INTRODUCTION TO THE COURSE OF HISTOLOGY. MICROSCOPIC TECHNIQUES

1.The term **"Histology"** was introduced by:
a) J. Purkinje;
b) M. Valentin;
c) K. Mayer;
d) K. Bichat.

2.Which method makes it possible to selectively isolate and study cell organelles?
a) Hybridization;
b) Centrifugation;
c) Molecular biology methods;
d) Biochemical methods.

3.Cytospectrophotometry is based on:
a) The selective absorption of light of a certain wavelength by substances in cells and tissues;
b) The selective emission of light of a certain wavelength by substances in cells and tissues;
c) The ability of cells and tissues to polarize a light beam;
d) The ability of cells and tissues to exhibit autoluminescence.

4.The first microscope was constructed by:
a) Galileo Galilei in 1609–1610;
b) Cornelis Drebbel in 1617–1619;
c) Robert Hooke in 1665;
d) Ernst Abbe in 1873.

5.What is the resolving power of a microscope?
a) The product of the magnification of the objective lens and the eyepiece;
b) The magnification of the eyepiece;
c) The minimum distance between two points of a microscopic object that can still be seen separately;
d) The magnification of the objective lens.

6.Ultraviolet microscopy makes it possible to:
a) Increase the resolving power of a microscope;
b) Determine the quantity of substances in cells;
c) Identify substances of different chemical nature in cells and tissues;
d) Determine the intensity of biochemical processes in cells.

7.The following types of electron microscopy are distinguished:
a) Fluorescence microscopy;
b) Ultraviolet microscopy;
c) Transmission and scanning microscopy;
d) Polarization microscopy.

8.Fixation of histological material is used for:
a) Inactivation of enzyme systems, elimination of microorganisms, and preservation of structure;
b) Improvement of staining;
c) Removal of liquid from the specimen;
d) Increase of contrast.

9.The instrument used for preparing histological sections is called:
a) Microtome;

b) Stage micrometer;
c) Thermostat;
d) Centrifuge.
10.Histological staining is performed in order to:
a) Increase the resolving power of the microscope;
b) Ensure preservation of the histological specimen;
c) Provide contrast to histological structures;
d) Separate components of intracellular structures.
11.Tinctorial properties are:
a) The ability of histological structures to be stained in different colors;
b) The ability of histological structures to be stained with acidic dyes;
c) The ability of histological structures to be stained with basic dyes.
12. Oxyphilia is:
a) the ability of histological structures to stain in different colors;
b) the ability of histological structures to be stained by acidic dyes;
c) the ability of histological structures to stain a color different from that of the dye solution;
d) the ability of histological structures to be stained by basic dyes.
13. Acidophilia is:
a) the ability of histological structures to stain in different colors;
b) the same as oxyphilia;
c) the ability of histological structures to stain a color different from that of the dye solution;
d) the ability of histological structures to stain selectively.
14. Polychromatophilia is:
a) the ability of histological structures to stain in different colors;
b) the ability of histological structures to stain a color different from that of the dye solution;
c) the ability of histological structures to be stained by both acidic and basic dyes;
d) the ability of histological structures to stain selectively.
15. Metachromasia is:
a) the ability of histological structures to stain in different colors;
b) the ability of histological structures to stain a color different from that of the dye solution;
c) the ability of histological structures to be stained by both acidic and basic dyes;
d) the ability of histological structures to stain selectively.
16. Argentophilia is:
a) the ability of structures to be stained with silver salts;
b) the ability of structures to be stained with gold salts;
c) the ability of histological structures to be fixed with silver salts;
d) the ability of histological structures to be fixed with gold salts.
17. Chromophilia is:
a) the ability of histological structures to take up (bind) dyes, i.e., to become stained;
b) the ability of histological structures to change the color of a dye in solution;
c) the ability of histological structures to be stained with chromium salts;
d) the ability of histological structures to be stained with heavy metal salts.

CYTOLOGY

1. The main principles of the cell theory were developed by:
a) M. Schleiden and T. Schwann, supplemented by A. Kölliker;
b) M. Schleiden and T. Schwann, supplemented by J. Purkinje;
c) M. Schleiden and T. Schwann, supplemented by R. Virchow;
d) M. Schleiden, supplemented by R. Virchow and J. Purkinje.

2. The chemical composition of biological membranes is:
a) 40% lipids, 50% proteins, 10% carbohydrates;
b) 40% lipids, 50% proteins, 10% other substances;
c) 50% proteins, 50% lipids;
d) 50% lipids, 30% proteins, 20% carbohydrates.

3. According to their location, membrane proteins are classified into:
a) transport, catalytic, structural, and receptor proteins;
b) integral, semi-integral, and peripheral proteins;
c) mobile, semi-mobile, and immobile proteins;
d) crystalline, simple, and complex proteins.

4. Cytoplasm consists of the following structures:
a) nucleoplasm, nuclear envelope, chromatin, nucleolus;
b) hyaloplasm, nucleoplasm, cytoskeleton;
c) hyaloplasm, organelles, inclusions;
d) glycocalyx, hyaloplasm, supporting-contractile apparatus.

5. Cell organelles are classified into:
a) protein, non-protein, and mixed;
b) general and specialized; membranous and non-membranous;
c) general, specialized, and mixed; membranous and non-membranous;
d) temporary and permanent.

6. Structures on the surface of the cell membrane that recognize signals arriving at the cell:
a) receptors;
b) cilia;
c) glycocalyx;
d) tonofibrils.

7. The cell membrane performs the following functions:
a) barrier, transport, participation in endocytosis, intercellular interactions, receptor, digestive;
b) barrier, participation in endocytosis and exocytosis, intercellular interactions, receptor, synthetic;
c) barrier, transport, participation in endocytosis and exocytosis, intercellular interactions, receptor;
d) barrier, transport, participation in exocytosis, intercellular interactions, receptor, digestive.

8. Which structural elements of the cell ensure the processes of endocytosis and exocytosis?
a) cell membrane and endoplasmic reticulum;
b) cell membrane and hyaloplasmic microfilaments;
c) cell membrane and myofibrils;
d) nuclear envelope and hyaloplasmic microfibrils.

9. What is endocytosis?
a) release of substances from the cell into the surrounding space;
b) intracellular digestion of substrates;
c) uptake of particles from the surrounding space into the cell;
d) entry of particles from the hyaloplasm into the endoplasmic reticulum.
10. Which type of intercellular junction forms a barrier between intercellular spaces and the external environment?
a) synaptic;
b) desmosome;
c) tight junction;
d) simple junction.
11. Which type of intercellular junction ensures the transfer of chemical substances from one cell to another?
a) desmosome;
b) interlocking junction (“zipper”);
c) synaptic junction;
d) gap junction.
12. Structural elements of the cell responsible for protein synthesis:
a) nucleus, rough endoplasmic reticulum, polyribosomes;
b) nucleus, smooth endoplasmic reticulum, polyribosomes;
c) Golgi complex, rough endoplasmic reticulum, polyribosomes;
d) nucleus, Golgi complex, polyribosomes.
13. Cell organelles responsible for the synthesis of carbohydrates and lipids:
a) rough endoplasmic reticulum and Golgi complex;
b) smooth endoplasmic reticulum and lysosomes;
c) rough and smooth endoplasmic reticulum;
d) smooth endoplasmic reticulum and Golgi complex.
14. General-purpose organelles with a membranous structure include:
a) endoplasmic reticulum, Golgi complex, ribosomes, peroxisomes, mitochondria;
b) endoplasmic reticulum, ribosomes, lysosomes, peroxisomes, mitochondria;
c) endoplasmic reticulum, Golgi complex, lysosomes, ribosomes, mitochondria;
d) endoplasmic reticulum, Golgi complex, lysosomes, peroxisomes, mitochondria.
15. Specialized organelles include:
a) cilia, myofibrils, mitochondria;
b) cilia, microvilli, mitochondria;
c) myofibrils, microvilli, mitochondria;
d) microvilli, cilia, myofibrils.
16. What types of endoplasmic reticulum are there?
a) rough and open;
b) smooth and open;
c) rough and villous;
d) rough and smooth.
17. What structural elements make up the Golgi complex?
a) flattened cisternae, tubules, and vacuoles;
b) flattened cisternae, granules, and vacuoles;
c) flattened tubules, granules, and vacuoles;
d) flattened cisternae, tubules, and granules.

