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Histology and Embryology in Questions

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Table of Contents

Foreword 5

Summer Semester: Histology as a Subject, Cytology, Histological Technique, and General Histology 7

Chapter One: Microscope. Histological Technique 8

Chapter One Answers: 20

Chapter Two: Cell 21

Chapter Two Answers: 32

Chapter Three: Covering and Lining Epithelia 33

Chapter Three Answers: 44

Chapter Four: Glandular Epithelia 45

Chapter Four Answers: 55

Chapter Five: Connective Tissue Proper 56

Chapter Five Answers: 67

Chapter Six: Cartilage 68

Chapter Six Answers: 76

Chapter Seven: Bone Tissue 77

Chapter Seven Answers: 86

Chapter Eight: Blood 87

Chapter Eight Answers: 97

Chapter Nine: Muscle Tissue 98

Chapter Nine Answers: 109

Chapter Ten: Nerve Tissue 110

Chapter Ten Answers: 120

Winter Semester: Special Histology (Microscopic Anatomy of the Organ Systems) 121

Chapter One: Cardiovascular System 122

Chapter One Answers: 135

Chapter Two: Lymphatic System 136

Chapter Two Answers: 148

Chapter Three: Endocrine System 149

Chapter Three Answers: 162

Chapter Four: Gastrointestinal System 1 (Digestive Tract) 163

Chapter Four Answers: 176

Chapter Five: Gastrointestinal System 2 (GIT-Associated Glands) 177

Chapter Five Answers: 190

Chapter Six: Tooth – dentistry only 191

Chapter Six Answers: 204

Chapter Seven: Respiratory System 205

Chapter Seven Answers: 219

Chapter Eight: Urinary System 220

Chapter Eight Answers: 233

Chapter Nine: Male Reproductive System 234

Chapter Nine Answers: 247

Chapter Ten: Female Reproductive System 248

Chapter Ten Answers: 262

Chapter Eleven: Skin 263

Chapter Eleven Answers: 276

Chapter Twelve: Central and Peripheral Nervous System 277

Chapter Twelve Answers: 290

Chapter Thirteen: Senses – Eye and Ear 291

Chapter Thirteen Answers: 303

Chapter Fourteen: General Embryology 304

Chapter Fourteen Answers: 315

References 315

Foreword

Dear students,

Congratulations! At this very moment, you have come across material that we believe will benefit you in your study of (not only) histology and embryology.

We have compiled in a comprehensive form all the general and special histology topics you may encounter during your studies in the first and second years. No topic has been left out, so you can be sure that the content provided will prepare you well for the examination in our subject and will also serve you well in higher years in preparation for subsequent subjects.

We have endeavored to help you effectively acquire the key knowledge in our subject, but our main aim remains that you not only learn but, more importantly, understand and can apply the knowledge you have acquired. Therefore, you must combine several pieces of knowledge to answer some of the more difficult questions. Of course, to really understand why an answer is right or wrong, you need to study the recommended literature to which you are hereby referred.

This set of questions is divided into 24 chapters, aligning with the topics covered in the lectures and practical exercises of the summer and winter semesters. Each topic contains approximately 40 to 50 questions, which are didactically divided into approximately two equal halves. We recommend starting with the first half first, as this will teach you to focus on the essentials, creating a sort of solid outline on which you can "stick" more and more knowledge. You will recognize these questions by the longer, more explicative answers and by the wording of the questions themselves, starting with "Decide whether...". You can then continue with the second half, where you will find questions often discussing particular problems and details. You will recognize these by the precise focus of the question and the (usually) shorter answer. The chapters on special histology also always include 10 questions directed at the development and congenital developmental defects of particular organ systems. For your better orientation, these questions are highlighted in brown. At the end of each chapter, on a separate page, you will find the key to the correct answers. In this way you will be able to test yourself; the correct answers are not marked directly next to the options. All black and brown questions are designed in such a way that one, all, or any combination between these extremes can be the correct answer.

There is a special section on clinical questions, where we have tried to show you that knowledge of histology and embryology has real relevance and will be important in your further studies and clinical practice. We have tried to indicate why you are studying the subject. These questions and their study are the culmination of your, and our, efforts. They have been crafted so that there is only one best answer to them. So, even if multiple answers seem plausible, you need to choose only the one that is more correct than all the others. They are marked in blue and are included in each chapter.

Each chapter include a concise introduction to provide a basic overview of the topic. Therefore, this publication can also be seen as a "2 in 1" book. A short theoretical introduction should be the beginning of your journey towards knowledge of the subject of histology and embryology, while successfully

completing the test questions at the end. We recommend using our book in two phases; initially to orient yourself in the subject, and later to check your own level of knowledge and gain confidence that you have the required level of knowledge in the subject of histology and embryology.

We are aware that most of you will spend time with the questions because they will be part of the final exam. However, we hope that at the end you will understand for yourselves that these questions were not designed to burden you with new responsibilities, but to make your study of our admittedly difficult but beautiful subject as easy as possible. Every house is easier to build if it has a solid and sound foundation. This is our contribution to forming the foundation of your histological and embryological knowledge!

The team of authors

Summer Semester: Histology as a Subject, Cytology, Histological Technique, and General Histology

Chapter One: Microscope. Histological Technique

1. Decide whether the following statements about the light microscopy are true T or false F:

a) we use an inverted microscope to observe common histological slides

b) the eyepiece is an optical component of a light microscope

c) we use a coarse focus for sharpening at the highest magnifications

d) the condenser is an illuminating and optical component of a light microscope

2. Decide whether the following statements about the light microscopy are true T or false F:

a) the resolving power of a light microscope is limited by the wavelength of photons of light in the visible spectrum

b) the inverted microscope is used to observe cell cultures

c) the immersion objective is used to observe blood smears

d) the resolving power of a light microscope is 0.2 nm

3. Decide whether the following statements about the light microscopy are true T or false F:

a) the stage of a microscope can be moved in two parallel planes

b) the fully open iris aperture increases the contrast of structures on a histological slide

c) the inverted microscope has a condenser above and objectives below the slide stage

d) the lenses of a light microscope are only in objectives

4. Decide whether the following statements about the light microscopy are true T or false F:

a) we start to microscope at the highest magnification

b) the final magnification of the image is calculated by multiplying the magnification of an eyepiece by the magnification of an objective lens

c) the arm and fine coarse represent mechanic parts of a microscope

d) in a brightfield microscopy, we use ultraviolet light

5. Decide whether the following statements about the electron microscopy are true T or false F:

a) a binocular light microscope contains one tube and one eyepiece

b) we start to microscope with the stage in the lowest position

c) the eye observes the primary image shown by the eyepiece

d) brightfield microscopy is the most used method for observing common histological slides

6. Decide whether the following statements about the electron microscopy are true T or false F:

a) the resolving power of an electron microscope is 0.05 0.2 nm

b) the electron microscope allows higher resolution than the light microscope because electrons have a significantly shorter wavelength compared to the wavelength of photons in the visible spectrum

c) the scanning electron microscope makes it possible to visualize the sample's surface, for example, the microvilli surface of absorptive cells

d) we can observe the inner structure of cilia axonemes with a scanning electron microscope

7. Decide whether the following statements about the electron microscopy are true T or false F:

a) the role of lenses in electron microscopy is fulfilled by a series of electromagnets

b) the resulting image of the sample examined in the electron microscope appears in grayscale

c) the maximum useful magnification of an electron microscope is one thousand times

d) the image from the electron microscope is called a photomicrograph

8. Decide whether the following statements about the electron microscopy are true T or false F:

a) the beam of accelerated electrons passes through ground glass lenses

b) when observing a sample in a scanning electron microscope under high vacuum conditions, it is desirable for the sample to be conductive, in other words coated with a layer of precious metal, such as gold

c) the resolving power of a scanning electron microscope is 1 10 nm

d) prior to observation in the electron microscope, the slides must be stained in a similar way to light microscopy

9. Decide whether the following statements about the electron microscopy are true T or false F:

a) a beam of electrons is emitted from the anode and is accelerated by a high voltage applied to the cathode

b) a transmission electron microscope is used to observe the ultrastructure of cells

c) the recorded image from an electron microscope is called an electron micrograph

d) the electron microscopy was invented by Max Knoll and Antonie van Leeuwenhoek

10. Decide whether the following statements about the electron microscopy are true T or false F:

a) ultrathin sections are used in electron microscopy

b) an objective and eyepiece are considered to be electromagnetic lenses

c) the principle of transmission electron microscopy is the reflection of electrons from the surface of a sample

d) the chromatin structure can be observed with a scanning electron microscope

11. Decide whether the following statements about the special microscopic techniques are true T or false F:

a) dark-field observation is one of the most routine and common techniques for tissue microscopy

b) light rays that do not interact with the specimen are excluded from image formation in dark-field observation

c) polarization microscopy exploits the ability of some tissues and structures to change the plane of polarization of light

d) polarizing microscopy enables studying for example the orientation of hydroxyapatite crystals in the bone matrix

12. Decide whether the following statements about the special microscopic techniques are true T or false F:

a) slides stained with hematoxylin and eosin are observed with a polarizing microscope

b) phase contrast microscopy allows visualization of living cells in cell culture

c) to observe the sample in phase contrast, the sample must first be stained

d) in phase contrast, we observe fixed slides that have been impregnated with heavy metal salts

13. Decide whether the following statements about the special microscopic techniques are true T or false F:

a) fluorescence microscopy uses the ability of the sample to rotate the plane of polarized light

b) fluorochromes (fluorophores) are characterized by excitation by light of shorter wavelengths and subsequent emission of light of longer wavelengths

c) hemoglobin, for example, has an intrinsic fluorescence ability

d) a fluorescence microscope is a type of electron microscope

14. Decide whether the following statements about the special microscopic techniques are true T or false F:

a) confocal microscopy allows the reconstruction of a three-dimensional image

b) a confocal microscope is a type of light microscope

c) the principle of confocal microscopy is to use confocal apertures to outline a specific plane interval of the sample

d) confocal microscopy is most used in combination with fluorescence microscopy

15. Decide whether the following statements about the special microscopic techniques are true T or false F:

a) observation in the dark field exploits the natural fluorescence of some molecules

b) light polarization is the phenomenon of excitation of structures with shorter wavelengths of light followed by emission of long-wavelength light

c) phase contraction is useful, for example, for the observation of vital spermatozoa

d) in a dark field, we can observe structures that are below the resolution of a light microscope

16. Decide whether the following statements about histologic techniques are true T or false F:

a) removing tissue from a dead person is called a biopsy

b) tissue fixation is used to facilitate slicing of the specimen on the microtome

c) the most used chemical fixative is 10% formol (formalin)

d) basophilic structures are chemically acidic in nature, such as DNA in the cell nucleus

17. Decide whether the following statements about histologic techniques are true T or false F:

a) eosinophilia indicates that the structure has an affinity for alkaline dyes

b) the frozen section method is faster than the traditional paraffin section method

c) while the paraffin section method is more time-consuming yet produces better image quality and the resulting slide is permanent in comparison to the frozen sectioning method

d) preparation of slides using the paraffin technique is routinely used in fast perioperative biopsy diagnostics

18. Decide whether the following statements about histologic techniques are true T or false F:

a) the paraffin section technique uses a physical method of fixation

b) cryomicrotome is used to cut paraffin blocks

c) staining of the paraffin section of the sample is possible immediately after cutting

d) a series of alcohols in increasing concentration is used to dehydrate the sample

19. Decide whether the following statements about histologic techniques are true T or false F:

a) argyrophilia and argentaphilia are related phenomena that refer to the ability of a structure to stain with silver salts

b) impregnation involves revealing certain structures by reducing metal salts on their surface

c) a common method of impregnation is the use of hematoxylin and eosin

d) hematoxylin stains collagen fibers purple

20. Decide whether the following statements about histologic techniques are true T or false F:

a) eosin stains the cell nucleus pink

b) paraffin sections are cut with a microtome to a standard thickness of 2–7 micrometers

c) paraffin is used to embed the specimen, which can be sliced once it has become solid

d) xylene is used to brighten the samples

21. Decide whether the following statements about the histochemistry are true T or false F:

a) histochemistry involves staining of immunocomplexes

b) histochemistry is the staining of chemical substances, such as enzymes, in cells

c) glycogen in the liver can be histochemically proved using the PAS method

d) we can use histochemistry to demonstrate the presence of alkaline phosphatase, for example in the brush border in epithelial cells of the proximal tubule of kidney nephron

22. Decide whether the following statements about the histochemistry are true T or false F:

a) the PAS method is a combination of Schiff's reagent and periodic acid

b) we histochemically visualize for example DNA in the nucleus using hematoxylin

c) we classify the detection of alkaline phosphatase as an enzyme histochemical method

d) the PAS reaction is used to demonstrate substances of a fatty nature

23. Decide whether the following statements about the immunohistochemistry are true T or false F:

a) immunohistochemistry is used to demonstrate specific epitopes of antigens

b) the most used chromogen in immunohistochemistry is diaminobenzidine (DAB)

c) monoclonal antibodies are directed against multiple epitopes of antigens

d) immunization of laboratory animals produces exclusively monoclonal antibodies

24. Decide whether the following statements about the immunohistochemistry are true T or false F:

a) immunohistochemistry is of fundamental importance not only in research, but also in the clinical diagnosis of, for example, tumors

b) conventional paraffin blocks can be used for immunohistochemistry

c) secondary antibodies are used in direct immunohistochemistry

d) polyclonal antibodies are produced by a specific clone of plasma cells

25. Decide whether the following statements about the immunohistochemistry are true T or false F:

a) cytokeratin tonofilaments as markers of cells of epithelial origin can be visualized by immunohistochemistry

b) estrogen receptor displays nuclear positivity with immunohistochemical staining

c) there are three main types of positivity in immunohistochemistry – nuclear, cytoplasmic, and membrane

d) immunohistochemistry is used to differentiate cell populations that cannot be distinguished by conventional staining, such as T and B lymphocytes

26. What is the correct chronological order of steps in the routine processing of histologic specimens?

a) sectioning, 2. embedding, 3. clearing, 4. mounting

b) fixation, 2. embedding, 3. rehydration, 4. mounting

c) dehydration, 2. clearing, 3. embedding, 4. sectioning

d) deparaffinization, 2. rehydration, 3. staining, 4. mounting

e) fixation, 2. dehydration, 3. clearing, 4. embedding

f) clearing, 2. fixation, 3. dehydration, 4. staining

27. Which dyes are acidophilic?

a) eosin

b) hematoxylin

c) aniline blue

d) methylene blue

e) picric acid

28. Which of the following approaches to visualizing specimens use a histochemical approach?

a) periodic acid-Schiff reagent (PAS)

b) silver impregnation

c) Sudan stain

d) acid phosphatase

e) Masson stain

f) Pappenheim stain

29. Could the following couples have theoretically met in the past?

a) Camillo Golgi – Andreas Vesalius

b) Santiago Ramón y Cajal – Camillo Golgi

c) Rudolf Wirchow – Jan Evangelista Purkyně

d) Antonie van Leeuwenhoek – Robert Hooke

e) Ernst Abbe – Carl Zeiss

f) Xavier Bichat – Albert Coons

30. What optical parts does the beam pass through in Köhler illumination?

a) condenser lens

b) magnetic coil

c) objective

d) ocular lens

31. What chemicals are used in transmission electron microscope specimen preparation during fixation and postfixation?

a) hematoxylin

b) glutaraldehyde

c) formaldehyde

d) ethanol

e) osmium tetroxide

32. What determines the resolution?

a) wavelength of particles used

b) numerical aperture of objective

c) refractive index of the medium between specimen and objective

d) intensity of beam of light or electrons

e) extent to which aperture is closed

33. Which of the following statements about the eosin are true?

a) it is a basic dye

b) it can stain the cytoplasm of the vast majority of cells pink

c) it was developed to stain collagen green

d) it serves as a chemical agent during fixation

34. The following can be said about hematoxylin:

a) it is a basic dye

b) can stain the cytoplasm of most cells pink

c) was developed to stain collagen green

d) can be used to visualize cell nuclei

35. Which of the following statements about the microscope are true?

a) objective lenses magnify and project the illuminated image of the object toward the eyepiece

b) the ocular lens further magnifies the image and projects it onto the viewer's retina

c) the maximum resolution of the light microscope is approximately 0.2 nm

d) the total magnification of an optical microscope is obtained by multiplying the magnification of the condenser and objective

e) numerical aperture for microscope lenses typically ranges from 0.10 to 1.25, corresponding to focal lengths of about 40 mm to 2 mm

36. Which of the following dye-biological structure pairs are correct?

a) Sudan – sugars

b) aniline blue – elastin

c) orcein – elastin

d) hematoxylin – mitochondria

e) silver – reticular fibers

f) osmium tetroxide – lipids

37. Which of the following statements about the term "resolution" are true?

a) is the degree to which an object appears enlarged in the image

b) is a degree of separation between two adjacent points in the specimen

c) depends mainly on the objective

d) the resolution of the naked eye is approximately 0.2 mm

e) the resolution of the electron microscope is approximately 0.2 μm

38. Replace the incorrect word with the correct one in the following sentence: The principle of fluorescent microscopy is that specimen is illuminated with light of a specific wavelength which is absorbed by the fluorophores, causing them to emit light of shorter wavelengths (i.e., of a different color).

a) fluorescent → darkfield

b) absorbed → reflected

c) shorter → longer

d) color → saturation

39. What microscopy technique uses visible light as a radiation source?

a) atomic force microscopy

b) transmission electron microscopy

c) confocal microscopy

d) phase-contrast microscopy

e) fluorescence microscopy

40. What is used for antigen retrieval in immunohistochemistry protocols?

a) trypsin

b) formaldehyde

c) X-rays

d) heat

41. Who coined the term "cell"?

a) Marcello Malpighi

b) Antoni van Leeuwenhoek

c) Karl Mayer

d) Robert Hooke

42. What are some of the routine clearing agents used in histology?

a) paraffin

b) xylene

c) methyl salicylate

d) hematoxylin

e) ethanol

43. What is the name of the histological device used to slice thin sections from blocks of tissue?

a) dermatome

b) myotome

c) histotome

d) microtome

e) sclerotome

44. What is an antigenic determinant of known structure – the part of an antigen recognized by a specific immunoglobulin – called?

a) chromophore

b) antibody

c) epitope

d) immunocomplex

45. Which of the following statements about the staining are true?

a) when stained with H&E, nuclei are generally stained pink

b) hematoxylin stains mitochondria well

c) cresyl Violet is one of the dyes used in Nissl staining

d) in H&E staining, the two visible compartments of the cell – nucleus and cytoplasm – are usually stained in contrast

Chapter One Answers:

1)	bd	13)	bc	25)	abcd	37)	bcd
2)	abc	14)	abcd	26)	bcde	38)	c
3)	c	15)	cd	27)	ace	39)	cde
4)	bc	16)	cd	28)	abcd	40)	ad
5)	bcd	17)	bc	29)	bcde	41)	d
6)	abc	18)	d	30)	acd	42)	bc
7)	ab	19)	ab	31)	be	43)	d
8)	bc	20)	bcd	32)	abc	44)	c
9)	bc	21)	bcd	33)	b	45)	cd
10)	a	22)	ac	34)	ad		
11)	bcd	23)	ab	35)	abe		
12)	b	24)	ab	36)	cef		

Chapter Two: Cell

1. Decide whether the following statements about the cell nucleus are true T or false F:

a) euchromatin is the term for dark condensed chromatin

b) the predominance of heterochromatin is typical of cells with low transcriptional activity

c) a dark heterochromatic nucleus is typical of a cell with a significant proteosynthetic activity

d) pyknosis indicates a state of maximal condensation of nuclear chromatin

2. Decide whether the following statements about the cell nucleus are true T or false F:

a) nuclear pores allow bidirectional communication between the cytoplasm and nucleoplasm

b) the nuclear envelope consists of two membranes, each about 8 nm thick

c) 2:1 is the typical nucleocytoplasmic ratio in immature progenitor cells

d) a nucleocytoplasmic ratio of 4:1 is typical of immature cells, but can also be observed in mature cells, for example lymphocytes

3. Decide whether the following statements about the cell nucleus are true T or false F:

a) the basic functional and regulatory structure of chromatin is the nucleosome

b) heterochromatin is strongly basophilic when stained with hematoxylin

c) euchromatin is a transcriptionally active chromatin that appears slightly basophilic when stained with hematoxylin

d) in an electron microscope image, heterochromatin is electron dense

4. Decide whether the following statements about the cell nucleus are true T or false F:

a) the arrangement of heterochromatin and euchromatin allows us to distinguish, for example, a B lymphocyte from a plasma cell

b) the nuclear pore complex consists of an outer and inner ring and a central channel

c) the perinuclear compartment is located between the cytoplasm and the outer nuclear membrane

d) nuclear pore can be identified at the light-microscopic level

5. Decide whether the following statements about the cell nucleus are true T or false F:

a) the pyknotic nucleus can be seen in sperm or in the surface epithelial cells of the skin

b) karyolysis is typically described in cell division

c) stem cells usually have a bright, optically empty nucleus

d) most cells have a very dark pyknotic nucleus

6. Decide whether the following statements about the ribosomes are true T or false F:

a) ribosomes are the site of post-translational modification of proteins

b) basophilia is a typical property of ribosomes due to the abundance of acidic molecules

c) mRNA is the only type of RNA found in ribosomes

d) basophilia is a typical feature of ribosomes due to the abundance of molecules that are basic in nature

7. Decide whether the following statements about the ribosomes are true T or false F:

a) rRNA, tRNA and mRNA are integral parts of ribosomes

b) ribosomes are membrane organelles

c) ribosomes are also found in mitochondria

d) rRNA of ribosomes is synthesized in the cell nucleolus

8. Decide whether the following statements about the endoplasmic reticulum are true T or false F:

a) the smooth endoplasmic reticulum has ribosomes attached to the membrane and is used for protein synthesis

b) accumulation of rough endoplasmic reticulum and polyribosomes in the cytoplasm of neurons is called a Nissl substance

c) the smooth endoplasmic reticulum is used, for example, in the synthesis of steroid hormones

d) the rough endoplasmic reticulum is stained pink with eosin

9. Decide whether the following statements about the endoplasmic reticulum are true T or false F:

a) cells with high proteosynthetic activity have a predominance of smooth endoplasmic reticulum

b) the endoplasmic reticulum is a double membrane organelle

c) post-translational modification of proteins takes place in the inside of the rough endoplasmic reticulum

d) the rough endoplasmic reticulum is a reservoir of calcium cations needed for muscle contraction

10. Decide whether the following statements about the nucleolus are true T or false F:

a) a dark basophilic nucleolus is observed, for example, in plasma cells or fibroblasts

b) the nucleolus is the site of mRNA synthesis

c) the nucleolus is surrounded by a double membrane

d) both subunits of the ribosome are synthesized in the nucleolus

11. Decide whether the following statements about the cells are true T or false F:

a) the shape of the nucleus usually copies the shape of the whole cell

b) mitochondria with cristae are the most common type of mitochondria

c) a phagolysosome is a type of primary lysosome

d) the Golgi apparatus is used for post-translational modification of proteins

12. Decide whether the following statements about the cells are true T or false F:

a) lysosomes are non-membrane organelles

b) mitochondria can be observed at the light microscopic level after staining with a specific method, otherwise it is difficult to identify them

c) the mitochondria's own DNA comes exclusively from the mother

d) cells that synthesize steroid hormones contain tubular mitochondria

13. Decide whether the following statements about the cells are true T or false F:

a) mitochondria are surrounded by a single membrane

b) the smooth endoplasmic reticulum is used, for example, for protein synthesis

c) most cells have one nucleus

d) the syncytium refers to cells with two nuclei, for example cardiomyocytes

14. Decide whether the following statements about the cells are true T or false F:

a) most cells in the human body have a single nucleus

b) syncytium is a common feature of muscle fibers and osteoclasts

c) microtubules are membrane organelles

d) mitochondria have their own ribosomes in addition to their own circular DNA molecule

15. Decide whether the following statements about the cells are true T or false F:

a) the high content of mitochondria in the cytoplasm of a cell gives it a strong affinity for acidic dyes, such as eosin

b) primary lysosomes contain phagocytosed material

c) residual body is a synonym for tertiary lysosome

d) microtubules are part of the cytoskeleton and form the inner skeleton of cilia

16. Decide whether the following statements about the cell inclusions are true T or false F:

a) lipofuscin is found in long living cells, such as cardiomyocytes or neurons

b) Reinke's crystalloids in Leydig cells of the testis are cellular inclusions

c) steatosis refers to the physiological storage of fat droplets in hepatocytes

d) pheomelanin is responsible for the black coloration of skin and hair

17. Decide whether the following statements about the cell inclusions are true T or false F:

a) glycogen granules are PAS positive structures

b) fat droplets are clearly visible when stained with hematoxylin and eosin

c) skin color is not determined by the number of melanocytes but by the total number of melanosomes

d) the accumulation of exogenous carbon particles in alveolar macrophages is the basis of anthracosis

18. Decide whether the following statements about the cell inclusions are true T or false F:

a) hemosiderin is an exogenous pigment

b) neuromelanin is a synonym for pigment of aging

c) colored particles injected into the subcutaneous tissue during tattooing are endogenous pigments

d) we use Sudan III stain to show fat droplets

19. Decide whether the following statements about the cell inclusions are true T or false F:

a) albinism is an inherited disorder characterized by a deficiency in the production of lipofuscin

b) glycogen granules in hepatocytes are easily visible when stained with hematoxylin and eosin

c) large amounts of neuromelanin are found, for example, in the substantia nigra

d) hemosiderin is a hematogenous endogenous pigment

20. Decide whether the following statements about the cell inclusions are true T or false F:

a) lipofuscin is also known as the aging pigment

b) lipofuscin accumulation is typical of epithelial cells in the small intestine

c) myoglobin is a hemoglobin-related pigment typical of muscle tissue

d) inclusions are cell organelles

21. Which of the following statements about the cell nucleus are true?

a) contains the genome

b) contains enzymes for RNA transcription

c) is the site of ribosomal RNA synthesis

d) chromatin is responsible for its characteristic eosinophilia

e) in gametes, contains a set of 46 chromosomes

f) is a double-membrane limited organelle

22. Where is it possible to find the nuclear lamina?

a) in perinuclear cisternal space

b) next to outer nuclear membrane

c) adjacent to the inner nuclear membrane

d) around the granular material of nucleolus

23. Which of the following statements about the nucleolus are true?

a) is a membrane-bound region within the nucleus

b) is a primary site of ribosome production and assembly

c) is involved in regulation of cell cycle

d) does not contain a genome

e) is well visible when stained with acidic dyes

24. What is typical of a dying cell?

a) karyolysis

b) shutdown of endonucleases

c) karyorrhexis

d) pyknosis

e) cell blebbing

25. What does a nucleosome consist of?

a) hexamer (six histone molecules)

b) octamer (eight histone molecules)

c) six loops of DNA

d) two loops of DNA

26. In the nuclei of which cells would you see a predominance of euchromatin?

a) cells producing antibodies

b) cells producing testosterone

c) cells producing collagen

d) phagocytic cells

e) cells carrying respiratory gases

27. In which cells would you see a well-developed smooth ER?

a) cells carrying respiratory gases

b) male germ cells

c) lipid storing cells

d) cells producing sebum

e) cells with detoxification function

f) cells producing testosterone

28. Which cells have retained their mitotic potential?

a) cells that transmit nerve impulses

b) cells carrying respiratory gases

c) malignant cells

d) stem cells

29. What do mitosis and meiosis have in common?

a) two daughter cells have the same DNA content as the parent cell

b) both occur in a cleavage of the zygote

c) preceding S-phase

d) crossing-over

e) both have metaphase

f) both have pachytene stage of prophase

30. What are some of the diseases that appear to be caused by losing cells?

a) Parkinson's disease

b) AIDS

c) cancer

d) proliferative glomerulonephritis

e) muscular dystrophies

31. Where in the body can apoptosis be observed?

a) follicular atresia

b) in the uterus after childbirth

c) during a tumor formation

d) on cells damaged beyond repair

32. What are non-membranous organelles?

a) mitochondria

b) ribosomes

c) rough endoplasmic reticulum

d) centriole

e) acrosome

f) cytoskeleton

33. What can be found in the plasma membrane?

a) cerebrosides

b) cholesterol

c) integral proteins

d) connexons

e) clathrin

f) sphingomyelin

34. In the following statement, correct the word to make this statement correct: The production of proteins by the cell begins within the nucleus with translation, in which the genetic code is encoded to mRNA.

a) proteins → lipids

b) nucleus → nucleolus

c) translation → transcription

d) mRNA → tRNA

35. Which of the given pairs are correct?

a) Golgi – cytochrome c

b) smooth ER – cardiolipin

c) mitochondria – SNARE proteins

d) plasma membrane – cholesterol

e) microtubules – dynein

f) nucleus – lamins

g) basal body – actin

36. What is it glycocalyx?

a) polysaccharide coating of cells

b) type of sphingolipid in plasma membrane

c) positively charged pericellular matrix

d) voltage-gated channel at the apical surface of cell

37. Which of the following statements about the endocytosis are true?

a) is the passive transfer of substances across the cytoplasmic membrane

b) is the opposite of pinocytosis

c) one of its type is phagocytosis

d) can be mediated by specific receptors

38. Which of the following statements about the cell cycle are true?

a) cell cycle interphase can be divided into G1, S and G2 phases

b) DNA duplication occurs during the G1 phase

c) during the G2 phase the cell is prepared for mitotic division

d) the length of the cell cycle is independent of external conditions

39. Which of these statements about different organelles are true?

a) secondary lysosomes do not comprise digested material

b) intermediate filament proteins include vimentin

c) mitochondria are basophilic organelles

d) microvillus is approximately 10 µm wide

e) the cell nucleus is round regardless of the cell shape

f) Golgi complex is functionally and structurally related to the endoplasmic reticulum

40. What could be a different function of the smooth ER in different cells?

a) production of steroid hormones

b) post-translational modification and sorting of proteins

c) intracellular transport

d) detoxification

e) lipid metabolism

f) phosphate anions storage

g) protein synthesis

Chapter Two Answers:

1) bd
2) abd
3) abcd
4) ab
5) ac
6) b
7) acd
8) bc
9) c
10) ad
11) abd
12) bcd
13) c
14) abd
15) acd
16) ab
17) acd
18) d
19) cd
20) ac
21) abcf
22) c
23) bc
24) acde
25) bd
26) ac
27) cdef
28) cd
29) ce
30) abe
31) abd
32) bdf
33) abcdf
34) c
35) def
36) a
37) cd
38) ac
39) bf
40) ade

Chapter Three: Covering and Lining Epithelia

1. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the endothelium is a simple columnar epithelium lining the vessels and cavities of the heart

b) the basal labyrinth is typical of cells with significant active transport, for example in the lining epithelial cells of the proximal tubules of the kidney

c) the apical part of epithelial cells contains adhesive intercellular junctions

d) in simple epithelia, all cells contact the basement membrane

2. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) lamina fibroreticularis is a product of epithelial cells

b) lamina basalis and membrana basalis are synonyms

c) zonula occludens is a cohesive intercellular junction

d) the nexus consists of two connexons synthesized by two adjacent epithelial cells to communicate with each other

3. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) nexuses are one of the communicating junctions through which neighboring epithelial cells exchange signaling molecules

b) both zonula adherens and a desmosome are band-type of adherent intercellular junctions

c) desmosomes are associated with intermediate filaments of epithelial cells known as cytokeratin tonofilaments

d) zonula adherens consists of E-cadherin, a transmembrane protein to which actin filaments attach

4. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) simple columnar epithelium is typical for the mucosa of small intestine

b) simple epithelia are generally mechanically more resistant to stress and abrasion than stratified epithelia

c) the proximal tubules of nephrons are lined by a simple squamous epithelium

d) lamina densa and lamina lucida are components of a basal lamina that are commonly observed with a light microscope

5. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the basement membrane lies at the border between the epithelial cells and the free surface

b) the major type of collagen in lamina basalis is the collagen type IV

c) the basement membrane consists of two sublayers, lamina basalis, which is synthesized by epithelial cells and lamina fibroreticularis produced by connective tissue cells

d) lamina fibroreticularis is part of the blood-air barrier in lung alveoli

6. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) it is typical for pseudostratified epithelia that only cells with nuclei in the uppermost rows reach the basement membrane

b) the trachea is lined by a pseudostratified columnar epithelium with cilia and goblet cells

c) zonula occludens is a lateral tight intercellular junction located closest to the apical pole of the epithelial cell

d) nexus is a communicating junction formed by two connexins

7. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the transitional epithelium (urothelium) is an example of a pseudostratified epithelium

b) the umbrella cells of the urothelium attach to the basement membrane

c) transitional epithelium means that a different number of epithelial layers can be observed depending on the functional state of an organ (for example filling of the bladder)

d) pseudostratified epithelia are characterized by all epithelial cells reaching the free surface

8. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) pseudostratified epithelia are formed by a single layer of cells with nuclei located at one level

b) the lateral domain of epithelial cells contains hemidesmosomes

c) pseudostratified columnar epithelium lines for example the esophagus

d) cytokeratin tonofilaments are anchored into desmosomal plaques formed by desmoglein and desmoplakin

9. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) E-cadherin is an integral part of the communicating intercellular junctions (nexuses)

b) claudin and occludin are transmembrane proteins of desmosomes

c) hemidesmosomes connect epithelial cells to the basement membrane via integrins

d) the trachea is lined by a pseudostratified squamous epithelium

10. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the basal labyrinth contains large numbers of mitochondria

b) the junctional complex of the lateral domain of epithelial cells is formed by intercellular junctions in the following order from the free surface towards the basement membrane – zonula occludens, zonula adherens, desmosome

c) the junctions are part of the apical domain of epithelial cells

d) cytokeratin tonofilaments of epithelial cells are part of the microtubules

11. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the epidermis is formed by a stratified squamous keratinized epithelium

b) only the basal layer of a stratified epithelium attaches to the basement membrane

c) stratified squamous keratinized epithelium is also known as epithelium of mucosa

d) stratified epithelia are mechanically more resistant than simple epithelia

12. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) a stratified squamous epithelium means that all its cells are flat

b) the most common type of a stratified epithelium is the stratified columnar

c) stratified columnar epithelium is the typical epithelium of transitional zones

d) ducts of a larger exocrine gland may be lined with a stratified cuboidal epithelium

13. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the esophagus is lined by a mechanically resistant, stratified squamous non-keratinized epithelium

b) the shape of stratified epithelia is determined by the shape of their surface epithelial layers

c) the epithelium of the epidermis is sometimes called the parakeratinized epithelium

d) in stratified epithelia, the mitotically most active cells are closest to the free surface

14. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) orthokeratinization is the so-called "true" keratinization that is observed within the epithelium forming the epidermis

b) the boundary of stratified epithelia with a connective tissue is usually undulated to facilitate the nourishment of epithelial cells

c) all cells of stratified epithelia attach to the basement membrane

d) stratified columnar epithelium of the epidermis undergoes keratinization

15. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the most common type of stratified epithelium in the human body is the stratified squamous epithelium

b) stratified squamous epithelium lines the bladder

c) keratinization is typical for the lining epithelium of the digestive tract

d) stratified non-keratinized epithelium is characterized by the presence of living cells with typical organelles, including nuclei, even in the most superficial layers

16. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) lining epithelia are usually avascular, except for stria vascularis of the inner ear

b) epithelial tissue is characterized by a well-developed extracellular matrix

c) epithelial cells have multiple domains with different structure and function; hence they are polarized

d) covering and lining epithelia are found throughout the organism at the interface with the external environment

17. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) stereocilia are motile projections

b) the inner skeleton of cilia consisting of 9 peripheral pairs and 1 central pair of microtubules is referred to as the axoneme

c) both microvilli and stereocilia have an internal skeleton composed of actin microfilaments

d) the common feature of microvilli, stereocilia, and cilia is that they all belong to the apical specializations of epithelial cells

18. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) the axoneme has the same internal structure as the basal body

b) large number of microvilli are found on the surface of epithelial cells with high absorptive activity, for example enterocytes

c) brush border is a term for a set of stereocilia on the surface of epithelial cells of the small intestine

d) Kartagener syndrome affects organs in which epithelial cells have stereocilia on their surface

19. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) stereocilia are found, for example, on the surface of epithelial cells of the epididymis, but also as part of the hair cells of the inner ear

b) all covering and lining epithelia are derivatives of a single germ layer, the ectoderm

c) differentiation of epithelial cells into cells of a connective tissue is referred to as epithelial-mesenchymal transition (transformation)

d) change from one type of epithelium to another is referred to as metaplasia

20. Decide whether the following statements about the covering and lining epithelia are true T or false F:

a) motility of cilia is mediated by motor protein dynein bound to microtubules

b) cilia have an internal skeleton composed of 9 peripheral and 1 central pair of actin microfilaments

c) epithelia are avascular and therefore have a low capacity for regeneration

d) the basement membrane is crucial for epithelial regeneration

21. Which intermediate filaments are the most characteristic of epithelial cells?

a) vimentin intermediate filaments

b) cytokeratin intermediate filaments

c) desmin intermediate filaments

d) glial fibrillary acidic protein

22. What are typical characteristics of epithelial cells?

a) their polar orientation

b) are bound to adjacent cells by cell junctions

c) low rate of renewal

d) they can be terminally differentiated postmitotic cells (e.g., keratinocytes in stratum corneum of the epidermis)

e) some specialized cells may be contractile

f) they are closely aggregated cells that cover most body surfaces, cavities, and tubes

23. What are the apical specializations of epithelial cells?

a) tight junctions

b) microvilli

c) basal labyrinth

d) stereocilia

e) kinocilia

24. What intercellular junction is said to contain cadherins as transmembrane proteins and their intracellular segment binds to intermediate filaments instead of actin?

a) adhering junction, or zonula adherens

b) tight junction, or zonula occludens

c) desmosome, or macula adherens

d) gap junction, or nexus

e) hemidesmosomes

25. What type of lining epithelium is typical of the small intestine?

a) simple squamous non keratinized

b) simple cuboidal with stereocilia

c) simple columnar with microvilli

d) simple columnar with interspersed goblet cells

e) simple columnar with stereocilia

f) stratified columnar

26. What type of lining epithelium is typical of the conducting portion of the airways?

a) simple columnar with interspersed goblet cells

b) simple columnar with stereocilia

c) stratified columnar

d) pseudostratified columnar with goblet cells

e) pseudostratified columnar with kinocilia

f) stratified columnar with kinocilia

27. What type of lining epithelium is found on the absorptive surfaces of the digestive tube?

a) simple squamous

b) simple columnar

c) pseudostratified

d) transitional

28. Replace the incorrect word with the correct one in the following sentence: Actin microfilaments are vital for the maintenance of epithelial cell shape and polarity.

a) are vital → are lethal

b) Actin microfilaments → Cytokeratins

c) shape → adhesion

d) Actin → Myosin

29. What are the characteristics of the basement membrane?

a) appears as a PAS-positive layer under a light microscope

b) its basal lamina (product of epithelial cells) is detectable with impregnation with AgNO3

c) its lamina fibroreticularis contains reticular fibers

d) collagen type VIII is creating anchoring loops in its lamina fibroreticularis

e) laminin is a major glycoprotein component of the basal lamina

30. Which of the word pairs are correct?

a) integrins – nexus

b) dynein – stereocilia

c) cadherins – desmosomes

d) mitochondria – basal labyrinth

e) actin – microvillus

31. How would you define transitional epithelium?

a) a stratified epithelium with flat cells covered by keratin

b) a simple epithelium with tall cells possessing cilia

c) an epithelium with cells that change shape in response to internal pressure

d) a specific type of pseudostratified epithelium

32. Which intercellular junctions of epithelial cells provide the "non-leakiness" of the epithelial layer?

a) zonulae occludentes

b) zonulae adherentes

c) basal labyrinth

d) hemidesmosomes

33. What is a typical intercellular junction that maintains cell polarity, prevents paracellular penetration of substances?

a) zonula adherens

b) zonula occludens

c) nexus

d) desmosome

34. Which of the following statements are typical of epithelial tissue?

a) lies on the basement membrane

b) usually has a good innervation

c) is highly vascularized

d) is not visible in the light microscope

35. Where is simple cuboidal epithelium seen?

a) in the thyroid follicles

b) in the ducts of some glands

c) in the distal tubule of the nephron

d) in the jejunum

36. What is true about the goblet cell?

a) is characterized by the presence of large, light-colored granules

b) has a narrowed base

c) is present in the epithelium found in the small intestine

d) play a significant role in the synthesis and secretion of digestive enzymes in stomach

e) are capable of differentiating into various cell types, including neurons and muscle cells

