<table>
<thead>
<tr>
<th>Змістовий модуль 1. Вступ до біохімії. Прості та складні білки. Ферменти</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Тест</strong></td>
</tr>
<tr>
<td><strong>1.</strong> Enzymes are widely used as drugs in pharmacy. What is the main difference that separates enzymes from non-biological catalysts?</td>
</tr>
<tr>
<td>A. High specificity and selectivity</td>
</tr>
<tr>
<td>B. High universality</td>
</tr>
<tr>
<td>C. Low universality</td>
</tr>
<tr>
<td>D. High dispersion</td>
</tr>
<tr>
<td>E. High homogeneity</td>
</tr>
<tr>
<td><strong>2.</strong> Accidently ingestion of deathcap mushrooms containing α-amanitin causes intoxication. What enzyme is inhibited with this toxine?</td>
</tr>
<tr>
<td>A. RNApolymerase II</td>
</tr>
<tr>
<td>B. DNApolymerase</td>
</tr>
<tr>
<td>C. DNApolythetase</td>
</tr>
<tr>
<td>D. Peptidyltransferase</td>
</tr>
<tr>
<td>E. Translocase</td>
</tr>
<tr>
<td><strong>3.</strong> Disintegration of adenosine nucleotides results in release of ammonia. What enzyme plays the key role in ammonia synthesis from these compounds?</td>
</tr>
<tr>
<td>A. Adenosinedeaminase</td>
</tr>
<tr>
<td>B. Alcohol dehydrogenase</td>
</tr>
<tr>
<td>C. Lactatedehydrogenase</td>
</tr>
<tr>
<td>D. Alaninetransaminase</td>
</tr>
<tr>
<td>E. Amylase</td>
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<tr>
<td><strong>4.</strong> After drinking milk a 1-year-old child developed diarrhea, flatulence. The baby is likely to have the deficiency of the following enzyme:</td>
</tr>
<tr>
<td>A. Lactase</td>
</tr>
<tr>
<td>B. Maltase</td>
</tr>
<tr>
<td>C. Aldolase</td>
</tr>
<tr>
<td>D. Hexokinase</td>
</tr>
<tr>
<td>E. Glycosidase</td>
</tr>
<tr>
<td>A 5-year-old child presents with abdominal distension, abdominal cramps, and diarrhea occurring 1-4 hours after drinking milk. Described symptoms are caused by the lack of enzymes that break up:</td>
</tr>
<tr>
<td>A. Lactose</td>
</tr>
<tr>
<td>B. Glucose</td>
</tr>
<tr>
<td>C. Maltose</td>
</tr>
<tr>
<td>D. Saccharose</td>
</tr>
<tr>
<td>E. Fructose</td>
</tr>
<tr>
<td>Milk intake has resulted in the one-year-old child having diarrhea and abdominal distension. What enzyme deficiency does the child have?</td>
</tr>
<tr>
<td>A. Lactase</td>
</tr>
<tr>
<td>B. Maltase</td>
</tr>
<tr>
<td>C. Aldolase</td>
</tr>
<tr>
<td>D. Hexokinase</td>
</tr>
<tr>
<td>E. Glycosidase</td>
</tr>
<tr>
<td><strong>5.</strong> Decarboxylation of the amino acid histidine results in formation of histamine in the cells. Neutralization of this biogenic amine takes place due to the following enzyme:</td>
</tr>
<tr>
<td>A. Diaminooxidase (DAO)</td>
</tr>
<tr>
<td>B. Monoaminooxidase (MAO)</td>
</tr>
<tr>
<td>C. Catalase</td>
</tr>
<tr>
<td>D. Aminotransferase</td>
</tr>
<tr>
<td>E. Aminopeptidase</td>
</tr>
<tr>
<td><strong>6.</strong> When hydrogen peroxide solution is administered to bleeding wounds, it is broken up by one of the blood enzymes. Point out this enzyme.</td>
</tr>
<tr>
<td>A. Catalase</td>
</tr>
<tr>
<td>B. Monoamine oxidase</td>
</tr>
</tbody>
</table>
C. Cytochrome oxidase  
D. Aspartate aminotransferase  
E. Lactate dehydrogenase

7. The patient with myocardial infarction has been prescribed statines, cholesterol synthesis inhibitors, to prevent complications. What enzyme activity is suppressed by these medicines?  
A. Beta-GHB-reductase  
B. Hydroxylase  
C. Lecithin-cholesterol acyltransferase  
D. Esterase  
E. Oxygenase

8. Detoxication rate is 4 times lower in children than in adults. What enzyme necessary for toxic compounds conjugation has low activity in children?  
A. Glucuronosyl transferase  
B. ALAT  
C. AspAT  
D. Creatine phosphokinase  
E. LDH1

9. Inhibitors of one of the amides metabolism enzymes are used to treat depression. What enzyme inhibition has such an effect?  
A. Flavin adenine dinucleotide (FAD)-containing monoamine oxidase (MAO)  
B. Acetylcholinesterase  
C. Formylkynureninase (Arylformamidase)  
D. Kynurenine 3-hydroxylase  
E. Lactate dehydrogenase

10. 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

11. Growth of some cancer cells is caused by a certain growth factor. Treatment of leukemia involves applying an enzyme that destroys this essential factor. Specify this enzyme:  
A. Asparaginase  
B. Glutaminase  
C. Succinate dehydrogenase  
D. Citrate synthase  
E. Aspartate aminotransferase

12. The anti-tumor preparation Methotrexate is a structural analogue of folic acid. The mechanism of its action is based on the inhibition of the following enzyme:  
A. Dihydrofolate reductase  
B. Xanthine oxidase  
C. Hexokinase  
D. Creatine kinase  
E. Lactate dehydrogenase

13. A patient with Parkinson’s disease exhibits low level of dopamine which is produced from dihydroxyphenylalanine (DOPA). What enzyme catalyzes this conversion?  
A. Decarboxylase  
B. Deaminase  
C. Hydrolase  
D. Aminotransferase  
E. Carboxypeptidase

14. Amylolytic enzymes catalyze the hydrolysis of polysaccharides and oligosaccharides. They have an effect upon the following chemical bond:  
A. Glycosidic  
B. Hydrogen  
C. Peptide
15. Proteolytic enzymes of gastric juice exhibit maximum activity in the medium with the following pH:
   A. pH 3.2-3.5
   B. pH 6.5
   C. pH 7.0
   D. pH 9.0
   E. pH 0.5-1.0

16. Medicinal plants infected by microorganisms cannot be used in the pharmaceutical industry. Invasive properties of phytopathogenic microorganisms are due to the following enzymes:
   A. Hydrolytic
   B. Isomerase
   C. Transferase
   D. Oxidoreductase
   E. Lyase

17. A patient with hyperproduction of thyroid hormones has been prescribed Merkazolilum. This drug inhibits the following enzyme of iodothyronine synthesis:
   A. Iodide peroxidase
   B. Aromatase
   C. Reductase
   D. Decarboxylase
   E. Aminotransferase

18. Contrykal is used to prevent pancreatic autolysis. This drug is the inhibitor of the following enzymes:
   A. Proteases
   B. Lipases
   C. Glycosidases
   D. Nucleases
   E. Synthetases

19. The 55-year-old female patient has developed a case of acute pancreatitis caused by greasy food. What is the main pathogenesis step of this disorder?
   A. Premature activation of enzymes in gland ducts and cells
   B. Pancreatic juice deficiency
   C. Low bile production in liver
   D. Fats digestion disruption
   E. Acute bowel obstruction

20. Depressive states can be treated by means of drugs inhibiting the enzyme that inactivates biogenic amines. Specify this enzyme:
   A. MAO (monoamine oxidase)
   B. LDH (lactate dehydrogenase)
   C. CPK (creatine phosphokinase)
   D. AST (aspartate aminotransferase)
   E. ALT (alanine aminotransferase)

21. A patient complains of pain behind the breastbone on the left, perspiration and palpitation. Which of the following enzymes should be found in blood in order to confirm the diagnosis of myocardium infarction?
   A. AspAT, CPK, LDH-1
   B. AlAT, aldolase, LDH-4
   C. Amylase, alkaline phosphatase, AlAT
   D. Acid phosphatase, LDH-5, LDH-4
   E. α-fetoprotein, aldolase, CPK

22. During practice in the laboratory the students had been investigating in vitro, how malonate affects enzymes of tricarboxylic acid cycle. They detected accumulation of the following metabolite:
   A. Succinate
   B. Malate
   C. Isocitrate
   D. Fumarate
   E. Succinyl-CoA
23. A sanitary-epidemic station employee has been poisoned when the premises were processed with an organophosphorous insecticide. What enzyme is inhibited by organophosphorous compounds?
   A. Acetylcholinesterase
   B. Lactate dehydrogenase
   C. Xanthine oxidase
   D. Catalase
   E. Pepsin

24. Main process of ammonia neutralization occurs in the liver. Arginine decomposition reaction that produces urea as a result is catalyzed with arginase. What group of enzymes does arginase belong to?
   A. Hydrolases
   B. Synthetases
   C. Oxidoreductases
   D. Transferases
   E. Isomerases

25. In a human body there occur numerous reactions of direct interaction between substrate and molecular oxygen. What enzyme catalyzes attachment of two oxygen atoms to the substrate?
   A. Dioxygenase
   B. Catalase
   C. Monooxygenase
   D. Superoxide dismutase
   E. Glutathione reductase

26. Eicosanoids synthesis begins with freeing polyene acids from membrane phospholipids by means of a specific phospholipase. Name this enzyme:
   A. Phospholipase A2
   B. Cyclooxygenase
   C. Phospholipase C
   D. Protein kinase
   E. Arginase

27. Blood analysis of a patient revealed high content of the following enzymes: creatine kinase (MB-isoform), aspartate aminotransferase and LDH 1,2. What pathology should be suspected in this case?
   A. Myocardium infarction
   B. Muscular dystrophy
   C. Liver cirrhosis
   D. CNS affection
   E. Pancreatitis

28. Ions of heavy metals are very toxic. They block SH-groups that are a part of active centre of enzymes. What is the type of their inhibition mechanism?
   A. Noncompetitive
   B. Allosteric
   C. Competitive
   D. Uncompetitive
   E. Substrate

29. Dehydrogenases are enzymes that detach hydrogen atoms from the substrate. What enzyme class is lactate dehydrogenase related to?
   A. Oxidoreductases
   B. Transferases
   C. Hydrolases
   D. Isomerases
   E. Lipases

30. Pancreas secretes an enzyme that is able to break up α − 1,4-glycosidic linkages in a glycogen molecule. What enzyme is it?
   A. α-amylase
   B. Phosphatase
   C. Enterokinase
   D. Chemotrypsin
   E. Lysozyme

