

Faculty of Dentistry

**Cytology,
embryology,
histology**

Syllabus

Autumn semester

EDUCATIONAL PROGRAM
(SILLABUS) of Azerbaijan Medical
University
GENERAL HISTOLOGY

**"CONFIRM" Head of the
Department of Histology,
Cytology and Embryology
Gasimov E.K.**

Signature _____
12.09.2021

FACULTY: 070104 Dentistry
SUBJECT CODE: İPF- B05
SUBJECT TYPE: Mandatory
SEMESTER OF LEARNING THE SUBJECT:S1
SUBJECT CREDIT: 7 credits
FORM OF LEARNING THE SUBJECT: Full-time
LEARNING LANGUAGE: Azerbaijani, Russian, English
ОБУЧАЮЩИЕ ПРЕДМЕТУ Teaching staff of the department
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PREREQUISITES: No subject to be studied before studying the subject

CORREQUESITES: Teaching the subject "Human Anatomy" must be carried out in parallel with the teaching of this subject.

POST-REQUISITES: Students who have not completed a semester in cytology, embryology and histology should not be allowed to study pathological anatomy.

DESCRIPTION OF THE SUBJECT:

This subject describes in detail the emergence, definition, tasks and methods of research in cytology and embryology as separate independent sciences. In addition, the main components of the cell such as the cell membrane, the constituent proteins of the cell membrane (spectrin, ankyrin, protein 4.1, adduxin, etc.), cell elements - filaments (actin), intermediate filaments (cytokeratin, vimentin, desmin, glial acidic fibrillar protein, neurofilament proteins, nuclear lamina), intermediate filaments, neurofilament proteins, nuclear lamina), the chemical composition of microtubules, properties and functions of the ultrastructural structure.

Detailed information on histological and ultrastructural features, cyto-genesis and functions of membrane (mitochondria, smooth endoplasmic reticulum, rough endoplasmic reticulum, Golgi complex, lysosomes, endosomes, peroxisomes), membraneless organelles (cell center, ribosomes, proteasomes) and inclusions.

Along with the structure and functions of the components of the nucleus (nuclear envelope, chromatin, nucleolus and nucleoplasm), the storage and transmission of genetic information from generation to generation, as well as the regulation of protein synthesis, cell cycle, meiosis and mitosis, are studied.

Explain the topic and tasks of human embryology, medical embryology - the main directions of development and the role in modern medicine, gametogenesis, fertilization, implantation, the formation of germ layers (endoderm, mesoderm and ectoderm), the main stages of histo- and organogenesis, critical periods in the formation of organs and systems .

Tissues as a system of cells and their derivatives, their morphofunctional (group) and genetic (species) classification, histogenesis, structural and functional characteristics, concepts of cell populations and differentials, types of physiological regeneration, tissue variability limits, metaplasia and its capabilities are taught based on actual materials.

Detailed information is given by describing the structures of organs and systems of the body at different stages of individual development (ontogenesis) using modern methods (microscopic, electron microscopic, autoradiographic, immunohistochemical, etc.).

In addition, the fundamental bases of histo- and morphogenesis, the molecular mechanisms of the processes that ensure the joint activity of cells and tissues participating in the organization of each organ, the fundamental principles of perception, transmission and perception of stimuli in different parts of the body are explained in detail. analyzer, general principles of fluid flow in the body and modern data on the presence of lymphatic vessels, hemorrhage and immune response, various forms of exposure that play an important role in neurohumoral regulation, digestion and absorption of nutrients, the morphology of aero-hematological, hematoencephalic, hemato-testicular and hematological -follicular barriers.

In addition, the description of the important stages of the formation of organs and systems in the prenatal and postnatal periods, an explanation of possible changes in their structure and functions based on clinical examples, variations and abnormalities is taught on the basis of evidence.

THE TASK OF THE SUBJECT:

Microscopic and ultrastructural features of the types of cells and tissues that make up the human body, the molecular mechanism of fertilization, the formation of germ leaves, the main stages of organogenesis and systemogenesis, morphological foundations of the master plans of human organs and systems, their histological and ultrastructural features, the study of the stages of development of organs and systems and the most frequent variations and anomalies in the prenatal and postnatal period.

