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HISTOLOGY, CYTOLOGY, EMBRYOLOGY

A GUIDE FOR KNOWLEDGE LEVEL CONTROL FOR FOREIGN STUDENTS OF SPECIALIZATION "MEDICINE"

Part 2. Basic Histology

КИЇВСЬКИЙ УНІВЕРСИТЕТ 2021

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A guide for knowledge level control of discipline "Histology, Cytology and Embryology" contains questions from topics that belong to Basic Histology, devoted to the peculiarities of histological structure of four main types of tissues in human body: epithelial, connective, muscular and nerve tissues.

For students of specialty 222 "Medicine" of the educational qualification level "Master".

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INTRODUCTION

The second part of a guide for knowledge level control for foreign students of specialization "Medicine" "HISTOLOGY, CYTOLOGY, EMBRYOLOGY" contains questions from topics that belong to Basic Histology.

The second part of this guide contains 4 chapters that provide questions about 4 main types of tissues in human body: epithelial, connective, muscular and nerve. Each chapter has subchapters that include questions about classification of tissues, special features of cells morphology and functions as well as the structure of extracellular matrix.

The first chapter of the guide book is dedicated to general classification of tissues as well as peculiarities of structure of cells in covering and glandular epithelium; their localization in human body, classification of glands and mechanisms of secretion, histogenesis of epithelial tissue.

The second chapter of the guide book contains questions about special features of cellular morphology and structure of extracellular matrix of the connective tissue. This chapter is the vastest and includes blood, proper connective tissue, adipose tissue, skeletal connective tissues to which belong bone and cartilage.

The third chapter contains questions on three types of muscle tissue: skeletal, cardiac and smooth, features of their cell structure and function; sarcomere structure; comparative characteristics of muscle tissues.

The last fourth chapter provides a test of knowledge of the structure of nervous tissue, special features of structure and function of neurons and glial cells, the mechanisms of generating the action potential in nerve fibers.

The ability of students to answer the proposed questions allows checking the level of mastering the theoretical material and the ability to analyze it, as well as to avoid the subjective assessment of knowledge by the teacher. The acquired knowledge will be the basis for mastering the next unit of this course "Special histology".

CHAPTER 1

1.1. General characteristic and classification of tissues

1. The term that describes formation and development of tissues is _____.
   A. Ontogenesis
   B. Phylogenesis
   C. Embryogenesis
   D. Organogenesis
   E. Histogenesis

2. Choose a statement that describes the term "histogenesis":
   A. The science about tissues
   B. The combination of all cells and extracellular matrix in one tissue
   C. The microscopic structure of the organs and systems of the organism
   D. The process of hematopoiesis in the red bone marrow
   E. The process of tissues formation and development

3. Choose a statement that describes the concept of "tissue":
   A. The limitation of the possibility of cell development paths as a result of determination
   B. A set of cells with similar structure
   C. A network of collagen and elastic fibers immersed in an amorphous substance
   D. The main morphofunctional unit of the organism
   E. An aggregate of cells and non-cellular structures that have a common origin and perform the same function

4. The specification of the further cell development as a result of blocking certain components in genome is called:
   A. Reduction
   B. Commitation
   C. Impotence
   D. Determination
   E. Differentiation

5. The synonym for the term differon is
   A. Programmed cell death
   B. Simplast
   C. Syncytium
   D. Cell proliferation
   E. The cells of the same type but different age

6. What histological element provides the basic properties of the tissue?
   A. Intercellular substance
   B. Fibers
   C. Basic substance
   D. Postcellular formation
   E. Cells

7. How are noncellular tissue structures arised?
   A. They are formed independently of cells
   B. They are self-synthesized from inorganic components
   C. They are derivatives of viruses
   D. They are formed from dead cells
   E. They are derivatives of cells

8. What is the name of the aggregate of cells of a certain tissue that is consistently evolving from one type of the stem cell?
   A. Histon
   B. Keylin
   C. Compton
   D. Stoburon
   E. Diferon

9. All types of specialized cells in adult human body are arranged into _____
   A. Nervous tissues
   B. 5 main tissues
   C. 3 main tissues
   D. Muscular tissues
   E. 4 main tissues

10. Tissue that covers body surfaces, lines body cavities, and forms glands is _____
   A. Connective tissue
   B. Muscle tissue

C. Nerve tissue
D. None of the answers
E. Epithelium

11. Tissue that underlies or supports the other three basic tissues, both structurally and functionally is _____ .
A. Epithelium
B. Muscle tissue
C. Nerve tissue
D. None of the answers
E. Connective tissue

12. Tissue that is made up of contractile cells and is responsible for movement is _____ .
A. Epithelium
B. Connective tissue
C. Nerve tissue
D. Endothelium
E. Muscle tissue

13. Tissue that receives, transmits, and integrates information from outside and inside the body to control the activities of the body is _____ .
A. Epithelium
B. Connective tissue
C. Muscle tissue
D. Endothelium
E. Nerve tissue

14. Despite their different structure and physiologic properties, all organs are made up of such basic tissue types as _____.
A. Connective tissue, Muscle tissue, Nerve tissue, Mesenchyme
B. Epithelium, Muscle tissue, Nerve tissue, Connective tissue
C. Epithelium, Nerve tissue, Connective tissue, Blood and Lymph
D. Epithelium, Muscle tissue, Nerve tissue, Blood and Lymph
E. Epithelium, Connective tissue, Muscle tissue, Nerve tissue

1.2. Epithelial tissue

1.2.1. General characteristic of epithelial tissue

15. Indicate the characteristic feature of epithelial tissue:
    A. Contains a dense capillary network
    B. Consists of highly specialized cells that can not regenerate
    C. It has a large amount of extracellular matrix
    D. The cells are lacquered and washed with tissue fluid
    E. The cells are closely adjacent to each other, forming a layer

16. The apical domain exhibits special structural surface modifications:
    A. Microvilli
    B. Stereocilia
    C. Microvilli and cilia
    D. Stereocilia and cilia
    E. Microvilli, cilia and stereocilia

17. What is NOT true about epithelial tissues:
    A. Epithelium covers body surfaces, lines body cavities, and constitutes glands, therefore it is subdivided into lining and glandular
    B. Epithelium creates a selective barrier between the external environment and the underlying connective tissue
    C. The cells predominate, they are closely apposed and adhere to one another by means of special junctions
    D. Epithelium doesn't containe the blood vessels
    E. Their apical surface is attached to an underlying basement membrane

18. What is NOT true about epithelial tissues:
    A. Epithelium covers body surfaces, lines body cavities, and constitutes glands, therefore it is subdivided into covering and glandular
    B. Epithelium creates a selective barrier between the external environment and the underlying connective tissue
    C. The cells predominate, they are closely apposed and adhere to one another by means of special junctions

D. Epithelium doesn't containe the blood vessels
E. Their lateral domains are attached to an underlying basement membrane

19. Choose a statement that is specific to epithelial tissues:
A. A set of highly specialized cells that have lost the ability to divide
B. The cells are surrounded by a large amount of extracellular matrix
C. The cells have long processes
D. Intensive vascularization
E. The cells are attached to the basement membrane

20. The sign, that is NOT peculiar to the epithelial tissue:
A. The cells form a layer
B. Cells have a clearly polar structure
C. The cells predominate
D. The tissue does not have blood supply
E. The tissue is not capable of regeneration

1.2.2. Polarity of epithelial tissue cells

21. Which morphologic surface domain of epithelial cells does not exist?
A. Apical
B. Lateral
C. Basal
D. All exist
E. Integral

22. The nucleus usually is located near _____ surface of the epithelial cell
A. Apical
B. Lateral
C. Integral
D. In the middle of the cell
E. Basal

23. Structural and functional asymmetry of the epithellum cell is called_____
A. Apicallity
B. Functionality

C. Specialization
D. Diffusion
E. Polarity

24. Microvilli and cilia on epitheliocytes can be located on
A. Basal surface
B. Lateral surface
C. A and E
D. A and B
E. Apical surface

25. Lateral surface of epitheliocytes doesn't have
A. Zonulae occludentes
B. Zonulae adherents
C. Maculae adherents
D. Gap junctions
E. Hemidesmosomes

26. Apical surface of epitheliocytes has _____
A. Zonulae occludentes and zonulae adherents
B. Hemidesmosomes
C. Maculae adherentes
D. Gap junctions
E. Microvilli and cilia

27. Basal surface of epitheliocytes has
A. Zonulae occludentes and zonulae adherents
B. Microvilli and cilia
C. Maculae adherentes
D. Gap junctions
E. Hemidesmosomes and basal striations

1.2.3. Histogenesis of epithelial tissue

28. The source of development of corneal epithelium and lens of eye is:
A. Neuroectoderm (neural crest)
B. Mesoderm
C. Endoderm
D. Neuroectoderm (neural tube)
E. Surface ectoderm

29. The source of development of epithelial parts of pancreas is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

30. The source of development of epithelial parts of parathyroid glands is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

31. The source of development of epithelial parts of liver is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

32. The source of development of epithelial parts of tonsils is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

33. The source of development of epithelial parts of auditory tube is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

34. The source of development of epithelial parts of tympanic cavity is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)

C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

35. The source of development of epithelial parts of thyroid gland is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

36. Which germ layers are the sources of epithelium development?
A. Ecto- and mesoderm
B. Ecto- and endoderm
C. Meso- and endoderm
D. Ectoderm
E. Ecto-, ento- and mesoderm

37. The source of development of epithelial lining of GI tract (pharynx, esophagus, stomach, small and large intestines) is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

38. The source of development of epithelial lining of respiratory tract (trachea, bronchi, lungs) is:
A. Surface ectoderm
B. Neuroectoderm (neural crest)
C. Mesoderm
D. Neuroectoderm (neural tube)
E. Endoderm

39. The source of development of epidermis and its derivatives is:
A. Neuroectoderm (neural crest)
B. Mesoderm
C. Endoderm
D. Neuroectoderm (neural tube)
E. Surface ectoderm

40. The source of development of hair, nails, sweat glands, sebaceous glands, and the parenchyma and ducts of the mammary glands is:

A. Neuroectoderm (neural crest)
B. Mesoderm
C. Endoderm
D. Neuroectoderm (neural tube)
E. Surface ectoderm

1.2.4. Classification of epithelial tissue

41. Which epithelium is called simple?

A. In which not all cells are attached to the basal membrane
B. In which cells are not attached to the basal membrane
C. Non-keratinized
D. Keratinized
E. In which all the cells are attached to the basement membrane

42. Which epithelium is called simple squamous?

A. In which not all cells are attached to the basal membrane and the width of the cell is greater than its height
B. In which cells are not attached to the basal membrane and the width and height of the cell are approximately the same
C. In which all the cells are attached to the basement membrane and the width and height of the cell are approximately the same
D. In which all the cells are attached to the basement membrane and the height of the cell is greater than its width
E. In which all the cells are attached to the basement membrane and the width of the cell is greater than its height

43. Which epithelium is called simple cuboidal?

A. In which not all cells are attached to the basal membrane and the width of the cell is greater than its height
B. In which cells are not attached to the basal membrane and the width and height of the cell are approximately the same
C. In which all the cells are attached to the basement membrane and the width of the cell is greater than its height

D. In which all the cells are attached to the basement membrane and the height of the cell is greater than its width
E. In which all the cells are attached to the basement membrane and the width and height of the cell are approximately the same

44. Which epithelium is called simple columnar?
A. In which not all cells are attached to the basal membrane and the width of the cell is greater than its height
B. In which cells are not attached to the basal membrane and the width and height of the cell are approximately the same
C. In which all the cells are attached to the basement membrane and the width and height of the cell are approximately the same
D. In which all the cells are attached to the basement membrane and the width of the cell is greater than its height
E. In which all the cells are attached to the basement membrane and the height of the cell is greater than its width

45. Which epithelium is called stratified?
A. In which all cells are located in one layer
B. In which cells are not attached to the basement membrane
C. Tumorous
D. In which all the cells are attached to the basement membrane
E. In which not all cells are attached to the basement membrane

46. Which epithelium is called pseudostratified?
A. Squamous
B. In which cells are not attached to the basement membrane
C. In which not all cells lie on the basement membrane
D. In which cells are lined up in a few layers
E. In which cells are lined up in one layer, but nuclei of cells are lined up in several rows

47. The epithelium in which cells are lined up in one layer, attached to basement membrane; nuclei of cells are lined up in one row and the width of the cell is greater than its height is named ________
A. Simple cuboidal epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified epithelium
E. Simple squamous epithelium

48. The epithelium in which cells are lined up in one layer, attached to basement membrane; nuclei of cells are lined up in one row and the width and height of the cell are approximately the same is named _____

A. Simple squamous epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified epithelium
E. Simple cuboidal epithelium

49. The epithelium in which cells are lined up in one layer, attached to basement membrane; nuclei of cells are lined up in one row and the height of the cell is greater than its width is named _____

A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Pseudostratified epithelium
D. Stratified epithelium
E. Simple columnar epithelium

50. The epithelium in which cells are lined up in one layer, attached to basement membrane; consists of several types of cell and cell nuclei are arranged in several rows is named _____

A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Simple columnar epithelium
D. Stratified epithelium
E. Pseudostratified epithelium

51. The epithelium in which cells are lined up in two or more cell layers, consists of several types of cell and only the cells of the lower layer are attached to the basement membrane is named _____

A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Simple columnar epithelium
D. Pseudostratified epithelium
E. Stratified epithelium

1.2.5. Particular qualities of different layers of stratified epithelium

52. What layer of Stratified squamous keratinized epithelium does consist of rhomb-shape cells and contains granules?

A. Stratum corneum
B. Stratum lucidum
C. Stratum spinosum
D. Stratum basale
E. Stratum granulosum

53. What layer of Stratified squamous keratinized epithelium is composed of keratinized cells?

A. Stratum lucidum
B. Stratum granulosum
C. Stratum spinosum
D. Stratum basale
E. Stratum corneum

54. What layer of stratified squamous keratinized epithelium does consist of mitotically active, columnar-shape cells?

A. Stratum corneum
B. Stratum lucidum
C. Stratum granulosum
D. Stratum spinosum
E. Stratum basale

55. What is true about stratum basale of Stratified squamous keratinized epithelium?

A. Cells are rhomb-shape and contains granules
B. Subdivision of the stratum corneum in the regions of thick skin
C. Consist of polygonal-shape cells
D. Composed of keratinized cells
E. Consist of mitotically active, columnar-shape cells

56. What is true about stratum spinosum of stratified squamous keratinized epithelium?

A. Cells are rhomb-shape and contains granules
B. Subdivision of the stratum corneum in the regions of thick skin

C. Consist of mitotically active, columnar-shape cells
D. Composed of keratinized cells
E. Consist of polygonal-shape cells

57. What is true for stratum granulosum of stratified squamous keratinized epithelium?
A. Subdivision of the stratum corneum on the regions of thick skin
B. Consist of polygonal-shape cells
C. Consist of mitotically active, columnar-shape cells
D. Composed of keratinized cells
E. Cells are rhomb-shape and contains granules

58. What is true about stratum lucidum of stratified squamous keratinized epithelium?
A. Cells are rhomb-shape and contains granules
B. Consist of polygonal-shape cells
C. Consist of mitotically active, columnar-shape cells
D. Composed of keratinized cells
E. Subdivision of the stratum corneum in the regions of thick skin