31. Oxidative deamination of biogenic amines in the tissues is catalyzed by the following enzyme:
   A. Monoaminooxidase
   B. Aspartate transaminase
   C. Alanine transaminase
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<tr>
<td><strong>32.</strong></td>
<td></td>
<td>Enzymes (biological catalysts) are used as pharmacologic preparations. What is the mechanism of enzyme action in the biochemical reactions?</td>
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<td></td>
<td>A. They reduce the energy of reaction activation</td>
<td>B. They increase the energy of reaction activation</td>
<td>C. They inhibit the reaction process</td>
<td>D. They change the constant of the reaction rate</td>
</tr>
<tr>
<td><strong>33.</strong></td>
<td></td>
<td>After examination a patient has been diagnosed with alkaptonuria. This pathology is caused by the deficit of the following enzyme:</td>
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<tr>
<td></td>
<td>A. Homogentisic acid oxidase</td>
<td>B. Diamine oxidase</td>
<td>C. Acetylcholinesterase</td>
<td>D. Thyroxin hydroxylase</td>
</tr>
<tr>
<td><strong>34.</strong></td>
<td></td>
<td>Single-oxygenase system of membranes of endoplasmic hepatocyte reticulum includes flavoprotein NADFcytochrome, R-450-reductase and R-450- cytochrome. It stimulates inactivation of biologically active substances or neutralization of toxic compounds by catalyzing the reaction of:</td>
<td></td>
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<tr>
<td></td>
<td>A. Hydroxylation</td>
<td>B. Oxidation</td>
<td>C. Methylination</td>
<td>D. Acetylation</td>
</tr>
<tr>
<td><strong>35.</strong></td>
<td></td>
<td>Nonsteroid anti-inflammatory drugs are used in medical practice for treating the rheumatoid arthritis, osteoporosis, inflammatory diseases of the connective tissue. These preparations inhibit the activity of the following enzyme:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Cyclooxygenase</td>
<td>B. Hexokinase</td>
<td>C. Succinate dehydrogenase</td>
<td>D. Aminotransferase</td>
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<tr>
<td></td>
<td>A 55-year-old patient developed gastric bleeding due to the ulceration of the gastric mucosa. Ulcerogenic effect of the drug is associated with a decrease in the activity of the following enzyme:</td>
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<tr>
<td></td>
<td>A. Cyclooxygenase-1</td>
<td>B. Cyclooxygenase-2</td>
<td>C. Lipoygenase</td>
<td>D. Thromboxane synthetase</td>
</tr>
<tr>
<td><strong>36.</strong></td>
<td></td>
<td>Pheochromocytoma provokes hypersecretion of adrenaline and noradrenaline. The concentration of free fatty acids is higher than normal. In this case hyperlipidemia is caused by activation of the following enzyme:</td>
<td></td>
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<tr>
<td></td>
<td>A. Triglyceride lipase</td>
<td>B. Phospholipase C</td>
<td>C. Phospholipase A2</td>
<td>D. Phospholipase A1</td>
</tr>
<tr>
<td><strong>37.</strong></td>
<td></td>
<td>Examination of a patient reveals an increase in ammonia and citrulline concentration in blood, a decrease in urea concentration in urine as well as citrullinuria. This condition is caused by the deficiency of the following enzyme:</td>
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</tr>
<tr>
<td></td>
<td>A. Arginine-succinate synthetase</td>
<td>B. Glutamine synthetase</td>
<td>C. Ornithine carbamoyl transferase</td>
<td>D. Glutaminase</td>
</tr>
<tr>
<td><strong>38.</strong></td>
<td></td>
<td>A patient consulted a doctor about sunburns, decreased visual acuity. His hair, skin and eyes are not pigmented. He has been diagnosed with albinism. The patient presents with the following enzyme deficiency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Tyrosinase</td>
<td>B. Arginase</td>
<td>C. Carbonic anhydrase</td>
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</tr>
</tbody>
</table>
39. What enzyme allows for synthesis of various genes from template-RNA to DNA in genetic engineering (this enzyme catalyzes the process discovered in RNA-viruses)?
A. Reverse transcriptase  
B. Exonuclease  
C. DNA-ligase  
D. Helicase  
E. Endonuclease

40. What mediator provides information transmission from nerve terminations of motoneurons to the fibers of skeletal muscles?
A. Acetylcholine  
B. Adrenaline  
C. Noradrenaline  
D. Serotonin  
E. GABA

41. Analysis of a patient’s urine revealed increased concentration of the uric acid. The patient was prescribed allopurinol. What is the biochemical mechanism of its action?
A. Xanthine oxidase inhibition  
B. Cyclooxygenase activation  
C. Desaminase inhibition  
D. Phosphorylase inhibition  
E. Nucleosidase inhibition

42. A patient undergoes chemotherapy with 5-fluorouracil that is a competitive inhibitor of thymidilate synthase. What process is inhibited by this drug?
A. Thymidinemonophosphate synthesis  
B. Purine nucleotides disintegration  
C. Adenosinetriphosphatesynthesis  
D. Purine nucleotidessalvage  
E. Glucose synthesis

43. Name inhibitory transmitters:
A. GABA and glycine  
B. Adrenaline and noradrenaline  
C. Noradrenaline and dopamine  
D. Serotonin and glycine  
E. Acetylcholine and GABA

44. Some products of amino acid decarboxylation are biologically active substances. What CNS inhibition mediator is formed by decarboxylation of glutamic acid?
A. GABA  
B. Putrescine  
C. Histamine  
D. Cadaverine  
E. Asparagine

45. A patient presents with weakening of the inhibitory processes of CNS which is associated with disturbed production of gamma-aminobutyric acid. What substance is the GABA precursor?
A. Glutamate  
B. Tryptophane  
C. Methionine  
D. Valine  
E. Glycin

<table>
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<tr>
<th>Змістовий модуль 2: Загальні уявлення про обмін речовин та енергії</th>
</tr>
</thead>
<tbody>
<tr>
<td>Тест</td>
</tr>
</tbody>
</table>
| 1. It is known that some chemical compounds uncouple the tissue respiration and oxidative phosphorylation. Name one of these compounds:  
A. 2,4-dinitrophenol  
B. Carbon monoxide  
C. Antimycin A  
D. Lactic acid |  

2. 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. Acetylcoenzyme A  
   D. Succinate  
   E. Malate

3. 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

4. Oligomycin antibiotic is prescribed to the patient with tuberculosis. What mitochondrial process is slowed down by this medicine?
   A. Oxidative phosphorylation  
   B. Substrate-linked phosphorylation  
   C. Microsomal oxidation  
   D. Lipid peroxidation  
   E. Oxidative decarboxylation

5. The intracellular metabolism of glycerol starts with its activation. What compound is formed as a result of the first reaction of its conversion?
   A. Alpha-glycerolphosphate  
   B. Pyruvate  
   C. Lactate  
   D. Choline  
   E. Acetyl coenzyme A

6. Antidepressants can increase the concentration of catecholamines in the synaptic cleft. What is the mechanism of action of these drugs?
   A. Inhibition of monoamine oxidase  
   B. Activation of monoamine oxidase  
   C. Inhibition of xanthine oxidase  
   D. Activation of acetylcholinesterase  
   E. Inhibition of acetylcholinesterase

7. Tricarboxylic acid cycle is a general way of carbohydrates, amino acids, and fatty acids oxidation. Specify the acid with which acetyl-CoA reacts first in tricarboxylic acid cycle:
   A. Oxaloacetic  
   B. Citric  
   C. Isocitric  
   D. Fumaric  
   E. Malic

8. A patient presents with hypoxia. What metabolic process activates when oxygen supply is insufficient?
   A. Anaerobic glycolysis  
   B. Urea cycle  
   C. Pentose-phosphate pathway  
   D. Oxidative decarboxylation of keto acids  
   E. Tricarboxylic acid cycle

9. Interaction of catecholamines with β-adrenoreceptors increases the level of cyclic adenosine monophosphate in tissue cells. Name an enzyme that catalyzes reaction of cyclic adenosine monophosphate generation:
   A. Adenylate cyclase  
   B. Phosphodiesterase  
   C. Phosphatase  
   D. Guanylate cyclase  
   E. Creatine kinase

10. Erythrocytes contain carbonic acid produced from CO2 and H2O. What enzyme ensures synthesis of carbonic acid in erythrocytes and its decomposition in pulmonary capillaries?
    A. Carbonic anhydrase
<p>| | |</p>
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<tbody>
<tr>
<td>B.</td>
<td>Alkaline phosphatase</td>
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<td>C.</td>
<td>Elastase</td>
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<tr>
<td>D.</td>
<td>Lipase</td>
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<tr>
<td>E.</td>
<td>Amylase</td>
</tr>
</tbody>
</table>

11. Transport of some substances is accompanied by utilization of metabolic energy (ATP energy). This process is called:
   A. Active transport  
   B. Simple diffusion  
   C. Filtration  
   D. Osmosis  
   E. Facilitated diffusion

12. ATP synthesis in glycolysis under anaerobic conditions takes place by means of substrate phosphorylation. In course of this process the energy of other high-energy compounds is used. Name such a substance:
   A. Phosphoenolpyruvate  
   B. Glucose 6-phosphate  
   C. Lactate  
   D. Pyruvate  
   E. Glucose

13. Electronic microscopy of a cell revealed mitochondrial destruction. What processes are disturbed?
   A. ATP synthesis  
   B. Protein biosynthesis  
   C. Glycolysis  
   D. Synthesis of nucleic acids  
   E. Fat synthesis

   A patient has taken a large dose of a barbiturate hypnotic (amytal) that inhibits NAD-dependent dehydrogenase of the respiratory chain. What process running in the mitochondria will be disturbed?
   A. ATP synthesis  
   B. Glycogen synthesis  
   C. Amino acid synthesis  
   D. Lipide synthesis  
   E. Glucose synthesis

14. A drug which inhibits ATP synthesis in a cell has been used during an experiment. What type of transmembrane transport will be disturbed?
   A. Active  
   B. Diffusion  
   C. Osmosis  
   D. Filtration  
   E. Facilitated diffusion

15. What mediator provides information transmission from nerve terminations of motoneurons to the fibers of skeletal muscles?
   A. Acetylcholine  
   B. Adrenaline  
   C. Noradrenaline  
   D. Serotonin  
   E. GABA

16. For treatment of the psychosis a patient was administered the neuroleptic aminazine. The main way of its biotransformation in the organism is induction of microsomal oxidation. Specify the principal component of this system:
   A. Cytochrome R-450  
   B. Cytochrome C  
   C. Cytochrome oxidase  
   D. NAD-dehydrogenase  
   E. CoQ-reductase

17. Under anaerobic conditions during glycolysis ATP is synthesized by the way of substrate phosphorylation. This process uses energy of other high-energy compounds. Specify one of such compounds:
   A. Phosphoenolpyruvate  
   B. Glucose 6-phosphate
18. A patient with signs of cardiac glycosides intoxication was prescribed Unithiol. What is the mechanism of drug action in this case?
A. Reactivation of membrane _+, Na+_adenosine triphosphatase  
B. Binding of ionized Ca2+  
C. Increased permeability of K+ into myocardocytes  
D. Increased Na+ content in myocardium  
E. Induction of cardiac glycoside metabolism

19. Examination of a patient revealed an increase in 17-ketosteroid concentration in urine. Hydroxylation of 17-ketosteroids is possible with the enzymes of the following system:
A. Microsomal oxidation  
B. Krebs cycle  
C. Protein synthesis system  
D. Pentose phosphate cycle  
E. Ornithine cycle

20. Barbiturates are used as soporifics. These substances, similarly to rotenone, are tissue respiration inhibitors. What complex level do these compounds suppress respiratory chain at?
A. NADH-coenzyme Q reductase  
B. Cytochrome oxidase  
C. Cytochrome C reductase  
D. Adenosine triphosphate synthetase  
E. Succinate dehydrogenase

21. Passive and active transport of substances is realized through the cell membrane. Name the type of active transport by which the membrane changes its structure:
A. Endocytosis  
B. Osmosis  
C. Filtration  
D. Diffusion  
E. Facilitated diffusion

22. Nutrients are transported to a bacterial cell by different mechanisms. One of them is facilitated diffusion that is realized by special membrane carrier proteins. What are they called?
A. Permeases  
B. Lyases  
C. Oxidoreductases  
D. Isomerases  
E. Ligases

23. Stable contraction of myofibrilla of muscle fibers takes place due to accumulation of the following ions in the cytoplasm:
A. Calcium  
B. Potassium  
C. Sodium  
D. Magnesium  
E. Hydrogen

24. Universal system of biological oxidation of nonpolar compounds (numerous drugs, toxic agents, steroid hormones, cholesterol) is microsomal oxidation. Name the cytochrome that is included in oxygenase chain of microsomes:
A. Cytochrome P-450  
B. Cytochrome C  
C. Cytochrome A3  
D. Cytochrome A  
E. Cytochrome C1