37. How does the lining epithelium in the respiratory tract contribute to lung function?

a) regulating body temperature

b) producing mucus to trap foreign particles and pathogens

c) providing structural support to the respiratory system

d) providing cilia for ciliary transport of substances

38. Pseudostratified epithelium lines the lumen of which structures/organs?

a) duct of epididymis

b) duodenum

c) urinary bladder

d) trachea

e) paranasal sinuses

f) loop of Henle

g) uterine tubes

39. Simple squamous epithelium lines the lumen of which structures/organs?

a) lymphatic vessels

b) vagina

c) loop of Henle

d) blood capillaries

e) esophagus

40. Which of the following criteria is used to classify lining epithelia?

a) shape of the cells in the basal layer

b) number of layers of epithelial cells

c) size of cell nuclei

d) presence of cytokeratins

e) presence of lamina basalis

Chapter Three Answers:

1) bd
2) d
3) acd
4) a
5) bc
6) bc
7) abc
8) d
9) c
10) ab
11) abd
12) cd
13) ab
14) ab
15) ad
16) acd
17) bcd
18) b
19) acd
20) ad
21) b
22) abdef
23) bde
24) c
25) cd
26) de
27) b
28) b
29) ace
30) cde
31) cd
32) a
33) b
34) ab
35) abc
36) abc
37) bd
38) acde
39) acd
40) b

Chapter Four: Glandular Epithelia

1. Decide whether the following statements about the glandular epithelia are true T or false F:

a) goblet cell is intraepithelial exocrine unicellular gland

b) large salivary glands are multicellular endocrine glands

c) secretory products of multicellular exocrine glands are called hormones

d) extraepithelial exocrine glands are always in contact with the surface through one or more ducts

2. Decide whether the following statements about the glandular epithelia are true T or false F:

a) parotid gland is a purely compound serous exocrine gland

b) serous cell has typical features of a proteosynthetically active cell – an euchromatic nucleus, a dark prominent nucleolus, and a basophilic cytoplasm

c) example of a simple tubular gland is a crypt of Lieberkühn in the colon

d) sublingual gland is a compound tubuloacinar gland with a predominance of mucous tubules

3. Decide whether the following statements about the glandular epithelia are true T or false F:

a) striated ducts are a type of intercalated ducts

b) mucus in goblet cells is easily seen when stained with hematoxylin and eosin

c) serous acini usually have a lumen which is well visible on histologic slide

d) mucous cells display PAS positivity

4. Decide whether the following statements about the glandular epithelia are true T or false F:

a) each exocrine gland with branched secretory units is also a compound gland with a branched duct system

b) all types of ducts of exocrine gland are lined by a simple cuboidal epithelium

c) alveoli are secretory units characterized by a broad well-visible lumen

d) each compound exocrine gland with a branched duct system also has a branched system of secretory units

5. Decide whether the following statements about the glandular epithelia are true T or false F:

a) interlobar ducts of major salivary glands are lined by stratified cuboidal to columnar epithelium

b) intercalated ducts open at the body surface or into the lumen of a hollow organ

c) exocrine glands secrete their product directly into the blood

d) myoepithelial cells around secretory units of a mammary gland help to discharge the secretory product

6. Decide whether the following statements about the glandular epithelia are true T or false F:

a) the apocrine mechanism of secretion is observed in the lactating mammary gland

b) the typical feature of holocrine secretion is that a secretory product is released by exocytosis

c) in the apocrine mechanism of secretion, the cell loses the apical part of the cytoplasm

d) an example of a holocrine secreting gland is a parotid gland

7. Decide whether the following statements about the glandular epithelia are true T or false F:

a) holocrine secretion is characterized by apoptosis of secretory cells

b) pancreatic enzymes are secreted from serous cells by a merocrine mechanism

c) in eccrine secretion, there is no change in cell shape

d) substances of a lipid nature, for example milk fat, are secreted by apocrine mechanism

8. Decide whether the following statements about the glandular epithelia are true T or false F:

a) eccrine secretion is typical for sweat glands

b) if a cell disappears and becomes part of the secretion, it is a holocrine type of secretion

c) in apocrine secretion, different cell heights are observed depending on the phase of secretion

d) a mammary gland secretes all the components of breast milk by the apocrine mechanism

9. Decide whether the following statements about the glandular epithelia are true T or false F:

a) hormones are secreted from endocrine glands via apocrine, merocrine, and holocrine mechanism

b) dominant type of secretion in the major salivary glands is merocrine secretion

c) autocrine secretion means that a cell produces substances for its own use

d) paracrine secretion is when the secreted substance only affects the surrounding environment

10. Decide whether the following statements about the glandular epithelia are true T or false F:

a) goblet cells secrete mucus by exocytosis, which is apocrine mode

b) when a single cell secretes both hormones and exocrine products, this is called homotypic amphicrine secretion, as in hepatocytes

c) pancreas is a heterotypic amphicrine gland because it contains separate exocrine and endocrine components

d) insulin as well as pancreatic enzymes are secreted by holocrine mechanism

11. Decide whether the following statements about the glandular epithelia are true T or false F:

a) endocrine glands secrete hormones into the duct system

b) pancreas is a purely endocrine gland

c) follicles are epithelial structures typical for a thyroid gland

d) endocrine glands secrete hormones into the interstitium and from there directly into the blood

12. Decide whether the following statements about the glandular epithelia are true T or false F:

a) epithelial cells of zona fasciculata of the adrenal gland cortex have a foamy appearance due to their high cholesterol content

b) cords of epithelial cells of the adrenal gland cortex are surrounded by a rich network of blood capillaries

c) zona glomerulosa is arranged in cords while zona fasciculata is formed by follicles

d) thyroid gland is one of the exocrine glands because hormones are stored in the follicle cavity before secretion

13. Decide whether the following statements about the glandular epithelia are true T or false F:

a) DNES (diffuse neuroendocrine system) cells form macroscopically recognizable endocrine glands

b) endocrine and exocrine glands differ morphologically only in the arrangement of their secretory units

c) endocrine and exocrine glandular epithelia always share a common embryonic origin

d) thyroid follicles are surrounded by a network of capillaries with a fenestrated endothelial lining

14. Decide whether the following statements about the glandular epithelia are true T or false F:

a) the adrenal cortex is characterized by the presence of striated ducts

b) exocrine epithelia retain their connection with the covering or lining epithelium, whereas endocrine epithelia have secondarily lost this connection

c) unlike exocrine epithelia, endocrine epithelia do not attach to the basement membrane

d) all zones of the adrenal cortex have cells arranged in morphologically identical cords

15. Decide whether the following statements about the glandular epithelia are true T or false F:

a) in addition to glandular epithelia, endocrine secretion is also observed in other types of tissue, such as the heart or thymus

b) the adrenal cortex is divided by septa into lobules, within which the interlobular ducts run

c) the adrenal cortex is an example of the follicular arrangement of endocrine epithelia

d) a colloid is a specific form of glucocorticoid storage in the follicles of zona fasciculata of the adrenal cortex

16. Decide whether the following statements about the glandular epithelia are true T or false F:

a) autocrine secretion requires a system of ducts

b) epithelial cells of ducts have the same morphology as serous cells of secretory compartments

c) a mucous cell has a large round euchromatic nucleus

d) serous cells have a cuboidal or pyramidal shape

17. Decide whether the following statements about the glandular epithelia are true T or false F:

a) the goblet cell is an example of a serous cell

b) all multicellular glands are connected to the external environment by a duct

c) the goblet cell is found only as part of simple tubular glands

d) eccrine sweat glands are simple coiled glands

18. Decide whether the following statements about the glandular epithelia are true T or false F:

a) sebaceous glands have a tree-like branching system of ducts

b) a combination of merocrine and apocrine secretion is observed in sebaceous glands

c) serous lunules are artefacts of histological processing of specimens

d) the difference between tubuloacinar and purely acinar glands is mainly the morphology of their duct system

19. Decide whether the following statements about the glandular epithelia are true T or false F:

a) intercalated ducts are lined by two layers of cuboidal epithelium

b) serous cells do not display cell polarity, unlike lining epithelial cells

c) the secretory compartments of the parotid gland and the exocrine portion of the pancreas have an identical morphology

d) serous cells are characterized by secretion of substances of a fatty nature

20. Decide whether the following statements about the glandular epithelia are true T or false F:

a) mucus in goblet cells is PAS-negative

b) aromatic glands use exclusively eccrine mechanism of secretion

c) serous acini secrete their products directly into the blood

d) parenchyma cells of endocrine glands are surrounded by a rich network of fenestrated capillaries or sinusoids

21. Which exocrine gland has the form of simple tubular gland?

a) the one that is located in the mucosa of the ileum

b) submandibular gland

c) sebaceous gland

d) lactating mammary gland

e) eccrine sweat gland in skin

22. Apart from the smooth endoplasmic reticulum, what typical organelles will also contain adult Leydig cells?

a) numerous free ribosomes

b) mitochondria of tubular type

c) extensively developed Golgi apparatus

d) non-motile primary cilium

e) well-staining basophilic cytoplasm

23. Which is true of holocrine secretion?

a) occurs in endocrine glands

b) the apical part of the cytoplasm is being shredded during secretion

c) involves secretion of chlorine ions

d) occurs in sebaceous glands

24. Which cell type is best characterized as having abundant rough ER?

a) mucus-secreting cells

b) peptide-secreting cells

c) protein-secreting cells

d) steroid-secreting cells

e) ion-transporting cells

25. What is typical for cells with mitochondria of tubular type?

a) are protein-secreting cells

b) are located in the adrenal cortex

c) are located in the testicular interstitium

d) these mitochondria are located between infoldings of the basal plasma membrane

e) are steroid-secreting cells

26. What is typical of the glandular epithelium?

a) polar orientation of the (exocrine) cells

b) presence of lamina basalis

c) low rate of renewal

d) high cellularity

e) derived from former lining/covering epithelium

27. What is typical of the mucous cell?

a) forms a dense secretion with hydrophilic glycoprotein

b) merocrine secretion

c) its typical example is a myoepithelial cell

d) the basal compartment shows considerable basophilia due to local accumulation of polyribosomes

e) its typical example is a goblet cell

f) its apical pole is PAS-positive

28. In the following statement, correct the word to make this statement correct: Endocrine cells frequently form plates or cords, interspersed with abundant, large-bore, continuous capillaries.

a) large-bore → narrow

b) endocrine → exocrine

c) frequently → infrequently

d) continuous → fenestrated

29. Which of the word pairs are correct?

a) tubule – mucous cells

b) parotid gland – serous cells

c) sebaceous gland – holocrine secretion

d) rough ER – serous cell

30. What is true about myoepithelial cells?

a) they are contractile epithelial cells that facilitate the expulsion of secretions from exocrine glands

b) they lie just below the epithelial basal lamina

c) they are present in the secretory portion and ducts of the mammary gland

d) structurally resemble epithelial cells and cardiomyocytes

e) these are undifferentiated cells that are the precursors of future muscle fibers

31. What is part of the intralobular duct system?

a) intercalated ducts

b) main duct (e.g., Wharton's duct of submandibular gland)

c) striated duct

d) ducts that are not involved in any further modification of the product

32. Where is the glandular epithelium located in the cords?

a) in the thyroid gland

b) in the adenohypophysis

c) in the neurohypophysis

d) in adrenal gland cortex

e) in the large intestine, where forms the tubular glands

33. What is true about the DNES (diffuse neuroendocrine system)?

a) its cells are able to uptake monoamine precursors

b) are found in clusters as glands in lamina propria of several organs

c) its cells produce biogenic amines (e.g. somatostatin)

d) its cells are distributed as unicellular glands within the epithelia of the respiratory and GIT systems

e) its cells are regularly distributed in the nuclei of the hypothalamus

34. Which of the following statements about the glandular epithelium are true?

a) secretory portions of apocrine sweat glands are wrapped in myoepithelial cells

b) during the secretion cycle in glands with holocrine secretion, cells release secretory granules by exocytosis

c) all three major salivary glands contain serous cells

d) the cytoplasm of the serous secretory cell is pale pink (eosinophilic) on hematoxylin and eosin staining

e) the mammary gland is a simple tubuloalveolar gland

f) alveolus (acinus) is a synonym for the ductal pat of the exocrine glandular epithelium

35. What do exocrine and endocrine glands have in common?

a) both developed from superficial covering/lining epithelium

b) both have their version of a duct system

c) both are producing hormones

d) their cells lie on lamina basalis

36. Which of the following statements about the serous cell is true?

a) has the same shape as a mucous cell

b) here is an accumulation of rough ER around the nucleus

c) contains a large number of zymogen secretory granules

d) has a round cell nucleus

37. What is typical of glandular epithelium?

a) is made up of cells specialized in the production of liquid secretions

b) is located in the pancreas

c) the substances produced are stored in the cells in the form of membrane-bound vesicles – secretory granules

d) is located in the sweat gland

e) always has direct contact with the body surface or body cavity

38. The following applies to apocrine secretion:

a) the secretory product accumulates within the maturing cell, which simultaneously undergoes programmed cell death

b) it is the most common mechanism of secretion and is found, for example, in pancreatic acinar cells

c) secretory product is released along with a small amount of apical cytoplasm

d) can be found in the lactating mammary gland or in the ceruminous glands of the external auditory canal

39. Identify the correct pair!

a) sebaceous gland – merocrine secretion

b) fatty component of lactating mammary gland product – apocrine secretion

c) sweat gland – holocrine secretion

d) tubuloalveolar gland – lactating mammary gland

40. What cell populations are not part of the microscopic image of the parotid gland?

a) serous cells

b) adipocytes

c) myoepithelial cells

d) epithelial cuboidal cell of striated duct

Chapter Four Answers:

1) ad
2) abcd
3) d
4) cd
5) ad
6) ac
7) abcd
8) abc
9) bcd
10) bc
11) cd
12) ab
13) d
14) b
15) a
16) d
17) d
18) c
19) c
20) d
21) ae
22) b
23) d
24) bc
25) bce
26) abde
27) abef
28) d
29) abcd
30) ac
31) ac
32) bd
33) acd
34) ac
35) ad
36) bcd
37) abcd
38) cd
39) bd
40) e

Chapter Five: Connective Tissue Proper

1. Decide whether the following statements about the connective tissue proper are true T or false F:

a) fibroblasts have a basophilic cytoplasm

b) the nucleus resembling a clock face is found in mast cells

c) plasma cells display metachromasia

d) a fibrocyte is a quiescent form of a spindle-shaped basic connective tissue cell that differentiates from a fibroblast

2. Decide whether the following statements about the connective tissue proper are true T or false F:

a) an adipocyte with one large lipid vacuole is typical for brown adipose tissue

b) a reticular cell is a variant of a fibroblast and produces type III collagen

c) a typical feature of unilocular adipocytes is the absence of thermogenesis

d) wandering cells of a connective tissue proper are usually derived from a hematopoietic stem cell

3. Decide whether the following statements about the connective tissue proper are true T or false F:

a) Effector cell of T lymphocytes is a plasma cell

b) Metachromatic granules of mast cells contain histamine and heparin

c) A fibroblast is a star-like cell that produces all components of the extracellular matrix of a loose connective tissue

d) A fibroblast has typical features of a proteosynthetically active cell – a large euchromatic nucleus, prominent nucleolus/nucleoli, and a basophilic cytoplasm

4. Decide whether the following statements about the connective tissue proper are true T or false F:

a) fixed connective tissue cells usually differentiate directly from the mesenchyme and remain in place in connective tissue throughout life

b) wandering connective tissue cells include adipocytes and myofibroblasts

c) in general, wandering connective tissue cells have a predominantly immune function

d) both fixed and wandering connective tissue cells are polarized similarly to epithelial cells

5. Decide whether the following statements about the connective tissue proper are true T or false F:

a) fibroblasts and fibrocytes are morphologically and functionally identical

b) a plasma cell has a lower nucleocytoplasmic ratio than its progenitor cell (B lymphocyte)

c) macrophages belong to fixed cells of connective tissue proper

d) fixed connective tissue cells are characterized by recirculation between the bloodstream and the interstitium

6. Decide whether the following statements about the connective tissue proper are true T or false F:

a) the most common type of collagen is type I collagen

b) type III collagen is well visible with hematoxylin and eosin staining

c) elastic fibers are composed of the amorphous protein elastin that surround microfibrils of fibrillin (oxytalan fibers)

d) reticular fibers are argyrophilic

7. Decide whether the following statements about the connective tissue proper are true T or false F:

a) collagen is the most abundant protein in the human body

b) collagen microfibrils are made up of a triple helix of tropocollagen

c) histology uses special staining techniques to visualize elastic fibers, such as orcein or resorcin-fuchsin

d) reticular fibers display PAS positivity in addition to argyrophilia

8. Decide whether the following statements about the connective tissue proper are true T or false F:

a) components of a ground substance are well distinguishable by light microscopy

b) the amorphous ground substance with a high content of hyaluronic acid is well hydrated

c) laminin is a multi-adhesive glycoprotein that mediates adhesion of epithelial cells to the basal lamina through the binding of integrins to type IV collagen

d) proteoglycans are aggregates composed of a core protein to which sulfated glycosaminoglycans are covalently attached

9. Decide whether the following statements about the connective tissue proper are true T or false F:

a) ground substance and fibers form the extracellular matrix of a connective tissue

b) hyaluronic acid is a nonsulfated glycosaminoglycan that is abundant in well-hydrated connective tissue proper

c) fibronectin is a fibrous component of the extracellular matrix of connective tissue proper

d) the primary function of multiadhesive structural glycoproteins is to mediate binding between epithelia and connective tissue proper components

10. Decide whether the following statements about the connective tissue proper are true T or false F:

a) ground substance is PAS-positive due to its high carbohydrate content

b) fibroblasts produce the fibrous component of the extracellular matrix of connective tissue proper, whereas the ground substance is a product of wandering cells

c) dermatan sulfate is a sulfated glycosaminoglycan found, for example, in dermis

d) ground substance is crucial in regulating hydration of connective tissue proper and therefore has a major influence on, for example, immune processes

11. Decide whether the following statements about the connective tissue proper are true T or false F:

a) loose connective tissue is composed mainly of cells and ground substance; fibers are less numerous

b) loose connective tissue is a key site of immune processes in the body

c) one of the functions of the highly vascularized loose connective tissue is to nourish the lining epithelia which are almost always avascular

d) loose connective tissue contains only collagen fibers

12. Decide whether the following statements about the connective tissue proper are true T or false F:

a) fascia is a typical example of loose connective tissue

b) collagen fibers predominate over cells and amorphous (ground) substance in dense connective tissue

c) tendons consist of a dense irregular connective tissue

d) ligaments or aponeuroses are typical examples of a dense regular connective tissue

13. Decide whether the following statements about the connective tissue proper are true T or false F:

a) dense irregular connective tissue is found mainly in places where external forces act in one direction

b) thick parallel bundles of collagen fibers containing type I collagen with few flat fibrocytes are observed in tendons

c) dense connective tissue contains more cells than fibers

d) stratum reticulare of the dermis is a dense irregular connective tissue

14. Decide whether the following statements about the connective tissue proper are true T or false F:

a) although ligaments are histologically formed by a dense, regular connective tissue, they may also contain elastic fibers, for example, in ligamenta flava

b) tendinocytes are a specific type of fibrocytes found in tendons

c) trichrome staining is used to visualize collagen fibers in connective tissue

d) dense and loose connective tissue differ mainly in composition and amount of ground amorphous substance

15. Decide whether the following statements about the connective tissue proper are true T or false F:

a) dense connective tissue contains mainly type III collagen

b) fibrous capsules of parenchymal organs are formed by a dense irregular connective tissue

c) the wavy arrangement of bundles of collagen fibers in tendons provides some capacity to stretch

d) thick bundles of collagen fibers containing type I collagen in tendons, ligaments, and aponeuroses are highly resistant to tension

16. Decide whether the following statements about the connective tissue proper are true T or false F:

a) brown adipose tissue serves mainly as an energy reservoir

b) adipocytes may be isolated within a loose connective tissue, but when they are the dominant cell type, it is called an adipose tissue

c) mucous connective tissue in the umbilical cord contains a high content of hyaluronic acid

d) reticular connective tissue forms the fine supporting stroma in the secondary lymphoid organs

17. Decide whether the following statements about the connective tissue proper are true T or false F:

a) reticular tissue is best visualized by trichrome staining

b) brown adipose tissue is highly vascularized

c) brown adipose tissue is particularly important in neonates for its thermoregulatory function

d) for the specific demonstration of white adipose tissue, hematoxylin-eosin staining is most illustrative

18. Decide whether the following statements about the connective tissue proper are true T or false F:

a) all types of connective tissue contain many cells and few fibers

b) elastic tissues make up the majority of tendons and aponeurosis

c) in addition to brown and white adipose tissue, there is also beige adipose tissue

d) reticular tissue is formed by reticular cells and argyrophilic reticular fibers

19. Decide whether the following statements about the connective tissue proper are true T or false F:

a) adipocytes in adipose tissue form their own outer lamina, which is structurally like the basal lamina of epithelia

b) white adipose tissue does not contain blood vessels

c) mucous connective tissue is found in the umbilical cord or dental pulp before tooth eruption

d) mucous connective tissue has a minimum amount of amorphous ground substance

20. Decide whether the following statements about the connective tissue proper are true T or false F:

a) in addition to its storage function, white adipose tissue also has a very important endocrine function

b) conventional techniques dissolve lipids during sample processing, so we use special methods such as orcein staining to visualize adipose connective tissue

c) white adipose tissue may change to brown and vice versa

d) reticular fibers form a fine stroma, for example, around epithelial cells of the adrenal cortex

21. What is typical of loose connective tissue?

a) in the form of lamina propria layer, it is located beneath the avascular epithelium

b) is rich in blood and lymphatic vessels

c) forms the internal network in majority of the lymphoid organs (e.g. lymph node)

d) fibers predominate over amorphous ground substance

22. What is typical of fibroblast?

a) is the spindle-shaped cell with more processes and ovoid/fusiform nucleus

b) contains granules with heparin and histamine

c) as a chief cell of connective tissue proper, produces antibodies

d) as a chief cell of connective tissue proper, produces all components of the extracellular matrix

e) has a large pale ovoid/fusiform cell nucleus and a prominent nucleolus

f) is a fixed cell in the connective tissue proper with pale-stained cell nucleus, prominent nucleolus and basophilic cytoplasm

g) is typical of the content of mitochondria of tubular type

h) belongs to group of free (wandering) cells of connective tissue proper

23. What is the type of tissue that you would find in a tendon?

a) reticular tissue

b) (white) adipose tissue

c) loose connective tissue

d) dense connective tissue irregular

e) dense connective tissue regular

24. Fibers of which tissue are selectively stained with orcein?

a) loose connective tissue with mast cells

b) elastic connective tissue

c) reticular connective tissue

d) adipose tissue

e) mucous connective tissue

25. What is typical of elastic fibers?

a) are produced by both fibroblasts and smooth muscle cells in blood vessels

b) form elastic lamellae (membranes) in the aortic wall

c) can be visualized by aniline blue and exhibit a wavy course

d) are argyrophilic

e) include proteins elastin, elaunin, and oxytalan deposited

26. The nucleus of which of the cells resembles a clock face or a braided wheel?

a) fibroblast

b) plasma cell

c) mast cell

d) multilocular adipocyte

27. What are the differences between white and brown adipose tissue?

a) the size and number of fat vacuoles

b) heat production capability

c) brown one is specialized in storage of excess energy

d) different number of mitochondria in the cells of one of them

28. What is the difference between a dense connective tissue and a mucous tissue?

a) dense connective tissue is more abundant in the adult body

b) mucous tissue contains more amorphous ground substance with a predominance of hyaluronate

c) mucous tissue cannot be stained with trichrome stain

d) dense connective tissue contains less collagen fibers

29. What is true about brown adipose tissue?

a) contains multilocular adipocytes with high mitochondrial content

b) can generate heat

c) is richly vascularized

d) is formed by cells that have the shape of a sealing ring, while the flat cell nucleus is pushed to the periphery in the narrow rim of the cytoplasm

30. Which of the pairs are correct?

a) elastic tissue – orcein stain

b) reticular tissue – trichrome stain

c) adipose tissue – Sudan stain

d) dense connective tissue – silver impregnation

31. Which statements about the amorphous ground substance of connective tissue are true?

a) its basis is glycosaminoglycans and structural glycoproteins

b) hyaluronic acid is an unsulfated glycosaminoglycan

c) fibronectin and laminin are sulphated glycosaminoglycans

d) due to its hydrophobic properties, it contains only a minimum of water

32. Which statements about the functions of connective tissue cells are correct?

a) mast cell degranulation is associated with allergic reactions

b) plasma cells have abundant basophilic cytoplasm, and their function is phagocytosis

c) macrophages can fuse together to form huge multinucleated cells

d) unilocular adipocytes are able to generate heat

e) dead neutrophils co-create pus

33. In the following statement, correct the word to make this statement correct: Glycosaminoglycans are not part of the extracellular matrix of loose connective tissue.

a) Glycosaminoglycans → Proteoglycans

b) are not → are

c) loose → mucous

d) Glycosaminoglycans (are) → Hyaluronate (is)

34. Which statements about the collagen molecule are true?

a) the collagen protein is composed of a double helix

b) contains mainly the amino acids glycine and proline

c) a long-term deficiency of vitamin C results in its impaired synthesis

d) hydroxylation of its amino acids does not occur under physiological circumstances during synthesis

e) the fibroblast is the most common cell that creates collagen

35. Which statements about hyaluronic acid are true?

a) it is strongly hydrophobic (water repellent)

b) hyaluronidase cleavage of invading bacteria reduces the viscosity of hyaluronic acid and facilitates the penetration of microorganisms into the tissue

c) is abundant, e.g. in vitreous humor, synovial joint fluid, or Wharton's jelly

d) it is only non-sulphated glycosaminoglycan of the amorphous ground substance of connective tissue

e) it is a polymer of disaccharides

36. What can connective tissue cells do?

a) produce intercellular matrix

b) store fat

c) phagocytose

d) provide immunological response

e) convey nerve impulses

37. Which statements about mast cells are true?

a) they are derived from blood-borne monocytes

b) are spindle- to stellate-shaped cells

c) contain the extensive rough endoplasmic reticulum and Golgi apparatus

d) are produced in the bone marrow

e) contain a single large lipid droplet that compresses the cell nucleus and cytoplasm to the periphery of the cell

f) their cytoplasm is filled with numerous granules that contain mediators of the inflammatory response

g) are related, but not identical, to basophils

38. Which statements about reticular tissue are true?

a) forms the connective tissue capsule (capsula fibrosa) of the spleen, kidney, and liver

b) forms the hematopoietic bone marrow stroma

c) is characterized by the absence of phagocytic cells

d) its reticular cells produce and envelop the reticular fibers with their processes

e) its reticular fibers are PAS-negative

39. Which general statements about connective tissue proper are true?

a) belongs to the same tissue type as bone

b) arises ontogenetically from the mesenchyme

c) in contrast to the epithelium is avascular

d) is mainly composed of cells with very little extracellular matrix

40. What are the substances in mast cell granules?

a) mucinogen

b) heparin

c) histamine

d) hemoglobin

e) antibodies

Chapter Five Answers:

1) ad
2) bd
3) bcd
4) ac
5) b
6) acd
7) abcd
8) bcd
9) abd
10) acd
11) abc
12) bd
13) bd
14) abc
15) bcd
16) bcd
17) bc
18) cd
19) ac
20) acd
21) ab
22) adef
23) e
24) b
25) abe
26) b
27) abd
28) ab
29) abc
30) ac
31) ab
32) ace
33) b
34) bce
35) bcde
36) abcd
37) dfg
38) bd
39) ab
40) bc

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Chapter Six: Cartilage

1. Decide whether the following statements about the cartilage are true T or false F:

a) the most common type of cartilage in the human body is hyaline cartilage.

b) the tissue of cartilage is richly vascularized

c) the presence of type II collagen is typical for the extracellular matrix of cartilage

d) type II collagen fibrils of the cartilage extracellular matrix form distinct bundles that are easily seen by conventional staining

2. Decide whether the following statements about the cartilage are true T or false F:

a) perichondrium is the connective tissue layer providing nutrition to the cartilage

b) hyaline cartilage, including articular cartilage, is covered by the perichondrium

c) elastic cartilage contains only elastic fibers in the extracellular matrix

d) type I collagen is the predominant collagen type in fibrocartilage

3. Decide whether the following statements about the cartilage are true T or false F:

a) formation of isogenous groups is most typical for fibrocartilage

b) territorial matrix is basophilic due to the high content of acidic sulfated glycosaminoglycans

c) the chondrogenic layer of the perichondrium allows appositional growth of cartilage

d) the auricle and epiglottis are supported by elastic cartilage

4. Decide whether the following statements about the cartilage are true T or false F:

a) articular cartilage is nourished by synovial fluid

b) fibrocartilage contains distinct bundles of type I collagen fibers

c) chondrocytes of fibrocartilage are arranged either individually or in rows

d) fibrocartilage is surrounded by a well distinct perichondrium

5. Decide whether the following statements about the cartilage are true T or false F:

a) elastic cartilage has more cells and less isogenous groups than hyaline cartilage

b) hyaline cartilage provides a model for future bones that will ossify in a chondrogenic/endochondral manner

c) isogenous groups are always formed by a single pair of chondrocytes

d) chondroblasts that differentiate within the perichondrium are responsible for interstitial cartilage growth

6. Decide whether the following statements about the cartilage are true T or false F:

a) interterritorial matrix of a cartilage is more basophilic than territorial

b) cartilage has an excellent regenerative capacity due to its rich vascularity

c) fibrocartilage is a structure at the interface between cartilage and dense connective tissue

d) collagen fibrils of articular cartilage are arranged in arches in superficial layers

7. Decide whether the following statements about the cartilage are true T or false F:

a) type II collagen fibrils are masked in the extracellular matrix because their size is below the level of resolution of a light microscope

b) cartilage is resistant to compression because of high water content

c) chondrocytes of cartilage are embedded in lacunae

d) cartilage and perichondrium are morphologically identical, the only difference is the level of vascularization

8. What molecules make up the organic portion of the extracellular amorphous matrix of cartilage?

a) aggrecan

b) heparin

c) chondroitin sulfate

d) hydroxyapatite

9. What is typical of hyaline cartilage?

a) periosteum

b) basophilic territorial matrix

c) absence of isogenous groups

d) collagen type III

10. Which of the following statements about elastic cartilage are true?

a) has no perichondrium

b) reinforces the epiglottis

c) chondrocytes are arranged in larger isogenous groups

d) does not calcify with age

e) forms part of the intervertebral disc

f) can be selectively stained with orcein

11. Which general statements about cartilage are true?

a) is avascular

b) interior cells receive nutrients by diffusion

c) have abundant, flexible, semi-rigid extracellular matrix

d) of all the types, elastic cartilage is the most common

e) has a very high turnover of its extracellular matrix

f) is formed from condensed mesenchyme during prenatal development

12. Where in the body is fibrocartilage found?

a) discus interpubicus

b) nucleus pulposus disci intervertebralis

c) meniscus

d) cartilago cricoidea

e) symphysis manubriosternalis

13. What is the role of the perichondrium?

a) produces synovial fluid on the surface of articular cartilage

b) is a source of cells for the appositional growth of cartilage

c) prevents excessive stretching of cartilage

d) by its avascular nature isolates the cartilage from harmful substances

e) surrounds the capsular matrix around the lacunae

14. Which statements about hyaline cartilage are true?

a) is flexible due to the binding of water to negatively charged glycosaminoglycan chains

b) chondronectin conditions the attachment of chondrocytes to the collagen of the intercellular matrix

c) the capsular zone around chondrocytes is more basophilic than the surrounding matrix

d) in this type of cartilage, chondrocytes do not form isogenous groups

e) is covered by perichondrium except for joints

f) its chondrocytes are arranged in strings between parallel bundles of collagen fibers

15. Which features are typical of chondrocytes?

a) are spherical in shape, often flattened at the points of contact

b) often contain glycogen granules

c) are found in cavities called lacunae

d) are found in the inner layer of the perichondrium

e) as terminally differentiated cells are not subject to mitosis

16. In the following statement, correct the word to make this statement correct: If the cartilage cells grow from the chondrocytes within the cartilage, it is called appositional growth.

a) chondrocytes → chondroblasts

b) cells → glycosaminoglycans

c) appositional → interstitial

d) appositional → tumorous

17. The intense basophilia of the capsular matrix in hyaline cartilage is caused mainly by the synthetic activity of which chondrocyte organelle?

a) rough ER

b) smooth ER

c) Golgi

d) mitochondria

18. What cells are found in the synovial membrane?

a) fibrocytes

b) phagocytic synovial cells

c) chondroblasts

d) chondrocytes

e) secretory synovial cell

19. Which zones of articular cartilage can be identified?

a) tangential zone

b) zone of apposition growth

c) zone of hypertrophy

d) calcified zone

e) perichondral zone

f) deep (radial) zone

20. Where in the body is elastic cartilage found?

a) auricle

b) Eustachian tube

c) nucleus pulposus disci intervertebralis

d) anulus fibrosus disci intervertebralis

e) epiglottis

21. Which of the following statements about the perichondrium are true?

a) is made of dense connective tissue

b) stains more basophilic due to increased glycosaminoglycan content

c) is a source of blood vessels important for nutrition of the avascular cartilage

d) is essential for growth and maintenance of the cartilage and comprises precursors for chondroblasts

22. Which is the earliest of the steps in cartilage formation?

a) appositional growth

b) perichondrium histogenesis

c) interstitial growth

d) mesenchymal condensation

23. In the following statement, correct the word to make this statement correct: The inability of cartilage to respond to injury is due to cartilage avascularity, chondrocyte hypermobility, and a low rate of their renewal.

a) inability → ability

b) chondrocyte → chondroblast

c) hypermobility → immobility

d) low → high

24. Which of the following statements about calcification of the cartilage matrix are true?

a) once calcified, diffusion is impeded, and the chondrocytes die

b) it is one of the basic processes of intramembranous ossification

c) aging elastic cartilage tends to calcify over time

d) it is always a pathological process

25. Which of the following structures are typical of hyaline cartilage?

a) isogenous groups

b) mast cells

c) capsular matrix

d) collagen type III

e) versican

26. What is the molecular basis for the shock-absorbing capacity of articular cartilage?

a) attachment of chondrocytes to collagen type II

b) cushioning effect of hydrated glycosaminoglycans in the matrix

c) chondroitinsulphate polycationic property

d) cross-linking of collagen type I fibers in the perichondrium

27. Which of the pairs are correct?

a) auricle – orcein

b) hyaline cartilage – aggrecan

c) symphysis pubis – fibrocartilage

d) collagen type VI – capsular matrix

28. What molecules/structures impart resilience to the cartilage?

a) aggrecan

b) collagen molecule type III

c) collagen molecule type IV

d) hyaluronan

e) chondrocytes within the lacunae

f) anchorin CII

g) secreted metalloproteinases from chondrocytes

29. What are the glycosaminoglycans found in significant amounts in cartilage?

a) hyaluronic acid

b) dermatan sulfate

c) heparin

d) chondroitin 6-sulfate

e) decorin

f) keratan sulphate

g) chondroitin 4-sulfate

h) heparan sulfate

30. What are the typical features of cartilage?

a) avascular character

b) high rate of renewal

c) dense connective tissue capsule called perichondrium (with the exception of articular cartilage and fibrocartilage)

d) dominance of extracellular matrix

e) aggrecan being a typical proteoglycan

f) isogenous groups

g) uniform composition of extracellular matrix

h) eosinophilic character of extracellular matrix (due to sulphated ground substance)

31. What are the layers one can find in articular cartilage?

a) tangential zone

b) germinative zone

c) intermediate (transitional) zone

d) fibrous perichondrium

e) deep (radial) zone

f) zone of hypertrophy

g) calcified zone

h) tidemark – undulating, heavily calcified line

Chapter Six Answers:

1) ac
2) ad
3) bcd
4) abc
5) ab
6) cd
7) abc
8) ac
9) b
10) bdf
11) abcf
12) ace
13) bc
14) abce
15) abc
16) c
17) c
18) abe
19) adf
20) abe
21) acd
22) d
23) c
24) a
25) ac
26) b
27) abcd
28) ad
29) adfg
30) acdef
31) acegh

Chapter Seven: Bone Tissue

1. Decide whether the following statements about the bone are true T or false F:

a) bone does not contain blood vessels

b) rich vascularization contributes to bone's excellent regenerative capacity

c) the periosteum covers the bone and contains osteoprogenitor cells in the stratum osteogenicum

d) the endosteum is a thin fibrous layer consisting of reticular fibers and osteoprogenitor cells lining the inner cavities and canals of bone

2. Decide whether the following statements about the bone are true T or false F:

a) osteoprogenitor cells differentiate into osteoclasts

b) primary bone is divided into spongy and compact bone

c) the basic morphological unit of a compact bone is the Haversian system (osteon)

d) the periosteum is richly vascularized and innervated

3. Decide whether the following statements about the bone are true T or false F:

a) woven bone is arranged in osteons

b) both spongy bone and compact bone are types of secondary bone arranged in lamellae

c) cortical bone is the term for spongy bone on the surface of the diaphysis

d) Volkmann's canals connect adjacent osteons

4. Decide whether the following statements about the bone are true T or false F:

a) the diploë, a layer of spongy bone between two layers of compact bone, forms flat cranial vault bones

b) osteocytes have long processes that run in canaliculi ossium

c) bone remodeling is carried out by bone-forming osteoblasts and bone-resorbing osteoclasts

d) woven bone is the first to form during bone formation and fracture healing

5. Decide whether the following statements about the bone are true T or false F:

a) type I collagen is a major organic component of bone's extracellular matrix

b) interstitial lamellae of compact bone are remnants of previous generations of osteons after their remodeling

c) Sharpey's fibers are perforating collagen fibers of the stratum osteogenicum of the periosteum that attach the periosteum to the bone

d) osteoblasts can be distinguished microscopically as cells arranged in an epithelioid pattern on the surface of an osteoid during bone formation

6. Decide whether the following statements about the bone are true T or false F:

a) osteoclasts are the only bone cells that do not originate from osteoprogenitor cells

b) osteoclasts are part of the mononuclear phagocyte system

c) Haversian central canals contain only blood vessels

d) circumferential lamellae of a compact bone are formed by the process of interstitial growth

7. Decide whether the following statements about the bone are true T or false F:

a) ground bone preparation involves the demineralization of bone tissue

b) thicker trabeculae of spongy bone may contain complete osteons

c) spongy bone is a primary bone, and compact bone is a secondary bone

d) the basic morphological unit of a compact bone is the Volkmann system

8. Decide whether the following statements about bone ossification are true T or false F:

a) endochondral ossification relies on the model of connective tissue proper.

b) a line of erosion is seen in intramembranous ossification

c) most bones in the human body ossify on a hyaline cartilage model

d) a multipotent mesenchymal stem cell is the initial cell population for both types of ossification

9. Decide whether the following statements about bone ossification are true T or false F:

a) apoptosis of chondrocytes is observed in the process of desmogenic/intramembranous ossification

b) in chondrogenic/endochondral ossification, chondrocytes undergo differentiation into osteocytes

c) one of the steps in chondrogenic/endochondral ossification of the diaphysis of future long bones is the formation of the periosteal bony collar, which is formed by the process of desmogenic/intramembranous ossification

d) a key process in chondrogenic/endochondral ossification is the synthesis of vascular growth factors (VEGF) by chondrocytes undergoing apoptosis

10. Decide whether the following statements about bone ossification are true T or false F:

a) desmogenic/intramembranous ossification involves proliferation and hypertrophy of chondrocytes

b) bone spicules of an osteoid contain osteocytes that are arranged in an epithelioid pattern on the surface

c) the epiphyseal growth plate (cartilage) is essential for bone growth in length.

d) ossification takes place in an avascular environment

11. Decide whether the following statements about bone ossification are true T or false F:

a) a zone of calcified cartilage is observed in the epiphyseal growth plate

b) bones of the stylopodium, zeugopodium, and autopodium ossify in a chondrogenic/endochondral manner

c) chondrocyte proliferation on one side and cartilage degradation on the opposite side ensures that the thickness of the epiphyseal growth plate remains constant throughout bone growth

d) desmogenic/intramembranous ossification creates ossification centers directly in the thickened mesenchyme

12. Decide whether the following statements about bone ossification are true T or false F:

a) the entire axial skeleton ossifies from the mesenchyme template

b) a necessary part of ossification is the breakdown of bone by osteoclasts

c) in desmogenic/intramembranous ossification, secondary bone forms directly from the mesenchyme

d) it is essential for normal ossification that the ossification centers are well vascularized

13. Decide whether the following statements about bone ossification are true T or false F:

a) osteoid is present within the zone of hypertrophic cartilage

b) in desmogenic/intramembranous ossification, osteocytes arise directly in the thickened mesenchyme

c) bone-forming cells reach the primary ossification centers in the diaphysis of long bones via the bloodstream

d) osteoprogenitor cells differentiate directly within cartilage tissue during chondrogenic/endochondral ossification

14. What are the typical characteristics of compact bone?

a) there is a rich network of capillaries around its osteons

b) forms the diaphysis of the long bones

c) has osteocytes embedded between the lamellae

d) it is an immature stage of what will later become spongy bone

15. What are the general roles of bone tissue in the human body?

a) storage of iodine

b) to provide mechanical protection

c) storage of calcium

d) to serve as an embryonic skeleton

16. What are the various hollow spaces that can be found in bone tissue called?

a) canaliculi ossium

b) Volkmann's canals

c) spicules

d) osteonal (Haversian) canal

e) medullary cavity

f) canals of Hering

17. What is on the outer surface of bones?

a) perichondrium

b) Sharpey's fibers

c) metaphysis

d) periosteum

18. Which of the following statements about osteoclasts are true?

a) make up the bone matrix

b) are acidophilic

c) give rise to osteoblasts

d) are located in lacunae

e) are bone-resorbing cells

19. Which of the following statements about osteoclasts are true?

a) are phagocytic cells

b) are multinucleated

c) possess RANK receptors

d) estrogens trigger their activity

20. In the following statement, correct the word to make this statement correct: With the formation of the periosteal bony collar, the chondrocytes in the underlying cartilage become hypotrophic.

a) periosteal → perichondral

b) chondrocytes → chondroblasts

c) cartilage → woven bone

d) hypotrophic → hypertrophic

21. Which cells on the surface of bone tissue are directly involved in bone remodeling?

a) periosteal cells

b) hemopoietic stem cells

c) osteoprogenitor cells

d) osteoclasts

e) osteocytes

f) osteoblasts

22. Why is alkaline phosphatase (ALP) secreted from osteoblasts important?

a) ALP binds extracellular Ca2+

b) ALP is a basic enzyme present in Howship's lacuna

c) ALP is responsible for extracellular polymerization of collagen type I

d) ALP is important for mineralization by increasing the local concentration of PO4 ions

23. Which of the following statements about osteocytes are true?

a) are circular bone cells with more nuclei

b) are responsible for the production of bone matrix

c) arise from osteoblasts and its body is located in the bone lacuna

d) have many processes located in canaliculi

e) in the cytoplasm, they have many lysosomes with proteolytic enzymes

24. Which of the following terms are associated with active osteoclasts?

a) ruffled border

b) Howship lacuna

c) syntitium

d) alkaline phosphatase

25. Os frontale, clavicula and os zygomaticum. What do these bones have in common?

a) osteoclast activity in them

b) their hyaline cartilage precursors form part of the embryonic skeleton

c) the presence of a perichondral bony collar at the stage of their development

d) growth plates

e) origin in desmal osteogenesis

26. What zones can be differentiated in the epiphyseal growth plate?

a) of proliferation

b) of mineralization

c) resting zone

d) of hypertrophy

e) tangential zone

27. Which of the following statements applies to chondral osteogenesis (enchondral ossification)?

a) is a mode of origin of the clavicle and flattened bones of the skull

b) epiphyseal plate is responsible for the bone growth in width

c) occurs in the cartilaginous diaphysis of future long bone

d) during which hypertrophied chondrocytes change to osteoblasts by transdifferentiation

28. What can be said about the woven bone?

a) its collagen fibers are arranged in lamellae

b) is temporary, and in adults, it is replaced by secondary bone

c) has irregularly arranged collagen fibrils

d) usually is less mineralized than Haversian bone

e) has no osteocytes

29. What can be said about the osteoid?

a) is a non-mineralized bone matrix

b) is tissue within the stratum chondrogenicum of the perichondrium

c) is free of collagen fibrils

d) is synthesized by osteoblasts

30. Which description is true of intramembranous ossification?

a) is the process of periosteal bone collar formation

b) forms most of the bony skeleton

c) involves osteoid formation by osteoclasts

d) involves zones of proliferation, hypertrophy, and calcification

31. Which of the following statements about the secondary bone are true?

a) Haversian system (osteon) is a basic morphological unit of secondary spongy bone

b) Haversian system (osteon) is a basic morphological unit of secondary compact bone

c) can be found as compact bone or spongy bone

d) can be found as compact bone or woven bone

32. How do the following hormones affect the bone?

a) parathormone indirectly stimulates osteoclast activity

b) thyroxine stimulates bone growth

c) estrogen activates apoptosis of osteocytes

d) calcitonin inhibits osteoclast activity

e) growth factor stimulates osteoprogenitor cell differentiation

33. Which of the given pairs are correct?

a) dense connective tissue – endosteum

b) osteocytes – gap junctions

c) Sharpey fibers – collagen type I

d) cambium/osteogenic layer – osteoprogenitor cells

e) acid phosphatase – osteoclasts

Chapter Seven Answers:

1) bcd
2) cd
3) bd
4) abcd
5) abd
6) ab
7) b
8) cd
9) cd
10) c
11) abcd
12) bd
13) c
14) bc
15) bc
16) abde
17) d
18) be
19) abc
20) d
21) df
22) d
23) cd
24) abc
25) ae
26) abcd
27) c
28) bcd
29) ad
30) a
31) bc
32) abde
33) bcde

Chapter Eight: Blood

1. Decide whether the following statements about the blood are true T or false F:

a) an erythrocyte contains all typical organelles, including a cell nucleus

b) the most common blood cell is an erythrocyte

c) the average erythrocyte is about 7.5 micrometers in size

d) the typical shape of an erythrocyte is a biconvex disc

2. Decide whether the following statements about the blood are true T or false F:

a) the average lifespan of an erythrocyte is 120 days

b) the center of an erythrocyte is the thinnest part, only about 0.8 micrometers thick

c) a normocyte is an erythrocyte with a normal size of about 7.5 micrometers

d) acidic hemoglobin causes eosinophilia of an erythrocyte cytoplasm

3. Decide whether the following statements about the blood are true T or false F:

a) erythrocytes are sometimes called histological rulers

b) spectrin and ankyrin are part of the hemoglobin molecule

c) erythrocytes are shaped like a biconcave disc

d) the most abundant type of hemoglobin in adults is type F hemoglobin.