59. What is true about stratum corneum of stratified squamous keratinized epithelium?
A. Cells are rhomb-shape and contains granules
B. Subdivision of the stratum corneum in the regions of thick skin
C. Consist of polygonal-shape cells
D. Consist of mitotically active, columnar-shape cells
E. Composed of keratinized cells

60. Transitional epithelium consists of the following layers
A. Superficial layer and Basal layer
B. Intermediate layer and Basal layer
C. Stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum and stratum basale
D. Stratum corneum, stratum lucidum, stratum granulosum and stratum basale
E. Superficial layer, Intermediate layer and Basal layer

61. Stratified squamous keratinized epithelium consists of the following layers
A. Superficial layer and Basal layer
B. Superficial layer, Intermediate layer and Basal layer

C. Intermediate layer and Basal layer
D. Stratum corneum, stratum lucidum, and stratum basale
E. Stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum and stratum basale

62. What is true for Basal layer of stratified squamous non-keratinized epithelium?
A. Cells are flattened and converted from columnar into squamous
B. Subdivision of the stratum corneum on the regions of thick skin
C. Contains squamous cells
D. Composed of keratinized cells
E. Contains low columnar cells

63. What is true for Intermediate layer of stratified squamous non-keratinized epithelium?
A. Subdivision of the stratum corneum on the regions of thick skin
B. Contains squamous cells
C. Contains low columnar cells
D. Composed of keratinized cells
E. Cells are flattened and converted from columnar into squamous

64. What is true for superficial layer of stratified squamous non-keratinized epithelium?
A. Cells are flattened and converted from columnar into squamous
B. Subdivision of the stratum corneum on the regions of thick skin
C. Contains low columnar cells
D. Composed of keratinized cells
E. Contains squamous cells

65. Stratified squamous non-keratinised epithelium consists of such layers:
A. Superficial layer and Basal layer
B. Intermediate layer and Basal layer
C. Stratum corneum, stratum lucidum, stratum granulosum, stratum spinosum and stratum basale
D. Stratum corneum, stratum lucidum, stratum granulosum and stratum basale
E. Superficial layer, Intermediate layer and Basal layer

66. Transitional epithelium is a specific type of
A. Stratified squamous non-keratinized epithelium that lines a cornea of the eye, oral cavity and esophagus
B. Stratified squamous keratinized epithelium that forms the skin epidermis
C. Stratified squamous non-keratinized epithelium
D. Stratified squamous keratinized epithelium
E. Stratified epithelium, lining the lower urinary tract that has specific morphologic characteristics that allow it to distend

1.2.6. Localization of different types of epithelium

67. The epithelium of vascular system (endothelium) is
A. Simple cuboidal epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified squamous epithelium
E. Simple squamous epithelium

68. Small ducts of exocrine glands are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Stratified columnar epithelium
D. Simple squamous epithelium
E. Simple cuboidal epithelium

69. Respiratory spaces in lung is a typical location for
A. Simple cuboidal epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified squamous epithelium
E. Simple squamous epithelium

70. _____lines a cornea of the eye, oral cavity and esophagus
A. Stratified squamous keratinized epithelium
B. Transitional epithelium
C. Pseudostratified epithelium

D. Stratified columnar epithelium
E. Stratified squamous non-keratinized epithelium

71. Body cavities (mesothelium) are the typical location for
A. Simple cuboidal epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified squamous epithelium
E. Simple squamous epithelium

72. _____is lining the lower urinary tract
A. Stratified squamous non-keratinized epithelium
B. Stratified squamous keratinized epithelium
C. Pseudostratified epithelium
D. Stratified columnar epithelium
E. Transitional epithelium

73. _____is located in epidermis, oral cavity and esophagus, vagina
A. Stratified cuboidal epithelium
B. Pseudostratified epithelium
C. Simple columnar ciliated epithelium
D. Stratified columnar epithelium
E. Stratified squamous epithelium

74. Small ducts of exocrine glands are the typical location for
A. Simple squamous epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified cuboidal epithelium
E. Simple cuboidal epithelium

75. Thyroid follicles are the typical location for
A. Transitional epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified cuboidal epithelium
E. Simple cuboidal epithelium

76. Surface of ovary (germinal epithelium) is a typical location for
A. Simple squamous epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified cuboidal epithelium
E. Simple cuboidal epithelium

77. Trachea and bronchial tree are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar ciliated epithelium
D. Simple columnar non-ciliated epithelium
E. Pseudostratified epithelium

78. Kidney tubules are the the typical location for
A. Simple squamous epithelium
B. Simple columnar epithelium
C. Pseudostratified epithelium
D. Stratified cuboidal epithelium
E. Simple cuboidal epithelium

79. Gastric glands are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple squamous epithelium
D. Simple cuboidal epithelium
E. Simple columnar epithelium

80. Small intestine and colon are the typical location for
A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Pseudostratified
D. Stratified columnar epithelium
E. Simple columnar epithelium

81. Small intestine and colon are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple squamous epithelium

D. Simple cuboidal epithelium
E. Simple columnar epithelium

82. Trachea and bronchial tree are the typical location for
A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Simple columnar epithelium
D. Stratified columnar epithelium
E. Pseudostratified epithelium

83. The body cavities (i.e., the abdominal, pericardial, and pleural cavities) are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple cuboidal epithelium
E. Simple squamous epithelium

84. Stomach lining and gastric glands are the typical location for
A. Simple squamous epithelium
B. Simple cuboidal epithelium
C. Pseudostratified epithelium
D. Stratified columnar epithelium
E. Simple columnar epithelium

85. The ventricles of the heart are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple cuboidal epithelium
E. Simple squamous epithelium

86. Epidermis is a typical location for
A. Stratified cuboidal epithelium
B. Transitional epithelium
C. Pseudostratified epithelium
D. Stratified columnar epithelium
E. Stratified squamous epithelium

87. The blood and lymphatic vessels are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple cuboidal epithelium
E. Simple squamous epithelium

88. Oral cavity and esophagus are the typical location for
A. Stratified cuboidal epithelium
B. Transitional epithelium
C. Pseudostratified epithelium
D. Stratified columnar epithelium
E. Stratified squamous epithelium

89. Respiratory spaces in lung are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple cuboidal epithelium
E. Simple squamous epithelium

90. Ureters are the typical location for
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Pseudostratified epithelium
D. Stratified columnar epithelium
E. Transitional epithelium

91. Kidney tubules are lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple squamous epithelium
E. Simple cuboidal epithelium

92. Urinary bladder and urethra are the typical location for
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Pseudostratified epithelium

D. Stratified columnar epithelium
E. Transitional epithelium

93. Surface of ovary is lined by
A. Stratified squamous epithelium
B. Stratified cuboidal epithelium
C. Simple columnar epithelium
D. Simple squamous epithelium
E. Simple cuboidal epithelium

94. Typically, according to how their products are released glands are classified into:
A. Pigmentary, trophic, secretory
B. Alveolar, tubular and tubuloalveolar
C. Intraepithelial and extraepithelial
D. Serous, mucous, mixed, sweat and sebaceous
E. Exocrine and endocrine

95. What is NOT true for unicellular glands:
A. The simplest in structure
B. The secretory component consists of single cells distributed among other nonsecretory cells
C. A mucus-secreting cell positioned among other columnar cells
D. Located in the surface lining and glands of the intestines and in certain passages of the respiratory tract
E. The simplest arrangement of them is a cellular sheet in which each surface cell is a secretory cell

1.2.7. Glandular epithelium, types of secretion

96. By the method of secretion from the cell the glands are divided into:
A. Pigmentary, trophic, secretory
B. Simple and complex
C. Alveolar, tubular and tubular alveolar
D. Serous, mucous, mixed, sweat and sebaceous
E. Merocrine, apocrine and holocrine

97. By the chemical nature of the secret that is produced the exocrine gland are divided into:

A. Pigmentary, trophic, secretory
B. Endocrine and exocrine
C. Alveolar, tubular and tubular alveolar
D. Merocrine, apocrine and holocrine
E. Serous, mucous, mixed

98. Type of secretion in which the complete destruction of the glandular cell does occur:

A. Merocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Holocrine

99. Type of secretion in which there is no destruction of the cellular membrane of the glandular cell:

A. Holocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Merocrine

100. Type of secretion in which the destruction of the apical pole of the glandular cell is observed:

A. Merocrine
B. Holocrine
C. Alveolar
D. Mixed
E. Apocrine

101. Type of secretion from pancreatic acinar cells is:

A. Holocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Merocrine

102. Type of secretion in which secretory product is released in the apical portion of the cell, surrounded by a thin layer of cytoplasm within an envelope of plasma membrane is:

A. Merocrine
B. Holocrine
C. Alveolar
D. Mixed
E. Apocrine

103. This mechanism of secretion that is found in the lactating mammary gland, where it is responsible for releasing large lipid droplets into the milk

A. Merocrine
B. Holocrine
C. Alveolar
D. Mixed
E. Apocrine

104. Type of secretion in which secretory product accumulates within the maturing cell, which simultaneously undergoes destruction orchestrated by programmed cell death pathway is:

A. Merocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Holocrine

105. Type of secretion that is found in sebaceous glands of skin is:

A. Merocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Holocrine

106. Type of secretion that is found in tarsal (Meibomian) glands of the eyelid is:

A. Merocrine
B. Alveolar
C. Apocrine

D. Mixed
E. Holocrine

107. Type of secretion in which secretory products and cell debris are discharged into the lumen of the gland is:
A. Merocrine
B. Alveolar
C. Apocrine
D. Mixed
E. Holocrine

108. In which type of multicellular glands the secretory cells are arranged in straight tubule; the duct is short and unbranched or absent
A. Simple coiled tubular
B. Simple branched tubular
C. Simple acinar
D. Simple branched acinar
E. Simple tubular

109. In which type of multicellular glands the secretory portion is formed by coiled tubule and the duct is unbranched
A. Simple tubular
B. Simple branched tubular
C. Simple acinar
D. Simple branched acinar
E. Simple coiled tubular

110. In which type of multicellular glands secretory cells are arranged in two or more branching tubules; the duct is short and unbranched or absent
A. Simple tubular
B. Simple coiled tubular
C. Simple acinar
D. Simple branched acinar
E. Simple branched tubular

111. What type of multicellular glands has both mucous branched tubular and serous branched acinar secretory units; they have acinar end-caps (demilunes)?
A. Compound tubular
B. Compound acinar

C. Simple branched tubular
D. Simple branched acinar
E. Compound tubuloacinar

112. What type of multicellular glands can have both mucous branched tubular and serous branched acinar secretory units?
A. Compound tubular
B. Compound acinar
C. Simple branched tubular
D. Simple branched acinar
E. Compound tubuloacinar

113. In which type of multicellular glands the secretory portions are formed by secretory cells arranged in branched acini, the duct is branched and relatively long?
A. Compound tubular
B. Compound tubuloacinar
C. Simple branched tubular
D. Simple branched acinar
E. Compound acinar

114. In which type of multicellular glands the secretory portions are formed by secretory cells arranged in branched tubules; the duct is branched and relatively long
A. Compound acinar
B. Compound tubuloacinar
C. Simple branched tubular
D. Simple branched acinar
E. Compound tubular

115. In which type of multicellular glands the secretory portion is formed by secretory cells arranged in branched acini; the duct is short and unbranched
A. Compound tubular
B. Compound acinar
C. Compound tubuloacinar
D. Simple branched tubular
E. Simple branched acinar

116. In which type of multicellular glands the the secretory portion is formed by secretory cells arranged in an unbranched acinus or alveolus; the duct is short and unbranched?

A. Simple tubular
B. Simple coiled tubular
C. Simple branched tubular
D. Simple branched acinar
E. Simple acinar

1.2.8. Location of glands

117. Which of the following are simple tubular glands?

A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Exocrine part of the pancreas
D. Sublingual and submandibular salivary glands
E. Glands of mucosa of large intestine

118. Which of the following are simple coiled tubular glands?

A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Exocrine part of the pancreas
D. Sublingual and submandibular salivary glands
E. Sweat glands in the human skin

119. Which of the following are simple branched tubular glands?

A. Sebaceous glands in the human skin
B. Sweat glands in the human skin
C. Exocrine part of the pancreas
D. Sublingual and submandibular salivary glands
E. Glands of the fundal part of the stomach

120. Which of the following are simple branched acinar glands?

A. Glands of the fundal part of the stomach
B. Sweat glands in the human skin
C. Exocrine part of the pancreas
D. Sublingual and submandibular salivary glands
E. Sebaceous glands in the human skin

121. Which of the following are compound acinar glands?
A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Sweat glands in the human skin
D. Sublingual and submandibular salivary glands
E. Exocrine part of the pancreas

122. Which of the following are compound tubuloacinar glands?
A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Sweat glands in the human skin
D. Exocrine part of the pancreas
E. Sublingual and submandibular salivary glands

123. Which of the following are compound glands?
A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Sweat glands in the human skin
D. Glands of mucosa of large intestine
E. Sublingual and submandibular salivary glands

124. Which of the following are compound glands?
A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Sweat glands in the human skin
D. Glands of mucosa of large intestine
E. Exocrine part of the pancreas

125. Which of the following are NOT compound glands?
A. Duodenal mucous glands (Brunner glands)
B. Exocrine part of the pancreas
C. Sublingual salivary glands
D. Submandibular salivary glands
E. Sebaceous glands in the human skin

126. Which of the following are simple glands?
A. Duodenal mucous glands (Brunner glands)
B. Sublingual salivary glands
C. Submandibular salivary glands

D. Exocrine part of the pancreas
E. Sebaceous glands in the human skin

127. Which of the following are NOT simple glands?
A. Glands of the fundal part of the stomach
B. Sebaceous glands in the human skin
C. Sweat glands in the human skin
D. Glands of mucosa of large intestine
E. Exocrine part of the pancreas

CHAPTER 2
CONNECTIVE TISSUE

2.1. Blood

2.1.1. The properties of plasma

128. The liquid extracellular material that imparts fluid properties to blood.
A. Lymph
B. Interstitial fluid
C. Hematocrit
D. Formed Elements of the Blood
E. Plasma

129. The relative volume of plasma in whole blood sample.
A. 92%
B. 45%
C. 8%
D. 1%
E. 55%

130. The relative volume of cells in whole blood sample.
A. 92%
B. 55%
C. 8%
D. 1%
E. 45%

131. What is NOT the function of blood?
A. Delivery of nutrients and oxygen to cells
B. Transport of wastes and carbon dioxide away from cells
C. Delivery of hormones and other regulatory substances to and from cells and tissues
D. Maintenance of homeostasis
E. Formation of the walls of blood vessels

132. What does the term "hematocrit" mean?

A. A fluid connective tissue that circulate through the cardiovascular system
B. Plasma that lacks coagulation factors
C. The coagulation factors of blood plasma
D. The fluid that surrounds tissue cells and has similar electrolyte composition as blood plasma
E. The volume of packed erythrocytes in a sample of blood

