

MINISTRY OF HIGHER AND SECONDARY SPECIAL EDUCATION OF THE
REPUBLIC OF UZBEKISTAN
MINISTRY OF HEALTH OF THE REPUBLIC
UZBEKISTAN

TASHKENT PEDIATRIC MEDICAL INSTITUTE
DEPARTMENT OF PATHOLOGICAL PHYSIOLOGY, HISTOLOGY



"I approve"
Vice-rector for academic Affairs prof
K. N. Khaitov
_____ 2020 y.

510000 Health care
5 510 200 Pediatric business
5 510 100 Medical business
5 111 000 Professional education
(5510100 Medical business)

Field of study:

WORKING EDUCATIONAL PROGRAM
on subject
HISTOLOGY, CYTOLOGY, EMBRYOLOGY

II-COURSE

Total labor intensity - 103
Classroom hours - 72
Of them:
Lecture - 18
Practical lesson - 48/6
Independent work - 31

Educational-methodical complex for the discipline Histology in the direction of education: 5510200 "Pediatric business"; 5510100 "General Medicine"; 55111000; Professional education (5510100 General medicine); 5510900 "Medical biology" was developed on the basis of the curriculum and curriculum of the department, respectively, DTS-2018 (Ministry of Health Uz. No. 544 of 08/30/2018)

Compiled by:

N. B. Zokirova-Associate Professor of the Department of Pathological physiology, histology of TashPMI, doctor of medical Sciences

Reviewers:

K. R. Tukhtaev-Professor of the Department of histology and medical biology of TMA
M. H. Rakhmatova-head of the Department of histology and medical biology of TSSI, doctor of medical Sciences, associate Professor

The work program for the discipline was approved by the Central methodological Council of TashPMI Protocol № 10_or « 19 »_06_2020 y

Head of the Department, Professor.

Yo.U.Zokirov

Dean of the I-Pediatric Faculty of TashPMI

A.A.Rahmatullayev

Head of the educational department of TashPMI

N.V. Agzamova.

INTRODUCTION

1.1. The purpose of the training is the mastery by students of the basic laws of embryonic development, microscopic and submicroscopic structure, cyto- and histophysiology of cells, tissues and organs of the human body, the acquisition of skills for the identification and interpretation of histological preparations.

Tasks of histology, cytology and embryology:

1. To study the patterns of the structure of the human body using the methods of microscopic and ultramicroscopic research, taking into account new scientific data, methodological and theoretical concepts necessary for the formation of clinical thinking of a general practitioner.
2. To instill in students the ability to independently read histological preparations and electronograms, understand, explain and generalize specific information about microscopic and submicroscopic structures and their significance in histophysiological processes occurring in the body, their applied significance in the clinic.
3. In the process of teaching histology, embryology and cytology, to educate students in civic qualities and medical ethical standards of behavior: conscientious attitude to work, commitment in the performance of their duty, striving for in-depth study of medical disciplines for the good of the sick person, neatness and accuracy in the documentation of histological observations, understanding the role of knowledge on the subject in the subsequent general medical and professional clinical training of a general practitioner.

1.2. Requirements for the level of preparedness (knowledge, skills, abilities)

The student must:

A. Have an idea:

1. about the features of taking material for histological examination, methods of tissue fixation;
2. about the spatial relationships of tissues within organs;
3. about the morphology of senescent cells, the mechanisms of their aging and death.

B. Know and be able to use:

1. structural features, functions and age-related transformations of the structure of cells in a living organism;
2. age periodization of human life, general patterns and stages of prenatal and postnatal development;
3. sources of development, structural and functional features, age-related changes in the main types of tissues;
4. features of the tissue composition of all human organ systems in a developing and mature organism;
5. understand the issues of tissue regeneration and its characteristics in connection with age;
6. determine under a microscope the structural elements of cells and tissues in the composition of organs, navigate in their functional purpose;
7. "Read" electron diffraction patterns of cells and non-cellular structures of tissues and organs.

B. Have skills:

1. Microscopic examination of histological preparations.
2. Calculation of the leukocyte formula in a blood smear, its analysis.
3. Solving situational tasks.
4. Reading scientific literature and writing short abstracts.

