

Pathobiochemistry 3: Exam questions 2024/25

1. Metabolic acidosis, its causes and consequences.
2. Metabolic alkalosis, its causes and consequences.
3. Combined disorders of acid-base equilibrium.
4. Relations between acid-base equilibrium and concentration of ions. Changes in ionogram in disorders of acid-base equilibrium. Changes in acid-base equilibrium in disorders of ion metabolism.
5. Principal reactive oxygen and nitrogen species: properties, reactions, main sources in the body, role in pathogenesis.
6. Physiological role of reactive oxygen species in metabolism: hydroxylases, local mediators, redox signaling, phagocyte weapons.
7. Lipid peroxidation as an example of oxidative damage to biomolecules. Significance of transition metals (iron, copper) in pathobiochemistry of reactive oxygen species.
8. Antioxidant defense of human body.
9. Difference between average life expectancy and maximum lifespan. Biochemical basis of ageing, sources of errors, role of genes.
10. Ageing at the level of cells and tissues: mitochondrial dysfunction, consequences of DNA damage, role of telomeres.
11. Ageing at the level of cells and tissues: cellular senescence, alteration of epigenome, collapse of proteostasis, inflammaging.
12. Theories that explain evolution of ageing. Effect of caloric restriction. Hormesis.
13. Metabolic syndrome and insulin resistance: characteristics, causes, consequences, possible therapeutic applications.
14. Formation of AGEs, interaction AGE-RAGE, potential mechanisms to reduce formation/effect of AGEs.
15. Mechanisms of hyperglycemia-induced tissue damage.
16. Carbonyl stress, its role in pathogenesis of long-term diabetic complications, atherosclerosis and renal failure.
17. Pathobiochemistry of inflammation – acute phase reactants, immunoglobulins.
18. Pathobiochemistry of inflammation – mediators of inflammation, alarmins.
19. Pathobiochemistry of inflammation – significance of complement and its activation.
20. Pathobiochemistry of inflammation – metabolic changes during inflammation, stress starvation.
21. Rules of protein folding.
22. Role of chaperones, proteasomes and lysosomes in the cell. Endoplasmic reticulum stress.
23. Mechanism of prion diseases.
24. Origins of pathological conformation of proteins and examples of clinical consequences.
25. Metabolic alterations in myocardium during anoxia and ischemia: limits of energy production, catabolism of purine nucleotides.
26. Metabolic alterations in myocardium during anoxia and ischemia: mitochondrial ATPase, myoglobin and NO, acidosis, ion gradients.
27. Reoxygenation and reperfusion injury.
28. Excitotoxicity in pathogenesis of CNS disorders.

At the oral examination student chooses by chance a doublet of questions.