133. What is the term for volume of packed erythrocytes in a sample of blood?

A. Serum
B. Interstitial fluid
C. Plasma
D. Formed Elements of the Blood
E. Hematocrit

134. What is the most abundant component of blood?

A. Erythrocytes
B. Leukocytes
C. Platelets
D. Coagulation factors
E. Plasma

135. What is the average pH level of blood?

A. 2.0
B. 5–6
C. 4.5–5.5
D. 11–12
E. 7.35–7.45

136. The fraction of body weight that corresponds to total blood volume.

A. 1%
B. 45%
C. 55%
D. 92%
E. 8%

137. What is the most abundant component of blood plasma?
A. Proteins
B. Electrolytes
C. Cells
D. Vitamins
E. Water

138. What does the term "serum" mean?
A. A fluid connective tissue that circulate through the cardiovascular system
B. The volume of packed erythrocytes in a sample of blood
C. The coagulation factors of blood plasma
D. The fluid that surrounds tissue cells and has similar electrolyte composition as blood plasma
E. Plasma that lacks coagulation factors

139. What does the term "interstitial fluid" mean?
A. A fluid connective tissue that circulate through the cardiovascular system
B. The volume of packed erythrocytes in a sample of blood
C. Plasma that lacks coagulation factors
D. The coagulation factors of blood plasma
E. The fluid that surrounds tissue cells and has similar electrolyte composition as blood plasma

140. How the plasma without coagulation factors is called?
A. Interstitial fluid
B. Formed elements of blood
C. Hematocrit
D. Lymph
E. Serum

141. How the fluid that surrounds tissue cells and has similar electrolyte composition as blood plasma is called?
A. Formed elements of blood
B. Serum
C. Hematocrit
D. Lymph
E. Interstitial fluid

142. What is NOT the component of blood plasma?
A. Water
B. Albumin
C. Electrolytes
D. Fibrinogen
E. Cells

143. What, from the list below, is the component of blood plasma?
A. Water
B. Proteins
C. Electrolytes
D. None of the answers
E. All of the above

144. What is the most abundant protein of blood plasma?
A. Immunoglobulins
B. Nonimmune globulins
C. Fibrinogen
D. Collagen
E. Albumin

145. What is the function of plasma protein albumin?
A. The humoral immune response
B. Transport of the iron
C. Transport of the copper
D. Involved in the formation of blood clot
E. Exerting the concentration gradient between blood and extracellular tissue fluid

146. What is the function of plasma protein fibrinogen?
A. Exerting the concentration gradient between blood and extracellular tissue fluid
B. The humoral immune response
C. Transport of the iron
D. Transport of the copper
E. Involved in the formation of blood clot

147. What is the function of plasma proteins immunoglobulins?
A. Exerting the concentration gradient between blood and extracellular tissue fluid
B. Transport of the iron
C. Transport of the copper
D. Involved in the formation of blood clot
E. The humoral immune response

148. A major plasma protein that maintains the blood osmotic pressure.
A. Immunoglobulin
B. Fibrinogen
C. Fibrin
D. Hemoglobin
E. Albumin

149. Plasma protein that is involved in transportation of iron and copper.
A. Immunoglobulins
B. Albumin
C. Fibrinogen
D. Hemoglobin
E. Nonimmune globulins

150. Plasma protein that is involved in humoral immune response.
A. Albumin
B. Fibrinogen
C. Nonimmune globulins
D. Hemoglobin
E. Immunoglobulins

151. What is the most abundant electrolyte in blood plasma?
A. Calcium
B. Magnesium
C. Potassium
D. Copper
E. Sodium

152. Plasma protein that involved in blood coagulation.
A. Immunoglobulins
B. Albumin
C. Nonimmune globulins

D. Hemoglobin
E. Fibrinogen

153. What is the function of nonimmune globulins of blood plasma?
A. Maintaining the osmotic pressure within the vascular system
B. Transport of the hemoglobin
C. Transport of the iron
D. Transport of the copper
E. All of the above

2.1.2. Erythrocytes (red blood cells, RBC)

154. What is the name of red blood cells?
A. Leukocytes
B. Thrombocytes
C. Platelets
D. Granulocytes
E. Erythrocytes

155. Which blood cells do not have nuclei?
A. Leukocytes
B. Lymphocytes
C. Granulocytes
D. Agranulocytes
E. Erythrocytes

156. What is the shape of normal human erythrocyte?
A. Spheric
B. Oval
C. Bilobed
D. Multilobed
E. Biconcave disc

157. What is the location of nuclei within the erythrocytes?
A. In the middle of the cell
B. At the periphery of the cell
C. Near the plasma membrane
D. None of them
E. There are no nuclei in erythrocytes

158. What is the average diameter of normal human erythrocyte?
A. 5 μm
B. 10 μm
C. 12.5 μm
D. 15 μm
E. 7.5 μm

159. The average life span of erythrocytes.
A. 12 days
B. 12 weeks
C. 120 weeks
D. 12 years
E. 120 days

160. Which blood cells have red colour?
A. Leukocytes
B. Lymphocytes
C. Granulocytes
D. Agranulocytes
E. Erythrocytes

161. The major protein of erythrocyte cytoplasm.
A. Immunoglobulins
B. Albumin
C. Fibrinogen
D. Nonimmune globulins
E. Hemoglobin

162. What is the average normal red blood cell count?
A. 4.8–5.4 thousand/μl ($\times 10^6$/L)
B. 130,000–360,000/μl ($\times 10^3$/L)
C. 130–360 million/μl ($\times 10^{12}$/L)
D. 4,000–11,000/μl ($\times 10^9$/L)
E. 4.8–5.4 million/μl ($\times 10^{12}$/L)

163. What is the main function of erythrocytes?
A. Transport of nutrients
B. Transport of wastes
C. Transport of hormones
D. Transport of electrolytes
E. Transport of gases

164. Which blood cells are anucleated?
A. Leukocytes
B. Lymphocytes
C. Granulocytes
D. Agranulocytes
E. Erythrocytes

2.1.3. Hemoglobin molecule structure and function

165. What is the function of hemoglobin?
A. Transport of nutrients
B. Transport of wastes
C. Transport of hormones
D. Transport of electrolytes
E. Transport of gases

166. Which part of hemoglobin bears an atom of iron?
A. Alpha-chain of globin
B. Beta-chain of globin
C. Alpha-chain and beta-chain of globin
D. All of them
E. Heme pigment

167. How many heme groups does one hemoglobin molecule contain?
A. 2
B. 10
C. 120
D. None of them
E. 4

168. What is the name for hemoglobin with oxygen molecules connected to it?
A. Carbaminohemoglobin
B. Carboxyhemoglobin
C. Deoxyhemoglobin
D. None of them
E. Oxyhemoglobin

169. The part of hemoglobin to which oxygen molecule bind?
A. Alpha -chain of globin
B. Beta-chain of globin
C. Alpha -chain and beta-chain of globin
D. All of them
E. Atom of iron

170. What is the name of the hemoglobin without oxygen molecules connected to it?
A. Carbaminohemoglobin
B. Carboxyhemoglobin
C. Oxyhemoglobin
D. None of them
E. Deoxyhemoglobin

171. The part of hemoglobin to which binds carbon dioxide?
A. Atom of iron
B. Heme pigment
C. None of them
D. All of them
E. Globin

172. What is the name of the hemoglobin with carbon dioxide molecules connected to it?
A. Carboxyhemoglobin
B. Oxyhemoglobin
C. Deoxyhemoglobin
D. None of them
E. Carbaminohemoglobin

173. How many atoms of iron does one hemoglobin molecule contain?
A. 2
B. 10
C. 120
D. None of them
E. 4

174. How many of oxygen molecules can one hemoglobin molecule bind?

A. 2
B. 10
C. 120
D. None of them
E. 4

175. The part of hemoglobin to which carbon monoxide bind?

A. Alpha-chain of globin
B. Beta-chain of globin
C. Alpha-chain and beta-chain of globin
D. All of the answers
E. Heme group

176. What is the possible cause of the decrease in renal blood oxygen level?

A. Reduced numbers of red blood cells
B. Reduced availability of oxygen to the blood
C. Increased demands for oxygen
D. None of the answers
E. A, B, C

177. Which gas is very dangerous for human because it competes with oxygen for hem binding with a much higher affinity?

A. CO_2
B. N_2
C. NH_3
D. All of the answers
E. CO

178. What is the name of the condition in which blood has an abnormally low oxygen-carrying capacity?

A. Polycythemia
B. Spherocytosis
C. Elliptocytosis
D. None of them
E. Anemia

2.1.4. Erythrocyte abnormalities

179. What is the name for the condition in which there is an abnormal excess of erythrocytes that increases the viscosity of the blood?

A. Anemia
B. Spherocytosis
C. Elliptocytosis
D. None
E. Polycythemia

180. What is the cause of anemia?

A. An insufficient number of red blood cells
B. Decreased hemoglobin content
C. Abnormal hemoglobin
D. None of them
E. All of the above

181. What is the cause of polycythemia?

A. An insufficient number of red blood cells
B. Decreased hemoglobin content
C. Abnormal hemoglobin
D. All of the above
E. Bone marrow cancer

182. What is the name for genetic condition in which abnormal hemoglobin is produced?

A. Polycythemia
B. Spherocytosis
C. Elliptocytosis
D. Myelofibrosis
E. Sickle-cell anemi

183. What is the name of the genetic condition in which the defected cytoskeleton of erythrocytes is formed?

A. Polycythemia
B. Sickle-cell anemia
C. Anemia
D. Myelofibrosis
E. Spherocytosis

184. What is the cause of the presence of elliptocytes in the blood?
A. Elliptocytosis
B. Iron deficiency anemia
C. Megaloblastic anemia
D. Sickle-cell anemia
E. All of the above

185. What is the name of the genetic condition in which the abnormal hemoglobin is produced?
A. Polycythemia
B. Spherocytosis
C. Elliptocytosis
D. Myelofibrosis
E. Thalassemia

186. What is the cause of polycythemia?
A. An insufficient number of red blood cells
B. Decreased hemoglobin content
C. Abnormal hemoglobin
D. All of the above
E. A response to reduced availability of oxygen as at high altitudes

2.1.5. Blood groups

187. Which donor-recipient combination is NOT allowed for blood transfusion?
A. Donor – type O, recipient – type AB
B. Donor – type O, recipient – type B
C. Donor – type B, recipient – type AB
D. Donor – O, recipient – type A
E. Donor – type AB, recipient – type B

188. Which donor-recipient combination is NOT allowed for blood transfusion?
A. Donor – type O, recipient – type A
B. Donor – type O, recipient – type B
C. Donor – type O, recipient – type AB
D. Donor – type A, recipient – type AB
E. Donor – type A, recipient – type B

189. Which donor-recipient combination is NOT allowed for blood transfusion?

A. Donor – type AB, recipient – type AB
B. Donor – type A, recipient – type AB
C. Donor – type B, recipient – type AB
D. Donor – type O, recipient – type AB
E. Donor – type AB, recipient – type O

190. Which donor-recipient combination is NOT allowed for blood transfusion?

A. Donor – type A, recipient – type AB
B. Donor – type B, recipient – type AB
C. Donor – type O, recipient – type A
D. Donor – type AB, recipient – type AB
E. Donor – type AB, recipient – type A

191. In which case Rhesus-incompatibility may happen?

A. Mother – rhesus(-), father – rhesus(+)
B. Mother – rhesus(+), child – rhesus(-)
C. Mother – rhesus(+), father – rhesus(-)
D. Father – rhesus(-), child – rhesus(+)
E. Mother – rhesus(-), child – rhesus(+)

192. Which of agglutinogens on the erythrocytes surface persons with blood type O have?

A. A
B. B
C. A and B
D. Rhesus
E. None

193. Which agglutinogen on the erythrocytes surface do people with blood type A have?

A. B
B. A and B
C. None
D. Rhesus
E. A

194. Which agglutinogen on the erythrocytes surface do people with blood type B have?

A. A
B. A and B
C. None
D. Rhesus
E. B

195. What agglutinogen on the erythrocytes surface do people with blood type AB have?

A. A
B. B
C. None
D. Rhesus
E. A and B

196. Which agglutinin in the blood plasma do people with blood type O have?

A. "a"
B. "b"
C. None
D. Rhesus
E. "a" and "b"

197. Which agglutinin in blood plasma do people with blood type A have?

A. "a"
B. "a" and "b"
C. None
D. Rhesus
E. "b"

198. Which agglutinin in the blood plasma do people with blood type B have?

A. "b"
B. "a" and "b"
C. None
D. Rhesus
E. "a"

199. Which agglutinin in the blood plasma do people with blood type AB have?

A. "a"
B. "b"
C. "a" and "b"
D. Rhesus
E. None

200. Which people are called universal donors?

A. With blood type A
B. With blood type B
C. With blood type AB
D. None of them
E. With blood type O

201. Which people are called universal recipient?

A. With blood type O
B. With blood type A
C. With blood type B
D. None of them
E. With blood type AB

202. Which people have a blood type that potentially can be successfully transferred to anybody?

A. With blood type O (+)
B. With blood type AB (-)
C. With blood type AB (+)
D. With blood type A (+)
E. With blood type O(-)

2.1.6. General characteristics of leukocytes

203. What is the name for white blood cells?

A. Erythrocytes
B. Thrombocytes
C. Platelets
D. Reticulocytes
E. Leukocytes

204. Why leukocytic cells are called white blood cells?
A. Not stained with hematoxylin
B. Not stained with eosin
C. Not stained with hematoxylin and eosin
D. None of them
E. Without color in blood

205. Which type of leukocytes of the blood is agranulocyte?
A. Basophil
B. Eosinophil
C. Mast cell
D. Neutrophils
E. Lymphocyte

206. What type of leukocytes of the blood is agranulocyte?
A. Basophil
B. Eosinophil
C. Mast cell
D. Neutrophils
E. Monocytes

207. Which type of leukocytes of the blood is granulocyte?
A. Macrophage
B. Lymphocyte
C. Fibrocyte
D. Monocyte
E. Basophil

208. Which type of leukocytes of the blood is granulocyte?
A. Macrophage
B. Lymphocyte
C. Fibrocyte
D. Monocytes
E. Eosinophil

209. Which type of leukocytes of the blood is granulocyte?
A. Macrophage
B. Mast cell
C. Lymphocytes
D. Monocytes
E. Neutrophil

2.1.7. General structure of leukocytes

210. Which type of organelles does NOT contain lymphocytes?
A. Apparatus Golgi
B. Rough endoplasmic reticulum
C. Smooth endoplasmic reticulum
D. Azurophilic granules
E. Specific granules

211. Which type of organelles does NOT contain agranulocytes?
A. Mitochondrion
B. Rough endoplasmic reticulum
C. Smooth endoplasmic reticulum
D. Azurophilic granules
E. Specific granules

212. Which type of leukocytes contains segmented nucleus?
A. Lymphocyte
B. Monocyte
C. Macrophage
D. Fibrocyte
E. Basophil

213. Which type of leukocytes contains segmented nucleus?
A. Lymphocyte
B. Adipocyte
C. Macrophage
D. Fibrocyte
E. Eosinophil

214. Which type of leukocytes contain segmented nucleus?
A. Lymphocyte
B. Monocyte
C. Macrophage
D. Fibrocyte
E. Neutrophil

215. Which type of leukocytes does NOT contain segmented nucleus?
A. Basophil
B. Eosinophil

C. Neutrophil
D. Fibrocyte
E. Monocyte

216. Which type of leukocytes does NOT contain segmented nucleus?
A. Basophil
B. Eosinophil
C. Adipocyte
D. Neutrophil
E. Lymphocyte