RESULTS OF STUDYING THE SUBJECT:

In the course of teaching this discipline, students must master the principles of various microscopic techniques and work freely with a light microscope, be able to recognize electrograms of cells and tissues, as well as histological sections, detect changes in cells and tissues during pathological processes compared to the norm, recognize and to depict cells and tissues involved in the organization of organs along with histological sections, to recognize and display electrograms, they must acquire the skills to detect changes in organs.

PLAN OF LECTURES

№	Topics	hours
1	Cytology as biological and medical science. The cell theory: basic stages of formation, the modern formulation, importance for biology and medicine. Plasma membrane: structure, functions. Cell compartments. Structure and functions of the cell membrane. Organelles. Nucleus. Chromatin. Nucleolus. Cell cycle and types of cell division. Aging and cell death. The concept of clinical cytology.	2
2	Embryology as part of biological development. Progenesis, human germ cells. Comparative analysis of spermatogenesis and oogenesis. Human gametes. Fertilization. Zygote. Morulation. Blastocyst formation in human. Implantation. Gastrulation. Axial organs of embryo. The differentiation of germ layers and axial organs of embryo. Human embryo in 2 -8 weeks. Conception about the critical periods and teratogenic factors.	2
3	Histology as a fundamental medical and biological discipline. Tissues: definition, classification, components, histogenesis. Epithelial tissues: classification, morphofunctional characteristics. Mesenchyme and its derivatives. Blood. Structural features, classification and histogenesis of cellular and non-cellular elements of the connective tissue proper. Connective tissues with special properties. Skeletal tissue. Contractile cells and tissues: classification, morphofunctional characteristics. Nervous tissue: histogenesis, structural and functional features. Nervous system: development, general structural and functional characteristics. Central and peripheral nervous system.	2
4	The general plan of the structure of the sensory organs. The concept of analyzers. The endocrine system. Morphological foundations of neurohumoral regulation. Cardiovascular system: development, general structural and functional plan. The relationship between hemodynamic conditions and the structure of the vessel wall Hematopoietic organs. Immunity, types, histological bases of immune defense reactions.	2

5	Features of the structure, blood supply, innervation of organs involved in the acts of chewing and swallowing (lips, cheeks, tongue, hard and soft palate, pharynx). The main stages of the formation of teeth in the pre- and postnatal periods. Features of the development and mineralization of hard tissues of teeth (enamel, dentin, cement). Mechanisms of eruption of deciduous teeth and their replacement with permanent teeth. Sources of the development of the soft tissues of the tooth (gum, alveolar periosteum, periodontium, tooth pulp), structural features, role in the nutrition of the hard tissues of the tooth.	2
6	Differentiation of the divisions (anterior, middle and posterior) of the primary (primitive) intestine in the embryonic period. Morphofunctional characteristics of the general plan of the structure of tubular organs and glands of the digestive system. Large salivary glands. Liver, pancreas. Gastroenteropancreatic system.	2
7	The integument system: development, components, functions. Respiratory system: development, components, structural and functional characteristics. Genitourinary system: development, general plan of structure, functions, hormonal regulation. Hemato - urinal, hemato – follicular and hemato-testicular barriers.	2

Totally: 14 hours

PROGRAM OF PRACTICAL LESSONS

№	TOPICS	hour
1.	Histologic techniques. Methods of investigation. The general morphology of eukaryotic cells. The chemical content and ultrastructure of the plasma membrane. Selective permeability	2
2.	Endocytosis. Exocytosis. Receptor function of the plasma membrane.	2
3.	Centrosome. Mitochondria. Ribosome. Endoplasmic reticulum.	2
4.	Golgi complex. Endosomes. Lysosomes. Proteasomes. Peroxisomes. Cytoplasmic deposits.	2
5.	Nucleus. Nuclear envelope. Nucleoplasm. Chromatin. Nucleolus.	2
6.	Cell cycle. Mitosis. Amitosis	2
7.	Progenesis. The structure of gametes. Meiosis. Fertilization. Implantation. Cleavage. Blastulation. Gastrulation.	2
8.	Differentiation of embryonic axial organs. Extraembryonic organs.	2
9.	Simple epithelium. Stratified epithelium. Glandular epithelium.	2
10.	Mesenchyme. Mesenchyma derivatives. Blood. Lymph.	2
11.	Loose (areolar) connective tissue . Dense connective tissue. Connective tissues with special properties.	2
12.	Cartilage tissue. Chondrogenesis.	2
13.	Bone tissue. Osteohistogenesis.	2
14.	Muscle tissue	2
15.	Nervous tissue. Neurons. Glial cells.	2
16.	Synaptic communication. Nerve fibers. Nerve endings.	2
17.	<i>Quiz</i>	2
18.	Spinal cord. Spinal ganglion. Cerebellum. Cerebral hemispheres	2
19.	Organ of vision. Olfactory organ.	2
20.	Organs of hearing and equilibrium. Taste organ	2
21.	Hypothalamus. Hypophysis (pituitary gland). Pineal gland.	2