1.2 CALENDAR-THEMATIC PLAN
for the 2020-2021 academic year

Department: Pathological Physiology, Histology
Subject: histology, cytology, embryology.
Faculties: I-II pediatrics, medical, medical and pedagogical.
Course: II, semester: 3
Semester hours: lecture - 18, practical lesson - 54

Lecture sessions		часы
№	The theme of the lesson	
1	Respiratory system. Skin and its derivatives.	2
2	Digestive system. Organs of the oral cavity. Esophagus.	2
3	Digestive system. Stomach. Small and large intestine.	2
4	Digestive system. Liver. Pancreas	2
5	Urinary system. The male reproductive system.	2
6	The female reproductive system.	2
7	Fundamentals of human embryology.	2
8	Nervous system.	2
9	Sense organs. Organ of vision. Organ of hearing and balance.	2
in total		18

Practical class		Часы
№	The theme of the lesson	
1	Skin and its derivatives.	3
2	Respiratory system.	3
3	Digestive system. Cavity. The structure of the tongue and its papillae. The structure of the salivary glands and their classification.	3
4	Digestive system. Tonsils and esophagus.	3
5	Digestive system. Stomach. Stomach of a newborn.	3
6	Digestive system. Small and large intestine. The vermiform Appendix and rectum.	3
7	Digestive system. Liver and gall bladder.	3
8	The digestive gland. The pancreas and its exocrine and endocrine parts.	3
9	Histophysiology of digestion (Intermediate control-II)	3
10	Urinary system. Structure of the kidney. Nephron. Formation of urine. Bladder. The ureter and its structure.	3
11	The male reproductive system. Testis, an appendage of the testis. VAS deferens, the structure of the prostate.	3
12	The female reproductive system. Ovary. The uterus is its structure. The uterus of a newborn. The mammary gland and its structure.	3
13	Fundamentals of human embryology. Reproductive cells.	3
14	Fundamentals of human embryology. Pharmacist agencies.	3
15	Nervous system. Spinal nodes. Peripheral nerves. Vegetative nervous system.	3
16	Nervous system. Cortex. Cerebellum.	3
17	Sense organs. Visual analyzer. Olfactory organ.	3
18	Sense organs. Organs of hearing and balance.	3
in total		54

1.3 CONTENT OF LECTURE MATERIALS.

ANNOTATION

to a lecture on the topic: Skin and its derivatives. Respiratory system.

Morphofunctional characteristics of the skin as an organ and system of cover. Sources and course of embryonic development. Tissue composition of the skin. Thick, thin skin, structural Skin as a sense organ. Postnatal development, regional features. Vascularization and innervation. features, topography. Skin regeneration. Age change.

Epidermis. Layer of epidermis. The concept of the keratinization process and soft keratin as a protein complex. Basal layer. The spiny layer as a zone of synthesis of the sulfur-containing component of keratin. Transition zone (grainy and shiny layers). Changes in cells during keratinization. Horny layer. Dermis. Papillary and reticular layers, their tissue composition. Cancer of the skin. Sebaceous and sweat glands, their development, structure, histophysiology. Skin derivatives: hair, development, structure, growth and change of hair. Nails, development, structure and growth of nails.

Respiratory system, General morphofunctional characteristics. The Airways and the respiratory Department. Sources and course of embryonic development. Membranes of the airway wall: mucosa, submucosa, fibrocartilage, outer membranes and their layers.

Extra-pulmonary Airways. The structure of the wall of the Airways: the nasal cavity, larynx, trachea and main bronchi. Histogenetically features of the mucous membrane.

Lungs: Intra-pulmonary Airways: bronchi and bronchioles. Dependence of the structure of the wall of the bronchi and bronchioles on their caliber. The cellular composition of the broncho-pulmonary epithelium. Exo- and endocrine cells. Structural foundations of mucociliary transport. Acinus as a morphofunctional unit of the lung. Structural components of the acinar. Structure of the alveolar wall. Types of pneumocytes, their histogenetically feature. Structural and chemical organization and function of the surfactant-alveolar complex. Structure of interalveolar partitions. Acro-geneticheskkii barrier and its significance in gas exchange. Macrophages of the lung. Blood supply and innervation of the lung. Age-related features of the lung. Pleura.

ANNOTATION

to a lecture on the topic: Digestive system. Organs of the oral cavity. Esophagus.

General principles of the structure of the walls of the digestive canal. Mucosa, submucosa, muscle and outer membranes, their layers and tissue composition. General characteristics of the mucous membrane, its structure and significance. Features of the mucous membrane of various parts of the digestive canal. Innervation and vascularization of the digestive tube, its lymphoid apparatus. Glands of the digestive system, localization and structural organization, principles of blood supply and innervation. Endocrine system, localization and structural organization, principles of Oral cavity. Development. Functions. The structure of the mucous membrane in connection with the function and features of conditions in the oral cavity. Lips, cheeks, hard and soft palate, tongue, gums, tonsils; their structure, blood supply, innervation. Salivary glands. Exo- and endocrine functions. Structure and histophysiology. Language. Functions, structure. Features of the structure of the mucous membrane on the upper and lower surfaces of the organ. Papillae of the tongue and their types. Blood supply and innervation. Age change. Teeth. Structure. Sources and course of embryonic development. Enamel, dentin, and cement: structure, meaning, and chemical composition. Tooth pulp - structure and meaning. Periodontal structure and meaning. Blood supply and innervation of the tooth. Diphodont. Age change.