217. Which type of leukocytes contains U-shaped, bean-shaped or irregular indented-nucleus?
A. Eosinophil
B. Basophil
C. Neutrophil
D. Lymphocyte
E. Monocyte

2.1.8. Functions of leukocytes

218. Which type of leukocytes is phagocyte?
A. Basophil
B. Lymphocyte
C. Adipocyte
D. Fibrocyte
E. Monocyte

219. Which type of leukocytes is antigen presenting cells?
A. Basophil
B. Eosinophil
C. Adipocyte
D. Neutrophil
E. Monocyte

220. What is the life span of the monocytes of healthy person?
A. Several years
B. Several days
C. One month
D. One year
E. Several month

221. What is the life span of neutrophils in normal condition (healthy person)?

A. One hour
B. One month
C. Several month
D. One year
E. Several days

222. What is the life span of the basophils in normal condition (healthy person)?

A. Several years
B. One month
C. Several month
D. One year
E. Several days

223. What is the life span of the lymphocytes?

A. Several days
B. One month
C. Several hours
D. One year
E. From several hours to several years

224. What is the life span of the eosinophils in normal condition (healthy person)?

A. One hour
B. One month
C. Several month
D. One year
E. Several days

225. Which type of leukocytes is associated with parasitic infection?

A. Basophil
B. Neutrophil
C. Monocyte
D. Lymphocyte
E. Eosinophil

226. Which type of leukocytes is phagocyte?

A. Basophil
B. Fibocyte

C. Adipocyte
D. Lymphocyte
E. Neutrophil

227. Which type of leukocytes plays important role in allergic reactions?
A. Adipocyte
B. Neutrophil
C. Monocyte
D. Lymphocyte
E. Basophil

228. Which type of leukocytes produces antibodies?
A. Eosinophil
B. Basophil
C. Neutrophil
D. Monocyte
E. Lymphocyte

229. Which type of leukocytes first appears in zone of bacterial infections and phagocytes bacteria?
A. Eosinophil
B. Basophil
C. Adipocyte
D. Lymphocyte
E. Neutrophils

230. Which type of leukocytes is able to migrate from the blood to the tissue and return into the blood?
A. Eosinophil
B. Basophil
C. Neutrophil
D. Monocyte
E. Lymphocyte

231. What does the term diapedesis mean?
A. Synthesis of antibody
B. Exocytosis
C. Phagocytosis
D. None of them
E. Slip out of the capillary (extravasation)

232. Which type of leukocytes contains drumstick Barr-body?
A. Eosinophil
B. Basophil
C. Monocyte
D. Lymphocyte
E. Neutrophil

233. What does the term chemotaxis mean?
A. Synthesis of antibody
B. Exocytosis
C. Slip out of the capillary (extravasation)
D. Phagocytosis
E. Migration toward zone of inflammation

2.1.9. Count of leukocytes in blood

234. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical. Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's complete blood count after screening examination. How many leukocytes are in 1 L of blood?
A. $4\text{-}11\times10^{3}$
B. $4\text{-}11\times10^{6}$
C. $4\text{-}11\times10^{12}$
D. $4\text{-}11\times10^{15}$
E. $4\text{-}11\times10^{9}$

235. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical. Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's differential count after screening examination. How many monocytes are in the blood (in %) of healthy person?
A. 15
B. 50
C. 90
D. 100
E. 5

236. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical. Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's differential count after screening examination. How many of neutrophils are in blood (in %) of the healthy person?

A. 1
B. 10
C. 90
D. 100
E. 50

237. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical. Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's differential count after screening examination. How many basophils are in the blood (in %) of healthy person?

A. 10
B. 50
C. 90
D. 100
E. 0.5

238. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical. Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's differential count after screening examination. How many of lymphocytes are in blood (in %) of the healthy person?

A. 1
B. 10
C. 90
D. 100
E. 30

239. Workers handling hazardous consumer products (petroil, pesticides etc.) can be experience in some levels of toxic chemical.

Medical evaluation for employees is required of medical program. A doctor analizes the result of patient's differential count after screening examination. How many eosinophils are in blood (in %) of healthy person?

A. 10
B. 50
C. 90
D. 100
E. 5

2.1.10. Abnormality of leukocytes and leukocytes organelles

240. What does the term leukocytosis mean?
A. Decreased count of leukocytes in blood
B. Increased count of neutrophils in blood
C. Decreased count of neutrophils in blood
D. Increased count of lymphocytes in blood
E. Increased count of leukocytes in blood

241. Which does the term leukopenia mean?
A. Increased count of leukocytes in blood
B. Increased count of neutrophils in blood
C. Decreased count of neutrophils in blood
D. Increased count of lymphocytes in blood
E. Decreased count of leukocytes in blood

242. Which is the major side effect of chemotherapy on blood?
A. Leukocytosis
B. Lymphocytosis
C. Neutrocytosis
D. Thrombocytosis
E. Leukopenia

243. Which type of organelles of eosinophils contains crystalloid body?
A. Apparatus Golgi
B. Rough endoplasmic reticulum
C. Smooth endoplasmic reticulum

D. Azurophilic granules
E. Specific granules

244. Which type of leukocytes does NOT contain specific granules?
A. Basophil
B. Eosinophil
C. Neutrophil
D. None of them
E. Lymphocyte

245. Which type of neutrophilic granules is primary?
A. Specific
B. Liposomes
C. Tertiary
D. None of them
E. Azurophilic

246. Which type of leukocytes does NOT contain azurophilic granules?
A. Basophil
B. Eosinophil
C. Neutrophil
D. Monocyte
E. None of them

247. Which type of leukocytes does NOT contain specific granules?
A. Basophil
B. Eosinophil
C. Neutrophil
D. None of them
E. Monocyte

248. Which type of organelles of eosinophils contains major basic protein (MBP)?
A. Mitochondria
B. Nucleus
C. Smooth endoplasmic reticulum
D. Azurophilic granules
E. Specific granules

249. Which type of neutrophilic granules is secondary?
A. Azurophilic
B. Liposomes
C. Tertiary
D. None of the answers
E. Specific

250. Which type of granules in basophils is secondary?
A. Azurophilic
B. Liposomes
C. Tertiary
D. None of the answers
E. Large basophilic-specific

251. Which type of granules in eosinophils is secondary?
A. Azurophilic
B. Liposomes
C. Tertiary
D. None of the answers
E. Large specific acidophilic

252. Which type of granules in basophils is primal?
A. Secondary basophilic
B. Liposomes
C. Tertiary
D. Large basophilic
E. Azurophilic

253. Which type of granules in eosinophils is primary?
A. Large acidophilic
B. Liposomes
C. Tertiary
D. None of them
E. Azurophilic

254. Which type of granules of neutrophils contains myeloperoxidase?
A. Secondary
B. Liposomes
C. Tertiary
D. None of them
E. Azurophilic

255. Which type of granules of eosinophils contains eosinophil myeloperoxidase?

A. Azurophilic
B. Liposomes
C. Tertiary
D. None of them
E. Specific

256. Which enzyme of azurophilic granules of neutrophils produces HOCl for killing bacteria?

A. NADPH-oxidase
B. Acid hydrolase
C. Lysozyme
D. Major basic protein
E. Meyloperoxidase

257. What enzyme of azurophilic granules of neutrophils produces H_2O_2 for killing bacteria?

A. Meyloperoxidase
B. Acid hydrolase
C. Lysozyme
D. Major basic protein
E. NADPH-oxidase

258. Which type granules of neutrophils facilitates the migration of the neutrophil through the connective tissue?

A. Azurophilic
B. Specific
C. Liposomes
D. None of the answers
E. Tertiary

259. Which component of granules of basophils causes dilation of small blood vessels?

A. Cationic protein
B. Meyloperoxidase
C. Major basic protein
D. All of the answers
E. Histamine

260. Which enzymes of granules of eosinophils effect on protozoans and helminthic parasites?

A. Cationic protein
B. Meyloperoxidase
C. Major basic protein
D. Eosinophil-derived neurotoxin
E. All of the answers

261. Which component of granules of basophils is an anticoagulant?

A. Cationic protein
B. Meyloperoxidase
C. Histamine
D. All of the answers
E. Heparin

262. Which component of granules of basophils causes dilation of small blood vessels?

A. Cationic protein
B. Meyloperoxidase
C. Major basic protein
D. All of the answers
E. Histamine

263. Which type of organelles of basophils contain histamine?

A. Mitochondria
B. Liposomes
C. Smooth endoplasmic reticulum
D. Azurophilic granules
E. Specific granules

264. What is the name of cellular fragments that found in the blood?

A. Erythrocytes
B. Leukocytes
C. Reticulocytes
D. Granulocytes
E. Platelets

265. What does term margination mean?

A. Synthesis of antibody
B. Exocytosis

C. Slip out of the capillary (extravasation)
D. Migration in zone of inflammation
E. Adhesion to endothelial cells

2.1.11. Thrombocytes (platelets)

266. What does term thrombocytopenia mean?
A. Increased count of leukocytes in blood
B. Decreased count of leukocytes in blood
C. Increased count of neutrophils in blood
D. Decreased count of neutrophils in blood
E. Decreased count of platelets in blood

267. What does the term hemostasis mean?
A. Maintaining balance
B. Maintaining of pH
C. Increased count of neutrophils in blood
D. Increased count of lymphocytes in blood
E. Stoppage of bleeding

268. Which type of the blood elements stops bleeding?
A. Neutrophils
B. Lymphocytes
C. Eosinophils
D. Monocytes
E. Thrombocytes

269. Which type of the blood elements forms primary plug?
A. Neutrophils
B. Lymphocytes
C. Eosinophils
D. Monocytes
E. Thrombocytes

270. How many platelets are normally in 1 L of blood?
A. $150–400\times10^{3}$
B. $150–400\times10^{6}$
C. $150–400\times10^{12}$
D. $150–400\times10^{15}$
E. $150–400\times10^{9}$

271. Which component of platelets contains vasoconstricting amines?
A. Cytoplasm
B. Nucleus
C. Mitochondria
D. Ribosomes
E. Granules

272. What is the size of platelets in μm?
A. 10
B. 15
C. 20
D. 25
E. 3

273. What is the shape of normal (inactivated) thrombocytes in blood?
A. Biconcave disc
B. Spherical
C. Process
D. Rhomb-shaped
E. Discoid (plate)

274. What is the shape of activated platelets?
A. Biconcave disc
B. Discoid (plate)
C. Spherical
D. Rhomb-shaped
E. Process shape

275. What is life span of platelets?
A. One day
B. One month
C. One year
D. One thousand
E. One week

276. Which component of platelets contains Ca^{2+}?
A. Cytoplasm
B. alpha-Granules
C. Mitochondria

D. Ribosomes
E. Delta Granules

277. Which component of platelets contains platelet-derived growth factor?
A. Cytoplasm
B. Nucleus
C. Mitochondria
D. Ribosomes
E. Alpha-Granules

2.1.12. Histogenesis of blood cells

278. Where do hematopoietic cells arise first?
A. Liver
B. Spleen
C. Bone marrow
D. Lung
E. Yolk-sac

279. What does the term hemopoiesis (hematopoiesis) mean?
A. Clot formation
B. Clot retraction
C. Embryo development
D. None of them
E. Blood cells development

280. The source of development of hematopoietic stem cells?
A. Endoderm
B. Ectoderm
C. Neuroectoderm (neural crest)
D. Neuroectoderm (neural tube)
E. Mesoderm

281. The second stage of hematopoiesis of embryo occurs in _____.
A. Spleen
B. Bone marrow
C. Yolk-sac
D. Lung
E. Liver

282. The third stage of hematopoiesis of embryo occurs in _____.
A. Liver
B. Bone marrow
C. Yolk sac
D. Lung
E. Spleen

283. The fourth stage of hematopoiesis of embryo occur in _____.
A. Liver
B. Spleen
C. Yolk-sac
D. Lung
E. Bone marrow

284. After birth hematopoiesis occurs in _____.
A. Liver
B. Spleen
C. Lung
D. A, B, C
E. Bone marrow

2.1.13. Stem cells, progenitor cells and precursor cell properties

285. Which type of hemopoietic cells is able for self-renewal?
A. Lymphoblast
B. Myeloblast
C. Megakaryocytoblast
D. Oxiphilic normoblast
E. Hematopoietic stem cell

286. What does monophyletic theory of hematopoiesis mean?
A. All myeloid cells arise from common myeloid progenitor cells
B. All lymphoid cells arise from common lymphoid progenitor cells
C. All myeloid cells arise from common lymphoid progenitor cells
D. All lymphoid cells arise from common myeloid progenitor cells
E. All cells arise from common stem cells

287. What is main difference between progenitor cells and stem cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low mitotic activity
D. Have low sensitivity to growth factors
E. Able for differentiation in restricted lineage

288. Which of those is specific characteristic of progenitor cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low mitotic activity
D. Have low sensitivity to growth factors
E. Able for differentiation in restricted lineages

289. Which is the characteristic of precursor cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low sensitivity to growth factors
D. Have low mitotic activity
E. Have a high mitotic activity

290. Which is NOT the characteristic of stem cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low sensitivity to growth factors
D. Have low mitotic activity
E. Lineages-restricted differentiation

291. Which is NOT characteristic of precursor cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low sensitivity to growth factors
D. Have low mitotic activity
E. All of the answers

292. Which is characteristic of precursor cells?
A. Able for self-renewal
B. Able for differentiation in all type of cells of blood
C. Have low sensitivity to growth factors
D. Have low mitotic activity
E. Have a high mitotic activity

2.1.14. Basic cytokines of hematopoiesis

293. Which cytokine activate differentiation of hematopoietic cells towards red blood cells?

A. Thrombopoietin
B. Granulocytic-Monocytic Growth Factor
C. Lymphopoietin
D. Stem cell factor
E. Erythropoietin

294. Which cytokine activate differentiation of hematopoietic cells towards granulocytes?

A. Thrombopoietin
B. Erythropoietin
C. Lymphopoietin
D. Stem cell factor
E. Granulocyte-Macrophage Growth Factor

295. Which cytokine activate differentiation of hematopoietic cells towards platelets?

A. Erythropoietin
B. Granulocyte-Macrophage Growth Factor
C. Lymphopoietin
D. Stem cell factor
E. Thrombopoietin

296. Which cytokine activate differentiation of hematopoietic cells towards monocytes?

A. Thrombopoietin
B. Erythropoietin
C. Lymphopoietin
D. Stem cell factor
E. Granulocyte-Macrophage Growth Factor

297. What cytokine activates differentiation of hematopoietic cells towards platelets?

A. Erythropoietin
B. Granulocyte-Macrophage Growth Factor
C. Lymphopoietin

D. Stem cell factor
E. Thrombopoietin

298. What cytokine activate differentiation of hematopoietic cells towards neutrophils and monocytes?

A. Thrombopoietin
B. Erythropoietin
C. Lymphopoietin
D. Stem cell factor
E. Granulocyte-Macrophage Growth Factor

299. What cytokine activate differentiation of hematopoietic cells towards granulocytes and monocytes?

A. Thrombopoietin
B. Erythropoietin
C. Lymphopoietin
D. Stem cell factor
E. Granulocyte-Macrophage Growth Factor

2.1.15. Morphology of red blood cell precursors

300. Which cells of erythropoiesis have large EUCHROMATIC nucleus with 1-2 nucleolus and MODERATE basophilic cytoplasm, cell size up to 20 μm?