Змістовий модуль 3: Метаболізм вуглеводів та його регуляція

<table>
<thead>
<tr>
<th>Тест</th>
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| 1. The end product of starch hydrolysis is:  
A. D-glucose  
B. D-fructose |
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<td>2.</td>
<td>Addison’s (bronze) disease is treated with glucocorticoids. Their effect is provided by the potentiation of the following process:</td>
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<tr>
<td></td>
<td>A. Gluconeogenesis</td>
<td>B. Glycolysis</td>
<td>C. Pentose phosphate cycle</td>
<td>D. Glycogenolysis</td>
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<td>Introduction of glucocorticoids induces strengthening of glucose concentration in blood. Which of the following processes will be activated in liver?</td>
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<tr>
<td></td>
<td>A. Gluconeogenesis</td>
<td>B. Glycogenolysis</td>
<td>C. Oxidation of fatty acids</td>
<td>D. Ketogenesis</td>
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<td>3.</td>
<td>A patient was admitted to a hospital in a state of hypoglycemic coma. It occurs at the following level of blood glucose:</td>
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<tr>
<td></td>
<td>A. 2.5 mmol/l or less</td>
<td>B. 4.0 mmol/l</td>
<td>C. 3.3 mmol/l</td>
<td>D. 4.5 mmol/l</td>
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<td>4.</td>
<td>A patient has been found to have sugar in the urine. Blood glucose is normal. Arterial pressure is normal. What is the mechanism of glycosuria development in this case?</td>
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<td></td>
<td>A. Disturbance of glucose reabsorption in the nephron tubules</td>
<td>B. Insulin deficiency</td>
<td>C. Hyperfunction of adrenal medulla</td>
<td>D. Hyperfunction of thyroid gland</td>
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<td>5.</td>
<td>Name the disaccharide with the following structure:</td>
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<tr>
<td></td>
<td>A. β-lactose</td>
<td>B. α-lactose</td>
<td>C. β-maltose</td>
<td>D. β-cellulose</td>
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<td>6.</td>
<td>One of the cyclic glucose forms is as follows: Name this compound:</td>
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</tr>
<tr>
<td></td>
<td>A. α-D-glucopyranose</td>
<td>B. β-D-glucopyranose</td>
<td>C. α-L-glucopyranose</td>
<td>D. α-D-glucofuranose</td>
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<td>7.</td>
<td>The 49-year-old female patient suffering long-term from pancreatic diabetes has developed the following symptoms after administering insulin: weakness, facial pallor, palpitation, anxiety, double vision, numbness of lips and tongue apex. Glucose molar concentration in blood was 2.5 mmol/l. What complication has developed in the patient?</td>
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<tr>
<td></td>
<td>A. Hypoglycemic coma</td>
<td>B. Hyperosmolar coma</td>
<td>C. Hypoglycemic coma</td>
<td>D. Hyperketonemic coma</td>
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<td>8.</td>
<td>Caffeine inhibits phosphodiesterase which converts cAMP to AMP. The most typical feature of caffeine intoxication is the reduced intensity of:</td>
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<tr>
<td></td>
<td>A. Glycogen synthesis</td>
<td>B. Protein phosphorylation</td>
<td>C. Pentose phosphate pathway</td>
<td>D. Glycolysis</td>
</tr>
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</tbody>
</table>
E. Lipolysis
Food rich in carbohydrates at first increases the blood glucose and then decreases its rate due to the insulin action. What process is activated by this hormone?
A. Synthesis of glycogen
B. Gluconeogenesis
C. Breakdown of glycogen
D. Breakdown of proteins
E. Breakdown of lipids

9. Three enumerated test tubes contain solutions of glucose, fructose and starch. What reagent can help to detect fructose?
A. Selivanov’s
B. Lugol’s
C. Fehling’s
D. Chempure
E. Tollens’

10. What of the following compounds belongs to ketose representatives?
A. Fructose
B. Mannose
C. Iodose
D. Galactose
E. Talose

11. During starvation the normal rate of glucose in blood is sustained due to the gluconeogenesis stimulation. Which of the following substances can be used as a source for glucose synthesis?
A. Alanine
B. Adenine
C. Ammonia
D. Nicotinamide
E. Urea

12. The given reaction is called:

\[
\text{C}_6\text{H}_{12}\text{O}_6 \xrightarrow{\text{enzymes}} 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2?
\]
A. Alcohol fermentation of glucose
B. Glucose hydrolysis
C. Glucose oxidation
D. Lactic-acid fermentation of glucose
E. Glucose reduction

13. Alpha-cells of pancreas stimulate synthesis of the glucagon hormone that is involved into the carbohydrate metabolism. It has the following effect on liver processes:
A. Activates glycogenolysis
B. Activates alcoholic fermentation
C. Inhibits glycogenolysis
D. Inhibits glycolysis
E. Activates lypogenesis

14. A patient presents with Kussmaul’s respiration, acetone smell from the mouth; low tonus of eyeballs, myotic pupils, dry skin, polyuria, glycosuria, hyperglycemia. Such symptom complex is typical for the following coma:
A. Diabetic
B. Hepatic
C. Alimentary dystrophic
D. Hypoglycemic
E. Adrenal
2. **Ketoacidosis occurs during starvation.** What metabolite blood concentration increase is symptomatic of this medical condition?
   - A. Acetoacetate
   - B. Oxaloacetate
   - C. Malonate
   - D. Beta-hydroxy-beta-methylglutaryl-CoA
   - E. Acetyl-CoA

3. Diabetes and starvation cause the excess production of ketone bodies that are used as an energy source. They are produced from the following compound:
   - A. Acetyl-CoA
   - B. Isocitrate
   - C. Lactate
   - D. Malate
   - E. Ketoglutarate

4. The patient uses a daily basis for several raw eggs, which contain antivitamin biotin - avidin. Violations of any phase of lipid metabolism might arise?
   - A. Fatty acid biosynthesis
   - B. Cholesterol biosynthesis
   - C. Lipid absorption
   - D. Glycerol oxidation
   - E. Lipid transport in blood

5. The most severe and dangerous complication of diabetes mellitus is hypoglycemic comathatis characterized by loss of consciousness and is lethal, unless efficient emergency treatment is received by patient. What is the main pathogenetic component of hypoglycemic coma?
   - A. Carbohydrated efficiency and low energy of cerebral neurons
   - B. Carbohydrated efficiency and low energy of myocardium cells
   - C. Blood hyperosmia
   - D. Noncompensated ketoacidosis
   - E. Respiratory alkalosis

6. A patient with atherosclerosis has been prescribed Linaetholum containing essential fatty acids. Which of the following acids is an essential part of the preparation?
   - A. Linolenic
   - B. Palmitic
   - C. Crotonic
   - D. Stearic
   - E. Oleic

7. During calculous cholecystitis attack the patient has developed the following symptoms: saponated feces and steatorrhea. What stage of fats metabolism is disrupted according to those symptoms?
   - A. Fat digestion, absorption and secretion
   - B. Fat absorption
   - C. Intermediary metabolism of fats
   - D. Fats metabolism in adipose tissue
   - E. Depositing disruption

8. Eicosanoids, hormone-like compounds, are used to stimulate labor and for contraception. What substances have such an effect?
   - A. Prostaglandines
   - B. Interleukines
   - C. Endorphines
   - D. Angiotensines
   - E. Enkephalines

9. Hyperlipemia can be observed in 2-3 hours after eating fatty food. 9 hours later lipid content normalizes again. How can this condition be characterized?
   - A. Alimentary hyperlipemia
   - B. Transport hyperlipemia
   - C. Hyperplastic obesity
   - D. Retention hyperlipemia
   - E. Hypertrophic obesity

10. A patient had an attack of calculous cholecystitis that was accompanied by saponated feces, steatorrhea. These
changes are the evidence of disturbance of the following stage of lipometabolism:
A. Digestion and absorption
B. Transport
C. Intermediary metabolism
D. Adipose tissue exchange
E. Depositing

11. When fats get into an organism they are digested and absorbed. What products of fat hydrolysis are absorbed in an intestine?
A. Glycerine, fatty acids
B. Amino acids
C. Monosaccharides
D. Lipoproteins
E. Polypeptides

12. A patient was prescribed L-carnitine preparation. This preparation provides transmembrane transfer of the following substances:
A. Higher fatty acids
B. Amino acids
C. Purine nucleotides
D. Pyrimidine nucleotides
E. Glucose

A patient has been administered L-carnitine. This preparation ensures transmembrane transfer of the following substances:
A. Higher fatty acids
B. Amino acids
C. Purine nucleotides
D. Pyrimidine nucleotides
E. Glucose

13. Natural fats have liquid or solid consistence. What is the main cause of their existence in this or that aggregate state:
A. Ratio of saturated and unsaturated acids
B. Presence of hydrogen bonds
C. Molecule sizes
D. Molecule solvation
E. Way of production

14. Ligation of the common bile duct in an experimental animal results in block of bile inflow to the duodenum. This will cause the failure of hydrolysis of the following substances:
A. Fats
B. Carbohydrates
C. Proteins
D. Fats and carbohydrates
E. Proteins and carbohydrates

15. Inhibition of the synthesis of bile acids from cholesterol in liver of an experimental animals has caused maldigestion of lipids. What is the role of these acids in the enteral lipidic metabolism?
A. They emulsiﬁy dietary lipids
B. They keep balance of alkaline environment in the gut
C. They participate in the synthesis of lipids
D. They are part of LDL
E. They activate the formation of chylomicrons

16. A patient was prescribed with bile preparation for the purpose of improvement of rich food digestion. What components of this preparation take part in fat emulsification?
A. Bile acids
B. Cholesterol and its ethers
C. Diglyceride
D. Bilirubin-glucuronids
E. Higher fatty acids

17. A patient has high concentration of chylomicrons in blood, especially after taking fatty food. He has also type I hyperlipoproteinemia that resulted from deficiency of the following enzyme:
A. Lipoprotein lipase
B. Adenylate cyclase
C. Protein kinase  
D. Phospholipase C  
E. Prostaglandin synthetase  

18. A man has symptoms of cardiovascular atherosclerosis. The most probable characteristic of this state will be growth of the following biochemical value:  
A. Concentration of low-density lipoproteins  
B. Concentration of high-density lipoproteins  
C. Concentration of chylomicrons  
D. LDH5 activity  
E. Activity of pancreatic lipase

19. A patient has been administered a competitive inhibitor of cholinesterase. Name it:  
A. Proserin  
B. Aspirin  
C. Sodium diclofenac  
D. Indometacin  
E. Allopurinol

20. A patient suffers from the cerebral atherosclerosis. Blood count showed hyperlipoproteinemia. You will most likely observe increase in the concentration of the following plasma lipoprotein class:  
A. Low-density lipoproteins  
B. High-density lipoproteins  
C. Chylomicrons  
D. Globulin complexes with steroid Hormones  
E. Fatty acid complexes with albumines  
A 70-year-old patient has been found to have atherosclerosis of heart and rain vessels. Examination revealed the changes in the lipid profile. Pathogenesis of atherosclerosis is greatly influenced by an increase in the following lipoproteins rate:  
A. Low-density lipoprotein  
B. Very-low-density lipoproteins  
C. Intermediate-density lipoproteins  
D. High-density lipoprotein  
E. Chylomicrons  
A 70-year-old patient presents with Cardiac and cerebral atherosclerosis. Examination revealed changes of blood lipidspectre. Increase of the following lipoproteins plays a significant role in atherosclerosis pathogenesis:  
A. Low-density lipoproteins  
B. Very low-density lipoproteins  
C. Intermediate density lipoproteins  
D. High-density lipoproteins  
E. Chylomicrons

21. Examination of a patient revealed an increase in low-density lipoprotein concentration in blood serum. The patient can be expected to have the following disease:  
A. Atherosclerosis  
B. Pneumonia  
C. Glomerulonephritis  
D. Acute pancreatitis  
E. Gastritis

22. Transport form of lipids in blood are lipoproteins. Cholesterol is transported to the liver mostly in form of:  
A. High-density lipoproteins  
B. Low-density lipoproteins  
C. Very-low-density lipoproteins  
D. Interferons  
E. Albumins

23. Bile contains of bile acids. choose one of them:  
A. Cholic  
B. Glutamine  
C. Lactic  
D. Arachidonic
24. Fatty food is digested by means of several digestive juices. Which of them enables fat emulsification?
A. Bile  
B. Saliva  
C. Intestinal juice  
D. Gastric juice  
E. Pancreatic juice

