the gastrointestinal tract blood proteins are exposed to intestine microorganisms. What substance will be dramatically elevated in the blood and urine of the patient?

- A.* Indole
- B.* Tryptophan
- C.* Vitamin K.
- D.* Creatine
- E.* Creatinine

78) To the traumatology it was taken a man with crushed muscle tissue. What biochemical indicator of serum will be increased?

- A.* Creatinine
- B.* Creatine
- C.* Mineral salts
- D.* Urea
- E.* Uric acid

79) The patient has increased concentration of GABA in the brain. This inhibitory mediator is formed due to decarboxylation of:

- A.* Glutamate
- B.* Aspartate
- C.* Glutamin
- D.* Asparagine
- E.* Arginine

80) The patient has acute glomerulonephritis. The appearance of which substance in the urine indicates about basal membrane damage of the kidney glomeruli capillaries in this pathology?

- A. Protein
- B. Fructose
- C. Indican
- D. Creatine
- E. 17-keto steroids

81) Reduced acidity of gastric juice significantly degrades digestion of protein foods. This is primarily due to insufficient activity of the enzyme:

- A. Pepsin
- B. Gastricsin
- C. Trypsin
- D. Chymotrypsin
- E. Aminopeptidases

82) Patient's urine is brown. The content of indican in the blood is 6,5 $\mu\text{mol/L}$ (norm 1,04,7). Indican is formed from indole by its detoxification firstly in the liver, and then in the kidneys. The intensity of which processes and where does point to?

- A. Rotting in the large intestine
- B. Absorption of amino acids in the small intestine
- C. Transformation of proteins in the stomach
- D. Urine formation in the kidneys
- E. Splitting of proteins in the liver

83) Decarboxylation of amino acids is the reaction underlying their transformation into biogenic amines. Mark such an amine, which is released into the blood in allergic reactions, a vasodilator, stimulates secretion in the stomach pepsin, HCl and others.

- A. Histamine
- B. Tryptamine
- C. Serotonin
- D. Tyramine
- E. γ -aminobutyric acid

84) Protein digestion in the GIT is a complex process of their hydrolysis up to free amino acids and peptides. Name the enzymes that cleave proteins in the duodenum.

- A. Trypsin, chymotrypsin

- B. Enterokinase, lipase
- C. Amylases
- D. Pepsin, gastricsin
- E. Phospholipases

85) Patient went to a doctor with complaints about impossibility of staying under the solar radiation; there were skin burns and vision derangements. Albinism was diagnosed. What enzyme deficiency takes place?

- A. Tyrosinase
- B. Ornithine carbamoyltransferase
- C. DOPA-oxidase
- D. Phenylalanine hydroxylase
- E. Arginase

86) Alkaptonuria was diagnosed during a patient's checkup. What enzyme deficiency causes this pathological state?

- A. Homogentisate oxidase
- B. Tyrosinase
- C. Phenylalanine hydroxylase
- D. Thyroxine hydroxylase
- E. Monoamine oxidase

87) Pigment melanin synthesis doesn't occur at albinism. Abnormalities that cause this disease are connected with metabolism of the amino acid:

- A. Asparagine
- B. Phenylalanine
- C. Alanine
- D. Methionine
- E. Glutamine

88) A man presents with signs of albinism: blonde hair, extreme photosensitivity, impaired vision. What amino acid metabolism is disrupted in the patient?

- A. Tyrosine
- B. Methionine
- C. Proline
- D. Histidine
- E. Valine

89) In the blood of the patient there are increased concentration of ammonia, citrulline, and in urine - decreased urea and citrulinuria. The deficiency of which enzyme is observed?

- A. Argininosuccinate synthetase
- B. Argininosuccinate lyase
- C. Glutaminase

- D. Glutamin synthetase
- E. Ornithic carbo-methyltransferase

90) The patient has an excessive deposition of a specific pigment alkapton in the tissues and secretion of the homogentisic acid with the urine. The defect of which enzyme causes to this pathology?

- A. Homogentisic acid oxidase
- B. Phenylalanine monooxygenase
- C. Aspartate aminotransferase
- D. Tyrosinase
- E. Adenosine deaminase

91) Two-year-old child has a general weakness, dizziness, fatigue. There is a mental retardation. In the laboratory testing high concentrations of valine, leucine and isoleucine were detected in blood and urine. Urine has a specific odor. What could be the cause of this condition?

- A. Maple syrup disease
- B. Hartnup disease
- C. Girke disease
- D. Wilson's disease
- E. Niemann-Pick disease

92) In a patient after intake of insecticide-treated vegetables a toxic hepatitis has developed. To assess detoxificational function of the liver it is determined:

- A. Quick assay (loading with sodium benzoate)
- B. Residual nitrogen
- C. Urea
- D. Amino acid spectrum
- E. Uric acid

93) A chronic disease of the liver has been revealed in a patient. What biochemical indices should be determined in blood serum to characterize protein metabolism, except:

- A. Cholesterol
- B. Total protein
- C. Albumins
- D. Globulins
- E. Urea

94) Among the listed enzymes which are determined for liver pathology diagnostics, the only one is organ-specific:

- A. Ornithine transcarbamoylase
- B. Aldolase
- C. Aminotransferases
- D. Alkali phosphatase

E. Leucine aminopeptidase

95) Proteolytic enzymes (pepsin, trypsin) are synthesized in inactive form as zymogens (pepsinogen, trypsinogen), and activated during food digestion by the restricted proteolysis. Mechanism of their activation:

- A. Splitting an inhibitory peptide off zymogen
- B. Phosphorylation
- C. Dephosphorylation
- D. Action of allosteric effector
- E. Activation by substrate

96) A woman complained to a doctor that her newborn child's urine becomes black in the air. Point, what hereditary enzymopathy stipulated this abnormality.

