University of Split School of Medicine

Department of Medical Chemistry and Biochemistry

Course: Medical chemistry and biochemistry

Oral exam questions

I

1. General structure of the amino acids. The classification of the amino acids concerning their side chain structure.
2. Peptide bond and the level of protein structure
3. Isoelectric point
4. Structure and function of hemoglobin
5. Structure and function of myoglobin. Differences from the hemoglobin
6. Hemoglobinopathies
7. Hemoglobin - Bohr effect
8. Interaction of hemoglobin with 2,3-BPG
9. Sickle cell anemia
10. Fetal hemoglobin
11. The classification of enzymes
12. Enzyme kinetics
13. Inhibition of the enzyme
14. Regulation of enzyme activity
15. Coenzymes and prosthetic groups
16. Important enzymes in clinical diagnostics
17. The synthesis and structure of collagen and elastin, and related

II

1. Oxidation of metabolic fuels - reduced coenzymes
2. Respiratory chain and oxidative phosphorylation
3. Reactive oxygen radicals and antioxidant capacity
4. Glycolysis
5. Gluconeogenesis
6. Pentose phosphate pathway
7. Polyol pathway
8. The metabolism of fructose. Disorders of fructose metabolism
9. The metabolism of lactose. Disorders of lactose metabolism
10. The structure and function of glutathione
11. The structure and synthesis of glycogen
12. Degradation of glycogen – glycogenolysis
13. Glycogen storage diseases
14. The mechanism of glucagon action
15. The mechanism epinephrine (adrenaline) action
16. The effect of insulin on carbohydrate metabolism
17. Citric acid cycle
18. Catabolic and anabolic role of citric acid cycle
19. The metabolism of pyruvate, and pyruvate dehydrogenase activity
20. Regulation of the citric acid cycle
21. Transporters of the inner mitochondrial membrane
22. Glucose transporters
23. Glycosaminoglycans, proteoglycans, and glycoproteins

III

1. The oxidation of fatty acids
2. ​​Ketogenesis
3. Synthesis of fatty acid
4. The synthesis of eicosanoids
5. Synthesis of triacylglycerol and lipogenesis
6. Phospholipids and glycosphingolipids
7. Lipoproteins - types and roles
8. The synthesis of cholesterol
9. Bile acids
10. Steroid hormones - types and mechanism of action
11. Deficit of 21-hydroxylase in steroid hormone synthesis
12. Signal transduction by activation of phospholipase C
13. Signal transduction disorders

IV

1. Metabolism of proteins and nitrogen from amino acids
2. The cycle of urea
3. Glucogenic and ketogenic amino acids
4. Metabolism and metabolic disorders of aromatic amino acids
5. The essential and non-essential amino acids. The synthesis of non-essential amino acids
6. Synthesis of catecholamines
7. Synthesis and action of thyroid hormones
8. The synthesis of serotonin, melatonin and histamine
9. Synthesis of creatine and creatinine
10. Synthesis of heme
11. The degradation of heme and the creation of bilirubin
12. Prehepatic, hepatic and posthepatic jaundice
13. Synthesis of purine
14. Synthesis of pyrimidine
15. Synthesis of purine from metabolic waste
16. Degradation of purines
17. Gout and mechanism of allopurinol action

V

1. Control of blood glucose levels
2. The metabolic effects of insulin
3. Metabolic effects of glucagon
4. The metabolism in the fed state
5. Metabolism in fasting conditions
6. The metabolism in diabetes mellitus
7. Digestion and absorption of food
8. The principles of digestion of carbohydrates
9. The principles of digestion of proteins
10. Zymogens
11. The principles of digestion of lipids
12. Water soluble vitamins - structure, role and disorders
13. Vitamins soluble in fats and oils - structure, role and disorders
14. Alcohol metabolism
15. Obesity

VI

1. DNA replication in prokaryotes and in eukaryotes
2. DNA damage and repair
3. Types of RNA and differences between eukaryotes and prokaryotes
4. Transcription of DNA
5. Protein synthesis (translation)
6. Control of gene expression by control of transcription (promoters, transcription factors)
7. Diffrerences between gene expression in eukaryotes and prokaryotes
8. Lactose operon
9. Alternatively RNA splicing
10. The amplification of DNA (PCR)
11. Base analogues in chemotherapy

VII

1. Blood clotting - inner pathway
2. Blood clotting - external pathway
3. The role of vitamin K in blood clotting
4. Fibrinolysis