

## ***CYTOLOGY***

1. In a cell the synthesis of a histone proteins was artificially blocked. What cell structure will be damaged?

- A. Nucleolus.
- B. Nuclear chromatin. \*
- C. Golgi apparatus.
- D. Cell membrane.
- E. Nuclear envelope.

2. A chemical agent influenced cell plasmolemma. Consequently, the cell changed its form. Which layer of plasmolemma takes part in this process?

- A. Glycocalyx.
- B. Cortical. \*
- C. Bilipid.
- D. Hydrophilic.
- E. Hydrophobic.

3. An electron micrograph shows a cell-to-cell adhesion consisting, in each cell, of an attachment plaque. The intercellular space is filled with electron-dense substance including transmembrane fibrillar structures. Specify this adhesion:

- A. Tight junction.
- B. Desmosome. \*
- C. Adherens junction.
- D. Nexus.
- E. Synapse.

4. In a histological specimen is observed a human somatic cell in the metaphase of mitotic cell division. How many chromosomes form the metaphase plate, taking into account that every chromosome contains two sisterly chromatids?

- A. 48.
- B. 92.

C. 23.

D. 46. \*

E. 24.

5. A patient with poisoning has been hospitalizes. It is detected the hepatic detoxification mechanisms are disordered. Which hepatocytes organelle has primarily caused the process?

- A. Mitochondria.
- B. Smooth endoplasmic reticulum. \*
- C. Rough endoplasmic reticulum.
- D. Golgi apparatus.
- E. Ribosomes.

6. Cells of healthy liver actively synthesize glycogen and proteins. What organelles are the most developed in them?

- A. Granular and agranular endoplasmic reticulum. \*
- B. Mitochondria.
- C. Cell center.
- D. Lysosomes.
- E. Peroxisomes.

7. Cytochemical investigation has shown high concentration of hydrolytic ferments in the cytoplasm of cells. The activity of which organelles does this fact indicate?

- A. Endoplasmic reticulum.
- B. Mitochondria.
- C. Polysomes.
- D. Lysosome. \*
- E. Centrosome.

8. There is a large quantity of carbohydrates in the dietary intake of a human. What structure will be seen in the cytoplasm of hepatocytes?

- A. Fat drops.

- B. Glycogen granules. \*
- C. One large fat drop.
- D. Increase of free ribosomes quantity.
- E. Lipofuscin inclusions.

9. In the course of a scientific experiment a researcher destroyed a structure of one of cell parts, which broke cell division capacity. Which structure has been affected?

- A. Microfibriles.
- B. Glycocalyx.
- C. Golgi apparatus.
- D. Centrosome. \*
- E. Mitochondria.

10. Tumor cells culture was acted on with colchicine that blocks the synthesis of tubulin-proteins, which forms spindle apparatus. What stage of cellular cycle will be affected?

- A. G<sub>0</sub> period.
- B. G<sub>1</sub> phase.
- C. S phase.
- D. G<sub>2</sub> phase.
- E. Mitosis. \*

11. Prolonged influence of toxic substances on the organism led to considerable protein synthesis decrease in hepatocytes. Which organelles have suffered of intoxication most of all?

- A. Rough endoplasmic reticulum. \*
- B. Mitochondria.
- C. Microtubules.
- D. Lysosomes.
- E. Smooth endoplasmic reticulum.

12. A ribosomal structure has been affected in a cell. What processes will suffer first of all?

- A. Synthesis of protein. \*
- B. Synthesis of nucleic acids.
- C. Synthesis of carbohydrates.
- D. Synthesis of lipids.
- E. Synthesis of mineral substances.

13. While studying maximally spiralized chromosomes of human karyotype the process of cell division was stopped in the following phase:

- A. Interphase.
- B. Prophase. \*
- C. Metaphase.
- D. Telophase.
- E. Anaphase.

14. At a certain stage of cell cycle chromosomes reach cellular poles, undergo despiralization; nuclear membranes are being formed around them; nucleolus is restored. What stage of mitosis is it?

- A. Anaphase.
- B. Metaphase.
- C. Telophase. \*
- D. Prophase.
- E. Prometaphase.

15. A specimen of an onion rootlet includes a cell in which the fully condensed chromosomes are located in the equatorial plane making the monaster. What phase of the mitotic cycle is the cell in?

- A. Interphase.
- B. Late telophase.
- C. Prophase.
- D. Early telophase.
- E. Metaphase. \*

16. Labeled amino acids alanine and

tryptophane were injected to a mouse in order to study localization of protein synthesis in its cells. The labeled amino acids will be accumulated near the following organelles:

- A. Golgi apparatus.
- B. Ribosomes. \*
- C. Lysosomes.
- D. Cell centre.
- E. Smooth endoplasmic reticulum.

17. Golgi complex exports substances from a cell due the fusion of the membrane saccule with the cell membrane. The saccule contents flows out. What process is it?

- A. All answers are false.
- B. Facilitated diffusion.
- C. Exocytosis. \*
- D. Active transport.
- E. Endocytosis.