- A. Alcapton oxidase
- B. Tyrosinase
- C. Phenylalanine hydroxylase
- D. Phenylalanine deaminase
- E. Monoamine oxidase

97) What substance deficiency may cause phenylketonuria?

- A. Biopterin
- B. Folic acid
- C. Tyrosine
- D. Methionine
- E. Phenylalanine

98) Under gut infections production of toxic substances, including phenol, in the large gut increases. What enzyme fulfills detoxification of that compound in the liver?

- A. UDP-glucuronyl transferase
- B. Alanine aminotransferase
- C. Aspartate aminotransferase
- D. Lactate dehydrogenase
- E. Glutamate dehydrogenase

99) Mother of a 2-year-old boy told a doctor of a very unusual smell of urine which resembled the maple syrup smell. After carrying the analyses out the diagnosis was made. Ketoaciduria of branched acids. Which are these amino acids?

- A. Leucine, valine, isoleucine
- B. Tyrosine, tryptophan
- C. Arginine, histidine
- D. Proline, serine, glycine
- E. Phenylalanine, tyrosine

100) In a woman a disbalance in amino acid metabolism was revealed, and it was ascertained as aminobutyric acidurea that resulted in to GABA increase in the blood. What amino acid this biogenic amine is produced from?

- A. Glutamic acid
- B. Leucine
- C. Serine
- D. Threonine
- E. Valine

101) High concentration of serotonin in human blood is an index which specifies of urinary bladder cancer. What amino acid this biogenic amine is produced from?

- A. Tryptophan
- B. Phenylalanine
- C. Glycine
- D. Tyrosine
- E. Alanine

102) In a child after wasp bite a state of allergy developed, and that state was accompanied by histamine increase in the blood. In what reaction is this biogenic amine inactivated ?

- A. Oxidative deamination
- B. Reduction
- C. Decarboxylation
- D. Sulfation
- E. Hydrolysis

103) Under acute pancreatitis some preparations are prescribed which help to avoid autolysis of the pancreas. Name them.

- A. Protease inhibitors
- B. Inhibitors of growth factors
- C. Inhibitors of angiotensin-converting enzyme
- D. Proteolytic enzymes activators
- E. Activators of growth factors

104) Metabolic chain of indole and skatole detoxification in the liver includes the process of their conversion. Point stages of that process:

- A. Oxidation and conjugation
- B. Phosphorylation
- C. Transamination
- D. Transacetylation
- E. Sulfation

105) Vitamin B₆ is included in the composition of the coenzyme pyridoxal phosphate (PALP). What reactions take place with the participation of PALP?

- A. Decarboxylation and transamination of amino acids

- B. Synthesis of steroid hormones and cholesterol
- C. Synthesis of bile acids and cholesterol
- D. Synthesis of nucleic acids and phospholipids
- E. Synthesis of ketone bodies and bile acids

106) Increased excitability of the CNS, recurrent seizures are observed in a child under intake of isoniazid. What CNS mediator production abnormality takes place in the child?

- A. Gamma amino butyric acid (GABA)
- B. Serotonin
- C. Histamine
- D. Acetylcholine
- E. Glutathione

107) Ammonia is toxic for cells of the human organism. Urea – non-toxic substance which is used for excretion of nitrogen excess from the body. Urea is synthesized in the liver, and excreted via kidneys. What is normal range of urea content in blood serum?

- A. 3,33-8,30 mmol/L
- B. 3,33-6,6 $\mu\text{mol/L}$
- C. 65-85 g/L
- D. 0,86-5,1 $\mu\text{mol/L}$
- E. 8,5-20,5 $\mu\text{mol/L}$

108) During making a hard physical work under high temperature of the surrounding medium in a man protein composition of blood plasma has changed. In particular, there developed:

- A. Relative hyperproteinemia
- B. Absolute hyperproteinemia
- C. Hypoproteinemia
- D. Disproteinemia
- E. Paraproteinemia

109) It is known that under genetic blockade at the final stage of B-lymphocyte differentiation into plasmocytes which synthesize IgA, it was noted that level of these immunoglobulins lowered. The latter resulted in:

- A. Mucosal protection weakens
- B. Anti-cancer immunity weakens
- C. Autoimmune disease probability rises
- D. Organism resistance to viruses lowers
- E. Immune status of the organism does not change

110) Mother noticed that child's urine colours a diaper in black. Enzymopathy – alcaptonurea – was diagnosed. Symptoms of the disease appear as a result of blockade on the stage:

- A. Alcapton-maleylacetoacetate
- B. Tyrosine-melanin
- C. Tyrosine-tyroxine
- D. Hydroxyphenylpyruvate-alcapton
- E. Tyrosine-adrenalin

111) A 62-year-old woman complains of pain in chest, back, loin, and noticed some cases of cracked ribs under slight physical influence. A doctor supposed myeloma. What blood biochemical index will confirm the diagnosis?

- A. Cryoglobulin
- B. Hepatocuprein
- C. Alpha 1-phetoprotein
- D. C-reactive protein
- E. Interferon

112) A 40-year-old woman complains of pain in the joints. Increased concentrations of C-reactive protein and hydroxyproline were revealed in the patient's blood serum. What disease these symptoms are typical for?

- A. Rheumatism
- B. Gout
- C. Hepatitis
- D. Oxalateurea
- E. Polyarthrititis

113) A patient is very thin because of gastro-intestinal tract pathology, abnormality of digestion and absorption processes. What changes of the protein fractions one can wait under examination?

- A. Albumin decrease
- B. Globulin decrease
- C. α -Globulin increase
- D. β -Globulin increase
- E. γ -Globulin increase

114) In a patient gastric juice acidity equals to 120 units. What from the listed diseases a significant gastric juice acidity rise is typical for?

- A. Duodenal ulcer
- B. Chronic hypotrophic gastritis
- C. Chronic colitis
- D. Chronic atrophic gastritis
- E. Stomach cancer

115) An important substrate for gluconeogenesis in the liver is alanine. Name the reaction in which it is produced in muscles from pyruvate?

