

THE MINISTRY OF HEALTH OF UKRAINE
ZAPORIZHZHYA STATE MEDICAL UNIVERSITY

BIOCHEMISTRY & LABORATORY DIAGNOSTICS DEPARTMENT

MCQs in BIOCHEMISTRY

for preparation to test lesson for

MODULE 2. SUBMODULE 4: Biochemistry of
vitamins. Functional biochemistry of organs
and tissues. Biochemical indexes of blood and
urine in diagnostics of metabolic disorders

FOR STUDENTS OF INTERNATIONAL FACULTY
SPECIALTY: 7.12010001 "GENERAL MEDICINE"

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The collected tests is recommended to use for students of international faculty (the second year of study) for independent work at home and in class.

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Вступ

Збірник тестів “MCQs in biochemistry” був складений викладачами кафедри для використання іноземними студентами 2 курсу міжнародного факультету, які вивчають біохімію англійською мовою. Цей збірник містить різноманітні тестові завдання з усіх тем, що включені у змістові модулі 8, 9 та 10 модулю 2 робочої програми навчальної дисципліни «Біологічна хімія» спеціальність 7.12010001 “Лікувальна справа”. Він може бути використаний студентами у самостійній роботі під час підготовки до кожного із занять (тести розділені за заняттями), до контролю засвоєння субмодулю 4 та до підсумкового контролю засвоєння модулю 2.

За допомогою тестового матеріалу студенти мають змогу більш поглиблено освоювати тему, що вивчають, здійснювати самоконтроль, у разі виявлення незрозумілих для студента питань, звернутися за допомогою до викладача на практичному занятті. Як результат такої форми роботи, студент є добре підготовленим до підсумкового контролю з модулю, до комплексного іспиту та до ліцензійного іспиту «Крок 1»

Preface

This book has been compiled with main aim to help the II year students of International Faculty to prepare in systematic way to control testing on submodule 4 of module 2. It contains more than 304 original MCQs.

The book is well balanced and consists of multiple choice questions from all the important topics like: the role of vitamins in the metabolic processes of humans; biochemistry of muscular, connective and nervous tissues, xenobiotics metabolism and other important biochemical aspects.

This book is recommended to all the students preparing for each class and control testing on submodule 4 of module 2.

Module 2

Molecular Biology. Biochemistry of cell-to-cell interactions, of tissues and physiological functions

Submodule 4

Biochemistry of vitamins. Functional biochemistry of organs and tissues. Biochemical indexes of blood and urine in diagnostics of metabolic disorders

Lesson 10. The role of water-soluble vitamins in the metabolism of humans. Vitamin similar substances

1. Choose the correct definition of vitamin:
 - A. Essential food proteins
 - B. Food factors that cannot be synthesized in human organism
 - C. Essential biologic amines
 - D. Organic compounds, containing amino group
 - E. Essential energy sources
2. Choose the vitamin, whose oxidation results in blue fluorescing product under UV-light:
 - A. Pyridoxine
 - B. Rutin
 - C. Thiamine
 - D. Folic acid
 - E. Ascorbic acid
3. Choose the vitamin that contains the isoalloxazine fragment in its structure:
 - A. Thiamine
 - B. Riboflavin
 - C. Pyridoxine
 - D. Ubiquinone
 - E. Naphtoquinone
4. Point out the vitamin, whose deficiency leads to pellagra:
 - A. Vitamin P
 - B. Vitamin A
 - C. Vitamin C
 - D. Vitamin B₃
 - E. Vitamin B₂
5. Name the metabolic pathway which is in need for vitamins B₁, B₂, B₃, B₅ supplement at the same time:
 - A. Pentose Phosphate Cycle
 - B. Glycolysis
 - C. Urea Cycle

- D. Krebs Cycle
 - E. Glycogenesis
6. Find out the enzyme name whose activity is depended on the presence of vitamin B₂:
- A. Pyruvate carboxylase
 - B. Succinate dehydrogenase
 - C. Malate dehydrogenase
 - D. Isocitrate dehydrogenase
 - E. Citrate synthase
7. The avitaminosis of ascorbic acid is named as:
- A. Cushing`s syndrome
 - B. Addison`s disease
 - C. Kwashiorkor
 - D. Hemolytic anemia
 - E. Scurvy
8. Propose the main food product to promote the intake of vitamin C:
- A. Parsley
 - B. Black currant
 - C. Beef
 - D. Milk
 - E. Butter
9. Find out the vitamin whose deficiency is associated with disturbed transamination of amino acids:
- A. Pyridoxine
 - B. Rutin
 - C. Thiamine
 - D. Folic acid
 - E. Ascorbic acid
10. The glycolysis duration is in need for one vitamin, only. Name it:
- A. Pyridoxal phosphate
 - B. Riboflavin
 - C. Thiamine
 - D. Nicotinic acid
 - E. Ascorbic acid

11. Examination of a patient with frequent hemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagen fibers. What vitamin absence caused disturbance of their hydroxylation?
- A. Vitamin A
 - B. Thiamine
 - C. Vitamin K
 - D. Vitamin E
 - E. Vitamin C
12. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beri-beri). What vitamin deficit results in development of this disease?
- A. Folic acid
 - B. Thiamine
 - C. Ascorbic acid
 - D. Riboflavin
 - E. Pyridoxine
13. Most participants of Magellan expedition to America died from avitaminosis. This disease declared itself by general weakness, subcutaneous hemorrhages, falling of teeth, gingival hemorrhages. What is the name of this avitaminosis?
- A. Biermer's anemia
 - B. Polyneuritis (beri-beri)
 - C. Pellagra
 - D. Rachitis
 - E. Scurvy
14. Pyruvate concentration in the patient's urine has increased 10 times from normal amount. What vitamin deficiency can be the reason of this change:
- A. Vitamin B₆
 - B. Vitamin A
 - C. Vitamin E
 - D. Vitamin C
 - E. Vitamin B₁

15. Hydroxylation of endogenous substrates and xenobiotics requires a donor of protons. Which of the following vitamins can play this role?
- A. Vitamin C
 - B. Vitamin E
 - C. Vitamin P
 - D. Vitamin A
 - E. Vitamin B₆
16. A 10-year-old girl often experiences acute respiratory infections with multiple hemorrhages in the places of clothes friction. Hypovitaminosis of what vitamin is in this girl organism?
- A. A
 - B. B₂
 - C. B₁
 - D. B₆
 - E. C
17. A 9-month-old infant is fed with artificial formulas with unbalanced vitamin B₆ concentration. The infant presents with pellagra dermatitis, convulsions, anaemia. Convulsions development might be caused by the disturbed formation of:
- A. Dopamine
 - B. Histamine
 - C. Serotonin
 - D. DOPA
 - E. GABA
18. A 20-year old male patient complains of general weakness, rapid fatigability, irritability, decreased performance, bleeding gums, petechiae on the skin. What vitamin deficiency may be caused of these changes?
- A. Riboflavin
 - B. Ascorbic acid
 - C. Retinol
 - D. Thiamine
 - E. Folic acid

19. A number of disorders can be diagnosed by evaluation activity of blood transaminases. What vitamin is one of cofactors for these enzymes?
- A. B₆
 - B. B₁
 - C. B₅
 - D. B₂
 - E. B₈
20. Symptoms of pellagra (vitamin PP deficiency) is particularly pronounced in patients with low protein diet, because nicotine amide precursor in humans is one of the essential amino acids, namely:
- A. Lysine
 - B. Threonine
 - C. Tryptophan
 - D. Arginine
 - E. Histidine
21. A 36-year-old female patient has a history of B₂-hypovitaminosis. The most likely cause of specific symptoms (epithelial, mucosa, cutaneous, corneal lesions) is the deficiency of:
- A. Cytochrome oxidase
 - B. Cytochrome B
 - C. Cytochrome A1
 - D. Cytochrome C
 - E. FAD or FMN
22. A patient is diagnosed with chronic atrophic gastritis attended by deficiency of Castle's (intrinsic) factor. What type of anemia does the patient have?
- A. B₁₂-deficiency anemia
 - B. Iron-deficiency anemia
 - C. Hemolytic anemia
 - D. Protein-deficiency anemia
 - E. Iron refractory anemia
23. The water-soluble vitamins are, in most cases:
- A. Coenzymes in enzyme systems or precursors of coenzymes

- B Steroids
 - C Components of blood coagulation system
 - D A storage form of metabolic fuel
 - E A transport form of metabolic fuel
24. Vitamin C is in need for certain type of reaction. Choose it.
- A. Carboxylation
 - B. Dehydrogenation
 - C. Hydroxylation
 - D. One-carbon transfer
 - E. Transamination
25. Which of the following vitamins requires the intrinsic factor for absorption?
- A. Folic acid
 - B. Vitamin B₁₂
 - C. Vitamin C
 - D. Vitamin E
 - E. Vitamin K
26. Choose the vitamin which is important in non-oxidative decarboxylation, transamination and transsulfuration reactions from the following list:
- A. Riboflavin
 - B. Thiamine
 - C. Pyridoxine
 - D. Pantothenic acid
 - E. Folic acid
27. Point out vitamin which is the most indispensable during mitosis:
- A. Folic acid
 - B. Pantotenic acid
 - C. Ascorbinic acid
 - D. Aspartic acid
 - E. Thiamine
28. Which vitamin is related to cofactor in glycine metabolism?
- A. Tocopherol
 - B. Folic acid
 - C. Thiamine

- D. Cobalamin
 - E. Pantothenic acid
29. What vitamin takes part in flavoprotein formation?
- A. Vitamin B₆
 - B. Vitamin B₂
 - C. Vitamin B₁
 - D. Vitamin A
 - E. Vitamin PP
30. Point out the vitamin that is essential for transamination:
- A. B₁
 - B. B₂
 - C. B₆
 - D. B₁₂
 - E. B₉
31. Choose the most stored form of vitamin B₁₂ in human body:
- A. Methyl cobalamin
 - B. Hydroxy cobalamin
 - C. Cobalamin polymer
 - D. Cyanocobalamin
 - E. Carboxy cobalamin
32. Wernicke's encephalopathy (Korsakoff's syndrome) develops due to the deficiency of one vitamin. Name it:
- A. Niacin
 - B. Cyanocobalamin
 - C. Pantothenic acid
 - D. Riboflavin
 - E. Thiamine
33. Point out vitamin that is necessary for Coenzyme A synthesis:
- A. Pantothenic acid
 - B. Ascorbic acid
 - C. Pyridoxine
 - D. Biotin
 - E. Riboflavin
34. Point out the enzyme which doesn't contain biotin as coenzyme:
- A. Propionyl-CoA carboxylase

- B. Pyruvate carboxylase
- C. Pyruvate dehydrogenase
- D. Acetyl-CoA carboxylase
- E. Answers B and C are correct