25. Inflammatory processes in the gall bladder exert negative influence on the colloidal properties of bile. This may lead to gallstone formation. One of the causes of their formation is the crystallization of the following substance:
A. Cholesterol  
B. Albumine  
C. Haemoglobin  
D. Urates  
E. Oxalates

26. Intracellular metabolism of glycerol starts with its activation. What compound is formed in the first reaction of its conversion?
A. α-glycerolophosphate  
B. Pyruvate  
C. Lactate  
D. Choline  
E. Acetyl-coenzymeA

27. To prevent fatty degeneration of liver after viral hepatitis, a patient should be administered lipotropic factors. Indicate one of them:
A. Choline  
B. Tryptophane  
C. Allopurinol  
D. Contrical  
E. Vicasol

28. The second stage of detoxification involves joining certain chemical compounds with functional groups of toxines. Select one such compound:
A. Glucuronic acid  
B. Higher fatty acids  
C. Cholesterol  
D. Glucose  
E. Pyruvate

29. A patient with type I diabetes mellitus developed hyperketonemic coma. What acid-base imbalance will be observed in the patient?
A. Nongaseous acidosis  
B. Gaseous acidosis  
C. Nongaseous alkalosis  
D. Gaseous alkalosis  
E. There will be no acid-base imbalance

Змістовий модуль 5: Обмін простих та складних білків. Біохімічні аспекти. Молекулярної біології та генетики

<table>
<thead>
<tr>
<th>Тест</th>
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</thead>
</table>
| 1. Purine ring biosynthesis occurs in ribose-5-phosphate by gradual accumulation of nitrogen and carbon atoms and closing the rings. The source of ribosephosphate is the process of: A. Pentose phosphate cycle  
B. Glycolysis  
C. Glycconeogenesis  
D. Gluconeogenesis  
E. Glycogenolysis |
| 2. The primary structure of nucleic acids is a polynucleotide chain which has a certain composition and order of the nucleotides. What bonds stabilize this structure? A. 3′,5′-phosphodiester  
B. Peptide  
C. Glycosidic  
D. Disulfide |
3. Natural peptides can perform various functions. What bioactive peptide is a major antioxidant and performs coenzyme functions?
   A. Glutathione  
   B. Bradykinin  
   C. Oxytocin  
   D. Liberin  
   E. Anserine

4. Cataract (lenticular opacity) has developed in the 52-year-old female patient with pancreatic diabetes. What process intensification has caused lenticular opacity?
   A. Protein glycosylation  
   B. Lipolysis  
   C. Ketogenesis  
   D. Protein proteolysis  
   E. Gluconeogenesis

5. Patients with severe depression demonstrate decreased serotonin levels in brain and cerebrospinal fluid. What aminoacid is a serotonin precursor?
   A. Tryptophan  
   B. Threonine  
   C. Tyrosine  
   D. Glutamic acid  
   E. Aspartic acid

6. Chromatin contains positively charged histoneproteins. What aminoacid is contained in histoneproteins in large amounts?
   A. Lysine  
   B. Alanine  
   C. Valine  
   D. Threonine  
   E. Serine

7. Streptomycin and other aminoglycosides by binding with 30S subunit of ribosome prevents formylmethionyl-tRNA joining. What process is disrupted due to this effect?
   A. Translation initiation  
   B. Translation termination  
   C. Transcription initiation  
   D. Transcription terminat  
   E. Peprication

8. In response to the administration of protein drugs, a patient developed an allergic reaction. The development of the allergic reaction is caused by the increased synthesis of the following compound:
   A. Histamine  
   B. Choline  
   C. Adrenaline  
   D. Histidine  
   E. Serotonin

9. Hemoglobin catabolism results in release of iron which is transported to the bone marrow by a certain transfer protein and is used again for the synthesis of hemoglobin. Specify this transfer protein:
   A. Transferrin(siderophilin)  
   B. Transcobalamin  
   C. Haptoglobin  
   D. Ceruloplasmin  
   E. Albumin

10. During long-term carbon tetrachloride poisoning of animals significant activity drop of aminoacyl tRNA synthetase in hepatocytes was detected. What metabolic process is disrupted in this case?
    A. Protein biosynthesis  
    B. DNA replication  
    C. RNA transcription  
    D. Post-translational modification of peptides  
    E. Post-transcriptional modification of RNA

11. Nucleoproteins contain significant amount of alkaline proteins. What proteins carry out structural function in chromatin?
<table>
<thead>
<tr>
<th></th>
<th>A. Protamines and histones</th>
<th>B. Albumines and globulines</th>
<th>C. Prolamines and glutenins</th>
<th>D. Hemoglobin and myoglobin</th>
<th>E. Interferones and mucin</th>
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<tr>
<td>12.</td>
<td>Chronic pancreatitis is accompanied by the decreased synthesis and secretion of trypsin. This impairs the hydrolysis and absorption of the following substances:</td>
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<tr>
<td></td>
<td>A. Proteins</td>
<td>B. Lipids</td>
<td>C. Polysaccharides</td>
<td>D. Nucleic acids</td>
<td>E. Disaccharides</td>
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<td>13.</td>
<td>Blood serum electrophoresis revealed interferon. This protein is in the following fraction:</td>
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<tr>
<td></td>
<td>A. γ-globulins</td>
<td>B. α1-globulins</td>
<td>C. α2-globulins</td>
<td>D. β-globulins</td>
<td>E. Albumins</td>
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<td>14.</td>
<td>Blood pressure is regulated by a number of biologically active compounds. What peptides that enter the bloodstream can affect the vascular tone?</td>
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<td></td>
<td>A. Kinins</td>
<td>B. Leukotrienes</td>
<td>C. Enkephalins</td>
<td>D. Iodothyronines</td>
<td>E. Endorphins</td>
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<td>15.</td>
<td>Interferons are natural antiviral and antitumor agents. What is their mechanism of action?</td>
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<tr>
<td></td>
<td>A. Proteinsynthesis depression</td>
<td>B. Proteinsynthesis increase</td>
<td>C. Replication activation</td>
<td>D. Transcription activation</td>
<td>E. Repair activation</td>
</tr>
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<td>16.</td>
<td>Uric acid is a derivative of:</td>
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<tr>
<td></td>
<td>A. Purine</td>
<td>B. Indole</td>
<td>C. Pyrazine</td>
<td>D. Pyrazole</td>
<td>E. Pyridine</td>
</tr>
<tr>
<td>17.</td>
<td>Tryptophan amino acid is a derivative of:</td>
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</tr>
<tr>
<td></td>
<td>A. Indole</td>
<td>B. Coumarin</td>
<td>C. Pyridine</td>
<td>D. Imidazole</td>
<td>E. Purine</td>
</tr>
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<td>18.</td>
<td>Structure of proteins includes proteinogenic amino acids. What is the position of the amingroup in the structure of these amino acids?</td>
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<tr>
<td></td>
<td>A. α-position</td>
<td>B. β-position</td>
<td>C. γ-position</td>
<td>D. δ-position</td>
<td>E. σ-position</td>
</tr>
</tbody>
</table>
19. L-DOPA and its derivatives are used in treatment of Parkinson’s disease. What aminoacid is this substance made of?
A. Tyrosine  
B. Asparagine  
C. Glutamate  
D. Tryptophan  
E. Arginine

Alkaptonuria is characterized by an excessive urinary excretion of homogentisic acid. Development of this disease is associated with disorder of the following amino acid metabolism:
A. Tyrosine  
B. Tryptophan  
C. Alanine  
D. Methionine  
E. Asparagine

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

20. A patient with ischemic heart disease has been administered inosine which is an intermediate metabolite in the synthesis of:
A. Purine nucleotides  
B. Metalloproteins  
C. Lipoproteins  
D. Glycoproteins  
E. Ketone bodies

21. Purine ring biosynthesis occurs in ribose-5-phosphate through gradual accumulation of nitrogen and carbon atoms and closing of the rings. The source of ribose phosphate is the process of:
A. Pentose phosphate cycle  
B. Glycolysis  
C. Glyconeogenesis  
D. Gluconeogenesis  
E. Glycogenolysis

22. An oncological patient was prescribed fluorouracil that is a competitive inhibitor of thymidine synthase. It inhibits the process of:
A. Pyrimidine nucleotides synthesis  
B. Carbohydrate disintegration  
C. Purine nucleotides synthesis  
D. Purine nucleotides disintegration  
E. Lipids synthesis

23. Patient’s joints are enlarged, look like thickened disfigured knots. Blood analysis revealed high concentration of uric acid and its salts. This state is caused by metabolic disorder of the following substances:
A. Purines  
B. Pyrimidines  
C. Porphyrines  
D. Cholesterol  
E. Phospholipids

24. Natural peptides can perform various functions. What bioactive peptide is a major antioxidant and fulfills coenzyme functions?
A. Glutathione  
B. Bradykinin  
C. Oxytocin  
D. Liberin  
E. Anserine
25. Gout develops when purine nucleotide metabolism is disturbed. A doctor prescribed the patient allopurinol that is a competitive inhibitor of:
   A. Xanthine oxidase
   B. Succinate dehydrogenase
   C. Alcohol dehydrogenase
   D. Lactate dehydrogenase
   E. Hexokinase

26. Avidin - an egg white protein - inhibits reception of biotin (carboxylase coenzyme) by the body. What reaction will be blocked by avidin administration?
   A. CO2 attachment to pyruvate
   B. NH3 attachment to glutamate
   C. NH3 detachment from glutamine
   D. Detachment of phosphate residuals
   E. Beta-oxidation of fatty acids

27. During routine preventive examination the local pediatrician noticed a boy of short stature. Mental development of the child corresponds with his age. What endocrine disorder is it?
   A. Pituitary nanism
   B. Cretinism
   C. Acromegalia
   D. Gigantism
   E. Rickets

28. A 55-year-old man came to a doctor with complaints of acute pain in his big toes. Meat and wine remain permanently in his diet. The doctor suspects gout. What substance must be measured in the patient’s blood to confirm this diagnosis?
   A. Uric acid
   B. Urea
   C. Lactate
   D. Bilirubin
   E. Ketone bodies

29. 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

   A 56-year-old patient complains about limitation of movements and pain in hand joints, mainly at night. Objectively: there is a disfiguring painful swelling of affected joints. Blood and urine have high concentration of uric acid. What disease has developed?
   A. Gout
   B. Pellagra
   C. Phenylketonuria
   D. Alkaptonuria
   E. Tyrosinosis

30. Final urine is generated as a result of three sequential processes. Name the most credible sequence:
   A. Filtration, reabsorption, secretion
   B. Secretion, filtration, reabsorption
   C. Reabsorption, filtration, secretion
   D. Secretion, reabsorption, filtration

31. To the membrane proteins that contact with this or that biologically active substance transmitting information into the cell belong:
   A. Receptor proteins
   B. Pump proteins
   C. Enzyme proteins
   D. Channel proteins
   E. Glycocalix

32. Pharmaceutical preparations of protein hydrolysate are applied for parenteral proteinic feeding. Hydrolysates are of full value if they contain essential amino acids. Which of the following amino
Amino acids relates to the essential ones:
A. Methionine  
B. Cysteine  
C. Alanine  
D. Serine  
E. Glycine

Active form of one of the sulphurcontaining amino acids can be used as a methyl group donor for the drug methylatation. Specify this amino acid:
A. Methionine  
B. Glycin  
C. Glutamine  
D. Tyrosine  
E. Glutamate

### 33. Albinism
Albinism is characterized by lacking formation of melanin in an organism. This disease is caused by metabolic disorder of the following amino acid:
A. Phenylalanine  
B. Methionine  
C. Alanine  
D. Glutargine  
E. Asparagine

A patient has an increased concentration of hippuric acid in the urine. This acid is the product of benzoic acid detoxification in the liver of. In the human body benzoic acid is formed from the following amino acid:
A. Phenylalanine  
B. Succinate  
C. Lactate  
D. Aspartate  
E. Malate

### 34. Isoelectric point
Isoelectric point of protein equals 8.3. Electrophoretic mobility of protein macromolecule will be equal to zero if $pH$ value is:
A. 8.3  
B. 7.0  
C. 11.5  
D. 2.3  
E. 4.7

