

TOPICS FOR EXAM FROM MOLECULAR PATHOPHYSIOLOGY FOR STUDY YEAR

1. INTERCELLULAR SIGNALLING

1. Basics of cellular signaling - endocrine, paracrine, autocrine etc., concept of receptors; humoral & neural principles
2. Type of receptors, messengers, regulatory cascade - kinases, phosphatases – principles and examples
3. Signaling through GPCR and G proteins (c-AMP, inositol-phosphate cascades and similar)
4. Intracellular signaling via mitotic cascades (ras - dependent, independent); cytokine signaling (JAK, STAT, SMAD)
5. Signaling through intracellular receptors; Contact systems of signaling (Notch, a pod.)
6. Role of calcium in intracellular signaling; Signaling via NO- cGMP pathways

2. DAMAGE TO THE CELLS, REPARATION, ADAPTATION

A. Inflammatory changes

7. Inflammation – general description, etiopathogenesis; clinical forms, stages, classif.; systemic manifestations
8. Acute inflammation – manifest., types, humoral fact. (classes, functions; effects in tissues); vascular reactions
9. Acute inflammation - cellular elements (granulocytes, agranulocytes, APC, killing mechanism; disorders)
10. Healing – types, mechanisms, timing; tissue and cellular processes

B. Cellular damage, cell stress

11. Cell cycle – basics of regulation; cyclins, cyclin/ dependent kinases
12. Apoptosis and necrosis – morphological and functional alterations; causes and applications
13. Cell damage, adaptation & maladaptation – morph. & functional changes (aplasia, hyperplasia, meta-/dysplasia)
14. Cellular stress; HSP (heat shock proteins); stress signaling; ionizing radiation damage
15. Cellular pathomechanisms of ischemia and hypoxia; Ischemic-reperfusion injury
16. Oxidative damage - reactive forms of oxygen (ROS); mechanisms of damage
17. System of anti-oxidative defense – endogenous antioxidants (in. enzymes), exogenous antioxidants
18. Oxidative stress in pathogenesis of diseases (aging, atherosclerosis, chronic complication of diabetes, etc.)
19. Atherosclerosis – definition, pathogenesis; stages, risk factors

3. PATHOPHYSIOLOGY OF GENE EXPRESSION

20. Types & mechanisms of mutations; Alterations (genetic, hereditary, congenital, familial etc.)
21. Monogenic diseases - Mendelian autosomal and gonosomal – dominant, recessive; principles and examples
22. Monogenic disorders with non/ Mendelian heredity (imprinting, triple repeat mutat., mitochondrial heredity)
23. Chromosomal aberrations – structural and numerical alterations in autosomes and gonosomes
24. Pathophysiology of gene expression - genetic and epigenetic mechanisms
25. Pre-/ post-translational alterations – alternative RNA splicing; endoplasmic reticulum stress; microRNA

4 MOLECULAR BASICS OF CARCINOGENESIS

26. Tumor - types, classif., epidem.; Systemic manif.: paraneoplasia; tumor markers; tumor immunology
27. Benign & malignant tumors – cellular & metabolic characteristics; precanceroses; invasive growth; metastasing
28. Tumor etiopathogenesis – physical, chemical, biological factors; hereditary forms of tumors
29. Molecular carcinogenesis (in. oncogenes, tumor suppressor genes; multi-hit theory, clonal development)
30. Molecular carcinogenesis (in. metastasing – forms, mechanisms; metastasis suppressor genes; angiogenesis)

Note. Many topics by their titles and content purposely overlap, extend and follow logically up the topics from Pathological Physiology for 3. year General medicine