A. Basophilic erythroblast
B. Polychromatophilic erythroblast
C. Orthochromatophilic erythroblast
D. Polychromatophilic erythrocytes
E. Proerythroblast

301. Which type of cells of erythropoiesis have heterochromatic nucleus and strong basophilic cytoplasm, cell size up to 16 μm?

A. Proerythroblast
B. Polychromatophilic erythroblast
C. Orthochromatophilic erythroblast
D. Polychromatophilic erythrocytes
E. Basophilic erythroblast

302. Which type of cells of erythropoiesis have coarse heterochromatin granules forming a checkerboard pattern and gray or lilac color of cytoplasm?

A. Proerythroblast
B. Basophilic erythroblast
C. Orthochromatophilic erythroblast
D. Polychromatophilic erythrocytes
E. Polychromatophilic erythroblast

303. Which cells are the first microscopically recognizable cells in erythropoiesis?

A. Promyelocytes
B. Myelocytes
C. Promonocyte
D. Basophilic erythroblast
E. Proerythroblast

304. What are the last cells of erythropoiesis that are able to mitotic dividing?

A. Proerythroblast
B. Basophilic erythroblast
C. Orthochromatophilic erythroblast
D. Polychromatophilic erythrocytes
E. Polychromatophilic erythroblast

305. What are the last cells of erythropoiesis that contain nucleus?

A. Proerythroblast
B. Basophilic erythroblast
C. Polychromatophilic erythroblast
D. Polychromatophilic erythrocytes
E. Orthochromatophilic erythroblast

2.1.16. Granulo-, mono- and lymphocytopoiesis

306. Which cells are the first to be recognized microscopically in granulocytopoiesis?

A. Proerythroblast
B. Promyelocytes
C. Myelocytes
D. Monoblast
E. Myeloblast

307. At what stage of granulocytopoiesis azurophilic granules appear?
A. Monoblast
B. Myeloblast
C. Myelocytes
D. Metamyelocytes
E. Promyelocytes

308. Which cells of granulocytopoiesis are the last able for division mitotically?
A. Proerythroblast
B. Promyelocytes
C. Myeloblast
D. Monoblast
E. Myelocytes

309. At what stage of granulocytopoiesis specific granules appears?
A. Monoblast
B. Myeloblast
C. Promyelocytes
D. Metamyelocytes
E. Myelocytes

310. What cells are the first microscopically recognizable cells in monocytopoiesis?
A. Myeloblast
B. Promyelocytes
C. Myelocytes
D. Metamyelocytes
E. Monoblast

311. Which cells of granulocytopoiesis contain indented (bean-shaped) nucleus and NOT able to divide mitotically?
A. Proerythroblast
B. Promyelocytes
C. Myelocytes
D. Myeloblast
E. Metamyelocytes

312. Which cells of granulocytopoiesis contain segmented nucleus?
A. Promyelocytes
B. Myelocytes

C. Myeloblast
D. Metamyelocytes
E. Neutrophils

313. Which type of cells of granulocytopoesis contains round nucleus and only azurophilic granules?
A. Proerythroblast
B. Myelocytes
C. Myeloblast
D. Metamyelocytes
E. Promyelocyte

314. Which type of cells of granulocytopoiesis contains around nucleus and azurophilic and specific granules, able to mitotic division?
A. Proerythroblast
B. Promyelocyte
C. Myeloblast
D. Metamyelocytes
E. Myelocytes

315. Which type of cells of granulocytopoiesis contains indented nucleus and azurophilic and specific granules, NOT able to mitotic division?
A. Proerythroblast
B. Promyelocyte
C. Myelocytes
D. Myeloblast
E. Metamyelocytes

2.1.17. Megakaryocytopoiesis

316. Which type of blast cells will give rise to platelets?
A. Proerythroblast
B. Lymphoblast
C. Myeloblast
D. Monoblast
E. Megakaryoblast

317. Which type of bone marrow cells is polyploid?
A. Proerythroblast
B. Lymphoblast

C. Megakaryoblast
D. Myeloblast
E. Megakaryocytes

318. Which type of bone marrow cells can reach size up to 140 μm?
A. Proerythroblast
B. Lymphoblast
C. Megakaryoblast
D. Myeloblast
E. Megakaryocytes

319. Which type of bone marrow cells undergoes endomitosis?
A. Proerythroblast
B. Lymphoblast
C. Myeloblast
D. Monoblast
E. Megakaryoblast

320. Which type of bone marrow cells produces platelets?
A. Proerythroblasts
B. Lymphoblasts
C. Megakaryoblasts
D. Myeloblasts
E. Megakaryocytes

321. Which type of bone marrow cells produces lymphocytes?
A. Proerythroblast
B. Megakaryoblast
C. Myeloblast
D. Megakaryocytes
E. Lymphoblast

322. Which type of tissue is supporting tissue in the red bone marrow?
A. Mucous
B. Dense regular
C. Dense irregular
D. Skeletal
E. Reticular

323. The disorder in which the number of circulating platelets i s deficient (<50,000/µl) is:

A. Polycythemia
B. Hemophilia
C. Anemia
D. Embolism
E. Thrombocytopenia

324. What is the name of disorder in which abnormal clotting of blood in an unbroken vessel takes place?

A. Polycythemia
B. Leukopenia
C. Thrombocytopenia
D. Hemophilia
E. Thrombosis

2.1.18. Hemostasis

325. What can be used as a treatment to minimize the damage caused by clots that lead to strokes?

A. ADP
B. Thromboxane A_2
C. Serotonin
D. Fibrinogen
E. Tissue plasminogen activator (TPA)

326. What substance directly causes vascular smooth muscle cells to contract, thereby reducing local blood flow at the site of injury?

A. Prothrombin activator
B. Fibrinogen
C. Gibrin
D. Ca^{2+}
E. Serotonin

327. What substance directly causes the transformation of fibrinogen into fibrin?

A. Prothrombin actovator
B. Serotonin
C. Ca^{2+}

D. Prothrombin
E. Thrombin

328. What substance directly causes the transformation of fibrin into fibrin polymer (insoluble filaments)?
A. Prothrombin activator
B. Serotonin
C. Thrombin
D. Prothrombin
E. Ca^{2+}

329. What substance directly causes the transformation of prothrombin into thrombin?
A. Serotonin
B. Ca^{2+}
C. Fibrinogen
D. Fibrin
E. Prothrombin activator

330. What substance directly causes the vascular smooth muscle cells to contract, thereby reducing local blood flow at the site of injury?
A. Prothrombin activator
B. Ca^{2+}
C. Thrombin
D. Prothrombin
E. Serotonin

331. What substance is NOT released from the platelets granules?
A. Serotonin
B. ADP
C. Thromboxane A_2
D. Platelet thromboplastic factor (PF_3)
E. Fibrin polymer

332. What substance forms a loose mesh over the initial plug?
A. Thrombin
B. Serotonin
C. Ca^{2+}
D. Plasmin
E. Fibrin

333. What is the source of the tissue plasminogen activator (TPA)?
A. This substance is dissolved in the plasma.
B. White blood cell
C. Platelets
D. Red blood cells
E. Endothelial cells

334. What substance directly causes the lysis of clot (clot dissolution)?
A. Thrombin
B. Serotonin
C. Ca^{2+}
D. Fibrin
E. Plasmin

335. What substance directly causes the transformation of plasminogen into plasmin?
A. Serotonin
B. Ca^{2+}
C. Thrombin
D. Prothrombin
E. Kallikrein

2.2. Connective tissue

2.2.1. Connective tissue classification

336. Which of the following is NOT a proper connective tissue?
A. Loose
B. Dense regular
C. Dense irregular
D. Areolar
E. Adipose

337. Which of the following is NOT a specialized connective tissue?
A. Adipose
B. Blood
C. Bone
D. Reticular
E. Dense irregular

338. Which of the following is NOT a skeletal connective tissue?
A. Hyaline cartilage
B. Bone
C. Fibrocartilage
D. All of the answers are skeletal connective tissues
E. Tendon

339. Which of the following is NOT an embryonic connective tissue?
A. Mucous
B. Wharton's jelly
C. Mesenchyme
D. All of the answers are embryonic connective tissue
E. Reticular

340. Which of the following is NOT a connective tissue?
A. Blood
B. Skeletal
C. Specialized
D. Proper
E. Epithelial

341. To which group of connective tissues does adipose tissue belong?
A. Areolar
B. Dense irregular
C. Mucous
D. Reticular
E. Specialized

342. To which group of connective tissues does reticular tissue belong?
A. Dense irregular
B. Areolar
C. Mucous
D. Loose
E. Specialized

343. To which group of connective tissues does blood belong?
A. Areolar
B. Dense regular
C. Dense irregular
D. Loose
E. Specialized

344. To which group of connective tissues does cartilage belong?
A. Areolar
B. Dense regular
C. Dense irregular
D. Loose
E. Skeletal

345. To which group of connective tissues does mucous connective tissue belong?
A. Areolar
B. Dense regular
C. Dense irregular
D. Specialized
E. Embryonic

346. To which group of connective tissues does derma of skin belong?
A. Embryonic
B. Dense regular
C. Skeletal
D. Specialized
E. Dense irregular

347. To which group of connective tissues does bone belong?
A. Embryonic
B. Dense regular
C. Dense irregular
D. Loose
E. Specialized

2.2.2. Proper connective tissue. Fibers of extracellular matrix

348. Which of the following is NOT a fiber found in connective tissue?
A. Collagen fiber
B. Elastic fiber
C. Reticular fiber
D. All of the options can be found in connective tissue
E. Purkinje fiber

349. Which type of collagen composes reticular fibers?
A. I
B. II
C. IV
D. IX
E. III

350. Which type of collagen is widely distributed in dense irregular connective tissue?
A. II
B. IV
C. VI
D. IX
E. I

351. Which type of collagen is widely distributed in dense regular connective tissue?
A. II
B. IV
C. VI
D. IX
E. I

352. Which type of collagen is the most abundant in loose connective tissue?
A. II
B. IX
C. X
D. XI
E. I

353. Which type of fibers is the most abundant in lymph node?
A. Collagen type I
B. Collagen type II
C. Collagen type X
D. Elastic
E. Reticular

354. Which type of fibers of connective tissue is not branched?
A. Elastic
B. Reticular

C. Collagen and Reticular
D. Elastic and Collagene
E. Collagen

355. Which types of fibers of connective tissue are branched?
A. Elastic
B. Collagen
C. Collagen and Reticular
D. Elastic and Collagen
E. Elastic and Reticular

356. Which type of collagen is NOT contained in the proper connective tissue?
A. I
B. II
C. I, II and III
D. None of the answers
E. II and III

357. What is the colour of reticular fibers after **hematoxylin** and **eosin** staining?
A. Red
B. Dark blue
C. Grey
D. Pink
E. None of the answers

358. Which of the following would be best suited to differentiate reticular fibers from other fibers?
A. Wright's stain
B. Hematoxylin and eosin stain
C. Sudan stain
D. Masson's trichrome stain
E. Silver-stain

2.2.3. Cells of connective tissue

359. Which connective tissue cell type shows properties of smooth muscle cells?
A. Fibroblast
B. Plasma cells

C. Mast cells
D. Histiocytes
E. Myofibroblast

360. Which cell is a connective tissue macrophage?
A. Kupffer cells
B. Langerhans cell
C. Dust cell
D. Microglia
E. Histiocytes

361. What kind of connective tissue cell is responsible for the development of allergic reaction?
A. Fibroblast
B. Myofibroblast
C. Plasma cells
D. Histiocytes
E. Mast cells

362. What kind of connective tissue cell is an antigen-presenting cell?
A. Fibroblast
B. Myofibroblast
C. Plasma cells
D. Mast cells
E. Histiocytes

363. Which connective tissue cells are able to store neutral fats (triglycerides) and produce a variety of hormones?
A. Myofibroblast
B. Plasma cells
C. Mast cells
D. Histiocytes
E. Adipocytes

364. Which one of these cells is not a cell type routinely found in loose connective tissue?
A. Fibroblast
B. Macrophage
C. Mast cell
D. Plasma cell
E. Microglia

365. What kind of connective tissue cells develops from the bone marrow and contains abundant basophilic granules?

A. Fibroblast
B. Myofibroblast
C. Plasma cells
D. Histiocytes
E. Mast cells

366. What kind of connective tissue cells responses for the repair and formation of new tissue (for example wound healing)?

A. Myofibroblast
B. Plasma cells
C. Mast cells
D. Histiocytes
E. Mesenchymal stem cells

367. Which connective tissue cell type produces the ground substance in connective tissue?

A. Adipocytes
B. Histiocyte
C. Plasma cell
D. Mast cell
E. Fibroblast

368. Which type of connective tissue cells is derived from monocytes?

A. Fibroblast
B. Myofibroblast
C. Plasma cell
D. Mast cell
E. Histiocyte

369. Which connective tissue cell is derived from B lymphocytes?

A. Fibroblast
B. Myofibroblast
C. Histiocyte
D. Mast cell
E. Plasma cell

370. Which connective tissue cell type produces collagen?

A. Adipocytes
B. Histiocyte

C. Plasma cell
D. Mast cell
E. Fibroblast

371. Which type of cells is most abundant in dense regular connective tissue?
A. Myofibroblasts
B. Plasma cells
C. Mast cells
D. All the answers are correct
E. Fibroblasts

372. Which type of connective tissue cells secret collagen type III fibers?
A. Basophils
B. Eosinophils
C. Plasma cells
D. Histiocytes
E. Reticular cells

373. Which type of connective tissue cells release mediator that increases permeability of blood vessels?
A. Fibroblast
B. Myofibroblast
C. Plasma cells
D. Adipose cells
E. Mast cells

374. Which type of cells is most abundant in dense irregular connective tissue?
A. Adipocytes
B. Plasma cells
C. Mast cells
D. All of above
E. Fibroblast

375. Which connective tissue cell type secretes histamine?
A. Fibrocytes
B. Myofibroblast
C. Plasma cells

D. All of above
E. Mast cells

376. Which type of cells is most abundant in specialized connective tissue?
A. Fibroblast
B. Plasma cells
C. Mast cells
D. Myofibroblasts
E. Adipocytes

377. Which type of cells composes stroma of specialized connective tissue?
A. Neutrophils
B. Plasma cells
C. Mast cells
D. Macrophage
E. Reticular cells

378. What is the shape of the reticular cells?
A. Cuboidal
B. Columnar
C. Oval
D. Spherical
E. Elongated with cell process

2.2.4. Connective tissue disorders

379. What is the reason of development of the ***Osteogenesis imperfecta*** disease?
A. Mutations in the gene of collagen type II
B. Mutations in the gene of collagen type III
C. Mutations in the gene of collagen type IV
D. None of the answers
E. Mutations in the gene of collagen type I

380. What is the reason of development of the ***Alport's syndrome***?
A. Mutations in the gene of collagen type I
B. Mutations in the gene of collagen type II
C. Mutations in the gene of collagen type III

D. None of the answers
E. Mutations in the gene of collagen type IV

381. What is the reason of development of the ***Infantile cortical hyperostosis***?
A. Mutations in the gene of collagen type II
B. Mutations in the gene of collagen type III
C. Mutations in the gene of collagen type IV
D. None of the answers
E. Mutations in the gene of collagen type I

