

Pathophysiology exam questions

1. Pathophysiology of heart failure

Significance. Causes and precipitating factors. Classification and symptoms of heart failure. Compensatory mechanisms, neurohormonal changes. Outline of therapy.

2. Pathophysiology of coronary circulation

Classification and differential diagnosis of acute coronary syndrome. Pathomechanism of angina pectoris syndrome and myocardial infarction. Complications of myocardial infarction. Outline of therapy and prevention.

3. Pathophysiology of arrhythmias

Symptoms, clinical significance and classification of arrhythmias. Pathomechanism of tachy- and bradyarrhythmias. Arrhythmias caused by reentry: simple and complex forms. Vagal maneuvers, cardioversion. Non pharmacologic therapy of arrhythmias.

4. Pathophysiology of circulatory shock. 1.

Importance, definition and causes of circulatory shock. Different forms of circulatory shock. Clinical signs. Compensatory mechanisms in shock. Mechanism of decompensation, role of immune system.

5. Pathophysiology of circulatory shock. 2.

Pathomechanism of reperfusion. Shock organs, liver, kidney, intestine, lung, adipose tissue and skeletal muscle. Diagnostic and prognostic evaluation of circulatory shock. Therapeutic possibilities.

6. Pathophysiology of essential hypertension

Role of hereditary and environmental factors in the development of essential hypertension. Role of vasoactive mediators and changes in cardiac output in the pathophysiology of essential hypertension. Connection between obesity and hypertension.

7. Pathogenesis and hemodynamic characteristics of the different forms of secondary hypertension

Pathogenesis and hemodynamic characteristics of renovascular, renal parenchymal, and endocrine (adrenal, pituitary and thyroid) forms of hypertension.

8. Disturbances of protein and amino acid metabolism

Causes of protein deficiency. Protein-calorie undernutrition: clinical patterns, consequences and diagnostic criteria. Abnormalities of plasma proteins. Disturbances of amino acid metabolism due to abnormal transport processes or metabolic blocks.

9. Pathophysiology of starvation

Energy demand during physiological and pathological conditions. Feeding-fasting cycle and its regulation. Adaptive mechanisms in different stages of starvation. Consequences of starvation. Pathomechanism of cachexia associated with malignant diseases. Comparison of weight loss methods.

10. Pathophysiology of obesity

Criteria for obesity. Indexes used to estimate obesity. Types, pathogenesis and consequences of obesity. Obesity induced comorbidities.

11. Disturbances of carbohydrate metabolism

Causes of hyperglycemia. Characteristics of the metabolic disorder associated with diabetes mellitus. Classification of diabetes syndrome. Diagnostic criteria. Types of hypoglycemia. Disorders of carbohydrate metabolism due to enzyme deficiencies. Glycogen storage diseases.

12. Complications of diabetes mellitus

Hypoglycemic, hyperglycemic ketoacidotic, and nonketotic hyperosmolar coma. Micro- and macroangiopathy, peripheral neuropathy.

13. Pathogenesis of type 1 diabetes mellitus

Genetic and environmental factors. The natural history of type 1 diabetes mellitus. Autoimmune and idiopathic types. Pathogenesis of insulinitis. Detection of autoantibodies. LADA.

14. Pathogenesis of type 2 diabetes mellitus

Genetic and environmental factors. Insulin resistance and hyperinsulinemia. Type 2 cases with monogenic inheritance. The role of obesity and the “thrifty” gene.

15. Liver diseases 1.

Parenchymal lesions of the liver: toxins, viruses. Different types of viral hepatitis. Chronic hepatitis. Alcoholism. Metabolism of alcohol. Different forms of alcoholic liver disease: fatty liver, hepatitis, cirrhosis.

16. Liver diseases 2.

Disorders of protein, carbohydrate and lipid metabolism caused by hepatic insufficiency. Non alcoholic fatty liver, non alcoholic steatohepatitis. Hepatic encephalopathy: symptoms, risk factors, pathomechanism. Hepatorenal syndrome.

17. Liver diseases 3.

Classification and differential diagnosis of jaundice. Congenital liver diseases. Forms of biliary obstruction. The causes and pathomechanism of cirrhosis. Forms and consequences of portal hypertension. Pathomechanism of ascites production.

18. Pathophysiology of the gastrointestinal tract 1.

Most important diseases of the upper GI tract: importance of reflux disease, pathomechanism, symptoms, complications, therapy. Regulation of gastric acid secretion, balance theory. Ulcus pepticum, the role of Helicobacter pylori infection. Pathogenicity factors of Helicobacter pylori. Gastric ulceration induced by NSAID-therapy.

19. Pathophysiology of the gastrointestinal tract 2.

Diseases of the small intestine: malabsorption, lactose intolerance, inflammatory bowel diseases.

20. Pathophysiology of the gastrointestinal tract 3.

Colorectal carcinoma: importance, epidemiology, clinical signs, risk factors, diagnosis and therapy. Possible pathomechanisms (FAP, WNT, APC) of its development.