18. What is the structure of lysosomes?
a) membrane-bound vesicles containing polysaccharides;
b) membrane-bound vesicles containing hydrolytic enzymes;
c) membrane-bound vesicles containing crystals;
d) membrane-bound vesicles containing glycogen.
19. What is the classification of lysosomes?
a) primary, secondary, heterophagic, residual bodies;
b) primary, secondary, autophagic, residual bodies;
c) primary, secondary (heterophagic and autophagic), storage bodies;
d) primary, secondary (heterophagic and autophagic), residual bodies.
20. What is autophagocytosis?
a) digestion in secondary lysosomes of particles that entered the cell by pinocytosis;
b) digestion in secondary lysosomes of particles that entered the cell by endocytosis;
c) digestion of proteins in secondary lysosomes;
d) digestion of intracellular structures in secondary lysosomes.
21. What is a residual body?
a) a secondary lysosome without enzymes, containing undigested biological substrates and pigments;
b) a secondary lysosome with a small amount of enzymes, containing undigested biological substrates and pigments;
c) a primary lysosome with a small amount of enzymes, containing undigested biological substrates and pigments;
d) a phagosome with a small amount of enzymes, containing undigested biological substrates and pigments.
22. What is the main source of energy in the cell?
a) high-energy bonds of ADP;
b) high-energy bonds of DNA;
c) high-energy bonds of RNA;
d) high-energy bonds of ATP.
23. What is the structure of a mitochondrion?
a) bodies bounded by a membrane forming folds (cristae), with matrix between them;
b) bodies bounded by a double membrane, containing a matrix with vesicles inside;
c) bodies bounded by a membrane, containing a fine-granular matrix inside;
d) bodies bounded by a double membrane, whose inner membrane forms folds (cristae), with matrix between them.
24. The mitochondrial matrix contains:
a) electron-dense granules, lysosomes, DNA molecules;
b) electron-dense granules, peroxisomes, RNA molecules;
c) electron-dense granules, ribosomes, DNA molecules;
d) electron-dense granules, vacuoles, DNA molecules.
25. What functions do mitochondria perform?
a) accumulation of energy in the form of high-energy ATP bonds, synthesis of structural proteins;
b) accumulation of energy in the form of high-energy ADP bonds, synthesis of structural proteins;
c) accumulation of energy in the form of high-energy ATP bonds, synthesis of structural

lipids;
d) accumulation of energy in the form of high-energy ATP bonds, synthesis of enzymes.

26. Where in the mitochondrion does ADP phosphorylation occur?

a) in the matrix;
b) on ribosomes;
c) on submitochondrial particles;
d) on the inner membrane.

27. What is the structure of ribosomes?

a) a structure consisting of one subunit formed by RNP (ribonucleoprotein);
b) a structure consisting of three subunits formed by RNP;
c) a structure consisting of two subunits formed by ADP;
d) a structure consisting of two subunits formed by RNP.

28. What function do ribosomes perform in cells?

a) carbohydrate synthesis;
b) lipid synthesis;
c) hormone synthesis;
d) protein synthesis.

29. What is the structure of the centrosome (cell center)?

a) two centrioles arranged parallel to each other and surrounded by matrix;
b) two centrioles arranged at an angle to each other and surrounded by matrix;
c) two centrioles arranged at an angle to each other and surrounded by glycocalyx;
d) two centrioles arranged at an angle to each other and surrounded by a centrosphere.

30. How is a centriole organized?

a) a cylinder of 8 microtubule triplets surrounded by satellites;
b) a cylinder of 9 microtubules surrounded by satellites;
c) a cylinder of 8 microtubules surrounded by satellites;
d) a cylinder of 9 microtubule triplets surrounded by satellites.

31. What function does the centrosome perform in a dividing cell?

a) ensures cytokinesis;
b) destroys the nuclear envelope;
c) forms the achromatic spindle of division;
d) causes chromosome spiralization.

32. Inclusions are:

a) structured temporary accumulations of substances in the hyaloplasm reflecting various aspects of intracellular metabolism;
b) permanent structures of the cytoplasm reflecting various aspects of intracellular metabolism;
c) structured temporary accumulations of substances in the nucleoplasm reflecting various aspects of intracellular metabolism;
d) labile structures of the mitochondrial matrix reflecting various aspects of intracellular metabolism.

33. Which structural elements form the nucleus?

a) chromosomes, nucleolus, chromatin, nuclear envelope;
b) chromosomes, nucleolus, nucleoplasm, chromatin;
c) chromosomes, nucleolus, nucleoplasm, matrix;
d) chromosomes, nucleolus, nucleoplasm, nuclear envelope.

34. Which regions of chromosomes are called heterochromatic?

a) ring-shaped in the dividing nucleus;
b) decondensed in the non-dividing nucleus;
c) branched in the non-dividing nucleus;
d) retaining condensation in the non-dividing nucleus.

35. Which regions of chromosomes are called euchromatic?

a) decondensed, inactive;
b) condensed, functionally active;
c) decondensed, functionally active;
d) decondensed, fragmented.

36. What function do chromosomes perform?

a) carriers of heredity, synthesize RNA and ATP molecules;
b) carriers of heredity, synthesize DNA and RNA molecules;
c) carriers of heredity, synthesize DNA and ATP molecules;
d) carriers of heredity, synthesize RNA and ADP molecules.

37. How is the nuclear envelope (karyotheca) structured?

a) formed by a membrane and glycocalyx;
b) formed by two membranes with glycocalyx between them;
c) formed by two membranes with hyaloplasm between them;
d) formed by two membranes with a perinuclear space between them.

38. What is the significance of the nucleus in cell activity?

a) carrier of hereditary information and center of microtubule assembly;
b) carrier of hereditary information and center of energy accumulation;
c) carrier of hereditary information and control center of intracellular metabolism;
d) carrier of hereditary information and site of lysosome formation.

39. The cell life cycle is:

a) the time from one cell division to the next;
b) the time from cell division to the resting period;
c) the time from cell division to its next division or death;
d) the time from cell division to the beginning of DNA synthesis.

40. What is the mitotic cycle?

a) G1 and S phases, mitosis;
b) prophase, metaphase, anaphase, telophase;
c) S and G2 phases;
d) G1, S, and G2 phases, mitosis.

41. Which process results in the formation of two cells with an equal diploid set of chromosomes?

a) meiosis;
b) mitosis;
c) cytokinesis;
d) endomitosis.

42. What occurs in the cell during the G1 phase?

a) synthesis of lipids necessary for DNA replication;
b) synthesis of glycosaminoglycans necessary for DNA replication;
c) synthesis of glycosaminoglycans necessary for RNA replication;
d) synthesis of proteins necessary for DNA replication and cell growth.

43. What processes occur in the cell during the S phase?

a) DNA synthesis and duplication of the centrosome;
b) RNA synthesis and duplication of the centrosome;
c) lipid synthesis and duplication of the centrosome;
d) DNA synthesis and splitting of the centrosome.

44. What processes occur in the cell during the G2 phase?

a) DNA synthesis, energy accumulation, and microtubule assembly;
b) synthesis of proteins for the mitotic spindle, accumulation of trophic inclusions, DNA synthesis;
c) synthesis of proteins for the mitotic spindle, energy accumulation, RNA synthesis;
d) RNA synthesis, energy accumulation, and lysis of the nuclear envelope.

45. What processes occur in the cell during prophase?

a) disassembly of the nuclear envelope, assembly of the nucleolus, chromosome condensation;
b) disassembly of the nuclear envelope, disappearance of the nucleolus, chromosome condensation;
c) disassembly of the nuclear envelope, disappearance of the nucleolus, chromosome decondensation;
d) disassembly of the nuclear envelope, assembly of the nucleolus, chromosome decondensation.

