

Content module 1 "General histology"

1. Histology. Definition and significance for biology and medicine. Methods of histological research. Basic principles and stages of preparation of histological preparations.
2. Cytology. Definition, meaning for biology and medicine. Morphofunctional characteristics of the main cell structures (plasmolemma, cytoplasm, organelles, inclusions)
3. Intercellular contacts, their types, structure and functions.
4. The nuclear apparatus of the cell, its meaning. The main components of the core, their structural and functional characteristics. Nuclear-cytoplasmic relationship.
5. Cell cycle: its stages, morphological and functional characteristics. Methods of reproduction of cells , their morphological characteristics. Mitosis , significance, characteristics of phases and regulation. The concept of endoreproduction and polyploidy. Meiosis, meaning. Difference from mitosis.
6. Tissues. Definition of the concept. Classification. Concept of tissue determination and differentiation. Patterns of development. Physiological and reparative regeneration of various types of tissues. Epithelial tissues. General characteristics. Morphofunctional and phylogenetic classification of their types and characteristics of different types of covering epithelium. Glandular epithelium. Classification and structure of glands. Morphology of the secretory cycle. Types of secretion.
7. Tissues of the internal environment. Classification, sources of development, general morphofunctional characteristics. Characteristics of blood as a tissue. Formed elements of blood. Erythrocytes, structure and functional significance. Platelets, their number, function, duration of existence. Hemogram.
8. Leukocytes. Classification, morphofunctional characteristics. Leukocyte formula and its features at different stages of ontogenesis. Granulocytes (neutrophils, eosinophils and basophils) structure and functions. Morphofunctional characteristics of agranulocytes (lymphocytes, monocytes). Leukocyte formula.
9. Embryonic hemocytopoiesis. Development of blood as a tissue. Localization, terms, features of hematopoiesis. Postembryonic hematopoiesis. Hematopoietic stem cells, structure, markers, properties.
10. General characteristics of connective tissues. Classification.

11 . Fibrous connective tissue. loose fibrous connective tissue: sources of development, localization, morphofunctional characteristics of cells of loose connective tissue .

12 . Intercellular substance. The main amorphous substance: chemical composition, structure and functions.

13. Collagen fibers: chemical composition, structure and functional significance. Stages of formation of collagen fibers. The stage of formation of collagen fibers . Elastic fibers: chemical composition, molecular organization, structure, functional significance. Stages of synthesis and maturation of elastic fibers. Reticular fibers: chemical composition, structure, visualization methods, functional significance.

14 . Dense fibrous connective tissues, their types - formal and informal, localization, structure and functions.

15 . Connective tissues with special properties: classification, localization, structure and functions.

16 . General characteristics of skeletal tissues (sources of development, structure, functions). Classification. Cartilaginous tissues. Structural composition. Histogenesis of cartilage tissue. Morphofunctional characteristics of cells, intercellular substance and different types of cartilage tissue. Appositional and interstitial growth of cartilage. Peculiarities of chondrocyte metabolism.

17. Bone tissue. General plan of structure and function. Classification. Morphofunctional characteristics of bone tissue and intercellular substance. Types of bones. Parts of the tubular bone. Histoarchitectonics in different zones of the tubular bone. Direct and indirect osteogenesis. Stages, regulation. Growth of tubular bones in length. Epiphyseal plate. Growth regulators and mechanisms.

18. General characteristics of muscle tissues , properties, classification. Muscle fiber as a structural and functional unit of skeletal muscle tissue . X characteristics of reduction. Regeneration of skeletal muscle tissue.

19 . Cardiac muscle tissue. Source of development, structure, characteristics of reduction. Cardiac muscle fibers. Types of cardiomyocytes.

20 . Smooth muscle tissue . _ Histogenesis, morphofunctional characteristics of smooth myocyte contraction. Reduction mechanism. Regeneration of smooth muscle tissue .

21 . Myoid and myoepithelial cells. Sources of development, structural features, functional significance.

22 . Nervous tissue: sources of development, structure, functional properties and significance of neurocytes . Morphological and functional classification of neurons . Neurosecretory cells.

23 . Neuroglia. Classification, sources of development, structure. functional significance of neuroglia cells .

24 . Nerve fibers. General characteristics, classification, pulse conduction characteristics. Myelinated and unmyelinated nerve fibers. Structural and molecular basis of impulse conduction. Regeneration of nerve fibers.

25 . Nerve endings. Receptor (afferent) nerve endings. Classification. structure, localization, relationships with other tissues, functional significance.

26 . Efferent nerve endings. Target cells. Neuromuscular synapses: structure, functional significance, regulation mechanisms.