22.	Thyroid gland. Parathyroid gland. Adrenal glands.	2
23.	Arteries. Microcirculation. Veins. Heart.	2
24.	Hemopoiesis. Bone marrow. Thymus.	2
25.	Lymph node. Spleen.	2
26.	Histological structure of organs involving in formation walls of oral cavity. Lips. Palates. Cheeks.	2
27.	Histological structure of organs of oral cavity. Tongue. Palatine tonsils. Salivary glands.	2
28.	Structure and development of hard tissues of tooth. Structure and development of soft tissues of tooth.	2
29.	Esophagus. Stomach.	2
30.	Small and large intestines. Appendix.	2
31.	Liver. Pancreas.	2
32.	Trachea. Bronchi. Lungs.	2
33.	Skin. Skin appendages.	2
34.	Kidneys. Ureters. Urinary bladder	2
35.	Testes. Epididymis. Seminiferous tubules. Prostate gland.	2
36.	Ovaries. Ovogenesis	2
37.	Uterus. Fallopian tubes. Mammary gland. Placenta.	2
38.	<i>Quiz</i>	2

Totally: 76 hours

EVALUATION:

It is possible to collect the necessary 100 points for obtaining a loan in this subject as follows:

50 points - before the exam

Including:

10 points - for attendance

10 points - for references

20 points - for intermediate assessment

10 points-gained in the classroom seminars.

Quizes will be held twice a semester. If you do not participate in the colloquium, 0 (zero) points will be recorded in the journal.

50 points - will be collected on the exam

The exam will be conducted by test method. The test will consist of 50 questions. Each question is one point. For incorrectly answered questions, points are removed from correctly answered questions.

THE NOTE:

If the exam does not score at least 17 points, the points earned prior to the exam will not be awarded. The points earned during and before the exam are added up and the final total is estimated as follows:

A-“excellent”	-91-100
B-“very good”	-81-90
C-“good”	-71-80
D-“satisfactory”	-61-70
E-“acceptable”	-51-60
F-“unsatisfactory”	- less than 51

REFERENCES:

During the semester, 2 references are given. The performance of each is estimated with 5 points.