18. Life cycle of a cell includes a process of DNA autoreduplication. As a result of this process monochromatid chromosomes become bichromatid. This phenomenon is observed within the following period of the cell cycle:

- A. G<sub>2</sub>
- B. G<sub>1</sub>
- C. S \*
- D. G<sub>0</sub>
- E. M

19. Normal, actively dividing cells of human red bone marrow are analyzed. What number of cells' chromosomes is typical for G<sub>1</sub> period?

- A. 23
- B. 47
- C. 48

- D. 45
- E. 46 \*

20. In the life cycle of a cell during mitosis a natural change in the amount of genetic material occurs. The DNA doubles at the following stage:

- A. Interphase. \*
- B. Prophase.
- C. Metaphase.
- D. Anaphase.
- E. Telophase.

### ***EMBRYOLOGY***

1. Students study the stages of gametogenesis. They analyze a cell having a haploid number of chromosomes. And each chromosome consists of two chromatids. The chromosomes are located in the equatorial plane of the cell. Such situation is typical for the following stage of meiosis:

- A. Prophase of the first division.
- B. Metaphase of the second division. \*
- C. Anaphase of the second division.
- D. Metaphase of the first division.
- E. Anaphase of the first division.

2. While examining the amniotic fluid collected with the help of amniocentesis (puncture of amniotic membrane) cells with sex chromatin containing nuclei (Barr's bodies) were detected. What does this fact indicate?

- A. Development of a female fetus. \*
- B. Development of a male fetus.
- C. Genetic disorders in embryonic development.
- D. Trisomy.
- E. Polyploidy.

3. Blue asphyxia of a newborn child has been diagnosed. What vessel carrying oxygenated maternal blood to the fetus has been pinched during delivery?

- A. Chorionic artery.
- B. Umbilical artery.
- C. Chorionic vein.
- D. Umbilical vein. \*
- E. Uterine artery.

4. The process of germ implantation consists of 2 stages adhesion and invasion. Morphologic manifestation of blastocyst process is:

- A. Destruction of endometrium epithelium.
- B. Attachment of blastocyst to endometrium. \*
- C. Destruction of endometrium connecting tissue.
- D. Destruction of endometrium vessels.
- E. Formation of lacunas.

5. An anlage of an organ performing endocrine function is formed of a trophoblast during embryogenesis. What organ is this?

- A. Villous chorion (fetal part of placenta). \*
- B. Amnion.
- C. Yolk sac.
- D. Allantois.
- E. Umbilical cord.

6. A human embryo is comprised of two blastomeres. Name its location under the condition of normal genesis.

- A. Ovary.
- B. Cavity of uterus.
- C. Abdominal cavity.
- D. Endometrium.

E. Uterine tube. \*

7. Some microorganisms being the reason of infectious diseases can pass through the placental barrier. What structures does it consist of?

- A. All components of tertiary villi. \*
- B. Chorion and amnion.
- C. All components of secondary villi.
- D. Allantois, yolk sac.
- E. Basal lamina of endometrium with decidual cells.

8. In a specimen an oocyte at the moment of its fertilization by spermatozoon can be seen. What is the main result of fertilization?

- A. Formation of zygote. \*
- B. Determining the child's sex.
- C. Meiosis completion with oocyte.
- D. Penetration of oolemma by spermatozoon.
- E. Cortical reaction.

9. Two sacs with each other (amniotic and yolk) can be seen in a 10-day embryo specimen. What is the structure in the place of their contact called?

- A. Amniotic crus.
- B. Bottom of amniotic sac.
- C. Roof of yolk sac.
- D. Embryonic plate (disc). \*
- E. Extraembryonic mesoderm.

10. A specimen of a 10-day-old human embryo shows two interconnected sacs (amniotic and yolk sacs). Name the structure located in the place where these two sacs connect:

- A. Roof of the amniotic sac.
- B. Extraembryonic mesoderm.

- C. Embryonic shield (disc). \*
- D. Amniotic stalk.
- E. Floor of the amniotic sac.

11. Histological specimen of a 10-day human embryo represents 2 contacting sacs (amniotic and yolk sacs). Specify the structure that separates the amniotic cavity from the yolk sac:

- A. Embryonic shield (disc). \*
- B. Extraembryonic mesoderm.
- C. Floor of the amniotic sac.
- D. Amniotic stalk.
- E. Roof of the yolk sac.

12. In a histological specimen is observed an extraembryonic organ that represents a bladder connected with intestinal tube. Its wall is covered with epithelium on the inside, on the outside it is formed of embryonic connective tissue. At early stages of embryogenesis it functions as a hematopoietic organ. What organ is this?

- A. Amnion.
- B. Allantois.
- C. Yolk sac. \*
- D. Umbilical cord.
- E. Uterine artery.

13. At early stages of human embryogenesis there arises a digitiform outgrowth of the ventral wall of the primitive gut rooting itself in the amniotic crus. What is the name of this extraembryonic organ?

- A. Yolk sac.
- B. Allantois. \*
- C. Amnion.
- D. Placenta.
- E. Umbilical cord.

