

Fall Semester

1. Pathophysiology of heart failure

Pre- and afterload, contractility. Etiology of heart failure. Pressure- and volume overload. Characteristic energetic alterations and possible compensatory mechanisms of heart failure. Stepping across the compensation-decompensation border. Left and right ventricular failure.

2. Pathophysiology of cardiomyopathies

Pathomechanism of congestive, hypertrophied, restrictive and obliterative cardiomyopathies. Myocarditis. Secondary myocardopathies: alcoholic, diabetic, peripartal and ischemic heart disease.

3. Pathophysiology of coronary circulation

Causes of insufficient oxygen supply of the myocardium. Angina pectoris syndrome. Pathomechanism of myocardial infarction. Typical alterations in serum enzyme levels and ECG-morphology. Complications of myocardial infarction.

4. Pathophysiology of arrhythmias

Mechanisms of the development of arrhythmias. Disturbances of impulse formation and conduction. Hemodynamic effects of arrhythmias.

5. Disturbances of the regulation of respiration, the different forms of tissue hypoxia

Abnormal ventilatory patterns. Sleep apnea. Abnormalities of central and peripheral chemoreceptors. Forms of tissue hypoxia. Cyanosis. Pulmonal dyspnea.

6. Pathophysiology of ventilatory disorders

Obstructive ventilatory disorder, causes and functional characteristics: compliance, resistance, lung volumes. Restrictive ventilatory disorder, causes and functional characteristics: compliance, resistance, lung volumes. Pathophysiology of bronchial asthma.

7. Pathophysiology of alveolar ventilation

Alveolar hypo- and hyperventilation. Significance of ventilation-perfusion mismatch. Disturbances of alveolar diffusion.

8. Pathophysiology of respiratory insufficiency

Partial and total respiratory failure. Compensatory mechanisms in respiratory failure. Causes and pathomechanism of ARDS. Causes and outcomes of alveolar hyperventilation.

9. Circulatory shock. Systemic reactions

Definition and common etiological factors of circulatory shock. Characteristics of the major forms of shock. Reactions of the circulatory and immune system. Pathomechanism of reperfusion. Role of adipose tissue in shock.

10. Local effects of circulatory shock

Reaction of the skeletal muscle in shock. Role of the liver in shock. Pathological events in the lung in shock. Intestine as shock-organ. Contribution of kidney in shock. Pathophysiological bases for shock therapy.

11. Pathophysiology of essential hypertension

Role of heredity 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.

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

Pathogenesis and hemodynamic characteristics of renovascular, renal parenchymal, and endocrine (Cushing's syndrome, primary aldosteronism, acromegaly, pheochromocytoma) forms of hypertension.

13. Disturbances of carbohydrate metabolism

Characteristics of the metabolic disorder associated with diabetes mellitus. Classification of diabetes syndrome. Diagnostic criteria. Types of hypoglycemia. Glycogen storage diseases and other enzymatic disorders of carbohydrate metabolism.

14. Early and delayed sequelae of diabetes mellitus

Hypoglycemic, hyperglycemic ketoacidotic, and nonketotic hyperosmolar coma. Micro- and macroangiopathies, organ manifestations.

15. Pathogenesis of type I diabetes mellitus

Heredity, environmental effects; pathogenetic concepts in the different stages of the disease.

16. Pathogenesis of type II diabetes mellitus

Heredity, environmental effects; pathogenetic concepts in the different stages of the disease.

17. Causes of hepatic lesions

Forms of viral hepatitis, differential diagnosis. Toxic lesions. Different forms of alcohol induced hepatic disease: fatty liver, hepatitis, cirrhosis. Congenital hepatic diseases.

18. Forms of hepatic lesions

Liver cell injury. Forms of cholestasis. Classification and differential diagnosis of jaundice. Pathomechanism of cirrhosis. Liver dysfunction associated with heart failure. Forms and sequelae of portal hypertension.

19. Metabolic disorders accompanying hepatic failure

Disorders of protein, carbohydrate and lipid metabolism accompanying hepatic insufficiency. Detoxifying function in normal and pathologic states: alcohol, bilirubin and ammonia. Development of hepatic coma. Pathomechanism of ascites production. Effect of hepatic failure on the water and electrolyte balance.

20. Pathophysiology of starvation

Energy demand in pathological states. Feeding-fasting cycle and its regulation. Different stages of starvation. Differences in the metabolic characteristics of the short-term and prolonged (adapted) starvation.

21. Pathophysiology of obesity

Criteria of obesity. Indexes used to estimate obesity. Types, pathogenesis and outcomes of obesity.

22. Disturbances of protein and amino acid metabolism

Protein deficiency. Protein-calorie undernutrition: clinical patterns, outcomes and diagnostic criteria. Secondary protein metabolism abnormalities. Disturbances of amino acid metabolism.

23. 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 tumors. Impaired dietary habits.

24. Disturbances of gastric juice secretion. Peptic ulcer

Role of defensive and aggressive factors in the pathomechanism of acid-peptic disease. Cytoprotection. Pathomechanism of gastric ulcer. Role of heredity in the pathomechanism of duodenal ulcer. Pathophysiological characteristics of duodenal ulcer. The mucus-bicarbonate barrier. Stress-ulcer.