382. What is the reason of development of the ***Dupuytren's contracture***?
A. Mutations in the gene of collagen type I
B. Mutations in the gene of collagen type II
C. Mutations in the gene of collagen type IV
D. None of the answers
E. Mutations in the gene of collagen type III

383. What is the reason of development of the ***Ehlers–Danlos syndrome***?
A. Mutations in the gene of collagen type I
B. Mutations in the gene of collagen type III
C. Mutations in the gene of collagen type V
D. None of the answers
E. All of the answers

384. Defect in which type of connective tissue fiber is connected with ***Marfan's syndrome***?
A. Collagen type I
B. Elastic
C. Reticular
D. Emilin
E. Fibrillin

385. What is the reason of development of the ***Schmid metaphyseal dysplasia***?
A. Mutations in the gene of collagen type I
B. Mutations in the gene of collagen type III
C. Mutations in the gene of collagen type V

D. Mutations in the gene of collagen type IX
E. Mutations in the gene of collagen type X

386. Which amino acid provides bonding of elastic fibers?
A. Cysteine
B. Proline
C. Leucine
D. Isoproline
E. Desmosine

387. Which amino acid provides bonding of elastic fibers?
A. Cysteine
B. Proline
C. Leucine
D. None of the answers
E. Isodesmosine

388. Which type of glycoprotein is substrate for the assembly of elastic fibers?
A. Collagen
B. Elastic
C. Reticular
D. Emilin
E. Fibrillin

2.2.5. Histogenesis of connective tissue

389. The source of development of white adipocytes is:
A. Hematopoietic stem cells
B. Endoderm
C. Mesenchymal skeletal myogenic progenitor cells
D. None of the answers
E. Mesenchymal perivascular stem cells

390. The source of development of brown adipocytes is:
A. Hematopoietic stem cells
B. Endoderm
C. Mesenchymal perivascular stem cells
D. Ectoderm
E. Mesenchymal skeletal myogenic progenitor cells

391. The source of development of loose connective tissue is:
A. Ectoderm
B. Endoderm
C. Neuroectoderm (neural tube).
D. All of the answers
E. Mesoderm

392. What does connective tissue develop from?
A. Mesothelium
B. Mesangial cells
C. Mesentery
D. Wharton's jelly
E. Mesenchyme

393. The source of development of dense regular connective tissue is:
A. Ectoderm
B. Endoderm
C. Neuroectoderm (neural tube)
D. All of the answers
E. Mesoderm

394. The source of development of dense irregular connective tissue is:
A. Ectoderm
B. Endoderm
C. Neuroectoderm (neural tube).
D. All of the answers
E. Mesoderm

2.2.6. Location of different types of proper connective tissue

395. Which of the following is NOT skeletal connective tissue?
A. Hyaline Cartilage
B. Bone
C. Fibrocartilage
D. All of the answers belong to skeletal connective tissue
E. Tendon

396. What is peritendineum?
A. Adipose connective tissue
B. Dense regular connective tissue
C. Loose connective tissue
D. Reticular connective tissue
E. Dense irregular connective tissue

397. What kind of tissue is the peritendineum?
A. Loose connective tissue
B. Dense regular connective tissue
C. Cartilage
D. Skeletal connective tissue
E. Dense irregular connective tissue

398. What kind of tissue is the endotendineum?
A. Dense regular connective tissue
B. Dense irregular connective tissue
C. Cartilage
D. Skeletal connective tissue
E. Loose connective tissue

399. What is the function of endotendineum?
A. It stores energy
B. It allowes the organ to resist excessive stretching and distension
C. All of the answers
D. None of the answers
E. It contains small blood vessels and nerves

2.2.7. Specific features of different types of proper connective tissue

400. Which type of proper connective tissue contains little ground substance?
A. Areolar
B. Loose
C. Cartilage
D. Blood
E. Dense irregular

401. Which type of proper connective tissue contains abundant ground substance?

A. Dense regular
B. Dense irregular
C. Tendon
D. Skeletal
E. Loose

402. Which type of proper connective tissue play central role in immune response?

A. Embryonic
B. Dense regular
C. Dense irregular
D. None of the answers
E. Loose

403. Which type of proper connective tissue contains abundant cells of different types?

A. Dense regular
B. Dense irregular
C. Adipose
D. Mucous
E. Loose

404. Which type of proper connective tissue contains collagen fibers arranged parallel to each other?

A. Loose
B. Dense irregular
C. Areolar
D. All of the above
E. Dense regular

405. Which type of proper connective tissue contains randomly arranged collagen fibers?

A. Tendon
B. Dense regular
C. Skeletal
D. All of the answers
E. Dense irregular

406. What type of tissue makes up the dermis of the skin?

A. Mucous connective tissue
B. Mesenchyme

C. Loose irregular connective tissue
D. Dense regular connective tissue
E. Dense irregular connective tissue

407. Where is loose connective tissue located?
A. In the tendon
B. In the ligament
C. In both tendon and ligament
D. None of the answers
E. Beneath the epithelia that cover the body surfaces and line the internal surfaces of the body

408. Which compound is the most abundant in dense regular connective tissue?
A. Cells
B. Elastic fibers
C. Reticular fibers
D. None of the answers
E. Collagen fibers

409. Which of the following is a component of the ground substance in connective tissue?
A. Hyaluronic acid
B. Proteoglycans
C. Glycosaminoglycans
D. Chondroitin sulfate
E. All of the answers

410. What is the main function of the dense irregular connective tissue?
A. Storage of energy
B. Medium for nutrients and metabolic wastes
C. Immune defence
D. None of the answers
E. Allows the organ to resist excessive stretching and distension

411. What is the main component of the dense regular connective tissue?
A. Immune cells
B. Adipose cells
C. Muscle cells
D. Ground substances
E. Collagen fibers

2.3. Adipose tissue

412. What is the function of brown adipose tissue?
A. Insulation
B. Hormone production
C. Source of metabolic water
D. Metabolic energy storage
E. Heat production

413. What is the shape of cells of unilocular adipose tissue?
A. Elongated with cell processes
B. Cuboidal
C. Columnar
D. Rhomb-shape
E. Spherical

414. What is the function of the reticular cells?
A. Heat production
B. Insulation
C. Source of metabolic water
D. None of the answers
E. Provide structural support and production of extracellular matrix

415. What is NOT the function of the white adipose tissue?
A. Metabolic energy storage
B. Insulation
C. Hormone production
D. Source of metabolic water
E. Heat production

416. Which type of hormone produced by adipose tissue is linked to obesity?
A. Glucagon
B. Peptide YY
C. Ghrelin
D. Insulin
E. Resistin

417. What type of adipose tissue tends to increase as humans age?
A. Brown adipose tissue
B. Multilocular adipose tissue

C. All the answers
D. None of the answers
E. White (unilocular) adipose tissue

418. Which type of hormone produced of adipose tissue is linked to type 2 diabetes?
A. Glucagon
B. Peptide YY
C. Ghrelin
D. Insulin
E. Resistin

419. What is the function of white adipose tissue?
A. Metabolic energy storage
B. Insulation
C. Hormone production
D. Source of metabolic water
E. All of the answers

420. Where is nucleus of multilocular adipose tissue cells located?
A. At the periphery of cells inside one large lipid droplet
B. Near the plasma membrane between one large lipid droplet and plasma membrane
C. Cells don't contain nucleus
D. Cells contain many nucleus scattered in cytoplasm between multiple lipid droplets
E. In an eccentric position between numerous lipid droplets

421. Which type of hormone produced by adipose tissue is linked to obesity?
A. Glucagon
B. Ghrelin
C. Peptide YY
D. Insulin
E. Leptin

422. What is the function of uncoupling protein -1 (UCP-1)?
A. Increase storage of triglycerides
B. Separate synthesis of triglycerides

C. Disrupt differentiation of adipocytes
D. None of the answers
E. Separate the oxidation of fatty acids from the production of ATP

423. What is the shape of nucleus of adipocytes of white adipose tissue?
A. Oval
B. Round
C. Rhomb-shaped
D. None of the answers
E. Flattened

424. What is the shape of nucleus of adipocytes of brown adipose tissue?
A. Flattened
B. Doughnut-shape
C. Rhomb-shaped
D. None of the answers
E. Round

425. Which type of connective tissue is related with obesity?
A. Dense regular
B. Dense irregular
C. Loose
D. Multilocular adipose tissue
E. Unilocular adipose tissue

426. Which type of connective tissue is related with obesity?
A. Dense regular connective tissue
B. Dense irregular connective tissue
C. Loose connective tissue
D. Reticular connective tissue
E. Adipose connective tissue

427. What structure provides brown color of multilocular adipose connective tissue?
A. Smooth endoplasmic reticulum
B. Rough endoplasmic reticulum
C. Golgi apparatus
D. Nucleus
E. Mitochondria

428. What type of tissue are ligaments composed of?
A. Mucous connective tissue
B. Mesenchyme
C. Loose irregular connective tissue
D. Dense irregular connective tissue
E. Dense regular connective tissue

429. What is the colour of inclusions in adipocytes of unilocular adipose connective tissue after Hematoxylin and eosin staining?
A. Red
B. Dark blue
C. Grey
D. Pink
E. None of the answers

430. Which type of adipose tissue contains numerous small blood vessels?
A. White
B. White and Brown
C. All of the answers
D. None of the answers
E. Brown

431. Which type of connective tissue can proliferate in lipoma?
A. Dense regular connective tissue
B. Dense irregular connective tissue
C. Loose connective tissue
D. Reticular connective tissue
E. Adipose connective tissue

432. What is a microscopic structure of unilocular connective tissue after Hematoxylin and eosin staining?
A. Tightly packed cuboidal cells with oval nuclei
B. Parallel arranged elongated cells between collagen fibers
C. Abundant ground substance with sparse collagen and elastic fibers and numerous different cells types
D. None of the answers
E. Delicate meshwork of polygonal profiles with flattened nucleus near the plasma membrane

2.4. Skeletal connective tissue

2.4.1. Cartilage

433. What is the most abundant part of cartilage?
A. Cells
B. Fibers
C. Ground substances
D. All of the components present in equal part
E. Intercellular water

434. How many blood vessels are in cartilage?
A. Solitary
B. Numerous
C. Plenty
D. A few
E. Blood vessels are absent

435. Which type of cartilage growth is a process of formation of new cartilage within an existing cartilage (in length)?
A. Appositional
B. Appositional and interstitial
C. Radial
D. None of the answers
E. Interstitial

436. Which type of cartilage does NOT exist?
A. Hyaline
B. Elastic
C. Fibrocartilage
D. None of the answers
E. Reticular

437. Which type of tissue is perichondrium?
A. Loose
B. Dense regular
C. Reticular
D. None of the answers
E. Dense irregular

438. Which type of cartilage growth does NOT exist?
A. Appositional
B. Interstitial
C. Appositional and interstitial
D. None of the answers
E. Radial

439. Which type of cartilage contains elastic fibers?
A. Hyaline
B. Fibrocartilage
C. Retucular
D. None of the answers
E. Elastic

440. Which type of cartilage contains large bundles of collagen fibers made up of by collagen type I?
A. Hyaline
B. Elastic
C. Reticular
D. None of the answers
E. Fibrocartilage

441. Which types of cartilage undergo calcification?
A. Hyaline and Elastic
B. Elastic and Fibrocartilage
C. Elastic and Reticular
D. Fibrocartilage and Retucular
E. Hyaline and Fibrocartilage

442. Perichondrium consists of the following layers:
A. Outer fibrous
B. Inner cellular
C. Medium Reticular
D. Outer fibrous, medium Reticular and inner cellular
E. Outer fibrous and inner cellular

443. Which type of cartilage does NOT have perichondrium?
A. Hyaline
B. Elastic
C. Reticular

D. None of the answers
E. Articular

444. Which type of cartilage does not undergo calcification?
A. Hyaline
B. Fibrocartilage
C. Retucular
D. None of the answers
E. Elastic

445. Which type of cartilage provides soft, gliding surface at articulations (synovial joints)?
A. Elastic
B. Fibrocartilage
C. Retucular
D. Areolar
E. Hyaline

446. Which type of cartilage does NOT have perichondrium?
A. Elastic
B. Hyaline
C. Reticular
D. None of the answers
E. Fibrocartilage

447. Which type of cartilage provides model for formation of new bone?
A. Elastic
B. Fibrocartilage
C. Retucular
D. Areolar
E. Hyaline

448. Which type of cartilage composes intervertebral disks?
A. Elastic
B. Hyaline
C. Retucular
D. Elastic and hyaline
E. Fibrocartilage

449. Which type of cartilage composes auricle of the external ear?
A. Hyaline
B. Fibrocartilage

C. Retucular
D. Elastic and hyaline
E. Elastic

450. Which type of cartilage composes larynx, trachea and bronchi?
A. Elastic
B. Fibrocartilage
C. Retucular
D. Elastic and fibrocartilage
E. Hyaline

451. Which type of cartilage growth is the process of formation of new cartilage at the surface of existing cartilage (in width)?
A. Interstitial
B. Appositional and interstitial
C. Radial
D. None of answers
E. Appositional

452. What is the pathogenesis of osteoarthritis?
A. Expansion of the connective tissue
B. Replacement of cartilage by bone
C. Development of fibrocartilage
D. None of the answers
E. Joint deformation and destruction of the articular cartilage

453. What does the term "isogenous group" in cartilage tissue mean?
A. It is bundle of collagen fibers
B. It is group of extracellular molecules that form hyaline cartilage
C. All the answers
D. None of the answers
E. It is group of cells that divided from one and lie in one lacuna

454. Which of the following are the cartilage cells?
A. Adipocytes
B. Osteoblasts
C. Reticulocytes
D. Myofibroblasts
E. Chondroblasts

455. Which type of cells produces extracellular matrix of cartilage?
A. Adipocytes
B. Fibroblast
C. Reticulocytes
D. None of the answers
E. Chondrocytes

456. Which type of cells are located in perichondrium?
A. Fibroblast
B. Chondroblasts
C. Pluripotent progenitor cells
D. None of the answers
E. All the answers

457. Which type of cell organelles are well developed in chondrocytes?
A. Mitochondria and lysosomes
B. Peroxisomes and lysosomes
C. Mitochondria and peroxisomes
D. All of the answers
E. Rough endoplasmic reticulum and Golgi apparatus

458. Which type of cartilage cells are NOT able to divide?
A. Fibroblasts
B. Chondroblasts
C. Chondrocytes
D. Pluripotent progenitor cells
E. None of the answers

459. Which type of cells are NOT cartilage cells?
A. Fibroblasts
B. Chondroblasts
C. Chondrocytes
D. None of the answers
E. Reticular

460. Which type of collagen molecules is specific for cartilage?
A. I
B. III
C. IV

D. VIII
E. II

461. Which type of collagen forms fibers in fibrocartilage?
A. II and III
B. III and IV
C. IV and V
D. None of the answers
E. I and II

462. Which type of collagen molecules is the most abundant in cartilage?
A. III
B. IV
C. V
D. X
E. II

463. Which type of collagen molecules is the most abundant in fibrocartilage?
A. III and IV
B. V and VI
C. IX and XI
D. X and XI
E. I and II