46. What happens in the cell during metaphase?

a) chromosomes are located at the poles of the cell and begin to separate;
b) chromosomes are arranged as a tangled mass and begin to separate;
c) chromosomes are arranged as two tangled masses and begin to separate;
d) chromosomes are aligned at the cell equator and begin to separate.

47. What happens in the cell during anaphase?

a) chromosomes move toward the poles of the cell;
b) chromosome condensation;
c) chromosome decondensation;
d) formation of daughter nuclei.

48. What happens in the cell during telophase?

a) chromosome separation, cytokinesis, formation of nucleoli, multiplication of organelles;
b) chromosome condensation, nucleolar disintegration, cytokinesis, duplication of organelles;
c) reconstruction of daughter nuclei, chromosome condensation, cytokinesis, multiplication of organelles;
d) reconstruction of daughter nuclei, formation of nucleoli, cytokinesis, multiplication of organelles.

49. What is apoptosis?

a) physiological programmed cell death;
b) physiological programmed death of old parts of cells;
c) physiological cell regeneration;
d) massive cell death due to an “accident.”

50. Which nuclear changes are characteristic of necrosis?

a) pyknosis, karyorrhexis, karyolysis;
b) pyknosis and karyolysis;

c) pyknosis and karyorrhexis;
d) karyolysis, karyorrhexis, and karyokinesis.

EMBRYOLOGY

1. The idea that a new organism forms as a result of "mixing male and female seed" was first proposed by:
a) Hippocrates;
b) Aristotle;
c) W. Harvey;
d) C. Wolff.
2. The statement "All living beings arise from an egg" was first proposed by:
a) Hippocrates;
b) Aristotle;
c) W. Harvey;
d) C. Wolff.
3. The science that studies development from the formation of the zygote to birth is:
a) genetics;
b) physiology;
c) morphology;
d) embryology.
4. The initial period of individual development is called:
a) phylogenesis;
b) embryogenesis;
c) histogenesis;
d) phyl-embryogenesis.
5. The main properties of mature germ cells are:
a) differentiated, haploid, unable to divide;
b) undifferentiated, haploid, capable of division;
c) differentiated, diploid, unable to divide;
d) undifferentiated, diploid, capable of division.
6. The size of a human spermatozoon is:
a) 1–2 μm;
b) 10–20 μm;
c) 60–70 μm;
d) 1–2 mm.
7. The acrosome is:
a) a derivative of the Golgi complex;
b) a derivative of the rough endoplasmic reticulum;
c) a derivative of the smooth endoplasmic reticulum;
d) a derivative of mitochondria.
8. The structure of the axial filament of the sperm tail is similar to that of:
a) cilia;
b) microvilli;
c) tonofibrils;
d) myofibrils.
9. The size of a human ovum is:

a) 1.5–2 μm;
b) 30 μm;
c) 150 μm;
d) 1–2 mm.

10. The type of egg cell in lancelet is:
a) primary isolecithal;
b) secondary isolecithal;
c) moderately telolecithal;
d) strongly telolecithal.

11. The type of egg cell in amphibians is:
a) primary isolecithal;
b) secondary isolecithal;
c) moderately telolecithal;
d) strongly telolecithal.

12. The type of egg cell in birds is:
a) primary isolecithal;
b) secondary isolecithal;
c) moderately telolecithal;
d) strongly telolecithal.

13. The type of egg cell in humans is:
a) primary isolecithal;
b) secondary isolecithal;
c) moderately telolecithal;
d) strongly telolecithal.

14. The function of cortical granules in the egg cell is:
a) initiation of zygote cleavage;
b) accumulation of nutrients;
c) facilitation of sperm penetration;
d) formation of the fertilization membrane.

15. The initial stage of embryogenesis is:
a) cleavage;
b) gastrulation;
c) fertilization;
d) organogenesis.

16. Capacitation is:
a) formation of the fertilization membrane;
b) loss of the sperm flagellum;
c) activation of the spermatozoon;
d) release of enzymes from spermatozoa.

17. Where does fertilization occur in mammals and humans?
a) in the uterine cavity;
b) in the distal part of the oviduct (fallopian tube);
c) in the abdominal cavity;
d) in the vagina.

18. The embryonic stage in which development transitions from a single cell to a multicellular organism is:

a) fertilization;
b) gastrulation;
c) cleavage;
d) histogenesis.

19. The type of cleavage in lancelet is:
a) complete equal synchronous;
b) complete unequal asynchronous;
c) partial discoidal;
d) incomplete equal synchronous.
20. The type of cleavage in amphibians is:
a) complete equal synchronous;
b) complete unequal asynchronous;
c) partial discoidal;
d) incomplete equal synchronous.
21. The type of cleavage in birds is:
a) complete equal synchronous;
b) complete unequal asynchronous;
c) partial discoidal;
d) incomplete equal synchronous.
22. The type of cleavage in humans is:
a) complete equal synchronous;
b) complete asynchronous unequal;
c) partial discoidal;
d) incomplete equal synchronous.
23. Blastula of the lancelet:
a) coeloblastula;
b) amphiblastula;
c) discoblastula;
d) blastocyst.
24. Blastula of amphibians:
a) coeloblastula;
b) amphiblastula;
c) discoblastula;
d) blastocyst.
25. Blastula of birds:
a) coeloblastula;
b) amphiblastula;
c) discoblastula;
d) blastocyst.
26. Blastula of mammals:
a) coeloblastula;
b) amphiblastula;
c) discoblastula;
d) blastocyst.
27. Parts of the blastocyst include:

a) trophoblast, embryoblast, exocoelomic cavity;
b) ectoderm, endoderm, mesoderm;
c) blastoderm, blastocoel;
d) roof, floor, marginal zone.

28. The embryoblast gives rise to:
a) chorion and allantois;
b) body of the embryo, amnion, and yolk sac;
c) body of the embryo, amnion, yolk sac, and allantois;
d) amnion, yolk sac, and allantois.

29. The trophoblast gives rise to:
a) chorion;
b) body of the embryo, amnion, and yolk sac;
c) body of the embryo, amnion, yolk sac, and allantois;
d) amnion, yolk sac, and allantois.

30. Gastrulation in lancelet occurs by:
a) delamination;
b) immigration;
c) epiboly;
d) invagination.

31. Gastrulation in amphibians occurs by:
a) delamination and epiboly;
b) immigration and epiboly;
c) delamination and immigration;
d) invagination and epiboly.

32. Formation of epiblast and hypoblast in birds and mammals occurs by:
a) delamination and epiboly;
b) immigration and epiboly;
c) delamination and immigration;
d) invagination and epiboly.

33. Gastrulation in humans:
a) occurs after implantation via delamination, migration, and invagination;
b) occurs before implantation via delamination, migration, and invagination;
c) occurs during implantation via delamination, migration, and invagination;
d) occurs after implantation via delamination, migration, and epiboly.

34. Timing of gastrulation in human embryos:
a) days 1–6;
b) days 7–20;
c) days 10–15;
d) days 20–30.

35. Location of the human embryo on day 5–6:
a) in the oviduct;
b) in the uterine cavity;
c) in the vagina;
d) in the abdominal cavity.

36. Derivatives of the epiblast:
a) embryonic and extraembryonic ectoderm, chordomesodermal primordium, neural tube;

b) embryonic and extraembryonic endoderm, yolk sac, allantois;
c) embryonic and extraembryonic endoderm, chordomesodermal primordium, neural tube;
d) embryonic and extraembryonic ectoderm, amnion, chorion.

37. Derivatives of the hypoblast:
a) ectoderm, neural tube;
b) embryonic and extraembryonic endoderm;
c) chordomesodermal primordium;
d) extraembryonic ectoderm, amnion, chorion.

38. Source of formation of the human yolk sac:
a) embryonic ectoderm;
b) extraembryonic endoderm and mesoderm;
c) embryonic mesenchyme;
d) embryonic endoderm.