4. Decide whether the following statements about the blood are true T or false F:

a) thrombocytes contain typical cell organelles, including the cell nucleus

b) a megakaryocyte is a giant bone marrow cell, fragments of which are called platelets

c) thrombocytes are about 12 micrometers in size

d) thrombocytes contain a darker central granulomere and a lighter peripheral hyalomere

5. Decide whether the following statements about the blood are true T or false F:

a) platelets are about 2–3 micrometers, making them the smallest formed blood elements

b) the granulomere of platelets contains alpha granules in which coagulation factors are found

c) platelets have a lifespan of about 10 days

d) platelets are found individually or in clumps in a blood smear

6. Decide whether the following statements about the blood are true T or false F:

a) the most numerous types of leukocytes are neutrophilic granulocytes

b) granulocytes are also known as polymorphonuclear granulocytes

c) Arneth classes determine the average number of segments in the nucleus of eosinophilic granulocytes

d) band cells is the term for old neutrophilic granulocytes

7. Decide whether the following statements about the blood are true T or false F:

a) in the blood smear, an eosinophilic granulocyte contains brick-red specific granules

b) specific granules of basophilic granulocytes show metachromasia.

c) basophilic granulocytes normally make up approximately 30% of all white blood cells

d) the Barr body is an inactivated Y chromosome in males that can be observed in one of the segments of a neutrophilic granulocyte

8. Decide whether the following statements about the blood are true T or false F:

a) the average neutrophilic granulocyte is about 10–12 micrometers in size

b) a neutrophilic granulocyte has no specific granules in the cytoplasm

c) granulocytes are classified as neutrophilic, eosinophilic, and basophilic granulocytes according to the staining ability of azurophilic granules

d) 60–70% of leukocytes are neutrophilic granulocytes

9. Decide whether the following statements about the blood are true T or false F:

a) the older the neutrophil, the more segmented its cell nucleus

b) neutrophils are also known as microphages

c) eosinophilic granulocytes have a bilobed nucleus that resembles eyeglasses

d) the nucleus of a basophilic granulocyte consists of 4–5 segments

10. Decide whether the following statements about the blood are true T or false F:

a) the main function of eosinophils is to fight parasites, but they are also involved in allergic reactions

b) the dense crystalloid is part of the specific granules of basophilic granulocytes

c) only about 0.5–1% of all circulating leukocytes are basophilic granulocytes

d) the smallest leukocytes are neutrophilic granulocytes

11. Decide whether the following statements about the blood are true T or false F:

a) agranulocytes do not have granules in the cytoplasm

b) the characteristic feature of agranulocytes is an unsegmented nucleus, hence the name mononuclear cells

c) the largest agranulocytes are monocytes

d) B and T lymphocytes can be distinguished in a normal blood smear by nuclear morphology

12. Decide whether the following statements about the blood are true T or false F:

a) monocytes differentiate into macrophages in tissues

b) monocytes are about 20 micrometers in size

c) up to 90% of all lymphocytes are small lymphocytes, measuring 6–8 micrometers

d) lymphocytes have a nucleocytoplasmic ratio of 1:1

13. Decide whether the following statements about the blood are true T or false F:

a) the staining method used for blood smears is Pappenheim staining.

b) monocytes have a centrally located round cell nucleus

c) monocytes circulate in the blood for only 1–3 days

d) lymphocytes are the second most abundant type of leukocyte in peripheral blood after neutrophils

14. Decide whether the following statements about the blood are true T or false F:

a) the nucleus of monocytes is eccentrically located and kidney-shaped

b) monocytes are sometimes called naked nuclei

c) both lymphocytes and monocytes have a similar nucleo-cytoplasmic ratio

d) both lymphocytes and monocytes have a basophilic cytoplasm

15. Decide whether the following statements about the blood are true T or false F:

a) monocytes, as part of the mononuclear phagocyte system, differentiate into different populations of cells after entering a tissue

b) monocytes circulate in the blood for about 120 days

c) monocyte is the largest and most numerous type of leukocyte in the peripheral blood

d) B lymphocytes and T lymphocytes can be distinguished from each other in a conventionally stained blood smear by the staining ability of their CD markers

16. Decide whether the following statements about the blood are true T or false F:

a) T lymphocytes develop from the myeloid lineage

b) all formed blood elements are derived from one common multipotent hematopoietic stem cell

c) a reticulocyte is an immature form of erythrocyte that still contains a nucleus

d) a polychromatophilic erythroblast stains only with basic dyes

17. Decide whether the following statements about the blood are true T or false F:

a) all formed blood elements except lymphocytes are part of the myeloid lineage

b) the mesoblastic period of hematopoiesis is characterized by extramedullary hematopoiesis that begins in the wall of the yolk sac

c) the myeloid progenitor cell is unipotent

d) the orthochromatic erythroblast has an eosinophilic cytoplasm like mature erythrocytes

18. Decide whether the following statements about the blood are true T or false F:

a) blood plasma without clotting factors is called serum

b) water forms about 90% of blood plasma

c) blood plasma makes up about 45% of blood volume

d) blood plasma contains formed blood elements

19. Decide whether the following statements about the blood are true T or false F:

a) in adults, hematopoiesis occurs only in the bone marrow

b) all agranulocytes develop from the lymphoid lineage, whereas all granulocytes originate from the myeloid lineage

c) a basophilic erythroblast has a cell nucleus

d) a myeloblast differentiates from a promyelocyte

20. Decide whether the following statements about the blood are true T or false F:

a) hematopoiesis occurs exclusively in the bone marrow from the beginning of intrauterine development

b) extramedullary hematopoiesis takes place in the yellow bone marrow

c) precursor cells of hematopoiesis are always more differentiated than progenitor cells

d) megakaryoblast, promegakaryocyte, and megakaryocyte are developmental stages of thrombopoiesis

21. What is the average size of erythrocytes?

a) around 15 µm

b) around 7.5 µm

c) around 35 µm

d) around 350 nm

22. Where in the blood do we find the largest percentage of transported carbon dioxide?

a) bound to erythrocyte hemoglobin as a carbamino compound

b) bound to blood plasma albumin

c) freely dissolved CO2 in blood plasma

d) in plasma in the form of bicarbonate

23. Which cells are the result of myelopoiesis?

a) megakaryocytes

b) reticulocytes

c) mast cells

d) NK cells

24. Which cells are the result of myelopoiesis?

a) eosinophils

b) macrophages

c) T lymphocytes

d) monocytes

e) plasma cells

25. Which of the leukocytes is generally the largest?

a) neutrophil

b) monocyte

c) basophil

d) matured B lymphocyte

26. What substances do specific granules of basophils contain?

a) major basic protein

b) histamine

c) heparin

d) proteolytic enzymes

27. Which of the following statements about erythrocytes are true?

a) their average lifespan is 120 days

b) are capable of ameboid movement

c) contain Fe^{2+}

d) have a desmin cytoskeleton

e) do not have a developed glycocalyx

f) their concentration is approximately 5 million in 1 µm of blood

28. What do erythrocytes and thrombocytes have in common?

a) common myeloid progenitor cell

b) that they contain no mitochondria

c) presence of actin molecule

d) biconcave shape

29. Which of the given erythrocyte developmental stages is the least mature?

a) polychromatophilic normoblast/erythroblast

b) orthochromatic normoblast/erythroblast

c) reticulocyte

d) basophilic normoblast/erythroblast

30. Which of the following is most abundant in peripheral blood?

a) monocyte

b) platelet

c) eosinophil

d) neutrophil

31. In the following statement, correct the word to make this statement correct: The metamyelocyte is the stage at which neutrophil, eosinophil, and basophil lines can be clearly identified by the presence of numerous azurophilic granules.

a) metamyelocyte → promyelocyte

b) basophil → monocyte

c) azurophilic → specific

d) granules → inclusions

32. Which of the following statements about neutrophils are true?

a) their granules contain metalloproteinases

b) can differentiate into macrophages

c) have a polymorphic nucleus divided into 1–5 segments (lobules)

d) are the most numerous type of leukocytes in blood

33. Which of the following statements about neutrophils are true?

a) make up 13–40% of all leukocytes

b) makes up 55–70% of leukocytes

c) are induced by microbial inflammation

d) become microphages in tissues

e) their specific granules contain histamine and heparin

34. What is most likely to indicate an elevated differential lymphocyte count?

a) an early sign of arterial bleeding

b) possible leukemic process in the bone marrow

c) bone marrow suppression

d) advanced HIV infection with manifestations of AIDS

e) the presence of a viral infection in the body

35. Which of the following statements about T lymphocytes are correct?

a) participates in acquired (specific) cellular immunity

b) mature and gain their immunocompetence in the bone marrow

c) some of them can retain information about the antigen, i.e., the infection, for many years

d) most measure between 8 and 10 µm

e) against B lymphocytes, they are best distinguished by identification of surface CD markers (cluster of differentiation markers)

f) are slightly larger than B lymphocytes

g) are several times more abundant in the peripheral blood than are B lymphocytes

36. Which of the following statements about basophils are correct?

a) are least numerous of the leukocytes

b) their euchromatin is chiefly centrally located in nuclei

c) possess receptors for IgE antibodies

d) do not contain azurophilic granules

37. Which of the following statements about eosinophils are correct?

a) make up 60–70% of leukocytes

b) are proliferated in allergy sufferers and patients with parasitic diseases

c) their nuclei are typically bilobed

d) contain MBP (major basic protein)

e) their products multiply the effects of histamine on tissues

38. The concentration of which hormone is increased in the blood of an athlete who is training at a high altitude?

a) thrombopoietin

b) thymopoietin

c) erythropoietin

d) somatostatin

39. Which of the following statements about the erythrocytes are correct?

a) survive for hours to days at most

b) mitochondria are the only type of organelle present in their cytoplasm

c) cannot normally pass through an intact vessel wall from the bloodstream into the connective tissue

d) have a form of biconvex discs

e) has a disk diameter of approximately 6.2–8.2 µm

40. Which of the pairs are correct?

a) hyalomere – platelet

b) bean-shaped nucleus – monocyte

c) nucleus – reticulocyte

d) hematopoietic stem cell – red bone marrow

Chapter Eight Answers:

1) bc
2) abc
3) ac
4) bd
5) abcd
6) ab
7) ab
8) ad
9) abc
10) ac
11) bc
12) abc
13) acd
14) ad
15) a
16) b
17) abd
18) ab
19) c
20) cd
21) b
22) d
23) abc
24) abd
25) b
26) bcd
27) acf
28) ac
29) d
30) b
31) c
32) acd
33) bcd
34) be
35) acdeg
36) abc
37) bcd
38) c
39) ce
40) abd

Chapter Nine: Muscle Tissue

1. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) the basic morphological unit of skeletal muscle is the striated muscle cell

b) the sarcoplasmic reticulum is a smooth endoplasmic reticulum that serves as a reservoir for calcium cations

c) skeletal muscle exhibits transverse striations because of the parallel arrangement of myofibrils in sarcomeres

d) the sarcolemma is the name given to a triad of structures – the cytoplasmic membrane, the basal lamina, and a fine network of reticular fibers

2. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) muscle fiber is a syncytium with centrally located nuclei

b) individual muscle fibers are surrounded by an epimysium

c) skeletal muscle has cross-striations

d) striated skeletal muscle is also found in the wall of some internal organs, for example, the cervical part of the esophagus

3. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) high mitochondrial content makes muscle fiber cytoplasm basophilic

b) the basis of muscle fiber contraction is the shortening of sarcomeres

c) myofibrils are made up of contractile myofilaments – titin and alpha-actinin

d) triads are formed by single terminal cisterna of the sarcoplasmic reticulum and a T-tubule

4. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) T-tubules are invaginations of sarcolemma conducting the action potential to the depth of the muscle fiber thus ensuring synchronized contraction of all myofibrils at the same time

b) a muscle fiber is a syncytium that may contain tens to hundreds of nuclei located just below the sarcolemma

c) anchoring of actin myofilaments to the Z-line by alpha-actinin is observed by conventional light microscopy staining

d) actin and myosin myofilaments interact with the troponin-tropomyosin complex during muscle contraction

5. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) slow oxidative muscle fibers have lots of myoglobin, mitochondria, and a rich capillary network

b) the basis of the transverse striation of skeletal muscle fibers is the alternation of A- and I-bands, which are clearly visible when stained for example with iron hematoxylin

c) the A stripe is made up exclusively of thick myosin myofilaments

d) the triad is a combination of a single T-tubule and a pair of terminal cisternae of the sarcoplasmic reticulum

6. Decide whether the following statements about the cardiac muscle tissue are true T or false F:

a) the cardiac muscle is striated and, like the skeletal muscles, can be controlled by will

b) cardiomyocytes are single- to double-nucleated cells that branch in an X- or Y-shape

c) the sarcoplasm of cardiomyocytes contains dyads – combinations of one terminal cisterna of the sarcoplasmic reticulum and one T-tubule

d) cardiomyocytes have most myofibrils in the vicinity of the cell nucleus

7. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) intercalated discs of cardiomyocytes consist entirely of gap junctions

b) cardiac muscle is richly vascularized – it contains capillaries of continuous type

c) cross-striations of cardiomyocytes are best seen in their transverse section

d) the endomysium around the cardiomyocytes is formed by dense connective tissue

8. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) cardiomyocytes have a less developed sarcoplasmic reticulum than skeletal muscle

b) the intercalated disc contains desmosomes and fasciae adherentes in addition to communicating junctions

c) the sarcoplasm of cardiomyocytes is basophilic

d) the nucleus of cardiomyocytes is located just below the sarcolemma

9. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) the cardiac muscle is capable of automatic, lifelong, tireless contraction

b) cardiomyocytes cannot be controlled at will because they have no striations

c) cardiomyocytes form a morphological syncytium

d) gap junctions of intercalated discs ensure synchronized contraction of the cardiac muscle

10. Decide whether the following statements about the skeletal muscle tissue are true T or false F:

a) cardiomyocytes require lots of energy and therefore up to 40% of their sarcoplasmic content consists of mitochondria

b) the intercalated discs can be observed at the level of light microscopy in longitudinal sections of cardiomyocytes

c) a lighter part around the nucleus of a cardiomyocyte which is devoid of myofibrils is called an endoplasm

d) unlike skeletal muscle fibers, the sarcolemma of cardiomyocytes is not invaginated in the form of T-tubules

11. Decide whether the following statements about the smooth muscle tissue are true T or false F:

a) smooth muscle cells form both morphological and functional syncytia

b) smooth muscle cells do not show striations because they do not contain actin and myosin myofilaments

c) a smooth muscle cell has a single nucleus in the center

d) the nucleus of a smooth muscle cell copies its shape – it is round

12. Decide whether the following statements about the smooth muscle tissue are true T or false F:

a) the smooth muscle cell is found together with the striated muscle cell in the thoracic part of the esophagus

b) smooth muscle cells have a more developed sarcoplasmic reticulum than skeletal muscle

c) the T-tubules and L-cisternae of the sarcoplasmic reticulum of smooth muscle cells form triads

d) actin myofilaments of smooth muscle cells are anchored into dense bodies

13. Decide whether the following statements about the smooth muscle tissue are true T or false F:

a) sarcolemma of smooth muscle cells does not invaginate in the form of T-tubules

b) smooth muscle cells are normally about 20 to 50 micrometers long

c) smooth muscle cells are surrounded by an endomysium

d) smooth muscle of a blood vessel wall can be controlled by will

14. Decide whether the following statements about the smooth muscle tissue are true T or false F:

a) smooth muscle cells transport calcium from the extracellular space via pinocytosis

b) myofibrils of smooth muscle cells are arranged in sarcomeres

c) calcium cations bind to troponin C, as in skeletal muscle

d) smooth muscle cells usually have two cell nuclei

15. Decide whether the following statements about the smooth muscle tissue are true T or false F:

a) calcium cations bind to calmodulin in smooth muscle

b) smooth muscle cells have more mitochondria than cardiomyocytes

c) smooth muscle sarcomeres are about 2,5 micrometers long

d) the nucleus of a smooth muscle cell is cigar shaped – it copies the spindle shape of the cell

16. Decide whether the following statements about the muscle tissue are true T or false F:

a) the muscle spindle is innervated by alpha-motoneurons

b) a motor unit is a group of muscle fibers innervated by the axon of a single alpha-motoneuron

c) the neuromuscular synapse of a muscle fiber is called a motor end plate

d) muscle spindles are responsible for proprioception

17. Decide whether the following statements about the muscle tissue are true T or false F:

a) energy is only needed for muscle contraction, the release of the actin-myosin complex occurs passively

b) titin is a giant protein ensuring the integrity of the entire sarcomere

c) the bundles of muscle fibers are surrounded with endomysium

d) the epimysium is made up of a fine layer of reticular fibers

18. Decide whether the following statements about the muscle tissue are true T or false F:

a) the troponin-tropomyosin complex is bound to myosin myofilaments

b) troponin I exposes the binding site for myosin on the actin filament in the presence of calcium bound to troponin C, which is essential for muscle fiber contraction

c) in the muscle fiber, calcium cations are bound to calmodulin

d) fast glycolytic type II B muscle fibers are pale because of low myoglobin content

19. Decide whether the following statements about the muscle tissue are true T or false F:

a) the major protein of muscle tissue intermediate filaments is myomesin

b) alpha-actinin is essential for binding actin myofilaments to the Z lines of sarcomeres

c) striation of muscle fibers is caused by repeating alternation of H-bands and M-lines

d) muscle cells are the only cell type capable of contraction

20. Decide whether the following statements about the muscle tissue are true T or false F:

a) in addition to muscle cells and fibers, other cells such as myofibroblasts or pericytes have a system of contractile myofilaments

b) dense bodies are typical components of cardiomyocytes

c) sarcoplasm is the cytoplasm of a muscle cell or muscle fiber

d) the perimysium is a connective tissue that surrounds bundles of muscle fibers

21. Why is striated muscle striated?

a) because of regular parallel arrangement of two kinds of myofilaments

b) because sarcomeres in adjacent myofibrils are in register

c) because of regular altering of myosin heavy and light chains

d) because of absence of calmodulin in striated cells

22. Which of the following statements about the cardiac muscle cells are true?

a) are called cardiomyocytes

b) are called leiomyocytes

c) contain one or two centrally located nuclei

d) are united in form of morphological syncytium

e) contain a few mitochondria

23. Which of the following statements about the cardiac muscle cells are true?

a) their euchromatic nucleus is peripherally located

b) cytoplasm is basophilic due to intensive protein-synthetic organelle content

c) their cytoplasm is eosinophilic due to high amount of mitochondria

d) display irregular shape of the cell (X, Y or Z-shaped cell) due to cell branches

e) contain triads (T-tubule and two cisternae of the sarcoplasmic reticulum)

24. Which of the following statements about the cardiac muscle cells are true?

a) are always uninuclear

b) are characterized by a significant regenerative ability due to presence of stem cells close to each cell

c) their cross striation is obvious especially in longitudinal section through the cardiac muscle tissue

d) contain dyads (T-tubule and one small cisterna of the sarcoplasmic reticulum)

e) their sarcomeres extend from one Z-line to the other

25. Which of the following statements about the intercalated discs are true?

a) are composed of fascia adherens, desmosomes and gap junctions

b) are composed of transverse and lateral components

c) co-create dyads

d) are found only among the cardiomyocytes of the conduction system

e) gap junctions are found on their lateral component

26. Which of the following statements about the cells of skeletal muscle tissue are true?

a) are called muscle fibers

b) are multinucleated syncytium

c) are formed by the fusion of myoblasts

d) can be several centimeters long

e) are a typical unit for myometrium in uterus

27. Which of the following statements about the microscopic anatomy of cells of skeletal muscle tissue are true?

a) have one or two centrally located cell nuclei

b) deep invaginations of sarcolemma are their typical ultrastructural features

c) stain basophilic in basic HE stain

d) their myofilaments form a spatial network (free arrangement)

e) the nuclei of these cells are located directly under the sarcolemma

f) are invested in the perimysium

g) contain well developed smooth endoplasmic reticulum called sarcoplasmic reticulum

28. Where to look for striated visceral muscle tissue?

a) in the tongue

b) in the uterus

c) in the pharynx

d) in the trachea

29. Which of the following statements about the thin myofilaments are true?

a) in smooth muscle cell are anchored to the dense bodies

b) their F-actin are double-stranded helices

c) their troponin consist of complex of four globular subunits

d) is composed of four light and two heavy chains

30. Which of the pairs are correct?

a) satellite cells – cardiac muscle

b) smooth muscle cell – calmodulin

c) cardiomyocytes – caveolae

d) sarcoplasmic reticulum – storage of Ca2+

31. In the following statement, correct the word to make this statement correct: Attachment is the initial stage of the contraction cycle; the myosin head is tightly bound to troponin molecule of the thin filament.

a) initial → final

b) head → tail

c) troponin → actin

d) thin → thick

32. Which of the following statements about the smooth muscle are true?

a) its basic morphological unit is a spindle-shaped cell enclosed in basal lamina and reticular fibers sheath

b) typically can be found in the tongue

c) is innervated by autonomous nervous system

d) forms the arrector muscle of hair

e) typically can be found in the wall of muscle artery

33. Which of the following statements about the smooth muscle cells are true?

a) are connected by special cell connections called intercalated discs

b) do not show striations because they do not contain actin and myosin myofilaments

c) their sarcoplasmic reticulum participates in the formation of triads

d) are interconnected by gap junctions

e) their intermediate filaments contain protein desmin

34. What do cardiac and smooth muscle have in common?

a) mitotic potential

b) efferent innervation by the autonomic nervous system

c) absence of cross-striation

d) deep and wide T-tubules

35. Which of the following proteins are creating part of Z-disc (Z-line) in sarcomere?

a) myomesin

b) α-actinin

c) troponin complex

d) filamin-C

36. Which of the following statements about the I-band are true?

a) defines the contractile unit of muscle fiber

b) is the site of interaction of tropomyosin and troponin M

c) comprises an overlap between actin and myosin filaments

d) shortens during muscle contraction

e) consists entirely of thin filaments

37. Which of the following statements about the motor end plate are true?

a) it is the neuroeffector synapse between Golgi type I motoneuron and skeletal muscle fiber.

b) the basal lamina of the muscle fiber is absent in the synaptic cleft

c) the neurotransmitter used here is acetylcholine

d) there are always several of these synapses on the surface of twitch muscle fiber

38. Which feature of skeletal muscle is directly proportionate to the strength of contraction?

a) size of motor units

b) thickness of endomysium

c) fiber diameter

d) number of T-tubules

39. Which of the following statements about the sarcomere are true?

a) myosin myofilaments are anchored to the M lines

b) H-band is not visible at maximal contraction

c) its length changes during contraction

d) actin filament shows ATPase activity

40. Which of the following statements about the endomysium of the skeletal muscle are true?

a) is argyrophilic

b) is made of dystrophin and desmin proteins

c) wraps individual muscle fibers

d) plays a role in the mechanical transmission of force

Chapter Nine Answers:

1) bcd
2) cd
3) b
4) abd
5) abd
6) bc
7) b
8) ab
9) ad
10) abc
11) c
12) ad
13) abc
14) a
15) ad
16) bcd
17) ab
18) bd
19) b
20) acd
21) ab
22) ac
23) cd
24) cde
25) abe
26) abcd
27) beg
28) ac
29) ab
30) bd
31) c
32) acde
33) de
34) b
35) bd
36) de
37) ac
38) c
39) abc
40) acd

Chapter Ten: Nerve Tissue

1. Decide whether the following statements about the nerve tissue are true T or false F:

a) the gray matter represents the accumulation of neuron bodies and glial cells

b) cranial nerves are part of the central nervous system

c) nerve ganglia are an example of neuron bodies located outside the central nervous system

d) spinal nerves and majority of cranial nerves are classified as peripheral nerves

2. Decide whether the following statements about the nerve tissue are true T or false F:

a) the endoneurium encloses each individual nerve fiber

b) individual peripheral nerves usually contain only one type of nerve fiber

c) the endoneurium is synonymous with myelin sheath

d) we can represent myelin sheaths by impregnation with OsO_4

3. Decide whether the following statements about the nerve tissue are true T or false F:

a) neurofibrils are best represented by conventional histological stains

b) myelin sheaths can be stained black using the Holmes method

c) the endoneurium is a fine connective tissue with a predominance of reticular fibers

d) peripheral nerves contain the bodies of neurons

4. Decide whether the following statements about the nerve tissue are true T or false F:

a) most peripheral nerves contain Schwann cells

b) myelinated nerve fibers of a peripheral nerve are surrounded by a sheath of astrocytes

c) unmyelinated nerve fibers allow saltatory conduction of nerve impulse

d) a single Schwann cell forms a myelin sheath around a portion of a nerve fiber

5. Decide whether the following statements about the nerve tissue are true T or false F:

a) a peripheral nerve contains dendrites of pseudounipolar neurons of spinal ganglia

b) most fibers in a peripheral nerve are not myelinated

c) the perineurium envelops bundles of nerve fibers in the peripheral nerve

d) peripheral nerves have their own vascular supply and innervation in the form of vasa nervorum and nervi nervorum

6. Decide whether the following statements about the nerve tissue are true T or false F:

a) the body of a neuron is also called the perikaryon or soma

b) alpha-motoneurons of the anterior horns of the spinal cord are classified as pseudo-unipolar neurons

c) neurons have a basophilic cytoplasm in the form of Nissl substance

d) Nissl substance is present in the body of a neuron as well as in all processes, including axons

7. Decide whether the following statements about the nerve tissue are true T or false F:

a) the most common type of neurons are multipolar neurons

b) pseudounipolar neurons share a common dendraxon that branches in a T-shape

c) axon can be identified by basic hematoxylin and eosin staining in the light microscope.

d) axons are devoid of Nissl substance

8. Decide whether the following statements about the nerve tissue are true T or false F:

a) a tigroid can be visualized with Luxol blue

b) all neurons of the human body have an axon

c) the plasma membrane of a neuron is also called the neurilemma

d) neurofibrils are visualized by Holmes' impregnation

9. Decide whether the following statements about the nerve tissue are true T or false F:

a) motoneurons are unipolar star-shaped neurons with a round, pale stained nucleus

b) an example of neurons that do not have an axon are amacrine cells of the retina

c) an axon is a centrifugal or efferent process

d) when a neuron has an axon, there is always an axon coming out of its body, which may branch

10. Decide whether the following statements about the nerve tissue are true T or false F:

a) a multipolar neuron has one dendrite and several axons

b) a unipolar neuron has only one process

c) an example of a multipolar neuron is a Purkinje cell of cerebellar cortex

d) as a long living cell, a neuron may contain lipofuscin in its cytoplasm

11. Decide whether the following statements about the nerve tissue are true T or false F:

a) microglia are part of the mononuclear phagocyte system

b) astrocytes are responsible for myelination in the central nervous system

c) gray matter contains protoplasmic astrocytes

d) neuroglia include satellite cells around pseudounipolar neurons of the spinal ganglia

12. Decide whether the following statements about the nerve tissue are true T or false F:

a) microglia can be demonstrated using impregnation according to del Rio Hortega

b) Membrana limitans glialis perivascularis is the term for blood-brain barrier formed by pedicles of astrocytes and continuous capillaries

c) oligodendrocytes form a myelin sheath around several nerve fibers

d) ependymal cells rest on the basement membrane

13. Decide whether the following statements about the nerve tissue are true T or false F:

a) ependymocytes line the central canal of the spinal cord and cerebral ventricles

b) fibrillary astrocytes are found in the white matter of the central nervous system

c) tanycytes are a special type of ependymal cells that are in contact with the capillaries of the brain

d) the ependyma is a type of simple cuboidal epithelium

14. Decide whether the following statements about the nerve tissue are true T or false F:

a) Golgi impregnation shows astrocytes in black color

b) Schwann cells form myelin sheaths in the central nervous system

c) satellite cells line the central canal of the spinal cord

d) astrocyte processes on the surface of the central nervous system form membrana limitans glialis superficialis

15. Decide whether the following statements about the nerve tissue are true T or false F:

a) we can show microglia by Golgi impregnation

b) neuroglial cells are much less numerous than neurons

c) fibrillary astrocytes are responsible for myelination within the central nervous system

d) satellite cells are neuroglial cells in the spinal ganglia

16. Decide whether the following statements about the nerve tissue are true T or false F:

a) myelinated nerve fibers transmit impulses more slowly than unmyelinated ones

b) Schwann cells form a Schwann sheath around unmyelinated nerve fibers

c) nodes of Ranvier are found on unmyelinated nerve fibers

d) the epineurium surrounds the whole nerve, the perineurium surrounds bundles of nerve fibers, and the endoneurium surrounds individual nerve fibers

17. Decide whether the following statements about the nerve tissue are true T or false F:

a) nerve tissue has an excellent regenerative capacity

b) the same cell population is responsible for myelination in both the CNS and PNS

c) myelinated nerve fibers can transmit impulses at 100–120 m/s due to their saltatory mechanism

d) myelin sheaths are best visualized using hematoxylin and eosin

18. Decide whether the following statements about the nerve tissue are true T or false F:

a) nerve fibers in the human body can be tens of meters long

b) Purkinje neurons are among the largest cells in the human body

c) Nissl substance is a term used exclusively to describe alpha-motor neurons in the anterior horns of the gray matter of the spinal cord

d) neurons have no cell nucleus

19. Decide whether the following statements about the nerve tissue are true T or false F:

a) the neuropil is part of the brain gray matter

b) white matter of the CNS is made up of neuronal processes, their sheaths, and glial cells

c) the perineurium contains fibroblasts arranged in an epithelioid pattern

d) a peripheral nerve contains a mixture of sensory and motor nerve fibers

20. Decide whether the following statements about the nerve tissue are true T or false F:

a) visceromotor and viscerosensory fibers always run separately outside the peripheral nerves, providing somatomotor and somatosensory innervation

b) the epineurium surrounds the entire peripheral nerve

c) the ability of the nervous system to change its activity by reorganizing synaptic connections is called plasticity

d) perineurium consists of elastic tissue

21. What are the types of glial cells in the CNS?

a) Bergmann glia

b) satellite cells

c) pituicytes

d) astroglial cells

e) Schwann cells

22. What is the name of the glial cell that act as phagocyte to aid in protecting CNS neurons?

a) microglia

b) oligodendrocyte

c) Schwann cell

d) ependymal cell

23. Fill in the two blanks with the correct option: When a neuron is depolarized, the gated channels of the membrane open to allow _____ to enter the neuron. A neuron becomes hyperpolarized when the gated channels of the membrane open thus allowing _____ to exit the neuron.

a) K+; Na+

b) Na+; K+

c) Mg2+; Ca2+

d) Ca2+; K+

24. When a neuron is hyperpolarized, it means that:

a) becomes more sensitive to new stimuli

b) responds as normal as it is its resting period

c) cannot respond to new stimuli

d) positive ions are entering into the neuron

25. Which of the following statements about neurons are true?

a) many neurons have a basophilic cytoplasm due to their intense protein-synthesizing activity

b) neurons generally have an euchromatic nucleus and a highly basophilic nucleolus

c) neurons may contain lipofuscin granules

d) the neuron's nucleus is usually large, round, and pale

e) the body of the neuron is also called axoplasm

26. Which of the following statements about the peripheral nerve are true?

a) contains bipolar neurons surrounded by satellite cells

b) is composed of fascicles of nerve fibers (axons), myelin sheaths and connective tissue coverings

c) comprises Schwann cells

d) comprises bodies of neurons

27. What does the cerebellar cortex contain?

a) pyramidal cells

b) Purkinje cells

c) has three layers

d) Purkinje fibers

e) granular neurons

28. Which of the following statements about the neuronal Nissl bodies are true?

a) extend into axon hillock

b) are accumulations of rough ER

c) are prominent cisterns of Golgi

d) can extend into the dendrites

29. Which of the following statements about the neuronal dendrites are true?

a) convey information away from the cell

b) in bipolar neurons, there must be at least two

c) carry information centripetally

d) are unmyelinated

e) usually are tapered

f) are terminated with an enlarged tip – bouton terminal

g) at their bases, they are generally wider than the axons

30. What is the role of kinesin in axonal transport?

a) is involved in retrograde transport

b) is microtubule-associated protein motor

c) is important in polymerization of microtubules

d) can hydrolyze ATP

e) carries material to the periphery

31. Which structures are closely related to the myelin sheath?

a) mesaxon

b) Schmidt-Lanterman clefts

c) nodes of Ranvier

d) Nissl bodies

e) paranodal loops

32. Which general statements about various neuronal types are true?

a) Purkinje neurons are among the smallest neurons in the CNS

b) multipolar neuron is found in the anterior horns of gray matter of the spinal cord

c) pseudounipolar neuron has a single process that bifurcates close to the perikaryon

d) great pyramidal neurons are principal sensitive neurons

33. Which of the following statements about the oligodendrocytes are true?

a) form the myelin sheaths in PNS

b) are responsible for the phagocytosis

c) are mainly found in the gray matter of the CNS

d) originate from a hematopoietic stem cell

e) participate in the formation of the blood-brain barrier

f) form myelin sheaths around multiple axons at once

34. Which of the following statements about the protoplasmic astrocytes are true?

a) are mainly found in the white matter of the CNS

b) originate from a hematopoietic stem cell

c) participate in the formation of the blood-brain barrier

d) provide physical and metabolic support for neurons

e) possess pedicles (vascular feet)

f) form a glial scar in the site of neuronal injury

35. Which of the following statements about the microglia are true?

a) originate from a hematopoietic stem cell

b) participate in the formation of the blood-brain barrier

c) are responsible for the phagocytosis

d) are found within the dorsal root ganglia

36. In the following statement, correct the word to make this statement correct: Regeneration of an axon distal to an injury site is called anterograde or Wallerian and occurs within hours of injury.

a) Regeneration → Degeneration

b) axon → dendrite

c) distal → proximal

d) anterograde → retrograde

e) hours → days

37. Which of the following cellular structures gives rise (origin) to the cell projection that conducts impulses away from the cell body?

a) Nissl bodies

b) axon hillock

c) centrosome

d) axoplasm

38. Which of the following statements about the ependymal cells are true?

a) are involved in the formation of cerebrospinal fluid

b) lining the blood vessels of the brain

c) may have cilia

d) lie on the basement membrane

e) are involved in the formation of blood-brain barrier

39. What are functions of the various glia?

a) repair of neuronal injury

b) physical support

c) clearance of neurotransmitters from synaptic clefts

d) synthesis of neurotransmitters

e) phagocytosis of cellular debris

40. What are the common excitatory neurotransmitters?

a) glutamate

b) serotonin

c) GABA (γ-aminobutiric acid)

d) norepinephrine

Chapter Ten Answers:

1) acd
2) ad
3) c
4) ad
5) acd
6) ac
7) abcd
8) d
9) bcd
10) bcd
11) acd
12) abc
13) abc
14) ad
15) d
16) bd
17) c
18) ab
19) abcd
20) bc
21) acd
22) a
23) b
24) c
25) abcd
26) bc
27) bce
28) bd
29) cdeg
30) bde
31) abce
32) bc
33) f
34) cdef
35) ac
36) a
37) b
38) ac
39) abce
40) abd

Winter Semester: Special Histology (Microscopic Anatomy of the Organ Systems)

