ANNOTATION

work program of the discipline

"Biochemistry"

Speciality	05/31/01 General medicine
Number of credits	In accordance with the RUP
Interim certification form	Assessment/test/exam

1. The purpose of studying the discipline isto develop knowledge about the basic patterns of metabolic processes that determine the state of health and adaptation of a person at the molecular, cellular and organ level of the whole organism and the ability to apply the acquired knowledge when solving clinical problems.

2. **Brief**content of the discipline by sections

1. **Features of enzymatic catalysis. Regulation of enzyme activity. Application of enzymes and their modulators in medicine. Introduction to metabolism. Biological oxidation.**Mechanism of action of enzymes. The influence of various factors on the rate of enzymatic reaction. Classification of enzymes. Classification of enzyme inhibitors. Coenzyme role of vitamins. Regulation of enzyme activity. Enzymodiagnostics. The use of enzymes and their inhibitors as therapeutic drugs.

Exchange of the organism with the environment. Anabolic and amphibolic reactions. Specific and general path of catabolism. Macroergic compounds. Pathways for ATP synthesis.

2. Carbohydrate metabolism. Digestion of carbohydrates. Common pathways of glucose metabolism. Synthesis and breakdown of glycogen. Glycogenoses. Glycolysis. Gluconeogenesis. Glucose pentose phosphate pathway. Regulation of blood glucose levels.

3. Metabolism of proteins, amino acids and nucleotides. Transport of amino acids into the cell. Deamination of amino acids. Transamination. Aminotransferases, their use in enzyme diagnostics. Ammonia neutralization. Ornithine cycle of urea synthesis. Ammonia transport. Hyperammonemia. Introduction of amino acids into the general pathway of catabolism and gluconeogenesis. Decarboxylation of amino acids. Biogenic amines. Metabolism of individual amino acids and its disorders. Phenylketonuria, alkaptonuria, albinism. Creatine synthesis: biological role, clinical significance of determination of creatine and creatinine in urine and blood plasma. Catabolism of purine nucleotides. Pathways for the regeneration of purine nucleotides. Purine metabolism disorders.

4. Metabolism of lipids and lipoproteins.B-oxidation of saturated and unsaturated fatty acids. Synthesis and use of ketone bodies. Biological role of α-, ω- and peroxisomal fatty acid oxidation. Synthesis of fatty acids. Synthesis and degradation of triacylglycerols and glycerophospholipids. Hormonal regulation of lipolysis and lipogenesis. Cholesterol synthesis. Bile acids. Transport lipoproteins. Atherosclerosis. Atherogenic coefficient. Hyperlipoproteinemia.

5. Biological membranes. Lipid peroxidation. Lipid composition of biological membranes. Membrane proteins. Membrane asymmetry. Membrane assembly. Microtransport. Protein channels and transporter proteins. Macrotransport. Lysosomes, Golgi apparatus and membrane transport. Reactive oxygen species. Peroxidation of membrane lipids in normal and pathological conditions. Hypoxia, phagocytosis. Mechanisms of protection against the toxic effects of oxygen. Prooxidants and antioxidants. Bactericidal effect of phagocytic leukocytes. Formation of eicosanoids, their biological role.

6. Hormones. Hormonal regulation of metabolic processes. Biochemistry of the excretory system. Mineral metabolism. Target cells and cellular hormone receptors. Membrane receptors. Structure of G proteins. Education of secondary intermediaries. Metabolic changes in response to signaling molecules. Intracellular signal transmission. Hormones of the hypothalamus. Pituitary hormones. Iodine-containing hormones. Changes in metabolism in hyperthyroidism and hypothyroidism. Hormones of the pancreas and adrenal glands. Metabolic disorders in diabetes mellitus and fasting. Hormones in the implementation of stress reactions. Sex hormones, influence on metabolism. Hyper- and hypoproduction of hormones. Blood minerals. The role of the kidneys in maintaining the osmotic pressure of the blood and the body's CBS. Normal and pathological components of urine, their origin. Regulation of phosphorus-calcium metabolism, participation of parathyroid hormone and calcitonin, active forms of vitamin D. Renin-angiotensin-aldosterone system. Vasopressin, atriopeptides.