### 35. Transamination
Transamination is the biochemical process in which amino groups of different amino acids take form of one of the amino acids. What amino acid is it?
A. Glutamic  
B. Glycine  
C. Valine  
D. Leucine  
E. Arginine

### 36. Aminotransferases
Aminotransferases are the enzymes that transfer an amino group from one compound to another. What compound is the acceptor of amino groups?
A. $\alpha$-ketoglutaric acid  
B. Acetone  
C. Lactic acid  
D. Succinic acid  
E. Butyric acid

### 37. Gluconeogenesis
An important role during starvation on diet belongs to gluconeogenesis that helps to maintain normal rate of glucose in blood. Name the main substrate of this process:
A. Aminoacids  
B. Cholesterol  
C. Nucleic acids  
D. Bile acids  
E. Acetone

### 38. Buffer properties
Some proteins in the human organism have buffer properties. Which aminoacid allows hemoglobine to reveal its buffer properties in blood?
A. Histidine  
B. Alanine  
C. Isoleucine  
D. Valine  
E. Threonine

<table>
<thead>
<tr>
<th>39.</th>
<th>Which of these chemical substances <strong>CANNOT</strong> act as an excitatory neurotransmitter in the central nervous system?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Glycine</td>
</tr>
<tr>
<td>B.</td>
<td>Serotonin</td>
</tr>
<tr>
<td>C.</td>
<td>Noradrenaline</td>
</tr>
<tr>
<td>D.</td>
<td>Substance P</td>
</tr>
<tr>
<td>E.</td>
<td>Dopamine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>40.</th>
<th>Alkaptonuria is characterized by an excessive urinary excretion of homogentisic acid. Development of this disease is associated with disorder of the following amino acid metabolism:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Tyrosine</td>
</tr>
<tr>
<td>B.</td>
<td>Tryptophan</td>
</tr>
<tr>
<td>C.</td>
<td>Alanine</td>
</tr>
<tr>
<td>D.</td>
<td>Methionine</td>
</tr>
<tr>
<td>E.</td>
<td>Asparagine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>41.</th>
<th>A patient was diagnosed with anacystic gastritis. What enzyme activity will be reduced?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Pepsin</td>
</tr>
<tr>
<td>B.</td>
<td>Amylase</td>
</tr>
<tr>
<td>C.</td>
<td>Lipase</td>
</tr>
<tr>
<td>D.</td>
<td>Chemotrypsin</td>
</tr>
<tr>
<td>E.</td>
<td>Trypsin</td>
</tr>
</tbody>
</table>

During gastric secretory function research decrease of hydrochloric acid concentration in gastric juice was detected. What enzyme will be less active in such a condition?  
| A.  | Pepsin                                                                                       |
| B.  | Amylase                                                                                      |
| C.  | Lipase                                                                                       |
| D.  | Dipeptidase                                                                                 |
| E.  | Hexokinase                                                                                  |

During the gastric secretion, proteolytic enzymes are secreted in form of zymogens. What enzyme is activated by hydrochloric acid?  
| A.  | Pepsin                                                                                       |
| B.  | Trypsin                                                                                      |
| C.  | Amylase                                                                                      |
| D.  | Lipase                                                                                       |
| E.  | Chymotrypsin                                                                                |

Study of secretory function of stomach revealed a decrease in hydrochloric acid concentration in gastric juice. This must cause hypoactivity of the following enzyme:  
| A.  | Pepsin                                                                                       |
| B.  | Hexokinase                                                                                  |
| C.  | Amylase                                                                                      |
| D.  | Lipase                                                                                       |
| E.  | Dipeptidase                                                                                 |

<table>
<thead>
<tr>
<th>42.</th>
<th>What segment of digestive tract secretes digestive juice that has acid reaction?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Stomach</td>
</tr>
<tr>
<td>B.</td>
<td>Oral cavity</td>
</tr>
<tr>
<td>C.</td>
<td>Small intestine</td>
</tr>
<tr>
<td>D.</td>
<td>Large intestine</td>
</tr>
<tr>
<td>E.</td>
<td>Esophagus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>43.</th>
<th>It is known that digestion of proteins, fats and carbohydrates happens due to protease, lipase and amylase respectively. What digestive juice contains all three enzyme groups enough for digestion?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Juice of pancreas</td>
</tr>
<tr>
<td>B.</td>
<td>Saliva</td>
</tr>
<tr>
<td>C.</td>
<td>Gastric juice</td>
</tr>
</tbody>
</table>
D. Bile  
E. Juice of large intestine

It is known that the digestion of proteins, fats and carbohydrates is possible due to the protease, lipase and amylase respectively. What digestive juice contains the enough supply of all the groups of enzymes?

A. Pancreatic  
B. Saliva  
C. Gastric  
D. Bile  
E. Gastric juice and bile

44. 150 ml of meat broth was introduced into the gastric cavity of an experimental dog through the feeding tube. This will result in rapid rise of concentration of the following hormone in the animal’s blood:

A. Gastrin  
B. Vasointestinal polypeptide  
C. Neurotensin  
D. Somatostatin  
E. Insulin

Increase in secretion of hydrochloric acid in the stomach of an experimental animal can be provoked by subcutaneous injection of the following gastrointestinal hormone:

A. Gastrin  
B. Secretin  
C. Cholecystokinin  
D. Somatostatin  
E. Motilin

45. Protein digestion in the stomach is carried out by pepsin secreted in form of an inactive pepsinogen. Pepsinogen is converted to pepsin by the removal of the N-terminal peptide that is provoked by:

A. Perchloric acid  
B. Sulfuric acid  
C. Acetic acid  
D. Bile acids  
E. Amino acids

46. A 45-year-old patient complains of nausea, foul-smelling eructation, periodic vomiting, meteorism. Fractional analysis of the secretory function of stomach revealed the absence of hydrochloric acids and some enzymes. The patient has the following pathology of the gastrointestinal tract:

A. Achylia  
B. Hypochlorhydria  
C. Hypoacidic state  
D. Achlorhydria  
E. Anacidic state

47. Digestion of proteins in the digestive tract is a complex process of their hydrolysis till peptides and free amino acids. What enzymes decompose proteins in the duodenum?

A. Trypsin, chemotrypsin  
B. Enterokinase, lipase  
C. Amylase, maltase  
D. Pepsin, gastricsin  
E. Lipase, phospholipase

48. A patient with obstructive jaundice presents with bradycardia, low arterial pressure, itching, irritability, asthenia. What is the cause of these presentations?

A. Cholemia  
B. Anacholia  
C. Hypercholesterolemia  
D. Hypocholesterolemia  
E. Hyperbilirubinemia

49. In order to prevent adipose liver degeneration after viral hepatitis it is necessary to prescribe the patient lipotrophic factors. Name one of them:

A. Choline  
B. Tryptophane  
C. Allopurinol  
D. Contrical
50. Biochemical meaning of transamination is that amino groups of different aminoacids are assembled in form of one of aminoacids. What aminoacid is it?
   A. Glutamine  
   B. Asparaginic  
   C. Valine  
   D. Leucine  
   E. Arginine

51. A number of hereditary diseases is caused by mutations in gene areas that determine beginning or end of an intron. What process results in removal of introns and joining of exons?
   A. Splicing  
   B. Transcription  
   C. Recombination  
   D. Replication  
   E. Translation

52. Gastric juice of a patient has decreased concentration of enzymes. What secretory cells of stomach display dysfunction?
   A. Chief cells of glands  
   B. Parietal cells of glands  
   C. Gland mucocytes  
   D. Cells of tegumental epithelium  
   E. G-cells

53. It is required to measure the nitrogen metabolism in a person under observation who is recovering from continuous starvation. What result is most likely to be expected?
   A. Decrease in nitrogen secretion  
   B. Nitrogen equilibrium  
   C. Negative nitrogen balance  
   D. Acetonemia  
   E. -

54. 3 years ago a patient was diagnosed with chronic glomerulonephritis. The patient has got multiple edemata within the last 6 months. What is the cause of their development?
   A. Proteinuria  
   B. Hyperaldosteronism  
   C. Injection of non-steroidal antiinflammatory preparations  
   D. Glucocorticoid treatment  
   E. Vasopressin hyperproduction

55. Ammonia is generated in different tissues and organs and then transported to liver for detoxication and conversion into urea. What amino acid transports it from skeletal muscles to liver?
   A. Alanine  
   B. Histidine  
   C. Glycin  
   D. Serine  
   E. Valine

56. A child exhibits physical and mental retardation. Urine analysis revealed high concentration of orotic acid. This disease can be addressed by the constant use of:
   A. Uridine  
   B. Adenine  
   C. Guanine  
   D. Glutamine  
   E. Alanine

Змістовий модуль 6: Молекулярні механізми дії гормонів та вітамінів

Тест

1. Fatty acids arrive into mitochondria, and there the iroxidation occurs. Name the vitamin-like substance that takes part in transportation of fatty acids through mitochondrial membrane:
   A. Carnitine  
   B. Choline  
   C. Biotin  
   D. Pantothenicacid  
   E. Folic acid
2. A patient has been receiving Theophylline (inhibitor of cyclicadenosinemonophosphate phosphodiesterase) for a week. What hormone can increase its action due to such treatment and cause hyperglycemia?
   A. Glucagon
   B. Testosterone
   C. Aldosterone
   D. Insulin
   E. Estradiol

3. Fatty acids synthesis occurs in the human body. What compound is initial in this process?
   A. AcetylcoenzymeA
   B. Vitamin C
   C. Glycine
   D. Succinate
   E. Cholesterol

4. A patient has a mental disorder due to the insufficient synthesis of gamma-aminobutyric acid in the brain. Such pathological changes might be caused by the deficiency of the following vitamin:
   A. Pyridoxine
   B. Tocopherol
   C. Cyanocobalamin
   D. Folic acid
   E. Riboflavin

5. A 30 year-old patient suffering from pulmonary tuberculosis, has been prescribed isoniazid. Continuous taking of this drug may lead to the deficiency of the following vitamin:
   A. Pyridoxine
   B. Tocopherol
   C. Cobalamin
   D. Ergocalciferol
   E. Retinol

6. In large intestine microorganisms synthesize vitamins that participate in organism’s biochemical processes. What vitamins are mainly synthesized by microflora?
   A. K, B12
   B. A, C
   C. E, PP
   D. B1, B2
   E. B6, E

7. The patient has hypovitaminosis PP. What amino acid taken with meals partially compensates patient’s need for vitamin PP?
   A. Tryptophan
   B. Phenylalanine
   C. Valine
   D. Arginine
   E. Methionine

8. The poultry factory worker, who has been consuming 5 or more raw eggs daily, complains of weakness, drowsiness, muscle pain, loss of hair, seborrhea. What vitamin deficiency causes such condition?
   A. H (biotin)
   B. C (ascorbic acid)
   C. A (retinol)
   D. B1 (thiamine)
   E. B2 (riboflavin)

9. 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. Folic acid
   C. Pantothenic acid
   D. Ascorbate
   E. Thiamine

8. A patient has developed megaloblastic anemia on a background of alcoholic cirrhosis. The main cause of anemia in this patient is the following vitamin deficiency:
   A. Folic acid
9. Food rich in carbohydrates at first increases the blood sugar and then decreases its rate due to the insulin action. What process is activated by this hormone?
   A. Synthesis of glycogen
   B. Gluconeogenesis
   C. Breakdown of glycogen
   D. Breakdown of proteins
   E. Breakdown of lipids

10. Synthesis of steroid hormones arises from a precursor that contains cyclopentane perhydrophenantrene ring. Name this precursor:
    A. Cholesterine
    B. Acetyl-CoA
    C. Malonyl-CoA
    D. Levulinic acid
    E. Tyrosine

11. Vitamin B1 deficiency has a negative effect on a number of processes. This is caused by the dysfunction of the following enzyme:
    A. Pyruvate dehydrogenase complex
    B. Aminotransferase
    C. Succinate dehydrogenase
    D. Glutamate
    E. Lactate dehydrogenase