14. In the histological specimen of a human fetus there can be seen one of extraembryonic organs – a bladder linked with intestinal tube. In its wall there are primary germ cells and primary erythrocytes (megaloblasts). Define what this organ is.

- A. Yolk sac. \*
- B. Allantois.
- C. Placenta.
- D. Umbilical cord.
- E. Amnion.

15. In a histological specimen there is a hen embryo in the stage of mesoderm differentiation to somites, nephrotomes, and splanchnotome. Of which material will the axial skeleton develop?

- A. Myotome.
- B. Dermatome.
- C. Nephrotome.
- D. Splanchnotome.
- E. Sclerotome. \*

16. Zygote cell division after blastula formation. What type of blastula is specific of a human being?

- A. Discoblastula.
- B. Celoblastula.
- C. Blastocyst. \*
- D. Amphiblastula.
- E. Morula.

17. During the third week of embryogenesis the central part of epiblast cells (ectoderm) sags and neurulation process begins. In which direction will the remaining ectodermal cells differentiate?

- A. Gut.
- B. Skin. \*
- C. Somites.

- D. Chord.
- E. Yolk sac.

18. In a microscopic specimen of a human embryo, taken after involuntary miscarriage, an embryonic plate (disc) has been detected with two cellular layers: endo- and ectoderm. At what stage of embryonic development is this embryo?

- A. Gastrulation. \*
- B. Progenesis.
- C. Neurulation.
- D. Histogenesis.
- E. Organogenesis.

19. During the process of a human embryo formation one can observe the rise of a cavity, light little blastomeres at the periphery, and dark big blastomeres at one of the poles. How is the embryo called at this stage of development?

- A. Blastocyst. \*
- B. Morula.
- C. Zygote.
- D. Gastrula.
- E. Embryonic disk.

20. Gonoblasts, sex stem cells, are detected in a 2-3 week-old embryo. Where do these cells differentiate?

- A. In embryonic endoderm.
- B. In mesenchyme.
- C. In embryonic ectoderm.
- D. In dermatome.
- E. In yolk sac. \*

21. Embryonic implantation into endometrium (uterine mucosa) consists of two phases – adhesion and invasion. The first phase is accompanied by:

- A. Activation of uterine glands secretion.

B. Destruction of endometrium connective tissue.

C. Destruction of endometrium epithelial cells.

D. Blastocyst attachment to endometrium surface. \*

E. Suppression of uterine glands secretion.

22. A histological specimen shows a transverse of an organ, whose basis is formed of mucous connective tissue, two arteries, and a vein. What organ is it?

- A. Yolk sac.
- B. Allantois.
- C. Umbilical cord. \*
- D. Amnion.
- E. Placenta.

23. “To be born with a silver spoon in one’s mouth” corresponds to Russian “to be born in a shirt”. What “shirt” is meant?

- A. Serous.
- B. Yolk.
- C. Amniotic. \*
- D. Chorionic.
- E. Tromboblatic.

24. An embryo displays disturbed process of dorsal mesoderm segmentation and somite formation. What part of skin will have developmental abnormalities?

- A. Derma. \*
- B. Epidermis.
- C. Hair.
- D. Sebaceous glands.
- E. Sudoriferous (sweat) glands.

25. In the course of the experiment on a frog embryo the external embryonic layer – ectoderm has been destroyed. Which of

the following morphological structures has not developed henceforth?

- A. Epidermis. \*
- B. Somites.
- C. Nephrotome.
- D. Splanchnotome.
- E. Myotome.

26. A microslide of the skin sample taken from the finger of a child shows that epidermis is insufficiently developed. What germ layer was damaged in the process of embryo development?

- A. Ectoderm. \*
- B. Ectomesenchyme.
- C. Endoderm.
- D. Mesoderm.
- E. Mesenchyme.

27. Study of the biopsy material of an embryo revealed a zone of developmental abnormality in a somite. The zone was located close to the endoderm and the notochord. What formations may have abnormal development in case of pregnancy continuation?

- A. Skeletal striated muscle tissue.
- B. Genitor-urinary system.
- C. Skeletal tissues. \*
- D. Fibrous connective tissue of skin.
- E. Cardiac striated muscle tissue.

28. A fetus' umbilical cord is compressed, but blood circulation between the mother and child is preserved. What structures provided this primarily?

- A. Mucous connective tissue. \*
- B. Residue of allantois.
- C. Arteries sheath.
- D. Veins sheath.
- E. Residue of yolk pedicle.

29. In an embryo the process of dorsal mesoderm segmentation and somite formation is disturbed. What part of skin will probably have developmental abnormalities?

- A. Perspiratory (sweat) glands.
- B. Epidermis.
- C. Dermis. \*
- D. Sebaceous glands.
- E. Hair.

30. A histological specimen shows significant amount of mucous connective tissue (Warton's jelly), vessels, as well as residual yolk and allantois. Name this organ:

- A. Umbilical cord. \*
- B. Esophagus.
- C. Ureter.
- D. Urethra.
- E. Vermiform appendix.