35 Thiamine is essential for one enzyme from list placed below. Point out it:

- A. Pyruvate dehydrogenase
- B. Isocitrate dehydrogenase
- C. Succinate dehydrogenase
- D. Acetyl CoA synthetase
- E. Lactate dehydrogenase

36. Pantothenic acid is necessary for formation of one coenzyme. Point out it.

- A. NAD^+
- B. NADP^+
- C. FAD
- D. Pyridoxal phosphate
- E. CoASH

37. Severe deficiency of thiamine in human causes one disease. Point out it:

- A. Beri Beri
- B. Scurvy
- C. Night blindness
- D. Rickets
- E. Thrombosis

38. Choose the vitamin required for carboxylation reactions in human tissues:

- A. Vitamin B_2
- B. Vitamin B_6
- C. Vitamin H
- D. Vitamin B_{12}
- E. Vitamin K

39. Which enzyme activity is measured in diagnostic of Beri-beri?

- A. Transketolase
- B. Glucose-6-phosphste dehydrogenase

- C. Alanine transaminase
 - D. Deaminase
 - E. Glutamate decarboxylase
40. People eating only maize as staple diet develop vitamin PP deficiency due to low content in maize of:
- A. Niacin
 - B. Leucine
 - C. Tryptophan
 - D. Isoleucine
 - E. Positions A & C are right
41. Point out the place for vitamin B₁₂ and folic acid absorption:
- A. Duodenum
 - B. Jejunum
 - C. Ileum
 - D. Colon
 - E. Esophagus
42. Point out the place of intrinsic factor production (used for vitamin B₁₂ absorption):
- A. Terminal ileum
 - B. Lower jejunum
 - C. Stomach
 - D. Duodenum
 - E. Proximal ileum
43. Point out the function for vitamin C:
- A. Coenzyme in the synthesis of clotting factors
 - B. Coenzyme for enzymes of post translational modification of procollagen
 - C. Anticoagulant
 - D. The component of electron transport chain in mitochondria
 - E. Coenzyme for beta-oxidation of HFA

Lesson 11. The role of fat-soluble vitamins in the metabolism of humans. Antivitamins

1. Point out the vitamin, which is soluble in lipids:
 - A. Vitamin C
 - B. Vitamin B₁
 - C. Vitamin PP
 - D. Vitamin K
 - E. Vitamin H
2. Choose the vitamin, whose precursor is named as b-carotene:
 - A. Vitamin C
 - B. Vitamin D
 - C. Vitamin A
 - D. Vitamin B₁₂
 - E. Vitamin P
3. Choose the vitamin, whose molecule structure is unsaturated cyclic alcohol (one hydroxide-group only):
 - A. Vitamin K
 - B. Vitamin F
 - C. Vitamin B₅
 - D. Vitamin D₂
 - E. Vitamin H
4. Choose the vitamin, whose antivitamin is named as Dicoumarol:
 - A. Vitamin A
 - B. Vitamin B₆
 - C. Vitamin C
 - D. Vitamin D
 - E. Vitamin K
5. Choose the vitamin, whose deficiency leads to osteomalacia at adults:
 - A. Vitamin C
 - B. Vitamin E
 - C. Vitamin D
 - D. Vitamin K

- E. Vitamin PP
6. Choose the vitamin, which is a powerful natural antioxidant:
- A. Retinal
 - B. Tocopherol
 - C. Ergocalciferol
 - D. Riboflavin
 - E. Pyridoxine
7. Name the blood plasma index whose low value will prove the deficiency of vitamin K in patient:
- A. Urea
 - B. Albumins
 - C. Immunoglobulin G
 - D. Prothrombin
 - E. C-reactive protein
8. Name the active form of vitamin whose level in the blood is depended on the secretion rate of parathyroid hormone:
- A. Ascorbic acid
 - B. Calcitriol
 - C. Thiamine
 - D. Tocopherol
 - E. Naphtoquinone
9. Find out the fat-soluble vitamin whose function is hormone-similar one:
- A. Vitamin C
 - B. Vitamin E
 - C. Vitamin D
 - D. Vitamin K
 - E. Vitamin PP
10. Vitamin A group contains substance whose function is associated mainly with stimulation of proliferation and differentiation processes in tissues. Name it:
- A. Retinal
 - B. Pantothenic acid
 - C. Retinoic acid
 - D. Nicotinic acid

- E. Nicotine amide
11. A patient suffers from vision impairment – hemeralopia (night blindness). What vitamin preparation should be administered the patient in order to restore his vision?
- A. Pyridoxine
 - B. Retinol acetate
 - C. Vicasol
 - D. Thiamine chloride
 - E. Tocopherol acetate
12. There is disturbed process of Ca^{2+} absorption through intestinal wall after the removal of gall bladder in patient. What vitamin will stimulate this process?
- A. K
 - B. C
 - C. D_3
 - D. PP
 - E. B_{12}
13. A 6 y.o child was administered vicasol to prevent postoperative bleeding. Vicasol is a synthetic analogue of vitamin K. Name post-translation changes of blood coagulation factors that will be activated by vicasol:
- A. Carboxylation of glutamic acid residues
 - B. Polymerization
 - C. Partial proteolysis
 - D. Glycosylation
 - E. Phosphorylation of serine radicals
14. A patient who was previously ill with mastectomy as a result of breast cancer was prescribed radiation therapy. What vitamin preparation has marked radioprotective action caused by antioxidant activity?
- A. Tocopherol acetate
 - B. Riboflavin
 - C. Folic acid
 - D. Ergocalciferol
 - E. Thiamine chloride

15. There is an inhibited coagulation in the patients with bile ducts obstruction, bleeding due to the low level of absorption of vitamin. What vitamin is in deficiency?
- A. K
 - B. E
 - C. D
 - D. A
 - E. Carotene
16. A 2-year-old child has got intestinal dysbacteriosis, which results in hemorrhagic syndrome. What is the most likely cause of hemorrhage of the child?
- A. Activation of tissue thromboplastin
 - B. PP hypovitaminosis
 - C. Fibrinogen deficiency
 - D. Vitamin K insufficiency
 - E. Hypocalcemia
17. During examination of an 11-month-old infant a pediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:
- A. Thiamine
 - B. Riboflavin
 - C. Bioflavonoids
 - D. Pantothenic acid
 - E. Cholecalciferol
18. A patient presents with twilight vision impairment. Which of the following vitamins should be administered?
- A. Cyanocobalamin
 - B. Ascorbic acid
 - C. Nicotinic acid
 - D. Retinol acetate
 - E. Pyridoxine hydrochloride
19. After the disease a 16-year-old boy is presenting with decreased function of protein synthesis in the liver as a result has a symptom like vitamin *K* deficiency. This may cause disorder of:

- A. Erythropoietin production
 - B. Erythrocyte sedimentation rate
 - C. Blood coagulation
 - D. Osmotic blood pressure
 - E. Anticoagulant production
20. The structural analogue of vitamin B₂ (acrichine) is administered in a case of enterobiasis. The disorder of which enzyme synthesis is caused by this medicine in microorganisms?
- B. NAD-dependent dehydrogenases
 - C. Cytochrome oxidases
 - D. FAD-dependent dehydrogenases
 - E. Peptidases
 - F. Aminotransferases
21. In clinical practice tuberculosis is treated with izoniazid preparation – that is an antivitamin able to penetrate into the tuberculosis bacillus. Tuberculostatic effect is induced by the interference with replication processes and oxidation-reduction reactions due to the buildup of pseudo-coenzyme:
- A. FMN
 - B. NAD
 - C. CoQ
 - D. FAD
 - E. TPP
22. Some infectious diseases caused by bacteria are treated with sulfanilamides, which block the synthesis of bacteria growth factor. What is the mechanism of their action?
- A. They inhibit the absorption of folic acid
 - B. They are allosteric enzyme inhibitors
 - C. They are allosteric enzymes
 - D. They are anti-vitamins of para-amino benzoic acid
 - E. They are involved in red-ox processes
23. A patient complains of photoreception disorder and frequent acute viral diseases. He has been prescribed a vitamin that affects photoreception processes by producing rhodopsin, the photosensitive pigment. What vitamin is it?

- A. Cyanocobalamin
 - B. Tocopherol acetate
 - C. Pyridoxine hydrochloride
 - D. Thiamine
 - E. Retinol acetate
24. A 6-year-old child suffers from delayed growth, disrupted ossification processes, decalcification of teeth. What can be the cause?
- A. Vitamin D deficiency
 - B. Hyperthyroidism
 - C. Vitamin C deficiency
 - D. Decreased glucagon production
 - E. Insulin deficiency
25. A patient, who has been suffering for a long time from intestine disbacteriosis, has increased hemorrhaging caused by disruption of posttranslational modification of blood coagulation factors II, VII, IX and X in the liver. What vitamin deficiency is the cause of this condition?
- A. K
 - B. B12
 - C. B9
 - D. C
 - E. P
26. During regular check-up a child is detected with interrupted mineralization of bones. What vitamin deficiency can be the cause?
- A. Calciferol
 - B. Riboflavin
 - C. Tocopherol
 - D. Folic acid
 - E. Cobalamin
27. Choose uncharacteristic symptom of vitamin A deficiency in humans among the listed ones below:
- A. Growth retardation
 - B. Malformation of the long bones
 - C. Loss of body mass

- D. Affected mucous epithelium and eyes
 - E. Night blindness
28. Point out lipid component in the human skin which is included in process of vitamin D₃ synthesis on exposure to sunlight or radiation from a UV lamp:
- A. Cholesterol
 - B. Phosphatidylcholine
 - C. Phosphatidylethanolamine
 - D. Phosphatidylinositol
 - E. Phosphatidylserine
29. Point out a powerful naturally occurring antivitamin K:
- A. Phylloquinone
 - B. Menaquinone
 - C. Vicasol
 - D. β-ionone
 - E. Dicoumarol
30. Deficiency of which of the following vitamins can lead to anemia?
- A. Folic acid
 - B. Vitamin B₁₂
 - C. Vitamin C
 - D. Vitamin E
 - E. All of the above
31. Choose the most active form of vitamin D₃:
- A. 25-Hydroxycholecalciferol
 - B. 25-Hydroxyergocalciferol
 - C. 24, 25-Dihydroxycholecalciferol
 - D. 1, 25-Dihydroxycholecalciferol
 - E. Calcidiol
32. What reaction is in need of vitamin K?
- A. Gamma-carboxylation
 - B. Oxidation
 - C. Methylation
 - D. Hydroxylation
 - E. Alpha-decarboxylation

33. Point out the vitamin used for post-translational modification of glutamic acid to gamma-carboxyglutamate in polypeptide chain of precursor for prothrombin:

