

Molecular basis of metabolism

Keypoints for laboratories

Laboratory 1.

- Structure and characteristics of amino acids included in proteins
- Classification of amino acids according to the structure and properties of their side chains
- Structure, significance and peptide binding properties.

Laboratory 2.

- Proteins - classification, characteristics of the I, II, III and IV structure, properties and functions. Detailed construction of α -helix and β -sheet.
- Types of bonds involved in the formation of the correct protein conformation (hydrogen, ion, electrostatic, hydrophobic, van der Waals bonds).
- Post-translational modification of proteins.
- Prions as an example of the medical significance of proper folding of the polypeptide chain.

Laboratory 3.

- Structure, function and role of myoglobin and hemoglobin and immunoglobulins.
- The mechanism of combining oxygen with myoglobin and hemoglobin.
- Glycosylated hemoglobin.
- Characteristics and functions of plasma proteins.

Laboratory 4.

- Enzyme - structure, features, ways to create enzyme-substrate complexes.
- Construction, physical and chemical properties of isoenzymes.
- The importance of isoenzymes in diagnostics.
- Classification of enzymes.
- Kinetics and mechanism of enzymatic reaction of Michaelis-Menten and allosteric enzyme.
- Regulation of enzymes.
- Types of inhibition.
- Units of enzymatic activity.

Laboratory 5.

- Vitamins - structure and importance in metabolic processes.
- Construction of coenzymes and functions performed by coenzymes in enzymatic reactions.

Laboratory 6.

- The role of enzymes in digestion (carbohydrates, lipids, proteins and nucleic acids).
- The role of bile acids in the digestive process.
- Synthesis and role of hydrochloric acid.
- Biosynthesis of bile acids and regulation of this process

Laboratory 7.

- Glucose as a source of ATP - reactions of the glycolysis pathway, substrate phosphorylation, regulation of glycolysis.
- Glycolysis under anaerobic and aerobic conditions.
- Glycolysis in a red blood cell
- Pentoseophosphate pathway.
- The course and regulation of gluconeogenesis.