25. Disturbances of gastrointestinal tract motility

Disturbances of mastication and swallowing. Gastro-esophageal reflux. Achalasia esophagi. Alterations of gastric motility. Motility disorders of small intestine. Duodenal reflux. The early dumping syndrome. Motility disorders of the colon. The spastic colon.

26. Malabsorption syndrome

Gastrointestinal and extragastrointestinal causes of malabsorption. Clinical features and outcomes of malabsorption syndrome. Whipple's disease. Crohn's disease. Irritable bowel syndrome. Colitis ulcerosa.

27. Disorders of the exocrine pancreas function. Inflammatory and neoplastic diseases of the pancreas

Hyposecretion of the pancreatic juice. Mucoviscidosis. Pancreatic juice hypersecretion. Etiology, clinical course and complications of acute pancreatitis. Etiology, pathomechanism and alterations in pancreatic function and laboratory findings in chronic pancreatitis. Pancreatic tumors.

28. General characteristics of inflammation. Role of biogen amines, lipid mediators and cytokines

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

29. Role of proteolytic systems in inflammation

Plasma contact activating system and its regulation. Role of complement system. Formation and regulation of cytokines in inflammation. Diseases of abnormal complement system function.

30. 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.

31. Systemic reactions in inflammation

Mechanism of the development of fever, fever patterns. Endogenous pyrogens and cryogens. Biological significance of fever. Role of leukocytosis and thrombocyte aggregation. Alterations in the synthesis of serum proteins, acute phase proteins.

32. Immunodeficiencies: causes and sequelae. Immunosuppression

Inherited and acquired disorders of the complement system. Classification of congenital immunodeficiencies, causes and clinical features of the certain diseases. Acquired immunodeficiencies. Possible methods for immunosuppression.

33. Hypersensitivity reactions

Anaphylaxis, allergy, atopic diseases. Types of hypersensitivity reactions, syndromes caused by them, their pathomechanisms. Role of hypersensitivity reactions in autoimmune diseases.

34. Connections between malignancies and the immune system. Immunotherapy

Possible mechanisms of the protection of immune system against tumors. Possibilities for tumors to escape. Significance of tumorantigens. Theories of immunotherapy.

35. Immuno-tolerance

Humoral and cellular immunity. Natural and induced tolerance. Possible mechanisms of the development of tolerance, evidences. Significance of central and peripheral tolerance.

36. Autoimmune processes and their pathogenetic role

Definition of autoimmunity, autoimmune reactions without pathologic consequences. Classification of autoimmune diseases, their incidence and aggravating factors. The MHC. Forms of contribution of humoral and cellular immune system in certain autoimmune diseases. Theories concerning the development of autoimmune diseases.

Spring Semester

37. Pathophysiology of aging

Molecular and cellular processes of aging. Alterations in the different organs with aging. Factors influencing aging. Important diseases associated with old age.

38. Sideropenic and sideroachrestic anemias

Causes and development of iron deficiency. Laboratory, hematological and clinical characteristics of iron deficiency anemia. Sideroachrestic anemias.

39. 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. Polyglobulias.

40. Hemolytic anemias

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

41. Reactive alterations in the leukocyte count. Malignancies of the bone marrow

Granulocytosis. Leukemoid reaction. General features of malignant cell-proliferation. Acute non-lymphocytic leukemias. Malignant hyperplastic diseases of the bone marrow. Chronic myeloid leukemia, polycythemia vera, idiopathic myelofibrosis.

- 42. Reactive and malignant processes of the lymphoid system.**
Disorders of the pluripotent hemopoietic stem cell
Reactive alterations in the lymphoid system. Infectious mononucleosis. Hodgkin's lymphoma. Clonal diseases of the lymphoid system: acute lymphoblastic leukemia, non-Hodgkin lymphomas. Aplastic anemia. Myelodysplasias.
- 43. Pathophysiology of hemorrhagic diatheses. Coagulopathies**
Forms of hemorrhagic diatheses. Laboratory differential diagnosis. Inherited and acquired coagulopathies.
- 44. Pathophysiology of thrombocytopathies and vasculopathies**
Bleeding disorders accompanying quantitative and qualitative defects of thrombocytes, laboratory differential diagnosis. Vasculopathies.
- 45. Pathophysiology of thrombophilias and thromboembolias**
Factors predisposing for thrombosis. Congenital thrombophilias. Differences and similarities between the pathomechanism of arterial, venous and intracardiac thrombus formation. DIC. Thrombotic microangiopathies.
- 46. Pathophysiology of hypertriglyceridemias and hypolipidemias**
Classification and composition of lipoproteins. Transport of exogenous and endogenous triglycerides. Classification of primary hyperlipoproteinemias. Primary and secondary hypertriglyceridemias. Hypolipidemias.
- 47. Pathophysiology of hypercholesterolemias and lipid storage diseases**
Classification and functions of apoproteins. Transport of exogenous and endogenous cholesterol. "Reverse" cholesterol-transport. Classification of hyperlipoproteinemias. Primary and secondary hypercholesterolemias. Lipid storage diseases.

