

**Questions for concluding session by the theme:
“Metabolism of simple proteins. Molecular biology and genetics”.**

1. Amino acids: classification, structure, properties (essential and non-essential, relative non-essential; hydrophobic and hydrophilic; charge and undischarged).
2. Elementary composition of proteins. Function of proteins. Methods of separation and purification of proteins. Qualitative and quantitative determination of proteins. Biuret test.
3. The levels of structure organization of proteins (primary, secondary, tertiary, quaternary, domainary). Kinds of chemical bonds in proteins.
4. Physicochemical property of proteins (molecular weight, amphotericity, isoelectric point, solubility, hydrophilism, denaturation, sedimentation, graining).
5. Classification of simple proteins (by structure and behaviour), characteristic of some classes of simple proteins, its biological significance (albumins, globulins, protamines, histones).
6. Nitrogen balance, its types. Daily needs of proteins in human organism. The dynamic state of the proteins in a human body. The norm of the proteins in nutrition. Protein minimum and optimum. Rubner's wear coefficient. Complete and incomplete value proteins. Biological value of proteins.
7. Digestion of simple proteins in the stomach, enzymes, mechanism its activation, endopeptidases and exopeptidases. Role of HCl. Role of mucin and rennin. Digestion of proteins in small intestinal: proteases, its activation. Absorption of protein's hydrolysis products.
8. Putrefaction of proteins in large intestinal (products of putrefaction of Lysine, Ornithine, Phenylalanine, Tyrosine, Tryptophane). Mechanism of detoxification of putrefactive products. Deactivation of indol. Clinical significance of animal's indican determination in urine.
9. Pool of amino acids: its resupply and using in organism. Ubiquitin. Proteasoms. Intermediary metabolism of simple proteins. Transamination: enzymes, coenzymes, mechanism, significance. Role of glutamate and α -ketoglutarate in transamination. Aminotransferases and mechanism of its actions, clinical significance of transaminase's determination.
10. Deamination: types, mechanism, enzymes, coenzymes, significance. Mechanism of oxydative deamination of glutamate. Amino acids decarboxylation. Formation and biological action of biogenic amines (histamine, serotonin, GABA, epinephrine), its deactivation (MAO).
11. Sources of ammonia in organism. The ways of ammonia detoxification (temporarily and final). Transport forms of ammonia (ALA, GLU and GLN, ASP and ASN), Alanine cycle. Role of glutaminase and asparaginase. Urea cycle. Fumarate cycle and its significansc. Urea as a final product of nitrogen (proteins) metabolism, content in blood and urine.
12. Conception of gluconeogeneses, glucogenic and ketogenic amino acids; ways of pyruvate utilization. Metabolism and biological significance of some amino acids: Glycine, Serine, Cysteine, Aspartate and Asparagene, Glutamate and Glutamine, Arginine, Histidine, Tryptophan, Phenylalanine, Tyrosine. Peculiarity of Methionine

metabolism, significance of homocysteine. Peculiarity of Arginine metabolism and nitrogen oxide (NO) formation.

13. Conception of enzymatic blocks and molecular (hereditary) diseases (phenylpyruvate oligophrenia, cretinism, albinism, alkaptonuria).

14. The role of liver in protein metabolism. Biochemical indexes of protein metabolism.

15. Complex proteins: definition, classification. 8. Brief characteristics of nucleoproteins.

16. History of nucleic acids investigations. Modern research in molecular biology and genetics.

17. Nucleic acids: definition, types and biological significance.

18. Components and structure of nucleosides and nucleotides (nitrogenous bases, carbohydrates). Structure of nucleic acids strands.

19. DNA: structural organization. The Chargaff's rules.

20. The model by Watson and Crick. Denaturation and renaturation of DNA.

21. RNA: composition, classification, characteristics of different types.

22. Digestion of nucleoproteins into digestive tract, absorption of hydrolysis products.

23. Metabolism of nucleoproteins. Sources of purine nucleus. Synthesis of purine mononucleotides.

24. Sources of pyrimidine nucleus. Synthesis of pyrimidine mononucleotides.

25. Disintegration of pyrimidine mononucleotides in tissues. Final products of its catabolism.

26. Disintegration of purine mononucleotides in tissues. Final products of its catabolism. Contents of uric acid in blood and urine.

27. Molecular bases of genetic code, its characteristics.

28. DNA biosynthesis (replication): definition, biological significance, factors, mechanisms.

29. Damages and reparation of DNA.

30. RNA biosynthesis (transcription): definition, biological significance, factors, mechanisms. Promoters and palindromes. Processing. Inhibitors of transcription.

31. Translation (protein synthesis): definition, factors, biological significance.

32. Mechanisms of translation. Post-translational modification of proteins.

33. Protein biosynthesis regulation by Jacob and Monod.

34. Features of protein biosynthesis and its regulation in humans: amplification, recombination of genes, enhancers, silencers.

35. Mechanisms and significance of point mutations. Molecular diseases.