Department of Microscopic Morphology/Histology

Associate Professor Exam, position II/6

April July, 2018

Topics and references

I. GENERAL HISTOLOGY

1. Basic principles in histology: microscope, chemical bases of cell and tissue staining. Types of dyes and staining.

2. Morphological, histochemical and immunohistochemical methods for the identification of epithelial, connective, muscular and nervous tissues.

3. The smears: cytology technique, staining methods, interpetation.

4. General cell organization, cellular components, cellular features adapted to the function.

5. Epithelial tissues: definition and histogenesis of epithelial tissues. General characters and classification of the epithelia. Histological description of epithelia. The basal membrane. Regeneration of epithelia. Morphological features of secretory epithelial cells. General biology of epithelia.

6. Connective tissues: definition, histogenesis, general characters and classification of connective tissues. Fixed and wandering connective tissue cells. The ground substance. Types of connective tissue fibers, fibrillogenesis. Variety of connective tissues: embryonic, proper and specialized.

7. Cartilaginous tissues: definition, general characters and histogenesis. Cells of cartilage tissue and cartilage matrix. Types of hyaline, elastic and fibrous cartilage. Growth and nutrition of cartilage, cartilaginous channels. Cartilage repair.

8. Bone tissue: definition, general characters and classification. Bone tissue cells and bone extracellular matrix. General structure of bone tissue. Types of bone tissue. Bone as an organ. Endomembraneous and endochondral osteogenesis. Bone growth in length. Bone remodeling. Repair of fractures. Histology of joints.

9. Muscular tissues: definition, general characters, histology and classification. Skeletal striated muscle tissue. Myofilaments and myofibrils. Types of muscle fibers. Mechanism of contraction. The motor and sensorial innervation of skeletal striated muscle. Cardiac striated muscle tissue. The nodal tissue. Smooth muscle tissue. Repair and regeneration of muscle tissues.

10. Blood: generalities, components and general functions. Blood plasma. Bone constituents: red blood cells, blood platelets, neutrophilic granulocytes, eosinophilic granulocytes, basophilic granulocytes, lymphocytes, plasma cells, monocytes. The leukocyte formula.

11. Hematopoiesis: stages, involved histological structures, cell lineage for each mature blood cell. Microscopic criteria for recognition of cells involved in hematopoiesis. Methods for the study of hematopoiesis in adult: medullary smear, medulogram.

12. Nervous tissue: generalities, study methods, nervous tissue components. Phylogenesis, embryogenesis and histogenesis. Classification and types of neurons. Neuron body, dendrites and axon. Supporting cells. Astrocytes. Oligodendrocytes. Microglia. Ependymal cells, choroid plexuses and cerebrospinal fluid. Schwann cells and myelin sheath. The satellite cells. Axonal transport system. Neuron response to injury. Synapses.

II. SPECIAL HISTOLOGY

1. The nervous system. Organization of central nervous system, gray matter and white matter. Connective tissue coatings of CNS. Central nervous system organs: brain, cerebellum, spinal cord, histological structure, histophysiology. The organs of the peripheral nervous system: the nerve ganglia, the autonomic nervous system, the nerve fibers, the connective components of the peripheral nerve - the histological structure.

2.Hematolymphopoietic organs. Myeloid tissue and bone marrow. Lymphoid tissue: forms of organization. Thymus and histophysiology of immunity. The lymph node: structure and histophysiology. Spleen: structure and functions. Tonsils: structural features. Mucosa associated lymphoid tissue.

3. The cardiovascular system. General organization. The endothelial cell. Vasculogenesis, angiogenesis and lymphangiogenesis. Blood vessels: general structure, histological features, histophysiology, special vascular devices. Special arteries. Sensorial structures in the arterial wall. Lymphatic vessels: histological structure. The heart: embryological development and histological structure.

4. Respiratory system. The respiratory epithelium. Respiratory tract: nasal cavities, paranasal sinuses, nasopharynx, larynx, trachea-histological structure and histophysiology. Lung: embryological development, general organization, histological structure. The bronchial tree. Pulmonary alveoli: alveolar cells, structure, histophysiology, air-blood barrier. Vascularization and microscopic innervation of the lung. Pleura.