12. A 40-year-old male presented to the endocrinology department with disproportionate enlargement of limbs, mandible and nose. These manifestations are caused by the overproduction of the following hormone:
    A. Somatostatin
    B. Corticotropin
    C. Aldosterone
    D. Adrenaline
    E. Vasopressin

13. A patient exhibits small (petechial) hemorrhages under the skin and mucous membranes, bleeding gums, tooth decay, general weakness, edemata of the lower extremities. What vitamin deficiency can be suspected?
    A. C
    B. B1
    C. A
    D. D
    E. E

14. Urine analysis revealed a decrease in sodium ion concentration. Which hormone provides an enhanced reabsorption of sodium ions in the convoluted nephron tubules?
    A. Aldosterone
    B. Vasopressin
    C. Somatostatin
    D. Adrenaline
    E. Acetylcholine

Analysis of a patient’s urine showed an increase in Na⁺ ions concentration and a decrease is K⁺ ions concentration. This might be caused by the reduced secretion of the following hormone:
    A. Aldosterone
    B. Insulin
    C. Thyroxine
    D. Hydrocortisone
    E. Prolactin

15. A 40-year-old patient has developed polyuria (10-12 liters per day) and polydipsia induced by damage to the hypothalamo-hypophyseal tract. What hormone deficiency causes such disorders?
    A. Vasopressin
    B. Oxytocin
    C. Corticotropin
16. A 28-year-old male got a burn that caused an increase in spontaneous secretion of gastric juice. It is associated with secretion of the following substance:
A. Histamine
B. Secretin
C. Gastric inhibitory peptide
D. Cholecystokinin-Pancreozymin
E. Serotonin

Immediate-type allergies are characterized by degranulation of the tissue basophils that secrete biologically active substances. One of such substances is:
A. Histamine
B. Acetylcholine
C. Plasminogen
D. Hageman’s factor
E. Thromboxane

17. Food rich in carbohydrates at first increases the blood glucose and then decreases its rate due to the insulin action. What process is activated by this hormone?
A. Synthesis of glycogen
B. Gluconeogenesis
C. Breakdown of glycogen
D. Breakdown of proteins
E. Breakdown of lipids

18. A patient has developed megaloblastic anemia on a background of alcoholic cirrhosis. The main cause of anemia in this patient is the following vitamin deficiency:
A. Folic acid
B. Lipoic acid
C. Biotin
D. Thiamin
E. Pantothenic acid

The 56-year-old patient has developed megaloblastic anemia in the course of alcoholic cirrhosis. What vitamin deficiency is the main cause of anemia in this patient?
A. Folic acid
B. Lipoic acid
C. Biotin
D. Thiamine
E. Pantothenic acid

Sulfanilamides inhibit the growth and development of bacteria. The mechanism of their action is based on the impairment of the following acid synthesis:
A. Folic
B. Lipoic
C. Nicotinic
D. Pantothenic
E. Pangamic

19. The patient uses a daily basis for several raw eggs, which contain antivitamin biotin - avidin. Violations of any phase of lipid metabolism might arise?
A. Fatty acid biosynthesis
B. Cholesterol biosynthesis
C. Lipid absorption
D. Glycerol oxidation
E. Lipid transport in blood

20. Parents of a 10-year-old child have made an appointment with endocrinologist due to complaints of the child’s slow height. The child’s appearance is corresponding with that of a 5-year-old. What hormone causes such changes in physical development, if its secretion is disrupted?
A. Somatotropic hormone
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>B. Adrenocorticotropic hormone</strong></td>
<td></td>
</tr>
<tr>
<td><strong>C. Thyroxin</strong></td>
<td></td>
</tr>
<tr>
<td><strong>D. Testosterone</strong></td>
<td></td>
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<tr>
<td><strong>E. Insulin</strong></td>
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</tbody>
</table>

21. During ultrasound investigation a patient has been diagnosed with bilateral stenosis of renal artery with atherosclerotic genesis. Specify the bioactive substance that due to its excessive secretion is the key component of arterial hypertension pathogenesis in the given case:

   - A. Renin
   - B. Cortisol
   - C. Vasopressin
   - D. Noradrenaline
   - E. Thyroxin

22. A patient demonstrates symmetrical dermatitis on the palms. A doctor made a diagnosis of pellagra. What vitamin deficiency can result in such symptoms?

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

A patient has neurasthenic syndrome, diarrhea, dermatitis. This is associated with deficiency of the following vitamin:

   - A. Nicotinic acid
   - B. Vitamin K
   - C. Vitamin D
   - D. Folic acid
   - E. Vitamin B12

23. A patient consulted an ophthalmologist about deterioration of twilight vision and xerophthalmus. What drug should the doctor prescribe?

   - A. Retinol
   - B. Pyridoxine
   - C. Tocopherol
   - D. Ascorbic acid
   - E. Cocarboxylase

24. Diet of an individual must contain vitamins. What vitamin is usually prescribed for treatment and prevention of pellagra?

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

25. An elderly man exhibits low levels of red blood cells and hemoglobin in blood; however, his color index is 1.3. Blood smear analysis revealed megaloblasts. What type of anemia is observed in this case?

   - A. B12-folic acid deficiency
   - B. Iron-deficiency
   - C. Acquired hemolytic
   - D. Hereditary hemolytic
   - E. Chronic posthemorrhagic

26. A male patient who suffers from chronic intestinal obstruction has intensified putrefaction of proteins in the colon. What toxic substance originates from tryptophane in this case?

   - A. Indole
   - B. Bilirubin
   - C. Lactate
   - D. Kreatine
   - E. Glucose

27. A woman noticed that a cut on her skin was still bleeding even after 20 minutes had passed. What vitamin deficiency causes such condition?

   - A. Vitamin K
   - B. Vitamin A
   - C. Vitamin D
28. Isoniazid is an antituberculous drug derivative from:
   A. Isonicotinic acid
   B. Nicotinic acid
   C. Picolinic acid
   D. Pyrrole-2-carboxylic acid
   E. N-aminobenzoic acid

29. Increased concentration of active oxygen forms is a mechanism of pathogenesis in a number of diseases. To prevent this process, antioxidants are prescribed. Select an antioxidant from the list below:
   A. Alpha-tocopherol
   B. Glucose
   C. Calciferol
   D. Cobalmine
   E. Glicerol

30. The patient has mucosal dryness and mesopic vision disorder. What vitamin deficiency causes these symptoms?
   A. A
   B. P
   C. E
   D. C
   E. D

31. Sulfanilamides are widely used as bacteriostatic agents. The mechanism of antimicrobial action of sulfanilamides is based on their structural similarity to:
   A. Para-aminobenzoic acid
   B. Glutamic acid
   C. Folic acid
   D. Nucleic acid
   E. Antibiotics

32. After an insulin injection a 45-year old female with a long history of diabetes mellitus has developed weakness, paleness, palpitation, anxiety, double vision, numbness of lips and the tip of tongue. Blood glucose is at the rate of 2,5 mmol/l. What complication has developed in the patient?
   A. Hypoglycemic coma
   B. Hyperosmolar coma
   C. Hyperglycemic coma
   D. Hyperketonemic coma
   E. Uremic coma
33. A parturient woman diagnosed with uterine inertia has been delivered to the maternity ward. The doctor gave her an injection of the drug that activates the contraction of smooth muscles of the uterus. What hormone is a component of this drug?
   A. Oxytocin  
   B. Gastrin  
   C. Secretin  
   D. Angiotensin  
   E. Bradykinin

   A woman in labour was given a preparation that activates contractions of smooth uterine muscles. What hormone is contained in this preparation?
   A. Oxytocin  
   B. Gastrin  
   C. Secretin  
   D. Angiotensin  
   E. Bradykinin

34. Parents of a 10-year-old child have made an appointment with an endocrinologist due to complaints of the child’s low height. The child’s appearance is corresponding with that of a 5-year old. What hormone causes such changes in physical development, if its secretion is disturbed?
   A. Somatotropic hormone  
   B. Adrenocorticotropic hormone  
   C. Thyroxin  
   D. Testosterone  
   E. Insulin

35. Examination of a patient revealed reddening of oral mucosa, cracks on the lips and mouth corners, face skin dryness and desquamation, conjunctiva inflammation, vasculature invasion into the cornea. The possible cause of this pathology is the deficit of the following vitamin:
   A. B2  
   B. C  
   C. E  
   D. K

36. Sulfonamides are widely used as bacteriostatic agents. The mechanism of antimicrobial action of sulfonamides is based on their structural similarity to:
   A. Para-aminobenzoic acid  
   B. Glutamic acid  
   C. Folic acid  
   D. Nucleic acid  
   E. Antibiotics

37. A patient suffers from hyperchromic B12-deficiency anemia. What vitamin preparation should be prescribed in this case?
   A. Cyanocobalamin  
   B. Riboflavin  
   C. Vicasol (Menadione)  
   D. Thiamine chloride  
   E. Retinol acetate

38. For cardiovascular disease prevention the patient was recommended to take vitamin F. What is the chemical nature of this vitamin?
   A. Complex of polyunsaturated fatty acids  
   B. Cholesterol derivative  
   C. Polysaccharide complex  
   D. Amino acids complex  
   E. Carotin derivative

39. A patient has been receiving Theophylline (inhibitor of cyclic adenosine monophosphate phosphodiesterase) for a week. What hormone can increase its action due to such treatment and cause hyperglycemia?
   A. Glucagon  
   B. Testosterone  
   C. Aldosterone  
   D. Insulin  
   E. Estradio

40. A patient complains of severe abdominal pain, cramps, blurred vision. His relatives exhibit the same symptoms.
The urine is of red colour. The patient has been hospitalized for acute intermittent porphyria. This disease might have been caused by the impaired synthesis of the following compound:
A. Heme
B. Insulin
C. Bile acids
D. Prostaglandins
E. Collagen

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>41. A 48-year-old patient has been intravenously administered prednisolone solution to arrest severe attack of bronchial asthma. What group of hormonal agents does prednisolone belong to?</td>
<td></td>
</tr>
<tr>
<td>A. Glucocorticoids</td>
<td></td>
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<tr>
<td>B. Gestagenic drugs</td>
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<tr>
<td>C. Estrogenic drugs</td>
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<tr>
<td>D. Mineralocorticoid</td>
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<tr>
<td>E. Anabolic steroids</td>
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</table>

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<th>Question</th>
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<tbody>
<tr>
<td>42. Antivitamins are substances of various structure that limit utilization of vitamins in an organism and have an opposite to them action. Name antivitamin of vitamin K:</td>
<td></td>
</tr>
<tr>
<td>A. Dicumarol</td>
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<tr>
<td>B. Sulfapyridasine</td>
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<td>C. Deoxypyridoxine</td>
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<tr>
<td>D. Aminopterin</td>
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<td>E. Isoniazid</td>
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<tr>
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<tbody>
<tr>
<td>43. Analysis of urine composition revealed changed concentration of sodium ions. Which hormone provides regulation of sodium ions reabsorption in nephron canaliculi?</td>
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<tr>
<td>A. Aldosterone</td>
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<td>B. Vasopressin</td>
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<tr>
<td>C. Somatostatin</td>
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<tr>
<td>D. Adrenaline</td>
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<td>E. Parathormone</td>
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<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>44. A patient ill with pheochromocytoma has high secretion of the following hormone:</td>
<td></td>
</tr>
<tr>
<td>A. Adrenaline</td>
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</tr>
<tr>
<td>B. Glucagon</td>
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<tr>
<td>C. Insulin</td>
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<tr>
<td>D. Thyroxin</td>
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<tr>
<td>E. Somatotropin</td>
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</tbody>
</table>

An adult presents with systemic arterial pressure at the rate of 160/100 mm Hg. This might be caused by the increased concentration of the following hormone in blood:
A. Adrenalin |
| B. Aldosterone |
| C. Glucagon |
| D. Cortisol |
| E. Thyroxin |