21. Pathophysiology of the gastrointestinal tract 4.

Acute and chronic pancreatitis: epidemiology, etiologic factors, pathomechanism, diagnosis, complications and therapy. Pancreatic cancer: symptoms, diagnosis and prognosis.

22. General characteristics of inflammation. Role of biogenic amines, lipid mediators and cytokines

Local signs, forms, endogenous and exogenous causes of inflammation. Alterations of microcirculation. Role of histamine, serotonin, prostaglandins, leukotrienes, PAF in inflammation.

23. Role of proteolytic systems in inflammation

The plasma contact activated system and its regulation. Role of complement system. Formation and regulation of cytokines in inflammation. Diseases of abnormal complement system function.

24. Inherited and acquired disorders of chemotaxis and phagocytosis

Mechanism of chemotaxis and chemokinesis. O₂-dependent and O₂-independent mechanisms of phagocytosis. Congenital and acquired dysfunction of phagocytes. Processes of chronic inflammation and wound healing.

25. Systemic reactions in inflammation

Mechanism of the development of fever, fever patterns. The biological significance of fever. Role of leukocytosis and thrombocyte aggregation. Alterations in the synthesis of serum proteins. Acute phase proteins.

26. Evolution of atherosclerosis – lipid theory of atherosclerosis

Process of the development of atherosclerosis. Different types of atherosclerotic plaques. Organ manifestations. Possible pathogenetic role of atherogenic lipoproteins. Lipid theory of atherosclerosis, lipid theory at the cellular level.

27. Non-lipid theories of atherosclerosis

Thrombogenic, mesenchymal, tumor, “response to injury” and unified theories of atherosclerosis.

28. Risk factors of atherosclerosis. Prevention.

Major risk factors of atherosclerosis. Possibilities for screening and concepts for prevention.

29. Pathophysiology of hyperlipidemias 1.

Classification and composition of lipoproteins. Transport of exogenous and endogenous lipids. Classification of primary hyperlipoproteinemias. Primary hyperlipoproteinemias.

30. Pathophysiology of hyperlipidemias 2.

“Reverse” cholesterol transport. Secondary hyperlipidemias. Hypolipidemias. Lipid storage diseases.

31. Disturbances in the function of hypophysis

Definition, etiology and pathophysiology of panhypopituitarism. Clinical forms of growth hormone hypo- and hypersecretion. Abnormalities of prolactin secretion, hyperprolactinemias.

32. Disturbances of thyroid function

Etiology and clinical forms of hypo- and hyperthyroidism. Pathophysiology and clinical symptoms of Graves' disease and Hashimoto's thyroiditis.

33. Hypofunction of the adrenal cortex and medulla

Acute and chronic forms of adrenal cortex hypofunction: Waterhouse-Friderichsen syndrome, Addison's disease, iatrogenic causes. Hypofunction of the adrenal medulla.

34. Pathophysiology of glucocorticoid excess. Pheochromocytoma.

Definition and pathophysiology of Cushing's syndrome. Clinical signs and diagnostic methods of pheochromocytoma.

35. Pathophysiology of mineralocorticoid excess. Adrenogenital syndrome.

Primary and secondary hyperaldosteronism. Adrenogenital syndrome.

36. Disturbances in female sexual function

Disturbances in sexual maturation. Menstruation abnormalities and infertility. Pathophysiology of polycystic ovary syndrome and endometriosis.

37. Disturbances in male sexual function

Disturbances in sexual differentiation. Precocious puberty. Forms of hypogonadism (pituitary, testicular, testicular feminization).

38. Disturbances of calcium and phosphate metabolism

Diseases with hyper- and hypocalcemia. Hypercalciurias. Hormonal regulation of bone turnover. Development of rickets and osteomalacia. Role of vitamin D in non skeletal diseases.

39. Pathophysiology of skeletal diseases

Metabolic bone diseases. Primary and secondary osteoporosis. Pathomechanism of renal osteodystrophy. Tumor associated bone diseases. Paget's disease of bone.

40. Respiratory insufficiency 1.

Definition and types of respiratory insufficiency. Pathophysiology of type I (partial) respiratory failure. Disturbances of alveolar diffusion. Right-left shunts, ventilation-perfusion mismatch. Pathophysiology of restrictive ventilatory disorders and RDS. Pulmonary function studies.

41. Respiratory insufficiency 2.

Pathophysiology of type II (total) respiratory failure. Pathomechanism and diagnosis of alveolar hypoventilation and obstructive ventilatory disorders.

42. Pathophysiology of the connective tissue

Inherited disorders of collagen metabolism. Mucopolysaccharidoses. Acquired diseases of the connective tissue.

43. Pathophysiology of the muscle

Abnormal function of the skeletal muscle system. Diseases of the peripheral motoric neurons. Abnormalities of the neuromuscular junction. Primary and secondary muscular dystrophies. Abnormalities of the myocyte membrane. Metabolic muscle diseases.