Chapter One: Cardiovascular System

1. Decide whether the following statements about the heart are true T or false F:

a) the epicardium is the most superficial layer of the heart wall

b) the endothelium is a layer of the endocardium that is in direct contact with the blood

c) the thickest layer of the heart wall is the myocardium

d) cells of the cardiac conduction system are found in the subendothelial layer of the endocardium

2. Decide whether the following statements about the heart are true T or false F:

a) the myocardium is made up of layers of smooth muscle

b) Purkinje fibers are specialized nerve fibers of the cardiac conduction system

c) the epicardium and the visceral layer of the pericardium are identical structures

d) the epicardium includes a subepicardial layer with a large amount of adipose tissue

3. Decide whether the following statements about the heart are true T or false F:

a) Purkinje fibers are modified cardiomyocytes of the cardiac conduction system

b) the pericardium is a serous membrane formed by the parietal and visceral layers between which the pericardial cavity is located

c) the subepicardial layer contains branches of coronary arteries

d) the endocardium is lined by a single layer of mesothelial cells

4. Decide whether the following statements about the heart are true T or false F:

a) the thickest layer of the heart wall is the endocardium

b) Purkinje fibers are localized in the subendocardial layer of the heart ventricles

c) the heart like blood vessels has three basic layers – endocardium, myocardium, and epicardium

d) cardiomyocytes of the working myocardium are larger than Purkinje fibers

5. Decide whether the following statements about the heart are true T or false F:

a) the subendothelial layer consists of a dense connective tissue

b) epicardium is synonymous with the parietal layer of the pericardium

c) Purkinje fibers contain myofibrils, particularly around the nucleus

d) cardiac skeleton is formed by rings of a dense irregular connective tissue

6. Decide whether the following statements about the arteries are true T or false F:

a) the thickest wall of arteries is tunica media

b) muscular arteries contain predominantly elastic membranes in tunica media

c) an example of an elastic artery is the aorta

d) most arteries in the human body are of a muscular type

7. Decide whether the following statements about the arteries are true T or false F:

a) arteries tend to have a regular lumen on histological slides

b) fenestrated elastic membranes are found, for example, in the aorta

c) elastic arteries are mainly peripheral arteries of medium and small caliber

d) the internal elastic membrane of muscular arteries is generally well developed

8. Decide whether the following statements about the arteries are true T or false F:

a) up to 40 layers of smooth muscle cells are observed in tunica media of muscular arteries

b) tunica adventitia is the most developed layer in arteries

c) elastic arteries have no vasa vasorum in the wall – all nutrients and oxygen are supplied by diffusion from the circulating blood

d) the internal elastic membrane of arterioles is usually well developed

9. Decide whether the following statements about the arteries are true T or false F:

a) tunica media of arterioles consists of 1–5 layers of smooth muscle cells

b) the subendothelial layer of elastic arterioles may contain smooth muscle cells

c) tunica adventitia of elastic arteries contains both vasa vasorum and nervi vasorum

d) the only difference between muscular and elastic arteries is the structure of the media

10. Decide whether the following statements about the arteries are true T or false F:

a) the endothelium of all types of arteries consists of a single layer of flat cells which are in direct contact with the blood

b) all largest arteries leaving the heart are of elastic type

c) arteries generally have an irregular, collapsed lumen

d) the external elastic membrane is best developed in arterioles

11. Decide whether the following statements about the veins are true T or false F:

a) the thickest layer of the vein wall is tunica adventitia

b) postcapillaries are the smallest veins, consisting only of endothelium and pericytes

c) in muscular venules, smooth muscle cells are gradually replaced by pericytes

d) the valves of veins are duplications of tunica intima

12. Decide whether the following statements about the veins are true T or false F:

a) small caliber veins are characterized by well defined lamina elastica interna

b) large veins contain many smooth muscle cells in tunica adventitia in the direction of the long axis of the vein

c) veins generally have an irregular lumen when cut transversally

d) most smooth muscle cells in the wall of large veins are found in tunica media

13. Decide whether the following statements about the veins are true T or false F:

a) unlike the wall of arteries, the wall of veins does not contain vasa vasorum

b) the thickest layer of the vein wall is tunica intima

c) the collapsed, irregular lumen is one of the main features that distinguishes veins from arteries on histological section

d) vasa vasorum of the vein walls are more numerous than in the arteries because the blood circulating in the veins is poor in oxygen and nutrients

14. Decide whether the following statements about the veins are true T or false F:

a) the thickest layer of the vein wall is tunica media

b) venules have a wider lumen than postcapillaries

c) erythrocytes are often seen in the lumen of venules

d) tunica adventitia is best visible in collecting venules

15. Decide whether the following statements about the veins are true T or false F:

a) venous valves are duplications of tunica media

b) smooth muscle cells of the vein wall can produce all components of the extracellular matrix

c) valves of veins are most abundant in veins of the lower extremities

d) all veins in the human body, without exception, are lined by flat endothelial cells

16. Decide whether the following statements about the blood capillaries are true T or false F:

a) sinusoids are capillaries with a continuous lining

b) capillaries with fenestrations without diaphragms (capillaries with pores) are found only in the glomeruli of the renal corpuscle

c) capillaries with a continuous epithelium are found, for example, in a connective tissue or skeletal muscle

d) fenestrated capillaries are localized, for example, in the intestine or endocrine organs

17. Decide whether the following statements about the blood capillaries are true T or false F:

a) sinusoids have a wide lumen, fenestrations, pores, and a discontinuous basal lamina

b) sinusoids are found in the spleen, liver, and bone marrow

c) the different types of capillaries can be reliably distinguished under the light microscope

d) sinusoids are about 7 micrometers in diameter

18. Decide whether the following statements about the blood capillaries are true T or false F:

a) capillaries with a continuous lining are also called somatic capillaries

b) capillaries with fenestrations are also known as visceral capillaries

c) capillaries, like other blood vessels, are made up of three layers

d) pericytes around capillaries are capable of contraction

19. Decide whether the following statements about the blood capillaries are true T or false F:

a) capillaries with continuous lining are found, for example, in the adenohypophysis or bone marrow

b) sinusoids have a wider lumen compared to other types of capillaries

c) the width of the lumen is the only feature that distinguishes sinusoids from other types of capillaries

d) sinusoids are found in the bone marrow or adenohypophysis

20. Decide whether the following statements about the blood capillaries are true T or false F:

a) capillaries with a continuous lining are found in organs with intensive metabolism

b) all capillaries have a diameter of about 40 micrometers

c) capillaries do not have their own tunica media; its function is replaced by pericytes

d) pericytes can influence capillary permeability

21. What is the most common tissue found in the walls of arteries?

a) elastic tissue

b) dense connective tissue

c) muscle tissue

d) epithelial tissue

22. What are the different types of blood capillaries?

a) of continuous type

b) fenestrated

c) of muscle type

d) sinusoids

23. In which organs are fenestrated capillaries found?

a) small intestine mucosa

b) brain

c) most of endocrine glands

d) skeletal muscles

24. Which of the following statements about the valves in vessels are true?

a) are most commonly found in the arteries of the lower extremities

b) are duplicature of tunica intima together with tunica media

c) are covered by the vascular endothelium

d) prevent backflow of blood in the extremities

25. Which of the following statements about the pericytes are true?

a) wrap around the endothelial cells

b) in brain capillaries, they help form the blood-brain barrier

c) are present in tunica media of the larger arteries

d) communicate with each other using gap junctions

e) have spindle-shaped morphology without cytoplasmic projections

26. How does a vein differ from a comparably sized artery?

a) the vein has thicker tunica media

b) the vein can contain valves

c) the vein more often contains blood

d) the vein has a more regular lumen

e) the vein may not contain tunica intima

f) vein usually has a greater representation of smooth muscle in tunica adventitia

27. What are the arteries of elastic type?

a) arteria pudenda media

b) arteria mesenterica inferior

c) aorta

d) truncus pulmonalis

28. How lymphatic capillaries differ from blood capillaries?

a) start blindly

b) usually have a smaller diameter

c) erythrocytes are found here, but in smaller quantities

d) have a looser endothelium with larger fenestrae

29. How do we selectively visualize typical structures in tunica media of the aorta?

a) resorcin-fuchsin

b) azan

c) HE

d) Sudan black

e) orcein

30. Which of the following statements about vasa vasorum are true?

a) are not located in tunica media of the arteries

b) are more abundant in the wall of veins than in arteries

c) serve to supply the walls of blood vessels with oxygen and nutrients

d) larger vasa vasorum may contain additional vasa vasorum in their wall

31. Which of the following statements about membrana elastica interna are true?

a) forms the boundary between tunica media and tunica adventitia in many arteries

b) despite its name, it is not made up of elastic fibers

c) it is most pronounced in muscular arteries

d) in histological slides runs in a wavy pattern

32. Which of the following general statements about the blood capillaries are true?

a) their tunica media is made of 2 to 5 layers of smooth muscle cells

b) their wall can contain pericytes

c) are lined by flat endothelial cells and their lamina basalis, which may be continuous or discontinuous

d) their endothelium is composed of cuboidal cells and deposited on lamina basalis

33. Which of the following general statements about the Purkinje fibers are true?

a) are located in the subendocardial connective tissue

b) are made up of specialized neurons

c) specialize in spreading action potential

d) contain a lot of glycogen, so their cytoplasm is bright in HE-stained paraffin sections

e) are found on atrial preparations of the heart

34. Which of the following statements about the endothelium are true?

a) is also found in the brain capillaries

b) the endocardium of the heart is lined with cuboidal endothelial cells

c) forms the innermost single layer lining of vessels and is deposited longitudinally in the direction of blood flow

d) is a significant source of hormones

e) is not found in lymphatic vessels

35. What tissue is the epicardium covered with?

a) stratified squamous epithelium

b) loose connective tissue

c) simple squamous epithelium

d) dense connective tissue (capsule)

36. Which of the following cell junctions are a typical structure of an intercalated disc?

a) gap junctions

b) zonulae occludentes

c) fasciae adherentes

d) hemidesmosomes

e) desmosomes

37. What are the hormones produced by the myocardium called?

a) atrial natriuretic factor

b) cardiac natriuretic peptide

c) antidiuretic hormone

d) brain natriuretic peptide

38. In the following statement, correct the word to make this statement correct: Vasculogenesis is the physiological process through which new blood vessels form from pre-existing vessels formed in the earlier stages.

a) Vasculogenesis → Angiogenesis

b) physiological → always pathological

c) blood → lymphatic

d) pre-existing vessels → pre-existing blood islands

39. Which of the pairs are correct?

a) membrana elastica interna – muscular artery

b) Purkinje fibers – gap junctions

c) pericardial cavity – mesothelium

d) papillary muscles – smooth muscle cells

e) tachycardia – nervus vagus

40. What are the average diameters of the different blood vessels in adulthood?

a) elastic arteries: 1 to 4 cm

b) blood capillaries: 50 to 150 µm

c) arterioles: 10 to 100 µm

d) muscular arteries: 0.1 to 10 mm

41. Decide whether the following statements about the development of the cardiovascular system are true T or false F:

a) the cardiovascular system begins to develop in the 5th week after fertilization

b) the heart begins to develop as two endocardial heart tubes, which fuse together to form a single heart tube

c) the first blood vessels develop extraembryonically in the wall of the yolk sac

d) ductus venosus is the junction between the umbilical vein and the inferior vena cava, bypassing the liver

42. Decide whether the following statements about the development of the cardiovascular system are true T or false F:

a) the heart begins to beat 22–23 days after fertilization.

b) the dorsal aorta arises from the intermediate mesoderm.

c) first blood vessels begin to develop from the splanchnopleure of the lateral mesoderm.

d) the right vitelline vein gives rise to the portal circulation of the liver

43. Decide whether the following statements about the development of the cardiovascular system are true T or false F:

a) bulbus cordis is the part of the primitive heart from which the atria develop

b) the cardinal veins flow from the wall of the yolk sac into the venous sinus

c) the aortic sac is associated with the outflow part of the primitive heart

d) foramen primum gives rise to future foramen ovale

44. Decide whether the following statements about the development of the cardiovascular system are true T or false F:

a) sinus venosus is partly involved in the development of the atria

b) during septation of the heart, septum intermedium is formed, which gives rise to the right and left atria

c) septation of the atria and ventricles does not occur simultaneously – the atria divide first, followed by the ventricles

d) at the same time as septum primum has been attaching to septum intermedium, apoptosis forms an opening in septum primum called foramen secundum

45. Decide whether the following statements about the development of the cardiovascular system are true T or false F:

a) foramen ovale patens (apertum) is a congenital developmental defect of septation of the ventricles

b) cor sigmoideum already occurs at the stage of paired endocardial heart tubes

c) bulbar ridges and ridges in truncus arteriosus are associated with the development of the future aorta and truncus pulmonalis, and neural crest cells are involved in their formation

d) septum aorticopulmonale has a spiral course and is therefore also referred to as septum spirale

46. From what tissue are the very first blood islands formed?

a) splanchnic mesoderm

b) neural crest cells

c) extraembryonic mesenchyme

d) epiblast

47. What are the tributaries of sinus venosus during embryonic development?

a) vitelline vein

b) dorsal aorta

c) common cardinal vein (duct of Cuvier)

d) umbilical vein

48. Which of the following pairs of embryonic vessels and the definitive vessels formed from them are correct?

a) 2nd aortic arch – maxillary artery

b) vitelline artery – coeliac trunk

c) right umbilical vein – hepatic veins

d) left 4th aortic arch – left pulmonary artery

49. Which of the following happen during cardiac looping?

a) primitive atrium moves cranially and dorsally

b) sinus venosus becomes part of right ventricle

c) the right and left atrium develop symmetrically

d) bulbus cordis continues to expand

50. Which structures may be dysfunctional in atrial septal defects?

a) cono-truncal ridges

b) septum intermedium

c) septum primum

d) septum secundum

Chapter One Answers:

1) abc
2) cd
3) abc
4) bc
5) d
6) acd
7) abd
8) a
9) abc
10) ab
11) abcd
12) bc
13) cd
14) bc
15) bc
16) bcd
17) ab
18) abd
19) bd
20) cd
21) c
22) abd
23) ac
24) cd
25) abd
26) bcf
27) cd
28) ad
29) ae
30) bcd
31) cd
32) bc
33) acd
34) acd
35) c
36) ace
37) ad
38) ad
39) abc
40) acd
41) bcd
42) ad
43) c
44) ad
45) cd
46) c
47) acd
48) b
49) ad
50) cd

Chapter Two: Lymphatic System

1. Decide whether the following statements about the lymphatic system are true T or false F:

a) the lymph node is an encapsulated lymphoid organ

b) all secondary lymphoid organs have both afferent and efferent lymphatic vessels

c) the paracortex of a lymph node consists of lymphoid follicles

d) lymphoid follicles together with dendritic cells are key components of the lymph node cortex

2. Decide whether the following statements about the lymphatic system are true T or false F:

a) impregnation with silver salts shows reticular fibers which form a fine stroma of the lymph node

b) the lymph node contains only efferent lymphatic vessels

c) palatine tonsils are covered by a stratified squamous non-keratinized epithelium

d) tonsils are part of the MALT system – mucosa-associated lymphoid tissue

3. Decide whether the following statements about the lymphatic system are true T or false F:

a) a lymph node is also called a lymphoid follicle

b) lymphoid follicles form B-dependent zones in secondary lymphoid organs

c) tonsils are partially encapsulated lymphoid organs

d) a primary lymphoid follicle has a bright germinal center

4. Decide whether the following statements about the lymphatic system are true T or false F:

a) secondary activated lymphoid follicles have a bright germinal center

b) the MALT system is a non-encapsulated organ of the lymphatic system

c) palatine tonsils are covered by a stratified columnar epithelium with cilia and goblet cells

d) the marginal sinus lies just below the lymph node capsule and receives lymph from afferent lymphatic vessels

5. Decide whether the following statements about the lymphatic system are true T or false F:

a) primary lymphoid follicles contain B lymphocytes that have not yet came into contact with an antigen

b) the paracortex of the lymph node is a T-dependent zone that is not organized into lymphoid follicles

c) the lymph node is a lymph filter between afferent and efferent lymphatic vessels

d) tonsils are the only component of the MALT system

6. Decide whether the following statements about the thymus are true T or false F:

a) the thymus is a primary lymphoid organ

b) the stroma of a thymus is formed by a reticular connective tissue

c) the cortex of a thymus contains lymphoid follicles

d) T lymphocytes acquire immunocompetence in the thymus

7. Decide whether the following statements about the thymus are true T or false F:

a) the reticular epithelium in the thymus provides support for T lymphocytes

b) thymus parenchyma is divided into pseudolobules by connective tissue septa

c) the thymus cortex contains developing T lymphocytes, giving it a dark appearance in routine hematoxylin and eosin staining method

d) Hassall's bodies are observed in thymic cortex

8. Decide whether the following statements about the thymus are true T or false F:

a) thymus contains both afferent and efferent lymphatic vessels

b) maturation of B lymphocytes takes place in the thymus

c) Hassall's bodies are found in thymic medulla

d) Hassall's bodies resemble layers of an onion in histological slides from a thymus

9. Decide whether the following statements about the thymus are true T or false F:

a) thymus reaches its maximum size in adulthood

b) thymic cortex is paler when stained with hematoxylin and eosin

c) connective tissue septa divide the thymus into right lobules

d) during process of maturation, T lymphocytes in the thymus are separated from blood by the blood-thymus barrier

10. Decide whether the following statements about the thymus are true T or false F:

a) thymus contains only efferent lymphatic vessels

b) Hassall's bodies are clearly eosinophilic structures of the thymic medulla

c) involution of the thymus occurs during aging and causes its disappearance

d) up to 97% of naive T lymphocytes are lost through the process of positive selection in the cortex of the thymus

11. Decide whether the following statements about the spleen are true T or false F:

a) in the spleen we distinguish a peripheral cortex and an inner medulla which is common to several pseudolobules

b) white pulp of the spleen is made up of splenic lymphoid follicles

c) PALS is part of the red pulp of the spleen

d) arteriola centralis is located peripherally on histological slides from splenic lymphoid follicles

12. Decide whether the following statements about the spleen are true T or false F:

a) stroma of the spleen is formed by cords of Billroth of the red pulp as part of the reticular connective tissue

b) red pulp of the spleen contains continuous capillaries

c) trabeculae divide the spleen into true lobes

d) all types of blood formed elements are part of the red pulp

13. Decide whether the following statements about the spleen are true T or false F:

a) PALS of the white pulp of the spleen is a T-dependent zone

b) splenic lymphoid follicles are part of the red pulp of the spleen

c) red pulp of the spleen is composed of reticular epithelium

d) spleen has only closed type of blood microcirculation

14. Decide whether the following statements about the spleen are true T or false F:

a) wide sinusoids are typically found in the red pulp of the spleen

b) in the closed circulation, blood from the penicillary arteries flows between the cords of the red pulp

c) spleen is a secondary lymphoid organ whose stroma is formed by a reticular tissue

d) spleen is the largest solid lymphoid organ in the human body

15. Decide whether the following statements about the spleen are true T or false F:

a) white pulp of the spleen is composed exclusively of primary lymphoid nodules

b) old erythrocytes that are unable to pass through the cords of the red pulp back to the sinusoids are phagocytosed by macrophages

c) the blood circulation of the human spleen is both open and closed, with the open system being predominant

d) spleen is the only lymphoid organ in the human body where lymphoid tissue is always associated with arteries

16. Decide whether the following statements about the lymphatic system are true T or false F:

a) processus vermiformis is part of a MALT system

b) lymphoid nodules in processus vermiformis are mostly of primary type

c) the germinal center of lymphoid nodules is a morphological manifestation of activated humoral adaptive immunity

d) MALT system can be found in the digestive and respiratory systems, where it is called GALT and BALT respectively

17. Decide whether the following statements about the lymphatic system are true T or false F:

a) primary lymphoid organs include the thymus and bone marrow

b) the thymus consists of a darker peripheral cortex and a lighter central medulla

c) capsules of all lymphoid organs are made up of a dense connective tissue

d) secondary lymphoid organs do not contain lymphoid nodules

18. Decide whether the following statements about the lymphatic system are true T or false F:

a) PALS of the spleen is located around sinusoids

b) thymus is the only lymphoid organ stroma of which is formed by epithelium rather than connective tissue

c) Peyer's patches of a small intestine are part of the MALT, more precisely the GALT system

d) the germinal center contains both centroblasts and centrocytes which results in paler staining of the center of the lymphoid follicle in hematoxylin and eosin

19. Decide whether the following statements about the lymphatic system are true T or false F:

a) we can easily distinguish individual cell populations within a germinative center when using conventional staining methods

b) PALS is a T-dependent zone of the red splenic pulp

c) white and red pulp are names based on the staining of these splenic components using hematoxylin and eosin

d) the palatine tonsil as a part of the Waldeyer's lymphoid ring is lined by a stratified squamous non-keratinized epithelium

20. Decide whether the following statements about the lymphatic system are true T or false F:

a) the stroma of tonsils is composed of a reticular epithelium

b) because tonsils are in constant contact with the external environment, they always contain at least one secondary lymphoid nodule

c) the red pulp of the spleen is composed of reticular connective tissue, macrophages, blood vessels including wide sinusoids, and all formed blood elements with a predominance of erythrocytes

d) the parenchyma of a thymus is divided into right lobes by connective tissue septa

21. What are the primary lymphoid organs?

a) thymus

b) yellow bone marrow

c) palatine tonsil

d) red bone marrow

e) spleen

22. Where HEV (high endothelial venules) can be found?

a) spleen

b) thymic cortex

c) paracortex of the lymph node

d) Peyer’s patches

e) medulla of the lymph node

f) tonsils of Waldeyer's ring

23. What are the T-dependent zones of different lymphoid organs?

a) splenic red pulp

b) periarteriolar lymphoid sheath of the spleen

c) deep cortex (paracortex) of the lymph node

d) cortex of the lymph node

e) splenic Malpighian corpuscle

24. Which of the following statement about the thymus are true?

a) its cortex is a primary lymphoid organ

b) its septa divide the parenchyma into pseudolobules

c) in its medulla, B lymphocytes can be seen

d) in its cortex, the corpuscles (bodies) of Hassall are formed

25. Which of the following statements about the blood-thymus barrier are true?

a) is mostly formed by Hassall's corpuscles (bodies)

b) its main purpose is to prevent cortical T lymphocytes from interacting with foreign macromolecules

c) is a functional and selective barrier separating T lymphocytes from blood in the medulla of the thymus

d) is co-formed by continuous blood capillaries

e) is co-formed by type I epithelial reticular cells

26. What structures can be found in the spleen?

a) marginal zone

b) Hassall's corpuscles

c) cords of Billroth

d) periarteriolar lymphoid sheath

e) sinusoids

f) paracortex

27. Which of the following statements about the lymph are true?

a) is enriched with antibodies as it passes through the medullary cords of lymph nodes

b) the transfer of tissue fluid into lymphatic capillaries leads to its production

c) can contain also erythrocytes

d) does not contain T lymphocytes or macrophages

e) it is generally similar to blood plasma

f) also transports fats from the digestive system

g) is picking up bacteria and transports them to the circulation

28. What do the spleen and lymph node have in common?

a) filter the blood

b) contain sinusoids (sinuses)

c) contain lymphoid follicles

d) are encapsulated

29. What do lymphatic and blood vessels have in common?

a) both can have valves

b) are lined with endothelium

c) both start blindly in the intercellular spaces

d) both are entering the tonsils

30. Which of the following statements about the lymphoid follicles are true?

a) the development of their germinal center corresponds to the humoral immune response of B lymphocytes

b) secondary lymphoid follicles do not have a mature germinal center

c) their mantle zone contains centroblasts

d) contain follicular dendritic cells

31. Where under physiological conditions can a lymphoid follicle be found?

a) in tonsilla pharyngea

b) in the spleen

c) in the thymic cortex

d) in the paracortex of the lymph node

32. What different sinuses can be found in the lymph node?

a) subcapsular (marginal) sinus

b) venous sinus

c) perinodular (paratrabecular, intermediary) sinus

d) medullary sinus

e) paranasal sinus

33. The reticular tissue creates a delicate stroma of which lymphoid organs?

a) spleen

b) lymph node

c) thymus

d) bone marrow

34. Which of the following statements about the T lymphocyte are true?

a) acquires its immunocompetence in the thymus

b) its activated stage is called a plasma cell and produces antibodies

c) in the lymph node, it is predominantly found in the cortical part of the lymph node

d) it is also responsible for cell-specific immunity

e) in the spleen, it is predominantly found in the periarteriolar lymphoid sheath (PALS)

f) once activated, it is responsible for the humoral component of the immune response – it produces complement proteins

g) the nucleus-cytoplasm ratio is shifted in favor of the nucleus

35. Which of the following statements about the tonsils are true?

a) are completely encapsulated

b) lymph is supplied to them by afferent lymphatic vessels (several)

c) their epithelium may be interspersed with lymphocytes (follicle associated epithelium)

d) they do not contain lymphoid nodules

36. Which of the following pairs related to the lymph node are correct?

a) medullary cords – macrophages

b) paracortex – high endothelial venules

c) stroma – argyrophilic staining

d) connective tissue capsule – plasma cells

e) subcapsular (marginal) sinus – plasma cells

37. Which of the following statements about the immunity are true?

a) a clone is a collection of cells of genetically identical origin

b) activated macrophages secrete cytokines with the function of chemotaxis and promoting inflammation

c) phagocytosis is one of the cellular mechanisms of acquired immunity

d) antigen-presenting cells have MHC class II molecules

38. Which description of all the secondary lymphoid organs are true?

a) contain lymphoid follicles

b) their delicate stroma is made of reticular epithelial cells

c) contain crypts with detritus

d) are filtering lymph

e) possess afferent lymphatic vessels

39. Which of the following statements about the Hassall's corpuscles are true?

a) occur in the thymic cortex

b) disappear during thymic involution at puberty and adulthood

c) are clusters of degenerating and transformed T lymphocytes

d) are formed from eosinophilic type VI epithelial reticular cells

e) their epithelial cells contain keratohyalin

40. Decide whether the following statements about the development of the lymphatic system are true T or false F:

a) the reticular epithelium of the thymus develops from the first ectodermal pharyngeal cleft

b) the spleen develops from mesenchymal cells located between the layers of the dorsal mesogastrium

c) the palatine tonsil develops from the 2nd endodermal pharyngeal pouch and surrounding mesenchyme

d) the lymph nodes are of endodermal origin

41. Decide whether the following statements about the development of the lymphatic system are true T or false F:

a) the reticular epithelium of the thymus develops from the third endodermal pharyngeal pouch

b) the spleen develops from the endoderm of the foregut

c) the palatine tonsil develops from the third endodermal pharyngeal pouch and surrounding mesenchyme

d) neural crest cells play an important role in the development of the thymus

42. Which pharyngeal pouches contribute to the formation of lymphoid organs?

a) 1st

b) 2nd

c) 3rd

d) 4th

43. Which of the following statements about the development of the spleen are true?

a) develops from the mesenchymal condensation in the lesser sac

b) accessory spleens may develop near the hilum of the spleen

c) is derivative of the gut endoderm

d) is derivative of the mesoderm

44. Which of the following statements about the development of the lymphatic vessels are true?

a) start to appear together with blood vessels

b) arise by the processes of vasculogenesis and angiogenesis

c) arise from mesenchymal precursors

d) arise from the extraembryonic mesoderm

45. Which element would likely be missing in a newborn case where the innate immune system is functional but the adaptive immune system is not yet developed?

a) intact covering epidermis

b) macrophages

c) neutrophils

d) IgMs

46. Which of the following zones of the lymphoid organs would develop as hypoplastic in case of a developmental disorder involving the third pharyngeal pouch?

a) paracortex of the lymph nodes

b) red pulp of the spleen

c) PALS of the spleen

d) medulla of the lymph nodes

e) cortex of the lymph nodes

f) mantle zone of Malpighian corpuscles of the spleen

Chapter Two Answers:

1) ad
2) acd
3) bc
4) abd
5) abc
6) ad
7) abc
8) cd
9) d
10) abd
11) bd
12) ad
13) a
14) acd
15) bcd
16) acd
17) abc
18) bcd
19) d
20) bc
21) ad
22) cdf
23) bc
24) abc
25) bde
26) acde
27) abef
28) bcd
29) ab
30) ad
31) ab
32) acd
33) abd
34) adeg
35) c
36) abc
37) abd
38) a
39) de
40) bc
41) ad
42) bc
43) abd
44) bc
45) d
46) ac

Chapter Three: Endocrine System

1. Decide whether the following statements about the endocrine system are true T or false F:

a) histologically, the neurohypophysis is composed of endocrine glandular epithelium

b) Herring neurosecretory bodies are found in the pars distalis of the adenohypophysis

c) chromophil cells are part of the adenohypophysis

d) like the liver, the adenohypophysis contains a portal system

2. Decide whether the following statements about the endocrine system are true T or false F:

a) the neurohypophysis is histologically a nervous tissue that does not contain glandular epithelial cells and does not produce hormones

b) chromophobe and chromophil cells are the two main cell populations of the adenohypophysis and are present in approximately equal numbers

c) acidophilic cells of the adenohypophysis produce hormones that act on other endocrine glands in the body

d) acidophilic cells of the adenohypophysis are more numerous than basophilic cells

3. Decide whether the following statements about the endocrine system are true T or false F:

a) Herring bodies represent accumulations of vesicles containing antidiuretic hormone and oxytocin

b) hormones stored in Herring bodies are the product of neurons in the hypothalamus

c) pituicytes are one of the cell populations of the adenohypophysis

d) glandotropic hormones are a product of the basophilic cells of the adenohypophysis

4. Decide whether the following statements about the endocrine system are true T or false F:

a) the hypophyseal-portal system is formed by two capillary beds connected in series

b) the adenohypophysis contains capillaries with a continuous endothelial lining

c) Rathke's follicles are found in the neurohypophysis as remnants of the Rathke's pouch

d) chromophil cells of the adenohypophysis produce liberins and statins

5. Decide whether the following statements about the endocrine system are true T or false F:

a) the adenohypophysis is composed of endocrine glandular epithelium arranged in irregular cords and nests

b) pituicytes are neuroglial cells of the neurohypophysis

c) the adenohypophysis contains two populations of cells – chromophobe and chromaffin

d) the pituitary gland is a gland functionally superior to the hypothalamus, the activity of which it influences

6. Decide whether the following statements about the endocrine system are true T or false F:

a) basophilic cells make up about 10% of epithelial cells of the adenohypophysis

b) the hypothalamus has a superior position within the hypothalamo-hypophyseal axis

c) the neurohypophysis contains mainly Herring bodies, unmyelinated axons, and pituicytes

d) chromophobe cells are a distinct cell population of the adenohypophysis

7. Decide whether the following statements about the endocrine system are true T or false F:

a) chromophobe cells of the adenohypophysis stain pink with eosin

b) the adenohypophysis contains blood capillaries with fenestrations

c) the adenohypophysis and neurohypophysis are morphologically and functionally identical

d) folliculostellate cells are glial cells of the neurohypophysis

8. Decide whether the following statements about the endocrine system are true T or false F:

a) the pineal gland contains glial cells called pituitary cells

b) the parenchyma of the pineal gland is formed by the endocrine glandular epithelium

c) the two main cell populations of the pineal gland are astrocytes and pinealocytes

d) the product of the pinealocytes is melatonin, which regulates circadian rhythms

9. Decide whether the following statements about the endocrine system are true T or false F:

a) part of the pineal gland are extracellular calcified bodies called corpora arenacea

b) a pinealocyte is a spherical cell without processes

c) astrocytes of the pineal gland can be distinguished from pinealocytes by the shape of the nucleus

d) astrocytes have a dark flattened cell nucleus

10. Decide whether the following statements about the endocrine system are true T or false F:

a) pinealocytes have a large cell nucleus with 1–2 visible nucleoli

b) connective tissue arising from pia mater divides the parenchyma of the pineal gland into lobules

c) melatonin is a product of astrocytes of the pineal gland

d) many myelinated axons surround the pinealocytes and astrocytes of the pineal gland

11. Decide whether the following statements about the endocrine system are true T or false F:

a) the thyroid gland is an endocrine organ with a follicular arrangement of glandular epithelium

b) T3 and T4 are products of parafollicular thyroid cells

c) colloid is the name given to the storage form of thyroid hormones with thyroglobulin being the basic component

d) the stroma of the thyroid gland contains many fenestrated capillaries

12. Decide whether the following statements about the endocrine system are true T or false F:

a) chief cells of the parathyroid gland have an acidophilic cytoplasm

b) oxyphil cells of the parathyroid gland produce parathormone

c) the parathyroid gland contains several fat cells, the number of which increases with age

d) oxyphil cells of the parathyroid gland form clusters and are less numerous than chief cells

13. Decide whether the following statements about the endocrine system are true T or false F:

a) chief cells of the parathyroid gland are larger than oxyphil cells

b) chief cells of the parathyroid gland have a basophilic cytoplasm and oxyphil cells have an eosinophilic cytoplasm

c) the surface of the parathyroid gland is covered by a fibrous capsule

d) the stroma of the parathyroid gland contains capillaries with a continuous endothelial lining

14. Decide whether the following statements about the endocrine system are true T or false F:

a) the thyroid gland contains parafollicular cells which produce calcitonin

b) follicular cells of the thyroid gland are lining follicles in a single layer

c) parafollicular cells of the thyroid gland are located in the fibrous stroma

d) thyroid follicular cells are about a thousand times less numerous than parafollicular cells

15. Decide whether the following statements about the endocrine system are true T or false F:

a) the thyroid gland is covered by a connective tissue capsule

b) the amount of fat cells in the parathyroid gland decreases with age

c) the parathyroid gland is an example of a follicular arrangement of glandular epithelium

d) parafollicular thyroid cells are larger and less numerous than follicular cells

16. Decide whether the following statements about the endocrine system are true T or false F:

a) the adrenal cortex contains chromaffin cells

b) chromaffin cells of the adrenal gland are named after the staining of their cytoplasm with common dyes

c) zona fasciculata of the adrenal cortex is the thickest of its three layers

d) zona reticularis of the adrenal cortex is located at the border with the medulla

17. Decide whether the following statements about the endocrine system are true T or false F:

a) the adrenal medulla is a developmentally modified sympathetic ganglion

b) chromaffin cells of the adrenal medulla have an affinity for chromium salts

c) cells of zona fasciculata of the adrenal cortex have a dark cytoplasm

d) zona fasciculata of the adrenal cortex is located just below the capsule

18. Decide whether the following statements about the endocrine system are true T or false F:

a) a chromaffin cell is a modified postsynaptic neuron of the adrenal gland medulla that produces catecholamines

b) the stroma of the adrenal cortex is made up of a dense connective tissue.

c) blood capillaries of the adrenal cortex are of fenestrated type

d) cells of zona fasciculata of the adrenal cortex are pale due to the high content of fat droplets

19. Decide whether the following statements about the endocrine system are true T or false F:

a) lipofuscin granules can be seen in epithelial cells of zona reticularis of the adrenal cortex

b) glandular cells of the adrenal cortex are surrounded by a rich network of capillaries with a continuous endothelial lining

c) the inner stroma of the adrenal cortex is formed by a network of fine reticular fibers

d) the adrenal cortex and medulla are developmentally and morphologically distinct

20. Decide whether the following statements about the endocrine system are true T or false F:

a) although not part of the endocrine system, hormones are also produced by several other organs, such as the thymus, liver, and heart

b) all components of the parenchyma of endocrine organs are always formed by glandular epithelium

c) endocrine glands are called glandulae sine ductibus in Latin

d) each hormone-producing organ is called an endocrine gland

21. Which of the following endocrine glands have cells arranged in cords?

a) adrenal cortex

b) adenohypophysis

c) neurohypophysis

d) thyroid

22. Which of the following statements about the thyroid gland are true?

a) height of its follicular cells depends on their activity

b) the precursors of its hormones, T3 and T4, are stored intracellularly

c) its parafollicular cells are producing hormone parathormone

d) its colloid is basophilic

e) is follicular type of endocrine gland

23. What are the glands in which glial cells can be found?

a) neurohypophysis

b) adenohypophysis

c) adrenal medulla

d) pineal gland

e) thyroid

24. Which of the cell-product pairs are correct?

a) chromaffin cells – catecholamines

b) acidophils – prolactin

c) basophils – proopiomelanocortin (POMC)

d) oxyphil cells – parathormone

e) pinealocytes – melanin

f) pituicytes – antidiuretic hormone (ADH)

25. What are the typical characteristics of endocrine glands?

a) production of enzymes

b) presence of fenestrated blood capillaries

c) epithelial or neuroectodermal origin of their cells

d) are ductless

e) their secretion is often regulated by feedback mechanisms

26. What structures can be seen in the neurohypophysis?

a) Hassall's bodies

b) Herring bodies

c) unmyelinated axons

d) pinealocytes

27. What histological structures can be seen in the pineal gland?

a) pinealocytes

b) pituicytes

c) pial capsule

d) brain sand

e) interstitial cells

f) colloid

28. What are the parts of the neurohypophysis?

a) infundibulum

b) pars tuberalis

c) pars nervosa

d) pars distalis

e) pars intermedia

29. In the following statement, correct the word to make this statement correct: Neurons from the hypothalamic nuclei secrete releasing hormone into a hypothalamo-hypophyseal portal system that flows from the hypothalamus to the posterior pituitary.

a) Neurons → Pituicytes

b) releasing → inhibiting

c) posterior → anterior

d) hypothalamic → epithalamic

30. What are the ways that parathormone increases the level of serum calcium?

a) increases bone resorption

b) decreases Ca2+ bile excretion

c) increases kidney reabsorption

d) decreases kidney reabsorption

e) increases calcium absorption from the small intestine

31. ADH (antidiuretic hormone, vasopressin) enters the systemic circulation through fenestrated capillaries that are present in which of the following anatomic locations?

a) eminentia mediana in infundibulum

b) pars nervosa of the posterior pituitary

c) paraventricular nucleus of the hypothalamus

d) pars tuberalis of the anterior pituitary

e) at the site of the pituitary gland where pituicytes occur

f) at the site of terminal branches of inferior hypophyseal arteries

32. Which of the following terms best describes the biochemical composition of the material stored within the thyroid follicles?

a) proteoglycan

b) big glycoprotein

c) pentapeptide

d) steroid precursor

e) complex carbohydrate

f) thyroglobulin

33. Which of the following statements about the parathyroid parenchyma are true?

a) contains the endocrine cells that are arranged in the follicles

b) its cells are of two types – chief cells and oxyphil cells

c) its predominant cell type is oxyphil cell

d) its cells are in close connection with the continuous capillaries

34. Which of the following applies to steroid hormones?

a) are generally synthesized from cholesterol

b) their source are also gonads and placenta

c) can't pass through the cell membrane

d) their receptors may be nuclear

e) are produced by a polyhedral epithelioid cells with a single eccentrically located ovoid nucleus and with rod-shaped crystal-like structures 3 to 20 micrometers in diameter (Reinke's crystals)

f) their production can be stimulated by growth hormone

35. Which of the following statements about the products of adrenal gland are true?

a) zona fasciculata of the cortex produces hormone aldosterone

b) its medulla produces hormone dopamine

c) its medulla produces hormone noradrenaline (norepinephrine)

d) its cortex produces catecholamines

36. Where can the cells with abundant smooth ER, many mitochondria of the special – tubular type, and many lipid droplets that give them a vacuolated appearance come from?

a) pars distalis adenohypophysis

b) zona fasciculata of the adrenal cortex

c) adrenal medulla

d) zona reticularis of the adrenal cortex

37. Where is colloid located as a filling of hollow formations within endocrine glands?

a) in pars intermedia of the adenohypophysis

b) around acervulus cerebri in pineal gland

c) in thyroid follicles

d) in lymphoid follicles

38. Which of the following statements are true?

a) the reticular fibers are found in the adrenal stroma (visible after silver salt impregnation/staining)

b) cells of adrenal medulla have characteristic features of steroid-secreting cell

c) parafollicular cells are part of the parenchyma of the parathyroid glands

d) thyroid gland consists of the endocrine cells arranged into the cords

e) adrenal medulla possesses chromaffin cells that are modified sympathetic postganglionic neurons

39. Which cells of the adenohypophysis belong to the basophilic cells?

a) adrenocorticotrophs

b) somatotrophs

c) lactotrophs

d) gonadotrophs

40. The cells of the adrenal cortex have morphological peculiarities. What are these?

a) their mitochondria have a tubular arrangement of the inner membrane

b) their cell nuclei are strongly dominated by euchromatin

c) contain lipid inclusions

d) their cytoplasm has a foamy appearance in routine staining

41. Decide whether the following statements about the development of the endocrine system are true T or false F:

a) Rathke's pouch is the ectodermal basis of the adenohypophysis

b) foramen caecum of the tongue is a remnant of the descent of the basis for the parathyroid gland

c) the adrenal medulla develops as a modified sympathetic ganglion

d) the basis of the parafollicular cells of the thyroid gland is the ultimobranchial body