39. The wall of the yolk sac consists of:
a) embryonic endoderm, ectoderm, and mesoderm;
b) extraembryonic endodermal epithelium and extraembryonic mesoderm;
c) embryonic ectoderm and mesoderm;
d) extraembryonic ectodermal epithelium and extraembryonic mesoderm.

40. Functions of the human yolk sac:
a) trophic, hematopoietic, formation of primordial germ cells;
b) hormonal, secretory, formation of primordial germ cells;
c) hematopoietic, formation of primordial germ cells, hormonal;
d) formation of aqueous environment, hormonal, respiratory.

41. Origin of the amnion wall:
a) extraembryonic ectoderm and mesoderm;
b) embryonic ectoderm and mesoderm;
c) extraembryonic ectoderm and embryonic mesoderm;
d) embryonic ectoderm and extraembryonic mesoderm.

42. Structures forming the amniotic membrane:
a) embryonic ectodermal epithelium, parietal layer of ventral mesoderm;
b) extraembryonic ectodermal epithelium and mesoderm (connective tissue base);
c) visceral layer of ventral mesoderm;
d) embryonic endodermal epithelium.

43. Tissue layers of the amniotic membrane:
a) amniotic epithelium and connective tissue layer;
b) smooth muscle cells;
c) trophoblastic chorionic epithelium;
d) cytotrophoblast.

44. Functions of the amniotic membrane:
a) trophic;
b) respiratory;
c) excretory;
d) formation of an aqueous environment and mechanical protection.

45. Functions of the allantois:
a) conduction of blood vessels from fetus to placenta;
b) gas exchange;

c) excretion;
d) formation of aqueous environment.

46. Structures derived from ectoderm:

a) somites;
b) neural tube, ganglionic plate;
c) nephrotomes;
d) myotomes.

47. Structures derived from mesoderm:

a) somites, mesenchyme, nephrotomes, splanchnotome;
b) intestinal tube, liver and pancreas epithelium;
c) neural tube, ganglionic plate;
d) oral vestibule epithelium.

48. Derivatives of endoderm:

a) brain, nerves, ganglia;
b) epithelium of gastrointestinal tract, liver, pancreas;
c) epidermis, sweat and sebaceous glands;
d) kidneys, smooth muscle, vessels.

49. Derivatives of cutaneous ectoderm:

a) epidermis, sweat and sebaceous glands, oral vestibule epithelium, tooth enamel;
b) spleen, lymph nodes, bone marrow;
c) gastrointestinal, liver, pancreas epithelium;
d) somites, mesenchyme, nephrotomes, splanchnotome.

50. Derivatives of neuroectoderm:

a) nervous tissue, neurons and glia of brain and spinal cord, neurohypophysis, retina, olfactory organ;
b) epidermis and skin glands;
c) gastrointestinal epithelium, liver, pancreas;
d) somites and mesodermal derivatives.

51. Derivatives of dermatome (somitic mesoderm):

a) epidermis;
b) kidneys;
c) mesothelium;
d) dermis of skin.

52. Derivatives of myotome:

a) smooth muscle tissue;
b) blood vessels;
c) skeletal striated muscle tissue;
d) bone tissue.

53. Derivatives of sclerotome:

a) skeletal muscle;
b) brain and spinal cord;
c) bone and cartilage tissues;
d) eye membranes.

54. Derivatives of splanchnotome:

a) mesothelium, adrenal cortex, myocardium, serous epithelium;
b) skeletal muscle;

c) dermis;
d) brain.

55. Processes by which embryo establishes connection with mother:
a) gastrulation, placentation;
b) implantation, placentation;
c) placentation, histogenesis;
d) placentation, invagination.

56. Type of human placenta:
a) multiple desmohorial placenta;
b) diffuse epitheliochorial placenta;
c) discoidal hemochorial placenta;
d) zonary endotheliochorial placenta.

57. Structures of primary chorionic villi:
a) blood vessels, connective tissue;
b) cytotrophoblast and syncytiotrophoblast;
c) mucous connective tissue and cytotrophoblast;
d) extraembryonic ectoderm and mesoderm.

58. Structures of secondary chorionic villi:
a) trophoblast, connective tissue, blood vessels;
b) mucous connective tissue and cytotrophoblast;
c) extraembryonic ectoderm and mesoderm;
d) reticular tissue.

59. Structures of tertiary chorionic villi:
a) trophoblast epithelium, capillaries, connective tissue, fibrinoid;
b) connective tissue and vessels only;
c) mucous connective tissue and cytotrophoblast;
d) reticular tissue and vessels.

60. Type of fetal nutrition in villous placenta:
a) hematotrophic;
b) histiotrophic;
c) epithelio-trophic;
d) mixed histiotrophic and epithelio-trophic.

61. Structures of the fetal part of placenta:
a) fetal vessels, chorionic plate, villi, amnion;
b) endometrium, lacunae, septa, decidual cells;
c) decidual membrane and related structures;
d) chorionic connective plate only.

62. Structures of the maternal part of placenta:
a) fetal vessels and chorion;
b) decidua, blood lacunae, septa, decidual cells;
c) chorionic connective plate;
d) endometrium only.

63. Functions of human placenta:
a) formation of amniotic fluid;
b) gas exchange, excretory, protective;

c) formation of aqueous environment, excretion, trophic;
d) trophic, excretory, endocrine, protective, connection between fetus and mother.

64. Components of the placental (hematochorial) barrier:

a) blood space, connective tissue, endothelium;
b) trophoblast epithelium, connective tissue, basement membrane, capillary endothelium;
c) amniotic epithelium, connective tissue, capillary endothelium;
d) endothelium and amniotic epithelium.

65. Structures of the umbilical cord:

a) amniotic epithelium, mucous connective tissue, umbilical arteries and vein;
b) reticular tissue, vessels only;
c) amniotic epithelium, loose connective tissue, umbilical vein;
d) trophoblast epithelium, connective tissue, vessels.

66. When does the embryonic period end and the fetal period begin in human prenatal development?

a) at the end of the first month;
b) at the beginning of the third month;
c) at the end of the third month;
d) at the beginning of the fourth month.

GENERAL HISTOLOGY

EPITHELIAL TISSUES

1. Tissue whose cells lie on a basement membrane as a layer, with no intercellular substance or blood vessels, strong polarity, and high regenerative ability:
a) epithelial;
b) connective;
c) muscular;
d) nervous.

2. Histogenetic type of epithelium developing from mesenchyme:
a) epidermal;
b) enterodermal;
c) angiodermal;
d) coelonephrodermal.

3. Histogenetic type of simple cuboidal epithelium of kidney tubules:
a) entodermal;
b) coelonephrodermal;
c) ependymoglial;
d) epidermal.

4. Histogenetic type of simple columnar epithelium of the stomach:
a) epidermal;
b) angiodermal;
c) entodermal;
d) ependymoglial.

5. Histogenetic type of epithelium lining the spinal canal and brain ventricles:
a) entodermal;
b) coelonephrodermal;
c) ependymoglial;
d) epidermal.