- A. A
- B. D
- C. B₂
- D. K
- E. C

34. Choose the name of phase for vitamin K use in the formation of clotting factors:

- A. Post-transcription
- B. Post-translation
- C. Transcription
- D. Reparation
- E. Replication

35. Choose the correct statement about vitamin K:

- A. It increases a coagulation time in infants with hemorrhagic diseases
- B. It is helpful in preventing thrombosis
- C. It is synthesized by intestinal bacteria
- D. It is present in increased amount in cows and breast milk
- E. It is derived to coenzyme of α -decarboxylases

36. Toad skin is seen in deficiency of one vitamin mainly. Point out it:

- A. Retinol
- B. Riboflavin
- C. Cholecalciferol
- D. Biotin
- E. L-Ascorbic acid

37. Point out a similarity between vitamin C and vitamin K:

- A. Both help in conversion of proline to hydroxyproline
- B. Both help in post-translational modification of polypeptide chains
- C. Both are fat soluble vitamins
- D. Both are involved in coagulation cascade
- E. Both are water soluble vitamins

38. What vitamin derivative acts as hormone?

- A. Vitamin D₃

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

39. Choose vitamin K dependent clotting factors:

- A. Factors V and VIII
- B. Factors XI and XIII
- C. Factors IX and X
- D. Factors III and XI
- E. Factors V and XII

40. All of the following are antioxidants except one. Choose it.

- A. Tocopherol
- B. Beta-Carotene
- C. L-Ascorbic acid
- D. Cholecalciferol
- E. Retinol

Lesson 12. Biochemistry of muscular and connective tissues

1. The high levels of creatine phosphokinase (CPK) (MB-isozyme) and lactate dehydrogenase LDH1 activity were revealed. Point out the most probable pathology in the patient:

- A. Hepatitis
- B. Myocardium infarction
- C. Osteoarthritis
- D. Pancreatitis
- E. Cholecystitis

2. Name the polysaccharide represented in connective tissue:

- A. Collagen
- B. Elastin
- C. Laminin
- D. Hyaluronic acid
- E. Fibrillin

3. Name the metabolic pathway used as the main energy source for myocardium contraction at healthy humans:
 - A. Anaerobic glycolysis
 - B. Aerobic glycolysis
 - C. Glycogen breakdown
 - D. Oxidation of High Fatty Acids
 - E. Pentose Phosphate cycle
4. It is established that there is specific system of energy supply in muscular cell. Point out this system:
 - A. Renin-angiotensinogen system
 - B. Creatine phosphate kinase system
 - C. Adenylate cyclase system
 - D. Translation system of a cell
 - E. Palmitate synthetase complex
5. There are some proteins in muscles: actin, myosin, actomyosin, tropomyosin, troponin. Point out what a specific group of proteins they are related to:
 - A. Enzymes
 - B. Sarcoplasmatic proteins
 - C. Stroma proteins
 - D. Calcium conjugated proteins
 - E. Coagulants
6. It is established that creatine synthesis in the liver is in need for three amino acids as substrates in this process. Point out them:
 - A. Ala, Ser, Glu
 - B. Arg, Gly, Met
 - C. Tre, Ile, Val
 - D. Phe, Trp, Val
 - E. Ala, Val, Leu
7. Point out the substance whose level in the blood plasma correlates with the volume of physical loading of skeletal muscular tissue:
 - A. Ammonia
 - B. Urea
 - C. Creatine
 - D. Creatinine

- E. Uric acid
- 8. Vitamin C deficiency causes the disorder in collagen synthesis because two enzymes in this synthesis are in need for the use of ascorbic acid. Name one of them:
 - A. Pyruvate dehydrogenase
 - B. Acetyl – CoA carboxylase
 - C. Prolyl hydroxylase
 - D. Lactate dehydrogenase
 - E. Phenylalanine hydroxylase
- 9. The metabolism disturbance in myocardium in a case of ischemic heart disease is followed by the decrease of ATP and creatine phosphate concentrations. Point out the reason of this event:
 - A. Glycolysis is activated in myocardium
 - B. Hypoxia causes the inhibition of all the processes in mitochondria
 - C. Glucose is not destroyed in myocardium
 - D. The oxidative phosphorylation is activated in myocardium
 - E. The accumulation of glucose is in myocardium
- 10. Point out the factors whose levels in the intracellular space of muscular cell influence the rate of muscular contraction:
 - A. ATP levels
 - B. Calcium ions content
 - C. Magnesium ions content
 - D. Stroma proteins content
 - E. All the factors above are in need
- 11. A 30 y.o. woman had been ill for a year when she felt pain in the area of joints for the first time, they got swollen, and skin above them became reddened. Provisional diagnosis is rheumatoid arthritis. One of the most probable causes of this disease is a structure alteration of a connective tissue protein:
 - A. Ovoalbumin
 - B. Collagen
 - C. Myosin
 - D. Troponin
 - E. Mucin

12. Increased fragility of vessels, enamel and dentine destruction resulting from scurvy are caused by disorder of collagen maturation. What stage of procollagen modification is disturbed under this avitaminosis?
- A. Hydroxylation of proline
 - B. Detaching of N-ended peptide
 - C. Formation of polypeptide chains
 - D. Glycosylation of hydroxylysine residues
 - E. Removal of C-ended peptide from procollagen
13. A patient with serious damage of muscular tissue was admitted to the trauma department. What biochemical urine index will be increased in this case?
- A. Creatinine
 - B. Common lipids
 - C. Uric acid
 - D. Glucose
 - E. Mineral salts
14. A 46-year-old female patient has a continuous history of progressive muscular (Duchenne`s) dystrophy. Which blood enzyme activity changes will be of diagnostic value in this case?
- A. Lactate dehydrogenase
 - B. Glutamate dehydrogenase
 - C. Adenylate cyclase
 - D. Pyruvate dehydrogenase
 - E. Creatine phosphokinase
15. A 53-year-old male patient is diagnosed with Paget`s disease. The concentration of oxyproline in daily urine is sharply increased, which primarily means intensified disintegration of:
- A. Albumin
 - B. Hemoglobin
 - C. Collagen
 - D. Fibrinogen
 - E. Keratin
16. Collagen occurs in different types, which are usually classified on the basis of the:

- A Type of carbohydrate present
 - B Cysteine content
 - C Hydroxyproline and hydroxylysine content
 - D Types of peptide chains present
 - E Glycine content
17. Adenosine triphosphatase (ATPase) activity needed for muscle contraction is a component of:
- A The amino-terminal globular head of myosin
 - B The carboxy-terminal tail region of myosin
 - C Troponin T
 - D Actin
 - E Troponin C
18. Correct statements regarding creatinine include all of the following except:
- A. Creatinine is formed by the spontaneous cyclization of a constant fraction of muscular creatine phosphate
 - B. The excretion of creatinine in the urine of adults is very constant from day to day
 - C. Creatinine is a precursor of creatine
 - D. Urinary creatinine levels help to estimate the muscular mass in person
 - E. Blood level of creatinine is a good indicator of kidney function
19. It's suspected that a child has a progressing muscular dystrophy. What urine component is increased and will confirm the diagnosis:
- A. Hippuric acid
 - B. Creatine
 - C. Ketone bodies
 - D. Glucose
 - E. Urea
20. Choose the enzyme of the blood plasma, whose activity increases in ten or more times for 3-4 hours after myocardium infarction:
- A. Aspartate transaminase
 - B. Leucine aminopeptidase
 - C. Alkaline phosphatase
 - D. Acidic phosphatase

- E. Arginase
21. Three amino acids take part in creatine synthesis in humans. Point out them:
- A. Serine, Aspartate, Glutamate
 - B. Tyrosine, Phenylalanine, Tryptophan
 - C. Threonine, Isoleucine, Valine
 - D. Arginine, Glycine, Methionine
 - E. Alanine, Valine, Leucine
22. Point out the amino acids that are determined in the structure of collagen, only:
- A. Glycine and glutamic acid
 - B. Proline and lysine
 - C. Hydroxyproline and hydroxylysine
 - D. Desmosin and proline
 - E. Glutamate and aspartate
23. Choose an enzyme which takes part in ATP resynthesis in the muscle tissue:
- A. Glucokinase
 - B. Creatine kinase
 - C. Hexokinase
 - D. Pyruvate kinase
 - E. Pyruvate carboxylase
24. Choose a substance that can be the product of enzymatic hydrolysis of elastin , only:
- A. Glycine
 - B. Pepsin
 - C. Nucleic acid
 - D. Desmosin
 - E. Ribose
25. Choose the product of guanidoacetate transmethylation from following list:
- A. Chlorine
 - B. Hydroxyproline
 - C. Creatinine
 - D. Creatine

- E. Glutathione
26. Triple helix is seen in one compound listed below. Choose it:
- A. Collagen
 - B. Fibrinogen
 - C. Histones
 - D. Serum amylase
 - E. F-actin
27. The cardiac muscle utilizes all of the following compounds from the blood except one. Point out it:
- A. Glucose
 - B. Acetone
 - C. Fatty acids
 - D. Acetoacetic acid
 - E. Alanine
28. A deficiency of copper affects the formation of normal collagen by reducing the activity of one enzyme from following list. Choose it:
- A. Glucosyl transferase
 - B. Galactosyl transferase
 - C. Prolyl hydroxylase
 - D. Lysyl oxidase
 - E. Collagenase
29. What does cardiac muscle prefer as source of energy?
- A. Fatty acids
 - B. Glucose
 - C. Ketone bodies
 - D. Glycogen
 - E. Fructose
30. Hydroxylation of proline to hydroxyproline in collagen synthesis requires all except one. Point out it.
- A. Pyridoxal phosphate
 - B. Ascorbic acid
 - C. O₂
 - D. Specific hydroxylase
 - E. Iron ion

31. Creatine is formed metabolically using one compound listed below.

Choose it:

- A. Tryptophan
- B. Phenylalanine
- C. Lysine
- D. Valine
- E. Leucine

32. Three residues (Gly-X-Y-) are repeated many times, and it is the absolute requirement for formation of the triple helix of collagen molecule type 1. What amino acid and its derivative mainly is represented as letters X and Y?