The pharynx and the esophagus. Function, wall structure, sources and course of embryonic development. Structure of various parts of the esophageal wall. Cancer of the esophagus, their histophysiology.

ANNOTATION

to a lecture on the topic: Digestive system. Stomach. Entrails.

Stomach. Morphofunctional characteristics, sources and course of embryonic development. Structure of the wall, its tissue composition. Features of the structure of the mucous membrane in various parts of the organ. Localization, structure and cellular composition of glands. Histophysiology of secretory cells. Blood supply and innervation of the stomach walls. Regenerative potencies of the organ. Age-related features of the structure of the stomach wall.

Small and large intestine. Sources of embryonic development of the intestinal tube. Development of villi, crypts, and glands. Intestine. Structure of the wall. The crypt-villi system as a structural and functional unit. Types of epithelial cells, their structure and cytophysiology. Features of the structure of the mucous membrane in various parts of the intestine (duodenum, jejunum and ileum). Histophysiology of the digestive process. The role of enterocyte microvilli in parietal digestion. Blood supply and innervation of the small intestine wall. Regenerative potencies.

Colon. Structure of the wall. Features of the structure of the mucous membrane in connection with the function. Blood supply and innervation. Vermiform. Its structure and meaning. Rectum, morphological and functional characteristics of the wall. Types of epithelium in various parts (zones) of the rectum. Age-related changes in the intestinal wall.

ANNOTATION

to a lecture on the topic: Digestive system. Liver. Pancreas

Liver. Morphological and functional characteristics. Sources and course of embryonic development. Features of blood supply to the liver. The structure of the lobule as a structural and functional unit. Representations of the portal lobule and acinus. Histogenetically feature of intralobular emocapella. Hepatocytes, their structure, cytochemical features and functions. The concept of morpho-functional differences in hepatocytes within the hepatic lobule. Regenerative potencies of the liver. The gallbladder and bile ducts. Development, classification, structure of the wall. Regenerative potencies.

Pancreas. General characteristics, sources of embryonic development. Structure of the exocrine and endocrine divisions. Cytophysiological characteristics of acinar cells. Types of endocrine cells and their characteristics. Acino-islet (endocrine) cells. Blood supply and innervation of the pancreas. Regenerative potencies of the organ.

ANNOTATION

to the lecture on: Urinary system.

General morphofunctional characteristics. Sources and course of embryonic development. Kidneys. Cortical and medullary substance of the kidney. Nephron-functional unit of the kidney. Renal corpuscle, the urinary tubule (proximal, loop of nephron, distal), collecting tubules. Types of nephrons. Histophysiology of the nephron and collecting duct. Kidney vascularization. Structure of the countercurrent system. Morpho-functional bases of regulation of the process of urination. Endocrine function of the kidney. Juxtaglomerular complex, structure and function of its components: dense spot, juxtaglomerular cells, juxta-vascular cells, mesangial cells. Prostaglandin apparatus of the kidney: interstitial cells and nephrocytes of collecting tubules. Innervation of the kidney. Regenerative potencies. Age-related changes in the kidney. Urinary tract. Structure of the walls of the renal calyces, cups and pelvises. Morphofunctional characteristics of the ureter, bladder, and urethra.

ANNOTATION

to a lecture on the topic: The reproductive system. The male reproductive system.

General morphofunctional characteristics. Sources and course of embryonic development. Male genital organs. Histogenetic processes in the germ of the gonad leading to testicular development. Sources and course of development of VAS deferens in embryogenesis. Testicle. Its generative and endocrine functions. Convoluted seminal canal, its wall. Spermatogenesis. The role

of sustentation in spermatogenesis. Glandulosity (interstitial glandulosity), their involvement in the regulation of spermatogenesis and development of secondary sexual characteristics. Gepatolentikulianaya barrier. Histophysiology of the direct tubules of the network and the outflow tubules of the testicle. Regulation of the generative and endocrine functions of the testes. Age-related changes in the testicle. VAS deferens. Epididymis. Deferent duct. Seminal vesicles. Ejaculatory channel. Prostate. Penis.

ANNOTATION

to a lecture on the topic: The female reproductive system.

Histogenetic processes in the germ of the gonad leading to the development of the ovary. Sources and course of development of the oviducts and uterus. Ovary. Its structure and functions are generative and endocrine. Oogenesis. Differences between oogenesis and spermatogenesis. Structure and development of follicles. Ovulation. The concept of the ovarian cycle and its regulation. Development, structure and functions of the corpus luteum during the cycle and during pregnancy. Atresia of follicles. Atretic bodies, atretic bodies. Age-related changes in the ovary. Features of the ovary of a newborn child, a girl before puberty, during puberty. Vascularization and innervation. Fallopian tube. Structure and functions of the fallopian tube. Uterus. The structure of the uterine wall in its different parts. The menstrual cycle and its phases. Features of the structure of the endometrium in different phases of the cycle. Relationship of the menstrual cycle with the ovarian one. Reconstruction of the uterus during pregnancy and after childbirth. Vascularization and innervation of the uterus. Age change.