References for SPECIAL HISTOLOGY

1. Selective permeability: pumps, ion channels, carrier proteins: types, functions, structure.
2. Endocytosis: phagocytosis and pinocytosis. Exocytosis.
3. The receptor function of the cell membrane. Membrane and nuclear receptors. Second messengers.
4. Centrioles: structure, functions. Mitochondria: structure and functional features. Mitochondrial DNA and its significance. Golgi complex: structure, functions. Lysosomes: formation, structure, classification and functions.
5. Smooth and rough endoplasmic reticulum: structure and functions. Ribosome. Translation: stages, mechanism. Signal theory of protein synthesis. Endosome, peroxisome and proteasome: structure and functions. Cytoplasmic inclusions: mechanisms of formation and expenditure.
6. Interphase nucleus, structure, functions. Nuclear envelope, nuclear pore. Nucleoplasm. Nucleolus. Chromatin: heterochromatin, euchromatin. Sexual chromatin, features of its formation and significance in medicine. The structure of the metaphase chromosome.
7. The cell cycle. Interphase: stages, regulation. DNA replication. Types of cell division. Mitosis.
8. Features of the structure of germ cells. Meiosis. Fertilization. Cleavage of zygote, morula, blastula. Implantation. Gastrulation. Formation of germ layers.
9. Differentiation of embryonic layers - ectoderm, mesoderm and human endoderm. Extra-embryonic organs and fetal membranes.
10. Covering epithelium: types of simple and stratified epithelium. Their histogenesis, classification, localization, morphofunctional characteristics and regeneration. Intercellular junctions, their types, structure and functions. Basement membrane: structure and function.
11. Blood: general characteristics, functions and its components
12. Loose connective tissue: cells and intercellular substance. Dense connective tissue, connective tissue with special properties. Loose connective tissue, its localization and functions. Cells and extracellular matrix. Dense connective tissues and connective tissues with special properties: their development, classification, localization and morphofunctional features.
13. Cartilage: classification, morphofunctional characteristics. Bone tissue: classification, morphofunctional characteristics. Osteohistogenesis. The structure of the bone as an organ.
14. Skeletal muscle tissue: structural and functional characteristics. The mechanism of muscle contraction. Smooth muscle tissue: histogenesis, structure, functions, mechanism of contraction. Cardiac muscle tissue.
15. Nervous tissue: histogenesis, general morphofunctional characteristics. Neurons: microscopic and submicroscopic structures, morphofunctional characteristics. Neurosecretory cells. Neuroglia. Nerve fibers, the mechanism of formation of the myelin sheath. Features of nerve impulse transmission. Sensory and motor nerve endings. Synapses: classification, submicroscopic structure.

16. Spinal cord. Peripheral nerve. Spinal ganglion. The meninges of the brain and spinal cord, their structure and functional significance. Cerebellum: general structure; neurons of the cerebellar cortex. Cerebral cortex: cytoarchitectonics and myeloarchitectonics.
- 17.. Sensory organs: classification. Organ of vision: development, structure. Functional apparatus of the eyeball (dioptric, accommodative, receptor), their morpho-functional characteristics The organ of hearing and equilibrium. Histophysiology of hearing. Organs of taste and smell, their structure, functional features, receptor cells.
18. Development, structure, cellular composition, hormones and functions of the hypothalamus, pituitary gland, epiphysis. Thyroid gland, parathyroid glands. The adrenal glands. The nature and mechanisms of action of the hormones
19. Arteries, veins, lymphatic vessels: development, general morphofunctional comparative characteristics, classification. Microcirculatory bed: arterioles, venules, capillaries, arteriol-venular anastomoses (AVA). The membranes of the heart, their morphofunctional features. The conducting system of heart.
20. Hematopoiesis: types and stages. Primary lymphoid organs: red bone marrow and thymus. Secondary lymphoid organs: lymph node and spleen. General morphofunctional characteristics: development, structure, cellular composition, functions.
21. Integumentary system (skin): components, sources of development, cellular composition, functions. Skin derivatives: sweat and sebaceous glands, hair and nails. Their structure, function, and morphofunctional characteristics.
22. Respiratory system: general morphofunctional characteristics. Conducting part. Bronchial tree: structure and functions. Respiratory part: structure and functions. Aerohematic barrier.
23. The organs of the oral cavity: development, general characteristics, structure, functional features. General characteristics of major salivary glands: plan of structure and function. Teeth: development, structure. Hard and soft tissues of teeth.
24. The general plan of the structure of the digestive tube. Esophagus, stomach: histological structure, glands. Properties of the gastric mucosa, regeneration. Features of the histological structure of the small and large intestine . Endocrine cells of the digestive system.
25. Liver: development, functions. General plan of structure, classical hepatic lobule. Portal lobule and liver acinus. Pancreas: development, structure and functions. Exocrine and endocrine parts of the gland.
26. Kidneys: development, general structure plan, structural units and functions. Types of nephrons, their structure and histophysiology. Mechanism and phases of urine formation, its regulation. Cortical and juxtamedullar blood circulation.
27. Organs of the male reproductive system: their development, structure, functions and age-related changes. .
28. Female reproductive system. Ovary: development, structural and functional characteristics, age changes. The uterine tubes. Uterus: development, structure and functional significance. Vagina: features of the structure. Ovario-menstrual cycle and its regulation.

SILLABUS - WORKING EDUCATIONAL PROGRAM

The content of the bachelor's degree covers the planning of the educational process, the forms and methods of its implementation, the volume of the study load, the duration of educational stages (semesters), types of training (lectures, classes, laboratories, etc.), requirements for educational programs.