- A. Transamination
- B. Phosphorylation

- C.* Dehydrogenating
- D.* Decarboxylation
- E.* Isomerization

116) Antidepressants are able to increase the content of catecholamines in the synaptic cleft. What is their mechanism of action?

- A.* Inhibit monoamine oxidase
- B.* activate monoamine oxidase
- C.* inhibit acetylcholin esterase
- D.* activate acetylcholine esterase
- E.* inhibit xanthine oxidase

117) Protein catabolism in the body increases in the occurrence of such diseases as thyrotoxicosis, tuberculosis, etc. This process is accompanied by increasing of liver protein synthesis and excretion of some compound with the urine, specify it?

- A.* Urea
- B.* glucose
- C.* ketone bodies
- D.* fatty acids
- E.* nucleotides

118) Some biogenic amines are powerful vasodilators, at high concentrations they can cause a sudden drop in blood pressure. Specify this compound.

- A.* Histamine
- B.* Adrenalin
- C.* glycine
- D.* putrescine
- E.* norepinephrine

119) A patient with Parkinson's disease has a decreased amount of dopamine that formed from dioxiphenylalanine (DOPA). The action of which enzyme lead to this transformation?

- A.* Decarboxylase
- B.* Hydrolases
- C.* Carboxypeptidases
- D.* Aminotransferase
- E.* Deaminase

120) L-DOFA and its derivatives are used for the treatment of Parkinson's disease. What amino acid is the precursor to this substance?

- A.* Tyrosine
- B.* Glutamate

- C.* Tryptophan
- D.* Arginine
- E.* Asparagine

121) In a patient increased protein putrefaction in the intestines was diagnosed. By amount of what substance in the urine the intensity of this process and speed of neutralization reactions of toxic products in the liver may be estimated?

- A.* Indican
- B.* Lactic acid
- C.* Uric acid
- D.* Creatine
- E.* Acetone

122) A child with PKU has an unpleasant murine smell, growth retardation, mental retardation. These symptoms are associated with high concentration of the following substance in blood:

- A.* Phenylpyruvic acid
- B.* Uric acid
- C.* Cholesterol
- D.* Adrenaline
- E.* Glucose

123) Pharmaceutical drug contrikal is used to prevent pancreatic autolysis. What enzymes are inhibited by this drug?

- A.* Protease
- B.* Nucleases
- C.* Synthetase
- D.* Glycosidase
- E.* Lipase

124) Gastric juice analysis has a significant diagnostic value for diseases of the stomach. Which compound is used as a stimulator of gastric juice secretion in clinical diagnostics?

- A.* Histamine
- B.* Thyronine
- C.* Dopamine
- D.* Dioxyphenylalanine
- E.* GABA

125) Synthesis of dopamine in the brain is disturbed in Parkinson's disease. For treatment use the immediate precursor of dopamine, which easily penetrates the blood-brain barrier, namely:

- A.* DOPA
- B.* Tryptophan

- c.* GABA
- d.* Norepinephrine
- e.* Adrenalin

METABOLISM OF CONJUGATED PROTEINS

- 1) A 23-year-old man was diagnosed muscular dystrophy and recommended to use for intensification of the pyrimidine synthesis
 - A. Potassium orotate
 - B. Ascorbic acid
 - C. Lipoic acid
 - D. Cocarboxylase
 - E. Cyanocobalamin

- 2) A patient with ischemic disease of the heart was recommended to use inosine, which is an intermediate metabolite of biosynthesis of:
 - A. Purine nucleotides
 - B. Ketone bodies
 - C. Metalloproteins
 - D. Lipoproteins
 - E. Glycoproteins

- 3) A patient with gout was recommended to use allopurinol – the competitive inhibitor of xanthine oxidase which is the last enzyme of catabolism of:
 - A. Purine nucleotides
 - B. Heteropolysaccharides
 - C. Fatty acids
 - D. Glycoproteins
 - E. Phospholipids

- 4) The patients' urine got a red colour in an open air. The biochemical analysis detected a high protoporphyrine IX excretion, that points to abnormalities of synthesis of:
 - A. Heme
 - B. Purine
 - C. Phospholipids
 - D. Urea
 - E. Amino acids

- 5) Pancreatic nucleases and nucleotidases catalyze the hydrolysis of nucleic acids, mononucleotides and drugs which have in their structure the following chemical bond:
 - A. Phosphodiester bond
 - B. H-bond
 - C. Peptide bond
 - D. Glycosidic bond
 - E. Disulfide bond

6) In the urine of a patient a high level of uric acid was detected. A doctor recommended to use allopurinol. Point the biochemical way of this drug action.

- A. Xanthine oxidase inhibition
- B. Deaminase inhibition
- C. Phospholipase activation
- D. Cyclooxygenase activation
- E. Nucleotidase activation

7) It's known that nonconjugated bilirubin which is formed during the heme degradation is being conjugated in the liver. What organic substance participates in this process?

- A. UDP-glucuronic acid
- B. Urea
- C. Mevalonic acid
- D. Lactic acid
- E. Glycine

8) The end product of purine catabolism is uric acid. Increasing of uric acid level in the organism is the cause of:

- A. Gout
- B. Stomach ulcer
- C. Multiple neuritis
- D. Diabetes mellitus
- E. Hepatitis

9) As a result of abnormality of nucleic acid metabolism the precipitation of some salts in tissues, especially in the joints takes place. That can provoke certain diseases. Point the substance that forms the salts.

- A. Uric acid
- B. Glyoxylate
- C. Urea
- D. Allantoin
- E. Lactic acid

10) In a patient with jaundice the increasing of nonconjugated bilirubin in the blood serum and stercobilin quantity in the faeces and urine were detected. Level of conjugated bilirubin in the blood serum was normal. What type of jaundice takes place in this case?