Vagina. The structure of its walls in connection with the menstrual cycle. The use of vaginal smears in determining the phases of the female sexual cycle. Breast (breast) gland. Sources and course of development in embryogenesis. Postnatal changes. Functional morphology of the lactating and non-lactating (non-functional and post-lactation) breast. Neuro-endocrine regulation of mammary gland functions. Changes in the mammary glands during the sexual cycle and during pregnancy. Vascularization and innervation. Regenerative capabilities.

ANNOTATION

to a lecture on the topic: Fundamentals of human embryology.

The subject and objectives of the embryology of man. Medical embryology. The progenesis. Sex cell. Structure and functions of male and female germ cells, the main stages of their development. Fertilization. Biological significance of fertilization. Stages of fertilization. The fusion of the pronuclei. Conditions necessary for normal fertilization. Zygote. Structure of zygote, the principles of compartmentalization of the cytoplasm. The genome of the zygote. Crushing. Characteristics of the fragmentation of human embryo. Chronology, duration. The structure of the embryo at different stages of crushing. Morula. Blastocyst. Embryoblast and trophoblast. Features of implantation in humans. Gastrulation. Characteristics of gastrulation in the human embryo. The first phase of gastrulation. Processes that occur during this phase in the embryoblast and trophoblast. Localization of presumptive rudiments. Second phase of gastrulation. Migration paths of cells during the formation of germ layer. Embryonic histogenesis. The emergence of tissues based on the differentiation of cells of embryonic rudiments. Relations between organogenesis and histogenesis, the concept of morphogenesis. Mechanisms of histogenesis: induction, division, determination, migration, differentiation, integration, morphogenetic cell death, etc.

Pharmacist agencies. Chorion, amnion, yolk SAC, allantois. Their structure and functional significance. Extra-embryonic mesoderm. The value of the chorion in the formation of the placenta. Human placenta. Its structure and functions. Changes in the endometrium during pregnancy, fetal membranes. The system "mother-fetus". Cytological and histogenetic mechanisms of immunological relationships in the "mother-fetus" system. The concept of critical periods of development. The main critical periods of human embryo development.

ANNOTATION

to a lecture on the topic: The nervous system.

Nervous system, development, General characteristics. Central nervous system. Spinal cord: gray matter, structure, characteristics, neural structure, of the core. White matter, structure, and pathways. Brain stem, gray matter, medulla oblongata, concept of reticular formation. Midbrain and midbrain, nuclei, pathways. Spinal nodes, structure, neurons. Cerebellum, gray matter, its layers and neural composition, white matter of the cerebellum. Cyto- and myeloarchitectonics of the cerebral cortex, interneuron connections. Hemato-encephalic barrier, components and meaning. Age-related features of the nervous system.

ANNOTATION

for a lecture on the topic: Sensory organs.

General characteristics of the senses in the light of the doctrine of analyzers (sensory systems). Receptor cells and mechanisms of reception. Classification of sensory organs by the Genesis and structure of receptor cells.
Organ of vision. General morphofunctional characteristics. Sources and course of embryonic development. General plan of the structure of the eyeball. Shells, their divisions and derivatives, tissue composition. The main functional devices: dioptric (light-refractive), accommodation, and receptor apparatus. Photoreceptor cells. The mechanism of photoreception. Neural composition and retinal gliocytes. Pigment layer. Yellow spot and Central fossa. Optic disk. Vasculature of the eyeball. Auxiliary apparatus of the eye.
Olfactory organ. General morphofunctional characteristics. Sources and course of embryonic development. Receptor or olfactory cells. Supporting and basal cells. Histophysiology of the olfactory organ.

Organ of taste. General morphofunctional characteristics and course of embryonic and postnatal development. Taste buds. Taste cells. Supporting and basal cells. Innervation of taste buds. Histophysiology of the taste organ.
Organs of hearing and balance. General morphofunctional characteristics. Inner ear. Bony and membranous labyrinths. Sources and course of embryonic development. The vestibular part of membranous labyrinth: utricle, the SAC, and semicircular canals. Their receptor divisions: spots and ampullary scallops. Hair (sensory-epithelial) and support cells. The otolith membrane and the dome. Innervation. Histophysiology of the vestibular labyrinth. The cochlear part of the membranous labyrinth. Spiral organ. Hair (sensory-epithelial) and support cells. Innervation, histophysiology of sound perception. Pathways, subcortical and cortical centers.

1.4. RECOMMENDED TOPICS FOR PRACTICE

ANNOTATION

to a lecture on the topic: Skin and its derivatives. Respiratory system.