- A. Proline
- B. Tryptophan
- C. Lysine
- D. Valine
- E. Leucine

33 Which of the following is increased in the blood plasma at myocardial infarction?

- A. Creatine phosphokinase BB isozyme
- B. Lactate dehydrogenase isozyme 5
- C. Succinate dehydrogenase
- D. Alkaline phosphatase
- E. Creatine phosphokinase and aspartate aminotransferase

34. Choose the mechanism for proline conversion to hydroxyproline:

- A. Vitamin C mediated hydroxylation
- B. Reverse hydroxylation
- C. Vitamin H mediated carboxylation
- D. Post translation induction
- E. Vitamin K mediated hydroxylation

35. Name biochemical tests used for diagnostics of muscular dystrophy development:

- A. Creatine content in the blood plasma and urine
- B. Creatinine content in the blood plasma
- C. Creatine phosphate kinase activity in the blood plasma

- D. Myofibril proteins content in tissue homogenate obtained due to biopsy method
 - E. All that is placed above
36. Point out location of guanidoacetate synthesis and substrates for it.
- A. Kidney; Arginine+Glycine
 - B. Liver; Methionine+Glycine
 - C. Liver; Cysteine+Arginine
 - D. Muscle; Citrulline+Aspartate
 - E. Brain; Methionine+Arginine

Lesson 13. Biochemistry of nervous tissue

1. Simple and conjugated proteins are in the composition of nervous tissue. Point out the simple proteins of this tissue type:
 - A. Albumins, globulins
 - B. Prolamins, glutelins
 - C. Phosphoproteins
 - D. Nucleoproteins
 - E. Lipoproteins
2. Point out the amino acids which function as neurotransmitters in CNS:
 - A. Glutamic acid
 - B. Aspartic acid
 - C. Glycine
 - D. Dihydroxyphenylalanine
 - E. All the amino acids named above
3. There are special supportive proteins in the white matter of nervous tissue. Point out them:
 - A. Actins
 - B. Myosins
 - C. Troponins
 - D. Albumins
 - E. Neuroscleroproteins
4. Point out the main catabolic pathway for glucose in the brain tissue:

- A. Aerobic oxidation up to carbon dioxide and water
 - B. Anaerobic glycolysis
 - C. Pentose Phosphate Cycle
 - D. Glycogenesis
 - E. Gluconeogenesis
5. The myelin substance is a complex of some compounds. What prevailing components are in it?
- A. Protein, lipids
 - B. Carbohydrates, lipids
 - C. Nucleic acids
 - D. Adenine-linked nucleotides, creatine phosphate
 - E. Amino acids, mineral substances
6. Point out the lipid which hardly synthesized in brain of adults:
- A. Sphingomyelin
 - B. Cerebroside
 - C. Ganglyoside
 - D. Sulfatide
 - E. Cholesterol
7. Point out the neurotransmitter that is isolated from preganglionic neuron synapses of the sympathetic nervous system, mainly:
- A. Epinephrine
 - B. Dopamine
 - C. Acetylcholine
 - D. Glycine
 - E. Serotonin
8. Point out the main energy source substrate for the brain:
- A. Glucose
 - B. Fatty acids
 - C. Phospholipids
 - D. Ketone bodies
 - E. Amino acids
9. Point out the enzyme that catalyzes the degradation of some neurotransmitters in the brain:
- A. Aldolase
 - B. Glutamate dehydrogenase

- C. Monoamino oxidase
 - D. Hexokinase
 - E. Malate dehydrogenase
10. There is the feature of the chemical composition of neuroglia: one acidic protein has very high concentration. Name it:
- A. Protein S-100
 - B. Myosin
 - C. Albumin
 - D. Choline esterase
 - E. Neuroscleroprotein
11. Depressions and emotional insanities result from the deficit of noradrenalin, serotonin and other biogenic amines in the brain. Their concentration in the synapses can be increased by means of the antidepressants that inhibit the following enzyme:
- A. Phenylalanine-4-monooxygenase
 - B. Monoamine oxidase
 - C. D-amino-acid oxidase
 - D. L-amino-acid oxidase
 - E. Diamine oxidase
12. An unconscious patient was taken by ambulance to the hospital. On objective examination the patient was found to have on reflexes, periodical convulsions, irregular breathing. After laboratory examination the patient was diagnosed with hepatic coma. Disorders of the central nervous system develop due to the accumulation of the following metabolite:
- A. Urea
 - B. Histamine
 - C. Glutamine
 - D. Ammonia
 - E. Bilirubin
13. Disruption of nerve fiber myelinogenesis causes neurological disorders and mental retardation. These symptoms are typical for hereditary and acquired alterations in the metabolism of:
- A. Phosphatidic acid
 - B. Cholesterol

- C. Sphingolipids
 - D. Neutral fats
 - E. Higher fatty acids
14. Decarboxylation of glutamate induces production of gamma-aminobutyric acid (GABA) neurotransmitter. After inactivation GABA is converted into a metabolite of the citric acid cycle, that is:
- A. Fumarate
 - B. Succinate
 - C. Oxaloacetate
 - D. Malate
 - E. Citric acid
15. Monoamine oxidase inhibitors are widely used as psychopharmacological drugs. They change the level of nearly all neurotransmitters in synapses, with the following neurotransmitter being the exception:
- A. Acetylcholine
 - B. Serotonin
 - C. Dopamine
 - D. Noradrenalin
 - E. Adrenalin
16. Name the enzyme which produces acetylcholine (neurotransmitter):
- B. Acetylcholinesterase
 - C. Cholinesterase
 - D. Acetylcholine dehydrogenase
 - E. Acetylcholine carboxykinase
 - F. Choline acetyltransferase
17. The peptides with opiate-like activity (endorphins and enkephalins) have been shown to be derivatives of:
- A. β -Lipotropic hypophyseal hormone
 - B. Adrenocorticotrophic hormone
 - C. Growth hormone
 - D. Luteotropic hormone
 - E. Proinsulin
18. A special role in the metabolism of catecholamine mediators is assigned to the enzyme:

- A. Glutamate decarboxylase
 - B. S-adenosylmethionine decarboxylase
 - C. Acetylcholinesterase
 - D. Monoamine oxidase
 - E. Glutamate dehydrogenase
19. The main energy source for the brain is:
- A. Fatty acids
 - B. Glucose
 - C. Ketone bodies
 - D. Cholesterol
 - E. Nucleotides
20. Ammonia is a strong poison, and the nervous system is highly susceptible to it. Choose the amino acid that plays a special role in the neutralization of ammonia:
- A. Alanine
 - B. Arginine
 - C. Valine
 - D. Methionine
 - E. Glutamic acid
21. Point out the major fuel for the brain after several weeks of starvation:
- A. Glucose
 - B. Fatty acid
 - C. Beta hydroxyl butyrate
 - D. Tyrosine
 - E. Phenylalanine
22. Neurotransmitter serotonin is derived from one amino acid. Choose it:
- A. Phenylalanine
 - B. Serine
 - C. Tryptophan
 - D. Cysteine
 - E. Proline
23. In the brain ammonia is converted to product from following list. Point out it:

- A. Aspartate
 - B. Glutamine
 - C. Alanine
 - D. Histidine
 - E. Urea
24. Which substance does not cross the blood brain barrier?
- A. Insulin
 - B. Ascorbic acid
 - C. Bilirubin
 - D. Glucose
 - E. Oxygen
25. The brain contains relatively high amounts of all compounds from the following list except one. Point out it:
- A. Glutamine
 - B. N-Acetylaspartate
 - C. Gamma-aminobutyric acid (GABA)
 - D. Glycogen
 - E. Proteolipid
26. Point out the main pathways of catabolism in brain:
- A. Glycolysis and Citric Acid Cycle
 - B. Glycogenolysis and Glycogenesis
 - C. Glycogenolysis and Citric Acid Cycle
 - D. Embden-Meyerhof pathway and HMP shunt
 - E. Oxidation of fatty acids and ketogenesis
27. Choose the neurotransmitter from following list:
- A. Serine
 - B. Glutathione
 - C. Glutamate
 - D. Phenylalanine
 - E. Alanine
28. The application of drug atropine is based on its ability to block the muscarinic receptors. Name a neurotransmitter that takes place in the transmission of impulses binding with this type receptor in the autonomic nervous system:
- A. Acetylcholine

- B. Nor-epinephrine
 - C. Dopamine
 - D. Serotonin
 - E. Glycine
29. The content of certain acidic proteins is characteristic for the nervous tissue. Point out such protein:
- A. Histon
 - B. Protein S-100
 - C. Globin
 - D. Actin
 - E. Tubuline
30. The content of certain substance is sharply decreased in a striate of a brain at Parkinson disease. Point out it:
- A. Dopamine
 - B. Acetylcholine
 - C. GABA
 - D. Histamine
 - E. Nor-epinephrine

Lesson 14. Biochemical functions of the liver at healthy and diseased people

1. Point out the conjugation agent used for conjugated bilirubin formation in the liver cell:
- A. Glycine
 - B. Cysteine
 - C. UDP-glucuronic acid
 - D. PAPS
 - E. Acetyl-CoA
2. Find the protein name that is synthesized in the liver, only:
- A. Albumin of blood plasma
 - B. Alpha2-macroglobulin
 - C. Alpha1-antitrypsin
 - D. Ceruloplasmin

- E. All the names above are right answers
3. Find out the enzyme of liver tissue participating in the detoxification of cyanides:
- A. NADH - dehydrogenase
 - B. Cytochrome b
 - C. Thiosulfate transferase
 - D. Cytochrome c
 - E. Cytochrome P450
4. Point out the enzyme whose activity is determined in the blood plasma of patients to estimate the liver parenchyma damage:
- A. Lactate dehydrogenase
 - B. Palmitate synthase complex
 - C. Alanine amino transferase
 - D. Cytochrome c₁
 - E. Adenylate cyclase
5. Find out the enzyme name which is specific for liver tissue, only:
- A. Succinate dehydrogenase
 - B. Arginase
 - C. Alanine amino transferase
 - D. Aspartate amino transferase
 - E. Isocitrate dehydrogenase
6. Point out the amino acid that is conjugative agent at Quick`s test:
- A. Lactic acid
 - B. Glycine
 - C. Valine
 - D. Leucine
 - E. Histidine
7. Point out the liver enzyme participating in the neutralization of ammonia:
- A. Glutamine synthetase
 - B. Glutamate dehydrogenase
 - C. Carbomoyl phosphate synthetase
 - D. Alanine amino transferase
 - E. All the enzymes in A, B, C positions

8. Point out the lipid mainly synthesized in the liver:
- A. Ganglyoside
 - B. Phospatidyl ethanol amine
 - C. Cholesterol
 - D. Phosphatidyl choline
 - E. Phosphatidyl inositol
9. This lipoprotein class is synthesized in the liver, and is in need for the transport of triacylglycerols and cholesterol from the liver to tissues. Name it:
- A. IDL
 - B. HDL
 - C. LDL
 - D. VLDL
 - E. Chylomicrons
10. Point out the enzyme whose activity is decreased in the blood plasma at liver cirrhosis in patient:
- A. Glutamine synthetase
 - B. Glutamate dehydrogenase
 - C. Alanine amino transferase
 - D. Choline esterase
 - E. UDP - glucoronyl transferase
11. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?
- A. Uric acid
 - B. Creatinine
 - C. Ammonium salts
 - D. Hippuric acid
 - E. Amino acids
12. A patient with symptoms of acute alcohol poisoning was brought to the hospital. What carbohydrates metabolism changes are typical for this condition?
- A. The anaerobic glucose metabolism predominates in muscles
 - B. The gluconeogenesis is increased in the liver
 - C. The breakage of glycogen is increased in the liver