- A. Hemolytic jaundice
- B. Biliary obstruction
- C. Physiologic jaundice
- D. Jilber's disease
- E. Hepatic jaundice

11) The biosynthesis of purines is realized on ribose-5-phosphate by a step-by-step addition of atoms of nitrogen and carbon forming the purine ring. What process is the supplier of ribose-5-phosphate?

- A. Pentose phosphate pathway
- B. Glycolysis
- C. Gluconeogenesis
- D. Glycogenesis
- E. Citric acid cycle

12) In a child growth inhibition and intellectual development lag were observed. Level of orotic acid in the urine was high. In these conditions there is a need to use:

- A. Cytidine
- B. Adenine
- C. Guanine
- D. Glutamine
- E. ATP

13) A 27-year-old patient went to a doctor with symptoms of jaundice, high temperature and general weakness. It was diagnosed acute viral hepatitis. Which of biochemical indices is prevalent in the peak of jaundice?

- A. Conjugated bilirubin
- B. Stercobilin
- C. Non-conjugated bilirubin
- D. Verdoglobulin
- E. Biliverdin

14) Accumulation of the end product of purine metabolism can provoke gout. What is this end product?

- A. Uric acid
- B. Urea
- C. Stercobilin
- D. Bilirubin
- E. Ammonia

15) In a patient the increasing of a conjugated bilirubin level in the blood serum was observed, the faeces were light-grey; the urine had a colour of beer. The skin and mucous tunics were yellow. What type of jaundice took place in this case?

- A. Biliary obstruction
- B. Hepatic jaundice
- C. Physiologic jaundice
- D. Jilber's disease
- E. Hemolytic jaundice

16) For a gout treatment allopurinol is used. Point the mechanism of this drug action.

- A. Xanthine oxidase inhibition
- B. Deaminase inhibition
- C. Phospholipase activation
- D. Cyclooxygenase activation
- E. Nucleotidase activation

17) The joints of a patient are increased and look like flat strained knots. High levels of uric acid and its salts in the blood serum were observed. What substances metabolism abnormality can provoke this state?

- A. Purines
- B. Porphyrines
- C. Phospholipids
- D. Cholesterol
- E. Pyrimidines

18) In a patient the yellowing of the eyes, mucous tunic and skin were observed. What biochemical index increasing in the blood serum can be expected in this case?

- A. Bilirubin
- B. Glucose
- C. Biliverdin
- D. Amylase
- E. Cholesterol

19) A patient with gout feels ache in the joints. What substance level is increased in the blood and urine of this patient?

- A. Uric acid
- B. Glucose
- C. Allantoin
- D. Xanthine
- E. Hypoxanthine

20) A patient has a biliary obstruction. What compound is present in the urine of this patient?

- A. Bilirubin
- B. Uric acid
- C. Creatinine
- D. Keton bodies
- E. Glucose

21) A 40-year-old man has an ache in the right hypochondrium, the faeces were light-grey. The reason of decolouration of the faeces is the lack of:

- A. Stercobilin

- B. Bilirubin
- C. Urobilin
- D. Hemoglobin
- E. Skatole

22) Bilirubin is a product of heme degradation. What class of blood plasma proteins transfers bilirubin to the liver?

- A. Albumins
- B. LDL
- C. α -Globulins
- D. β -Globulins
- E. HDL

23) For a gout treatment allopurinol – the hypoxanthine analogue - is used. Point the mechanism of this drug action

- A. Xanthine oxidase inhibition
- B. Deaminase inhibition
- C. Phospholipase activation
- D. Cyclooxygenase activation
- E. Nucleotidase activation

24) A patient of age 45 took medical advice with complaints of a pain and foot joint swelling which reinforced before the weather changes. After the blood analysis a marked increase of uric acid concentration has been found. What name has this pathology?

- A. Gout
- B. Stomatitis
- C. Hepatitis
- D. Pellagra
- E. Rachitis

25) In a 38-year-old patient gout was diagnosed. What product of the purine nucleotide metabolism was present in excessive amount in the organism?

- A. Uric acid
- B. Phenylpyruvic acid
- C. Homogentisate
- D. Phenylalanine
- E. Gamma-aminobutyric acid

26) The patient complains on acute pain in the right hypochondrium. When examined, the doctor drew attention to the yellowish sclera of the patient. Laboratory tests showed increased ALT activity and a negative reaction to stercobilin in feces. What disease is characterized by such symptoms?

- A. Cholelithiasis disease
- B. Hemolytic jaundice

- c. Hepatitis
- D. Chronic colitis
- E. Chronic gastritis

27) What type of porphyria such features as: childhood, enlarged spleen, hemolytic anemia, presence of ulcers, scars, skin erythema, increased sensitivity to sunlight, leukocytosis, risen body temperature, red-orange colour of urine, are typical for?

- A. Uroporphyrin (Gunther's disease)
- B. Liver porphyria
- c. Erythropoietic porphyria
- D. Coproporphyrin
- E. Intermittent porphyria

28) Patient 33 years old has been ill for 10 years. Periodically, he complains to a doctor about acute abdominal pain, convulsions, visual impairment. His relatives have similar symptoms. His urine is red. He was hospitalized with a diagnosis: acute intermittent porphyria. The cause of the disease may be a violation of biosynthesis:

- A. Gem
- B. Insulin
- c. Fatty acids
- D. Prostaglandins
- E. Collagen

29) Increased sensitivity of the skin to sunlight, deep skin lesions, contractures are observed in a patient. Hemolytic anemia is also present. Being exposed to the air, urine turns dark red. What cause is most likely to stipulate such state?