44. Autoimmune processes and their pathogenetic role

Definition of autoimmunity, autoimmune reactions without pathologic consequences. Classification of autoimmune diseases, their incidence and risk factors. The MHC. The role of humoral and cellular immune system in certain autoimmune diseases. Theories explaining the development of autoimmune diseases.

45. General features of anemias

Anemias: symptoms and classification. Aplastic anemias. Anemias in chronic liver and renal failure. Anemias due to endocrine diseases.

46. Sideropenic and sideroachrestic anemias

Causes and development of iron deficiency. Laboratory, hematological and clinical characteristics of iron deficiency anemia. Anemia in chronic diseases. Anemias due to abnormal heme synthesis.

47. Hemolytic anemias

Symptoms of hemolysis (acute, chronic). Forms of corpuscular and extracorporeal hemolytic anemias. Hemoglobinopathies. Paroxysmal nocturnal hemoglobinuria (PNH).

48. Megaloblastic anemias

Role of vitamin B₁₂ and folic acid in the nucleic acid metabolism of red blood cells. Causes of B₁₂ or folic acid deficiency. Clinical symptoms of megaloblastic anemias. Polycythemia and secondary polyglobulias.

49. Reactive alterations in the leukocyte count. Malignancies of the bone marrow 1

Granulocytosis. Leukemoid reaction. General features of malignant cell proliferation. Acute myeloid leukemias.

50. Malignancies of the bone marrow 2

Chronic myeloproliferative syndromes: chronic myeloid leukemia. Myelodysplastic syndromes.

51. Reactive processes of the lymphoid system. Hodgkin's lymphoma.

Reactive alterations in the lymphoid system. Infectious mononucleosis. Hodgkin's lymphoma.

52. Malignant diseases of the lymphoid system.

Clonal diseases of the lymphoid system: acute lymphoblastic leukemia, non-Hodgkin lymphomas. Monoclonal gammopathies, plasmacytoma.

53. Pathophysiology of hemorrhagic diatheses. Coagulopathies

Forms of hemorrhagic diatheses. Laboratory differential diagnosis. Inherited and acquired coagulopathies.

54. Pathophysiology of thrombocytopathies and vasculopathies

Bleeding disorders caused by quantitative and qualitative defects of thrombocytes, laboratory differential diagnosis. Vasculopathies.

55. Pathophysiology of thrombus formation and thromboembolism

Factors predisposing for thrombosis. Congenital thrombophilias. Differences and similarities between the pathomechanism of arterial, venous and intracardiac thrombus formation. Disseminated intravascular coagulation (DIC).

56. Pathophysiology of vitamin metabolism. Metabolism of minerals. Nutritional diseases

Hypo- and hypervitaminoses. Abnormalities of trace mineral metabolism. Role of food constituents in the pathogenesis of different diseases. Abnormal dietary habits.

57. Pain

Biological significance of pain. Theories of the development of pain. Local and systemic reactions associated with pain. Diagnostic significance of pain. Pain syndromes. Acute and chronic pain. Theoretical foundations of relieving pain.

58. Disturbances of water homeostasis

Causes and outcomes of water depletion. Decreased intake and increased excretion of water. Causes and outcomes of water retention. Increased intake and decreased excretion of water. SIADH.

59. Disturbances of sodium homeostasis

Causes and complications of sodium depletion. Diseases with sodium depletion. Causes and complications of sodium retention. Sodium retention with hypo- and hypernatremia. Symptoms of sodium imbalance.

60. Disturbances of potassium metabolism

Causes and outcomes of hypokalemia. Causes and outcomes of hyperkalemia. Relationships between potassium metabolism and acid-base balance.

61. Acid-base disorders of respiratory origin

Causes and complications of respiratory acidosis. Diseases with respiratory acidosis. Causes and complications of respiratory alkalosis. Diseases with respiratory alkalosis.

62. Pathophysiology of the diseases with metabolic acidosis

Causes and significance of metabolic acidosis. Diseases with metabolic acidosis. The concept and use of anion gap. Renal tubular acidosis.

63. Pathophysiology of the diseases with metabolic alkalosis

Causes and significance of metabolic alkalosis. Diseases with metabolic alkalosis. Compensatory mechanisms of acid-base disorders.

64. Pathophysiology of acute parenchymal renal failure

Pathomechanism of acute renal insufficiency of renal origin. Role of vascular and tubular factors in decreasing the GFR. Role of thick ascending segment in the development of acute renal failure.

65. Pathophysiology of non-parenchymal acute renal failure

Pathomechanism of prerenal and postrenal acute failure. Consequences of acute renal insufficiency.

66. Pathophysiology of chronic renal failure

Alterations in fluid, sodium, potassium and urea excretion and in calcium-phosphate metabolism in chronic renal failure. Acid-base imbalance in chronic renal insufficiency. Factors contributing to the progression of renal disease.

67. Complications of chronic renal failure. Uremia

Anemia, bleeding tendency, hypertension, hyperlipidemia and impaired glucose tolerance in chronic renal failure. Characteristics of uremia. Uremic toxins.