Morphofunctional characteristics of the skin as an organ and system of cover. Sources and course of embryonic development. Tissue composition of the skin. Thick, thin skin, structural features, topography. Postnatal development, regional features. Vascolarization and innervation. Skin as a sense organ. Skin regeneration. Age change.
Epidermis. Layer of epidermis. The concept of the keratinization process and soft keratin as a protein complex. Basal layer. The spiny layer as a zone of synthesis of the sulfur-containing component of keratin. Transition zone (grainy and shiny layers). Changes in cells during keratinization. Horny layer. Dermis. Papillary and reticular layers, their tissue composition. Cancer of the skin. Sebaceous and sweat glands, their development, structure, histophysiology. Skin derivatives: hair, development, structure, growth and change of hair. Nails, development, structure and growth of nails.

Respiratory system, General morphofunctional characteristics. The Airways and the respiratory Department. Sources and course of embryonic development. Membranes of the airway wall: mucosa, submucosa, fibrocartilage, outer membranes and their layers.

Extra-pulmonary Airways. The structure of the wall of the Airways: the nasal cavity, larynx, trachea and main bronchi. Histogenetically features of the mucous membrane.

Lungs. Intra-pulmonary Airways: bronchi and bronchioles. Dependence of the structure of the wall of the bronchi and bronchioles on their caliber. The cellular composition of the bronchopulmonary epithelium. Exo- and endocrine cells. Structural foundations of mucociliary transport. Acinus as a morphofunctional unit of the lung. Structural components of the acinar. Structure of the alveolar wall. Types of pneumocytes, their histogenetically feature. Structural and chemical organization and function of the surfactant-alveolar complex. Structure of interalveolar partitions. Acro-geneticheskii barrier and its significance in gas exchange. Macrophages of the lung. Blood supply and innervation of the lung. Age-related features of the lung, Pleura.

New educational technology: black box

(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: Digestive system. Organs of the oral cavity. Esophagus.

General principles of the structure of the walls of the digestive canal. Mucosa, submucosa, muscle and outer membranes, their layers and tissue composition. General characteristics of the mucous membrane, its structure and significance. Features of the mucous membrane of various parts of the digestive canal. Innervation and vascularization of the digestive tube, its lymphoid apparatus. Glands of the digestive system, localization and structural organization, principles of blood supply and innervation. Endocrine system of the digestive tract.
Oral cavity. Development. Functions. The structure of the mucous membrane in connection with the function and features of conditions in the oral cavity. Lips, cheeks, hard and soft palate, tongue, gums, tonsils; their structure, blood supply, innervation. Salivary glands. Exo- and endocrine functions. Structure and histophysiology. Language. Functions, structure. Features of the structure of the mucous membrane on the upper and lower surfaces of the organ. Papillae of the tongue and their types. Blood supply and innervation. Age change. Teeth. Structure. Sources and course of embryonic development. Enamel, dentin, and cement: structure, meaning, and chemical composition. Tooth pulp - structure and meaning. Periodontal structure and meaning. Blood supply and innervation of the tooth. Diphodont. Age change.

The pharynx and the esophagus. Function, wall structure, sources and course of embryonic development. Structure of various parts of the esophageal wall. Cancer of the esophagus, their histophysiology.

Methods of new pedagogical technologies: brainstorming

(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: Digestive system. Stomach. Entrails.

Stomach. Morphofunctional characteristics, sources and course of embryonic development. Structure of the wall, its tissue composition. Features of the structure of the mucous membrane in various parts of the organ. Localization, structure and cellular composition of glands. Histophysiology of secretory cells. Blood supply and innervation of the stomach walls. Regenerative potencies of the organ. Age-related features of the structure of the stomach wall.

Small and large intestine. Sources of embryonic development of the intestinal tube. Development of villi, crypts, and glands. Intestine. Structure of the wall. The crypt-villi system as a structural and functional unit. Types of epithelial cells, their structure and cytophysiology. Features of the structure of the mucous membrane in various parts of the intestine (duodenum, jejunum and ileum). Histophysiology of the digestive process. The role of enterocyte microvilli in parietal digestion. Blood supply and innervation of the small intestine wall. Regenerative potencies.

Colon. Structure of the wall. Features of the structure of the mucous membrane in connection with the function. Blood supply and innervation. Vermiform. Its structure and meaning. Rectum, morphological and functional characteristics of the wall. Types of epithelium in various parts (zones) of the rectum. Age-related changes in the intestinal wall.