- A. Porphyria
- B. Alkaptonuria
- c. Hemolytic jaundice
- D. Albinism
- E. Pellagra

30) A 43-year-old woman – a worker at paint and varnish enterprise – complains of total weakness, loss of body weight, apathy, drowsiness. Chronic lead intoxication was confirmed in a laboratory. Hypochromic anemia was revealed. There was an increased level of protoporphyrin and a decreased content of δ -aminolevulinic acid in the blood. The latter witnesses that there is a pathology of synthesis of:

- A. Heme
- B. DNA
- c. RNA
- D. Protein
- E. Mevalonic acid

31) In premature neonates a nuclear jaundice is often observed. It's because such

neonates have insufficient process of:

- A. Bilirubin detoxification
- B. Heme biosynthesis
- C. Gluconeogenesis
- D. Breakdown of hemoglobin
- E. Erythropoiesis

32) Allopurinol, a hypoxanthine analogue, is used during gout treatment to inhibit the uric acid formation. How does this compound act?

- A. Inhibits xanthine oxidase
- B. Inhibits adenosine deaminase
- C. Activates xanthine oxidase
- D. Activates adenosine deaminase
- E. Interacts with hypoxanthine

33) Mechanism of toxic compound and drug neutralization in early childhood is not completely developed. Activity of an enzyme which takes part in neutralization of toxic compounds in children is 4 times lower than in adults. Name this enzyme:

- A. Glucuronyl transferase
- B. ALT
- C. AST
- D. Creatine phosphokinase
- E. LDH 1

34) Intestinal dysbiosis caused by a long-term tetracyclic antibiotic treatment is accompanied by some abnormalities of bile pigment metabolism. Under such conditions a growth of normal microflora in the intestine is oppressed. The microflora are to:

- A. Reduce bilirubin to stercobilinogen
- B. Oxidize bilirubin to stercobilinogen
- C. Reduce stercobilinogen to stercobilin
- D. Oxidize stercobilinogen to stercobilin
- E. Oxidize urobilinogen to stercobilinogen

35) Uric acid is the final metabolite of intracellular metabolism of nucleotides and is excreted from the body. What particular nucleotides decompose into uric acid?

- A. AMP, GMP
- B. only AMP
- C. only GMP
- D. UMP and CMP
- E. only CMP

36) In a 32-year-old patient a yellowing of the skin and sclera, and a decolouration of faeces and urine is observed. At biochemical analysis of blood plasma an increase of total bilirubin (direct bilirubin has risen) was ascertained. What type of

jaundice has developed in this patient?

- A. Post-hepatic (obstructive) jaundice
- B. Hepatic (parenchymal) jaundice
- C. Prehepatic (hemolytic) jaundice
- D. Enzymatic (inherited) jaundice
- E. Physiological jaundice

37) Ten-year-old boy has been diagnosed with elevated plasma level of uric acid and insufficiency of the enzyme xanthine oxidase. What substances will accumulate in the patient's body?

- A. Xanthin, hypoxanthine
- B. Adenine guanine
- C. Cytolzin, uracid
- D. Cytosine, thymine
- E. Adenine, thymine

38) To a patient who was diagnosed with viral conjunctivitis a doctor prescribed eye drops which contained:

- A. DNA-ase
- B. RNA-ase
- C. Trypsin
- D. Penicillin
- E. Streptocid

39) It is known that bilirubin which is produced during heme degradation, being detoxified in the liver. What enzyme takes part in the detoxification of bilirubin in hepatocytes?

- A. UDP-glucuronyltransferase
- B. Acetylcholinesterase
- C. Cytochrome oxidase
- D. Cytochrome P-450
- E. Monoamine oxidase

40) What compound concentration increases in urine under viral hepatitis?

- A. Direct bilirubin
- B. Indirect bilirubin
- C. ALT
- D. AST
- E. Co-synthase

41) What biochemical alterations in the blood of patients diagnosed with acute viral hepatitis are observed on the peak of disease?

- A. Increase of aminotransferase activity
- B. Little decrease of aminotransferase activity
- C. Big decrease of aminotransferase activity

- D. Decrease of alkaline phosphatase activity
- E. Decline in bilirubin in blood & urine

42) Choose a liver enzyme which catalyzes the reaction of conversion of indirect bilirubin into direct one:

- A. UDP-glucuronyltransferase
- B. Glucose-6-phosphatase
- C. Aldolase
- D. DNA-related RNA-polymerase
- E. PAPS-skatoxyltransferase

43) δ -Aminolaevulinate synthase – a regulatory enzyme of hemoglobin biosynthesis. Which compound from the listed below is an inhibitor of this enzyme?

- A. Heme of hemoglobin
- B. Glycine
- C. Succinyl-CoA
- D. δ -Aminolaevulinic acid
- E. Metal ions

44) In medical practice derivatives of 4-aminoquinoline (hingamin, delagil) are used. These derivatives block enzyme systems of the reticuloendothelial cells. What substances biosynthesis do they inhibit?

- A. Glycosaminoglycans and nucleic acids
- B. Proteins and nucleic acids
- C. Lipids and proteins
- D. Glucose and lipids
- E. Nucleic acids and glycogen

45) A patient supposed to have an inherited enzymopathy. At laboratory examination the deficiency of UDP-glucuronyltransferase was revealed. This deficiency was accompanied by:

- A. Hyperbilirubinemia
- B. Indicanuria
- C. Phenylketonuria
- D. Ketoacidosis
- E. Uremia

46) A patient visited a doctor with complaints of severe pain in the joints. Urine analysis revealed an increased level of uric acid that specified of:

- A. Intensive degradation of purine nucleotides
- B. Increased activity of adenylate deaminase in the brain
- C. Increased activity of adenylate deaminase in muscles
- D. Increased activity of adenosine deaminase in the brain
- E. Increased activity of adenosine deaminase in muscles

47) Ferrum is liberated from hemoglobin during its catabolism. Then it returns to bone marrow and is again used for hemoglobin biosynthesis. What transport protein ferrum is transported in complex with?