- D. The gluconeogenesis velocity in the liver is decreased
- E. The anaerobic breakage of glucose is increased in muscles
13. Desulfiram is widely used in medical practice to prevent alcoholism, it inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcohol?
- A. Acetaldehyde
 - B. Ethanol
 - C. Malonyl aldehyde
 - D. Propionic aldehyde
 - E. Methanol
14. A patient has been admitted to the contagious isolation ward with signs of jaundice caused by hepatitis virus. Which of the symptoms given below is strictly specific for hepatocellular jaundice?
- A. Bilirubinuria
 - B. Cholemia
 - C. Hyperbilirubinemia
 - D. Increase of ALT, AST level
 - E. Urobilinuria
15. Confirmation of elevation of alkaline phosphatase of hepatic origin is by
- A. SGOT (Serum glutamic oxaloacetic transaminase)
 - B. SGPT (Serum glutamic pyruvic transaminase)
 - C. GGT (Gamma-glutamyl transferase)
 - D. LDH (Lactate dehydrogenase)
 - E. Acid phosphatase
16. Choose the urine index that is used to estimate detoxification function of the liver:
- A. Citric acid
 - B. Acetyl-CoA
 - C. Pyruvate
 - D. Hippuric acid
 - E. Uric acid
17. One of liver functions is maintenance of glucose concentration in the blood. Point out the carbohydrate metabolic pathway in the liver

that provides realization of this function at exception of diet carbohydrates:

- A. Aerobic oxidation of glucose
 - B. Anaerobic oxidation of glucose
 - C. Gluconeogenesis
 - D. Pentose phosphate cycle
 - E. Glycogenesis
18. There is yellowness of the skin at newborn. The content of bilirubin in the blood is moderately increased due to indirect bilirubin. The fecal level of stercobilinogen is raised, bilirubin is not present in the urine. What type of a jaundice take place:
- A. Prehepatic jaundice
 - B. Hepatic jaundice
 - C. Posthepatic jaundice
 - D. Crigler-Najjar syndrome
 - E. Gilbert syndrome
19. The activity of UDP-glucuronyl transferase is reduced at Gilbert Syndrome. What metabolite concentration will raise in the blood at these patients?
- A. Direct bilirubin
 - B. Indirect bilirubin
 - C. Mesobilirubinogen
 - D. Stercobilinogen
 - E. Mesobilinogen
20. Liver does not produce one compound from the following list. Point out it:
- A. Albumin
 - B. Gamma-globulin
 - C. Fibrinogen
 - D. Prothrombin
 - E. Haptoglobin
21. Choose the right continuation of the statement: “In mammalian bile, the bile acids are normally present_____”.
- A. In their free form
 - B. As cholesterol esters

- C. As conjugated with glycine or taurine
 - D. As conjugated with beta-glucuronic acid
 - E. As conjugated with bilirubin
22. Liver synthesizes all the compounds from the following list EXCEPT:
- A. Clotting factor II
 - B. Clotting factor XII
 - C. Urea
 - D. Stercobilin
 - E. Cholesterol
23. Choose the process that is not placed in the liver:
- A. Urea synthesis
 - B. Bile acid synthesis
 - C. Detoxification of xenobiotics
 - D. Cortisol synthesis
 - E. Deposition of fat soluble vitamins
24. Glucose-6-Phosphate is the key metabolite of carbohydrate metabolism. Point out the pathway of its utilization which is present in liver:
- A. Glycogenesis
 - B. Gluconeogenesis
 - C. Glycolysis
 - D. Hexose Monophosphate Shunt
 - E. All of the above
25. What process is stimulated in the liver at starvation:
- A. Glycogenolysis
 - B. Gluconeogenesis
 - C. Non-oxidative phase of HMP
 - D. Ketogenesis
 - E. All of the above
26. The rate of high fatty acids synthesis in the liver is high. Point out the precursor for this process and its intracellular location:
- A. Acetyl CoA, Matrix
 - B. Acetyl CoA, Cytoplasm
 - C. Glucose, Matrix

- D. Amino acids, Cytoplasm
 - E. Amino acids, Matrix
27. Point out the pathways placed mainly in the liver:
- A. 25-hydroxycholecalciferol synthesis
 - B. Taurine synthesis
 - C. Cholic acid synthesis
 - D. Sex hormone binding protein synthesis
 - E. All of the above
28. Liver cirrhosis in patient is accompanied with:
- A. Disturbed production of urea
 - B. Accumulation of bilirubin total in the blood
 - C. Hypoproteinemia
 - D. Disturbed function of coagulation system of the blood
 - E. All that is placed above
29. Point out the process of carbohydrate metabolism which is occurred only in liver:
- A. Glycogenolysis
 - B. Glycogenesis
 - C. Heparin synthesis
 - D. Pentose phosphate pathway
 - E. Aerobic glycolysis
30. Point out the blood serum enzyme elevated in alcoholic cirrhosis of liver:
- A. Alcohol dehydrogenase
 - B. Creatine kinase
 - C. Acidic phosphatase
 - D. Gamma-glutamyl transpeptidase
 - E. Aspartate transaminase

Lesson 15. Xenobiotic transformation in humans.

Microsomal oxidation

1. Point out the main place for the location of microsomal oxidation in a cell:
 - A. Nucleus
 - B. Cytoplasm
 - C. EPR, smooth part
 - D. EPR, rough part
 - E. Lysosomes
2. Find the correct definition of the term "xenobiotic":
 - A. A substance that is an obligatory component of food products
 - B. A substance that is unnatural for humans
 - C. A substance that is synthesized in small quantities in humans
 - D. A substance that regulates metabolism in organism
 - E. A substance that is a terminal product of metabolism
3. Find the enzyme participating in the function of the microsomal monooxygenase chain:
 - A. НАДН - dehydrogenase
 - B. Cytochrome b
 - C. Cytochrome c1
 - D. Cytochrome c
 - E. Cytochrome P450
4. Point out the enzyme of monooxygenase chain as a final electron acceptor from NADPH:
 - A. Cytochrome b₅
 - B. Cytochrome b
 - C. Cytochrome P₄₅₀
 - D. Cytochrome c₁
 - E. Cytochrome aa₃
5. Monooxygenase and reductase chains of EPR (smooth part) are necessary for:
 - A. Saturated HFA synthesis
 - B. Structure modification of endogenous substrates only

- C. Structure modification of xenobiotics and endogenous substrates
- D. Structure modification of xenobiotics only
- E. Energy reception at the oxidation of xenobiotics
- 6. Point out the conjugation agent that is conjugative agent at the detoxification of heterocyclic alcohols in the liver:
 - A. Glutathione
 - B. Glycine
 - C. Valine
 - D. PAPS
 - E. Histidine
- 7. Point out the liver enzyme participating in the neutralization of xenobiotics, their metabolites and harmful endogenous products:
 - A. Glutamine synthetase
 - B. Glutamate dehydrogenase
 - C. Alanine amino transferase
 - D. Carbomoyl phosphate synthetase
 - E. UDP - glucoronyl transferase
- 8. Point out the peptide participating in the conjugation of some harmful products in the liver:
 - A. Glutathione
 - B. Methionine
 - C. Trialanine
 - D. Oxytocin
 - E. Prolylproline
- 9. Benzoic acid has the formula C_6H_5-COOH and causes the toxic effect at its accumulation in the liver. Choose the main conjugative agent for this substance:
 - A. Glycine
 - B. PAPS
 - C. S-adenosyl methionine
 - D. Glutathione
 - E. Urea
- 10. Point out the enzyme located in the cytoplasm of hepatocytes and participating in the modification of a xenobiotic:

- A. Glutamine synthetase
 - B. Alcohol dehydrogenase
 - C. Alanine amino transferase
 - D. Carbomoyl phosphate transferase
 - E. Glutamate dehydrogenase
11. In course of metabolic process active forms of oxygen including superoxide anion radical are formed in the human body. By means of what enzyme is this anion inactivated?
- A. Catalase
 - B. Glutathione reductase
 - C. Peroxidase
 - D. Superoxide dismutase
 - E. Glutathione peroxidase
12. A patient with encephalopathy was admitted to the neurological inpatient department. There was revealed a correlation between increasing of encephalopathy and substances absorbed by the bloodstream from the intestines. What substances that are formed in the intestines can cause endotoxemia?
- A. Indole
 - B. Ornithine
 - C. Acetacetate
 - D. Butyrate
 - E. Biotin
13. Study of conversion of a food colouring agent revealed that utilization of this xenobiotic takes place only in one phase – microsomal oxidation (modification phase). Name an enzyme of this phase:
- A. Cytochrome *aa3*
 - B. Cytochrome C oxidase
 - C. Cytochrome P-450
 - D. Cytochrome C1
 - E. Cytochrome b
14. Point out the donor of sulfate group in the conjugation phase of xenobiotics transformation:
- A. Glutathione

- B. UDP-glucuronic acid
 - C. Adenosine 3'-phosphate-5'-phosphosulfate
 - D. Acetyl-CoA
 - E. S-adenosylmethionine
15. Point out the chemical nature of prosthetic group of cytochrome P450:
- A. Nucleotide
 - B. Fe^{3+}
 - C. Fe^{2+}
 - D. Phosphate
 - E. Heme
16. Choose the exogenous factor (the drug) that can induce the UDP-glucuronosyltransferase gene expression in the liver:
- A. Calcitriol
 - B. Thyroxine
 - C. Riboxin
 - D. Phenobarbital
 - E. Thiamine diphosphate
17. All of the following may have a physiological antioxidant role except
- A. Beta-carotene
 - B. Vitamin C
 - C. Selenium
 - D. Iron
 - E. Vitamin E
18. Choose one wrong continuation of a phrase: Oxidation of ethanol...:
- A. Occurs, basically, in a liver
 - B. Is catalyzed by alcohol dehydrogenase
 - C. Is slowed down at increase NADH/NAD^+ in a cell
 - D. Can proceed under microsomal system action
 - E. Results in the formation of an intermediate product of Pentose phosphate cycle
19. Choose one wrong continuation of a phrase: Phase I of xenobiotics transformation:

- A. Is carried out by enzymes of endoplasmic reticulum
 - B. Demands presence of NADPH
 - C. Results in increase of polarity of a substance
 - D. Occurs in anaerobic conditions
 - E. Proceeds at participation of cytochrome P450
20. Name the compound metabolized in the liver across conjugation reaction like xenobiotics:
- A. Bilirubin
 - B. Cholesterol
 - C. Urea
 - D. Acetylcholine
 - E. Uric acid
21. Choose metabolites of methanol which may be produced in the liver:
- A. Acetaldehyde + Acetic acid
 - B. Formaldehyde + Formic acid
 - C. Pyruvate + Pyruvic acid
 - D. Fumarate + Fumaric acid
 - E. Glyceraldehyde + Glycerol
22. Point out the main enzyme in monooxygenase system of EPR responsible for modification of xenobiotics:
- A. Glucuronyl transferase
 - B. Glutathione S-transferase
 - C. NADPH reductase
 - D. Cytochrome P450
 - E. Cytochrome C oxidase
23. Choose the correct statement about hepatic monooxygenases linked with cytochrome P450 enzyme.
- A. Located mainly in smooth EPR
 - B. Catalyzes oxidation, reduction and hydrolysis reactions at the same time
 - C. Certain drug inactivate and certain drug enhance their reactions
 - D. Positions A, C are correct
 - E. Their action always causes the detoxification of xenobiotics
24. Which following cytochrome participates in drug metabolism?