6. Source of intestinal epithelium development:
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
7. Source of skin epithelium development:
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
8. Source of coelonephrodermal epithelium development:
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
9. Epithelium with all cells cylindrical and all lying on the basement membrane:
a) simple pseudostratified columnar;
b) simple single-layer columnar;
c) stratified transitional;
d) stratified columnar.
10. Epithelium with cells of different heights, all on the basement membrane:
a) simple single-layer columnar;
b) simple pseudostratified columnar;
c) stratified transitional;
d) stratified non-keratinized squamous.
11. In which epithelium are ciliated cells found?
a) simple pseudostratified columnar;
b) stratified keratinized squamous;
c) stratified non-keratinized squamous;
d) transitional epithelium.
12. Which epithelia belong to the multilayer group?
a) single-layer; pseudostratified; transitional;
b) keratinized, non-keratinized, transitional;
c) non-keratinized, keratinized, pseudostratified;
d) single-layer, keratinized, non-keratinized.
13. Epithelium with basal, spinous, and flat cells:
a) simple pseudostratified columnar;
b) transitional;
c) stratified non-keratinized squamous;
d) stratified keratinized squamous.
14. Epithelium with basal, spinous, granular, lucid, and keratin layers:
a) stratified non-keratinized squamous;
b) transitional;
c) stratified keratinized squamous;
d) simple pseudostratified.
15. In which layer of keratinized stratified squamous epithelium is keratohyalin found?
a) basal;

b) spinous;
c) granular;
d) keratin layer.
16. Transitional epithelium is:
a) changing from squamous to columnar;
b) changing from non-keratinized to keratinized;
c) changing from non-glandular to glandular;
d) changing cell layer arrangement depending on organ distension.
17. Where is endothelium found?
a) trachea;
b) skin;
c) inner surface of blood vessels;
d) urinary bladder.
18. Where is pseudostratified columnar epithelium found?
a) trachea;
b) skin;
c) urinary bladder;
d) cornea.
19. Where is non-keratinized stratified squamous epithelium found?
a) intestine;
b) trachea;
c) esophagus;
d) urinary bladder.
20. Where is stratified squamous epithelium found?
a) intestine;
b) trachea;
c) oral cavity;
d) urinary bladder.
21. Which structure is located at the apical pole of epithelial cells?
a) nucleus;
b) endoplasmic reticulum;
c) ribosome;
d) cell center.
22. Where is the nucleus located in epithelial cells?
a) centrally;
b) basal pole;
c) apical pole;
d) any position.
23. Cell junction composed of a thickened membrane and tonofibrils:
a) “zipper”;
b) desmosome;
c) nexus;
d) gap junction.
24. Special epithelial structure increasing absorptive surface:
a) flagellum;
b) microvilli;

c) tonofibrils;
d) cilia.
25. Type of contact with basement membrane:
a) desmosome;
b) hemidesmosome;
c) intercalated disc;
d) “zipper”.
26. Which gland is endocrine?
a) branched duct, alveolar end sections;
b) branched duct, tubular end sections;
c) no ducts, but rich blood supply;
d) branched duct, tubulo-alveolar end sections.
27. Simple exocrine glands are:
a) unicellular, no duct;
b) multicellular, unbranched duct;
c) unbranched secretory parts, branched duct;
d) multicellular, unbranched duct, branched secretory parts.
28. Compound exocrine glands are:
a) multicellular, branched secretory parts;
b) tubulo-alveolar with unbranched duct;
c) tubular with unbranched duct;
d) multicellular, branched duct.
29. Secretion type with partial destruction of cell:
a) merocrine;
b) apocrine;
c) holocrine;
d) endocrine.
30. Secretion type without cell destruction:
a) merocrine;
b) apocrine;
c) holocrine;
d) endocrine.
31. Secretion type with complete destruction of cell:
a) merocrine;
b) apocrine;
c) holocrine;
d) endocrine.

BLOOD, LYMPH, HEMATOPOIESIS

1. Source of blood development:
a) ectoderm;
b) mesoderm;
c) mesenchyme;
d) endoderm.
2. Percentage of plasma in blood:
a) 30%;

b) 40%;
c) 60%;
d) 90%.

3. Percentage of formed elements in blood:

a) 30%;
b) 40%;
c) 60%;
d) 90%.

4. Plasma is mainly composed of:

a) glycosaminoglycans;
b) collagen;
c) water;
d) chondroitin sulfate.

5. Water content in blood plasma:

a) 30%;
b) 40%;
c) 60%;
d) 90%.

6. Dry matter content in blood plasma:

a) 10%;
b) 40%;
c) 60%;
d) 90%.

7. Plasma proteins include:

a) collagen;
b) elastin;
c) fibrinogen;
d) rhodopsin.

8. Which cell is part of formed blood elements?

a) fibrocytes;
b) pigment cells;
c) platelets;
d) chondrocytes.

9. Average erythrocyte count in men:

a) 3.7–4.9 × 10^{12}/L;
b) 2.8–3.5 × 10^{12}/L;
c) 3.9–5.5 × 10^{12}/L;
d) 4.5–5.5 × 10^{12}/L.

10. Average erythrocyte count in women:

a) 3.7–4.9 × 10^{12}/L;
b) 2.8–3.5 × 10^{12}/L;
c) 3.9–5.5 × 10^{12}/L;
d) 4.5–6 × 10^{12}/L.

11. Increase in erythrocyte number is called:

a) erythropenia;
b) poikilocytosis;

c) anisocytosis;
d) erythrocytosis.

12. Decrease in erythrocyte number is called:

a) erythropenia;
b) poikilocytosis;
c) anisocytosis;
d) erythrocytosis.

13. Erythrocytes are:

a) a cell;
b) anucleate cell;
c) blood plate;
d) multinucleated cell.

14. Components of erythrocytes:

a) nucleus;
b) organelles;
c) inclusions;
d) special organelles.

15. Protein found in erythrocytes:

a) albumin;
b) globulin;
c) fibrinogen;
d) hemoglobin.

16. Main function of erythrocytes:

a) protective;
b) respiratory;
c) trophic;
d) homeostatic.

17. Typical shape of erythrocytes:

a) sickle-shaped;
b) irregular edges;
c) biconcave;
d) branched.

18. Average diameter of erythrocyte:

a) 5.1–5.9 μm;
b) 6.1–6.9 μm;
c) 7.1–7.9 μm;
d) 8.1–8.9 μm.

19. Reticulocyte percentage:

a) 2–8%;
b) 1–5%;
c) 18–38%;
d) 45–75%.

20. Leukocyte count in healthy adults:

a) 6.0–8.0 × 10^9/L;
b) 4.0–9.0 × 10^9/L;
c) 3.9–5.5 × 10^{12}/L;
d) 200–300 × 10^9/L.

21. Neutrophil percentage:
a) 65–75%;
b) 1–5%;
c) 0.5–1%;
d) 2–8%.
22. Neutrophils were called by I.I. Mechnikov:
a) macrophages;
b) histiocytes;
c) microphages;
d) siderophages.
23. Main function of neutrophils:
a) antibody production;
b) phagocytosis of microorganisms and particles;
c) antigen–antibody complex phagocytosis;
d) allergic reactions.
24. Eosinophil percentage:
a) 65–75%;
b) 1–5%;
c) 0.5–1%;
d) 2–8%.
25. Main function of eosinophils:
a) histamine inactivation, allergy involvement;
b) phagocytosis of microorganisms;
c) antigen–antibody complex phagocytosis;
d) antibody production.
26. Basophil percentage:
a) 65–75%;
b) 18–38%;
c) 0.5–1%;
d) 2–8%.
27. Cells producing histamine:
a) basophils;
b) neutrophils;
c) lymphocytes;
d) eosinophils.
28. Lymphocyte percentage:
a) 65–75%;
b) 1–5%;
c) 2–8%;
d) 18–38%.
29. Lymphocyte populations:
a) T, B, plasmacytes;
b) T, B, NK cells;
c) T, intermediate lymphocytes;
d) B, intermediate lymphocytes.
30. Monocyte percentage:
a) 65–75%;

b) 1–5%;
c) 18–38%;
d) 2–8%.

31. Monocytes differentiate into:

a) plasma cells;
b) microphages;
c) macrophages;
d) tissue basophils.

32. Platelet count:

a) 6.0–8.0 × 10^9/L;
b) 4.0–9.0 × 10^9/L;
c) 3.9–5.5 × 10^{12}/L;
d) 200–300 × 10^9/L.

33. Platelets are:

a) nucleated oval cells;
b) anucleate acidophilic cells;
c) cytoplasmic fragments with hyalomere and granulomere;
d) bilobed granulocyte.

34. Composition of lymph formed elements:

a) 50% lymphocytes + other leukocytes;
b) 50% lymphocytes + leukocytes + erythrocytes;
c) 95–98% lymphocytes + others;
d) 5% lymphocytes + others.

35. Site of primary blood formation:

a) allantois;
b) yolk sac;
c) amnion;
d) liver.

36. Universal hematopoietic organ:

a) spleen;
b) red bone marrow;
c) lymph node;
d) tonsil.