Methods of new pedagogical technologies: brainstorming
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: Digestive system. Liver. Pancreas

Liver. Morphological and functional characteristics. Sources and course of embryonic development. Features of blood supply to the liver. The structure of the lobule as a structural and functional unit. Representations of the portal lobule and acinus. Histogenetically feature of intralobular emacopella. Hepatocytes, their structure, cytochemical features and functions. The concept of morpho-functional differences in hepatocytes within the hepatic lobule. Regenerative potencies of the liver. The gallbladder and bile ducts. Development, classification, structure of the wall. Regenerative potencies.

Pancreas. General characteristics, sources of embryonic development. Structure of the exocrine and endocrine divisions. Cytophysiological characteristics of acinar cells. Types of endocrine cells and their characteristics. Acino-islet (endocrine) cells. Blood supply and innervation of the pancreas. Regenerative potencies of the organ.

Methods of new pedagogical technologies: brainstorming
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on: Urinary system.

General morphofunctional characteristics. Sources and course of embryonic development. Kidneys. Cortical and medullary substance of the kidney. Nephron-functional unit of the kidney. Renal corpuscle, the urinary tubule (proximal, loop of nephron, distal), collective tubules. Types of nephrons. Histophysiology of the nephron and collecting duct. Kidney vascularization. Structure of the counter-current system. Morpho-functional bases of regulation of the process of urination. Endocrine function of the kidney. Juxtaglomerular complex, structure and function of its components: dense spot, juxtaglomerular cells, juxta-vascular cells, mesangial cells. Prostaglandin apparatus of the kidney: interstitial cells and nephrocytes of collecting tubules. Innervation of the kidney. Regenerative potencies. Age-related changes in the kidney. Urinary tract. Structure of the walls of the renal calyces, cups and pelvises. Morphofunctional characteristics of the ureter, bladder, and urethra.

Methods of new pedagogical technologies: pen on the table
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: The reproductive system. Male reproductive system.

- General morphofunctional characteristics. Sources and course of embryonic development. Male genital organs. Histogenetic processes in the germ of the gonad leading to testicular development. Sources and course of development of VAS deferens in embryogenesis. Testicle. Its generative and endocrine functions. Convoluted seminal canal, its wall. Spermatogenesis. The role of sustentation in spermatogenesis. Glandulosity (interstitial glandulosity), their involvement in the regulation of spermatogenesis and development of secondary sexual characteristics. Gepatolentikuliamaya barrier. Histophysiology of the direct tubules of the network and the outflow tubules of the testicle. Regulation of the generative and endocrine functions of the testes. Age-related changes in the testicle. VAS deferens. Epididymis. Deferent duct. Seminal vesicles. Ejaculatory channel. Prostate. Penis

Methods of new pedagogical technologies: brainstorming
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: The reproductive sexual system.

Histogenetic processes in the germ of the gonad leading to the development of the ovary. Sources and course of development of the oviducts and uterus. Ovary. Its structure and functions are generative and endocrine. Oogenesis. Differences between oogenesis and spermatogenesis. Structure and development of follicles. Ovulation. The concept of the ovarian cycle and its regulation. Development, structure and functions of the corpus luteum during the cycle and during pregnancy. Atresia of follicles. Atretic follicles, atretic bodies. Age-related changes in the ovary. Features of the ovary of a newborn child, a girl before puberty, during puberty. Vascularization and innervation. Fallopian tube. Structure and functions of the fallopian tube. Uterus. The structure of the uterine wall in its different parts. The menstrual cycle and its phases. Features of the structure of the endometrium in different phases of the cycle. Relationship of the menstrual cycle with the ovarian one. Reconstruction of the uterus during pregnancy and after childbirth. Vascularization and innervation of the uterus. Age change.

Vagina. The structure of its walls in connection with the menstrual cycle. The use of vaginal smears in determining the phases of the female sexual cycle. Breast (breast) gland. Sources and course of development in embryogenesis. Postnatal changes. Functional morphology of the lactating and non-lactating (non-functional and post-lactation) breast. Neuro-endocrine regulation of mammary gland functions. Changes in the mammary glands during the sexual cycle and during pregnancy. Vascularization and innervation. Regenerative capabilities.

Methods of new pedagogical technologies: academic polemics.
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

ANNOTATION

to a lecture on the topic: Fundamentals of human embryology.

The subject and objectives of the embryology of man. Medical embryology. The progenesis. Sex cell. Structure and functions of male and female germ cells, the main stages of their development. Fertilization. Biological significance of fertilization. Stages of fertilization. The fusion of the pronuclei. Conditions necessary for normal fertilization. Zygote. Structure of zygote, the principles of compartmentalization of the cytoplasm. The genome of the zygote. Crushing. Characteristics of the fragmentation of human embryo. Chronology, duration. The structure of the embryo at different stages of crushing. Morula. Blastocyst. Embryoblast and trophoblast. Features of implantation in humans. Gastrulation. Characteristics of gastrulation in the human embryo. The first phase of gastrulation. Processes that occur during this phase in the embryoblast and trophoblast. Localization of presumptive rudiments. Second phase of gastrulation. Migration paths of cells during the formation of germ layer. Embryonic histogenesis. The emergence of tissues based on the differentiation of cells of embryonic rudiments. Relations between organogenesis and histogenesis, the concept of morphogenesis. Mechanisms of histogenesis: induction, division, determination, migration, differentiation, integration, morphogenetic cell death, etc.