- A. Transferrin
- B. Ceruloplasmin
- C. Albumin
- D. Haptoglobin
- E. Transcobalamin

48) A 43-year-old patient has an obstruction of common bile duct. What substance from the listed below appears in urine under such conditions?

- A. Bilirubin
- B. Creatinine
- C. Ketone bodies
- D. Glucose
- E. Uric acid

49) A patient was diagnosed with a tumor of the head of pancreas. That was accompanied by a disorder of common bile duct passability. What compound content will rise in the blood under such pathology?

- A. Bilirubin
- B. Urea
- C. Insulin
- D. Adrenaline
- E. Hemoglobin

50) The patient, who was poisoned mushrooms, the following symptoms developed: yellow coloring of the skin and sclera, dark urine. Hemolytic jaundice was diagnosed. What pigment does cause such color of the patient urine?

- A. Stercobilin
- B. Biliverdyn
- C. Free bilirubin
- D. Verdohemohlobin
- E. Direct bilirubin

51) In the newborn child due to Rh conflict hemolytic jaundice arose. The contents of which bile pigment will be increased in the blood of this child?

- A. Indirect bilirubin
- B. Direct bilirubin
- C. Urobilinogen
- D. Sterkobilinohen
- E. Bile acids

52) The collapse of adenosine nucleotides leads to the release of ammonia. What

enzyme plays an important role in the formation of ammonia in these compounds?

- A. Adenosine deaminase
- B. Alanine transaminases
- C. Alcohol dehydrogenase
- D. Amylase
- E. Lactate dehydrogenase

53) In the case of porphyria, porphyrins and porphyrinogens are accumulated and released from the body. Synthesis of which compound is broken in this pathology?

- A. Heme
- B. Triglycerides
- C. Cholesterol
- D. Urea
- E. Glucose

54) The patient's joints are deformed as a result of inflammation, hyperuricemia is revealed in the blood test. What disease is most likely in this patient?

- A. Gout
- B. Scurvy
- C. Atherosclerosis
- D. Pellagra
- E. Rheumatism

55) A 60-years-old man turned to a doctor with complaints of acute pain in his thumbs. He often uses beer. There was a suspicion of gout. The content of which of the following substances should be determined in the blood of confirmation of the diagnosis?

- A. Uric acid
- B. Ketone bodies
- C. Bilirubin
- D. Urea
- E. Lactate

56) A patient complains of pain in the small joints. High concentration of uric acid is detected in his blood plasma. What pathology causes such changes?

- A. Gout
- B. Diabetes mellitus
- C. Phenylketonuria
- D. Lesch-Nyhan syndrome
- E. Diabetes insipidus

57) A man came to hospital with an acute gout attack. The content of uric acid in the patient's blood serum is highly increased, and daily amount of this compound in the urine is elevated. What enzyme activity change leads to this pathology?

- A. Xanthine oxidase

- B.* Alanine aminotransferase
- C.* Glycogen synthase
- D.* Glucose-6-phosphatase
- E.* Lactate dehydrogenase

58) A patient undergoes chemotherapy with 5-fluorouracil that is a competitive inhibitor of thymidilate synthase. What process is inhibited by this drug?

- A.* Thymidine monophosphate synthesis
- B.* Purine nucleotides disintegration
- C.* Adenosine triphosphate synthesis
- D.* Purine nucleotides salvage
- E.* Glucose synthesis

59) Detoxication rate is 4 times lower in children than in adults. What enzyme necessary for toxic compounds conjugation has low activity in children?

- A.* Glucuronosyltransferase
- B.* ALAT
- C.* AspAT
- D.* Creatine phosphokinase
- E.* LDH1

PROTEIN BIOSYNTHESIS

- 1) A consumptive patient was prescribed rifampicin that inhibits an enzyme RNA-polymerase at the initiation stage of the process of
 - A. Transcription
 - B. Translation
 - C. Replication
 - D. Reparation
 - E. Amplification

- 2) Hereditary information is determined by the nucleotide order in DNA. Point what process directly provides realization of the hereditary information into a polypeptide chain:
 - A. Translation
 - B. Replication
 - C. Transformation
 - D. Translocation
 - E. Transcription

- 3) One codon from 64 triplets that code amino acids is an initiation codon which codes the amino acid methionine. Point this triplet:
 - A. AUG
 - B. UCG
 - C. GGU
 - D. GAC
 - E. CAU

- 4) DNA-polymerase creates the Okazaki fragments on the “replication fork” lagging strand. Point enzyme that joins these fragments into one chain:
 - A. DNA-ligase
 - B. Primase
 - C. Exonuclease
 - D. RNA-polymerase
 - E. DNA-polymerase

- 5) A large group of antibiotics, which are used in medicine, inhibits nucleic acid and protein synthesis. What specific processes from the following is inhibited by actinomycin?
 - A. Transcription in prokaryotes and eukaryotes
 - B. Transcription initiation in prokaryotes
 - C. Translation initiation in prokaryotes
 - D. Peptidyltransferase reaction of translation
 - E. Polypeptide chain elongation in prokaryotes and eukaryotes

- 6) Replication is one of the types of hereditary information transfer. Point the

enzyme that takes part in joining of separate fragments during the replication:

- A. DNA-ligase
- B. DNA-polymerase-1
- C. DNA-polymerase -2
- D. DNA-polymerase-3
- E. Ribonuclease H

7) Medicine rifampicin is used as an antituberculous and antibacterial preparation. What biochemical process does it influence on?

- A. Inhibits RNA-polymerase at the initiation stage
- B. Inhibits DNA-ligase
- C. Blocks aminoacyl-tRNA synthetase activity
- D. Inhibits DNA-polymerase
- E. Blocks effect of the protein synthesis protein factors

8) AIDS virus RNA penetrated inside the leucocyte and with the help of revertase (reverse transcriptase) causes a virus DNA synthesis in the cell. The base of this process is:

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

9) A 58-year-old man underwent the operation for removal of prostate (gland) cancer. In 3 months he took the course of a radical and chemotherapy. 5-Fluorodeoxyuridine (thymidylate synthase inhibitor) was included to the medical preparation complex. Synthesis of what compound was blocked by this preparation?