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
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<tbody>
<tr>
<td>45. A patient with low immunity, frequent colds is recommended to take ascorutine as a more effective drug than ascorbic acid. What constituent substance of this preparation intensifies action of vitamin C?</td>
<td></td>
</tr>
<tr>
<td>A. Vitamin P</td>
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<tr>
<td>B. Vitamin A</td>
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</tr>
<tr>
<td>C. Glucose</td>
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</tr>
<tr>
<td>D. Lactose</td>
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<tr>
<td>E. Vitamin</td>
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Enzyme hyaluronidase breaks down hyaluronic acid thus increasing intercellular permeability. Which vitamin strengthens vascular walls and inhibits activity of hyaluronidase?
A. P |
| B. A |
| C. B1 |
| D. B2 |
| E. D |

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>46. Thyroid hormones are related to aminoacid derivatives. What aminoacid is the structure of these hormones based off?</td>
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</table>

A. Tyrosine |
| B. Phenylalanine |
| C. Methionine |
| D. Tryptophan |
| E. Histidine |

---
47. Preventive examination of a woman revealed enlargement of her thyroid gland, exophthalmos, high body temperature, increase of heart rate up to 110 times per minute. It is advisable to determine content of the following hormone in blood:
A. Thyroxine  
B. Noradrenaline  
C. Adrenaline  
D. Insulin  
E. Cortisol

48. A 50 y.o. patient suffers from hypovitaminosis C (scurvy) as a result of continious improper feeding. Reduced activity of which enzyme is the cause of connective tissue affection in this pathology?
A. Proline hydroxylase  
B. Alanine aminotransferase  
C. Pyruvate carboxylase  
D. Tryptophane hydroxylase  
E. Glutaminase

49. Decreased rate of B6 vitamin in dietary intake results in disorder of protein metabolism. What biochemical processes in the patient’s organism will become less active?
A. Transamination  
B. Oxidation-reduction  
C. Phosphorilation  
D. Methylation  
E. Hydrolysis

50. A patient was prescribed with an antitumoral antibiotic that inhibits synthesis of nucleic acids in the cells. What of the following antibiotics has such a mechanism of action?
A. Actinomycin  
B. Tetracycline  
C. Nystatin  
D. Lincomycin  
E. Erythromycin

51. Patients ill with tuberculosis take a drug that is an antivitamin of nicotinic acid. Name this substance:
A. Isoniazid  
B. Sulfanilamide  
C. Acrichine  
D. Isoriboflavin  
E. Oxythiamine

52. Introduction of a hormone into a man’s organism resulted in increased water reabsorption in kidneys, high vascular tone, rise of arterial pressure. What hormone was introduced?
A. Vasopressin  
B. Adrenaline  
C. Thyroxine  
D. Aldosterone  
E. Noradrenaline

53. Anti-inflammatory effect of a number of drugs is caused by the inhibition of arachidonic acid release. This acid is the precursor of:
A. Prostaglandins  
B. Uric acid  
C. Urea  
D. Haem  
E. Cholesterol

54. A patient has impaired mesopic vision, his photopic vision is normal. What is the probable cause of such vision anomaly?
A. Vitamin A deficiency  
B. Hyperopia  
C. Cones disfunction
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<td><strong>D.</strong></td>
<td>Myopia</td>
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<tr>
<td><strong>E.</strong></td>
<td>Vitamin D deficiency</td>
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</table>

55. A 58 year old patient complained about persistent rise of arterial pressure. Clinical examination revealed chronic renal disease accompanied by disturbance of renal blood flow. Rise of arterial pressure was induced by activation of the following regulatory system:

A. Renin-angiotensin  
B. Parasympathetic nervous  
C. Sympathetic nervous  
D. Sympathoadrenal  
E. Hypothalmo-pituitary-adrenal

56. Steroid hormones are synthesized out of a precursor that contains cyclopentanoperhydrophenanthrene. Name this precursor:

A. Cholesterol  
B. Acetyl-CoA  
C. Malonyl-CoA  
D. Levulinic acid  
E. Tyrosine

57. Water-soluble vitamins take coenzyme form in an organism. Thiamine diphosphate is coenzyme of the following vitamin:

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

Cardiac diseases are treated with cocarboxylase preparation. This preparation is the coenzymatic form of the following vitamin:

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

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A. B1  
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C. B12  
D. C  
E. P

58. What disorders are possible as a result of thyroid insufficiency during infancy?

A. Cretinism  
B. Nanism  
C. Gigantism  
D. Basedow’s disease  
E. Itsenko-Cushing syndrome

59. A patient has bradycardia, moderate hypotension, decrease of basal metabolism, edemata. What abnormality can induce such syndrome?

A. Thyroid hypofunction  
B. Parathyroid hypofunction  
C. Thyroid hyperfunction  
D. Parathyroid hyperfunction
E. Adrenal hypofunction

60. Nicotinic acid amide fulfills important metabolic function. What disorder develops, when it is deficient in the organism?
   A. Pellagra
   B. Rickets
   C. Anemia
   D. Xerophthalmia
   E. Beriberi

61. A boy is 4 year old. Glucose concentration in blood plasma is 12 millimole/l. This might be caused by deficiency of the following hormone:
   A. Insulin
   B. Glucagon
   C. Cortisol
   D. Somatotropin
   E. Adrenocorticotropin

62. A 25-year-old woman with signs of acetemorphine in toxic ation was administered naloxone, which rapidly improved her condition. What is the mechanism of action of this drug?
   A. Opioid receptor blockade
   B. GABA receptor blockade
   C. Serotonin receptor blockade
   D. Dopamine receptor blockade
   E. Benzodiazepine receptor blockade

63. Anxious condition can be characterized by reduced salivation and sense of dry mouth. What mediator is exuded out of nerve terminals innervating salivary glands?
   A. Noradrenaline
   B. Acetylcholine
   C. Serotonin
   D. Histamine
   E. GABA

64. Decarboxylation of 5-hydroxytryptophane gives origin to a certain biogenic amine with vasoconstrictive action. What biogenic amine is it?
   A. Serotonin
   B. Histamine
   C. Gamma-aminobutyric acid
   D. Putrescine
   E. Cadaverine

65. After a stomach resection a patient presented with weakness, skin pallor, face puffiness, enlargement of liver and spleen. Analysis of the peripheral blood revealed megaloblasts and megalocytes; hyperchromatism (colour index - 1,3). What type of anaemia is observed in this patient?
   A. B12-deficient
   B. Haemolytic
   C. Hypoplastic
   D. Iron-deficient
   E. Toxic

66. Vitamin A is quickly oxidized in the open air and hereupon looses its biological activity. What component of the foodstuffs mainly prevents the oxidation of the vitamin?
   A. Tocopherol
   B. Nicotinic acid
   C. Common salt
   D. Protein
   E. Fat

67. Early pregnancy test involves analysis of a woman’s urine. Pregnancy is ascertained by presence of the following hormone:
   A. Chorionic gonadotropin
   B. Estriol
   C. Aldosterone
   D. Testosterone
   E. Progesterone

68. A patient complains about an increase in heart rate, hyperperspiration, irritability, sleeplessness. He has been presenting with these symptoms for the latest six months. They indicate the hyperfunction of the following
endocrine gland:
A. Thyroid gland  
B. Pancreas  
C. Adrenal glands  
D. Sexual glands  
E. Thymus

69. High-grade deficit of the ascorbic acid causes development of scorbutus. This pathology develops due to the disturbed synthesis of the following connective tissue protein:
A. Collagen  
B. Prothrombin  
C. Fibrinogen  
D. Albumin  
E. Ceruloplasmin

70. Biochemical function of water-soluble vitamins depends on their ability to turn into the coenzymatic forms. Specify the coenzymatic form of the vitamin B2 (riboflavin):
A. FMN (flavin mononucleotide)  
B. NAD+ (nicotinamide adenine dinucleotide)  
C. TMP (thiamine monophosphate)  
D. TDP (thiamine diphosphate)  
E. PALP (pyridoxal phosphate)

71. The thyroid gland synthesizes a hormone that lowers the rate of Ca2+ concentration in blood thus facilitating its deposition in bones. What hormone is it?
A. Calcitonin  
B. Thyroxin  
C. Triiodthyronine  
D. Adrenaline  
E. Parathormone

72. The microflora of the colon plays an important part in the process of digestion. What vitamins does it synthesize?
A. Vitamins K and B group  
B. Vitamin C  
C. Vitamin PP  
D. Vitamin E  
E. Vitamin A

73. Parents of a 11-year-old boy noticed that he is far behind his peers in the physical development. After the Xray an endocrinologist revealed that the growth zones of tubular bones had already closed. Under these conditions, the intake of growth hormone can result in the development of:
A. Acromegaly  
B. Gigantism  
C. Dwarfism  
D. Cretinism  
E. Myxedema

74. A patient complains of tachycardia, insomnia, weight loss, irritability, sweating. Objectively: the patient has goiter and slight exophthalmos. What gland is affected, and what functional disorder is it?
A. Hyperthyroidism  
B. Hypothyroidism  
C. Hyperparathyroidism  
D. Hypoparathyroidism  
E. Adrenomedullary hyperfunction

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Змістовий модуль 7: Основи фармацевтичної біохімії та біохімії тканин

<table>
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| 1. In snake venom there is a substance that causes erythrocyte hemolysis, when it is introduced into a human organism. Blood test revealed a large amount of lysolecithin (lysophosphatidylcholine). What enzyme leads to accumulation of lysolecithin in blood?  
A. Phospholipase A2  
B. Phospholipase A1  
C. Phospholipase C  
D. Phospholipase D  
E. Neuraminidase |
2. A patient demonstrate smilky-white color of blood plasma due to high content of chylomicrons. Disintegration of triacylglycerol is disrupted. Deficiency of the following enzyme activity is observed:
   A. Lipoproteinlipase
   B. Amylase
   C. Tripsin
   D. Cholesterolesterase
   E. Lactase

3. A patient has icteric skin; unconjugated bilirubin content in blood is high; conjugated bilirubin in urine is not detected. There is significant amount of urobilinurine and stercobilin in feces. Name the pathology characterized by given symptoms:
   A. Hemolytic jaundice
   B. Obstructive jaundice
   C. Jaundice of the newborn
   D. Hepatocellular jaundice
   E. Atherosclerosis

4. A child with PKU has an unpleasant mouse-like odor, growth retardation, mental retardation. These symptoms are associated with the high concentration of the following substance in blood:
   A. Phenylpyruvic acid
   B. Glucose
   C. Cholesterol
   D. Adrenaline
   E. Uric acid

5. Blood pressure is regulated by a number of biologically active compounds. What peptides that enter the bloodstream can affect the vascular tone?
   A. Kinins
   B. Leukotrienes
   C. Enkephalins
   D. Iodothyronines
   E. Endorphins

6. A patient was found to have an increased blood serum LDH-1 activity. In which organ is the pathological process localized?
   A. Heart
   B. Liver
   C. Kidneys
   D. Stomach
   E. Muscles

Blood analysis revealed rise of activity of LDH1, LDH2, aspartate aminotransferase, creatine phosphokinase-MB. Biochemical disorder is observed in the following organ:
   A. Heart
   B. Skeletal muscles
   C. Kidneys
   D. Liver
   E. Pancreas

7. A woman complains of nausea, vomiting, skin itch. She was diagnosed with mechanical jaundice. What is the possible cause of skin itch in such a condition?
   A. Bile acids accumulating in the blood
   B. Increased blood content of indirect bilirubin
   C. Cholesterol accumulating in the blood
   D. Direct bilirubin appearing in the blood
   E. Erythrocytedisintegration products accumulating in the blood

8. Tetanic spasms of skeletal muscles occur under low calcium concentration in blood. What endocrine disorder can this condition be associated with?
   A. Hypofunction of parathyroid glands
   B. Hyperfunction of adrenal cortex
   C. Hypofunction of adrenal cortex
   D. Hyperthyroidism
   E. Hypothyroidism

9. The patient with mushroom poisoning has developed the following symptoms: yellow coloring of skin and sclera, dark-colored urine. Hemolytic jaundice was diagnosed. What pigment causes such coloring of the
A male patient has pain in the right subcostal area, acholic feces. Decolouration of feces is caused by deficiency of:

A. Stercobilin  
B. Hemoglobin  
C. Bilirubin  
D. Bile acids  
E. Skatole

10. Diabetes and starvation cause the excess production of ketone bodies that are used as an energy source. They are produced from the following compound:

A. Acetyl-CoA  
B. Isocitrate  
C. Lactate  
D. Malate  
E. Ketoglutarate

11. A patient was found to have a tumor of the pancreatic head, which is accompanied by the impaired patency of the common bile duct. Blood test will reveal an increase in the following substance level:

A. Bilirubin  
B. Urea  
C. Hemoglobin  
D. Insulin  
E. Adrenaline

12. A patient presents with icteric sclera and mucous tunics; urine is dark; feces are light-colored. Blood content of direct and indirect bilirubin is increased, urine content of direct bilirubin is increased. What pathology can be characterized by these signs?