27 . Interneuronal synapses (classification, structure, mediators). The mechanism of transmission of excitation in synapses.

Content module 2 "Special histology"

1. General morphofunctional characteristics of the nervous system. Patterns of development. Classification. Central nervous system. Gray and white matter. Nerve centers: types, cytoarchitectonics. Meninges: tissue composition, structural features, functions. Histogemetic barriers of the brain.

2. Brain. General characteristics: development, structure, functions. Departments Big brain. Cerebral cortex: gyri, furrows, functional fields, morphological types of neurons. Neuroglia of the cortex. Histophysiology of cerebral cortex: layers, cytoarchitectonics, myeloarchitectonics. Morphological types of bark .

3. Cerebellum: localization, structure, functions. Cerebellar cortex: layers, cytoarchitectonics. afferent and efferent fibers. Interneuron connections in the cerebellar cortex.

4. Spinal cord. General morpho-functional characteristics. Gray matter: horns, nuclei, neurons. White matter. Front, side and back cords: structural composition, functional significance. Conductive ways.

5. Peripheral nervous system: ganglia, peripheral nerves, endings. Peripheral nerve: general structure plan, structural composition. Endoneurium, perineurium, epineurium. Hemato-neural barrier.
6. Nerve ganglia: types, general structure plan.
7. Vegetative ganglia. Types, sources of development. Structure: fabric composition.
8. General characteristics of sense organs. Classification of sense organs. Cellular and molecular bases of reception. Visual analyzer: links, their structural components, principles of functioning.
9. Organ of vision. Sources and course of development. Eyeball: general structure plan, shells, their parts, tissue composition and functions. Aqueous moisture: role in the functioning and trophism of eye structures. Filtration of aqueous moisture. Hemato-aqueous barrier. Circulation and reabsorption of aqueous moisture. Iris-corneal angle (angle of the anterior chamber of the eye). Trabecular meshwork. Scleral venous sinus (helmet channel).
10. Functional apparatus of the eye. Dioptric apparatus: structural components, general characteristics of light-refracting structures, sources of their trophic.
11. Cornea, layers, trophic, structural and molecular determinants of refraction. Corneal stroma: keratocytes, chemical composition of the intercellular substance. Corneal endothelium: structure, transport mechanisms, role in maintaining corneal hydrophilicity and trophicity.
12. Lens: surfaces, zones, trophic. Lens capsule. Lens epithelium. Morphogenesis of lens fibers, its regulation. Growth and regeneration of the lens.
13. Vitreous body: structure, features of the chemical composition of the matrix, functions, trophic.
14. Accommodation apparatus. Structures. Iris: layers, peculiarities of cellular composition, muscles of the iris, their regulation, role in adaptation to light intensity.
15. Ciliary (ciliary) body: parts, muscles, regulation, ciliary crown, role in changing the shape and refractive power of the lens.
16. Photoreceptor apparatus. Retina. Tissue composition, trophic. Neurons and gliocytes of the retina. Cytoarchitectonics. A yellow spot. Optic nerve. Optic disc (blind spot).

17. Trophic of the retina. The vascular membrane itself: layers, structure. Basal complex. Hematoretinal barrier.
18. Auxiliary apparatus of the eye. Lacrimal glands and lacrimal fluid. Conjunctiva: structure, functional and diagnostic significance. Age changes.
19. Statoacoustic sensor system. Auditory and vestibular analyzer.
20. Ear: sources and course of development. Morphofunction and oral characteristics of the structures of the outer and middle ear .
21. Bony and membranous labyrinth: zones, perilymph. Convolutional (auditory) part of the membranous labyrinth: vestibular membrane, basilar membrane, vascular strip. Endolymph: composition, filtration mechanisms.
22. Spiral organ: cellular composition, tectorial membrane, cytophysiology of the hearing aid.
23. Vestibular part of the membranous labyrinth. Receptor zones of the hair: spot, ampoule combs. Cellular composition of receptor zones: type I and II vestibulocytes (hair sensitive cells), supporting vestibulocytes. Cytophysiology of hair sensitive cells.
24. Olfactory analyzer: parts, structural composition, functional value. The organ of smell. Olfactory epithelium: localization, cellular composition. Olfactory neurosensory cells. Supporting and basal cells. Mechanisms of smell perception. Age changes.
23. Taste analyzer. The organ of taste. General characteristics: sources of development, localization, functional significance. Taste buds: structure. cell structure Taste sensorepithelial cells, supporting and basal cells. Histophysiology of the organ of taste.
24. Morphological bases of skin, deep and visceral sensitivity. Leather and its derivatives. General morphofunctional characteristics. Sources of development, layers, tissue composition, functions. Regeneration. Structural and functional types and zones of the skin. The cellular composition is the dermis in : layers, features of the structure of "thick" and "thin" skin.
25. Derma. Papillary and reticular layers. Features of blood supply and innervation. Skin glands. Sebaceous and sweat glands: localization, structure of end sections, cellular composition, mechanisms of secretion, regulation of the secretory cycle.