- A. DNA
- B. rRNA
- C. tRNA
- D. iRNA
- E. Protein

10) Antibiotics (streptomycin, neomycin, canomycin) are used at bacterial intoxications. What stage of the microbe cell protein biosynthesis do they affect on?

- A. Translation
- B. Processing
- C. Transport of RNA
- D. Transcription
- E. Replication

11) Development of gene isolation methods and creating of their new combinations

became a new biochemical achievement in genetic researches. For the joining of DNA chains that were isolated from different organisms an enzyme is used:

- A. Restriction endonuclease
- B. Lyase
- C. Synthetase
- D. Helicase
- E. Transferase

12) A large group of antibiotics, which are used in medicine, inhibits a nucleic acid and protein synthesis. What specific process or reaction from the following is inhibited by erythromycin?

- A. Ribosome translocation on mRNA in prokaryotes and eukaryotes
- B. Transcription initiation in prokaryotes
- C. Peptidyltransferase reaction of the translation in prokaryotes
- D. Aminoacyl-tRNA binding to the ribosome A site in prokaryotes
- E. Transcription in prokaryotes and eukaryotes

13) A patient with cancerous growth was prescribed fluorouracyl which was a competitive inhibitor of thymidylate synthase. What process is inhibited by this preparation?

- A. Pyrimidine nucleotide synthesis
- B. Lipid synthesis
- C. Carbohydrate catabolism
- D. Purine nucleotide synthesis
- E. Purine nucleotide catabolism

14) In genetic engineering the way of synthesis of different genes from a RNA matrix chain to DNA is carried out with the help of the following enzyme (this enzyme catalyzes the process found in RNA-containing viruses):

- A. Revertase
- B. Helicase
- C. Exonuclease
- D. DNA- ligase
- E. Endonuclease

15) Complementary RNA transcript biosynthesis on the DNA matrix chain occurs in the cell nucleus during the process of transcription. What enzyme catalyzes this process?

- A. RNA-polymerase
- B. Primase
- C. DNA-ligase
- D. DNA-polymerase
- E. DNA-ase

16) Oncogenic viruses use a reverse transcription for a transfer of their information from RNA to DNA. Point an enzyme with the help of which a hybrid of RNA-DNA is synthesized:

- A. Reverse transcriptase (revertase)
- B. DNA- synthetase
- C. RNA-polymerase
- D. Transcriptase
- E. Ribonuclease

17) Protein synthesis in prokaryotes takes place on ribosomes after the amino acid activation and their transportation to ribosomes with the help of t-RNAs. Point, what amino acid is the first in the biosynthesis?

- A. Formylmethionine
- B. Valine
- C. Serine
- D. Glycine
- E. Cysteine

18) Anticancer preparation 5-fluorouracyl is a competitive inhibitor of the enzymes that take part in the DNA synthesis. Point, what enzyme is blocked in this process?

- A. Thymidine synthetase
- B. Guanosine synthetase
- C. Uracyl synthetase
- D. Adenine synthetase
- E. Cytosine synthetase

19) A patient with a cancerous growth has been administered chemotherapy by cytostatics. What is the mechanism of these preparations' action?

- A. Inhibit thymidine monophosphate synthesis
- B. Block MAO (monoamine oxidase) action
- C. Inhibit proteolytic enzymes
- D. Inhibit enzymes by allosteric mechanism
- E. Initiate denaturation of enzymes

20) A noticeable decrease of aminoacyl-tRNA-synthetase activity in the hepatocytes was obtained under prolonged intoxication of animals by tetrachlormethane. What metabolic process is affected in this case?

- A. Protein biosynthesis
- B. DNA replication
- C. RNA transcription
- D. Posttranslational modification of peptides
- E. Posttranscriptional modification of RNA

21) Delay of malignant tumor cell division occurs under the influence of preparations that block the dTMP synthesis, inhibiting thymidylate synthase.

Choose a compound which can have such influence.

- A. 5-Fluorouracyl
- B. Thymine
- C. Hypoxanthine
- D. Dihydroorotic acid
- E. Adenylosuccinate

22) In the second stage of elongation a peptide bond is formed in the A site where a second amino acyl-tRNA is situated. N-formylmethionine is transformed to the A site from the P site. Point, what enzyme's assistance the first peptide bond is formed with?

- A. Peptidyl transferase
- B. Translocase
- C. Synthetase
- D. RNA polymerase
- E. DNA polymerase

23) Under occasional usage of mushrooms (death-cup), which contain a venom – α -amanitin, poisoning of the human organism occurs. Point, what enzyme is inhibited by this venom?

- A. RNA polymerase II
- B. DNA polymerase
- C. DNA synthetase
- D. Peptidyl transferase
- E. Translocase

24) Nucleic acids ensure safety and transmission to heirs of the inherited information and the mechanism of its realization. What nucleic acid carries the information about quantity and order of the amino acid residue arrangement in a protein molecule?

- A. mRNA
- B. tRNA
- C. 28S rRNA
- D. 18S rRNA
- E. ln RNA

25) In the recognition process reactions of amino acid activation and their joining to a specific tRNA are catalyzed by the same enzyme. Point this enzyme.

- A. Aminoacyl-tRNA synthetase
- B. Ribonuclease
- C. DNA ligase
- D. Nucleotidase
- E. Deoxyribonuclease

26) A newly synthesized organic compound specifically oppresses the reverse

transcriptase activity. What pharmacological action is most probable to this compound?

- A. Antiviral
- B. Antimicrobial
- C. Antitumoral
- D. Immunosuppressive
- E. Radioprotectoral

27) Interferon is often prescribed in case of respiratory viral infection. What biochemical process violates interferon?