- A. Cytochrome *aa3*
 - B. Cytochrome C1
 - C. Cytochrome C
 - D. Cytochrome P450
 - E. Cytochrome *b*
25. Point out the conjugation agent that is in need to detoxify heterocyclic alcohols in the liver:
- A. Glutathione
 - B. Glycine
 - C. Valine
 - D. PAPS
 - E. Histidine
26. Point out the liver enzyme participating in the neutralization of xenobiotics, their metabolites and harmful endogenous products:
- A. Glutamine synthetase
 - B. Glutamate dehydrogenase
 - C. Alanine amino transferase
 - D. Carbomoyl phosphate synthetase
 - E. UDP-glucuronyl transferase
27. Point out the peptide participating in the conjugation of some harmful sulfur containing products in the liver:
- A. Glutathione
 - B. Methionine
 - C. Trialanine
 - D. Oxytocin
 - E. Prolylproline
28. Benzoic acid causes the toxic effect at its accumulation in the liver. Choose the main conjugative agent to detoxify it:
- A. Glycine
 - B. PAPS
 - C. S-adenosyl methionine
 - D. Glutathione
 - E. Acetyl-CoA

Lesson 16. Biochemistry of blood tissue. Proteins of blood plasma. Non-Protein components of blood plasma at healthy and diseased people

1. Name the enzyme which is the indicator of myocardium damage if its activity will be increased in the blood plasma in 10 times or more:
 - A. Alkaline phosphatase
 - B. Malate dehydrogenase
 - C. Glutamate dehydrogenase
 - D. Guanine transaminase
 - E. Aspartate transaminase
2. Point out the most probable location of the plasma proteins synthesis:
 - A. Kidneys
 - B. Muscle tissue
 - C. Nervous tissue
 - D. Liver
 - E. Lungs
3. Point out the main blood plasma protein, participating in the blood oncotic pressure maintaining:
 - A. Globulin
 - B. Lipoprotein
 - C. Ceruloplasmin
 - D. Hemoglobin
 - E. Albumin
4. Point out the protein, which is not observed in the blood serum of healthy people:
 - A. Cryoglobulin
 - B. Albumin
 - C. Transferin
 - D. Haptoglobin
 - E. Alpha2-macroglobulin
5. Name the excretory enzyme of the blood plasma:
 - A. Alkaline phosphatase

- B. Malate dehydrogenase
 - C. Glutamate dehydrogenase
 - D. Alanine transaminase
 - E. Aspartate transaminase
6. Blood is the tissue needed for the transport of all absorbed products in the gut after digestion processes. Name the function of the blood described above:
- A. Body temperature regulatory function
 - B. Transport of hormones
 - C. Nutrition function
 - D. The maintenance of acid-base balance in the organism
 - E. Protection against microbial agents
7. Name the blood plasma protein used as inhibitor of some proteolytic enzymes:
- A. Albumin
 - B. Immunoglobulin G
 - C. C-reactive protein
 - D. Alpha 1-antitrypsin
 - E. Ceruloplasmin
8. Name the method used now as modern technique for the separation and determination of the content of some proteins in the blood plasma at the same time:
- A. Dialysis
 - B. Immunoelectrophoresis
 - C. Spectrophotometry method
 - D. X-ray radiation method
 - E. Densitometry method
9. Name the factor of blood coagulation system needed for fibrin formation from fibrinogen:
- A. Plasmin
 - B. Heparin
 - C. Thrombin
 - D. Prothrombin
 - E. Lysine
10. Point out the protease of blood that helps to solvate the fibrin clot:

- A. Plasminogen
 - B. Lysolipase
 - C. Plasmin
 - D. Antifibrinogen
 - E. Tromboplastin
11. Point out the permissible range of the pH fluctuation in the blood:
- A. 8.0-8.61
 - B. 7.36-7.44
 - C. 7.81-7.94
 - D. 6.2-6.84
 - E. 6.85-7.0
12. Point out the non-protein nitrogenous component of the blood plasma that is in a level about 50% of total non-protein nitrogen:
- A. Uric acid
 - B. Creatine
 - C. Creatinine
 - D. Amino acids
 - E. Urea
13. Point out the blood microelement:
- A. Sodium
 - B. Copper
 - C. Calcium
 - D. Potassium
 - E. Magnesium
14. Point out the most powerful buffer system of the blood:
- A. The bicarbonate buffer system
 - B. The phosphate buffer system
 - C. The protein buffer system
 - D. Haemoglobin buffer system
 - E. The acetate buffer system
15. Name the index of blood plasma which helps to recognize the change in biliary system function at cholestasis state:
- A. Fibrinogen
 - B. Conjugated bilirubin
 - C. Uric acid

- D. Urea
 - E. Creatine
16. Point out the major transport form of triacylglycerols from the intestine to the liver and other tissues:
- A. Chylomicrons
 - B. LDL
 - C. VLDL
 - D. IDL
 - E. HDL
17. Creatine level is much higher than normal, creatinine level is lower than normal in the blood plasma of patient. Choose the probable diagnosis for this patient:
- A. Myocardium infarction
 - B. Cholestasis
 - C. Viral hepatitis
 - D. Phenylketonuria
 - E. Muscular dystrophy
18. Metabolic acidosis is observed in patient's organism due to the accumulation of:
- A. Sodium ions
 - B. Glucose
 - C. Pyruvate
 - D. Fructose
 - E. Glycerol
19. Renal insufficiency was proposed to look at patient due to the change of the ratio [Urea]/Residual nitrogen (80%). Name the index of the blood plasma whose content will prove this diagnosis:
- A. High levels of sodium ion
 - B. Low levels of copper ion
 - C. High levels of glucose
 - D. High levels of creatinine
 - E. High levels of creatine
20. Name the indexes of blood plasma whose content may be higher at insulin-dependent diabetes mellitus:
- A. Glucose

- B. Cholesterol
 - C. Pyruvate
 - D. Ketone bodies
 - E. All the indexes named above
21. 12 hours after an acute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?
- A. Viral hepatitis
 - B. Diabetes insipidus
 - C. Collagenosis
 - D. Diabetes mellitus
 - E. Myocardial infarction
22. A patient who had been working hard under condition of elevated temperature of the environment has now a changed quantity of blood plasma proteins. What phenomenon is the case?
- A. Absolute hyperproteinemia
 - B. Relative hyperproteinemia
 - C. Absolute hypoproteinemia
 - D. Disproteinemia
 - E. Paraproteinemia
23. 62 y.o. woman complains of frequent pains in the area of her chest and backbone, rib fractures. A doctor assumed myelomatosis (plasmocytoma). What of the following laboratory characteristics will be of the greatest diagnostic importance?
- A. Proteinuria
 - B. Hypoproteinemia
 - C. Hypoglobulinemia
 - D. Hyperalbuminemia
 - E. Paraproteinemia
24. A 4 y.o. child with signs of durative proteinic starvation was admitted to the hospital. The signs were as follows: Growth inhibition, anemia, oedema, mental deficiency. Choose the cause of oedema development:
- A. Reduced synthesis of lipoproteins
 - B. Reduced synthesis of glycoproteins

- C. Reduced synthesis of hemoglobin
 - D. Reduced synthesis of globulins
 - E. Reduced synthesis of albumins
25. Marked increase of activity of MB-forms of CPK (creatine phosphokinase) and LDH-1 was revealed by examination of the patient's blood. What is the most probable pathology?
- A. Myocardial infarction
 - B. Hepatitis
 - C. Pancreatitis
 - D. Rheumatism
 - E. Cholecystitis
26. There is high activity of LDH_{1,2}, aspartate aminotransferase, creatine phosphokinase in the blood of patient. In what organs (tissues) the development of pathological process is the most probable?
- A. In the heart muscle {initial stage of myocardium infraction}
 - B. In skeletal muscle {dystrophy, atrophy}
 - C. In kidneys and adrenals
 - D. In liver and kidneys
 - E. In connective tissue
27. The high level of lactate dehydrogenase (LDH) isozymes concentration showed the increase of LDH-1 and LDH-2 in a patient's blood plasma. Point out the most probable diagnosis.
- A. Diabetes mellitus
 - B. Skeletal muscle dystrophy
 - C. Myocardial infarction
 - D. Acute pancreatitis
 - E. Viral hepatitis
28. Analysis of blood serum of a patient revealed the increase of alanine aminotransferase and aspartate aminotransferase levels. What cytological changes can cause such a situation?
- A. Disturbance of genetic apparatus of cells
 - B. Cellular breakdown
 - C. Disorder of enzyme systems of cells
 - D. Disturbance of cellular interrelations

- E. Disturbed energy supply of cells
29. Blood sampling for bulk analysis is recommended to be performed on an empty stomach and in the morning. What changes in blood composition can occur if to perform blood sampling after food intake?
- A. Reduced contents of erythrocytes
 - B. Increased contents of erythrocytes
 - C. Increased contents of leukocytes
 - D. Increased plasma proteins
 - E. Reduced contents of thrombocytes
30. A 34-year-old patient was diagnosed with chronic glomerulonephritis 3 years ago. Edema has developed within the last 6 months. What caused the edema?
- A. Liver dysfunction of protein formation
 - B. Hyperosmolarity of plasma
 - C. Proteinuria
 - D. Hyperproduction of vasopressin
 - E. Hyperaldosteronism
31. A 55 y.o. women consulted a doctor about having continuous cyclic uterine hemorrhages for a year, weakness, dizziness. Examination revealed skin pallor. Hemogram: Hb – 70 g/L, erythrocytes- $3.2 \times 10^{12}/L$, color index – 0.6; leukocytes – $6.0 \times 10^9/L$, reticulocytes – 1%, erythrocyte hypochromia. What anemia is it?
- A. Iron-deficiency anemia
 - B. B₁₂-folate-deficiency anemia
 - C. Hemolytic anemia
 - D. Aplastic anemia
 - E. Chronic posthemorrhagic anemia
32. A patient with hypochromic anemia has splitting hair and loss of hair, increased nail bottling and taste alteration. What is the mechanism of the development of these symptoms?
- A. Deficiency of vitamin B₁₂
 - B. Decreased production of thyroid hormones
 - C. Deficiency of vitamin A
 - D. Decreased production of parathyrin