26. Hair (hair). Development, structure, growth, hair change, hair follicle cycle: anagen, catagen, telogen - characteristics, regulation. Nails Development, structure, growth. General characteristics. Sources of development. Functional value.
27. Blood vessels. Classification. General plan of the structure of various types of vessels : membranes, tissue composition.
28. Microcirculatory bed. Morphofunctional characteristics of arterioles, capillaries , venules . Arteriolo-venular anastomoses. Histogemetic barriers.
29. Venules: (classification) types, structure, functional value. Veins, structural features according to hemodynamic conditions. Classification of veins. Structure of venous valves. Organ and age-related features of histophysiology of veins.
30. Lymphatic vessels. Classification of lymphatic vessels of different types. Lymphatic capillaries: structural features, mechanisms of formation and composition of lymph.
31. Heart. Embryogenesis. The general structure of the heart wall. Endocardium, myocardium, epicardium. Contractile apparatus of the heart. Myocardium: features of structure and function. Conductive system of the heart: peculiarities of the structure and functioning of excitatory and conducting cardiomyocytes. Secretory cardiomyocytes. Endocardium. Heart valves.
32. The concept of the chemical nature of hormones and their importance for the body. Target cells. Hormone receptors: types (membrane, nuclear), mechanism of action, biological effects of hormones. Classification of structures of the endocrine system. The central link of the endocrine system. Sources of development. General characteristics.
33. Hypothalamus: departments, nuclei, structural and functional connections with other departments of the nervous system.
34. Neurosecretory cells: structure, markers, cytophysiology. Axovasal synapses.
35. Hypothalamic-pituitary system.
36. Hypophysis. Embryonic development of the adeno- and neurohypophysis. Adenohypophysis: parts, tissue and cellular composition, principles of regulation. The intermediate part of the adenohypophysis: structural features, functional significance. Hypothalamic-adenohypophyseal vascular system, its role in hormone transport. Neurohypophysis: parts, structure, connection with the

hypothalamus , functional significance. Blood supply of the hypothalamic-pituitary system.

37. Pineal gland: development, structure, cellular composition, connection with other parts of the nervous system. Pinealocytes: structure, hormones, their targets and biological effects. Age changes.

38. Adrenal glands. Sources and course of development. General structure and functional significance. Cortical substance of the adrenal gland. Morphofunctional characteristics: zones, structure, types of adrenocorticocytes, regulation of their secretory activity. Brain substance of the adrenal gland: structure, cellular composition, hormones, their action.

39. Hypothalamic-pituitary-adrenocortical system: principles of regulation, biological role. Sympatho-adrenal system: composition, principles of functioning, biological significance.

40. Thyroid gland. Development. general structure plan, fabric composition. Follicles: structure, cellular composition. Thyrocytes: structure, secretory cycle, its regulation, hormones, their targets and biological effects. Reconstruction of follicles in connection with different functional activity. Hypothalamic-pituitary-thyroid system. Parafollicular endocrinocytes: sources of development, localization, structure, regulation, hormones, their targets and biological effects.

41. Parathyroid glands. Development, structure and cellular composition. Principles of regulation of calcium metabolism: hormones of the thyroid and parathyroid glands, vitamin D.

47. Single endocrinocytes of non-endocrine organs. Diffuse endocrine system: localization, cells, their hormones and biological role. Neuroendocrine cells of the ARUD system, localization, hormones and their action.

48. General morphofunctional characteristics and classification of organs of hematopoiesis and immunogenesis. Immune protection system. Non-specific and specific immunity. Antigen-presenting cells: structure, markers, functional significance.

49. Red bone marrow. Localization, structure and functions, tissue composition, cytoarchitectonics, vascularization.

50. Thymus as the central organ of T-lymphocytopoiesis. Localization, structure, tissue composition, functions. Thymus lobe: structure, functional zones. Epithelioreticulocytes: types, structure, functional value markers.