- A. Translation
- B. Translocation
- C. Synthesis of DNA
- D. Citric acid cycle (CAC)
- E. Glycolysis

28) Antiviral antibiotics block the main enzyme of transcription. Name it

- A. DNA-dependent RNA polymerase
- B. DNase
- C. DNA ligase
- D. RNA-dependent RNA polymerase
- E. DNA polymerase

29) The infected person is tetracycline. What is the mechanism of its antibacterial action?

- A. Inhibits the translation process on ribosomes
- B. Inhibits the synthesis of rRNA
- C. It inhibits DNA transcription
- D. Inhibits reverse transcription
- E. It inhibits DNA replication

30) What enzymes are inactivated by antibiotic actinomycin D?

- A. DNA-dependent RNA polymerase
- B. RNA replicase
- C. Revertase
- D. DNA polymerase
- E. Polynucleotide phosphorylase

31) The anticodon is necessary to translate the "language" of the genetic code into the amino acid sequence of the protein chain. The anticodon is in:

- A. Transport RNA
- B. Matrix RNA
- C. Nuclear DNA
- D. Mitochondrial DNA
- E. Ribosomal RNA

32) During the viral infections body is synthesizing the protective protein - interferon. One of the mechanisms of antiviral action of interferon is:

- A. Inhibition of protein biosynthesis
- B. stimulation of protein biosynthesis
- C. Inhibition of replication
- D. Stimulation of processing
- E. Inhibition of transcription

33) Interferons belong to natural antineoplastic agents. What activity the mechanism of their anticancer action is fulfilled through?

- A. Inhibition of protein biosynthesis
- B. Protein biosynthesis activation
- C. Replication process activation
- D. Transcription slowdown
- E. DNA restoration

34) It is known that same amino acids are encoded by the same nucleotide triplets in animals, microorganisms and plants. What is the name of such peculiarity of the genetic code?

- A. Universality
- B. Triplet arrangement
- C. Degeneracy
- D. Continuity
- E. Unidirectionality

35) It is known that to all amino acids except methionine and tryptophan, more than one codon does correspond. What is the name of such peculiarity of the genetic code?

- A. Degeneracy
- B. Universality
- C. Line arrangement
- D. Triplet arrangement
- E. Unidirectionality

36) DNA polymerases that take part in DNA replication are not capable to start synthesis of a new strand of DNA without RNA-primer. What enzyme is needed for its (primer) synthesis?

- A. Primase
- B. DNA-ligase
- C. Helicase
- D. DNA-polymerase I
- E. Gyrase

37) Eukaryotic messenger RNAs are synthesized as inactive predecessors then

being converted in biologically active RNA molecules due to maturation, or processing. What will appear after that in the structure of mature information RNA?

- A. Poly-A nucleotide sequence on 3'-end
- B. Additional introns
- C. Anticodon loop
- D. Additional exons
- E. Triplet CCA on 5'-end

38) Enzyme biosynthesis in bacteria is regulated on the level of transcription due to changes in their mRNA production rate. Name the authors of the “operon” theory.

- A. F. Jacob, J. Monod
- B. L. Michaelis, M. Menten
- C. J. Watson, F. Crick
- D. S. Stinger, G. Nickelson
- E. W. Baylis, E. Starling

39) DNA replication is not perfect. One mistake appears per every 10^4 - 10^5 nucleotides. However there is an enzyme in the nucleus that cuts out incorrectly added nucleotides and inserts correct ones. What enzyme controls and corrects DNA?

- A. DNA-polymerase III
- B. DNA-polymerase I
- C. DNA-gyrase
- D. DNA-ligase
- E. RNA-polymerase

40) In a patient who suffered from diabetes mellitus a wound did not cicatrize after operation for a long time. This fact specifies of abnormality in tissue trophism. What disbalance is a basis for such abnormality?

- A. Protein biosynthesis impairment
- B. Hyperglycemia
- C. Ketonemia
- D. Increased catabolism of lipids
- E. Anemia

41) For the formation of amino acid transport form for protein biosynthesis on ribosomes it is necessary to be present:

- A. Aminoacyl-tRNA synthetase
- B. GTP
- C. mRNA
- D. Ribosome
- E. Revertase

42) Detoxification of heavy metals on molecular level in the human organism is

the consequence of:

- A. Metallothionein gene amplification
- B. Microsomal oxidation
- C. Formation of a complex with the active form of glucuronic acid
- D. Formation of a complex with the active form of sulfuric acid
- E. Interactions with hepatocuprein

43) Mechanism of antiviral and antineoplastic action of interferons is connected with the influence on the process of:

- A. Initiation of protein biosynthesis
- B. Elongation of protein biosynthesis
- C. Termination of protein biosynthesis
- D. DNA biosynthesis
- E. RNA biosynthesis

44) In diagnostics of HIV-infection a method of polymerase chain reaction (PCR) is used. What is the PCR method based on?

- A. Gene amplification
- B. Gene recombination
- C. Transcription
- D. Translation
- E. Genome cutting

45) Streptomycin and other aminoglycosides, binding to the 30S-ribosome subunit, prevent joining formylmethionin-tRNA. What process is disrupted due to this effect?

- A. Initiation of translation
- B. Termination of translation
- C. Initiation of transcription
- D. Termination of transcription
- E. Initiation of replication

46) There's a reaction successfully used for rapid diagnosis of many bacterial, viral, protozoan and fungal diseases, the identification of pathogens in the environment, food and water.

Its principle is the multiple replication of a specific region of DNA or a separate gene with the enzyme DNA polymerase. Name this reaction.

- A. Polymerase chain reaction
- B. Reaction of enzyme-labeled antibodies
- C. Immunofluorescence reaction
- D. Radioimmunoassay
- E. Immunoenzyme analysis