Pharmacist agencies. Chorion, amnion, yolk-SAC, allantois. Their structure and functional significance. Extra-embryonic mesoderm. The value of the chorion in the formation of the placenta. Human placenta. Its structure and functions. Changes in the endometrium during pregnancy, fetal membranes. The system "mother-fetus". Cytological and histogenetic mechanisms of immunological relationships in the "mother-fetus" system. The concept of critical periods of development. The main critical periods of human embryo development.

Methods of new pedagogical technologies: solving situational problems.
(A: 1,2,3; K: 1,2,3,4,5,6,7,8,12, 13,15,16,17,18,19,20,21,22)

6. The design of the album.

Forms of organization of independent work of students include topics that are taken out for self-study: questions for self-control; typical tasks for self-testing, and more. Performance of control tasks and other materials is carried out in accordance with the calendar schedule of the educational process.

SRS forms

1. Preparation for practical training
2. Preparation and presentation of the project
3. Solving cases
4. Preparation of papers
5. Developing and completing graphic organizers
6. The development and solution of situational tasks
7. Developing and solving crossword puzzles
8. Participation in the SSS, preparation of reports for the SSS conference
9. Writing research papers, theses

Practical skill.

1. Working with a microscope.
2. Diagnostic preparations using a light microscope;
3. Identification of white blood cell types in a blood smear;
4. Correct interpretation of the submicroscopic structure of the plasmalemma, organelles, and nucleus;
5. Correct image of the main drug structures.

1.7. CRITERIA FOR EVALUATING AND CONTROLLING STUDENTS' KNOWLEDGE OF THE SUBJECT.

1. A score of "5" is awarded if:

the student highlights the main points in it, meaningfully applies the knowledge gained in practice, does not make mistakes when reproducing knowledge, performs control tasks confidently and accurately, and easily answers modified questions.

2. A score of "4" is awarded if:

the student answers the teacher's questions without much difficulty, is able to apply the knowledge gained in practice, does not make serious mistakes in oral answers and easily eliminates some inaccuracies with the help of additional questions from the teacher, and makes minor mistakes in control tasks.

3. A score of "3" is awarded if:

the student finds it difficult to reproduce it independently and requires additional and clarifying questions from the teacher, prefers to answer questions of a reproducing nature and is confused in the answers to modified questions, makes mistakes in control tasks.

1. A score of "2" is awarded to the student if:

he has only some ideas or complete knowledge of the material, the student makes gross mistakes. Current assessment-determined by the use of situational tasks, evaluated by the diagnosis of histological micro-products and checked for album design Intermediate and final assessment-conducted in the module, in the form of a test.

ANNOTATION

for a lecture on the topic: **The nervous system.**

Nervous system, development, General characteristics. Central nervous system. Spinal cord: gray matter, structure, characteristics, neural structure, of the core. White matter, structure, and pathways. Brain stem, gray matter, medulla oblongata, concept of reticular formation. Midbrain and midbrain, nuclei, pathways. Spinal nodes, structure, neurons. Cerebellum, gray matter, its layers and neural composition, white matter of the cerebellum. Cyto- and myeloarchitectonics of the cerebral cortex, interneuron connections. Hemato-encephalic barrier, components and meaning. Age-related features of the nervous system.

Methods of new pedagogical technologies: Web (A: 1,2,3; K: 1,2,3,7,8,9,12,19,20,21,22)

ANNOTATION

for a lecture on the topic: **Sensory organs.**

General characteristics of the senses in the light of the doctrine of analyzers (sensory systems). Receptor cells and mechanisms of reception. Classification of sensory organs by the Genesis and structure of receptor cells.

Organ of vision. General morphofunctional characteristics. Sources and course of embryonic development. General plan of the structure of the eyeball. Shells, their divisions and derivatives, tissue composition. The main functional devices: dioptric (light-refractive), accommodation, and receptor apparatus. Photoreceptor cells. The mechanism of photoreception. Neural composition and retinal glycoepithelium. Pigment layer. Yellow spot and Central fossa. Optic disk. Vasculature of the eyeball. Auxiliary apparatus of the eye.

Olfactory organ. General morphofunctional characteristics. Sources and course of embryonic development. Receptor or olfactory cells. Supporting and basal cells. Histophysiology of the olfactory organ.

Organ of taste. General morphofunctional characteristics and course of embryonic and postnatal development. Taste buds. Taste cells. Supporting and basal cells. Innervation of taste buds. Histophysiology of the taste organ.