37. Diaphone identification (acidophilic granules, histamine, kinin):

a) granulocytopoiesis;
b) monocytopoiesis;
c) lymphocytopoiesis;
d) erythropoiesis.

38. Cells entering blood from myeloid tissue:

a) metamyelocytes;
b) myelocytes;
c) band neutrophils;
d) segmented neutrophils.

39. Site of B-lymphocyte specialization:

a) spleen;
b) thymus;

c) yolk sac;
d) Bursa of Fabricius.

40. Cells formed from B-lymphocytes:

a) macrophages;
b) plasma cells;
c) neutrophils;
d) basophils.

41. Site of T-lymphocyte specialization:

a) red bone marrow;
b) thymus;
c) spleen;
d) tonsils.

42. Blood platelets arise from:

a) promyelocytes;
b) normocytes;
c) megakaryocytes;
d) metamyelocytes.

GENERAL HISTOLOGY

EPITHELIAL TISSUES

1.A tissue is present in all organs, where it accompanies blood and lymphatic vessels and forms the stroma of many organs. Cells lie on a basement membrane as layers, there is no intercellular substance and no blood vessels, polarity is well expressed, and regeneration is high. What tissue is it?

a) epithelial tissue;
b) connective tissue;
c) muscle tissue;
d) nervous tissue.

2.To which histogenetic type does epithelium derived from mesenchyme belong?

a) epidermal;
b) enterodermal;
c) angiodermal;
d) coelonephrodermal.

3.To which type in the histogenetic classification does the simple cuboidal epithelium of renal tubules belong?

a) entodermal;
b) coelonephrodermal;
c) ependymoglial;
d) epidermal.

4.To which histogenetic type does the simple columnar epithelium of the stomach belong?

a) epidermal;
b) angiodermal;
c) entodermal;
d) ependymoglial.

5.To which histogenetic type does the epithelial lining of the spinal canal and brain ventricles belong?
a) entodermal;
b) coelonephrodermal;
c) ependymoglial;
d) epidermal.
6.Source of development of intestinal epithelium?
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
7.Source of development of skin epithelium?
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
8.Source of development of coelonephrodermal epithelium?
a) ectoderm;
b) endoderm;
c) mesoderm;
d) mesenchyme.
9.In the epithelium, all cells are cylindrical and all lie on the basement membrane. What type of epithelium is it?
a) simple pseudostratified columnar;
b) simple single-layer columnar;
c) stratified transitional;
d) stratified columnar.
10.In the epithelium, cells are of different heights but all lie on the basement membrane. What type is it?
a) simple single-layer columnar;
b) simple pseudostratified columnar;
c) stratified transitional;
d) stratified squamous non-keratinized.
11.In which epithelium are ciliated cells found?
a) simple pseudostratified columnar;
b) stratified squamous keratinized;
c) stratified squamous non-keratinized;
d) stratified transitional.
12.According to the morphofunctional classification, which epithelia belong to the group of stratified epithelia?
a) simple; pseudostratified; transitional;
b) keratinized, non-keratinized, transitional;
c) non-keratinized, keratinized, pseudostratified;
d) simple, keratinized, non-keratinized.
13.The epithelium has 3 cell types: basal, spinous, and flat cells. What type is it?
a) simple pseudostratified columnar;
b) stratified transitional;

c) stratified squamous non-keratinized;
d) stratified squamous keratinized.
14.The epithelium shows layers: basal, spinous, granular, lucid, and keratinized scales. What type is it?
a) stratified squamous non-keratinized;
b) stratified transitional;
c) stratified squamous keratinized;
d) simple pseudostratified.
15.In which layer of stratified squamous keratinized epithelium is keratohyalin found?
a) basal;
b) spinous;
c) granular;
d) keratinized.
16.What is transitional epithelium?
a) transforming from squamous to columnar;
b) transforming from non-keratinized to keratinized;
c) transforming from non-glandular to glandular;
d) changing cell arrangement in stretched and relaxed states.
17.In which organ is endothelium (simple squamous epithelium) found?
a) trachea;
b) skin;
c) inner lining of blood vessels;
d) urinary bladder.
18.Where is simple pseudostratified columnar epithelium found?
a) trachea;
b) skin;
c) urinary bladder;
d) cornea.
19.Where is stratified squamous non-keratinized epithelium found?
a) intestine;
b) trachea;
c) esophagus;
d) urinary bladder.
20.Where is stratified squamous epithelium found?
a) intestine;
b) trachea;
c) oral cavity;
d) urinary bladder.
21.Which epithelial cell structure is located at the apical pole?
a) nucleus;
b) endoplasmic reticulum;
c) ribosome;
d) cell center.
22.At what level is the nucleus located in an epithelial cell?
a) center;
b) basal pole;

c) apical pole;
d) any level.
23.Which type of intercellular contact consists of two parts: a thickened membrane and a network of thin filaments (tonofibrils)?
a) “zipper”;
b) desmosome;
c) nexus;
d) gap junction.
24.Special epithelial structure that increases absorptive surface:
a) flagellum;
b) microvilli;
c) tonofibrils;
d) cilia.
25.Type of contact between cell and basement membrane:
a) desmosome;
b) hemidesmosome;
c) intercalated disc;
d) “zipper”.
26.Which gland is endocrine?
a) with unbranched duct and alveolar ends;
b) branched duct and tubular ends;
c) no ducts, richly vascularized;
d) branched duct and tubuloalveolar ends.
27.Which exocrine glands are simple?
a) unicellular without duct;
b) multicellular with unbranched duct;
c) unbranched secretory units but branched duct;
d) multicellular with unbranched duct but branched secretory units.
28.Which exocrine glands are complex?
a) multicellular with branched secretory units;
b) tubuloalveolar with unbranched duct;
c) tubular with unbranched duct;
d) multicellular with branched duct.
29.Type of secretion with partial cell destruction:
a) merocrine;
b) apocrine;
c) holocrine;
d) endocrine.
30.Type of secretion without cell destruction:
a) merocrine;
b) apocrine;
c) holocrine;
d) endocrine.
31.Type of secretion with complete cell destruction:
a) merocrine;
b) apocrine;

c) holocrine;
d) endocrine.

SUPPORTING TISSUES (CARTILAGE AND BONE TISSUE)

1.Indicate the types of cartilage tissues:
a) hyaline, elastic, fibrous;
b) hyaline, elastic, lamellar;
c) elastic, fibrous, lamellar;
d) hyaline, elastic, collagen-fibrous.
2.Describe the structure of cartilage as an organ:
a) perichondrium, layers of poorly differentiated and differentiated cartilage;
b) perichondrium, outer general plates, layers of poorly differentiated and differentiated cartilage;
c) perichondrium, outer general plates, layer of differentiated cartilage;
d) perichondrium, layers of poorly differentiated and differentiated cartilage.
3.In which of the listed tissues does the ground (amorphous) substance have the same refractive index as collagen fibers, so the fibers are not visible?
a) hyaline cartilage;
b) fibrous cartilage;
c) elastic cartilage;
d) bone tissue.
4.Which tissue is located in the auricle, horn-shaped and wedge-shaped cartilages?
a) hyaline cartilage;
b) fibrous cartilage;
c) elastic cartilage;
d) hyaline cartilage of articular surfaces.
5.Which tissue is located in the larynx, airways, and in the junctions of ribs with the sternum?
a) elastic;
b) hyaline;
c) fibrous;
d) bone.
6.Which cells are found in cartilage tissue?
a) fibroblasts;
b) osteoblasts;
c) osteocytes;
d) chondrocytes.
7.Source of development of cartilage tissue:
a) endoderm;
b) ectoderm;
c) mesoderm;
d) mesenchyme.
8.A specimen shows a connective tissue lacking microcirculatory vessels. Name this tissue:
a) pigment;
b) bone;