The planning and organization of the educational process (exemplary workers and individual) are implemented on the basis of work programs in the subjects. The form and structure of these documents are determined by the university.

Subject programs are developed by higher educational institutions in accordance with the requirements of higher education programs in specialties and are approved by the Ministry of Education of the Republic of Azerbaijan. Work programs (syllables) are developed on the basis of subject programs and are approved by higher educational institutions.

Working plan (syllabus) - a description of the subject, its purpose and objectives, a summary, duration and types of lessons, assignments for the student's independent work, their duration, consultation hours, information about the teacher, prepared on the basis of the corresponding curriculum of the subject; this is a document containing the teacher's requirements, assessment criteria, an intermediate grading schedule, a list of references.

LITERATURE AND MATERIALS:

<http://www.amu.edu.az/az/cafedra/1119/3208> General histology - the text of the lecture. Compiled by: Gasimov EK and Sultanova T.A.

1. Abdullayev M.S., Abiyev H.S. Histoloji nomenklatura: Ali məktəblər üçün dərs vəsaiti. Bakı: Az. Döv. Tibb İnst., 1972, 181 s.
2. Abdullayev M.S., Abiyev H.S. Ümumi histologiya : Ali məktəblər üçün dərslik. Bakı: Maarif, 1975, 323 s.
3. Qasımov E.K. Sitologiya: Ali məktəblər üçün dərslik. Bakı: "Time Print", 2013, 272 s.
4. E.K.Qasımov. Histologiya atlası. Bakı: Oskar, 2010, 510s.
5. Xüsusi histologiya. E.K. Qasımovun redaktəsi ilə. Bakı, 2015, 310s.
6. Алмазов И.В., Сутулов Л.С. Атлас по гистологии и эмбриологии. М.: Медицина, 1978, 543 с.
7. Гистология: (введение в патологию). Учебник для студентов / Под ред. Э.Г.Улумбекова, Ю.А.Челышева. М.: ГЭОТАР-МЕД, 1998, 960 с.
8. Гистология: (введение в патологию). Учебник для студентов / Под ред. Э.Г.Улумбекова, Ю.А.Челышева. М.: ГЭОТАР-МЕД, 2005, 672с.
9. Кузнецов С.Л., Мушкамбаров Н.Н. Гистология, цитология и эмбриология. Учебник для студентов медицинских вузов. М.: ООО "Медицинское информационное агенство", 2012, 600 с.
- 10.Хэм А., Кормак Д. Гистология (в пяти томах). Перевод с английского / Под ред. Ю.И.Афанасьева, Ю.С.Ченцова. М.: Мир, 1983, 1362 с.
- 11.Ю.И.Афанасьев, Н.А.Юрина. Гистология. М., 2006, 766 с.
- 12.Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Molecular Biology of the Cell. 5th ed. New York: Garland Publishing; 2008, 1601 p.

13. Gartner LP, Hiatt JL. Color textbook of histology. 4th international ed. Philadelphia: PA.; Elsevier, 2017, 657 p.
14. Gray's anatomy. 38th ed. / Chairman of the editorial board Peter L. Williams. New York: Churchill Livingstone Inc., 1995, 2092 p.
15. Junqueira LC, Carneiro J. Basic histology. New York: McGraw Hill Companies, 2013, 515 p.
16. Kerr JB. Atlas of functional histology. London: Mosby, 1999, 402 p.
17. Ross MH, Pawlina W. Histology. A text and atlas with correlated cell and molecular biology. 7th ed. Baltimore: Lippincott Williams & Wilkins, 2016, 984 p.
18. Sadler TW. Langman's Medical Embryology. 13th edition. Philadelphia: Lippincott Williams & Wilkins, 2015, 407 p.
19. Terminologia Histologica. International terms for human Cytology and Histology. Philadelphia: Lippincott Williams & Wilkins, 2008, 207 p.
20. Wheater's functional histology. 4th ed. / Edit. Young B and Heath JW. Edinburgh: Churchill Livingstone, 2000, 413 p.

CUORSEWORK

Coursework on this subject is not provided.

PRACTICE

Industrial practice on this subject is not provided.

PREPARED

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