42. Decide whether the following statements about the development of the endocrine system are true T or false F:

a) the glandular epithelium of the parathyroid glands originates from the endoderm of the 3rd and 4th pharyngeal pouches

b) the posterior lobe of the pituitary gland is derived from the neuroectoderm of the midbrain

c) the ultimobranchial body gives rise to the entire thyroid gland

d) migration of neural crest cells is essential for proper development of the adrenal medulla

43. Decide whether the following statements about the development of the endocrine system are true T or false F:

a) descending base of the thyroid gland communicates with the cavity of the primitive pharynx through a duct called ductus thyroglossus

b) ductus thyroglossus normally disappears and its remnant is foramen caecum at the root of the tongue

c) the glandular epithelium of the superior parathyroid gland develops from the endoderm of the 3rd pharyngeal pouch

d) the glandular epithelium of the inferior parathyroid gland develops from the endoderm of the 4th pharyngeal pouch

44. Decide whether the following statements about the development of the endocrine system are true T or false F:

a) Rathke's pouch is the basis for the posterior lobe of the pituitary gland

b) the adrenal cortex differentiates from the coelomic epithelium

c) the glandular epithelium of the superior parathyroid gland develops from the endoderm of the 4th pharyngeal pouch

d) the glandular epithelium of the inferior parathyroid develops from the endoderm of the 3rd pharyngeal pouch

45. Decide whether the following statements about the development of the endocrine system are true T or false F:

a) the pyramidal lobe is an accessory lobe of the thyroid gland that develops if the distal end of the thyroglossal duct does not disappear

b) the adrenal cortex originates from the neural crest neuroectoderm

c) the ultimobranchial body is the basis of the thyroid follicular cells

d) paraganglia originates from the neuroectoderm of the neural tube

46. Which endocrine tissues are derived from neural crest cells?

a) chief cells of parathyroid gland

b) cells of APUD system/DNES (diffuse neuroendocrine system)

c) adrenal medulla

d) parafollicular C-cells

e) pars nervosa of neurohypophysis

47. Which of the following statements about the thyroid primordium are true?

a) originates in ectoderm of the stomodeum

b) extends caudally in the form of ductus thyreoglossus

c) originate at the apex of foramen caecum

d) is formed from the endoderm

48. Which of the following endocrine glands originates in the third pharyngeal pouch?

a) adenohypophysis

b) thyroid gland

c) superior parathyroid gland

d) inferior parathyroid gland

49. What is the embryonic origin of adrenal cortex?

a) neural crest cells

b) coelomic epithelium

c) yolk sac

d) endoderm

50. From what structure does the adenohypophysis arise?

a) epithelium of the stomodeum

b) Rathke's pouch

c) diencephalon

d) second pharyngeal pouch

e) metencephalon

Chapter Three Answers:

1) cd
2) abd
3) abd
4) a
5) ab
6) abc
7) b
8) cd
9) acd
10) ab
11) acd
12) cd
13) bc
14) ab
15) ad
16) cd
17) ab
18) acd
19) acd
20) ac
21) ab
22) ae
23) acd
24) abc
25) bcde
26) bc
27) acde
28) ac
29) c
30) ace
31) bef
32) bf
33) b
34) abde
35) bc
36) bd
37) ac
38) ae
39) ad
40) acd
41) acd
42) abd
43) ab
44) bcd
45) a
46) cd
47) bcd
48) d
49) b
50) ab

Chapter Four: Gastrointestinal System 1 (Digestive Tract)

1. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the tongue is mainly made up of bundles of smooth muscle cells

b) circumvallate papillae are the most numerous types of papillae on the dorsum of the tongue

c) the root of a tongue contains many lymphoid nodules

d) serous von Ebner's glands are found in lamina propria of tongue mucosa in the region of circumvallate papillae

2. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) apices of filiform papillae may be partially keratinized (parakeratinized)

b) Weber's glands of the root of a tongue produce a mucous secretion

c) dental enamel is the hardest tissue in the human body

d) the dental pulp develops from the enamel

3. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) filiform papillae of the dorsum of the tongue are the most numerous

b) core of the tongue is made up of striated muscle

c) in front of the terminal sulcus on the tongue, there are 8–12 circumvallate papillae

d) filiform papillae do not contain taste buds

4. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) bodies of odontoblasts are localized at the border between enamel and dentin

b) taste buds are in lamina propria of the papillae of the tongue

c) when stained with hematoxylin and eosin, taste buds are paler than surrounding epithelial cells

d) all lingual papillae are covered by a stratified squamous non-keratinized epithelium (partially keratinized in some places)

5. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) cementum is a calcified layer of the tooth that covers the root dentin and is similar in composition to a woven bone

b) all lingual papillae are located on the root of a tongue

c) Von Ebner's glands are in the root of a tongue

d) Weber's serous glands are in lamina propria beneath the epithelium of tongue papillae

6. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the muscular layer of an esophageal wall consists of smooth muscle at its entire length

b) the esophagus is lined by a stratified squamous non-keratinized epithelium

c) serosa is the most superficial layer of the esophagus throughout its entire length

d) the esophageal wall does not contain any exocrine glands

7. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the musculature of the middle third of the esophagus consists of both smooth and striated muscle

b) the most cranial third of the esophagus (pars cervicalis) contains in the muscular layer a type of muscle with syncytium being its morphological unit

c) adventitia is a connective tissue layer that connects the cervical and thoracic parts of the esophagus to the surrounding area

d) esophageal wall may contain glands both in the mucosal connective tissue and in the submucosa

8. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the stomach is lined by a simple columnar epithelium

b) the fundus and body of the stomach contain glands composed of 5 different cell types

c) chief cells of the gastric glands display typical features of proteosynthetically active cells, including a basophilic cytoplasm

d) parietal cells of the gastric glands are the largest and have an eosinophilic cytoplasm

9. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) chief cells of the gastric glands are located mainly in the neck region

b) the muscular layer of the stomach wall is made up of the inner oblique, middle circular, and outer longitudinal layer of smooth muscle

c) the surface of the stomach is covered by adventitia

d) gastric pits are lined by mucous cells

10. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) stomach pyloric glands are branched tubular with a predominance of mucous cells

b) parietal cells of gastric glands have a pyramidal shape, eosinophilic cytoplasm, and produce HCl and intrinsic factor

c) mucous cells of the gastric glands are PAS positive

d) chief cells are characterized by their basophilic cytoplasm and their location mainly in gastric glands in fundus

11. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) microvilli of the small intestine are processes made up of the mucosal epithelium and lamina propria

b) microvilli on the surface of enterocytes form the brush border

c) large intestine contains simple tubular glands in lamina propria of the mucosa, called Lieberkühn crypts

d) Paneth cells are immune cells of the glands of the small intestine but can also be found in the appendix

12. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) small intestine is lined by a simple columnar epithelium

b) renewal of enterocytes of the small intestine takes around 6 days

c) PAS-positive goblet cells are part of the epithelial lining of the small intestine

d) mucosa of the large intestine forms villi

13. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) crypts of the large intestine contain mainly goblet cells

b) villi of the small intestine represent submucosal folds

c) Peyer's patches are found mainly in the aboral sections of the large intestine

d) Paneth cells are found predominantly in the neck region of Lieberkühn crypts

14. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the entire length of the large intestine is covered with serosa

b) the epithelial lining of the small intestine including the glands consists of 6 different cell types

c) the small intestine enlarges its absorptive surface by three types of structures – circular folds, villi, and microvilli

d) goblet cells are much more numerous in the large intestine than in the small intestine

15. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) circular folds or Kerckring's valves are formed by folds of the submucosa, villi by folds of the mucosa, and microvilli by folds of the cytoplasmic membrane of enterocytes

b) the entire length of the small intestine is covered by serosa

c) the epithelium of the small intestine contains 6 cell types – enterocytes, goblet cells, enteroendocrine cells, undifferentiated stem cells, M cells and Paneth cells

d) a lymphatic capillary, called the lacteal (chylous capillary), runs through the center of each villus of the small intestine

16. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the wall of the digestive tract is generally made up of 4 layers – mucosa, submucosa, tunica muscularis, and adventitia/serosa

b) the muscular wall of the digestive tube is generally composed of an inner longitudinal and outer circular layer

c) submucosa contains the myenteric Auerbach's plexus

d) lamina muscularis mucosae is always composed of smooth muscles

17. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the general structure of the digestive tract is similar in all its sections having the greatest differences within the mucosa

b) Meissner's nerve plexus is part of the mucosa of the digestive tube

c) the duodenum contains the mucous Brunner glands in the submucosa

d) villi have the same shape in all parts of a small intestine

18. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the boundary between a loose connective tissue of lamina propria and that of submucosa is tunica muscularis externa

b) the digestive tube is lined by two main types of epithelia – stratified squamous non-keratinized and simple columnar

c) adventitia of the digestive tube is a connective tissue layer covered with a mesothelium

d) tunica muscularis externa of the digestive tube is generally composed of an inner circular and an outer longitudinal layer

19. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) the main difference between a large and small intestine is that the large intestine does not contain villi or Lieberkühn's crypts

b) Cajal's interstitial cells act as pacemakers in the digestive tube

c) serosa covers organs of the digestive tube located in the peritoneum and is composed of a connective tissue and a single layer of flat mesothelial cells

d) the myenteric Auerbach's plexus is located between two layers of tunica muscularis

20. Decide whether the following statements about the gastrointestinal tract are true T or false F:

a) lamina muscularis mucosae consists of two layers of smooth muscle

b) a simple columnar epithelium lines the entire length of the digestive tube

c) duodenum has no glands in its wall

d) a simple columnar epithelium along the entire length of the alimentary canal serves exclusively for nutrient absorption

21. Why the lip is red?

a) the epithelium of the red lip is richly vascularized, the blood vessels in the epithelium show through

b) lamina propria of the red lip contains myoglobin

c) stratum lucidum renders epithelium of the red lip transparent

d) extensive vascularity allows the color of the blood to show through

22. What type of lingual papillae form a line in front of sulcus terminalis?

a) papillae vallatae

b) papillae fungiformes

c) papillae filiforme

d) papillae foliatae

23. Where are the taste buds not located?

a) filiform papillae

b) fungiform papillae

c) circumvallate papillae

d) vermilion

24. Which of the following statements about the glands located in the middle part of esophagus are true?

a) are found in submucosa

b) secrete acid mucin for lubrication

c) are mixed seromucous glands

d) are typical mucosal glands

25. Which of the following statements about esophageal wall are true?

a) tunica muscularis in its aboral third is made up of smooth muscle

b) it is mainly covered by serosa

c) inner layer of its tunica muscularis is oriented circularly

d) the epithelium in its aboral third transitions from stratified to simple

e) keratinization of epithelium does not normally occur

26. Which of these stomach-related pairs are correct?

a) hydrochloric acid – chief cells

b) pepsinogen – chief cells

c) intrinsic factor – parietal cells

d) gastrin – enteroendocrine cells

27. What do the pyloric and cardiac glands of the stomach have in common?

a) are located in submucosa

b) presence of enteroendocrine cells

c) presence of mucous cells

d) morphology of shallow pits into which they are opened

28. Which structures of the small intestine serve to increase the absorptive surface area?

a) stereocilia

b) papillae

c) circular folds (valves of Kerckring)

d) intestinal villi

e) microvilli

f) striated (brush) border

29. What do the esophagus and the duodenum have in common?

a) plexus Auerbachi

b) Paneth cells

c) submucosal glands

d) lacteal

e) type of epithelial lining

f) inner circular layer of tunica muscularis externa

30. Which of the following statements about the stomach tunica muscularis are true?

a) consists of three sublayers

b) outer sublayer is oriented obliquely

c) Auerbach's plexus is not developed here

d) its longitudinal bands are called "teniae"

31. In the following statement, correct the word to make this statement correct: Villi have a central blood vessel known as a lacteal, which is crucial for the absorption of lipids from the intestine.

a) Villi → Microvilli

b) blood → lymphatic

c) lacteal → sinusoid

d) lipids → carbohydrates

e) intestine → stomach

32. What structures are typical of the esophagus?

a) stratified squamous non-keratinized epithelium

b) mostly circular smooth muscle of lamina muscularis mucosae

c) smooth muscle layer

d) cross striated muscle layer

e) Meissner's plexus

33. Which of the following general statements about the wall of gastrointestinal tract are true?

a) its mucosa consists of lamina epithelialis, lamina propria and lamina muscularis mucosae

b) most organs of the digestive tract have muscles arranged in the inner longitudinal and outer circular layer

c) simple squamous epithelium can be found on its outer surface

d) adventitia is where the wall is directly attached to adjoining structures

e) the circular smooth muscle layers forms sphincters at specific locations

34. Which of the following statements about diffuse lymphoid tissue in gastrointestinal tract are true?

a) Peyer's patches are found in duodenal mucosa

b) aggregated lymphoid nodules is present in the appendix

c) M (microfold) cells initiate mucosal immunity responses in GALT

d) Paneth cells initiate mucosal immunity responses in GALT

35. Which of the following cells have basophilic cytoplasm?

a) serous cells

b) Paneth cells (basal part)

c) gastric chief cells

d) gastric parietal cells

e) mucous cell

f) Paneth cells (apical part)

36. Which of the following statements about the absorptive cell of small intestine are true?

a) is called colonocyte

b) absorb lipids by active transport

c) possesses microvilli on its apical surface

d) is the most numerous of all epithelial cells

e) synthesize triglycerides from absorbed lipids

37. Which of the following statements about the blood capillaries in jejunal mucosa are true?

a) are nourishing also avascular mucosal epithelium

b) are responsible for dietary fat uptake

c) are located in areolar loose connective tissue

d) are capillaries of continuous type

38. What do the stomach and small intestine have in common?

a) presence of MALT system in mucosa and/or submucosa

b) Brunner's glands

c) Paneth cells

d) enteroendocrine cells

e) simple columnar epithelium

39. What are the typical submucosal glands in the wall of the digestive tract?

a) Brunner's glands in duodenum

b) glandulae gastricae propriae

c) submucosal mucous-secreting esophageal glands

d) crypts of Lieberkühn

40. What are the functions of the oral cavity?

a) mechanical grinding of food

b) initiation of saccharide digestion

c) initiation of lipid digestion

d) participation in phonation

41. Decide whether the following statements about the development of the gastrointestinal tract are true T or false F:

a) the stomach rotates 90 degrees clockwise around its longitudinal axis during development

b) branches of the foregut are vascularized by the celiac trunk

c) the axis of rotation of the midgut is the inferior mesenteric artery

d) the entire duodenum arises from the midgut

42. Decide whether the following statements about the development of the gastrointestinal tract are true T or false F:

a) the finding of an intestinal loop in the umbilicus is always a pathological condition

b) the midgut rotates a total of 270 degrees anti-clockwise (when seen from the front)

c) linea dentata (pectinata) is the boundary between the epithelium of the anal canal, derived from the endoderm of the hindgut, and the epithelium derived from the ectoderm of the proctodeum

d) the superior mesenteric artery supplies the hindgut vasculature

43. Decide whether the following statements about the development of the gastrointestinal tract are true T or false F:

a) isthmus faucium is the location of the oropharyngeal membrane during development

b) the oral cavity is derived from the endoderm of the foregut

c) rotation of the stomach causes left vagus nerve to innervate the anterior wall of the stomach

d) derivatives of the midgut are vascularly supplied by the superior mesenteric artery

44. Decide whether the following statements about the development of the gastrointestinal tract are true T or false F:

a) the epithelium of the entire digestive tube is derived from the endoderm of the primitive intestine

b) failure of the midgut to complete rotation may result in a congenital developmental defect in which the cecum is located below the liver

c) Meckel's diverticulum is associated with abnormal development of the allantois

d) duodenum develops partly from the foregut and partly from the midgut

45. Decide whether the following statements about the development of the gastrointestinal tract are true T or false F:

a) Hirschsprung's disease is caused by a defect in the migration of neural crest cells to the intestinal primordium

b) proctodeum is of endodermal origin

c) if the midgut rotates clockwise (when viewed from the front), the rotation is reversed, and the transverse colon lies behind the duodenum

d) Meckel's diverticulum arises as a remnant of the omphaloenteric duct

46. What structures develop from the cloaca?

a) allantois

b) anorectal canal

c) vitelline vessels

d) urogenital sinus

47. Which of the following statements about the physiological umbilical herniation of intestinal loop are true?

a) it also rotates around the axis of arteria mesenterica superior

b) it happens in the 13th week

c) rotates in a counterclockwise direction

d) it retracts into the abdomen in the 10th week

e) overall, the intestinal loop rotates 360 degrees

48. Which components of the digestive tube are neural crest derivatives?

a) Meckel's diverticulum

b) enteric nervous system

c) lacteals

d) enteroendocrine cells

49. What is the name of the midgut and yolk sac coupling?

a) allantois

b) ductus omphaloentericus

c) hindgut

d) vitelline duct

e) cloaca

50. Epithelial lining of which primordia of the tongue are of ectodermal origin?

a) lateral lingual swellings

b) copula

c) ductus thyreoglossus

d) tuberculum impar

Chapter Four Answers:

1) cd
2) abc
3) abcd
4) cd
5) a
6) b
7) abcd
8) abcd
9) bd
10) abcd
11) bcd
12) abc
13) a
14) bcd
15) acd
16) ad
17) ac
18) bd
19) bcd
20) a
21) d
22) a
23) ad
24) ab
25) ace
26) bcd
27) bc
28) cdef
29) acf
30) a
31) b
32) acde
33) acde
34) bc
35) abc
36) cd
37) ac
38) ade
39) ac
40) abd
41) ab
42) bc
43) acd
44) bd
45) acd
46) abd
47) acd
48) b
49) bd
50) ad

Chapter Five: Gastrointestinal System 2 (GIT-Associated Glands)

1. Decide whether the following statements about the salivary glands are true T or false F:

a) striated ducts have a strongly basophilic cytoplasm

b) parotid gland is a purely serous gland

c) mucous tubules predominate over serous acini in sublingual gland

d) submandibular gland is a mixed tubuloacinar gland with a predominance of serous acini

2. Decide whether the following statements about the salivary glands are true T or false F:

a) lunulae of Gianuzzi are probably an artefact of histological processing of a sublingual gland tissue

b) striated ducts have many lysosomes in the basal labyrinth

c) intercalated ducts of large salivary glands are lined by a cuboidal epithelium

d) interlobar ducts of large salivary glands are lined by a stratified columnar epithelium

3. Decide whether the following statements about the salivary glands are true T or false F:

a) a basal labyrinth with many mitochondria is a typical feature of striated ducts at the ultrastructural level

b) parotid gland is a mixed seromucous gland

c) many adipocytes are found among the parenchymal cells of a parotid gland

d) the predominance of mucous tubules in a sublingual gland causes the gland to be predominantly dark basophilic when stained with hematoxylin and eosin

4. Decide whether the following statements about the gallbladder are true T or false F:

a) gallbladder has a basic wall structure identical to the rest of the digestive tube

b) gallbladder is lined by a simple columnar epithelium

c) Rokitansky-Aschoff sinuses are found in the submucosa of a gallbladder

d) the entire surface of a gallbladder is covered by serosa

5. Decide whether the following statements about the gallbladder are true T or false F:

a) the basic difference in the structure of a gallbladder wall compared to the rest of a digestive tract is that the gallbladder lacks lamina muscularis mucosae and submucosa

b) the free surface of the gallbladder is covered by serosa, while the area adjacent to the liver is covered by adventitia

c) cholecystocytes lining a gallbladder have cilia on their surface

d) gallbladder is lined by a simple cuboidal epithelium

6. Decide whether the following statements about the pancreas are true T or false F:

a) the pancreas, like the parotid gland, contains intercalated ducts

b) the pancreas is a purely exocrine gland

c) exocrine part of the pancreas consists of serous acini and a system of ducts

d) the pancreas contains no striated ducts

7. Decide whether the following statements about the pancreas are true T or false F:

a) B cells are located predominantly in the center of the islets of Langerhans

b) all endocrine cells of the islets of Langerhans can be reliably distinguished by hematoxylin and eosin staining

c) serous acini are responsible for the secretion of insulin and glucagon

d) B cells make up to 70% of all cells in the islets of Langerhans

8. Decide whether the following statements about the pancreas are true T or false F:

a) the pancreas contains both exocrine and endocrine parts and is therefore classified as a mixed seromucous gland

b) A cells are less numerous than B cells and are found predominantly on the periphery of the islets of Langerhans

c) pancreatic islets of Langerhans form digestive enzymes

d) the endocrine part of a pancreas predominates over the exocrine portion of the pancreatic parenchyma

9. Decide whether the following statements about the pancreas are true T or false F:

a) serous acini of the pancreas are made up of A and B cells

b) intercalated ducts start directly in acini and are formed by centroacinar cells

c) the pancreas is distinguished from the parotid gland mainly by the presence of many fat cells between the islets of Langerhans

d) striated pancreatic ducts secondarily regulate a mixture of digestive enzymes

10. Decide whether the following statements about the pancreas are true T or false F:

a) islets of Langerhans of the pancreas contain 5 main cell types – A, B, D, F (PP), and epsilon cells

b) hematoxylin and eosin show A-cells in red at the periphery of the islets of Langerhans

c) the pancreas is a purely endocrine gland

d) in hematoxylin and eosin staining, the islets of Langerhans are seen as lighter parts of the parenchyma in the predominantly dark basophilic exocrine portion

11. Decide whether the following statements about the liver are true T or false F:

a) the liver produces several hormones in addition to exocrine secretion (bile)

b) canaliculi biliferi do not have their own epithelial lining, they are formed only by neighboring hepatocytes

c) classic hepatic lobule (old name lobulus venae centralis) is the basic morphological unit of the liver parenchyma

d) trias hepatica contains only three structures – the interlobular bile duct, the vena cava, and the artery

12. Decide whether the following statements about the liver are true T or false F:

a) in addition to the interlobular vein, artery and bile duct, the portal triad contains other structures such as lymphatic vessels and autonomic nerves

b) the interlobular bile duct can be distinguished from the vessels in section mainly by the height of the epithelial lining

c) the liver contains capillaries with a continuous lining between the hepatocytes

d) the bile ducts of Hering have a wall composed partly of hepatocytes and partly of cholangiocytes and stem cells

13. Decide whether the following statements about the liver are true T or false F:

a) trias hepatica contains bile capillaries

b) the basic morphological unit of the liver parenchyma has a central vein in the center and portobiliary spaces at the angles

c) the liver is the largest gland in the human body

d) Disse's space is part of the portal triad

14. Decide whether the following statements about the liver are true T or false F:

a) the portal lobe is of hexagonal shape on the tissue section

b) the portobiliary space is in the center of the portal lobe

c) the basic morphological unit of the liver parenchyma is the hepatic acinus

d) Kupffer cells are specialized macrophages of the liver

15. Decide whether the following statements about the liver are true T or false F:

a) the hepatic acinus is the basic functional unit of the liver parenchyma

b) Kupffer cells are a reservoir of vitamin A

c) capusla fibrosa hepatis Glissoni is the liver capsule formed by a dense irregular connective tissue

d) the perisinusoidal (Disse's) space is found in the middle of the portal triad

16. Decide whether the following statements about the liver are true T or false F:

a) the Ito cell is in the perisinusoidal space and serves as a reservoir for vitamin A

b) the portal lobe is of triangular shape

c) the capillary network in the liver consists of sinusoids with a discontinuous lining

d) Kupffer cells are part of the lining of hepatic sinusoids

17. Decide whether the following statements about the liver are true T or false F:

a) a hepatocyte can contain two cell nuclei

b) a hepatocyte is a polygonal polarized epithelial cell

c) the bile pole of a hepatocyte is facing into Disse's compartment

d) the major exocrine secretory product of the liver is angiotensinogen

18. Decide whether the following statements about the liver are true T or false F:

a) the liver has a very limited regenerative capacity

b) the hepatocyte contains all typical organelles and many inclusions due to its high metabolic activity

c) the vascular pole of a hepatocyte has microvilli on its surface that are facing into Disse's space

d) the portal triad is in the center of a hepatic acinus

19. Decide whether the following statements about the liver are true T or false F:

a) fine stroma of the liver consists of a dense connective tissue

b) the portal triad is part of Disse's compartment

c) substances that pass between hepatocytes and blood must pass through Disse's space

d) venae centrales are a type of hepatic sinusoids

20. Decide whether the following statements about the liver are true T or false F:

a) a hepatocyte is a polygonal cell without apical and basolateral polarization

b) a hepatocyte always has one centrally located cell nucleus

c) in human, thick connective tissue septa between individual classic hepatic lobules can be well distinguished by trichrome staining

d) dividing the liver into hepatic acini helps to functionally subdivide the parenchymal compartments in terms of the dynamics of substance exchange and respiratory gases

21. Which of the following statements about the islets of Langerhans are true?

a) are surrounded by exocrine components

b) are avascular

c) their most common cell type is β (B) cell

d) are composed of chromaffin cells

22. What can a hepatocyte store in its cytoplasm?

a) vitamin A

b) vitamin D

c) iron (ferritin)

d) glycogen

23. Which terms are closely related to intrahepatic bile ducts?

a) cholangiocyte

b) canal of Hering

c) Rokitansky-Aschoff sinuses

d) space of Disse

e) Kupffer cell

24. Which of the following cells is most similar to the epithelial cell of the gallbladder mucosa?

a) Paneth cell

b) hepatocyte

c) serous cell

d) enterocyte

25. Which of the following glands is most similar histologically to the exocrine pancreas?

a) Ebner's gland

b) Webber's gland

c) sublingual gland

d) liver

e) endocrine pancreas

26. Which of the following statements about the exocrine pancreas are true?

a) contains centroacinar cells

b) its acinar cells contain zymogen granules in apical cytoplasm

c) possesses striated intralobular duct

d) possesses fenestrated blood capillaries

e) its acini contain serous cells

27. Which of these pairs are correct?

a) striated duct – parotid gland

b) perisinusoidal space – space of Mall

c) submucosa – gall bladder

d) liver sinusoids – Kupffer cells

e) Ito (stellate) cells – space of Disse

28. What is the name of the cell in the gland of the digestive system whose product regulates growth hormone release from the adenohypophysis?

a) δ (D) cell

b) hepatocyte

c) α (A) cell

d) PP cell

29. C peptide is secreted from secretory cells along with insulin. Function of what cells are we assessing when measuring urinary C peptide excretion?

a) pancreatic acinar cells

b) enteroendocrine cells

c) α (A) cell

d) β (B) cell

30. Which of the following glands contain serous secretory cells?

a) pancreas

b) submandibular gland

c) liver

d) parotid gland

e) sublingual gland

31. Which of the following statements about the ducts of digestive glands are true?

a) centroacinar cells are proximal portion of duct system of large salivary glands

b) epithelial cells of striated ducts contain numerous mitochondria

c) cholangiocytes are present both in the intrahepatal and extrahepatal bile ducts

d) intrahepatal bile capillaries are also called space of Disse

32. What cells can you find in the liver?

a) hepatocytes

b) endothelial cells

c) stellate (Ito) cells

d) PP cells

e) Kupffer cells

f) cholangiocytes

33. What is the name of the cell whose product is responsible for lipid emulsification in the small intestine?

a) β (B) cell

b) stellate (Ito) cell

c) acinar cell

d) hepatocyte

e) enterocyte

34. Which of the following statements about the wall of gall bladder are true?

a) its mucosa contains numerous serous glands producing bile

b) has no submucosa

c) exhibits huge folds which are covered by tall simple columnar epithelium with microvilli

d) has no tunica muscularis

35. Which structure is in the center of portal lobule?

a) space of Mall

b) central vein

c) portobiliary space (portal canals)

d) sinusoid

e) portal triad

36. Which of the following statements about the space of Disse are true?

a) is between the basal surfaces of hepatocytes and basal surfaces of endothelial cells

b) represents the barrier between the hepatocytes and bile capillaries

c) contains projections of microvilli of hepatocytes

d) contains stellate (Ito) cells

37. Which of the following statements about the Giannuzzi lunulae (serous demilunes or crescents of Giannuzzi) are true?

a) are found in pure serous glands

b) are artifact of the routine fixation method

c) are serous cells at the distal end of mucous tubuloalveolar secretory unit of certain salivary glands

d) are semilunar shaped cells of the intercalated ducts

38. What is the truth about mucinogen granules?

a) are synthesized and stored within the mucous cells

b) can be found in secretory portion of submandibular gland

c) are also termed as zymogenic granules

d) can be visualized using the alcian blue dye

39. In which of the following actions are the striated ducts of large salivary glands involved?

a) secretion of HCO_3^-

b) absorption of Cl^-

c) reabsorption of Na^+

d) secretion of IgA (secretory antibody)

40. Which of the following statements about the classic hepatic lobule (lobulus venae centralis) are true?

a) contains cords of hepatocytes

b) has roughly hexagonal shape

c) in the place of contact of three lobules is portal canal (portobiliary space) with canal of Hering

d) portal vein is in its center

41. Decide whether the following statements about the development of the digestive glands are true T or false F:

a) all cell populations of the liver are derived from the endoderm of the foregut

b) most of the pancreas develops from the anterior base of the pancreatic duct

c) pancreas anulare is formed when the anterior base of the pancreas bifurcates and wraps around the base of the duodenum from opposite sides

d) Kupffer cells arise from the mesenchyme in septum transversum

42. Decide whether the following statements about the development of the digestive glands are true T or false F:

a) the cranial part of the hepatic diverticulum gives rise to the gallbladder

b) hepatocytes are derived from the endoderm of the foregut

c) the posterior base of the pancreas gives rise to the head, body, and tail portions of the pancreas

d) the base of the pancreas originates in the midgut region

43. Decide whether the following statements about the development of the digestive glands are true T or false F:

a) hepatocytes originate from the mesenchyme of the transverse septum

b) the pancreas develops from a single base that grows out of the foregut

c) the cranial part of the hepatic diverticulum gives rise to the liver parenchyma

d) the caudal part of the hepatic diverticulum gives rise to the gallbladder

44. Decide whether the following statements about the development of the digestive glands are true T or false F:

a) the basis of the largest digestive gland develops in the region of the foregut

b) pancreas anulare is the result of a defect in the development of the posterior base of the pancreas

c) the fibrous stroma of the liver originates from the mesenchyme in the transverse septum

d) pancreas divisum is a congenital developmental defect resulting from a defect in the junction of the ducts of the anterior and posterior bases of the pancreas

45. Decide whether the following statements about the development of the digestive glands are true T or false F:

a) hepatocytes have the same embryonic origin as Kupffer cells

b) the transverse septum influences the formation and development of the base of the liver

c) the uncinate process of the pancreas develops from the dorsal base of the pancreas

d) the parotid gland is of ectodermal origin, whereas the submandibular and sublingual glands are of endodermal origin

46. Which of the following statements about the development of the parotid gland are true?

a) the epithelium-lined ductal junction between the developing acini and the oral cavity gives rise to the Stensen's duct

b) develops from a groove-like invagination of endoderm

c) its secretory portion originates from the underlying mesenchyme

d) develops from a groove-like invagination of ectoderm

47. What anatomical parts of the definitive pancreas are derived from the former ventral pancreas?

a) upper part of the head

b) lower part of the head

c) uncinate process

d) tail

48. Which of the following statements about the origin of the liver connective tissue are true?

a) originates from the hepatic cords

b) originate from the dorsal mesentery

c) originate from the ventral mesentery

d) originate from the mesenchyme of the mesoderm

49. Which of the following statements about the hepatic diverticulum are true?

a) originates from the foregut

b) gives rise to cords of hepatoblasts

c) gives rise to hepatic sinusoids

d) later it develops into a hepatic plate

50. How can the presence of accessory pancreatic duct in 7% of the population be explained?

a) because the common pancreatic bud in these people split into two

b) because the pancreas primordia are established on two places that may not connect

c) the dorsal pancreatic bud persisted and its ductal system gave rise to the accessory pancreatic duct

d) because they have developed pancreas anullare

Chapter Five Answers:

1) bcd
2) ad
3) ac
4) b
5) ab
6) acd
7) ad
8) b
9) b
10) ad
11) abc
12) abd
13) bc
14) bd
15) ac
16) abcd
17) ab
18) bc
19) c
20) d
21) ac
22) cd
23) ab
24) d
25) a
26) abe
27) ade
28) a
29) d
30) abde
31) bc
32) abcef
33) d
34) bc
35) ce
36) acd
37) bc
38) abd
39) ac
40) ab
41) cd
42) bc
43) cd
44) acd
45) bd
46) ad
47) bc
48) cd
49) ab
50) bc

Chapter Six: Tooth – dentistry only

1. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) secretory ameloblast is a cell with Tomes's process protruding from its apical surface

b) Hunter-Schreger bands can be observed in the tooth enamel when stained with hematoxylin and eosin

c) ameloblasts disappear after the tooth eruption

d) there are two basic types of enamel – prismatic and aprismatic

2. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) odontoblasts are epithelioid cells whose bodies lie at the periphery of the dental pulp

b) Tomes's fiber is the apical projection of odontoblasts, which runs in dentin tubules

c) dentin covers the dental crown

d) enamel prisms always extend through the entire width of the enamel

3. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) Hunter-Schreger bands are optical artefacts of sectioning

b) about 70% of the enamel mass is inorganic

c) the crown of the tooth is covered with cementum and the root is covered with enamel

d) the formation of primary enamel takes place throughout whole life

4. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) dentin tubules pass through the entire width of the dentin

b) dentin mineralizes continuously; therefore, it has a homogeneous appearance

c) there is a sheath of dentin at the border between dentin and dental pulp

d) the unmineralized predentin is found just above the apical surface of the odontoblast bodies, close to the pulp

5. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) predentin stains pink when stained with hematoxylin and eosin

b) growth lines of von Ebner correspond to the periodic progression of dentin mineralization

c) Tomes' fibers are part of the intercellular matrix of dentin – the dentin matrix

d) Tomes's fiber is synonymous with Tomes's process

6. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) cementum is part of periodontium

b) cementum covers the dentin of both the root and the crown

c) pulp is an avascular tissue

d) the subodontoblast (Weil's) zone is the innermost layer of the dental pulp

7. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) lymphocytes and plasma cells are fixed cells of the dental pulp

b) pulpocytes are immune cells found in the dental pulp

c) dental pulp fills both the pulp cavity and the root canals

d) the extracellular matrix of the dental pulp contains reticular fibers in addition to amorphous material

8. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) in composition, cementum resembles a compact bone containing Haversian systems

b) cementum has irregular thickness throughout the whole tooth

c) the organic component of cementum is predominantly type II collagen

d) precementum is a heavily calcified layer on the surface of cementum

9. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) the interdentin represents the transition zone between the predentin and the mineralized dentin

b) cementum is thickest in the cervical region

c) the dentin contains many blood vessels

d) tertiary dentin is also called reactive (reparative) dentin because it forms in response to various external influences, such as dental caries

10. Decide whether the following statements about the mature/erupted tooth are true T or false F:

a) pulpocytes belong to the fixed cells of the dental pulp

b) the dental pulp of a mature/erupted tooth is made up of dense connective tissue

c) the dental pulp is a very well-vascularized and innervated soft tissue of the tooth

d) bipolar fibroblasts are found in the dental pulp

11. Decide whether the following statements about the periodontium are true T or false F:

a) the gingiva covers part of the alveolar processes of the jawbone, the neck region of the tooth, and part of the anatomical crown of the tooth

b) gingiva alveolaris is sharply demarcated from the surrounding oral mucosa by the mucogingival junction (line)

c) gingiva marginalis is the non-moving part of the gingiva

d) gingiva alveolaris is the name given to the mobile part of the gingiva

12. Decide whether the following statements about the periodontium are true T or false F:

a) the mucoperiosteum is the direct connection between the periosteum of the dental alveolus (bony socket) and the gingiva

b) fibers of the periodontal ligament attach to the dental alveolus (bony socket) on one side and to the cementum on the other

c) the gingiva is formed by a mechanically resistant masticatory mucosa of the oral cavity

d) the periodontal ligament has the structure of a dense connective tissue

13. Decide whether the following statements about the periodontium are true T or false F:

a) the alveolar bone on the side of the tooth socket (inner side) is covered with mucoperiosteum

b) the supraalveolar fiber system is part of the periodontium

c) the fibers running between the cementum and the bone of the tooth socket are also part of the periodontium

d) periodontal ligament contains a predominance of collagen fibers with a small number of cells and amorphous material

14. Decide whether the following statements about the periodontium are true T or false F:

a) the periodontium contains progenitor cells that serve to rebuild the bone of the tooth socket

b) the gingiva consists of an epithelium, lamina propria, and submucosal connective tissue

c) periodontium is a term that includes the following structures: periodontal ligament, cementum, alveolar bone, and gingiva

d) Sharpey's fibers are elastic fibers present in the periodontal ligament

15. Decide whether the following statements about the periodontium are true T or false F:

a) collagen fibers in the lamina propria of the gingiva are classified according to their course as dentogingival, alveologingival, and circular

b) collagen fibers of the periodontal ligament attach to the tooth socket on one side and to the enamel on the other

c) mucoperiosteum represents the direct connection between the outer surface of the periosteum of the alveolus and the gingiva

d) the alveolar bone is part of the periodontium

16. Decide whether the following statements about the periodontium are true T or false F:

a) the outer surface of the alveolar bone in contact with the gingiva is covered with mucoperiosteum

b) gingiva marginalis is the movable part of the gingiva

c) the junctional epithelium/epithelial attachment of Gottlieb consists of a single layer of columnar cells

d) linea mucogingivalis is the line that separates the free gingiva from the oral mucosa

17. Decide whether the following statements about the periodontium are true T or false F:

a) the periodontal ligament consists only of collagen fibers that run between the cementum and the alveolar bone

b) the periodontal ligament contains many connective tissue cells with few fibers

c) the alveolar bone (the bone of the tooth socket) has the capacity for intensive rapid remodeling

d) the gingiva is covered with stratified squamous non-keratinized epithelium, which may slightly keratinize in some places

18. Decide whether the following statements about the periodontium are true T or false F:

a) the alveolar bone is a part of the periodontium

b) the gingiva is attached to the tooth throughout its entire extent

c) Sharpey's fibers are collagen fibers present in the periodontal ligament

d) the alveolar bone (the bone of the tooth socket) has a limited capacity for remodeling

19. Decide whether the following statements about the periodontium are true T or false F:

a) the alveolar bone is not at all covered by a layer of the mucoperiosteum

b) periodontal ligaments contain many elastic fibers

c) collagen fibers of the periodontal ligaments attach to the dental alveolus (bony socket) on one side and to the cementum on the other side

d) the periodontal ligament is made up mostly of collagen type I

20. Which tooth tissue is the most mineralized?

a) alveolar bone

b) cement

c) enamel

d) dentin

21. Which of the following statements about tooth are true?

a) the organ of enamel is active throughout life

b) adult dentition contains a total of 32 teeth

c) the cement covers the dental crown

d) the dental pulp contains nerves

e) dentin is of ectomesenchymal origin

22. Where are ameloblasts found in an adult human?

a) in one line on the boundary between pulp and dentin

b) in one line on the border between dentin and enamel

c) freely dispersed in the dental pulp

d) adult human does not have ameloblasts in erupted tooth

23. Which of the following statements about the dentin are true?

a) is produced by odontoblasts

b) it consists of 94% to 98% calcium hydroxyapatite

c) it can be observed in paraffin-embedded tooth tissues

d) made of loose connective tissue

e) can be reactively renewed

24. Which of the following statements about the dentin are true?

a) contains Tomes´s fibers

b) is produced by ameloblasts

c) contains collagen fibers of type I collagen

d) contains hydroxyapatite crystals

25. How many incisors are present in deciduous dentition?

a) 2

b) 4

c) 8

d) 12

26. Which of the following statements about the enamel are true?

a) is the hardest tissue in the body

b) covers the crown of the tooth

c) is composed of enamel rods

d) striae of Retzius are evidence of rhythmic growth of the enamel

e) is primarily composed of soft tissues, making it less resistant to wear and tear compared to other dental structures

f) can regenerate after damage, including the treatment of dental caries

27. Which of the following statements about the gingivodental junction (attachment epithelium) are true?

a) is a firm connection between the epithelium of the gingiva and the hard tissues of the tooth

b) the cells of the junctional epithelium have a high regenerative capacity

c) there are numerous leukocytes in the connective tissue under the epithelium

d) is primarily composed of enamel-forming ameloblasts actively involved in the secretion of enamel matrix during tooth development

28. In the following statement, correct the word to make this statement correct: The dental pulp cavity is a richly vascularized and innervated dense connective tissue compartment bounded by the tooth dentin.

a) pulp → matrix

b) richly → poorly

c) dense → loose

d) dentin → enamel

29. Which of the following statements about the histological processing of the tooth are true?

a) ground section preserves living (soft) tissues

b) ground section can be much thinner than paraffin-embedded sections

c) decalcification is needed for paraffin-embedded processing

d) enamel is lost in ground sections

e) the entire histology of the crown can be seen after the decalcification process