5. The urinary system. Kidney: embryological development and general morphology. Nephron: renal corpuscle and tubular system. Mesangium. The juxtaglomerular complex. Proximal tubes, intermediate segment, distal tubes and collectors. Renal interstitium. Microscopic vascularization of the kidney. Histology of extra-urinary tract: calyces, kidney pelvis, ureters, urinary bladder.

6. The digestive system. General organization of the oral cavity. Types of oral mucosa. Histological structure of lips and tongue. General organization of the digestive tract. Histological and histopathological features of pharynx, esophagus, stomach, small intestine, large intestine, appendix and anal canal. Histological structure of digestive glands: liver, pancreas and major salivary glands.

7. Endocrine system. General organization of the endocrine system. Hypophysis: general organization, adenohypophyseal structure, adenohypophyseal cells, neurohipophyseal structure and pituitary port system. Epiphysis: structure and histophysiology. Thyroid: histological structure, functional forms of thyroid follicles, synthesis of thyroid hormones. Parathyroids: structure and function. Adrenal gland: histogenesis, histological structure and functions. The diffuse neuroendocrine system.

8. Female genital system. General organization and embryological development. Ovaries: general histological structure, dynamics of morphological changes of ovarian follicles in the ovarian cortex, ovarian histophysiology. The fallopian tubes. Uterus: general organization, histological structure, endometrial cyclic changes, implantation, changes induced by pregnancy, vascularization and innervation. Uterine cervix: structure, function, cervicovaginal exfoliative cytology. The mammary gland: embryological development, histological structure at rest, pregnancy and lactation, age and hormonal status dependent histological features. Cell types of the mammary gland. Ducts of the mammary gland. Mammary areola and mamelon histology. Placenta: embryological development, components, structure of chorial villi and chorial plate, maternal decidua. Histophysiology of the placenta.

9. Male genital system. General organization and embryological development. Testis: general histological structure, seminiferous tubules, seminal line cells, Sertoli cells, Leydig interstitial gland. Intra- and extra-testicular ducts. Prostate. Seminal vesicles.

10. Skin and sense organs. Skin: general skin structure, functions, epidermis, keratinization process, non-epithelial cells in the epidermis; dermis: structure and functions; skin appendages: hair follicles, sebaceous glands and sweat glands. The olfactory mucosa. The eye: general structure. Eye compartments. Cornea and sclera. Choroid, iris, cilliary body and cilliary processes. Histological organization of the retina. Accessory components of the eye. The ear: external, medium and inner ear. The Corti organ. Ampoules and maculae. Histophysiology of the acoustic and vestibular analyzer.

III. IMMUNOMORPHOLOGY

1. Basic knowledge in immunomorphology

2. Immunohistochemical technique.

3. Keratin-markers for epithelial tissues

4. Immunomorphological identification of exocrine and endocrine glandular epithelia.

5. Markers for non-epithelial cells in epithelial structure.

6. Connective tissue proper: immunomorphological characters of cells, fibers and ground substance.

7. Immunomorphology of adipose tissues.

8. Specialized connective tissues: cartilage tissue and bone marrow expressed under normal and pathological conditions.

9. Expression of striated muscle tissue markers and their role in clinical diagnosis.

10. Smooth muscle tissue. Immunohistochemical markers

11. Neurons, Schwann cell glial cells and satellite cells. Immunohistochemical markers.

12. Hematogenous bone marrow, single: immunohistochemical markers, particularities of the immunocytological technique, practical utility.

Bibliography

1. Raica M, Căruntu ID, Cîmpean AM, Suciu C. Histologia organelor. Lito UMF, Timişoara, 2009

2. Raica M, Mederle O, Căruntu ID, Pintea A, Chindriş AM. Histologie teoretică şi practică. Editura Brumar, Timişoara, 2004

3. Kuehnel W. Color Atlas of Cytology, Histology and Microscopic Anatomy. 4th Edition, Thieme Publisher, 2004

4. Ross MH, Pawlina W. Histology: a Text and Atlas. Lippincot Williams, Sixth, North American Edition, 2010

5. Cîmpean AM. Imunomorfologie, curs. Lito UMF, 2009

6. Dabbs DJ. Diagnostic Immunohistochemistry. Theranostic and Genomic Applications, Sanders, 2010