A. Obstructive jaundice  
B. Hemolytic jaundice  
C. Hepatocellular jaundice  
D. Jaundice of the newborn  
E. Atherosclerosis

13. A 54-year-old man requested a pharmacist’s advice on drug prescription. The patient has 4-year-long history of chronic glomerulonephritis and 2-yearlong history of persistent hypertension. What substance synthesized in the kidneys has important role in development of arterial hypertension?

A. Renin  
B. Nitric oxide  
C. Aldosterone  
D. Histamine  
E. Catecholamines

14. A 71-year-old woman developed mechanical jaundice due to obstruction of the bile duct with a chollith. Decrease of blood pressure and bradycardia are detected. These changes in functioning of the patient’s cardiovascular system are caused by increased blood content of the following substance:

A. Bile acids  
B. Direct bilirubin  
C. Indirect bilirubin  
D. Urobilin  
E. Stercobilin

15. Hemoglobin break-up begins in the cells of reticuloendothelial system. What enzyme catalyzes the reduction reaction of biliverdine into bilirubin?

A. Biliverdine reductase  
B. Beta-glucuronidase  
C. Xanthine oxidase  
D. Heme oxygenase  
E. Hexokinase

16. Catabolism of body’s own tissue proteins is intensified during such diseases as thyrotoxicosis and
tuberculosis. This process is attended by intensive synthesis in liver and subsequent excretion with urine of the following:
A. Urea
B. Glucose
C. Acetone bodies
D. Fatty acids
E. Nucleotides

17. Fatty degeneration of liver is prevented by lipotropic substances. Which of the following substances relates to them?
A. Methionine
B. Cholesterol
C. Bilirubin
D. Glycine
E. Glucose

18. A patient has obstruction of the common bile duct. Which of these substances is usually found in urine in such cases?
A. Bilirubin
B. Ketone bodies
C. Uric acid
D. Creatinine
E. Glucose

19. A patient has obstruction of the common bile duct. Which of these substances is usually found in urine in such cases?
A. Bilirubin
B. Ketone bodies
C. Uric acid
D. Creatinine
E. Glucose

20. A newborn born to an Rh-negative mother (3rd pregnancy) presents with progressing jaundice, symptoms of CNS excitation, anemia. What type of jaundice is it?
A. Hemolytic
B. Parenchymatous
C. Obstructive
D. Parasitic
E. Toxic

21. A newborn infant has hemolytic jaundice caused by rhesus incompatibility. What bile pigment will be concentrated highest in the blood of this infant?
A. Unconjugated bilirubin
B. Conjugated bilirubin
C. Urobilinogen
D. Stercobilinogen
E. Bile acids

22. It is known that indirect bilirubin generated as a result of heme disintegration is detoxicated in liver. What organic compound takes part in bilirubin detoxication in hepatocytes?
A. Uridine diphosphate glucuronic acid
B. Urea
C. Mevalonic acid
D. Lactic acid
E. Glycin

23. A patient with chronic calculous cholecystitis complains of acute pains in the right subcostal area, itch and icteritiousness of skin, multiple punctuate hemorrhages, saponated and discoloured feces (steatorrhea). What type of jaundice is it?
A. Mechanic
B. Hemolytic
C. Parenchymatous
D. Hepatic
E. -

A patient 42 year old suffering from chronic calculous cholecystitis complains about acute pain in
1. The right subcostal area, itching and skin icteritiousness, multiple petechial haemorrhages, saponified and lightcoloured feces (steatorrhea). What type of icterus is it?
   A. Mechanic
   B. Hemolytic
   C. Parenchymatous
   D. Cythemolytic
   E. Hepatocellular

24. A patient complains of belting pain in epigastrium. Examination revealed high diastase content in urine, as well as undigested fat in feces. What pathology are these occurrences typical for?
   A. Acute pancreatitis
   B. Gastritis
   C. Infectious hepatitis
   D. Acute appendicitis
   E. Enterocolitis

25. Generation of primary urine in kidneys is induced by filtration in renal corpuscles. What components of blood plasma are absent in the primary urine?
   A. Proteins
   B. Amino acids
   C. Glucose
   D. Urea
   E. Ions

26. A female patient suffers from chronic glomerulonephritis. Urine analysis revealed proteinuria, hematuria, leukocyturia. Proteinuria indicates disturbance of the following process in kidneys:
   A. Glomerular filtration
   B. Tubular secretion
   C. Tubular reabsorption
   D. Tubular secretion and reabsorption
   E. Renal blood flow

27. A patient suffers from jaundice. Examination revealed that blood plasm had high concentration of indirect reacting (free) bilirubin, feces and urine had high concentration of stercobilin, concentration of direct reacting (conjugated) bilirubin was normal. What type of jaundice is it?
   A. Hemolytic
   B. Neonatal jaundice
   C. Parenchymatous
   D. Gilbert’s disease
   E. Obstructive

28. Certain drugs can stimulate liver to synthesize enzyme systems taking part in drugs and toxines metabolism. What compound stimulates drug metabolism in liver microsomes?
   A. Phenobarbital
   B. Heparin
   C. Menadione sodium bisulfite
   D. Sulfanilamide
   E. Aspirin

29. Physical exercise results in an increase in thermogenesis due to an increase in heat production in the following structure:
   A. Skeletal muscles
   B. Heart
   C. Lungs
   D. Liver
   E. Brain

30. Taking vasopressin resulted in a decrease in diuresis. The reason for it is increased water reabsorption in the following renal tubuli:
   A. Distal convoluted tubuli and receiving tubes
   B. Proximal convoluted tubuli
   C. Henle’s loops
   D. Descending limbs of Henle’s loops
   E. Ascending limbs of Henle’s loops

31. A patient was found to have an increase in total bilirubin concentration in plasma at the expense of indirect bilirubin; high rate of stercobilin in feces and urine; normal rate of direct bilirubin. What jaundice is it?
Rh-positive child of a Rh-negative woman (secundapara) has yellow skin, pathologic reflexes, convulsions. The child has an increased rate of indirect bilirubin in blood. What type of jaundice is it?

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<tbody>
<tr>
<td>A.</td>
<td>Haemolytic</td>
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<td>B.</td>
<td>Hepatic with violation of bilirubin capture</td>
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<tr>
<td>C.</td>
<td>Hepatic with violation of bilirubin conjugation</td>
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<tr>
<td>D.</td>
<td>Hepatic with violation of bilirubin excretion</td>
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<tr>
<td>E.</td>
<td>Mechanic</td>
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32. A group of alpinists climbing to the top had their blood tested. The test revealed erythrocytosis and increase in hemoglobin rate. What type of hypoxia caused the stimulation of erythropoiesis in the bone marrow?

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<tr>
<td>A.</td>
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<td>B.</td>
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<td>C.</td>
<td>Hemic</td>
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<td>D.</td>
<td>Circulatory</td>
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<td>E.</td>
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33. A patient has been found to have sugar in the urine. Blood glucose is normal. Arterial pressure is normal. What is the mechanism of glycosuria development in this case?

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<tbody>
<tr>
<td>A.</td>
<td>Disturbance of glucose reabsorption in the nephron tubules</td>
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<td>B.</td>
<td>Insulin deficiency</td>
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<td>C.</td>
<td>Hyperfunction of adrenal medulla</td>
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<tr>
<td>D.</td>
<td>Hyperfunction of thyroid gland</td>
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<td>E.</td>
<td>Hyperfunction of adrenal cortex</td>
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34. After a road accident a patient has the arterial pressure at the rate of 70/40 mm Hg and daily diuresis at the rate of about 300 ml. What is the mechanism of oliguria development in this case?

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<tbody>
<tr>
<td>A.</td>
<td>Decrease in glomerular filtration</td>
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<td>B.</td>
<td>Increase in glomerular filtration</td>
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<td>C.</td>
<td>Decrease in tubular reabsorption</td>
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<tr>
<td>D.</td>
<td>Increase in tubular reabsorption</td>
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<tr>
<td>E.</td>
<td>Decrease in tubular secretion</td>
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35. A 38 year old patient had hepatitis but didn't give up alcohol. There appeared symptoms of hepatocirrhosis along with ascites and edemata of his lower limbs. What changes in blood are main factor of edemata development?

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<tbody>
<tr>
<td>A.</td>
<td>Hypoalbuminemia</td>
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<td>B.</td>
<td>Hypoglobulinemia</td>
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<tr>
<td>C.</td>
<td>Hypocholesterolemia</td>
</tr>
<tr>
<td>D.</td>
<td>Hypokalemia</td>
</tr>
<tr>
<td>E.</td>
<td>Hypoglycemia</td>
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36. A 46-year-old patient was found to have hyperactivity of creatine kinase in blood serum. What kind of pathology should be suspected?

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<tbody>
<tr>
<td>A.</td>
<td>Myocardial infarction</td>
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<td>B.</td>
<td>Acute pancreatitis</td>
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<td>C.</td>
<td>Chronic hepatitis</td>
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<td>D.</td>
<td>Haemolytic anemia</td>
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<td>E.</td>
<td>Renal failure</td>
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37. Cellular and plasma mediators play an important part in the pathogenesis of secondary alteration during inflammation. What mediators are produced in the blood plasma?

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<tbody>
<tr>
<td>A.</td>
<td>Bradykinin</td>
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<td>B.</td>
<td>Histamine</td>
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<td>C.</td>
<td>Leukotrienes</td>
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<tr>
<td>D.</td>
<td>Prostaglandins</td>
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<td>E.</td>
<td>Lysosomal factors</td>
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</tbody>
</table>

38. A 45-year-old woman, who for two weeks has been taking neodicoumarin (ethyl biscoumacetate) due to trombophlebitis, during a regular examination was detected to have decreased blood content of prothrombin, in urine there is microhematuria. What drug should be administered as a neodicoumarin antagonist?

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<tbody>
<tr>
<td>A.</td>
<td>Vicasol (Menadione)</td>
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</table>
39. Most cases of alimentary starvation are accompanied by development of evident edemata. What is the leading pathogenetic mechanism of edemata development in this case?
A. Fall of oncotic pressure of blood plasma
B. Rise of hydrostatic pressure in the capillaries
C. Fall of hydrostatic pressure in the tissues
D. Rise of oncotic pressure in the intercellular fluid
E. Fall of osmotic pressure in the intercellular fluid

A child with evident hypotrophy has edemata of lower extremities, ascites. What is the main factor of pathogenesis of cachectic edema?
A. Drop of oncotic pressure of blood plasma
B. Rise of hydrostatic blood pressure
C. Rise of oncotic pressure of intercellular liquid
D. Increased permeability of vascular wall
E. Disorder of lymph outflow

40. A patient underwent an operation. After it he was prescribed glycosaminoglycan that has coagulating action. Specify this substance:
A. Heparin
B. Keratan sulfate
C. Hyaluronic acid
D. Chondroitin-6-sulfate
E. Chondroitin-4-sulfate

41. A patient with pneumosclerosis has blood pH at the rate of 7.34. Analysis of gas formula of blood showed hypercapnia. Urine analysis revealed the increase in its acidity. What form of acid-base disbalance is the case?
A. Gaseous acidosis
B. Secretory alkalosis
C. Gaseous alkalosis
D. Non-gaseous alkalosis
E. Non-gaseous acidosis