- E. Deficiency of iron-containing enzymes
33. Diabetes mellitus causes ketosis as a result of activated oxidation of fatty acids. What disorders of acid-base equilibrium may be caused by excessive accumulation of ketone bodies in blood?
- A. Metabolic alkalosis
 - B. Metabolic acidosis
 - C. Respiratory alkalosis
 - D. Respiratory acidosis
 - E. Any changes won't happen
34. A 63-year-old woman developed symptoms of rheumatoid arthritis. Their increase of which blood values indicators could be most significant in proving the diagnosis?
- A. R-glycosidase
 - B. Acid phosphatase
 - C. Lipoproteins
 - D. General cholesterol
 - E. Additive glycosaminoglycans
35. A worker has decreased buffer capacity of blood due to exhausting muscular work. What acidic substance that came to blood caused this phenomenon?
- A. 3-phosphoglycerate
 - B. 1,3-bisphosphoglycerate
 - C. Lactate
 - D. α -ketoglutarate
 - E. Pyruvate
36. Examination of 27-year-old patient revealed pathological changes in liver and brain. Blood plasma analysis revealed an abrupt decrease in the copper concentration, urine analysis revealed an increased copper, concentration. The patient was diagnosed with Wilson's degeneration. To confirm the diagnosis it is necessary to study the activity of the following enzyme in blood serum:
- A. Leucine aminopeptidase
 - B. Xanthine oxidase
 - C. Alcohol dehydrogenase
 - D. Ceruloplasmin

- E. Carbonic anhydrase
37. After a surgery a 36-year-old woman was given an intravenous injection of concentrated albumin solution. This has induced intensified water movement in the following direction:
- A. From the intercellular fluid to the capillaries
 - B. No changes of water movement will be observed
 - C. From the intercellular to the cells
 - D. From the cells to the intercellular fluid
 - E. From the capillaries to the intercellular fluid
38. Electrophoretic study of a blood serum sample, taken from the patient with pneumonia, revealed an increase in one of the protein fractions. Specify this fraction:
- A. γ -globulins
 - B. Albumins
 - C. α_1 -globulins
 - D. β -globulins
 - E. α_2 -globulins
39. Examination of a 56-year-old female patient with a history of type 1 diabetes revealed a disorder of protein metabolism that is manifested by aminoacidemia in the laboratory blood test values, and clinically by the delayed wound healing and decreased synthesis of antibodies. Which of the following mechanisms causes the development of aminoacidemia?
- A. Increased proteolysis
 - B. Decrease in the concentration of amino acids in blood
 - C. Albuminosis
 - D. Increase in the oncotic pressure in the blood plasma
 - E. Increase in low-density lipoprotein level
40. A 49-year-old male patient with acute pancreatitis was likely to develop pancreatic necrosis, while active pancreatic proteases were absorbed into the blood stream and tissue proteins broke up. What protective factors of the body can inhibit these processes?
- A. Immunoglobulin
 - B. Ceruloplasmin, transferrin
 - C. α_2 -macroglobulin, α_1 -antitrypsin

- D. Cryoglobulin, interferon
 - E. Hemopexin, haptoglobin
41. A patient is diagnosed with hereditary coagulopathy that is characterized by factor VIII deficiency. Specify the phase of blood clotting during which coagulation will be disrupted in the given case:
- A. Clot retraction
 - B. Thromboplastin formation
 - C. Fibrin formation
 - D. Plasmin formation
 - E. Thrombin formation
42. A 67-year-old male patient consumes eggs, pork fat, butter, milk and meat. Blood test results: cholesterol – 12.3 mmol/l, total lipids – 8.2 g/l, increased low-density lipoprotein fraction (LDL). What type of hyperlipoproteinemia is observed in the patient?
- A. Hyperlipoproteinemia type I.
 - B. Hyperlipoproteinemia type IV
 - C. Cholesterol, hyperlipoproteinemia
 - D. Hyperlipoproteinemia type IIa
 - E. Hyperlipoproteinemia type IIb
43. Human red blood cells do not contain mitochondria. What is the main pathway for ATP production in these cells?
- A. Creatine kinase reaction
 - B. Anaerobic glycolysis
 - C. Cyclase reaction
 - D. Aerobic glycolysis
 - E. Oxidative phosphorylation
44. Biochemical analysis of an infant's erythrocytes revealed evident glutathione peroxidase deficiency and low concentration of reduced glutathione. What pathological condition can develop in this infant?
- A. Hemolytic anemia
 - B. Megaloblastic anemia
 - C. Sickle cell anemia
 - D. Iron-deficiency anemia
 - E. Pernicious anemia

45. A 28-year-old patient undergoing treatment in a pulmonological department has been diagnosed with pulmonary emphysema caused by splitting of alveolar septum by elastase and trypsin. The disease is caused by the congenital deficiency of the following protein:
- A. Alpha-1-proteinase inhibitor
 - B. Haptoglobin
 - C. Cryoglobulin
 - D. Alpha-2-macroglobulin
 - E. Transferrin
46. A patient has experienced thirst, frequent urination, weight loss, and fatigue. Analysis of his blood reveals below normal pH, above normal glucose level. What is the primary cause for the decrease of normal pH in this patient?
- A Hyperventilation
 - B Water loss due to frequent urination
 - C Diabetes insipidus
 - D Renal failure
 - E Ketoacidosis
47. What of the following enzymatic actions is in need for vitamin K use?
- A. Activation of factor X of blood coagulation system
 - B. Regulation of blood calcium levels
 - C. Conversion of fibrinogen to fibrin
 - D. Synthesis of prothrombin
 - E. Transcriptional control of fibrinogen synthesis
48. All of the following are required for normal clot formation except:
- A. Vitamin K
 - B. Calcium
 - C. Plasmin
 - D. Thrombin
 - E. Proteolysis
49. The hypoproteinemia (30-40 g/l) is indicated at nephritis syndrome, and it causes an edema. Point out the protein of the blood plasma, whose content is decreased in this case:
- A. Fibrinogen

- B. Albumin
 - C. LDL
 - D. Interferon
 - E. Transferrin
50. Point out the protease of blood that helps to solvate the fibrin clot:
- A. Plasminogen
 - B. Plasmin
 - C. Thromboplastin
 - D. Antifibrinolysinogen
 - E. Lysokinase
51. Choose the blood plasma index that is used in screening of newborn for phenylketonuria estimation:
- A. Phenylalanine
 - B. Dihydroxyphenylalanine
 - C. Acetone
 - D. Acetoacetate
 - E. Pyruvate
52. Name the process that can be considered in the blood, only:
- A. Synthesis of proteins
 - B. Destruction of hormones
 - C. Thrombosis
 - D. β -Oxidation of fatty acids
 - E. High fatty acid synthesis
53. Mature RBC contains all except one from the following list. Point out it:
- A. Enzymes of HMP shunt pathway
 - B. Enzymes of TCA cycle
 - C. Glycolytic enzymes
 - D. Pyridine nucleotides
 - E. Hemoglobin
54. Choose the anticoagulant normally present in the blood plasma:
- A. Vitamin K
 - B. Heparin
 - C. Hyaluronidase
 - D. Dicumarol

- E. None of the above
55. Conversion of prothrombin to thrombin requires one or more factors from the following list: Choose them:
- A. Factor X and Ca^{2+} only
 - B. Factor V and Ca^{2+} only
 - C. Factors X, V, Ca^{2+} , acidic phospholipids
 - D. Factors XI, VI, Ca^{2+} , acidic phospholipids
 - E. Factors X, V and Mn^{2+}
56. Continue the statement: "Estimation of glycosylated hemoglobin in the blood helps to know the _____".
- A. Time duration of untreated diabetes mellitus
 - B. Rate of ketoacidosis
 - C. Rate of glucose utilization in tissues
 - D. The rate of oxygen saturation by hemoglobin
 - E. Reason of diabetes mellitus development
57. The activities of lactate dehydrogenase (LDH_4 , LDH_5), alanine aminotransferase, carbamoyl phosphate ornithine transferase are increased in the blood plasma of patient. What organ (tissue) is the pathological process developing in?
- A. Skeletal muscles
 - B. Myocardium
 - C. Liver
 - D. Kidneys
 - E. Bones
58. The activities of lactate dehydrogenase (LDH_1 , LDH_2), aspartate aminotransferase, creatine kinase in the blood plasma of patient are increased. In which of the following organs (tissues) is the pathological process probably developing?
- A. In the myocardium
 - B. In the skeletal muscles
 - C. In adrenal glands
 - D. In the connective tissue of cartilages
 - E. In the liver
59. A 47-year-old patient was brought to an emergency department with the diagnosis of myocardial infarction. What enzyme activity

would prevail in the patient's blood serum during the first 3-4 hours after the beginning of this pathological state?

- A. LDH1
 - B. Aspartate amino transferase
 - C. LDH₃
 - D. Creatine phosphate kinase MM isozyme
 - E. LDH₅
60. Point out the protein of blood plasma which provides the processes of coagulation hemostasis?
- A. Albumin
 - B. Haptoglobin
 - C. LDL
 - D. Ceruloplasmin
 - E. Fibrinogen
61. Choose the location of most plasma protein synthesis:
- A. Liver
 - B. Lungs
 - C. Small intestine
 - D. Kidney
 - E. Skin
62. All of blood plasma proteins are transporters EXCEPT one in this list. Choose it:
- A. Transferrin
 - B. Albumin
 - C. Ceruloplasmin
 - D. Fibrinogen
 - E. VLDL
63. Point out the most mobile and important buffer in extracellular fluid:
- A. Hemoglobin
 - B. Phosphate
 - C. Protein
 - D. H₂CO₃/HCO₃⁻
 - E. Na⁺/K⁺
64. Osmolality of blood plasma is:

- A. Osmolarity per kg of solvent
 - B. Osmolarity per liter of solvent
 - C. Osmoles of solute per kg of solvent
 - D. Number of osmoles of solute per liter of solution
 - E. A liter of solvent per 1 mole
65. Point out normal region of blood pH:
- A. 6.85-7.0
 - B. 7.05-7.2
 - C. 7.77-8.0
 - D. 7.38-7.4
 - E. 7.45-7.6
66. Most affinity of blood plasma iron ion is seen with one compound listed below. Choose it:
- A. Transferrin
 - B. Ferritin
 - C. Hemoglobin
 - D. Ceruloplasmin
 - E. Albumin
67. Point out the most important compensatory mechanism in metabolic acidosis:
- A. Hyperventilation
 - B. Increased NH_3 excretion by kidneys
 - C. Increased filtration of phosphates
 - D. Increased HCO_3^- production
 - E. Urea production in the liver