464. Which type of extracellular matrix molecules is the most abundant in elastic cartilage?
A. Collagen type I and elastin
B. Collagen type III and elastin
C. Collagen type IV and elastin
D. Elastin
E. Collagen type II and elastin

465. Which type of ground substances is the most abundant in fibrocartilage than in hyaline cartilage?
A. Aggrecan
B. Collagen type I
C. Collagen type II
D. Elastin
E. Versican

466. Which type of ground substances is the most abundant in hyaline cartilage than in fibrocartilage?

A. Collagen type I
B. Collagen type II
C. Versican
D. Elastin
E. Aggrecan

467. Which type of ground substances provides binding of water?

A. Collagen type I
B. Collagen type II
C. Versican
D. Elastin
E. Glycosaminoclycans (aggrecan-hyaluronan aggregates)

468. Which type of collagen is NOT specific for hyaline cartilage?

A. Collagen type II
B. Collagen type VI
C. Collagen type IX
D. Collagen type XI
E. Collagen type I

2.4.2. Bone classification and structure

469. Which of the following is compact bone?

A. Spongy bone
B. Woven bone
C. Immature bone
D. Cancellous bone
E. Dense bone

470. Which of the following is the covering of a bone?

A. Perimysium
B. Perichondrium
C. Perineurium
D. Endosteum
E. Periosteum

471. Which of the following is the cylindrical structure in compact bone, also called a Haversian system?

A. Osteoclast
B. Osteocyte
C. Osteoblast
D. Osteoid
E. Osteon

472. Which of the following is the lining of the medullary cavity of the bone?

A. Perimysium
B. Periosteum
C. Perichondrium
D. Perineurium
E. Endosteum

473. Which type of basic tissue type is the bone tissue?

A. Epithelium
B. Muscle
C. Nervous
D. None of the answers
E. Connective

474. What forms the articular surfaces of the bones?

A. Spongy bone
B. Compact bone
C. Elastic cartilage
D. Fibrocartilage
E. Hyaline cartilage

475. Which of the following is woven bone?

A. Cancellous bone
B. Compact bone
C. Dense bone
D. Spongy bone
E. Immature bone

476. Which of the following is the primary component of yellow bone marrow?

A. Hematopoietic tissue
B. Cartilage

C. Fibrous tissue
D. Bone
E. Fat

477. The spicules of spongy bone are called:
A. Canaliculi
B. Sharpey's fibers
C. Tome's process
D. Lacuna
E. Trabeculae

478. Which of the following is another term for the Haversian system?
A. Osteoclast
B. Osteocyte
C. Osteoblast
D. Osteoid
E. Osteon

479. Which of the following is nonlamellar bone?
A. Dense bone
B. Cancellous bone
C. Compact bone
D. Spongy bone
E. Woven bone

480. Which of the following describes the metaphysis?
A. it consists of two layers, essential for bone growth and repair
B. it is formed by lacunae and canaliculi
C. it lines the medullary cavity, contains osteoprogenitor cells
D. in adults, lipids are stored in it.
E. an area where the epiphysis joins the diaphysis

481. Which of the following are the small tunnels seen in bone?
A. Sharpey's fibers
B. Trabeculae
C. Tome's process
D. Lacuna
E. Canaliculi

482. In adults, lipids are stored in the
A. Endosteum
B. Metaphysis

C. Red bone marrow
D. Epiphysis
E. Yellow bone marrow

483. Which of the following is dense bone?
A. Immature bone
B. Cancellous bone
C. Woven bone
D. Spongy bone
E. Compact bone

484. Which of these statements is not true about bones?
A. Bone is a connective tissue characterized by a mineralized extracellular matrix.
B. Bone matrix contains mainly type I collagen along with other matrix (noncollagenous) proteins.
C. Bone mineralized extracellular matrix stores calcium and phosphate
D. Bone contributes to the skeleton, which supports the body, protects vital structures, provides mechanical bases for body movement, and harbours bone marrow.
E. Bone is an avascular structure

485. Which of the following provide a pathway for the diffusion of nutrients within compact bone tissue?
A. Hydroxyapatites
B. Lamellae
C. Periosteum
D. Osteoblasts
E. Canaliculi

486. Which of the following is the primary component of red bone marrow?
A. Fat
B. Cartilage
C. Fibrous tissue
D. Bone
E. Hematopoietic tissue

487. What is cancellous bone?
A. Immature bone
B. Bundle bone
C. Compact bone
D. Woven bone
E. Spongy bone

488. In osteous tissue, blood vessels and nerves are found in the
A. Canaliculi
B. Lamellae
C. Osteocytes
D. Osteoblasts
E. Haversian canals

2.4.3. Bone cells

489. Which of the following is true about osteoclasts?
A. Mature bone cells
B. The unspecialized stem cells for bone
C. Build the bone matrix
D. The precursor to bone forming cells
E. Break down the bone matrix

490. Which cell is involved in laying down new bone?
A. Osteoclast
B. Osteon
C. Osteocyte
D. Osteoid
E. Osteoblast

491. Which of the following cells is the precursor to bone forming cells?
A. Astroblasts
B. Chondroblasts
C. Hemocytoblasts
D. Osteocytes
E. Osteoprogenitor cells

492. Which cells do not originate from osteoprogenitor cells?
A. Osteoblasts
B. Osteocytes

C. Bone lining cells
D. There is no correct answer
E. Osteoclasts

493. Which of the following is a multinucleated cell?
A. Osteon
B. Osteocyte
C. Osteoblast
D. Osteoid
E. Osteoclast

494. The mature bone cell that sits in a space, called a lacuna
A. Osteoclast
B. Osteon
C. Osteoblast
D. Osteoid
E. Osteocyte

495. Which of the following is the space that an osteocyte rests in?
A. Canaliculi
B. Sharpey's fibers
C. Trabeculae
D. Tome's process
E. Lacuna

496. Which cell type is responsible for bone breakdown?
A. Chondrocyte
B. Chondroblast
C. Osteocyte
D. Bone lining cell
E. Osteoclast

497. Which of the following is an immature bone cell (the bone forming cell)?
A. Osteoclast
B. Osteon
C. Osteocyte
D. Osteoid
E. Osteoblast

498. A multinucleated cell involved in the resorption of bone tissue:
A. Osteon
B. Osteocyte
C. Osteoblast
D. Osteoid
E. Osteoclast

499. Which cell is involved in bone resorption?
A. Osteon
B. Osteocyte
C. Osteoblast
D. Osteoid
E. Osteoclast

2.4.4. Bone extracellular matrix

500. Which of the following are the mineral crystals in tooth enamel?
A. Calcite
B. Tourmaline
C. Rubellite
D. Indicolite
E. Hydroxyapatite

501. The noncollagenous proteins found in the bone matrix that are responsible for attachment of bone cells and collagen fibers to the mineralized ground substance
A. Glycosaminoglycans
B. Bone-specific, vitamin K–dependent proteins
C. Growth factors
D. Cytokines
E. Multiadhesive glycoproteins

502. The noncollagenous protein found in the bone matrix which serves as a glue between the collagen and hydroxyapatite crystals.
A. Glycosaminoglycans
B. Bone-specific, vitamin K–dependent proteins
C. Growth factors
D. Cytokines
E. Osteonectin

503. The unmineralized bone matrix is called:
A. Osteoclast
B. Osteon
C. Osteocyte
D. Osteoblast
E. Osteoid

504. The noncollagenous proteins found in the bone matrix which captures calcium from the circulation and attracts and stimulates osteoclasts in bone remodeling.
A. Osteonectin
B. Glycosaminoglycans
C. Growth factors
D. Cytokines
E. Bone-specific, vitamin K–dependent proteins

505. Sharpey's fibers are:
A. Elastic fibers
B. Reticular fibers
C. Trabeculae
D. Dense regular connective tissue
E. Collagen fibers

506. The most abundant mineral of bone is _____
A. Magnesium chloride
B. Sodium chloride
C. Calcium chloride
D. Sodium phosphate
E. Calcium phosphate (hydroxyapatite crystals)

507. The major structural component of bone matrix is _____
A. Type V collagen and, to a lesser extent, type VI collagen
B. Type IV collagen and, to a lesser extent, type VI collagen
C. Type I collagen and, to a lesser extent, type II collagen
D. Type X collagen and, to a lesser extent, type VI collagen
E. Type I collagen and, to a lesser extent, type V collagen

508. The periosteum is attached to the underlying bone through
A. Canaliculi
B. Osteocytes

C. Osteons
D. Astroblasts
E. Perforating (Sharpey's) fibres

509. The mineral crystals in bone are called:
A. Calcite
B. Tourmaline
C. Rubellite
D. Indicolite
E. Hydroxyapatite

510. Which of the following is present in the bone matrix?
A. Elastic fibers
B. Reticular fibers
C. Dense irregular connective tissue
D. Dense regular connective tissue
E. Collagen fibers

511. The noncollagenous protein found in the bone matrix which is produced exclusively by osteocytes in response to mechanical stress.
A. Osteonectin
B. Glycosaminoglycans
C. Growth factors
D. Cytokines
E. Podoplanin (E11)

512. Which cells are the precursor of osteoblasts?
A. Mesenchymal cells
B. Osteoblasts
C. Osteocytes
D. Osteoclasts
E. Osteoprogenitor cells

513. Which cells are the precursor of osteocytes?
A. Mesenchymal cells
B. Hemopoetic progenitor cells
C. Osteocytes
D. Osteoclasts
E. Osteoblasts

2.4.5. Bone development

514. The development of a bone, when a cartilage model serves as the precursor of the bone, is called …

A. Intramembranous ossification
B. Primary ossification
C. Secondary ossification
D. Calcification
E. Endochondral ossification

515. During ossification the osteoblasts are transformed into …

A. Mesenchymal cells
B. Osteoprogenitor cells
C. Osteoblasts
D. Osteoclasts
E. Osteocytes

516. Grown of bones in width is due to …

A. Secondary ossification center
B. Epiphyseal growth plate
C. Diaphyseal bone marrow
D. Epiphyseal bone marrow
E. Osteoblasts of the inner layer of periosteum

517. During ossification the osteoprogenitor cells are transformed into …

A. Mesenchymal cells
B. Osteoprogenitor cells
C. Osteocytes
D. Osteoclasts
E. Osteoblasts

518. Grown of bones in length is due to …

A. Secondary ossification center
B. Osteoblasts of the inner layer of periosteum
C. Diaphyseal bone marrow
D. Epiphyseal bone marrow
E. Epiphyseal growth plate

519. During ossification the mesenchymal cells are transformed into …

A. Mesenchymal cells
B. Osteoblasts
C. Osteocytes
D. Osteoclasts
E. Osteoprogenitor cells

520. Which zone of epiphyseal cartilage is the zone nearest to the diaphysis?

A. Zone of reserve cartilage
B. Zone of proliferation
C. Zone of hypertrophy
D. Zone of calcified cartilage
E. Zone of ossification

521. The development of a bone without a cartilage precursor called …

A. Endochondral ossification
B. Primary ossification
C. Secondary ossification
D. Calcification
E. Intramembranous ossification

522. Which zone of epiphyseal cartilage contains calcified matrix and the hypertrophied cells that begin to degenerate?

A. Zone of reserve cartilage
B. Zone of proliferation
C. Zone of hypertrophy
D. Zone of ossification
E. Zone of calcified cartilage

523. Which zone of epiphyseal cartilage contains greatly enlarged cartilage cells?

A. Zone of reserve cartilage
B. Zone of proliferation
C. Zone of calcified cartilage
D. Zone of ossification
E. Zone of hypertrophy

524. Which zone of epiphyseal cartilage contains the cartilage cells, that can divide and organize into distinct columns?

A. Zone of reserve cartilage
B. Zone of hypertrophy
C. Zone of calcified cartilage
D. Zone of ossification
E. Zone of proliferation

525. Which of the following forms the skeleton of the fetus?

A. Elastic cartilage
B. Fibrocartilage
C. Spongy bone
D. Compact bone
E. Hyaline cartilage

526. Which of the following forms the epiphyseal growth plate?

A. Elastic cartilage
B. Fibrocartilage
C. Compact bone
D. Spongy bone
E. Hyaline cartilage

527. Which zone of epiphyseal cartilage exhibits no cellular proliferation or active matrix production?

A. Zone of proliferation
B. Zone of hypertrophy
C. Zone of calcified cartilage
D. Zone of ossification
E. Zone of reserve cartilage

528. Which cells are the precursor of osteoprogenitor cells?

A. Osteoprogenitor cells
B. Osteoblasts
C. Osteocytes
D. Osteoclasts
E. Mesenchymal cells

CHAPTER 3
MUSCLE TISSUE

3.1. Muscle tissue classification, general structure and location

529. Which of the following is NOT a type of muscle tissue?
A. Skeletal
B. Cardiac
C. Smooth
D. None of the above
E. Reticular

530. Which of the following is NOT a type of striated muscle tissue?
A. Skeletal
B. Cardiac
C. None of the answers
D. All of the answers
E. Smooth

531. Which of the following is a type of striated muscle tissue?
A. Skeletal
B. Cardiac
C. Smooth
D. A and C
E. A and B

532. Which type of muscle tissue forms muscles that move eyes?
A. Striated cardiac
B. Striated visceral
C. Smooth
D. Rough
E. Striated skeletal

533. Which type of muscle tissue forms a heart muscle?
A. Striated skeletal
B. Striated visceral

C. Smooth
D. Rough
E. Striated cardiac

534. Which type of muscle tissue forms muscular layer of digestive tract?
A. Striated skeletal
B. Striated cardiac
C. Striated visceral
D. Rough
E. Smooth

535. Which type of muscle tissue forms muscular layer of respiratory tract?
A. Striated skeletal
B. Striated cardiac
C. Striated visceral
D. Rough
E. Smooth

536. Which of the following is a type of muscle tissue?
A. Skeletal
B. Cardiac
C. Smooth
D. None of the answers
E. All of the answers

537. In which type of muscle tissue do the cells exhibit transverse striations at the light microscope level?
A. Skeletal
B. Cardiac
C. Smooth
D. All of the answers
E. Only A and B

538. In which type of muscle tissue do the cells not exhibit transverse striations at the light microscope level?
A. Skeletal
B. Cardiac
C. All of the answers
D. None of the answers
E. Smooth

539. In which type of muscle tissue are the multinucleated structures present?

A. Cardiac
B. Smooth
C. All of the answers
D. None of the answers
E. Skeletal

540. Which type of muscle tissue forms muscular layer of blood vessels?

A. Striated skeletal
B. Striated cardiac
C. Striated visceral
D. Rough
E. Smooth

541. Which type of muscle tissue forms myocardium?

A. Striated skeletal
B. Striated visceral
C. Smooth
D. Rough
E. Striated cardiac

3.2. General organization of skeletal muscle

542. The whole muscle is surrounded by …

A. Endochondrium
B. Periosteum
C. Endomysium
D. Perimysium
E. Epimysium

543. Which structure is surrounded by endomysium?

A. Skeletal muscle
B. Muscle fascicle
C. All of the answers
D. None of the answers
E. Muscle fiber

544. Each skeletal muscle fiber is surrounded by …
A. Endochondrium
B. Periosteum
C. Perimysium
D. Epimysium
E. Endomysium

545. Which structure is surrounded by epimysium?
A. Muscle fascicle
B. Muscle fiber
C. All of the answers
D. None of the answers
E. Skeletal muscle