48. Evolution of atherosclerosis

Process of the development of atherosclerosis. Organ manifestations. Chemical, experimental and epidemiological evidences of the connection of atherosclerosis and cholesterol metabolism. Possible pathogenetic role of atherogenic lipoproteins.

49. Lipid theory of atherosclerosis

Connections between abnormal serum lipid concentrations and atherosclerosis. Possible connections between serum lipid levels and diet. Lipid theory at "cellular level".

50. Non-lipid theories of atherosclerosis

Thrombogenic, mesenchymal and "response to injury" theories of atherosclerosis.

51. Risk factors of atherosclerosis. Bases for the prevention of complications

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

52. Disturbances of potassium metabolism

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

53. 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.

54. 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.

- 55. Pathophysiology of the diseases with metabolic alkalosis**
Causes and significance of metabolic alkalosis. Diseases with metabolic alkalosis. Compensatory mechanisms of acid-base disorders.
- 56. Pathophysiology of acute parenchymal renal failure**
Pathomechanism of acute renal insufficiency of renal origin. Role of vascular and tubular factors in GFR decrease. Role of thick ascending segment in the development of acute renal failure.
- 57. Pathophysiology of non-parenchymal acute renal failure**
Pathomechanism of prerenal and postrenal acute failure. Sequelae of acute renal insufficiency.
- 58. 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.
- 59. Complications of chronic renal failure. Uremia**
Anemia, hemophilia, hypertension, hyperlipidemia and impaired glucose tolerance in chronic renal failure. Characteristics of uremia. Uremic toxins.
- 60. Disturbances in the function of hypophysis**
Definition, etiology and pathophysiology of panhypopituitarism. Clinical forms of growth hormone hyposecretion. Laron dwarf, Pygmy dwarf. Factors influencing prolactin secretion. Hyperprolactinemias.
- 61. Disturbances in thyroid function**
Pathophysiology and clinical symptoms of Grave's disease. Etiology and clinical forms of hypothyreosis. Cause and symptoms of Hashimoto's thyroiditis.

- 62. Hypofunction of the adrenal cortex and medulla**
Acute and chronic forms of adrenal cortex hypofunction: Waterhouse-Friderichsen syndrome, Addison's disease, iatrogenic causes. Adrenogenital syndrome. Hypofunction of the adrenal medulla.
- 63. Hyperfunction of the adrenal cortex and medulla**
Definition of Cushing's syndrome, forms with low and high ACTH concentration. Pathophysiology of Cushing's disease and ectopic ACTH syndrome. Primary and secondary hyperaldosteronism. Clinical signs and diagnostic laboratory methods of pheochromocytoma.
- 64. Disturbances in female sexual function**
Disturbances in sexual maturation. Menstruation abnormalities. Hormonal disturbances in pregnancy.
- 65. Disturbances in male sexual function**
Disturbances in sexual differentiation. Precocious puberty. Forms of hypogonadism (hypophysaer, testicular, peripheral).
- 66. Disturbances of calcium and phosphate metabolism.**
Pathophysiology of the diseases of skeleton
Diseases with hyper- and hypocalcemia. Tetany syndrome. Pathomechanism of renal and absorptive hypercalciurias. Pathomechanism of involutional osteoporosis. Secondary osteoporosis. Development of rickets and osteomalatia. Pathomechanism of renal osteodystrophy. Osteogenesis imperfecta. Paget's disease of bone. Osteopetrosis.
- 67. Qualitative and quantitative consciousness disorders**
Classification and differences between qualitative and quantitative disorders of consciousness. Disturbances of vigility and contents. "Short" consciousness disorders. Cerebral commotion. Pseudocomas. Pathogenetic classification of unconsciousness. Causes and classification of diffuse consciousness disorders of metabolic origin, fundamentals of the diagnostic route.

68. Pathophysiology of motor disorders

Disorders of voluntary motorium. Peripheral and central paresis. Apraxia. Pathomechanism of extrapyramidal movement disorders of cerebellar and brainstem origin.

69. Pain

Biological significance of pain sensation. Theories concerning the development of pain. Local and systemic reactions associated with pain. Diagnostic significance of pain. Pain syndromes. Acute and chronic pain. Theoretical bases for pain relief.

70. Disturbances of the autonomic nervous system

Chronic autonomic insufficiency and acute dysautonomy. Central, peripheral and local vegetative disorders.

71. Pathophysiology of CNS circulation

Global and focal ischemia of the brain. Disturbances in the autoregulation of brain circulation. Development of ischemic nerve cell damage. Classification of cerebral hemorrhages. Classification of cerebrovascular diseases according to their clinical course.

72. Pathophysiology of intracranial fluid spaces

Forms and characteristics of brain edema. Consequences of brain edema. Causes, most common forms and outcomes of the alterations in cerebrospinal fluid dynamics.

73. 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.

74. 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 retention.

75. Pathophysiology of thermoregulation

Hypo- and hyperthermias. Effects of heat exposure on human organism. Pathomechanism of heatstroke.