30. Which of the following statements about the cement are true?

a) its histology is similar to woven bone

b) is richly vascularized

c) is loose connective tissue

d) Sharpey's fibers are embedded in it

e) covers the crown of the tooth

f) contains cementocytes in lacunae

31. What are the functions of the periodontal ligament?

a) triggers the formation of the Hertwig epithelial root sheath

b) tooth attachment

c) proprioception

d) provide structural support and nourishment to the enamel

32. Which tissues of the tooth are avascular?

a) cementum

b) enamel

c) dentin

d) pulp

33. Which of the pairs are correct?

a) hydroxyapatite – dental pulp

b) Tomes's processes – ameloblasts

c) Tomes's fibers – odontoblasts

d) Sharpey's fibers – odontoblasts

e) striae of Retzius – enamel

34. Which of the following statements about the tertiary dentin are true?

a) it is formed before the tooth is erupted

b) also referred to as reactive, reparative

c) the number of its dentin tubules is reduced and their course is irregular

d) is an immature, non-mineralized dentin

35. What also belongs to the structures of the periodontium?

a) cement of the tooth root

b) junctional epithelium

c) dental pulp

d) dentin of the crown

e) supraalveolar system of ligaments

36. Which of the following statements about the periodontal ligaments are true?

a) they consist mainly of bundles of collagen fibers (collagen type I)

b) they consist mainly of thick elastic fibers

c) are arranged in a clockwise and anticlockwise direction

d) develop from the ectomesenchyme of the dental sac

37. Which of the following statements about the supraalveolar fiber system as part of the periodontium are true?

a) attach the gingiva and bone alveolus to the teeth

b) attach the root area of the tooth to the bone alveolus

c) are made up of both collagen and elastic fibers

d) are part of the periodontal ligaments

38. Which of the following statements about the junctional epithelium of the gingiva are true?

a) forms cells with high mitotic activity and regenerative capacity

b) formed by the fusion of the oral epithelium and part of the enamel epithelium during tooth eruption

c) is firmly attached to the dentin of the tooth

d) a pathological gingival pouch is formed when its connection with the tooth is broken

39. Into what tissues do periodontal ligaments insert?

a) enamel

b) dentin

c) junctional epithelium

d) alveolar bone

e) dental lamina

f) cementum

40. Decide whether the following statements about the development of the tooth are true T or false F:

a) root development occurs earlier than crown development of a tooth

b) cementoblasts develop from the enamel organ

c) during tooth root development, the epithelial root sheath (Hertwig's sheath) induces the differentiation of odontoblasts in the tooth papilla to form the root dentin

d) Malassez epithelial bodies in the periodontium represent the remnants of the epithelial root sheath

41. Decide whether the following statements about the development of the tooth are true T or false F:

a) mesenchymal cells of the tooth socket that come into contact with the dentin of the root initiate the formation of cementum and periodontium

b) the epithelial root sheath (Hertwig's sheath) is formed by the outer and inner enamel epithelium without the stellate reticulum in between

c) root development begins after crown development

d) the stellate reticulum differentiates into the definitive pulp during development

42. Decide whether the following statements about the development of the tooth are true T or false F:

a) the dental pulp develops from the ectomesenchyme of the dental papilla

b) the dental pulp develops from the inner epithelial layer of the enamel organ

c) the dental sac is the embryonic structure from which the dental pulp develops

d) the dental pulp develops from tissue derived from the mesenchyme and neural crest cells

43. Decide whether the following statements about the development of the bones of the skull are true T or false F:

a) bones of the skull develop from mesenchyme derived from both the mesoderm and ectomesenchyme of neural crest cells origin

b) bones of the chondrocranium ossify by a process called desmogenic ossification

c) most viscerocranial bones ossify via desmogenic ossification from tissue of pharyngeal arches

d) all cranial bones ossify by the same mechanism

44. Decide whether the following statements about the development of the bones of the skull are true T or false F:

a) bones of the cranial vault ossify in a desmogenic manner

b) most bones of the facial skeleton ossify by desmogenic ossification

c) bones of the viscerocranium grow much faster than bones of the neurocranium during fetal development

d) bones of the newborn's skull fuse definitively shortly after birth

45. Which of the following general statements about tooth development are true?

a) dental papilla is of endodermal origin

b) production of dentin precedes enamel production and appears in bell stage

c) preodontoblasts first appear in the stellate reticulum of developing tooth

d) the root of the deciduous tooth begins to form after the tooth erupts

46. Which of the following statements about enamel development are true?

a) secretory ameloblasts differentiate to form the outer enamel epithelium of the enamel organ

b) ameloblasts differentiate from the inner enamel epithelium of the enamel organ

c) enamel originates from the ectodermal epithelium of the primitive oral cavity

d) ameloblasts, producing the enamel, arise from ectomesenchyme of dental papilla

47. What is the embryonic origin of dentin?

a) ectoderm

b) mesenchyme

c) endoderm

d) cardiogenic mesoderm

48. Which of the following statements about the secretory ameloblasts ultrastructure are true?

a) are columnar cells

b) junctional complexes are present on both apical and basal parts of the cell

c) are in contact with the stratum intermedium

d) possess Tomes's process

49. What are the structures of the bell stage of tooth development?

a) stellate reticulum in the dental papilla

b) outer enamel epithelium

c) preodontoblasts

d) stratum intermedium

50. Which of the following statements about the Hertwig epithelial root sheath are true?

a) is derived from the inner and outer enamel epithelium

b) may be involved in cementogenesis

c) is located at the cervical loop of the enamel organ

d) is a temporary structure found in deciduous teeth but is absent in permanent teeth

Chapter Six Answers:

1) acd
2) abd
3) a
4) ad
5) ab
6) a
7) cd
8) b
9) ad
10) acd
11) ab
12) abcd
13) bcd
14) ac
15) acd
16) ab
17) cd
18) ac
19) cd
20) c
21) bde
22) d
23) ace
24) acd
25) c
26) abcd
27) abc
28) c
29) c
30) adf
31) bc
32) abc
33) bce
34) bc
35) abe
36) acd
37) ac
38) abd
39) df
40) cd
41) abc
42) ad
43) ac
44) ab
45) b
46) bc
47) ab
48) abcd
49) bcd
50) abc

Chapter Seven: Respiratory System

1. Decide whether the following statements about the respiratory system are true T or false F:

a) the epiglottis is reinforced by the elastic cartilage

b) the lingual surface of the epiglottis is covered by a stratified squamous non-keratinized epithelium

c) Reinke's space is a loose connective tissue beneath false vocal cords

d) the false vocal cords contain seromucous glands in the connective tissue

2. Decide whether the following statements about the respiratory system are true T or false F:

a) the epiglottis is reinforced by hyaline cartilage

b) the laryngeal surface of the epiglottis is covered by a pseudostratified columnar epithelium with cilia and goblet cells

c) the epiglottis contains seromucous glands in the connective tissue

d) tonsilla laryngea is an accumulation of lymphoid tissue in the epiglottis

3. Decide whether the following statements about the respiratory system are true T or false F:

a) plicae vocales contain mainly seromucous glands in the connective tissue

b) the larynx is reinforced exclusively by hyaline cartilage

c) plicae vocales are covered by a stratified squamous non-keratinized epithelium due to the intense mechanical stress of voice production

d) Reinke's space is a layer of loose connective tissue beneath plicae vocales

4. Decide whether the following statements about the respiratory system are true T or false F:

a) the cartilage reinforcing the epiglottis can be selectively stained, for example, with orcein

b) the laryngeal surface of the epiglottis is covered entirely by a stratified squamous non-keratinized epithelium

c) tonsilla laryngea is an accumulation of a lymphoid tissue in the region of ventriculus laryngis

d) the larynx is entirely lined by a pseudostratified columnar epithelium with cilia and goblet cells

5. Decide whether the following statements about the respiratory system are true T or false F:

a) the lingual surface of the epiglottis is covered by a pseudostratified columnar epithelium with cilia and goblet cells

b) the epiglottis is reinforced by fibrous cartilage

c) plicae vocales contain an elastic ligament referred to as ligamentum vocale

d) stratified squamous non-keratinized epithelium is present on the lingual as well as part of the laryngeal surface of the epiglottis

6. Decide whether the following statements about the respiratory system are true T or false F:

a) the trachea is reinforced by elastic cartilage

b) lymphoid follicles can be found within the lamina propria of the trachea as a part of the BALT system

c) cartilages that reinforce the trachea are C-shaped with open ends facing dorsally

d) lamina propria of the tracheal mucosa contains mixed seromucous glands

7. Decide whether the following statements about the respiratory system are true T or false F:

a) the trachea is reinforced by hyaline cartilage

b) lamina epithelialis of the trachea is formed by a stratified squamous non-keratinized epithelium

c) the wall of a trachea contains striated skeletal muscle called musculus trachealis

d) the basement membrane of the trachea epithelium is only visible when using selective staining

8. Decide whether the following statements about the respiratory system are true T or false F:

a) the basement membrane of the trachea epithelium is 2–4 micrometers thick, which enables it to be well visible even with hematoxylin and eosin staining

b) glands of the tracheal wall are purely mucous

c) the superficial layer of the trachea wall is tunica adventitia

d) ligamenta anularia connect the adjacent cartilages of the trachea

9. Decide whether the following statements about the respiratory system are true T or false F:

a) ligamenta anularia connect the free ends of the individual cartilages in the trachea

b) paries membranaceus is the designation for the musculo-vascular part of the wall of the trachea

c) the trachea is reinforced by fibrous cartilage

d) the trachea is covered with serosa, which connects it to the surrounding tissue

10. Decide whether the following statements about the respiratory system are true T or false F:

a) the trachea is lined by a pseudostratified columnar epithelium with cilia and goblet cells

b) free ends of the rings of hyaline cartilage in the wall of the trachea are ventrally directed

c) like the larynx, both hyaline and elastic cartilages reinforce the tracheal wall

d) musculus trachealis is a smooth muscle in the wall of the trachea

11. Decide whether the following statements about the respiratory system are true T or false F:

a) Clara cells are part of the lining of large bronchi

b) bronchioles contain hyaline cartilage in the wall

c) bronchioles have relatively more elastic fibers in relation to wall thickness than bronchi

d) bronchioles do not contain glands

12. Decide whether the following statements about the respiratory system are true T or false F:

a) bronchioles, unlike bronchi, contain lymphoid follicles in the connective tissue

b) the terminal bronchioles form the boundary between the conducting and respiratory parts of the respiratory system

c) bronchioles usually have a round lumen at the cross-section

d) Clara cells normally produce surfactant in the alveoli of the lungs

13. Decide whether the following statements about the respiratory system are true T or false F:

a) all compartments of the bronchial tree are lined by a pseudostratified columnar epithelium with cilia and goblet cells

b) the small bronchi, like the trachea, contain c-shaped hyaline cartilage in the wall

c) the bronchi are reinforced by hyaline cartilage, while the bronchioles contain elastic cartilage

d) the epithelium of the respiratory tract decreases in height towards the periphery

14. Decide whether the following statements about the respiratory system are true T or false F:

a) respiratory bronchioles contain glands in the wall, but not cartilage and lymphoid tissue

b) the hyaline cartilage in the bronchial wall ensures that postmortem bronchi have a rather regular lumen in histological slides

c) the exchange of respiratory gases can take place from the level of the respiratory bronchioles

d) postmortem contraction of the smooth muscle of the bronchiole wall causes them to have an irregular lumen in histological slides

15. Decide whether the following statements about the respiratory system are true T or false F:

a) most compartments of the respiratory system contain a layer in the wall where we find a combination of smooth muscle, connective tissue fibers, and cartilage

b) tunica fibromusculocartilaginea is part of the tracheal wall only

c) the surface of the bronchi is covered by tunica adventitia

d) terminal bronchioles are part of the respiratory portion of the respiratory system

16. Decide whether the following statements about the respiratory system are true T or false F:

a) the blood-air barrier is formed by type I pneumocytes, capillaries in the interalveolar septa, and their fused basal laminae

b) macrophages in the alveoli of the lungs are called dust cells or coniophages

c) alveoli, like the rest of the respiratory system, are lined by a pseudostratified epithelium with cilia

d) Kohn's pores interconnect and thus equalize pressure in adjacent alveoli

17. Decide whether the following statements about the respiratory system are true T or false F:

a) the blood-air barrier consists of type I pneumocytes and type II pneumocytes

b) interalveolar septa contain capillaries with a continuous lining

c) pulmonary alveoli are lined by a stratified squamous epithelium

d) type II pneumocytes produce the pulmonary surfactant

18. Decide whether the following statements about the respiratory system are true T or false F:

a) interalveolar septa contain capillaries with fenestrations

b) Kohn's pores are part of the blood-air barrier

c) all parts of the bronchial and alveolar tree are covered with pleura

d) the blood-air barrier is about 0.6 micrometers thick

19. Decide whether the following statements about the respiratory system are true T or false F:

a) the respiratory part of the respiratory system includes respiratory bronchioles, alveolar ducts, alveolar sacs, and alveoli

b) interalveolar septa contain capillaries with pores

c) the simple squamous epithelium of alveoli consists exclusively of type II pneumocytes

d) Clara cells produce a secretion that is similar in composition to the surfactant produced by type II pneumocytes

20. Decide whether the following statements about the respiratory system are true T or false F:

a) Clara cells have cilia on their surface

b) the blood-air barrier is formed exclusively by plasma membranes of type I pneumocytes and endothelial cells of capillaries

c) the blood-air barrier is about 5–6 micrometers thick

d) although the entire lung is covered by a pleura, individual sections of the bronchial tree are attached to the surrounding area by adventitia

21. Which components of the respiratory system belong to its respiratory part?

a) alveolar ducts

b) terminal bronchioles

c) respiratory bronchioles

d) alveoli

22. Which structures are involved in the conditioning of the air?

a) vibrissae

b) Club cells

c) plexus cavernosus conchae

d) Bowman's gland

23. Which cell populations can be found in the pseudostratified epithelium of the conducting portion of the respiratory system?

a) basal (stem) cells

b) club cells

c) dust cells

d) goblet cells

e) brush cells

24. Which cell populations can be found in the olfactory epithelium?

a) receptor cells

b) goblet cells

c) sustentacular cells

d) brush cells

25. Which of the following statements about the respiratory tract histology are true?

a) lamina propria of the bronchi contains abundant seromucous glands

b) all epithelial cells of the trachea have the same shape

c) tracheal epithelium is composed of cells that are all located on the basement membrane

d) type II alveolar cells are flat cells and, together with the blood capillary endothelium, form the blood-air barrier

26. Where in the respiratory tract can we physiologically find stratified squamous epithelium?

a) carina tracheae

b) ventricular folds

c) lingual surface of the epiglottis

d) vestibulum nasi

e) bronchioli

f) olfactory region of the nasal cavity

27. Which of the following statements about the trachealis muscle are true?

a) is bridging the craniocaudal gap between two C-shaped cartilages

b) is a cross-striated skeletal muscle

c) connects the free ends of C-shaped cartilage in the posterior aspect

d) together with the cartilage and connective tissue, form tunica fibromusculocartilaginea

28. Which of the following larynx-related pairs are factual?

a) ventriculus Morgagni – vocalis muscle

b) ventricular folds – mucosal glands

c) vocal cords – elastic cone

d) vocal cords – Reinke's space

29. Which of the following statements about the epiglottis are true?

a) contains hyaline cartilage

b) glands are only in its laryngeal aspect

c) contains cross-striated muscle

d) contains elastic cartilage

30. What is missing in the wall of the bronchioles and found in the wall of the bronchi?

a) hyaline cartilage

b) goblet cells

c) club (Clara) cells

d) smooth muscle

31. What is the role of type II pneumocyte?

a) to produce the pulmonary surfactant

b) is progenitor cell for type I pneumocyte

c) serve as a receptor

d) to produce anti-atelectasis factor

e) to form an effective barrier between the air and blood

32. What is the morphology of type II pneumocytes?

a) contain the lamellar bodies

b) are extremely thin squamous cells

c) tend to bulge into alveolar space

d) contain microvilli on their apical surface

33. Where in the respiratory system is simple cuboidal epithelium found?

a) olfactory region of the nasal cavity

b) bronchi

c) respiratory bronchioles

d) terminal bronchioles

e) false vocal cords

f) alveolar ducts

34. What are the components of blood-air barrier?

a) pulmonary surfactant

b) type I pneumocyte

c) basal membrane of tracheal type

d) alveolar pores of Kohn

e) fused laminae basales

f) type II pneumocyte

g) endothelial cell

35. What are some histological characteristics of the lungs?

a) most of the nerves are not visible under the light microscope

b) have two parallel blood circulations (nutritive and functional) that partially anastomose

c) their external surface is adventitia

d) pulmonal lobules are separated by connective tissue septa

e) its fenestrated blood capillaries facilitate diffusion of respiratory gases

36. Which components of the wall of the airways relatively increase with progressive branching of the tracheobronchial tree?

a) ciliated cells

b) goblet cells

c) cartilage

d) smooth muscle

e) elastic fibers

f) glands

37. Which of the following statements about the surfactant are true?

a) prevents alveolar collapse by increasing surface tension

b) its function relates to blood capillaries

c) is the product of type I pneumocytes

d) consist of proteins and phospholipids

e) its excess production can cause respiratory distress syndrome

38. What is part of the interalveolar septum?

a) reticular fibers

b) elastic fibers

c) cartilage

d) endothelial cells of lung capillaries

e) pulmonary surfactant

f) dust cells in blood capillaries

39. Which statements about the dust cells are true?

a) are specialized lung neutrophils

b) are derived from monocytes originating in the bone marrow

c) are also called alveolar macrophages

d) are also called Clara cells

e) are squamous alveolar cells

40. Which of the following statements about the pleura are true?

a) epithelial cells on its surface contains kinocilia

b) it is covered by simple squamous epithelium – mesothelium

c) visceral pleura lines the inner surfaces of the thoracic cavity on each side of the mediastinum

d) between two pleurae is a potential narrow space called the pleural cavity

41. Decide whether the following statements about the development of the respiratory system are true T or false F:

a) all components of the tracheobronchial tree develop from the endoderm

b) the development of the respiratory system is related to the development of the foregut

c) the final stage of lung maturation is the pseudoglandular stage

d) cartilages of the larynx develop from the mesenchyme, which is of neural crest cells origin

42. Decide whether the following statements about the development of the respiratory system are true T or false F:

a) the maturation of lungs occurs in four histological stages

b) the tracheoesophageal septum divides part of the foregut into the base of the respiratory system ventrally and parts of the digestive tube dorsally

c) the first stage in the development of the respiratory system is the laryngotracheal sulcus

d) the epithelium of the respiratory system develops from the mesenchyme, which originates from the mesoderm of the splanchnopleure

43. Decide whether the following statements about the development of the respiratory system are true T or false F:

a) mesenchyme originating from the mesoderm of the splanchnopleure gives rise to cartilage, muscle, and connective tissue in the organs of the respiratory system

b) various types of tracheoesophageal fistulae can arise when the bases of the trachea and esophagus are incompletely separated

c) the first histological stage of lung maturation is the canalicular stage

d) the bronchial tree arises from the cranial end of the laryngotracheal diverticulum

44. Decide whether the following statements about the development of the respiratory system are true T or false F:

a) giving birth to a fetus whose lungs are in the pseudoglandular stage is not compatible with life

b) the last stage of lung maturation is the alveolar stage

c) the respiratory system begins to develop in the 8th week after fertilization

d) the base of the respiratory system develops in the midgut region

45. Decide whether the following statements about the development of the respiratory system are true T or false F:

a) the pseudoglandular stage of lung maturation histologically resembles the exocrine glands

b) severe and chronic oligohydramnios leads to impaired lung development resulting in pulmonary hypoplasia

c) cartilages of the larynx develop from the material of the first and second pharyngeal arches

d) the respiratory system begins to develop in the 4th week after fertilization

46. Which components of the trachea are of endodermal origin?

a) hyaline cartilage C-shaped rings

b) ligamenta annularia

c) goblet cell

d) tracheal glands

e) endocrine cell of DES

f) tracheal muscle

47. How would you explain the relatively frequent occurrence of tracheoesophageal fistulas from an embryological point of view?

a) the protruding trachea grew into a primitive esophagus

b) wrong pattern of separation of the lung bud from the esophagus

c) pleuropericardial folds failed to meet and create pleural cavities

d) they have no embryological explanation; it is not a developmental defect but an acquired defect (e.g., after infection)

e) failure of the foregut to separate completely into the trachea and esophagus

48. Approximately how many divisions of the primary bronchial bud occurs by 28 weeks?

a) 3

b) 28

c) 16

d) division does not begin until after the 28th week

49. Which components of the respiratory system are of ectodermal origin?

a) vocalis muscle

b) endocrine cell of DNES in bronchi

c) tracheal autonomic innervation

d) olfactory organ

e) parietal pleura

50. Premature children do not produce adequate amounts of pulmonary surfactant. What would you expect to see on a histological preparation of lung tissue from such an infant?

a) collapsed alveoli

b) bronchiectasis (widened airways)

c) thickened blood-air barrier

d) emphysema (enlarged air-filled spaces with alveolar destruction)

Chapter Seven Answers:

1) abd
2) bc
3) cd
4) ac
5) cd
6) bcd
7) a
8) acd
9) b
10) ad
11) cd
12) b
13) d
14) bcd
15) ac
16) abd
17) bd
18) d
19) ad
20) d
21) acd
22) ac
23) ade
24) acd
25) ac
26) acd
27) cd
28) bcd
29) d
30) ab
31) abd
32) ac
33) cd
34) abeg
35) abd
36) de
37) d
38) abd
39) bc
40) bd
41) bd
42) abc
43) ab
44) ab
45) abd
46) cde
47) be
48) c
49) cd
50) a

Chapter Eight: Urinary System

1. Decide whether the following statements about the urinary system are true T or false T:

a) the renal corpuscle is always located in the cortex of the kidney

b) the urinary (Bowman's) space contains definitive urine

c) the urinary pole of the renal corpuscle directly continues into the distal tubule

d) the renal corpuscle is synonymous with the glomerulus

2. Decide whether the following statements about the urinary system are true T or false T:

a) pedicles of podocytes form the visceral sheet of the Bowman's capsule

b) the glomerulus is formed by capillaries with a continuous epithelial lining

c) renal corpuscles are found in both the cortex and medulla of the kidney

d) the nephron is formed exclusively by the renal corpuscle

3. Decide whether the following statements about the urinary system are true T or false T:

a) the proximal tubule is lined by epithelial cells with many microvilli that form a brush border

b) the lumen of the proximal tubules is round with smooth edges

c) the proximal tubule is part of the juxtaglomerular apparatus

d) macula densa is a set of specialized cells within the distal tubules

4. Decide whether the following statements about the urinary system are true T or false T:

a) the thin arm of Henle's loop (tubulus intermedius) is lined by a single layer of cuboidal epithelial cells

b) the collecting duct is part of the intrarenal ureters

c) the distal tubule has a round lumen with smooth edges

d) the parietal sheath of the Bowman's capsule is formed by a simple squamous epithelium

5. Decide whether the following statements about the urinary system are true T or false T:

a) the intraglomerular mesangium is part of the juxtaglomerular apparatus

b) the glomerular filtration barrier is formed by the primary processes of podocytes

c) the distal tubule is lined by a simple columnar epithelium with a brush border

d) the vascular pole of the renal corpuscle contains the afferent and efferent arteriole

6. Decide whether the following statements about the urinary system are true T or false T:

a) in the proximal tubule, not all epithelial cell nuclei can be seen in a histological slide

b) juxtaglomerular cells are modified renin-producing smooth muscle cells

c) macula densa is seen as a bright area of the distal tubules close to the glomerulus

d) the glomerulus of the kidney is formed by blood capillaries with pores

7. Decide whether the following statements about the urinary system are true T or false T:

a) the glomerular filtration barrier consists of the glomerular capillaries with pores, secondary processes (pedicles) of podocytes, and their fused basal laminae

b) the proximal tubule has a narrow star-shaped lumen

c) extraglomerular mesangial cells are part of the juxtaglomerular apparatus

d) macula densa is formed by modified smooth muscle cells of the afferent arteriole

8. Decide whether the following statements about the urinary system are true T or false T:

a) the boundary between the tubules of the nephron and the intrarenal urinary duct is formed by tubulus reuniens

b) the renal papilla contains renal corpuscles

c) the blood-urine barrier (filtration membrane) is formed by endothelial cells of the glomerular capillaries, pedicles of podocytes, and their fused basal laminae

d) the urinary space contains primary urine, which enters the proximal tubule at the urinary pole

9. Decide whether the following statements about the urinary system are true T or false T:

a) juxtaglomerular cells contain eosinophilic granules with renin in their cytoplasm

b) the collecting duct is lined by a simple columnar epithelium

c) the thin arm of Henle's loop is lined by a single layer of squamous epithelial cells

d) the parietal sheath of the Bowman's capsule is also part of the blood-urine barrier

10. Decide whether the following statements about the urinary system are true T or false T:

a) macula densa contains cells with nuclei closely adjacent to each other and is therefore distinguishable as a dark area on histological slides

b) tubulus reuniens is part of the nephron

c) the mesangial matrix and mesangial cells around the glomerulus of the renal corpuscle form the mesangium

d) a single layer of epithelial cells of varying height lines all ducts of the nephron

11. Decide whether the following statements about the urinary system are true T or false T:

a) the ureter is lined by a simple columnar epithelium

b) adventitia connects the ureter to its environment

c) mucosa of the ureter forms numerous long folds

d) the musculature of the ureter has the same arrangement as in the digestive tract – the inner layer is circular, and the outer layer is longitudinal

12. Decide whether the following statements about the urinary system are true T or false T:

a) the ureter is lined with urothelium – a simple squamous epithelium

b) the musculature of the ureter is arranged opposite to that of the digestive tube – the inner layer is longitudinal, and the outer is circular

c) the terminal third of the ureter additionally contains a third superficial longitudinal layer of musculature

d) the superficial layer of the ureter is referred to as serosa

13. Decide whether the following statements about the urinary system are true T or false T:

a) the ureter is lined with urothelium – a pseudostratified transitional epithelium

b) the surface cells of the urothelium are called umbrella cells

c) the ureter has a round, regular lumen

d) the musculature of the ureter is arranged in three layers along its entire course

14. Decide whether the following statements about the urethra are true T or false F:

a) pars spongiosa of the male urethra is lined by a stratified columnar epithelium

b) the female urethra is lined by two types of epithelia – urothelium and stratified squamous non-keratinized epithelium

c) the male urethra is lined by a total of four different types of epithelia in different anatomical locations

d) the entire female urethra is lined by the urothelium

15. Decide whether the following statements about the urethra are true T or false F:

a) fossa navicularis of the male urethra is lined by a stratified squamous non-keratinized epithelium

b) the male urethra has musculature arranged in an inner longitudinal and outer circular layer

c) different anatomical parts of the female urethra are lined by four different types of epithelia

d) both the male and female urethra are connected to the surrounding area by adventitia

16. Decide whether the following statements about the urinary system are true T or false T:

a) the bladder is lined with urothelium

b) the entire surface of the bladder is covered by serosa

c) the muscles of the bladder are arranged in three layers

d) the inner layer of the bladder musculature is longitudinal

17. Decide whether the following statements about the urinary system are true T or false T:

a) the musculature of the bladder is made up of the inner plexiform, middle circular, and outer longitudinal layers

b) the bladder is lined in different parts by different types of epithelia

c) most of the surface of the bladder is covered with serosa

d) the bladder is lined by a simple columnar epithelium

18. Decide whether the following statements about the urinary system are true T or false T:

a) most of the surface of the bladder is covered with adventitia

b) the muscles of the bladder are arranged in the same way as in the ureter

c) nuclei of epithelial cells of the bladder mucosa are always at the same level, regardless of the functional state

d) the bladder mucosa is arranged in folds

19. Decide whether the following statements about the urethra are true T or false F:

a) the female urethra contains paraurethral glands of Skene in the lamina propria

b) stratified squamous non-keratinized epithelium lines the part of the female urethra closer to the bladder

c) the part of the male urethra that directly follows the bladder is lined by urothelium

d) lamina propria of the male urethra contains paraurethral Littre's glands

20. Decide whether the following statements about the urinary system are true T or false T:

a) we distinguish the bladder from the ureter based on different types of epithelia

b) unlike the ureter, part of the bladder is covered with adventitia and part with serosa

c) the ureter is recognized on the slide from the bladder mainly by the arrangement of the musculature

d) both the male and female urethra contain intraepithelial Morgagni's glands formed by mucous cells

21. What epithelium lines the distal portion of the female urethra at or near its termination?

a) transitional

b) simple columnar

c) non-keratinized stratified squamous

d) the same as in fossa navicularis of the glans penis

e) stratified cuboidal

f) pseudostratified columnar

22. What is the specialized erectile tissue that surrounds the penile urethra called?

a) corpus albicans

b) tunica albuginea

c) corpora cavernosa

d) corpora arenacea

e) corpus spongiosum

23. The urethra is initially lined with $ epithelium until the ejaculatory ducts join the prostatic urethra. Replace $ with the correct word!

a) transitional zones

b) transitional

c) simple columnar

d) stratified columnar

24. Which of the following general statements about the urinary system are true?

a) urothelium lines the parietal sheet of the glomerular Bowman's capsule of the kidney

b) external layer of the urinary bladder may be covered by both adventitia and serosa

c) the thickest layer of the ureter consists of smooth muscle

d) the portion of the urethra leaving the urinary bladder is the prostatic urethra

25. Which of the following statements about the Bowman's capsule sheaths are true?

a) its visceral sheath comprises podocytes

b) its parietal sheath comprises podocytes

c) its visceral sheath comprises simple squamous epithelium

d) its parietal sheath comprises simple squamous epithelium

26. What is vas efferens that drains blood from the glomerulus?

a) sinusoid

b) venule

c) arteriole

d) continuous capillary

27. Which of the following statements about the umbrella cells are true?

a) often are binucleated

b) at the apical pole, they contain the transmembrane protein uroplakin

c) their mitotic activity is high

d) have massive connecting complexes between them

e) are basic cells of collecting ducts

28. Which cells does the urothelium consist of?

a) umbrella cells

b) DNES cells (diffuse endocrine)

c) intermediate cells

d) cells with cilia

e) basal cells

29. What is the proper arrangement of muscle layers in the tunica muscularis of the ureter?

a) third layer, internal longitudinal, less distinct than the other two is found only in the neighborhood of the bladder

b) mostly inner longitudinal – outer circular layers are formed

c) consists of several oblique layers of smooth muscle

d) mostly inner circular – outer longitudinal layers are formed

30. What distinguishes the proximal tubule from the distal tubule of the nephron?

a) absence of microvilli in the proximal tubule

b) the cuboidal shape of its epithelial cells

c) the proximal tubule is longer and therefore more numerous in cross-section

d) reabsorption of molecules takes place only in the proximal tubule

e) the proximal tubule is responsible for the reabsorption of about two-thirds of the filtered sodium and water

31. Which of the following statements about the glomerulus are true?

a) is a tuft of blood capillaries

b) is supplied by an afferent arteriole

c) consists of the proximal convoluted and straight tubule

d) together with Bowman's capsule constitutes the renal (Malpighian) corpuscle

e) contains intraglomerular mesangial cells

32. Which of the following statements about the renal corpuscle are true?

a) the filtration slit diaphragm between podocyte's pedicles acts as a size-selective filter

b) the visceral sheath of Bowman's capsule is made of mesangial cells

c) through the urinary pole enter and exit the vessels of the glomerulus

d) the glomerular basement membrane and endothelial glycocalyx act as a charge-selective filter

33. What are the functions of the juxtaglomerular apparatus?

a) hydroxylation of vitamin D3 to produce highly active calcitriol

b) renin, as a part of renin-angiotensin-aldosterone system, is being produced by cells of macula densa

c) cells of macula densa serve as a sensor of tubular fluid composition

d) regulation of blood filtration rate by podocytes

e) erythropoietin secretion

34. Which structures can be found in the medulla of the kidney?

a) extensive vascular supply

b) convoluted tubules

c) vasa recta

d) collecting ducts

e) straight tubules

f) major calyces

35. What does the filtration apparatus of the kidney consist of?

a) intraglomerular mesangial cells

b) endothelial glycocalyx

c) parietal sheath of Bowman's capsule

d) glomerular basement membrane

e) filtration slit diaphragm

36. What can be said about the morphology and function of juxtaglomerular cells?

a) are part of the juxtaglomerular apparatus

b) are modified smooth muscle cells in the wall of afferent arteriole

c) they contain secretory vesicles (granules) with renin

d) their cell nuclei are spindle-shaped and elongated

37. In which structures of the kidney can simple cuboidal epithelium be found?

a) vasa recta

b) glomerulus

c) proximal convoluted tubule

d) medullary collecting duct

e) Bowman's capsule

38. Which of the following statements about the loop of Henle are true?

a) runs in the cortex

b) is part of the nephron and is lined with a simple cuboidal to squamous epithelium

c) consists of ascending and descending segments

d) contains, e.g., macula densa and also renin-producing cells

e) its function is the formation of an osmolar concentration gradient in the medullary interstitium

39. What is part of a nephron?

a) interstitial connective tissue

b) descending limb of the Henle loop

c) papillary duct

d) glomerulus

40. Which of the pairs are correct?

a) basal labyrinth – distal tubule

b) aquaporin 1 – proximal tubule

c) brush border – proximal tubule

d) macula densa – loop of Henle

e) intercalated cells – collecting tubule

41. Decide whether the following statements about the development of the urinary system are true T or false F:

a) the pronephros gives rise to the definitive kidney

b) all components of the kidney develop from the metanephrogenic blastema

c) trigonum vesicae is formed by incorporation of the mesodermal Wolffian ducts into the base of the bladder from the endodermal part of the cloaca

d) epithelial components of the kidney develop from the intermediate mesoderm

42. Decide whether the following statements about the development of the urinary system are true T or false F:

a) the first stage in the development of the kidney is the rudimentary pronephros, which forms in the cervical region of the embryo

b) the pronephros develops early in the 4th week after fertilization

c) the metanephros, the basis of the permanent kidney, develops from the 5th week after fertilization

d) nephrons of the kidney develop from the ureteric bud

43. Decide whether the following statements about the development of the urinary system are true T or false F:

a) the basis of the intrarenal urinary tract is the metanephrogenic blastema

b) the ureter develops from the ureteric bud, which grows out of the mesonephric (Wolffian) duct

c) the bladder is entirely derived from part of the endodermal urogenital sinus.

d) both large and small kidney calyces develop from the ureteric bud

44. Decide whether the following statements about the development of the urinary system are true T or false F:

a) both the pronephros and mesonephros are rudimentary primordia that completely cease to exist – they form no definite derivatives

b) the urethra has the origin in the metanephrogenic blastema

c) although trigonum vesicae has a distinct origin, the epithelium that secondarily covers it in the definitive bladder is from the endoderm of the urogenital sinus

d) nephrons and intrarenal excretory ducts have distinct embryonic origins

45. Decide whether the following statements about the development of the urinary system are true T or false F:

a) the development of the urinary bladder is related to the allantois, which normally transforms into the urachus

b) metanephrogenic blastema develops from paraxial mesoderm

c) the epithelium of trigonum vesicae and its associated connective tissue structures are derived from the mesonephric (Wolffian) duct

d) the ureteric bud and the metanephrogenic blastema induce each other, which we refer to as reciprocal induction

46. Which tissue gives the foundation to nephric structures?

a) lateral plate mesoderm

b) ectomesenchyme

c) nephrotome

d) intermediate mesoderm

47. Which of the following statements about the pronephros development are true?

a) the mesenchymal-to-epithelial transition process had to take place to achieve the hollow tube system

b) starts at the 4th week of development

c) primitive nephrons are temporarily functional between the 6th and 10th week

d) it begins with the appearance of mesonephric ducts

48. What structure induces the transformation of the metanephric blastema into the metanephros?

a) Wolffian ducts

b) urogenital sinus

c) ureteric buds

d) mesonephric nephrons

49. What are ureteric bud derivatives?

a) major calyces

b) renal pelvis

c) collecting tubules

d) juxtaglomerular apparatus

e) urinary bladder

50. Which epithelial parts of the urinary system are of endodermal origin?

a) penile urethra

b) collecting ducts

c) trigone of the urinary bladder

d) greater part of the urinary bladder

Chapter Eight Answers:

1) a
2) a
3) ad
4) bcd
5) d
6) abd
7) abc
8) acd
9) abc
10) acd
11) bc
12) bc
13) ab
14) abc
15) abd
16) ac
17) a
18) ad
19) acd
20) bcd
21) cd
22) e
23) b
24) bcd
25) ad
26) c
27) abd
28) ace
29) b
30) ce
31) abde
32) ad
33) c
34) cde
35) bde
36) abc
37) cd
38) bce
39) bd
40) abce
41) cd
42) abc
43) bd
44) cd
45) ad
46) cd
47) abd
48) c
49) abc
50) ad

Chapter Nine: Male Reproductive System

1. Decide whether the following statements about the male reproductive system are true T or false F:

a) the germinal epithelium of the seminiferous tubules is divided into two compartments

b) spermatids are localized in the basal compartment of the seminiferous tubules

c) Sertoli cells are essential for the proper progression of spermatogenesis

d) testosterone is produced by Leydig cells in the interstitium of the testis

2. Decide whether the following statements about the male reproductive system are true T or false F:

a) Reinke's crystalloids are found in androgen-producing interstitial cells of the testis

b) intercellular junctions between Sertoli cells form a hematotesticular barrier

c) the acrosome is a modified lysosome that is essential for fertilization

d) spermatids differentiate from type B spermatogonia

3. Decide whether the following statements about the male reproductive system are true T or false F:

a) the largest cells in the spermatogenic epithelium are primary spermatocytes

b) secondary spermatocytes are more numerous than primary spermatocytes in the spermatogenic epithelium

c) spermatohistogenesis occurs earlier than spermatocytogenesis

d) type A pale spermatogonia continues to differentiate into primary spermatocytes during spermatocytogenesis

4. Decide whether the following statements about the male reproductive system are true T or false F:

a) tunica albuginea is formed by a dense connective tissue

b) cells that the immune system considers to be self are found in the adluminal compartment of the spermatogenic epithelium

c) the nucleus of primary spermatocytes often contains meiotic figures

d) spermatids are the smallest cells in the spermatogenic epithelium

5. Decide whether the following statements about the male reproductive system are true T or false F:

a) convoluted seminiferous tubules connect via tubuli recti to rete testis, which are located in mediastinum testis

b) normal spermatogenesis depends on the transition of spermatids from the basal to the adluminal compartment

c) light type spermatogonia have a heterochromatic nucleus

d) differentiation of primary spermatocytes into secondary spermatocytes is part of spermatohistogenesis

6. Decide whether the following statements about the male reproductive system are true T or false F:

a) ductus epididimydis is lined by a pseudostratified columnar epithelium with stereocilia

b) ductuli efferentes form the head of the epididymis and are lined by a pseudostratified epithelium

c) ductuli efferentes contain columnar cells with cilia

d) the epithelium of ductus epididymidis, unlike that of the testis, does not form a barrier between the blood and the epididymis

7. Decide whether the following statements about the male reproductive system are true T or false F:

a) the thickest layer of the wall of ductus deferens is the muscle layer

b) ductus deferens is lined by a pseudostratified columnar epithelium with cilia

c) muscles of ductus deferens wall are arranged in three layers

d) ductus deferens has a star-shaped lumen because its mucosa forms longitudinal folds

8. Decide whether the following statements about the male reproductive system are true T or false F:

a) ductus epididimydis is lined by a simple squamous epithelium

b) halo cells are basal cells of ductus epididymidis epithelium responsible for regeneration

c) ductus epididymidis is covered with serosa on the surface

d) the hematoepididymal barrier provides protection of sperm from unwanted immune responses

9. Decide whether the following statements about the male reproductive system are true T or false F:

a) tubuli recti testis are partially lined with sertoli cells

b) ductuli efferentes are exclusively part of the extratesticular genital tract

c) ductus epididymidis is covered with adventitia, which connects it to its surroundings

d) ductuli efferentes have an irregular "sawtooth" lumen because of the alternation of low cubic and high columnar cells

10. Decide whether the following statements about the male reproductive system are true T or false F:

a) ductus deferens has a wider lumen compared to the lumen of ductus epididymidis

b) ductus deferens is covered with adventitia

c) muscles of ductus deferens are arranged in two layers

d) all epithelial cells of ductuli efferentes have cilia on their surface

11. Decide whether the following statements about the male reproductive system are true T or false F:

a) glandula vesiculosa is lined with a pseudostratified columnar epithelium

b) up to 60–70% of the ejaculate volume is produced by glandula vesiculosa

c) columnar secretory cells of glandula vesiculosa epithelium have stereocilia on their surface

d) columnar secretory epithelial cells of glandula vesiculosa accumulate lipofuscin during puberty