c) cartilage;
d) adipose.
9.An electron micrograph shows four types of connective tissue cells with different nucleus-to-cytoplasm ratios, located singly or in groups in lacunae by zones. Which tissue is shown?
a) bone;
b) cartilage;
c) loose connective tissue;
d) reticular tissue.
10.In hyaline cartilage, in the young zone, cells are located:
a) singly without capsule;
b) singly in a capsule;
c) in isogenous groups of 2 cells;
d) in isogenous groups of 4 cells.
11.In which supporting tissue does calcification never occur?
a) hyaline cartilage;
b) elastic cartilage;
c) fibrous cartilage;
d) bone tissue.
12.Which tissue is found in intervertebral discs, semi-movable joints, and at transitions from fibrous connective tissue to hyaline cartilage?
a) hyaline cartilage;
b) elastic cartilage;
c) bone tissue;
d) collagen-fibrous cartilage tissue.
13.Which cells are found in bone tissue?
a) chondroblasts;
b) fibroblasts;
c) chondrocytes;
d) osteocytes.
14.What do we call the intercellular substance of bone tissue?
a) elastic fibers;
b) chondrin fibers;
c) collagen fibers;
d) ossein fibers.
15.Multinucleated cells with many lysosomes and mitochondria, weakly basophilic cytoplasm are found in bone tissue. Name these cells:
a) osteocytes;
b) chondrocytes;
c) osteoblasts;
d) osteoclasts.
16.Which cell matches the description: star-shaped cell, relatively large compact nucleus, no centrioles, weakly basophilic cytoplasm, located in a cavity matching its shape?
a) fibroblast;
b) chondroblast;

c) osteoblast;
d) osteocyte.
17.In which tissue are collagen fibers arranged randomly in thick bundles, with oval lacunae and branching canaliculi containing cells with processes; ground substance is calcified and the tissue is covered by a membrane?
a) elastic cartilage;
b) hyaline cartilage;
c) compact lamellar bone tissue;
d) fibrous bone tissue.
18.Which tissue is mainly found in embryos and in adults remains at healed skull sutures and tendon attachment sites?
a) fibrous cartilage;
b) elastic cartilage;
c) hyaline cartilage;
d) fibrous bone tissue.
19.In which tissue is the structural unit the osteon?
a) hyaline cartilage;
b) compact lamellar bone tissue;
c) adipose tissue;
d) fibrous bone tissue.
20.Compact lamellar bone tissue is located in:
a) epiphysis of long bones;
b) flat bones;
c) diaphysis of long bones;
d) between long bones.
21.A supporting tissue consists of three layers: outer general plates, a middle layer formed by concentrically arranged plates around vessels, and an inner layer of general plates. Name this tissue:
a) fibrous bone tissue;
b) compact lamellar bone tissue;
c) spongy lamellar bone tissue;
d) collagen-fibrous cartilage tissue.
22.Which process helps normalize Ca^{2+} content in bone tissue?
a) physical exercise;
b) weightlessness;
c) prolonged immobilization;
d) hypofunction of parathormone.
23.In which layer of compact lamellar bone tissue is the Haversian canal located?
a) endosteum;
b) periosteum;
c) osteonal layer;
d) inner layer of general plates.
24.In which layer of compact lamellar bone tissue are osteoblasts located?
a) outer general plate layer;
b) osteonal layer;
c) periosteum;
d) inner general plate layer.

25.Where are the cells located that ensure bone tissue regeneration after fractures?
a) in osteon canal; periosteum cambial layer; endosteum;
b) in osteon canal; fibrous periosteum layer; endosteum;
c) in periosteum cambial layer; endosteum;
d) in osteon canal, perivascularly; endosteum.
26.The following types of osteoblasts are distinguished:
a) young, mature, old;
b) young, mature, resting;
c) young, resorbing, resting;
d) preosteoblasts, young, resting.
27.From which cells are young osteoblasts directly formed?
a) hematogenous precursors;
b) perivascular cells;
c) preosteoblasts;
d) stromal mechanocytes.
28.The following types of osteocytes are distinguished:
a) young, old, degenerating;
b) synthesizing, resorbing, degenerative;
c) superficial, intermediate, perivascular;
d) intermediate, perivascular, deep.

MUSCLE TISSUE (Translation)

1. Which type of muscle tissue develops from mesenchyme?
a) smooth muscle tissue;
b) cardiac muscle tissue;
c) skeletal muscle tissue;
d) myoepithelium.
2. Muscle tissue develops from the splanchnotome of mesoderm. Identify it:
a) smooth muscle tissue;
b) cardiac muscle tissue;
c) skeletal muscle tissue;
d) myoepitheliocyte.
3. Which muscle tissue develops from somites of mesoderm?
a) smooth muscle tissue;
b) cardiac muscle tissue;
c) skeletal muscle tissue;
d) myoepitheliocyte.
4. Which muscle tissue develops from ectoderm (skin ectoderm)?
a) smooth muscle tissue;
b) cardiac muscle tissue;
c) skeletal muscle tissue;
d) myoepitheliocyte.
5. Which muscle tissue has a neural origin?
a) dilator and constrictor muscles of the eye;
b) myofibroblast;
c) myoepitheliocyte;
d) myocyte.

6. A spindle-shaped cell (20–500 μm long, 5–8 μm thick), with a rod-shaped central nucleus that twists like a corkscrew during contraction. Identify the cell:
a) cardiomyocyte;
b) syncytial muscle fiber (myosymplast);
c) myocyte;
d) myoepitheliocyte.
7. Which muscle cell has myofilaments arranged longitudinally or at an angle, forming a 3D network?
a) cardiomyocyte;
b) myocyte;
c) myosymplast;
d) myofibroblast.
8. Structural and functional units of muscle tissue contain a specialized organelle:
a) neurofibrils;
b) myofibrils;
c) flagella;
d) centrioles.
9. Smooth muscle tissue has connections ensuring functional interaction of myocytes:
a) desmosome;
b) tight junction;
c) simple contact;
d) nexus (gap junction).
10. Cells located in glands, star-shaped, with contractile apparatus in processes:
a) myocyte;
b) myoepitheliocyte;
c) cardiomyocyte;
d) myosymplast.
11. Smooth muscle tissue is found in the following organ:
a) heart;
b) brain;
c) stomach;
d) adrenal gland.
12. A muscle cell with cylindrical shape, central nucleus, well-developed smooth ER, and intercalated discs:
a) myocyte;
b) myoepitheliocyte;
c) myosymplast;
d) cardiomyocyte.
13. Types of cardiomyocytes in cardiac muscle tissue:
a) typical, working, atypical;
b) typical, atypical, secretory;
c) typical, atypical, secretory, working;
d) typical, working, atypical, secretory.
14. Tissue containing T-system and L-system:
a) cardiac muscle tissue;
b) smooth muscle tissue;

c) bone tissue;
d) cartilage tissue.

15. Tissue where actin and myosin are organized by telophragms and mesophragms:

a) smooth muscle tissue;
b) cardiac muscle tissue;
c) bone tissue;
d) dense connective tissue.

16. Tissue where sarcomeres are found (between two telophragms):

a) smooth muscle tissue;
b) dense connective tissue (tendon);
c) skeletal muscle tissue;
d) bone tissue.

17. Structure of a sarcomere:

a) half I band + A band + half I band;
b) Z-line + half I band + A band + half I band + Z-line;
c) A band + Z-line + half I band;
d) I band + Z-line + half A band.

18. Tissue showing isotropic and anisotropic bands under polarized light:

a) smooth muscle tissue;
b) bone tissue;
c) cartilage tissue;
d) cardiac muscle tissue.

19. In which muscle tissues do T-tubules occur and include the basal membrane?

a) cardiac muscle tissue;
b) skeletal muscle tissue;
c) smooth muscle tissue;
d) myoepithelial tissue.

20. Electrolytes involved in muscle contraction:

a) sodium ions;
b) calcium ions;
c) chloride ions;
d) magnesium ions.

21. Tissue where the main element is a fiber formed by a syncytium and satellite cells:

a) smooth muscle tissue;
b) bone tissue;
c) cardiac muscle tissue;
d) skeletal muscle tissue.

22. Sarcolemma is:

a) plasmalemma of the syncytium;
b) plasmalemma of myosatellite cell + basal membrane;
c) basal membrane and inner endomysium;
d) plasmalemma of syncytium + basal membrane of muscle fiber.