Organs of hearing and balance. General morphofunctional characteristics. Inner ear. Bony and membranous labyrinths. Sources and course of embryonic development. The vestibular part of membranous labyrinth: utricle, the SAC, and semicircular canals. Their receptor divisions: spots and ampullary scallops. Hair (sensory-epithelial) and support cells. The otolith membrane and the dome. Innervation. Histophysiology of the vestibular labyrinth. The cochlear part of the membranous labyrinth. Hair (sensory-epithelial) and support cells. Innervation, histophysiology of sound perception. Pathways, subcortical and cortical centers.

Methods of new pedagogical technologies: black box (A: 1,2,3; K: 1,2,3,4,5,6,7,8,12,15,16,17,18,19,20,21,22)

1.5. LABORATORY RESEARCH.

Laboratory classes on the subject of histology are not provided.

1.6. INDEPENDENT WORK

Extracurricular independent work of students contains several types of study of educational material.

№ n/n	Type of independent work
1.	Study of histological preparations
2.	Study of electronic micrographs
3.	Study of schemes
4.	Working with literature
5.	Study of lecture material, preparation for lectures and practical classes

1.8. Information and methodological support.

When teaching the subject of histology, Cytology, and embryology, the use of:

- multimedia presentation of lectures;
- educational videos, electronic textbooks, and computer programs;
- demonstration of preparations of cells, tissues and organs through the video system;
- new pedagogical technologies.

MAIN LITERATURE

1. Zufarov K. A. Histology: Textbook-Toshkent, 1991
2. Histology: Textbook/Edited by Yu. I. Afanasiev, N. A. Yurina, - M.: Medicine, 1989, 744 p.
3. Zufarov K.A. Gistologiya: darslik - Toshkent, 2005.

ADDITIONAL LITERATURE

1. Tursunov E.A. Gistologiya: oquv qollanma, I qism - Toshkent, 2010
2. Tursunov E.A. Gistologiya: oquv qollanma, II qism - Toshkent, 2011. - 2356.
3. Histology (introduction to pathology): Textbook. /Under the editorship of E. E. Ulumbekova and Y. A. Chelysheva. - M.: "GEOTAR-Media", 1997. - 940 p
4. Histology, Embryology, Cytology: Textbook. /Under the editorship of E. E. Ulumbekova and Y. A. Chelysheva. 3-ed., reprint and Additional-M.: "GEOTAR-Media", 2009. - 407 p.
5. Laboratory studies on the course of histology, Cytology and embryology /Under the ed. Yu. I. o. Afanasiev et al. - M.: Higher school, 1990, 1999. - 321 P.
6. Yushkantsev S. I. O., Bykov V. L. Histology, Cytology and immunology. Kratsky Atlas-Saint Petersburg, 2007. - 119
7. Kuznetsov S. L., Mushkambarov N. N. Histology, Cytology and Immunology- Moscow: OO "media-information Agency", 2007. - 600s.
8. Atlas of histology, Cytology and embryology. Kuznetsov S. L., Mushkambarov N. N., goryaehkina V. L.-M.: MIA, 2010
9. Hem A., Kormak D. Histology (Russian) -- 1-5 tomilar, M., 1983.
- 10 Atlas - textbook on histology. Computer program/ Ed. Kuznetsova S. L.-M., 1999
- 11 Junqueira L. K., Carneiro J. Histology: textbook, Atlas. - translated from English. ed. Bykova V. L.-M., 2009.- GEOTAR-Media, 576p.
- 12 Ross M.H., Patwina W. Histology:Text and Atlas. 6-th ed -2011.-996 p.
- 13 Junqueira L.C., Carneiro J. Basic Histology: Text and Atlas, 12-th ed.-2010 - 557p.

Websites from the Internet:

Internet information is obtained from the following sites:

- [www.histol.chuvashia.com.;](http://www.histol.chuvashia.com;)
- [donhist.fromru.com.;](http://donhist.fromru.com;)
- medmir.ru;
- www.molbiol.ru;
- www.pediatrica.ru;
- sdo.psu.edu.ru;
- histology.narod.ru;
- [http://medic.ufl.tmc.edu/Lecture/Main/Griff5.htm;](http://http://medic.ufl.tmc.edu/Lecture/Main/Griff5.htm)
- www.wplus.ru;
- [www.rezko.ru;](http://www.rezko.ru)
- [catalog.delovik.com.](http://catalog.delovik.com)
- <http://www.histology.narod.ru/>
- <http://rsnu.ru/8894.html>
- <http://www.dapamojnik.info/gist/>
- <http://www.morphology.dp.ua/hist.php>
- <http://histologyatlas.wisc.edu/q/>
- <http://www.histology-world.com/>
- <http://www.visualhistology.com/>
- <http://www.bu.edu/histology/n/>