51. Lymphocytopoiesis in the thymus. Positive and negative selection of lymphocytes. Age-related and accidental involution of the thymus.
52. Spleen: localization, structure and functions. Stroma of the spleen: tissue composition, role in functioning. Vascular system and features of blood supply to the spleen. Parenchyma of the spleen: tissue and structural composition, white and red pulp. White and red pulp and spleen: zones, cellular composition, functional significance.
- 53 . Lymph nodes: localization, structure and functions. Functional zones of lymph nodes. System of sinuses. Histophysiology of lymph nodes.
54. General morphofunctional characteristics of the digestive system. Sources of development. Division into departments according to development, structure and functions. General plan of the structure of the wall of the alimentary canal. Shells: tissue composition, functional significance. Mucous membrane - layers, tissues, relief. Innervation and vascularization of the digestive tube.
55. Oral cavity. Sources and course of development of the oral cavity and face. Features of the structure of the mucous membrane of the oral cavity. Functional types of the mucous membrane of the oral cavity.
56. Lips, cheeks, gums, hard and soft palate.
57. Tongue. Sources of development. General plan of the structure. Dorsal and ventral surfaces. Tongue papillae: localization, structure, functional significance.
58. Teeth. Milk and permanent teeth. Odontogenesis. Sources and development of teeth.
59. Tooth tissues. Enamel, dentin, cement - structure, chemical composition, function. Tooth pulp, structure, function. Periodontal disease. Age-related changes in teeth.
60. Pharynx (throat): parts, features of the structure of the pharynx wall.
61. Lympho-epithelial pharyngeal ring. Tonsils general structure, functional meaning. Lympho-epithelial cooperation in the implementation of immunity.
62. Esophagus: sources of development, membranes, tissue composition. Features of the structure of the esophagus wall in different parts.
63. Stomach. Sources and course of development. Departments The structure of walls, shells, their tissue composition, relief, functions. Mucous membrane of the

stomach. Epithelium: structure, functions, features of regeneration. Gastric glands: types, morphological type, cellular composition of glands, comparative characteristics. Own glands of the stomach: parts, distribution of cells. Gastric endocrinocytes: localization, types, hormones and their biological effects.

64. Small intestine. General characteristics of various anatomical departments, wall structure. Features of the relief of the mucous membrane. The "crypto-villi" system. Mucous membrane of the small intestine. Covering epithelium: cellular composition, types of epitheliocytes, their structure and functions. Histophysiology of intestinal digestion: phases, chemical and structural support.

65. Features of the structure of the duodenum, jejunum and ileum. Intestinal-associated lymphoid tissue: localization, structural organization, functional significance.

66. Colon. Sources and course of development. The structure of the wall of the large intestine: shells, tissue composition, relief. Mucous membrane. Relief. Crypts Covering epithelium: cellular composition, structural and functional characteristics of various cells.

67. Vermiform appendix, its structure, function.

68. The rectum, departments, their morphological and functional features. Age changes.

69. Digestive glands: types, connection with different departments of the digestive canal, general plan of structure, functional significance. Large and small salivary glands. Sources and course of development. Pancreas. Sources and course of development. General morphofunctional characteristics. Structure and function of exocrine and endocrine parts.

70. Liver. Sources and course of development. General characteristics: parts, fabric composition, functions. The structure of the classic lobule of the liver: zones, their functional characteristics. Hepatic beams. Hepatocytes: structural and functional types, their structure, functional zones and surfaces of hepatocytes, bile capillaries.

71. Biliary tract: composition, general structure plan.

72. General morphofunctional characteristics of the respiratory system. Airway: departments, sources and course of development. general plan of the structure, functions. Shells of the wall of the airways: tissue composition, functional significance.

73. Mucous membrane of the respiratory tube. Covering epithelium: its cellular composition, morphology and cell functions. Muco-ciliary apparatus. Bronchi-associated lymphoid tissue: structural characteristics, functional significance.

74. Regional features of the structure of the wall of the airways. Nasal cavity, larynx, trachea, bronchi (main, large, medium and small diameter), terminal bronchioles, their structure and function.

75. Lungs. Sources and course of development. General plan of the structure of the lung. The concept of a lobe of the lung. Acinus as a structural and functional unit of the respiratory department of the lung. Alveolus: structure, cellular composition, interalveolar partitions. Surfactant complex. Alveolar barrier.

76. Kidneys and urinary organs. General morpho-functional characteristics. Sources of development. General structure: cortex and medulla. Lobes and lobules of the kidney. Nephron as a structural and functional unit of the kidney. Filter barrier. Chemical composition of the ultrafiltrate.

77. Tubular apparatus of the nephron: segments, their location, structure and functional significance. Structural and molecular bases of tubular reabsorption and secretion, regulation. Urine concentration and dilution system. Antiflow-multiplier apparatus: loop of Henle, direct vessels of the kidney, collecting ducts. Collecting ducts: cellular composition. structural and functional characteristics, regulation.