23. In which muscle tissue do T-tubules form without the basal membrane entering them?

a) skeletal muscle tissue;
b) cardiac muscle tissue;
c) smooth muscle tissue;
d) myoepithelial tissue.

24. In which muscle tissue do satellite cells responsible for regeneration occur?

a) cardiac muscle tissue;
b) skeletal muscle tissue;
c) smooth muscle tissue;
d) myoepithelial tissue.

25. Location of myosatellite cells:

a) inner endomysium;
b) outer endomysium;
c) under the plasmalemma of syncytium;
d) between plasmalemma and basal membrane.

26. Tissue with connective tissue layers called endomysium, perimysium, epimysium:

a) nervous tissue;
b) connective tissue proper;
c) muscle tissue;
d) bone tissue.

27. Tissue containing fibers with nuclear bag (nuclear sack):

a) nervous tissue;
b) cartilage tissue;
c) bone tissue;
d) muscle tissue.

28. Tissue containing fibers with nuclear chain:

a) muscle tissue;
b) nervous tissue;
c) bone tissue;
d) cartilage tissue.

29. Which muscle tissue is incapable of physiological regeneration?

a) smooth muscle tissue;
b) myoepithelial tissue;
c) cardiac muscle tissue;
d) skeletal muscle tissue.

30. Physiological regeneration of skeletal muscle occurs via:

a) only intracellular regeneration;
b) only cellular regeneration;
c) both intracellular and cellular regeneration;
d) does not occur.

31. Reparative regeneration of skeletal muscle occurs via:

a) only intracellular regeneration;
b) only cellular regeneration;
c) both intracellular and cellular regeneration;
d) does not occur.

32. In which muscle tissue does physiological regeneration occur as compensatory hypertrophy?
a) smooth muscle tissue;
b) cardiac muscle tissue;
c) skeletal muscle tissue;
d) myoepithelial tissue.
33. Which muscle tissue contracts slowly, tonically, and is practically fatigue-resistant?
a) cardiac muscle tissue;
b) skeletal muscle tissue;
c) smooth muscle tissue;
d) myoneural tissue.

NERVOUS TISSUE

1.Neurocytes develop from:
a) neural tube;
b) notochordal island;
c) mesoderm;
d) endoderm;
2.Neurons of autonomic ganglia develop from:
a) mesoderm
b) neural tube
c) ganglionic plate
d) endoderm
3.The specific sign of the onset of nerve cell differentiation is considered to be:
a) appearance of bundles of neurofilaments and neurotubules in the cytoplasm;
b) development of lysosomes;
c) hypertrophy of the Golgi apparatus;
d) development of granular endoplasmic reticulum.
4.The marginal veil in the developing neural tube consists of:
a) neuronal processes;
b) neurocytes;
c) glial cells;
d) microglia.
5.In an experiment, the ganglionic plate was removed from an embryo. In which organ will defects occur?
a) spinal cord;
b) adrenal gland;
c) kidney;
d) lung.
6.In an embryo, development of the anterior brain vesicle is blocked. Which CNS organ will not develop?
a) cerebellum; b) cerebral cortex;
c) medulla oblongata; d) spinal cord.
7.In a preparation there are 3 types of neurons: multipolar, bipolar, pseudounipolar. How many axons does each neuron have?
a) 1;
b) 2;

c) 3;
d) 4.
8.What is the axon of a neurocyte?
a) a process that transmits the nerve impulse from the cell body to the periphery;
b) a process that transmits the impulse from the periphery to the cell body;
c) a process involved in anterograde axonal transport;
d) a process where neurotransmitters are synthesized.
9.What is a dendrite of a neurocyte?
a) a process transmitting impulses from the cell body to the periphery;
b) a process transmitting impulses from the periphery to the cell body;
c) a process involved in retrograde axonal transport;
d) a process where neurotransmitters are synthesized.
10.What is axonal transport?
a) continuous movement of cytoplasmic components along the axon;
b) discontinuous movement along the dendrite;
c) continuous movement along neuron processes;
d) a nerve impulse passing along processes.
11.A neuron has a pear-shaped body, 2–3 dendrites and an axon. Name the cell:
a) Betz cell;
b) Purkinje cell;
c) Kupffer cell;
d) ependymocyte.
12.A neuron has a pyramidal-shaped body up to 150 μm in size, with dendrites and an axon. Name the cell:
a) Purkinje cell;
b) Betz cell;
c) granule cell;
d) Golgi cell.
13.Name the cell found in intramural nerve plexuses:
a) Betz cell;
b) Purkinje cell;
c) Dogiel cell;
d) Golgi cell.
14.In a neuron, Nissl substance (tigroid) corresponds to:
a) lysosome;
b) rough endoplasmic reticulum;
c) Golgi apparatus;
d) neurofibrils.
15.In nerve impulse conduction in neurons, the following participates:
a) neurofibrils;
b) lysosomes;
c) ergastoplasm;
d) synaptic vesicles.
16.Neurofibrils in a neuron function in:
a) support;
b) protection;
c) impulse conduction;

d) trophic function.
17.Which specialized organelles characterize neurons?
a) microvilli;
b) synaptic vesicles;
c) cilia;
d) tonofibrils.
18.Which types of macroglia are distinguished?
a) astrocytic, choroid, tanycytes, oligodendroglia;
b) astrocytic, ependymal, fibrous, protoplasmic;
c) astrocytic, ependymoglia, oligodendroglia;
d) choroid, ependymoglia, oligodendroglia.
19.Neuroglia forming the lining of brain ventricles is called:
a) ependymocyte;
b) oligodendrocyte;
c) astrocyte;
d) microglia.
20.All features are typical for myelinated nerve fibers except:
a) one axon cylinder;
b) nodes of Ranvier;
c) tonofibrils;
d) multiple axon cylinders.
21.Myelin nerve fiber sheath structures are formed by:
a) ependymocytes;
b) astrocytes;
c) oligodendrocytes;
d) microglia.
22.The main role in regeneration of nerve fibers belongs to:
a) ependymocytes;
b) astrocytes;
c) neurolemmocytes;
d) microglia.
23.After nerve transection, a dense connective tissue scar formed. How will regeneration proceed?
a) no regeneration;
b) slowed regeneration;
c) accelerated regeneration;
d) normal recovery.
24.Structure of a myelinated nerve fiber:
a) one axon cylinder, myelin sheath, neurilemma, basement membrane;
b) several axon cylinders, myelin sheath, basement membrane;
c) one axon cylinder, glial boundary membrane, basement membrane;
d) several axon cylinders, glial boundary membrane, myelin sheath, basement membrane.
25.Structure of an unmyelinated nerve fiber:
a) one axon cylinder, myelin sheath, neurilemma, basement membrane;
b) several axon cylinders, myelin sheath, basement membrane;
c) one axon cylinder, glial boundary membrane, myelin sheath, basement membrane;

d) several axon cylinders suspended on mesaxons, lemmocyte cytoplasm, basement membrane.
26.Named eponymously, the unmyelinated gaps in nerve fibers are:
a) Rouget nodes;
b) Ranvier nodes;
c) Robertson nodes;
d) Dogiel nodes.
27.Which nerve fiber conducts impulses at 5–120 m/s?
a) collagen;
b) elastic;
c) unmyelinated;
d) myelinated.
28.A nerve ending is:
a) terminal branching of the axon;
b) terminal branching of dendrites;
c) terminal branching of neuron processes;
d) part of the axon hillock.
29.A receptor represented by branched axon endings surrounded by lemmocytes and a connective tissue capsule is:
a) free nerve ending;
b) free bush-like nerve ending;
c) unencapsulated ending;
d) encapsulated ending.
30.Muscle spindles belong functionally to:
a) neurosecretory;
b) motor;
c) associative;
d) sensory.
31.Sensory nerve endings are formed by:
a) axon terminal of sensory neuron;
b) dendrite terminal of sensory neuron;
c) dendrite terminal of efferent neuron;
d) axon collateral of neuron.