Lesson 17. Biochemistry of kidney. The role of kidneys in the regulation of mineral metabolism. The components of urine at healthy and diseased people

1. Point out the substance that appears in the urine in a case of alkaptonuria:
 - A. Fructose
 - B. Protein
 - C. Homogentisic acid
 - D. Glucose
 - E. Tryptophan
2. The diuresis in healthy adults is about:
 - A. 400-700 ml
 - B. 1000-2000 ml
 - C. 2000-3000 ml
 - D. 700-900 ml
 - E. 3000-4000 ml
3. Point out the pathological component of urine:
 - A. Haemoglobin
 - B. Urea
 - C. Uric acid
 - D. Creatinine
 - E. Amino acids
4. Point out the normal component of urine:
 - A. Coniugated bilirubin
 - B. Glucose
 - C. Ketone bodies
 - D. Uric acid
 - E. Albumins
5. What is the urine color when intestinal rotting processes are intensified:
 - A. Brown
 - B. Straw-yellow
 - C. Red
 - D. Green or blue

- E. Beer like color
6. Choose the urine component, whose concentration increases at consuming a lot of meat food:
- A. Glucose
 - B. Protein
 - C. Uric acid
 - D. Ketone bodies
 - E. Fructose
7. The concentration of what urine component will decrease in a case of viral hepatitis:
- A. Glucose
 - B. Protein
 - C. Urea
 - D. Lipids
 - E. Carbohydrates
8. Point out the qualitative reaction to prove the presence of blood pigments in urine:
- A. Heller's test
 - B. Benzidine test
 - C. Lugol's test
 - D. Trommer's reaction
 - E. Rozine's reaction
9. The violation of the hormone secretion is followed by polyuria. Choose this hormone:
- A. Adrenalin
 - B. Insulin
 - C. Testosterone
 - D. Vasopressin
 - E. Oxytocin
10. Point out the qualitative reaction to prove the presence of proteins in urine:
- A. Heller's test
 - B. Benzidine test
 - C. Lugol's test
 - D. Trommer's reaction

- E. Rozine's reaction
11. Examination of a 43 y.o. anephric patient revealed anemia symptoms. What is the cause of these symptoms?
- A. Folic acid deficit
 - B. Vitamin B₁₂ deficit
 - C. Reduced synthesis of erythropoietins
 - D. Enhanced destruction of erythrocytes
 - E. Iron deficit
12. A patient complains about dyspnea provoked by the physical activity. Clinical examination revealed anaemia and presence of the para-protein in the zone of gamma-globulins. To confirm the myeloma diagnosis it is necessary to determine the following index in the patient's urine:
- A. Ceruplasmin
 - B. Bilirubin
 - C. Antitrypsin
 - D. Bence Jones protein
 - E. Haemoglobin
13. A biochemical urine analysis has been performed for a patient with progressive muscular dystrophy. In the given case muscle disease can be confirmed by the high content of the following substance in urine:
- A. Urea
 - B. Porphyrin
 - C. Hippuric acid
 - D. Creatine
 - E. Creatinine
14. Which is a physiological constituent of urine
- A. Globulins
 - B. Glucose
 - C. Albumin
 - D. Creatinine
 - E. Bilirubin
15. Arthritis occur in
- A. Alkaptonuria

- B. Cystinosis
 - C. Maple syrup diseases
 - D. Homocystinuria
 - E. Addison's disease
16. Pyruvate concentration in the patient's urine is increased 10 times than the normal level. Choose the vitamin, the deficiency of which in the organism can be the reason of this change:
- A. Vitamin B₁
 - B. Vitamin K
 - C. Vitamin A
 - D. Vitamin C
 - E. Vitamin B₂
17. One way of acid-base balance maintenance in organism by means of kidney is ammonia salts formation. Point out the enzyme in kidney that takes part in this process:
- A. Monooxygenase
 - B. Arginase
 - C. Carbamoyl phosphate synthetase
 - D. Glutaminase
 - E. Alanine amino transferase
18. A boy (of 10 years) complains of general weakness, dizziness, and tiredness. A mental retardation is observed. A concentration of valine, leucine, isoleucine is high in blood and urine. Urine has a specific odour. Name the probable diagnosis:
- A. Maple syrup urine disease
 - B. Phenylketonuria
 - C. Histidinemia
 - D. Tyrosinemia
 - E. Hartnup disease
19. Choose the form of the bile pigment, which is the normal urine component:
- A. Uroporphyrin
 - B. Unconjugated bilirubin
 - C. Conjugated bilirubin
 - D. Mesobilinogen

- E. Stercobilinogen
20. Point out the pathological urine component that appears in the urine during nephritis, some cardiac diseases, some forms of idiopathic hypertension and pregnancy pathology. Test with sulphosalicylic acid for that component is the most sensitive reaction:
- A. Amino acids
 - B. Urea
 - C. Uric acid
 - D. Hippuric acid
 - E. Protein
21. Kidney insufficiency in patient is accompanied with:
- A. Excess levels of urea in the blood plasma
 - B. Excess levels of potassium ions in the blood plasma
 - C. Disturbed clearance
 - D. Disturbed filtration and reabsorption processes
 - E. All that is placed above
22. Point out a major source of ammonia in kidney tissue:
- A. Urea
 - B. Aspartate
 - C. Glutamine
 - D. Glutamate
 - E. Uric acid
23. Choose normal amount of proteins excreted in urine/24 hours.
- A. Less than 150 mg
 - B. 200 mg - 225 mg
 - C. 450 mg – 500 mg
 - D. More than 800 mg
 - E. 150 mg – 250 mg
24. Name organic compound which is terminal for humans and not reabsorbed in renal tubules:
- A. Globulins
 - B. Glucose
 - C. Albumin
 - D. Creatinine
 - E. Bilirubin

25. Choose the specific gravity region (g/ml) for urine of healthy person:
- A. 1.005-1.015
 - B. 1.030-1.040
 - C. 1.015-1.020
 - D. 1.030-1.040
 - E. Less than 1.010
26. Creatinine levels in the urine and blood are used to test kidney function. Creatinine is useful for this test because it is not significantly reabsorbed nor secreted by kidney, and metabolically it is:
- A. Produced at a constant rate
 - B. Produced only in kidney
 - C. A storage form of energy
 - D. An acceptor of protons in renal tubules
 - E. A precursor for phosphocreatine
27. Appearance of albumins in the urine of diseased person may be at:
- A. Acute nephritis
 - B. Chronical nephritis
 - C. Severe form of diabetes mellitus
 - D. Pyelonephritis
 - E. All that is placed above
28. Choose the main biochemical tests for diagnostics of kidney diseases:
- A. Urea content in the blood plasma and in the urine
 - B. Creatinine content in the blood and urine
 - C. Sodium ions content in the blood and urine
 - D. N-acetyl-beta-D-glucosaminidase activity (blood serum, urine)
 - E. All that is placed above
29. What organic compounds accumulate in final urine at severe form of diabetes mellitus?
- A. Albumins
 - B. Glucose
 - C. Ketone bodies
 - D. Bilirubin conjugated
 - E. All that is placed in positions A, B, C

30. Kidney insufficiency development will cause the infringements in those processes:
- A. Erythropoietin synthesis and secretion
 - B. Calcitriol synthesis
 - C. Mineralization of bone tissue
 - D. Creatine synthesis
 - E. All that is placed above

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Answers on MCQs Module2 submodule 4

Lesson 10				
1 B	11 E	21 E	31 A	41 C
2 C	12 B	22 A	32 E	42 C
3 B	13 E	23 A	33 A	43 B
4 D	14 E	24 C	34 C	
5 D	15 A	25 B	35 A	
6 B	16 E	26 C	36 E	
7 E	17 E	27 A	37 A	
8 B	18 B	28 B	38 C	
9 A	19 A	29 B	39 A	
10 D	20 C	30 C	40 E	

Lesson 11			
1 D	11 B	21 B	31 D
2 C	12 C	22 D	32 A
3 D	13 A	23 E	33 D
4 E	14 A	24 A	34 B
5 C	15 A	25 A	35 C
6 B	16 D	26 A	36 A
7 D	17 E	27 B	37 B
8 B	18 D	28 A	38 A
9 C	19 C	29 E	39 C
10 C	20 D	30 E	40 D

Lesson 12			
1 B	11 B	21 D	31 C
2 D	12 A	22 C	32 A
3 D	13 E	23 B	33 E
4 B	14 E	24 D	34 A
5 B	15 C	25 D	35 E
6 B	16 D	26 A	36 A
7 D	17 A	27 B	
8 C	18 C	28 C	
9 B	19 B	29 A	
10 E	20 A	30 A	

Lesson 13		
1 A	11 B	21 C
2 E	12 D	22 C
3 E	13 C	23 B
4 A	14 B	24 A
5 A	15 A	25 D
6 E	16 E	26 A
7 C	17 A	27 C
8 A	18 D	28 A
9 C	19 B	29 B
10 A	20 E	30 A

Lesson 14

1 C	11 D	21 C
2 A	12 D	22 D
3 C	13 A	23 D
4 C	14 D	24 E
5 B	15 C	25 E
6 B	16 D	26 B
7 E	17 C	27 E
8 C	18 A	28 E
9 D	19 B	29 C
10 D	20 B	30 D

Lesson 15

1 C	11 D	21 B
2 B	12 A	22 D
3 E	13 C	23 D
4 C	14 C	24 D
5 C	15 E	25 D
6 D	16 D	26 E
7 E	17 D	27 A
8 A	18 E	28 A
9 A	19 D	
10 B	20 A	

Lesson 16

1 E	11 B	21 E	31 A	41 B	51 A	61 A
2 D	12 E	22 B	32 E	42 D	52 C	62 D
3 E	13 B	23 E	33 B	43 B	53 B	63 D
4 A	14 D	24 E	34 E	44 A	54 B	64 C
5 A	15 B	25 A	35 C	45 A	55 C	65 D
6 C	16 A	26 A	36 D	46 E	56 A	66 A
7 D	17 E	27 C	37 A	47 D	57 C	67 B
8 B	18 C	28 B	38 A	48 C	58 A	
9 C	19 D	29 D	39 A	49 B	59 B	
10 C	20 E	30 A	40 C	50 B	60 E	

Lesson 17

1 C	11 C	21 E
2 B	12 D	22 C
3 A	13 D	23 A
4 D	14 D	24 D
5 D	15 A	25 C
6 C	16 A	26 A
7 C	17 D	27 E
8 B	18 A	28 E
9 D	19 E	29 E
10 A	20 E	30 E

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