78. Stages and mechanisms of urine formation, their structural support and regulation. Endocrine apparatus of the kidney. Juxtaglomerular complex, its structure and functions. Prostaglandin apparatus of the kidney. Interstitial cells: structure, prostaglandins, their targets and functional significance.

79. Urinary tract: departments, structure and functions. Peculiarities of histophysiology of kidney cups, bowl, ureters, urinary bladder, urethra.

80. General characteristics of the male reproductive system. Sources and course of development. Functions. Principles of regulation. Testis (testis): localization, structure and functions. Hematotesticular barrier.

81. Spermatogenesis: cycle and wave of spermatogenesis. Stages of spermatogenesis, processes that take place and their biological meaning. Spermatogenic cells: stem cells - spermatogonia, primary and secondary spermatocytes, spermatids, their structure and set of chromosomes. Spermogenesis: phases. morphological appearances, molecular determinants. Cytophysiology of sperm. Conditions and regulation of spermatogenesis.

82. Seminiferous tracts. Epididymis (appendage of the testicle). Ejaculatory duct. Ejaculatory duct. Male urethra . Additional glands. General structure, functional meaning. Seminal vesicles (follicular gland). Structure, characteristics of the secret, role in the formation of sperm.
83. Prostate gland: zones, groups of glands, characteristics of stroma and parenchyma. Age changes. Gland of the bulb of the urethra (bulb-urethral gland): structure, functional significance.
84. External genitalia. The penis (penis), its structure, vascularization and innervation.
85. General characteristics of the female reproductive system. Sources of development. Functions. Principles of regulation. Ovarian cycle: phases, regulation. Ovarian hormones: targets and biological effects. Cyclical changes in a woman's body.
86. Ovary: sources and course of development, general structure plan, functions. Cortical substance of the ovary: follicles, features of the stroma. Brain substance of the ovary: portal cells, their structure and functional significance.
87. Ovarian follicles: components: primary oocyte, follicular epithelium, transparent membrane, theca. Hematoovarian barrier. Types of ovarian follicles. Folliculogenesis. Ovulation: mechanisms, regulation, biological significance. Atresia of follicles. Yellow body: phases of development (luteogenesis). Ovarian hormones: targets and biological effects.
88. Oogenesis: phases, their essence, spatial-chronological characteristics, morphological manifestations, connection with folliculogenesis.
89. Histophysiology of the ovary in different age periods: before and during puberty, fertile period, during pregnancy and lactation, menopause. Internal genital organs: sources and course of development, general plan of structure, membranes, tissue composition, functional significance.
90. Fallopian tubes: parts, structure and functions, peculiarities of the cellular composition of the covering epithelium, its changes in different phases of the ovarian cycle.
91. Uterus. Wall structure (endometrium, myometrium, perimetrium). Endometrium: layers, tissue composition, features of blood supply of basal and functional layers. Uterine glands: parts, their functional significance. Uterine epithelial stem cells, physiological and reparative regeneration of the endometrium.

92. The menstrual cycle and its phases, connection with the hypothalamic-pituitary-ovarian regulation system.

93. Morphogenesis of the endometrium in different phases of the cycle, regulation, biological significance. Changes in the structure of the uterus (endometrium and myometrium) during pregnancy. Cervix: divisions, structure of the mucous membrane, cervical gland, regulation, characteristics of the secretion, cytological examination of smears-imprints of the epithelium of the cervix: criteria, diagnostic value.

94. Vagina: sources of development, structure of the wall, changes in the epithelium of the mucous membrane in different phases of the menstrual cycle.

95. Mammary gland: sources of development, general structure, functional significance, neuro-endocrine regulation. Mammary gland morphogenesis in different age periods: before and during puberty, during the fertile period, during pregnancy and lactation, post-lactation and age-related involution.

96. Periods of embryogenesis: general characteristics, duration, localization. Critical periods of development of the human organism. Progenesis: key events, possibilities and mechanisms of chromosomal aberrations, factors influencing their frequency.

97. Fertilization: location and conditions of implementation, characteristics of gametes involved in fertilization. Fertilization phases.

98. Cleavage: localization, characteristics, conditions of embryo transport. Blastomeres: characteristics, types, features of the cell cycle. Blastocyst formation: trophoblast, embryoblast (inner cell mass). Implantation: localization, conditions, characteristics, phases. Gastrulation: essence, morphogenetic events, phases, terms.

99. Formation of amnion, yolk sac, chorion, allantois: wall structure, functional significance. Trophics of the embryo. Chorion villi. Placentation: terms, morphogenesis, regulation, functional significance. Placenta: parts, structure, functional significance.