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**ÖMER HALİSDEMİR UNIVERSITY FACULTY OF MEDICINE**

**FIRST YEAR PHASE-III**

**INTRODUCTION TO CELL BIOLOGY PHASE**

**AIM:**

At the end of this phase, first year students will have understood some of the basic concepts in biophysics and their place in medicine, the properties of enzymes, their mechanisms of action, the regulation of their activities, the methods of statistical analysis and their use in healthcare services and the importance of up-to-date molecular concepts in medical biology.

**INTENDED LEARNING OUTCOMES:**

At the end of this phase, first year students will be able to:

1. Define enzymes, catalysis and catalysts, the terminology related to enzymes, their properties, nomenclature, active sites, models of enzyme-substrate binding,

2. Describe the Michaelis Menten equation, assumptions derived by Michaelis and Menten, Km, double inverted graph, Eadie Hofstee diagram, zero order reaction, first order reaction, turnover number, specificity constant, inhibition of the enzyme activity (competitive, noncompetitive, uncompetitive, mixed inhibitions), models of allosteric enzyme kinetics,

3. Define how the enzymes function, standard free energy exchange, biochemical standard free energy exchange, transition state, activation energy, reaction rate and reaction balance, first order reaction, second order reaction, binding energy, physical and thermodynamic factors that contribute to activation energy with enzymatic activity, specificity, types of catalysis, abzymes, ribozymes, enzyme-substrate relationship in two-substrate enzymatic reactions, factors affecting the rate of an enzymatic reaction, and methods of measuring enzyme activity as well as their units,

4. Define regulatory enzymes, feedback inhibition, variables that play a role in controlling enzyme activity (role of substrate change, allosteric enzymes, covalent modification, enzyme induction, enzyme inhibition, hormonal control), examples of using enzymes in diagnosis and prognosis and isozymes,

5. Describe coenzymes, prosthetic group, cofactors and the structure, properties, synthesis, precursors of various coenzymes; reactions that they catalyze and their roles in disease,

6. Learn the definition, classification, synthesis, biochemical and structural properties of carbohydrates,

7. Have knowledge about the synthesis, classification and biochemical properties of monosaccharides,

8. Have knowledge about the synthesis, classification and biochemical properties of disaccharides,

9. Have knowledge about the synthesis, classification and biochemical properties of polysaccharides such as glycoprotein, glycolipid, proteoglycan, as well as derivative carbohydrates, and the metabolism of monosaccharides, disaccharides and polysaccharides,

10. Explain the digestion and absorption of carbohydrates,

11. Know the purpose of the experiments on carbohydrates, how to perform and interpret them,

12. Classify lipids, identify their structures and the functional groups that can be found in different lipid molecules,

13. Comprehend the functions of lipids in human life whose physical properties they have learnt about and how to biochemically analyze them,

14. Explain the structures and functions of the membranes and the membrane transport systems,

15. Understand radioactivity, distance rule, radiation protection measures, their importance in health sciences, explain the measurements of radiation protection, SI units related to radioactivity, and its relation to the old units, the decisions of International Commission on Radiological Protection (ICRP) and the standard human characteristics

16. Explain optical events, how and why to use wave optics in medicine, the interaction of electromagnetic energy with living organisms, the biological effects of photoelectric events and how electromagnetic energy damages which tissues,

17. Comprehend LASER and the importance of using LASER rays in medicine, the importance electron microscopy imaging in medicine and its basic principles,

18. Explain the concept of golden standard,

19. Explain the concept of diagnostic tests,

20. Evaluate the area under the curve,

21. Interpret sensitivity, specificity, negative and positive determinant ratios,

22. Choose the appropriate graphs according to the types of variables,

23. Identify appropriate graphs based on the distribution of the numerical variable,

24. List the titles of the research reports,

25. List the key points of reporting a scientific research,

26. Be able to do biostatistical criticism of published articles,

27. Explain the concepts of rate, speed, prevalence, incidence and mortality,

28. Explain some basic concepts common to all eukaryotes such as mutations, cancer formation, apoptosis and cell senescence,

29. Comprehend gene expression, regulation of gene expression, DNA rearrangement and the structure of organelle genome,

30. Understand the communication between cells,

31. Explain cell cycle, mitosis and meiosis,

32. Interpret Mendelian and non-Mendelian inheritance,

33. Comprehend the evolution of cells and stem cells, define current techniques in medical biology,

34. Recognize cellular behavior under several osmotic conditions, blood tissue, and mitotic division under microscope,

35. Explain what blood groups are and identify them,

36. Explain the concept of categorical variable,

37. Interpret the independence between two categorical variables,

38. Interpret the accordance between markers,

39. Evaluate dependent measures made for a single categorical variable,

40. Interpret the relation between two numerical variables,

41. Identify dependent and independent variables,

42. Interpret the relation between dependent variables and independent variables