12. Decide whether the following statements about the male reproductive system are true T or false F:

a) the fibromuscular stroma of the prostate is made up of collagen and elastic fibers with a lot of smooth muscle cells

b) the prostate contains simple tubular glands

c) corpora amylacea are embedded in the fibromuscular stroma of the prostate

d) part of the urethra passes through the prostate

13. Decide whether the following statements about the male reproductive system are true T or false F:

a) the peripheral zone of the prostate contains the main glands and accounts for about 70% of the gland's volume

b) corpora amylacea are found in the lumen of the prostate

c) prostatic secretion accounts for most of the ejaculate volume

d) the fibromuscular stroma of the prostate contains striated muscle

14. Decide whether the following statements about the male reproductive system are true T or false F:

a) the prostate is the largest male accessory sex gland

b) the periurethral zone of the prostate contains the main glands

c) the height of epithelial cells of the prostate gland depends on its secretory activity, but usually, the epithelium is a pseudostratified columnar

d) mucosal glands of the prostate are firmly attached to the urethra

15. Decide whether the following statements about the male reproductive system are true T or false F:

a) corpora amylacea are found in the lumen of glandula vesiculosa

b) glandula vesiculosa is covered with adventitia

c) the musculature of glandula vesiculosa is made up of an inner circular and outer longitudinal layer

d) the prostate contains 30–50 branched tubuloalveolar glands

16. Decide whether the following statements about the male reproductive system are true T or false F:

a) the penis contains two corpora cavernosa and one corpus spongiosum

b) caverns of corpora cavernosa are lined by a fenestrated endothelium

c) the urethra passes through the center of the corpus cavernosum

d) trabeculae of corpora cavernosa contain striated muscle fibers

17. Decide whether the following statements about the male reproductive system are true T or false F:

a) the urethra passes through the center of corpus spongiosum

b) trabeculae divide corpora cavernosa into cavities (caverns) lined by an unfenestrated endothelium

c) tunica albuginea of the penis is composed of a mixture of collagen, elastic fibers, and smooth muscle cells

d) tunica albuginea is found in the penis only around corpus spongiosum

18. Decide whether the following statements about the male reproductive system are true T or false F:

a) the penis contains two corpora spongiosa and one corpus cavernosum

b) tunica albuginea around corpus spongiosum is thinner compared to corpora cavernosa

c) caverns of corpora cavernosa are lined by sinusoidal capillaries

d) trabeculae of corpora cavernosa protrude from tunica albuginea

19. Decide whether the following statements about the male reproductive system are true T or false F:

a) Von Ebner's cushions are found in the subendothelial layer of arterioles of corpora cavernosa

b) the urethra passing through corpus spongiosum is lined with a simple type of epithelium

c) tunica albuginea is found in the penis only around corpora cavernosa

d) corpora cavernosa are lined by a stratified squamous epithelium

20. Decide whether the following statements about the male reproductive system are true T or false F:

a) spermatohistogenesis takes place closest to the lumen of the coiled seminiferous tubules

b) contact with Sertoli cells is not required for spermatohistogenesis to proceed normally

c) Leydig cells are involved in the formation of the hematotesticular barrier

d) type A dark spermatogonia serves as a supply of stem cells for spermatogenesis

21. Which cells can be found in the seminiferous tubules?

a) Sertoli cells

b) Leydig cells

c) spermatogonia

d) spermatids

e) ciliated cells

22. What are the functions of Sertoli cells?

a) creation of a hematotesticular barrier

b) production of androgens

c) production of androgen-binding protein

d) phagocytosis of excess cytoplasm in the form of residual bodies of Regaud

e) movement of morphologically mature spermatozoa towards the rete testis employing kinocilia

f) physical support for developing cells

23. What are the ultrastructural morphological specificities of Leydig cells?

a) contain a lot of rough ER

b) possess mitochondria of tubular type

c) have basophilic cytoplasm

d) their cytoplasm contains membrane-bound lipid droplets

e) contain rod-shaped crystal-like structures called corpora amylacea

24. What structures are a part of the testes?

a) tunica albuginea

b) tunica dartos

c) pampiniform plexus

d) tubuli recti (straight tubules)

e) Littre's glands

25. Which events take place in the process of sperm cytodifferentiation, called spermiogenesis?

a) phagocytosis of acrosome by Sertoli cells

b) development of axonemal complex

c) formation of midpiece with mitochondria

d) condensation of the cell nucleus

e) completion of the 2nd meiotic division

26. Which cells of the seminiferous tubules are found in their adluminal compartment?

a) primary spermatocytes

b) secondary spermatocytes

c) spermatogonia type A

d) spermatogonia type B

27. In which structures can Sertoli cells be found?

a) tubuli recti (straight tubules)

b) rete testis

c) ductuli efferentes

d) tubuli seminiferi contorti

28. In which organs of the male genital system is pseudostratified columnar epithelium with stereocilia found?

a) ductuli efferentes

b) ductus epididymidis

c) ductus deferens

d) rete testis

29. Which of the following statements about ductus deferens are true?

a) this is where sperm mature and are stored

b) union of ductus deferens with the duct of the seminal vesicle creates the ejaculatory duct

c) forms part of the spermatic cord

d) its middle layer in tunica muscularis externa is oriented longitudinally

30. Which of the following statements about ductus deferens are true?

a) enter the abdominal cavity through the inguinal canal

b) its outermost layer is serosa

c) in its tunica muscularis, a circular muscle layer is interposed between two longitudinal ones

d) is lined with pseudostratified columnar epithelium with stereocilia

31. Which of the following statements about the seminal vesicles are true?

a) produces up to 30% of ejaculate volume

b) their epithelial cells can contain lipofuscin granules

c) are paired convoluted tubular glands

d) their mucosa forms elaborate folds

e) concretions – corpora amylacea, can be found inside

32. What can be found as part of the prostate gland?

a) dense fibromuscular stroma

b) tubuloalveolar glands

c) corpora amylacea

d) corpus cavernosum

33. Which of the following statements about the penis are true?

a) the glans penis is a distal continuation of corpora cavernosa

b) its skin is very thin and mostly loosely attached to the underlying connective tissue

c) its erectile bodies are all covered by tunica albuginea

d) Skene's glands are present near navicular fossa

34. Which cells of the germinal epithelium of the seminiferous tubules are the largest?

a) spermatogonia

b) spermatids

c) primary spermatocytes

d) secondary spermatocytes

35. What structures are found in the penis?

a) 3 erectile bodies

b) serous glands

c) unfenestrated endothelium

d) Littre's glands

36. Which of the following statements about the bulbourethral glands (Cowper's glands) are true?

a) their secretory portion is lined by squamous epithelium

b) belong to the accessory sex glands

c) are located proximal to the membranous section of the urethra

d) produce mucus

e) are responsible for producing a pre-ejaculate fluid

37. Where in the male reproductive system can syncytium be observed?

a) in the spermatogenic germinal epithelium

b) in the prostate glands

c) in corpus cavernosum of the penis

d) in the Littre's glands

38. Which of the following statements about the prostate are true?

a) it is a convoluted tubular gland

b) its stroma is fibromuscular

c) produces testosterone

d) creates a major portion of semen (ejaculate)

e) its major products are fructose and citric acid

39. Which of the following statements about the Leydig cells are true?

a) are located in the interstitial connective tissue between the seminiferous tubules

b) synthesize and secrete male sex hormones

c) synthesize androgen binding protein

d) are found in rete testis and tubuli recti

40. Decide whether the following statements about the development of the male reproductive system are true T or false F:

a) morphological features of the male embryo begin to appear as early as the 4th week after fertilization

b) chromosomal sex is determined at the time of fertilization, which is determined by the karyotype of the sperm

c) the paramesonephric (Müllerian) duct is largely involved in the development of the internal male genitalia

d) until the 7th week after fertilization, the sex cannot be determined from the morphological features of the gonads – this is the indifferent gonad stage

41. Decide whether the following statements about the development of the male reproductive system are true T or false F:

a) the primordial germ cells differentiate directly in the mesenchyme of the genital ridge

b) normal sexual differentiation in the male depends on dihydrotestosterone and antimüllerian hormone signaling

c) tubuli seminiferi contorti, tubuli recti, rete testis, and ductuli efferentes all have a common embryonic origin

d) ductus epididymidis develops from the paramesonephric duct

42. Decide whether the following statements about the development of the male reproductive system are true T or false F:

a) ductus deferens develops from the distal part of the mesonephric (Wolffian) duct

b) ducts forming the head, body, and tail of the epididymis develop from the mesonephric (Wolffian) duct

c) the genital tubercle at the cranial end of the cloacal membrane is the basis for the penis

d) extension of the genital tubercle gives rise to the primordial phallus

43. Decide whether the following statements about the development of the male reproductive system are true T or false F:

a) spermatic cords are the basis for tubuli seminiferi contorti, tubuli recti, and rete testis.

b) labioscrotal folds are the basis for the glans penis and glans clitoridis.

c) primordial cells migrate to the genital ridge from the yolk sac via the dorsal mesentery of the hindgut.

d) interstitial Leydig cells develop from the mesenchyme of the genital ridge.

44. Decide whether the following statements about the development of the male reproductive system are true T or false F:

a) prostate glands are of endodermal origin because they grow from the base of pars prostatica uretrae, which develops from part of the urogenital sinus

b) seminiferous cords develop in the region of the original cortex of the indifferent gonad

c) epispadias is a congenital developmental defect in which the external opening of the urethra is located on the ventral side of the penis

d) hypospadias is the most common congenital defect of the penis

45. What is the embryonic origin of fetal Leydig cells?

a) paramesonephric duct

b) testis cords

c) neural crest cells

d) mesonephric mesenchymal cells

46. From what tissue does the primordium of the future prostate arise at the 10th week of development?

a) endoderm

b) intermediate mesoderm

c) lateral plate mesoderm

d) ectoderm

47. The urinary and genital systems both develop from which of the following types of early mesoderm?

a) intermediate

b) lateral plate somatic

c) lateral plate splanchnic

d) paraxial

48. Which of the following statements about the development of the male external genitals are true?

a) the phallus forms the penis

b) the urogenital folds form the ventral aspect of the penis (i.e., penile raphe)

c) fused labioscrotal swellings form the scrotum

d) their early development varies considerably from the development in females

49. Where do primordial germ cells (PGCs), the future spermatogonia, originate?

a) gonadal ridge

b) dorsal endoderm of the yolk sac

c) Mullerian ducts

d) cloaca

Chapter Nine Answers:

1) acd
2) abc
3) a
4) acd
5) a
6) abc
7) acd
8) d
9) acd
10) b
11) abd
12) ad
13) ab
14) acd
15) bcd
16) a
17) abc
18) bd
19) ab
20) ad
21) acd
22) acdf
23) bd
24) ad
25) bcd
26) ab
27) ad
28) bc
29) bc
30) acd
31) bcd
32) abc
33) bc
34) c
35) acd
36) bcde
37) a
38) b
39) ab
40) bd
41) b
42) abcd
43) acd
44) ad
45) d
46) a
47) a
48) abc
49) b

Chapter Ten: Female Reproductive System

1. Decide whether the following statements about the female reproductive system are true T or false F:

a) the ovary is covered with a superficial epithelium (germinal in older literature) from which gametes develop

b) the developmental stages of ovarian follicles are in the medulla of the ovary

c) the secondary ovarian follicle contains a secondary oocyte

d) the primordial ovarian follicle consists of a primary oocyte and a single layer of squamous follicular cells

2. Decide whether the following statements about the female reproductive system are true T or false F:

a) all stages of ovarian follicles, except for the Graafian follicle just before ovulation, contain a primary oocyte

b) the ovarian stroma contains specialized fibroblasts and, in the hilus region, interstitial hilus cells

c) all primordial follicles contain primary oocytes that are in prophase 1 of meiosis

d) the oocyte has the same size in all types of ovarian follicles

3. Decide whether the following statements about the female reproductive system are true T or false F:

a) theca folliculi, the fibrous layer of the ovarian follicle, begins to form at the stage of the primary multilaminar follicle

b) the Graafian follicle is the mature form of the dominant tertiary ovarian follicle at the time of ovulation

c) all tertiary follicles contain secondary oocytes

d) from the primordial follicle stage, the oocyte is covered by zona pellucida

4. Decide whether the following statements about the female reproductive system are true T or false F:

a) tunica albuginea is a connective tissue ovarian sheath located beneath the superficial epithelium

b) the development of a cohort of follicles from the primordial follicle stage to the mature Graafian follicle takes place during the luteal phase of the ovarian cycle

c) the ovarian medulla does not contain any developmental stages of ovarian follicles

d) follicular atresia is a pathological process that is not observed under normal conditions

5. Decide whether the following statements about the female reproductive system are true T or false F:

a) the follicular cells surrounding the oocyte are called granulosa cells from the stage of the primary multilaminar follicle

b) the primary oocyte in the primordial follicle is about 130 micrometers in size

c) the Graafian follicle contains a mature egg (ovum) that has completed the 2nd meiotic division

d) the follicular antrum is fully developed at the tertiary follicular stage

6. Decide whether the following statements about the female reproductive system are true T or false F:

a) in the secondary ovarian follicle, cavities begin to form, which later fuse to form the follicular antrum

b) the primary oocyte in the primordial follicle is about 25–30 micrometers in size

c) cumulus oophorus is a typical structure of the primary unilaminar follicle

d) primordial follicles are the most numerous follicles of the ovarian cortex

7. Decide whether the following statements about the female reproductive system are true T or false F:

a) corona radiata is a set of granulosa cells that directly surround the oocyte

b) in each cycle, only one primordial follicle continues to develop under the influence of FSH

c) follicular atresia is a physiological process in which more than 99.9% of all ovarian follicles are lost by apoptosis during a lifetime

d) the development of a cohort of ovarian follicles is under the control of the same pituitary hormone that influences the activity of Sertoli cells in seminiferous tubules

8. Decide whether the following statements about the female reproductive system are true T or false F:

a) a mature egg (ovum) is formed only in the case of fertilization

b) the primary unilaminar follicle contains a primary oocyte surrounded by a single layer of cuboidal follicular cells

c) a follicular cohort is a group of 6–12 follicles that mature together each cycle

d) cumulus oophorus is an elevation inside the secondary follicle

9. Decide whether the following statements about the female reproductive system are true T or false F:

a) the uterine tube is lined by a simple columnar epithelium with cilia

b) the isthmus of the uterine tube represents locus fecundationis (place of fertilization)

c) the musculature of the uterine tube is arranged into an inner circular and outer longitudinal layer

d) all epithelial cells of the uterine tube have cilia on their surface

10. Decide whether the following statements about the female reproductive system are true T or false F:

a) the epithelium of the uterine tube contains two main populations of cells that reach the lumen – ciliated cells and secretory cells with microvilli

b) the surface of the uterine tube is covered with serosa

c) cilia of the uterine tube epithelium only move towards the uterus

d) the tubal ampulla is called locus fecundationis because this is where fertilization most commonly occurs

11. Decide whether the following statements about the female reproductive system are true T or false F:

a) mucosa of the uterine tube forms anastomosing folds, which are most prominently developed in the ampulla

b) the uterine tube is covered by adventitia

c) the cilia of the uterine tube epithelial cells oscillate in both directions, helping to move the oocyte and early embryo toward the uterus and the sperm in the opposite direction

d) the musculature of the uterine tube is the thickest in the ampulla and gets thinner towards the uterus

12. Decide whether the following statements about the female reproductive system are true T or false F:

a) the endometrium is the mucosa of the uterus, which is lined with a simple columnar epithelium

b) the thickest layer of the uterine wall is the endometrium

c) smooth muscle cells of the myometrium hypertrophy during pregnancy – they can increase in size by up to 10 times

d) the proliferative phase of the menstrual cycle corresponds to the follicular phase of the ovarian cycle

13. Decide whether the following statements about the female reproductive system are true T or false F:

a) endometrial glands in the proliferative phase have a saw-like appearance

b) the myometrium is the thickest layer of the uterine wall and consists of smooth muscle

c) the stratum basale of the endometrium undergoes significant morphological and functional changes during the menstrual cycle

d) the secretory phase of the menstrual cycle corresponds to the luteal phase of the ovarian cycle

14. Decide whether the following statements about the female reproductive system are true T or false F:

a) endometrial glands in the proliferative phase are straight

b) stratum functionale of the endometrium undergoes the most significant morphological and functional changes during the menstrual cycle

c) the cervix, like the rest of the uterus, is lined by a single type of epithelium

d) zona basalis ensures the regeneration of the endometrium during the following menstrual cycle

15. Decide whether the following statements about the female reproductive system are true T or false F:

a) the entire surface of the uterus is covered with perimetrium or serosa

b) the first phase of the menstrual cycle is the secretory phase

c) during pregnancy, smooth muscle cells of the myometrium undergo both hypertrophy and hyperplasia

d) the endometrium also contains special Hamperl cells that have important immune functions

16. Decide whether the following statements about the female reproductive system are true T or false F:

a) the endometrium contains both secretory cells and ciliated cells, like the uterine tube epithelium

b) the endometrium contains simple tubular glands that undergo significant changes during the menstrual cycle

c) smooth muscle cells of the myometrium do not undergo significant changes during pregnancy

d) the exocervix is lined by a stratified squamous non-keratinized epithelium

17. Decide whether the following statements about the female reproductive system are true T or false F:

a) mucosa of the endocervix does not contain glands

b) the endocervix is lined by a simple columnar epithelium

c) during the menstrual cycle, the cervix goes through the same significant morphological and functional changes as the endometrium of the uterus

d) during the secretory phase of the menstrual cycle, stromal cells undergo a predecidual reaction

18. Decide whether the following statements about the female reproductive system are true T or false F:

a) in the secretory phase of the menstrual cycle, two layers are morphologically distinguished – stratum compactum and stratum spongiosum of the endometrium

b) mucosa of the exocervix does not contain glands

c) the menstrual phase of the endometrial cycle begins due to a decrease in progesterone levels

d) both endocervix and exocervix are lined with the same type of epithelium

19. Decide whether the following statements about the female reproductive system are true T or false F:

a) the vaginal mucosa contains numerous tubuloalveolar glands

b) the epithelium of the vagina is simple columnar

c) the superficial layers of the vaginal epithelium contain numerous structures which can be visualized by the PAS reaction

d) the surface of the vagina is covered with adventitia

20. Decide whether the following statements about the female reproductive system are true T or false F:

a) tunica spongiosa of the vaginal wall contains many elastic fibers and several thin-walled veins

b) the musculature of the vaginal wall is divided into an inner circular layer and an outer longitudinal layer

c) the epithelium of the vagina is a mechanically resistant, stratified squamous non-keratinized

d) the surface of the vagina is covered by serosa

21. Which of the following statements about the ovarian follicles are true?

a) both the ovarian cortex and medulla contain ovarian follicles

b) are multicellular structures containing primary or secondary oocyte – according to the stage of follicle maturation

c) secondary ovarian follicle contains a secondary oocyte

d) primordial follicles contain columnar follicular cells

22. Which of the following statements about the ovarian medulla are true?

a) consists of loose connective tissue rich in vessels and nerves

b) consists of more layers of smooth muscles

c) with the exception of primordial follicles, all stages of follicles are present in it

d) can contain hilus cells with endocrine functions

23. Which of the following structures are part of the tertiary, Graafian follicle?

a) cumulus oophorus

b) zona pellucida

c) antrum folliculi

d) theca-lutein cells

e) tertiary oocyte

f) granulosa cells

24. Which of the following statements about the uterus are true?

a) endometrial lamina propria contains many fibroblasts

b) myometrium, which consists of more layers of smooth muscles, is the thickest layer of the uterine wall

c) simple alveolar glands are localized in lamina propria of the endometrium

d) mucosa of the uterus is lined by a pseudostratified columnar epithelium

25. Which of the following statements about the uterine cervix are true?

a) the epithelium of the exocervix (external os) is the same as the epithelium of vagina

b) mucus produced by the epithelial cells the uterine cervix is involved in moisturizing the vagina

c) the epithelium of the endocervix (internal os) is the same as the epithelium of the uterine fundus and body

d) the exocervix (external os) is lined by a simple columnar epithelium

e) mucosa of the uterine cervix does not contain any glands

26. Which of the following statements about the vagina are true?

a) numerous vaginal mucosal glands are active during sexual arousal

b) its wall contains rich networks of thin-walled veins

c) its epithelial cells synthesize and accumulate glycogen

d) its muscularis contains striated muscle

e) its lamina epithelialis consists of stratified squamous nonkeratinized epithelium

27. Which of the following statements about the uterine tubes are true?

a) ampullary uterine tube mucosa forms high longitudinal folds

b) their outermost layer is called adventitia

c) the longest mucosal folds are situated in the isthmus

d) their lamina epithelialis contains also columnar cells with motile kinocilia

28. Which of the following statements about the ovarian follicles are true?

a) the rupture of a mature Graafian follicle in the ovary is called luteolysis

b) zona pellucida is the extracellular mass between the follicular/granulosa cells and the thecal cells within the follicles

c) the programmed physiological cessation of ovarian follicles is referred to as follicular atresia

d) ovulation happens together with the menstrual bleeding

29. In what parts of the female genital system are cilia found?

a) uterine tubes

b) uterus

c) vagina

d) Bartholin's gland

30. What role does glycogen production play in vaginal epithelium?

a) nourishment of sperm

b) activation of sperm motility

c) is metabolized into lactic acid, which increases the acidity of the vagina

d) since the vagina is glandless, it lubricates the surface of the vagina in this way

31. Which one of the following statements best describes a histological difference between the esophagus and vagina?

a) vagina possesses submucosal glands, while the esophagus does not

b) vagina possesses keratinized stratified squamous epithelium; esophagus possesses non-keratinized stratified squamous epithelium

c) esophagus possesses submucosal glands, while the vagina does not

d) esophagus possesses more extensive vascular sinuses than the vagina

32. What is the structure within the female external genitalia possessing paired corpora cavernosa?

a) mons pubis

b) labia majora

c) labia minora

d) clitoris

33. Which of the following statements about the endometrial basal layer are true?

a) is supplied by the straight arteries

b) contains the bases of the endometrial glands

c) during menstruation is preserved

d) it becomes ischemic after rapid decline of corpus luteum hormones

e) is adjacent to the myometrium

34. In the following statement, correct the word to make this statement correct: The primary oocyte is arrested for up to 50 years in the zygotene stage of prophase of the first meiotic division.

a) primary → primordial

b) zygotene → diplotene

c) prophase → metaphase

d) first → second

35. Which of the following aptly describes the biological function of the zona pellucida?

a) hormone secretion

b) selective protein uptake

c) polyspermy prevention

d) sperm capacitation

e) sperm adhesion

f) prevention of early embryo implantation

36. Which of the following findings is expected on the gross and microscopic examination of an ovary obtained from a healthy woman during her reproductive life?

a) primordial follicles

b) implants of endometrial tissue

c) collagen scar tissue

d) rich capillary bed

e) surface simple cuboidal epithelium

f) secondary lymphoid nodules

37. What arteries are found in the uterus?

a) arcuate

b) radial

c) spiral

d) central

e) afferent

38. Which of the following statements about the vagina are true?

a) is lined with stratified squamous keratinized epithelium

b) is richly populated with Lactobacillus acidophilus

c) has abundant serous and mucous glands in its wall

d) has numerous elastic fibers in the wall

39. Which of the following statements about the corpus luteum are true?

a) is present in the ovaries at the time of the secretory phase of the endometrium

b) is formed in the ovary after ovulation

c) is a remnant of corpus albicans

d) produces progesterone

e) if fertilization does not occur, it ceases at the end of the menstrual cycle

40. How is the proliferative phase of the endometrium aligned with the ovarian cycle?

a) Follows ovulation

b) follows the luteal phase

c) approximately overlaps with the follicular phase

d) occurs during the formation of corpus albicans

41. Decide whether the following statements about the development of the female reproductive system are true T or false F:

a) follicular cells of the ovarian follicle develop from the mesenchyme

b) the SRY gene is essential for the proper development of the female embryo

c) the paramesonephric (Müllerian) duct is largely involved in the development of the internal female genitalia

d) the mesonephric (Wolffian) duct is essential for the development of the ovarian tubes and uterus

42. Decide whether the following statements about the development of the female reproductive system are true T or false F:

a) the entire vagina originates from the mesonephric (Müllerian) duct

b) cells of theca folliculi originate from the mesenchyme of the genital ridge

c) the paramesonephric (Müllerian) duct is the basis of the uterine tube, uterus, and cranial part of the vagina

d) follicular cells of the ovarian follicles develop from epithelial cords derived from the celomic epithelium

43. Decide whether the following statements about the development of the female reproductive system are true T or false F:

a) primordial cells develop in the same way as follicular cells from the celomic epithelium

b) Müllerian tubercle is formed at the junction of the uterovaginal canal and the pelvic part of the urogenital sinus

c) the vagina develops from two bases – one from the fused Müllerian ducts and one from the urogenital sinus

d) the vaginal vestibulum originates from the urogenital sinus

44. Decide whether the following statements about the development of the female reproductive system are true T or false F:

a) labioscrotal folds are the basis for labia minora

b) uterus bicornis is a congenital malformation that results from incomplete union of mesonephric (Wolffian) ducts

c) pelvic and phallic parts of the urogenital sinus give rise to the cranial part of the vagina

d) the ovary develops from the indifferent gonad which begins to differentiate towards the female phenotype from the 7th week after fertilization

45. Decide whether the following statements about the development of the female reproductive system are true T or false F:

a) the entire vagina develops from the urogenital sinus

b) a disorder in the development of the paramesonephric (Müllerian) ducts can result in a rare agenesis of the ovarian tubes, uterus, and cranial part of the vagina, known as Mayer-Rokitansky-Küster-Hauser syndrome

c) primordial cells differentiate directly in the genital ridge

d) the ovary develops from three embryologic origins – primordial germ cells, epithelial cords from the celomic epithelium, and mesenchyme of the genital ridge

46. During the development of the female reproductive system, the mesonephric ducts disappear. However, their remnant may persist in the female in the form of what structure?

a) Bartholin's cyst

b) Nabothian cyst

c) Gartner's cyst

d) ovarian cyst

e) epoöphoron

47. Which organs originate from the Müllerian ducts?

a) ovaries

b) uterine tubes

c) uterus

d) cranial portion of vagina

e) caudal portion of vagina

48. Which of the following statements about the urethral folds in females are true?

a) develops on either side of the urethral plate

b) meet at the genital tubercle

c) develop into labia majora

d) develop into clitoris

49. What structures or tissues give rise to the ovaries?

a) intermediate mesoderm of the posterior body wall

b) cells from the wall of the yolk sac

c) urogenital sinus

d) coelomic epithelium

50. Which organs originate from the urogenital sinus?

a) epoöphoron

b) thecal cells

c) Bartholin's glands

d) caudal portion of vagina

Chapter Ten Answers:

1) d
2) abc
3) ab
4) ac
5) ad
6) abd
7) acd
8) abc
9) ac
10) abd
11) ac
12) acd
13) bd
14) abd
15) cd
16) abd
17) bd
18) abc
19) cd
20) abc
21) b
22) ad
23) abcf
24) ab
25) abc
26) bce
27) ad
28) c
29) ab
30) c
31) c
32) d
33) abce
34) b
35) cef
36) acde
37) abc
38) bd
39) abde
40) c
41) c
42) bcd
43) bcd
44) d
45) bd
46) ce
47) bcd
48) ab
49) abd
50) cd

Chapter Eleven: Skin

1. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) all cells of the epidermis are known as keratinocytes

b) stratum basale and stratum spinosum are collectively referred to as stratum germinativum seu Malpighi

c) stratum lucidum is present only in thick type of skin

d) stratum corneum consists of several layers of keratinocytes with pale spherical nucleus

2. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) melanocytes use cytokrine secretion – melanin is directly "injected" into the cytoplasm of keratinocytes

b) Merkel cells are antigen-presenting cells of the epidermis

c) spines visible between the keratinocytes of stratum spinosum represent communicating junctions

d) keratinocytes of stratum basale are flat cells because the epidermis is a stratified squamous epithelium

3. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) stratum lucidum is a highly eosinophilic layer because of its eleidine content

b) Merkel cells, as part of tactile corpuscles, function as mechanoreceptors in the epidermis

c) keratinocytes of stratum basale contain basophilic keratohyalin granules

d) Langerhans cells are a population of keratinocytes

4. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) pheomelanin produced by melanocytes forms a more effective protection against UV rays than eumelanin

b) Langerhans cells are dendritic, antigen-presenting cells of the epidermis

c) stratum corneum contains only dead elements filled with keratin and devoid of cell organelles

d) all epidermal cell populations have the same embryonic origin

5. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) stratum basale of the epidermis is formed by a single layer of cuboidal to columnar cells

b) the spines of stratum corneum keratinocytes connect neighboring cells via hemidesmosomes

c) keratohyalin granules are basophilic structures in the cytoplasm of stratum granulosum keratinocytes

d) the epidermis is made up of four cell types – keratinocytes, melanocytes, Langerhans cells, and Merkel cells

6. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the dermis consists of two sublayers – stratum papillare and stratum reticulare

b) both layers of the dermis are made up of the same type of connective tissue

c) stratum reticulare contains sebaceous glands

d) the boundary between stratum papillare dermis and the epidermis is a straight line

7. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the hypodermis contains all types of skin appendages

b) stratum papillare of the dermis extends opposite the epidermis into papillae, which have an important mechanical and nutritive function

c) stratum papillare of the dermis is formed by a dense connective tissue

d) stratum reticulare of the dermis consists of a loose connective tissue

8. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) stratum reticulare of the dermis is formed by a dense irregular connective tissue

b) stratum papillare dermis is made up of a loose connective tissue

c) the hypodermis consists mainly of elastic connective tissue

d) stratum reticulare dermis contains only sebaceous glands from skin appendages

9. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the hypodermis contains varying amounts of adipose tissue in different parts of the body

b) panniculus adiposus is the name given to stratum reticulare of the dermis

c) the hypodermis is formed by a single type of connective tissue in all parts of the human body

d) stratum reticulare of the dermis is a dense connective tissue containing only collagen fibers

10. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) stratum reticulare of the dermis also contains many elastic fibers, which can be seen for example by staining with orcein

b) stratum reticulare of the dermis is where most of musculi arrectores pillorum run

c) Vater-Pacini and Ruffini corpuscles are found in stratum papillare dermis at the border with the epidermis

d) in most areas of the human body, the adipose tissue is the dominant type of connective tissue in the hypodermis

11. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) eccrine sweat glands have ducts composed of two layers of cuboidal epithelium

b) ducts of eccrine sweat glands open into the hair follicle

c) apocrine aromatic glands and eccrine sweat glands are always found together

d) sebaceous gland and a hair follicle usually form the pilosebaceous unit

12. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) sebaceous glands have a single duct lined by a stratified squamous non-keratinized epithelium

b) eccrine sweat glands use primarily the apocrine mechanism of secretion

c) scapus is the part of the hair that protrudes above the skin

d) the hair papilla is histologically an epithelial tissue

13. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the hair bulb (bulbus pili) contains keratinocytes, their precursors, and melanocytes and has a high mitotic activity

b) the inner epithelial sheath of the hair follicle consists of three layers – the cuticle, Huxley's layer, and Henle's layer

c) the root is the part of the hair shaft that protrudes above the skin

d) sebaceous glands open into the hair follicle above the exit of aromatic glands

14. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) eccrine sweat glands are simple glands with a coiled secretory part

b) the holocrine type of secretion predominates in sweat and aromatic glands

c) in aromatic glands, the merocrine mechanism of secretion predominates

d) keratinocytes in nails undergo a hard type of keratinization

15. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) musculi arrectores pilorum are striated muscles attaching to the hair follicle

b) aromatic glands open into the hair follicle, usually above the sebaceous gland

c) ducts of eccrine sweat glands are lined by a simple squamous epithelium

d) the mammary gland is an example of skin appendage

16. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the thick skin type does not contain any skin appendages

b) there is no stratum lucidum in the thick skin type

c) typical examples of the thick skin type are palms and soles

d) the division of skin into thick and thin types is based on the thickness of the entire skin, including the hypodermis

17. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) thin skin covers most of the body

b) the thin skin type does not contain eccrine sweat glands

c) stratum lucidum is usually not visible in the thin skin type

d) the thick skin type contains hair and sebaceous and aromatic glands

18. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the division of skin into thick and thin types is mainly based on the thickness of the epidermis

b) the thick type of skin has no hair, sebaceous, or aromatic glands

c) stratum corneum of the thick skin can be thicker than all the other layers of the epidermis put together

d) the difference between thick and thin skin types is the presence/absence of stratum spinosum

19. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) the thick skin contains stratum corneum, whereas the thin skin does not have this epidermal layer

b) most of the body is covered by thick skin

c) eccrine sweat glands are found in both thin and thick skin

d) the eyelids have thin skin and the back has thick skin

20. Decide whether the following statements about the skin and skin appendages are true T or false F:

a) Langerhans cells of the epidermis are important part of the immune system

b) Melanocytes have a different embryonic origin than skin keratinocytes

c) sebaceous glands always open into the hair follicle

d) the entire skin is made up of epithelial tissue

21. What is the expansion of a growing hair follicle formed by different cellular components at its base?

a) terminal

b) papilla

c) bulb

d) club

22. What tissues can be found in the skin?

a) epithelial lining in the epidermis

b) loose connective tissue in the epidermis

c) dense connective tissue in the reticular layer of dermis

d) white adipose tissue in the hypodermis

23. Which of the following statements about the spinous layer of the epidermis are true?

a) is composed of several layers of keratinocytes connected by desmosomes

b) is translucent thin layer of extremely flattened basophilic cells

c) is the source of new keratinocytes

d) is composed of columnar keratinocytes

e) shrinking of the microfilaments between desmosomes is responsible for its spiny appearance

24. Which of the following statements about the skin glands are true?

a) sweat glands of skin are the simple branched alveolar glands

b) eccrine sweat glands are tubular coiled glands

c) sweat glands of skin are the exocrine glands with holocrine secretion

d) sebaceous glands are the exocrine glands with holocrine secretion

25. Which of the following general statements about the skin are true?

a) stratum lucidum of the epidermis is absent in the thin skin type

b) melanocytes are pigment cells with long, irregular processes that protect the mitotically active cells of stratum basale of the skin from the damaging effects of sunlight

c) the layer of skin beneath the epidermis is called the hypodermis and is composed of connective tissue

d) reticular layer of the dermis is composed of the reticular connective tissue

26. What are the layers of the epidermis in a skin of thin type?

a) stratum basale

b) stratum granulosum

c) stratum papillare

d) stratum lucidum

e) stratum corneum

27. What are the typical histologic characteristics of the cells of the basal layer of the epidermis?

a) striking eosinophilia of their cytoplasm

b) contain various amounts of melanin

c) are low columnar to cuboidal

d) connected to the underlying lamina basalis by desmosomes

e) contain numerous keratohyalin granules

28. What are the typical cells of the epidermis?

a) Merkel cells

b) melanocytes

c) Langhans cells

d) fibroblasts

29. What ultrastructural component of the cell fills 85% of the volume of a differentiated keratinocyte?

a) microtubules

b) intermediate filaments

c) actin filaments

d) lamins

30. What amino acid is the basic building block of melanin?

a) leucine

b) valine

c) proline

d) tyrosine

31. Which of the following statements about the sebaceous glands of the skin are true?

a) are found in the skin of the external genitalia

b) form glandulae tarsales Meibomi in eyelid

c) are holocrine glands

d) are not found in the skin of the hands or feet

e) form glandulae ceruminosae of the external auditory canal

32. Which of the following statements about the mammary gland are true?

a) myoepithelial cells cause the milk to be ejected through the ducts

b) estrogen promotes its branching differentiation

c) the fat component of milk is secreted by the holocrine secretion

d) is absent in males

33. What are the functions of Vater-Pacini corpuscles?

a) pressure changes detection

b) phagocytosis of harmful particles

c) detection of vibration

d) heat detection (high temperature)

e) cold detection (low temperature)

34. Which of the following statements about the Huxley's layer of the internal root sheath of the hair follicle are true?

a) form its middle plate

b) is made of flattened epithelial cells

c) is in direct contact with the outermost part of the hair follicle

d) consists of cuboidal cells that produce keratin

35. Which of the following statements about the eccrine sweat glands are true?

a) are distributed almost over the entire body

b) are simple coiled glands

c) their secretory portion contains myoepithelial cells

d) despite the name, their mode of secretion is apocrine

36. Which of the following statements about the Meissner's corpuscles are true?

a) are also formed by Schwann cells

b) respond to stretch and torque

c) belongs to the encapsulated nerve endings

d) are housed in the papillae of the corium

e) are receptors for pain

37. Which skin structures are nociceptors (pain receptors)?

a) free nerve endings

b) Krause's corpuscles

c) Merkel discs

d) Ruffini's corpuscles

38. Which of the following epidermal cells is closely associated with terminal nerve fibers and serves as a mechanoreceptor in the skin?

a) Langerhans cell

b) melanocyte

c) Merkel cell

d) spinous keratinocyte

39. Which structures are generally absent in thick skin but is present in thin skin?

a) dermatoglyphics

b) arrector pili muscle

c) sebaceous glands

d) stratum lucidum

40. Which of the following statements about the keratohyalin granules are true?

a) are basophilic

b) they are found in stratum granulosum cells of the skin

c) contain a protein called profilaggrin

d) are eosinophilic

41. What distinguishes stratum papillare from stratum reticulare of the dermis?

a) different type of connective tissue proper (loose vs. dense)

b) only stratum reticulare is innervated

c) their location within the dermis

d) stratum papillare is thinner

42. Decide whether the following statements about the development of the skin and skin appendages are true T or false F:

a) the periderm is the base of the future epidermis

b) all epidermal cells have a common embryonic origin

c) all skin layers are derived from the superficial ectoderm

d) the epithelial portions of skin derivatives are of ectodermal origin

43. Decide whether the following statements about the development of the skin and skin appendages are true T or false F:

a) the connective tissue of the dermis originates from the dermatomes and somatopleure of the lateral plate mesoderm

b) Melanocytes are derived from the neuroectoderm of the neural crest

c) the epidermis arises from the basal cuboidal cells of the primitive epidermis

d) the periderm is involved in the development of the future dermis

44. Decide whether the following statements about the development of the skin and skin appendages are true T or false F:

a) Merkel cells of the epidermis have a neuroectodermal origin

b) at the end of the 3rd month after fertilization, melanoblasts of neuroectodermal origin migrate into the skin

c) the mammary ridge is involved in the development of the mammary gland throughout its entire course

d) the glandular epithelium of the mammary gland originates from the dermatomes of the somites

45. Decide whether the following statements about the development of the skin and skin appendages are true T or false F:

a) if the mammary ridge does not disappear completely, polythelia or polymastia develops

b) the keratinocytes of the epidermis develop from the surface ectoderm

c) sebaceous glands, unlike eccrine sweat glands, have a mesodermal origin

d) the periderm gives rise to the subcutaneous connective tissue

46. Decide whether the following statements about the development of the skin and skin appendages are true T or false F:

a) hair begins to develop in the 3rd month after fertilization as primary hair (lanugo)

b) sebaceous glands develop as outgrowths of the primitive hair follicle; thus they are of ectodermal origin

c) the epidermis develops from the dermatomes of the somites

d) Merkel cells develop from the surface ectoderm

47. What is the origin of the dermis?

a) intermediate mesoderm

b) dermatomes of somites

c) placodes

d) lateral plate mesoderm

e) ectomesenchyme

48. What is the future fate of periderm?

a) differentiates into cells of epidermal basal layer

b) is gradually sloughed into the amniotic cavity

c) participates in the formation of vernix caseosa

d) give rise to germinal basal layer of epidermis

49. The keratinocytes of the epidermis are embryologically derived from which germ layer?

a) neural crest cells

b) surface ectoderm

c) endoderm

d) somatic mesoderm

e) splanchnic mesoderm

50. Which cells of human epidermis originate from the ectoderm?

a) keratinocytes

b) Langerhans cells

c) melanocytes

d) Merkel cells

51. The breast develops along the mammary line/ridge or milk line. Which of the following is a possible location for the accessory nipple or breast?

a) armpits

b) groin

c) cubital fossa or anterior elbow

d) popliteal fossa or behind the knee

e) lower lateral neck above clavicle

Chapter Eleven Answers:

1) bc
2) a
3) ab
4) bc
5) acd
6) ac
7) b
8) ab
9) a
10) abd
11) ad
12) ac
13) ab
14) ad
15) bd
16) c
17) ac
18) abc
19) c
20) ab
21) c
22) acd
23) ace
24) bd
25) ab
26) abe
27) bc
28) ab
29) b
30) d
31) abcd
32) ab
33) ac
34) ab
35) abc
36) acd
37) a
38) c
39) bc
40) abc
41) acd
42) d
43) abc
44) ab
45) ab
46) ab
47) bd
48) bc
49) b
50) acd
51) ab

Chapter Twelve: Central and Peripheral Nervous System

1. Decide whether the following statements about the nervous system are true T or false F:

a) the spinal cord contains alpha-motoneurons in the anterior horns of the gray matter

b) the spinal cord has the same arrangement of gray and white matter as the brain

c) when stained with hematoxylin, Nissl substance is shown in the cytoplasm of alpha-motoneurons

d) the central canal of the spinal cord is lined by ependymal cells

2. Decide whether the following statements about the nervous system are true T or false F:

a) ependymal cells are epithelial cells that lie on the basement membrane

b) ependymal cells have microvilli and/or cilia on their surface

c) the gray matter of the spinal cord contains predominantly myelinated axons

d) alpha-motoneurons of the anterior horns of the spinal gray matter send out somatomotor fibers that innervate skeletal muscles

3. Decide whether the following statements about the nervous system are true T or false F:

a) the white matter of the spinal cord is present on its surface below sheaths

b) the white matter of the spinal cord contains predominantly myelinated axons, glial cells, and continuous blood capillaries

c) the central canal of the spinal cord is lined by different types of neurons

d) ependymal cells are glial cells arranged in epithelioid manner

4. Decide whether the following statements about the nervous system are true T or false F:

a) lateral horns of the spinal cord contain somatomotor fibers of alpha-motoneurons

b) posterior horns of the spinal cord contain axons of somatosensitive neurons bodies of which are in the dorsal root ganglia

c) the nerve fibers are stained pink with hematoxylin and eosin

d) the white matter of the spinal cord surrounds the central canal

5. Decide whether the following statements about the nervous system are true T or false F:

a) the central canal of the spinal cord is lined by cells with processes that aid in the circulation of cerebrospinal fluid

b) the white matter of the spinal cord is divided into anterior, lateral, and posterior roots

c) alpha-motoneurons in the anterior horns of the gray matter of the spinal cord send axons through anterior roots of spinal nerves

d) motor and sensory fibers are equally present in all corners of the gray matter of the spinal cord

6. Decide whether the following statements about the nervous system are true T or false F:

a) Betz cells are found in the most superficial layer of the cerebral cortex

b) the neocortex of the telencephalon is divided into three typical layers

c) lamina molecularis is the most superficial layer of the telencephalon neocortex

d) lamina multiformis of neocortex is located at the boundary with the white matter

7. Decide whether the following statements about the nervous system are true T or false F:

a) lamina pyramidalis interna of certain regions of the telencephalon may contain large Betz cells

b) Betz cells are multipolar pyramidal neurons with their tips always facing the surface of the great brain

c) Betz cells are part of the white matter of the hindbrain

d) the neocortex of the telencephalon consists of six layers

8. Decide whether the following statements about the nervous system are true T or false F:

a) the white matter of the telencephalon contains mainly myelinated nerve cell processes, glial cells, and continuous capillaries

b) lamina molecularis of the neocortex contains few cells and many fibers

c) lamina pyramidalis externa of the neocortex is the fifth layer from the surface

d) most pyramidal cells in the neocortex are found in granular layers

9. Decide whether the following statements about the nervous system are true T or false F:

a) all parts of the cerebral cortex are arranged in six layers

b) lamina multiformis of the neocortex contains neurons of different shapes

c) the paleocortex consists of three layers

d) the fourth layer of the neocortex from the surface is lamina granularis interna

10. Decide whether the following statements about the nervous system are true T or false F:

a) dura mater is a layer of dense connective tissue that covers both the brain and the spinal cord

b) the arachnoid is a layer of loose connective tissue that directly covers the brain tissue

c) dura mater of the brain fuses with the periosteum of skull bones

d) the arachnoid is formed by a loose connective tissue arranged in trabeculae, between which the cerebrospinal fluid flows

11. Decide whether the following statements about the nervous system are true T or false F:

a) Purkinje cells of the cerebellar cortex send dendrites into stratum moleculare, which we refer to as Purkinje fibers

b) Purkinje cell bodies are in the middle layer of the cerebellar cortex

c) the cerebellar cortex is divided into three layers

d) the dendritic tree of Purkinje cells branches out in stratum granulosum of the cerebellar cortex

12. Decide whether the following statements about the nervous system are true T or false F:

a) Purkinje cells are large multipolar neurons with dendritic tree branching out in stratum moleculare of the cerebellar cortex

b) stratum granulosum of the cerebellar cortex lies at the boundary between the gray and white matter

c) stratum purkinjese is the thickest layer of the cerebellar cortex

d) granular neurons are the main type of neurons in stratum granulosum of the cerebellar cortex and are one of the smallest cells in the human body

13. Decide whether the following statements about the nervous system are true T or false F:

a) mossy fibers are the most numerous afferent fibers of the cerebellar cortex

b) the cerebellar cortex contains five main types of neurons – granule, Purkinje, Golgi, stellate, and basket cells

c) Purkinje cells are pear-shaped, and their bodies form stratum purkinjese of the cerebellar cortex

d) the cerebellum has the same arrangement of gray and white matter as the spinal cord

14. Decide whether the following statements about the nervous system are true T or false F:

a) lamina multiformis is part of the cerebellar cortex

b) granular neurons are mainly found in stratum moleculare of the cerebellar cortex

c) stratum moleculare of the cerebellar cortex contains the axonal tree of Purkinje cells

d) the white matter of the cerebellum is predominantly composed of myelinated axons, glial cells, and continuous blood capillaries

15. Decide whether the following statements about the nervous system are true T or false F:

a) we can best observe Nissl substance in the bodies of Purkinje cells in Holmes impregnation

b) Purkinje cells are among the smallest cells in the human body

c) Purkinje cell bodies are found predominantly in the white matter of the cerebellum

d) granule cells are small excitatory neurons in the cerebellar cortex

16. Decide whether the following statements about the nervous system are true T or false F:

a) the spinal ganglion contains pseudounipolar neurons

b) neurons of spinal ganglia send an efferent axon towards peripheral organs

c) the spinal ganglion contains supporting satellite cells that have their own basal lamina

d) all sensory ganglia contain pseudounipolar neurons

17. Decide whether the following statements about the nervous system are true T or false F:

a) the choroid plexus is covered by modified ependymocytes

b) the choroid plexus is the site of cerebrospinal fluid production

c) processes of dura mater form the choroid plexus

d) the choroid plexus consists of a loose connective tissue and fenestrated blood capillaries

18. Decide whether the following statements about the nervous system are true T or false F:

a) the surface of a peripheral nerve is covered by the endoneurium

b) vasa nervorum and nervi nervorum are also part of peripheral nerves

c) the perineurium envelops each individual nerve fiber

d) axons and dendrites of peripheral nerves can be distinguished from each other by different impregnation methods

19. Decide whether the following statements about the nervous system are true T or false F:

a) the endoneurium is a connective tissue layer around individual nerve fiber

b) each peripheral nerve contains only one type of nerve fiber

c) the perineurium surrounds bundles of nerve fibers

d) the epineurium is a dense irregular connective tissue

20. Decide whether the following statements about the nervous system are true T or false F:

a) peripheral nerves do not have their own vascular supply

b) all peripheral nerve fibers are myelinated

c) the endoneurium is a reticular connective tissue found around the axons of individual nerve fibers of the peripheral nerve

d) the peripheral nerve contains somatomotor, somatosensitive, visceromotor, and viscerosensitive nerve fibers in various combinations

21. Which ganglia contain cell bodies of sensory neurons?

a) trigeminal ganglion

b) prevertebral ganglia

c) paravertebral ganglia

d) dorsal root ganglia

22. Which of the following statements about peripheral nerve connective tissue sheaths are true?

a) individual nerve fibers are surrounded by epineurium made of dense connective tissue

b) delicate layer of loose connective tissue with reticular fibers, the endoneurium, surrounds each nerve fiber

c) epineurium is a peripheral nerve outermost covering made of dense connective tissue

d) perineurium is composed of modified fibroblasts that are connected to form concentric cylindrical sheaths separated by fibrous collagen

23. Which of the following describes the function of neurons that are located in dorsal root ganglia of the nervous system?

a) autonomic motor

b) communicating interneuron

c) somatic motor

d) somatic sensory

e) visceral sensory

24. Which of the following cells contributes to the formation of the blood–brain barrier in the central nervous system?

a) endothelial cells

b) pericytes

c) ependymal cells

d) oligodendrocytes

e) astrocytes

25. In which organs is plexus myentericus Auerbachi located?

a) urethra

b) trachea

c) colon

d) ureter

26. In which layer of the neuronal cortex can Purkinje cells/neurons be found?

a) lamina pyramidalis interna

b) stratum granulosum

c) lamina multiforme

d) stratum ganglionare

27. Which structures are creating hematoneural barrier in the peripheral nerve?

a) myelin sheath

b) epitheloid-arranged fibroblasts of the perineurium

c) dense connective tissue of the epineurium

d) reticular tissue of the endoneurium

28. What histological structures can be found in the peripheral nerve?

a) satellite cell processes

b) axons (central processes) of pseudounipolar neurons

c) dentrites of alpha-motoneurons

d) vasa nervorum

e) endoneurium

29. Which of the following statements about the Purkinje neurons (cells) are true?

a) are excitatory neurons

b) have a particularly rich dendritic tree

c) their perikarya have a pyramidal shape

d) belong to the neurons with the largest perikarya

e) their axons form synapses with granular neurons

30. The bodies of which neurons can be found in the cerebellar cortex?

a) basket cells

b) granular neurons

c) Betz pyramidal neurons

d) dopaminergic neurons

e) stellate cells

31. Which of the following statements about the motoric neocortex are true?

a) consists of 6 different layers

b) consists of 7 different layers

c) its molecular layer contains an abundance of neuronal bodies

d) axons of its neurons create pyramidal tract

32. Which of the following statements about the spinal dorsal root ganglia are true?

a) comprise of pseudounipolar neurons and satellite cells

b) after insult, astrocytes form a glial scar here

c) comprise bipolar neurons and satellite cells

d) are involved in the sensitive pathway

33. Which of the following statements about the choroid plexus are true?

a) is responsible for cerebrospinal fluid production

b) is almost avascular to prevent subarachnoidal hemorrhage

c) is covered by cuboidal ependymal cells

d) is rich in blood vessels in loose connective tissue

e) lines central canal of the spinal cord

f) is lined by tanycytes

34. Where do we find bodies of Betz's motoneurons?

a) in cerebellar deep nuclei

b) in spinal ventral horns

c) in motoric cortex of girus praecentralis

d) in basal ganglia and pars compacta of substantia nigra

35. In which organs can satellite cells be seen?

a) coeliac ganglia of coeliac plexus

b) dorsal root ganglia

c) nervus ischiadicus

d) nervus vagus

e) cornu posterior of the spinal cord

f) prevertebral symphatetic ganglia

36. The bodies of which neurons can be found in the cerebral cortex?

a) Cajal-Retzius cells

b) Martinotti cells

c) Purkinje cells

d) Betz pyramidal cells/neurons

37. In which CNS structures are neuronal bodies found in large numbers?

a) substantia nigra

b) anterior commissure

c) pyramidal tract

d) nucleus paraventricularis

e) intermediolateral cell column

f) dorsal column

38. Which structures are part of the proprioceptive monosynaptic reflex arc?

a) intrafusal fibers of muscle spindle

b) dendrite (peripheral process) of pseudounipolar neuron

c) inhibitory interneuron

d) axon of alpha-motoneuron

39. Which of the following statements about the myelinated nerve fibers are true?

a) myelin sheath of one axon is formed by many Schwann cells

b) one Schwann cell forms a myelin sheath around many axons

c) myelin insulates axons and increases the rate at which electrical impulses are passed along the axon

d) axons are embedded in a cytoplasm of Schwann cells

40. Which cells can we find in white matter tracts?

a) interneurons

b) astrocytes

c) oligodendrocytes

d) microglia

41. Decide whether the following statements about the development of the nervous system are true T or false F:

a) notochord together with paraxial mesoderm induce differentiation of ectoderm to neuroectoderm

b) the neural plate is the basis for the neural tube

c) the anterior and posterior neuropores close simultaneously

d) anencephaly is the result of failure of the posterior neuropore to close

42. Decide whether the following statements about the development of the nervous system are true T or false F:

a) only genetic factors are involved in the development of congenital neural tube defects

b) neural crest cells are derived from the neuroectoderm of the neural tube

c) since only the bones of the neurocranium are derived from cells of the neural tube, their differentiation potential is limited

d) neuroepithelial cells differentiate into neuroblasts, glioblasts, and ependymoblasts

43. Decide whether the following statements about the development of the nervous system are true T or false F:

a) two brain vesicles develop from the mesencephalon, the telencephalon and diencephalon

b) a fifth cerebral vesicle (myelencephalon) develops from the rhombencephalon

c) the thalamus and hypothalamus are derivatives of the prosencephalon

d) the cerebellum develops from the metencephalon

44. Decide whether the following statements about the development of the nervous system are true T or false F:

a) motor neurons of the ventral horns of the spinal cord develop from the basal plate of the neural tube

b) by the 2nd month of embryonic development, the spinal cord and spine are of equal length

c) groups of motor nuclei (n. oculomotorius, n. trochlearis, n. ruber) arise from the alar plates of the mesencephalon

d) motor nuclei of the cranial nerves arise from the basal plates of the metencephalon

45. Decide whether the following statements about the development of the nervous system are true T or false F:

a) the autonomic nervous system develops from neural crest cells

b) myelination of nerve fibers begins in the 4th month and is completed just before birth

c) the ventricular system and the central canal of the spinal cord develop from the lumen of the neural tube

d) failure of the anterior neuropore to close can lead to the development of spina bifida

46. To what brain vesicles does the rhombencephalon further differentiate?

a) metencephalon

b) mesencephalon

c) diencephalon

d) myelencephalon

47. Which of the flexions of neural tube are ventrally directed?

a) pontine flexure

b) cranial (mesencephalic) flexure

c) cervical flexure

d) sacral spinal flexure

48. Which zone of the neural tube neuroepithelium is the place, where neurons are created?

a) mantle zone

b) ventricular zone

c) marginal zone

d) zone, which surrounds the central lumen

49. Which structures of the CNS originate in the basal plates?

a) nucleus of the trochlear nerve

b) vestibular nuclei of n. vestibulocochlearis

c) ventral horns of the spinal cord

d) dorsal horns of the spinal cord

50. Which of the following statements about the spina bifida are true?

a) it is sought at screening by measuring maternal blood alpha-fetoprotein levels at 15–17 weeks of gestation

b) arises when rhombomeres do not disappear

c) has a multifactorial etiology

d) is a malformation that occurs when the closure of the neural tube in the posterior neuropore fails

Chapter Twelve Answers:

1) acd
2) bd
3) abd
4) bc
5) ac
6) cd
7) abd
8) ab
9) bcd
10) acd
11) bc
12) abd
13) abc
14) d
15) d
16) ac
17) abd
18) b
19) acd
20) cd
21) ad
22) bcd
23) de
24) abe
25) c
26) d
27) b
28) de
29) bd
30) abe
31) ad
32) ad
33) acd
34) c
35) abf
36) abd
37) ade
38) abd
39) ac
40) bcd
41) ab
42) bd
43) bcd
44) abd
45) ac
46) ad
47) bc
48) bd
49) ac
50) acd

Chapter Thirteen: Senses – Eye and Ear

1. Decide whether the following statements about the eye are true T or false F:

a) tunica fibrosa bulbi is the innermost layer of the eyeball

b) amacrine cells in the retina are the only neurons in the human body that do not have an axon

c) the posterior corneal epithelium attaches to Bowman's membrane

d) the cornea has a rich vascular supply

2. Decide whether the following statements about the eye are true T or false F:

a) the anterior corneal epithelium is a stratified squamous non-keratinized epithelium

b) the epithelium of the ciliary body and iris is part of the uvea

c) the optic part of the retina consists of ten typical layers

d) rods and cones are first neurons of the visual pathway

3. Decide whether the following statements about the eye are true T or false F:

a) rods and cones are part of pars caeca retinae

b) suspensory ligaments attach the lens to the ciliary body which is important for accommodation

c) the posterior corneal epithelium is stratified squamous non-keratinized

d) the sclera is composed predominantly of dense irregular connective tissue

4. Decide whether the following statements about the eye are true T or false F:

a) the iris contains two smooth muscles – m. sphincter and m. dilatator pupillae

b) Schlemm's canal is an endothelium-lined drainage system for aqueous humor

c) Descemet's membrane is the basement membrane of the posterior corneal epithelium

d) the ciliary body has posteriorly a simple epithelium which is part of the blind spot of the retina

5. Decide whether the following statements about the eye are true T or false F:

a) the lens is covered anteriorly by a simple cuboidal epithelium, which is the source of the lens fibers

b) Müller cells are glial cells that run along the entire width of the retina

c) bipolar cells represent third neurons of the visual pathway

d) amacrine cells of the retina have like other multipolar neurons usually one axon and many dendrites

6. Decide whether the following statements about the eye are true T or false F:

a) the boundary between pars caeca and pars optica retinae is formed by the anterior chamber of the eye

b) the pigment epithelium is the innermost layer of the optic part of the retina

c) lens fibers are present only on the surface of the lens

d) the choroid contains Bruch's membrane, which lies between the choroid and optic part of the retina

7. Decide whether the following statements about the eye are true T or false F:

a) both the anterior and posterior corneal epithelium are simple squamous

b) the stroma (substantia propria) is the thickest layer of the cornea

c) the anterior border layer of the iris contains fibroblasts and melanocytes

d) the iris has anteriorly an epithelium like the cornea

8. Decide whether the following statements about the eye are true T or false F:

a) the iris has anteriorly the anterior border layer instead of the epithelium

b) corpus vitreum is part of the eyeball wall

c) musculus dilatator pupillae is formed by myoepithelial cells

d) the boundary between the non-photosensitive and photosensitive area of the retina is ora serrata

9. Decide whether the following statements about the eye are true T or false F:

a) nerve fiber layer of the photosensitive part of the retina is located just below the pigment epithelium

b) external plexiform layer of the photosensitive part of the retina is formed by synapses between processes of photoreceptor cells and bipolar cells

c) the vitreous humor is formed in pars plana of the ciliary body

d) inner limiting membrane of the photosensitive part of the retina is formed by synapses between ganglion cells and bipolar cells

10. Decide whether the following statements about the eye are true T or false F:

a) rods are responsible for black and white vision

b) cones are responsible for seeing colors and small details

c) the conjunctiva of the eyeball extends into the adjacent corneal epithelium

d) loose connective tissue of the iris does not contain any blood vessel

11. Decide whether the following statements about the ear are true T or false F:

a) the base of the auricle is elastic cartilage

b) the entire external acoustic meatus consists of hyaline cartilage

c) stratum cutaneum of the tympanic membrane is formed by a stratified squamous keratinized epithelium

d) all layers of the tympanic membrane have a common embryonic origin

12. Decide whether the following statements about the ear are true T or false F:

a) the middle ear cavity contains three auditory ossicles and two muscles

b) the middle ear is connected to the outer ear by the Eustachian tube

c) stapes is attached to the oval window

d) the middle ear cavity is lined by a simple squamous to low cuboidal epithelium

13. Decide whether the following statements about the ear are true T or false F:

a) the membranous labyrinth contains only the organ of Corti and the vestibular system consists only of the bony part

b) all sensory structures of the membranous labyrinth contain hair cells

c) stria vascularis is the only epithelium in the human body that contains blood vessels

d) the vestibular system is in scala media

14. Decide whether the following statements about the ear are true T or false F:

a) the organ of Corti contains two types of hair cells – outer and inner

b) cristae ampullares are part of the organ of Corti

c) the organ of Corti is positioned on the basilar membrane

d) the bony labyrinth is located inside the membranous labyrinth

15. Decide whether the following statements about the ear are true T or false F:

a) scala media is part of the bony labyrinth

b) the boundary between scala media and scala vestibuli is the basilar membrane

c) stria vascularis is a pseudostratified epithelium that is involved in the formation of the endolymph

d) the three semicircular canals of the bony labyrinth contain the three semicircular ducts of the membranous labyrinth

16. Decide whether the following statements about the ear are true T or false F:

a) helicotrema is a place at the apex of the cochlear labyrinth where scala tympani and scala vestibuli meet

b) hairs of outer hair cells extend into membrana tectoria

c) phalangeal cells are a type of hair cell in the organ of Corti

d) all hair cells have many motile cilia on their surface

17. Decide whether the following statements about the ear are true T or false F:

a) cristae ampullares contain hair cells covered by the cupula

b) macula sacculi et utriculi are found in the organ of Corti

c) the otolithic membrane is part of membrana tectoria of the organ of Corti

d) the entire membranous labyrinth of the inner ear is responsible for hearing and movement

18. Decide whether the following statements about the ear are true T or false F:

a) membrana vestibularis separates scala media from scala vestibuli

b) endolymph flows through the bony labyrinth

c) perilymph flows in the membranous labyrinth

d) scala media has triangular shape in cross-section

19. Decide whether the following statements about the ear are true T or false F:

a) hair cells of cristae ampullares have a cilium on their surface in addition to stereocilia

b) inner hair cells of the organ of Corti have stereocilia on their surface, whereas outer hair cells have cilia

c) the endolymph flows in the membranous labyrinth

d) the bony labyrinth contains the perilymph

20. Decide whether the following statements about the ear are true T or false F:

a) stria vascularis is part of the vestibular system

b) ligamentum spirale is a modified periosteum of the bony labyrinth and is the site of absorption of the endolymph

c) in addition to phalangeal and hair cells, the organ of Corti contains many other cells, for example pillar cells, Claudius cells, etc

d) the outer, middle, and inner ear share a common embryonic origin

21. Which of the following statements about the membranous labyrinth are true?

a) maculae are composed of hair cells that have motile kinocilia

b) otoliths are mainly composed of calcium carbonate

c) the saccule and utricle are lined by a single layer of flat epithelium

d) the epithelium of the labyrinth is of endodermal origin

22. Which of the following statements about the middle ear are true?

a) it is filled with endolymph, the composition of which is similar to intercellular fluid

b) it communicates with the cavities in processus mastoideus of the temporal bone

c) communicates via the Eustachian tube (tuba pharyngotympanica) with the pharynx

d) is a space covered by a stratified squamous epithelium, which also passes to the three middle ear ossicles

23. Which of the following statements about Corti's organ are true?

a) fluid flows through it – called cortilymph

b) it contains macula utriculi and macula sacculi

c) contains special receptor cells – called hair cells

d) lies on the basilar membrane

24. Which of the following statements about tela choroidea of the eye are true?

a) it contains m. sphincter pupillae and thus participates in miosis

b) is rich in melanocytes

c) consists of vascularized sparse collagen fibrils

d) forms the middle layer in the posterior 5/6 of the eyeball

25. Which of the following structures associated with the eye or ear contains ciliated epithelium?

a) the Eustachian tube

b) the epithelium of the external auditory canal

c) the retina as part of the cone

d) the hair cells of the inner ear

26. Which of the following statements about retinal cones are true?

a) most of them are concentrated in macula lutea

b) they consist of an inner and an outer segment

c) they are specialized dendrites of bipolar neurons

d) they are responsible for scotopic vision (twilight)

27. What are the glial cells of the retina of the eye called?

a) amacrine cells

b) Müller cells

c) Bergmann's glia

d) pinealocytes

28. Where would you find hyalocytes?

a) in the anterior chamber of the eye

b) in the sclera

c) in pars plana of corpus ciliare

d) in arteria hyaloidea

29. What is Bruch's membrane?

a) innermost layer of the choroid of the eye

b) pentalaminar structure located between the retinal pigment epithelium and the fenestrated choroidal capillaries of the eye

c) basement membrane of the inner epithelium (endothelium) of the cornea

d) basement membrane of lens fibers

30. Which of the following are histological components of the cornea?

a) zonular fibers

b) musculus ciliaris

c) Descemet's membrane

d) Bowman's membrane

31. What are the functions of corpus ciliare?

a) production of ventricular fluid

b) mydriasis

c) miosis

d) accommodation

32. What is the truth about ganglion neurons of the retina?

a) they are the third neuron of the optical pathway

b) are the second neuron of the optical pathway

c) their axons form the fibers of nervus opticus

d) are bipolar

e) arise from the optic placode

33. Which of the following statements about the lens are true?

a) its back surface is covered with epithelium

b) its lens capsule is made up of a particularly thick basement membrane of lens epithelial cells

c) the lens fibers of its matrix are made up of fine collagen fibers

d) can vary its optical power due to its elasticity

34. Decide whether the following statements about the development of the eye are true T or false F:

a) the retina has the origin in the neuroectodermal lens placode

b) the ectomesenchyme together with neural crest cells are strongly involved in the development of the fibrous components of the eye

c) both pars caeca and pars optica retinae share a common embryonic origin

d) the optic cup is the basis for the lens

35. Decide whether the following statements about the development of the eye are true T or false F:

a) the choroidal fissure is a slit that opens into the optic vesicle

b) the lens develops from the lens placode which originates from the surface ectoderm

c) the eye begins to develop from the 7th week after fertilization

d) the sphincter and dilator pupillae arise from the ectomesenchyme

36. Decide whether the following statements about the development of the eye are true T or false F:

a) the optic stalk, which connects the eye sac to the prosencephalic cavity at the beginning of eye development, is the basis of the optic nerve

b) the vitreous body (corpus vitreum) develops from the mesenchyme in the cavity of the optic cup

c) the entire cornea develops from the surface ectoderm

d) only the optic cup and its derivatives are of neuroectodermal origin

37. Decide whether the following statements about the development of the eye are true T or false F:

a) the base of the eye begins to develop from the 4th week after fertilization

b) the anterior epithelium is the only part of the cornea that develops from the surface ectoderm

c) the pupil arises as a constricted circular entrance to the optic cup

d) the lens develops from two different origins

38. Decide whether the following statements about the development of the eye are true T or false F:

a) the lens placode develops from the neuroectoderm of the optic cup

b) the cavity of the eye sac gradually becomes the cavity of the optic cup

c) the central retinal artery develops from the hyaloid artery

d) both the entire iris and ciliary body arise from the neuroectoderm of the optic cup

39. Decide whether the following statements about the development of the ear are true T or false F:

a) the outer, middle, and inner ear all originate from the neural crest

b) the tympanic membrane develops at the point where the 1st pharyngeal cleft and the 1st pharyngeal pouch meet

c) the auricle arises from six hillocks around the edge of the 1st pharyngeal cleft

d) the otic placode is the basis for the external ear canal

40. Decide whether the following statements about the development of the ear are true T or false F:

a) the otic placode is the basis for the membranous labyrinth of the inner ear

b) the tympanic cavity and the auditory (Eustachian) tube develop from the tubotympanic recess

c) structures of the middle ear develop from the otocyst

d) structures of the middle ear arise from the pharyngeal region

41. Decide whether the following statements about the development of the ear are true T or false F:

a) hair cells of both the auditory and vestibular systems are derived from the ectodermal otocyst

b) the membranous labyrinth of the inner ear starts to develop from the 4th week after fertilization

c) the tympanic cavity is derived from the 1st endodermal pharyngeal pouch

d) during the development of the external and middle ear, membrana obturans between the 1st pharyngeal cleft and the 1st pharyngeal pouch is perforated

42. Decide whether the following statements about the development of the ear are true T or false F:

a) the ear starts to develop at 8 weeks after fertilization

b) both the bony and membranous labyrinth develop from the ectodermal otocyst

c) membrana obturans between the 1st pharyngeal pouch and the 1st pharyngeal cleft forms the basis of the tympanic membrane.

d) the vestibulocochlear ganglion as well as hair cells arise from the otocyst.

43. Decide whether the following statements about the development of the ear are true T or false F:

a) the maleus, incus, and stapes are all derived from the cartilage of the 1st pharyngeal arch

b) the development of the entire external auditory canal is completed during the embryonic period

c) atresia of the external auditory canal may occur if the 1st pharyngeal arch fails to develop

d) the vestibulocochlear ganglion arises from the neuroectoderm of the neural crest

44. What is the thickening of the ectoderm induced in response to proliferation of the eyestalk from the diencephalon at week 4 called?

a) eyecup

b) lens placode

c) otic placode

d) eye sac

45. Which parts of the eye are of mesenchymal origin?

a) retina

b) lens

c) corneal epithelium

d) choroidea

e) corneal fibrous stroma

f) vitreous

46. What components remain in the eye as remnants of arteria hyaloidea?

a) nervus opticus

b) blind spot

c) canalis hyaloideus

d) arteria centralis retinae

47. From what does ductus endolymphaticus arise?

a) from the condensed mesenchyme of the 1st pharyngeal arch

b) from the otic placode

c) from recessus tubotympanicus

d) from the otocyst (auditory sac)

e) from the first pharyngeal groove

48. What does the external ear canal develop from?

a) its epithelium from the superficial ectoderm

b) from the first pharyngeal groove

c) from recessus tubotympanicus

d) from the first pharyngeal pouch

Chapter Thirteen Answers:

1) b
2) acd
3) bd
4) abc
5) ab
6) d
7) bc
8) acd
9) b
10) abc
11) ac
12) acd
13) bc
14) ac
15) cd
16) ab
17) a
18) ad
19) acd
20) bc
21) bc
22) bc
23) acd
24) bcd
25) acd
26) ab
27) b
28) b
29) ab
30) cd
31) ad
32) ac
33) bd
34) bc
35) b
36) ab
37) abc
38) c
39) bc
40) abd
41) abc
42) c
43) cd
44) b
45) def
46) cd
47) bd
48) ab

Chapter Fourteen: General Embryology

1. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the development of corpus luteum corresponds to the follicular phase of the menstrual cycle

b) theca-lutein cells are more numerous compared to granulosa-lutein cells

c) corpus luteum graviditatis grows to a size of 2–5 cm

d) theca-lutein cells are localized at the periphery of corpus luteum

2. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) theca-lutein cells are larger than granulosa-lutein cells

b) corpus luteum graviditatis produces mainly progesterone and is essential for maintaining pregnancy

c) the final stage of corpus luteum degeneration is fibrous corpus albicans

d) theca-lutein cells are about 15 micrometers in size and synthesize mainly androgens

3. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) granulosa-lutein cells secrete progesterone under the influence of luteinizing hormone

b) entire corpus luteum is surrounded by the outer fibrous layer of theca folliculi externa

c) luteolysis of corpus luteum is induced by high levels of hCG

d) granulosa-lutein cells are round with diameter of about 30 micrometers

4. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) decidua is the name given to the myometrium of the uterine wall during pregnancy

b) decidual reaction involves the transformation of endometrial stromal cells into decidual cells

c) decidua parietalis is involved in the formation of the placenta

d) chorion frondosum develops in the area of decidua basalis

5. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) decidual transformation of the endometrium ensures the histotrophic nutrition during early development of the embryo

b) decidual reaction involves the proliferation of endometrial blood vessels and the formation of thin-walled sinusoidal capillaries

c) the future placenta is formed in the region of decidua capsularis

d) decidual cells have an euchromatic nucleus and contain abundant lipids and glycogen in the cytoplasm

6. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the part of the decidua that lies just below the nested blastocyst is called decidua marginalis

b) decidua basalis plays an important role in the development of the maternal part of the placenta

c) decidual reaction involves increased activity of the glands of the endometrium

d) Arias-Stella reaction refers to changes in the cell nucleus of endometrial epithelial cells during decidual transformation

7. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) decidual cells develop from epithelial cells of endometrial glands

b) decidual cells have a heterochromatic nucleus and are smaller than stromal cells from which they are derived

c) decidual transformation is essential during the hemotrophic nutrition of developing embryo

d) decidua is the name for the endometrium during pregnancy

8. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) chorion laeve develops in the region of decidua capsularis

b) decidual cells arise from endothelial cells of endometrial capillaries

c) Arias-Stella reaction represents changes in the nucleus of decidual cells

d) decidual reaction involves all layers of the uterine wall

9. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) glandula mammaria lactans is a tubuloalveolar gland

b) during lactation, the parenchyma of the mammary gland increases, and the stroma is reduced

c) ductus lactiferi are intralobular ducts of the mammary gland

d) the mammary gland is specific in that it also contains myoepithelial cells around ducts

10. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the transformation of an inactive mammary gland into a lactating mammary gland is under the influence of prolactin, estrogen, and placental progesterone

b) glandula mammaria lactans contains only ducts without developed secretory units

c) secretory alveoli of the mammary gland are formed by galactocytes and myoepithelial cells

d) stimulation of milk secretion and ejection during lactation is under the influence of oxytocin

11. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) primary chorionic villi contain blood vessels

b) all types of chorionic villi are covered with syncytiotrophoblast

c) stem chorionic villi grow from the chorionic plate

d) secondary chorionic villi contain mesenchyme

12. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the fetal part of the placenta forms septa which divide it into cotyledons

b) the fetal part of the placenta is covered by the amnion

c) chorionic villi contain specialized macrophages called Hofbauer cells

d) stem chorionic villi arise from free chorionic villi

13. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) under normal conditions, the intervillous space contains fetal blood

b) the placental barrier is formed by the endothelium of fetal blood vessels, trophoblast cells, their basal laminae, and the mesenchymal layer

c) the cytotrophoblast is part of the placental barrier throughout whole pregnancy

d) the basal plate of the placenta grows from the chorionic plate

14. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the intervillous space normally contains only maternal blood

b) the placental septa, which divide the placenta into cotyledons, grow from the basal plate

c) tertiary chorionic villi contain fetal blood vessels in the mesenchyme

d) secondary chorionic villi are composed exclusively of cytotrophoblast and syncytiotrophoblast

15. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) fully mature chorionic villi contain a minimum of mesenchyme, with fetal capillaries in close contact with the syncytiotrophoblast

b) the umbilical cord attaches to the basal plate

c) the mesenchyme of chorionic villi is derived from the embryonic mesoderm

d) the syncytiotrophoblast is part of the placental barrier throughout whole pregnancy

16. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the umbilical cord contains two veins and one artery

b) the connective tissue of the umbilical cord contains large amounts of hyaluronic acid and is known as Wharton's jelly

c) the mature umbilical cord always contains ductus omphaloentericus under normal circumstances

d) the presence of intestinal hernia in the umbilical cord is always considered a pathological phenomenon

17. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the umbilical cord is covered with amniotic epithelium

b) the umbilical cord contains an intestinal hernia until the 3rd trimester

c) the two umbilical arteries contain deoxygenated blood, and the umbilical vein contains oxygenated blood

d) umbilical vessels develop from allantoic vessels

18. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the development of the umbilical cord is closely related to the bending of the trilaminar germ disc

b) an extraembryonic coelom can be seen in the mature umbilical cord

c) the biomechanical properties of Wharton's jelly protect umbilical vessels from strangulation

d) as the embryo flexes and the umbilical cord develops, the yolk sac becomes a narrow duct – ductus omphaloentericus

19. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) the umbilical cord attaches to the chorionic plate

b) Wharton's jelly develops from the extraembryonic mesenchyme

c) most of the mesenchyme in the developing umbilical cord is derived from the material of the connecting stalk

d) the mature umbilical cord is similar in length to a full-term fetus – about 50 cm

20. Decide whether the following statements about the structures during pregnancy are true T or false F:

a) Wharton's jelly is made up of a dense connective tissue

b) the chorion is located on the surface of the umbilical cord

c) a variable part of the umbilical cord, seen especially in the early stages of development, is ductus allantoicus (allantois)

d) the presence of an intestinal hernia in the umbilical cord during the 6th to 10th week of development is called physiological gut herniation

21. Which of the following statements about the trilaminar germ disc are true?

a) is formed by trophoblast, epiblast and hypoblast

b) is formed in the fourth week

c) all its germ layers originate from the epiblast

d) consists of ectoderm, mesoderm and endoderm

22. What are the physiological roles of the yolk sac?

a) in weeks 4–12, provide nutrition for the developing embryo

b) its extraembryonic mesoderm is a major site of hematopoiesis

c) primordial germ cells are formed in its wall

d) is a repository of waste products of fetal metabolism

23. Which of the following statements about the extraembryonic spaces are true?

a) an exocoelomic cyst arises during the formation of a definitive yolk sac

b) amniotic cavity disappears during the fetal period of development

c) the yolk sac is the basis for the placenta and part of the fetal membranes

d) the chorionic cavity forms by splitting of the extraembryonic mesoderm into two layers

24. Which of the following statements about the multiple pregnancy are true?

a) under normal circumstances, about 10% of human pregnancies are multiple (usually twins)

b) Siamese (conjoined) twins are fraternal (dizygotic), so they can be of different sexes

c) monozygotic twins are created by postzygotic division of an early embryo

d) monozygotic twins can have both a common placenta (monochorionic) and a common amniotic cavity (monoamniotic)

25. What is the first axial organ of the embryo?

a) the notochord

b) the Heuser's membrane

c) the neural tube

d) the primitive node

26. What happens around the 22nd day of development?

a) notochordal plate separates from endoderm to form a solid notochord

b) embryonic folding commences

c) posterior neuropore closes

d) septum transversum forms

e) exocoelomic cyst is formed

f) cranial neural crest cells migration starts

g) tertiary bronchial buds appear

27. What is the structure that has never been directly associated with the primitive gut during its evolution?

a) neural tube

b) allantois

c) ductus vitellinus

d) pronephros

28. Around day 20, the yolk sac cavity temporarily communicates with the amniotic cavity. What is this opening called?

a) oropharyngeal membrane

b) ductus omphaloentericus

c) neurenteric canal

d) primitive pit

29. Which of the following statements about the placental barrier are true?

a) mesenchyme can be located between trophoblast and endothelium of branches of umbilical vessels

b) the trophoblast in the mature placenta consists of the syncytiotrophoblast and an incomplete cytotrophoblast

c) it is a semipermeable layer of fetal tissue separating the maternal from the fetal blood in the placenta

d) continuous type of endothelium of maternal vessels prevents HIV infection of the fetus

30. What structures are derivatives of the surface ectoderm?

a) hair follicle

b) enteroendocrine cell

c) canal of Hering

d) retina

31. Which of the following statements about the embryo implantation are true?

a) in two-thirds of cases it implants on the dorsal surface of the uterus

b) it precedes hatching of the embryo

c) abnormal implantation in uterine tubes consequently causes the formation of placenta praevia

d) it occurs approximately ten days after fertilization

e) just after it begins, the trophoblast starts to produce human chorionic gonadotropin

32. Which events need to happen just before fertilization itself?

a) sperm capacitation

b) cleaving of blastomeres

c) hatching

d) cortical reaction

e) acrosome reaction

33. Which of the following pairs: typical anatomical site – event, are correct?

a) ampulla of the uterine tube – fecundation place

b) uterine cervix – formation of placenta praevia

c) isthmus of the uterine tube – hatching

d) lower anterior wall of the uterus – implantation

34. What is the origin of the mesenchyme in the head region?

a) the mesodermal cells of cardiogenic zone

b) neural crest cells

c) the cervical somites

d) somatopleuric mesenchyme

35. Replace "$" with the correct word in the following sentence: The intraembryonic coelom first appears during the $ week.

a) second

b) fourth

c) fifth

d) seventh

36. What can be said about the sperm capacitation?

a) is another term for the cortical reaction

b) during this process, acrosomal enzymes are released

c) is a process which takes place in the epididymis and ejaculatory ducts

d) physiological changes spermatozoa must undergo in order to have the ability to penetrate and fertilize an oocyte

e) includes removal of cholesterol from sperm plasma membrane

37. What is it hatching?

a) another term for delivery

b) cleavage of zygote

c) reaction of endometrium after implantation

d) stripping of zona pellucida

38. Which of the following statements about corpus luteum are true?

a) granulosa-lutein cells are located predominantly in the central part of corpus luteum near the blood clot

b) corpus luteum graviditatis is a major source of progesterone in early pregnancy

c) granulosa-lutein cells are darker and smaller than theca-lutein cells

d) is composed of two types of cells with endocrine function – theca-lutein and granulosa-lutein cells

39. What are the components of the tertiary chorionic villi?

a) the extraembryonic mesenchyme

b) maternal capillaries

c) syncytiotrophoblast

d) cytotrophoblast

e) decidual cells

f) Hofbauer cells

40. Which events are part of the decidual reaction?

a) differentiation of fibroblasts into glycogen-containing decidual cells

b) increase in secretory functions of the endometrium

c) formation of primary chorionic villi

d) maternal spiral arteries remodeling

e) presence of large numbers of leukocytes

Chapter Fourteen Answers:

1) cd
2) bcd
3) abd
4) bd
5) abd
6) bcd
7) d
8) a
9) abd
10) acd
11) bcd
12) bc
13) b
14) abc
15) ad
16) b
17) acd
18) acd
19) abcd
20) cd
21) cd
22) bc
23) ad
24) cd
25) a
26) abdf
27) ad
28) c
29) abc
30) a
31) ae
32) ade
33) ab
34) b
35) b
36) de
37) d
38) abd
39) acdf
40) abde

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