546. In which layer of connective tissue can the satellite cells be found?
A. Endochondrium
B. Periosteum
C. Perimysium
D. Epimysium
E. Endomysium

547. Which structure is surrounded by perimysium?
A. Skeletal muscle
B. Muscle fiber
C. All of the answers
D. None of the answers
E. Muscle fascicle

548. Each muscle fascicle is surrounded by …
A. Endochondrium
B. Periosteum
C. Endomysium
D. Epimysium
E. Perimysium

549. Which tissue is epimysium made of?
A. Epithelial
B. Loose connective
C. Muscle
D. Nerve
E. Dense connective

550. Which tissue is endomysium made of?
A. Epithelial
B. Muscle
C. Nerve
D. Dense connective
E. Loose connective

551. Which tissue is perimysium made of?
A. Epithelial
B. Muscle
C. Nerve
D. Dense connective
E. Loose connective

3.3. Sarcomere structure

552. Thin filaments are mainly composed of:
A. Myosin
B. Troponin
C. Tropomyosin
D. Alpha-actinin
E. Actin

553. Which protein forms thick filaments?
A. Actin
B. Troponin
C. Tropomyosin
D. Alpha-actinin
E. Myosin

554. Which protein binds Ca^{2+} ions?
A. Actin
B. Myosin
C. Tropomyosin
D. Alpha-actinin
E. Troponin

555. Which protein prevents actin–myosin interaction?
A. Actin
B. Myosin
C. Nebulin
D. Alpha-actinin
E. Tropomyosin

556. Which protein forms Z-lines?
A. Actin
B. Myosin
C. Troponin
D. Tropomyosin
E. Alpha-actinin

557. Which protein blocks myosin-binding sites on actin?
A. Actin
B. Myosin
C. Nebulin
D. Alpha-actinin
E. Tropomyosin

558. Which protein holds actin strands together in a thin filament?
A. Titin
B. Troponin
C. Tropomyosin
D. Alpha-actinin
E. Nebulin

559. Dense bodies of smooth muscle tissue are formed by…
A. Actin
B. Myosin
C. Desmin
D. Vimentin
E. Alpha-actinin

560. Which protein reaches from tips of thick filaments to the Z line?
A. Nebulin
B. Troponin
C. Tropomyosin
D. Alpha-actinin
E. Titin

561. Which protein binds tropomyosin to actin filaments?
A. Nebulin
B. Titin
C. Myosin
D. Alpha-actinin
E. Troponin

3.4. Smooth muscle

562. Which complex initiates the contraction in smooth muscle fiber?
A. Ca^{++}-Troponin
B. Ca^{++}-Tropomyosin
C. Ca^{++}-Myosin
D. Ca^{++}-Actin
E. Ca^{++}-Calmodulin

563. Which protein forms intermediate filaments of smooth muscle fibers?
A. Alpha-actinin
B. Desmin
C. Vimentin
D. Both A and C
E. Both B and C

564. Which protein forms intermediate filaments of smooth muscle fibers?
A. Actin
B. Myosin
C. All of the answers
D. None of the answers
E. Desmin

565. Which protein is associated with thin filaments in smooth muscle fibers?
A. Tropomyosin
B. Caldesmon
C. Calponin
D. None of the answers
E. All of the answers

566. Which protein is associated with contractile apparatus of smooth muscle fibers?

A. Myosin light chain kinase
B. Calmodulin
C. Alpha-actinin,
D. None of the answers
E. All of the answers

567. Which protein is NOT involved in the formation of thin filament?

A. Actin
B. Nebulin
C. Tropomyosin
D. Troponin
E. Myosin

568. Which protein forms intermediate filaments of smooth muscle fibers?

A. Actin
B. Myosin
C. All of the answers
D. None of the answers
E. Vimentin

569. Which protein is not associated with contractile apparatus of smooth muscle fibers?

A. Myosin light chain kinase
B. Calmodulin
C. Alpha-actinin
D. Myosin
E. Troponin

570. What does the term "sarcolemma" mean?

A. Subunit of the muscle fiber
B. Cytoplasm of the muscle fiber
C. Muscle fiber
D. Endoplasmic reticulum of the muscle fiber
E. Plasma membrane of the muscle fiber

571. What does the term "sarcoplasmic reticulum" mean?

A. Subunit of the muscle fiber
B. Plasma membrane of the muscle fiber

C. Cytoplasm of the muscle fiber
D. Muscle fiber
E. Endoplasmic reticulum of the muscle fiber

572. How are the stem cells in skeletal muscles named?
A. Muscle fibers
B. Syncytium
C. Endomysium
D. Epimysium
E. Satellite cells

573. What does the term "sarcoplasm" mean?
A. Subunit of the muscle fiber
B. Plasma membrane of the muscle fiber
C. Muscle fiber
D. Endooplasmic reticulum of the muscle fiber
E. Cytoplasm of the muscle fiber

574. What does the term "myofibril" mean?
A. Plasma membrane of the muscle fiber
B. Cytoplasm of the muscle fiber
C. Muscle fiber
D. Endooplasmic reticulum of the muscle fiber
E. Subunit of the muscle fiber

575. In smooth muscle tissue filaments are attached to the structures named…
A. Z discs
B. Intercalated discs
C. T tubules
D. Caveolae
E. Dense bodies

576. What does the term "sarcomer" mean?
A. Thick filaments of the muscle fiber
B. Plasma membrane of the muscle fiber
C. Cytoplasm of the muscle fiber
D. Endooplasmic reticulum of the muscle fiber
E. Contractile unit in a striated muscle fiber

577. Which of the following is the term for the plasma membrane of the muscle fiber?

A. Sarcoplasma
B. Sarcomer
C. Sarcoplasmic reticulum
D. None of the answers
E. Sarcolemma

578. Which of the following is the term for endoplasmic reticulum of the muscle fiber

A. Sarcolemma
B. Sarcoplasma
C. Sarcomer
D. None of the above
E. Sarcoplasmic reticulum

579. Which of the following is the term for the cytoplasm of the muscle fiber?

A. Sarcolemma
B. Sarcomer
C. Sarcoplasmic reticulum
D. None of the answers
E. Sarcoplasm

580. Which structure is a depot for Ca^{++} in smooth muscle cells?

A. Z discs
B. Intercalated discs
C. Dense bodies
D. Terminal cisternae
E. Caveolae

3.5. Structure of skeletal muscle fiber

581. Which of the following is the term for the contractile unit in a striated muscle fiber?

A. Sarcolemma
B. Sarcoplasma
C. Sarcoplasmic reticulum
D. None of the answers
E. Sarcomer

582. Which of the following provides the striation pattern for the striated muscle fiber?

A. Sarcolemma
B. Sarcoplasma
C. Sarcoplasmic reticulum
D. None of the answers
E. Sarcomer

583. The transverse tubules (T tubules) are the derivatives of…

A. Sarcoplasma
B. Sarcomer
C. Sarcoplasmic reticulum
D. None of the answers
E. Sarcolemma

584. The action potential is transferred inside the muscle fiber by …

A. Terminal cisternae
B. Sarcoplasm
C. Sarcoplasmic reticulum
D. Mitochondria
E. T-tubules

585. The terminal cisternae are the derivatives of …

A. Sarcolemma
B. Sarcoplasma
C. All of the answers
D. None of the answers
E. Sarcoplasmic reticulum

586. The triad of the skeletal muscle fiber consist of

A. 2 T tubules and 1 terminal cisterna
B. 1 T tubule and 1 terminal cisterna
C. 2 T tubules and 2 terminal cisternae
D. 3 sarcomers
E. 1 T tubule and 2 terminal cisternae

587. What is the name of the functional unit of muscle that tend to work together to perform a specific function and surrounded by perimysium?

A. Muscle fiber
B. Muscle fibril

C. Muscle filament
D. None of the answers
E. Muscle fascicle

588. Which of the following is true about intercalated discs?
A. Join cell membranes of adjacent cardiomyocytes
B. Enhance molecular and electrical connections
C. Are specialized contact points between cardiomyocytes
D. None of the answers
E. All of the answers

589. What is the other term for the muscle cell in striated muscles?
A. Muscle fascicle
B. Muscle fibril
C. Muscle filament
D. None of the answers
E. Muscle fiber

590. The borders of the sarcomer are defined by…
A. M-line
B. I-band
C. A-band
D. H-zone
E. Z-line

591. The center of the A-band is the…
A. I-band
B. Zone of overlapping
C. Z-line
D. H-zone
E. M-line

592. The center of the I-band is …
A. M-line
B. Zone of overlapping
C. A-band
D. H-zone
E. Z-line

593. The densest, darkest area on a light micrograph of the sarcomer is…
A. I-band
B. A-band
C. Z-line
D. H-zone
E. Zone of overlapping

594. A-band contains …
A. Actin filaments only
B. Myosin filaments only
C. Actin filaments and the overlap of actin and myosin filaments
D. None of the answers
E. Myosin filaments and the overlap of actin and myosin filaments

595. I-band contains …
A. Myosin filaments only
B. Myosin filaments and the overlap of actin and myosin filaments
C. Actin filaments and the overlap of actin and myosin filaments
D. Both actin and myosin filaments
E. Actin filaments only

596. H-band contains …
A. Actin filaments only
B. Myosin filaments and the overlap of actin and myosin filaments
C. Actin filaments and the overlap of actin and myosin filaments
D. Both actin and myosin filaments
E. Myosin filaments only

597. In which part of sarcomer are only myosin filaments present?
A. M-line
B. Zone of overlapping
C. I-band
D. Z-line
E. H-zone

598. In which part of sarcomer are only actin filaments present?
A. M-line
B. Zone of overlapping
C. A-zone
D. H-zone
E. I-band

599. In which part of sarcomer are both actin and myosin filaments present?

A. M-line
B. I-band
C. Z-line
D. H-zone
E. A-zone

3.6. Types of skeletal muscle fiber

600. Which of the following is true about fast fibers of skeletal muscle?

A. Contract very quickly
B. Contract very slowly
C. Have large diameter
D. Both B and C
E. Both A and C

601. Which of the following is true about slow fibers of skeletal muscle?

A. A) Contract very quickly
B. C) Have large diameter
C. Both A and C
D. Both B and C
E. B) Contract slowly

602. Which of the following is true about fast fibers of skeletal muscle?

A. B) Contract very slowly
B. C) Have small diameter
C. Both A and C
D. Both B and C
E. A) Contract very quickly

603. Which of the following is true about slow fibers of skeletal muscle?

A. Have high myoglobin content
B. Have low myoglobin content
C. Have small diameter
D. Both B and C
E. Both A and C

604. Which of the following is true about fast fibers of skeletal muscle?
A. B) Contain myoglobin
B. Have many mitochondria
C. Both A and C
D. Both B and C
E. A) Have large glycogen reserves

605. Which of the following is true about slow fibers of skeletal muscle?
A. Have large glycogen reserves
B. Contain myoglobin
C. Have many mitochondria
D. Both A and C
E. Both B and C

606. Which of the following is true about fast fibers of skeletal muscle?
A. Have large glycogen reserves
B. Contain myoglobin
C. Have few mitochondria
D. Both B and C
E. Both A and C

607. Which of the following is true about slow fibers of skeletal muscle?
A. A) Have large glycogen reserves
B. C) Have few mitochondria
C. Both A and C
D. Both B and C
E. B) Contain myoglobin

608. Most human muscles are formed with…
A. Fast muscle fibers
B. Slow muscle fibers
C. White muscle fibers
D. Red muscle fibers
E. Intermediate muscle fibers

609. Which of the following is true about intermediate fibers of skeletal muscle?
A. Have small diameter
B. Have large diameter
C. Have high myoglobin content

D. Contract very slowly
E. Have low myoglobin content

610. Which type of skeletal muscle fibers has the highest myoglobin content?
A. Fast muscle fibers
B. Intermediate muscle fibers
C. White muscle fibers
D. Pink muscle fibers
E. Slow muscle fibers

611. Which type of skeletal muscle fibers has the largest cross-sectional diameter?
A. Slow muscle fibers
B. Intermediate muscle fibers
C. Red muscle fibers
D. Pink muscle fibers
E. Fast muscle fibers

612. Which type of skeletal muscle fibers has the largest amount of mitochondria?
A. Fast muscle fibers
B. Intermediate muscle fibers
C. White muscle fibers
D. Pink muscle fibers
E. Slow muscle fibers

3.7. Cardiac muscle *vs* skeletal muscle

613. What is different in cardiac muscle tissue in comparison to skeletal muscle tissue?
A. B) Nuclei are at peripheral part of the fibers
B. C) Intercalated discs are absent
C. Both A and C
D. Both B and C
E. A) Nuclei are in the center of the fibers

614. Which of the following is true for cardiac muscle fibers?
A. Numerous nuclei
B. T tubules are absent
C. Triads are present
D. Sarcomeres are absent
E. Small length

615. Which of the following is NOT true for cardiac muscle fibers?
A. Small size
B. Single nucleus
C. Triads are absent
D. All of the answers
E. None of the answers

616. What is different in cardiac muscle fibers in comparison to skeletal muscle fibers?
A. A) Actin and myosin arrangement
B. C) Presence of T tubules
C. Both A and C
D. Both B and C
E. B) Number of nuclei

617. Which of the following is true for cardiac muscle fibers?
A. Large length
B. Numerous nuclei
C. Triads are present
D. Sarcomeres are absent
E. T tubules are present

618. What is the same in cardiac and skeletal muscle fibers?
A. Number of nuclei
B. Presence of triads
C. Presence of gap junctions
D. All of the answers
E. Actin and myosin arrangement

619. Which of the following is true for cardiac muscle fibers?
A. Small length
B. Single nucleus
C. T tubules are absent

D. Both A and C
E. Both A and B

620. What is typical for cardiac muscle tissue but not for skeletal muscle tissue?
A. Nuclei are in the centre of the fibers
B. Nuclei are at the peripheral part of the fibers
C. Intercalated discs are present
D. Both B and C
E. Both A and C

621. Which of the following is TRUE for cardiac muscle fibers?
A. Large length
B. Numerous nuclei
C. T tubules are absent
D. All of the answers
E. None of the answers

622. Which of the following is NOT TRUE for cardiac muscle fibers?
A. Small length
B. T tubules are present
C. Triads are absent
D. Terminal cisternae are absent
E. Numerous nuclei

623. Which of the following is TRUE for cardiac muscle fibers?
A. T tubules are present
B. Triads are present
C. Desmosomes are present
D. Both A and B
E. Both A and C

624. Which of the following is TRUE for cardiac muscle fibers?
A. Small length
B. Usually one nucleus
C. T tubules are present
D. None of the answers
E. All of the answers

625. What is typical for cardiac muscle tissue but not for skeletal muscle tissue?

A. Nuclei are in the centre of the fibers
B. Cells are fused into syncytium
C. Intercalated discs are present
D. Both A and B
E. Both A and C

626. Which of the following is NOT true for cardiac muscle fibers?

A. Large length
B. Numerous nuclei
C. Triads are absent
D. Both A and C
E. Both A and B

627. Which of the following is true for cardiac muscle fibers?

A. A) T tubules are absent
B. C) Desmosmes are absent
C. Both A and C
D. Both B and C
E. B) Triads are absent

628. Which of the following is NOT true for cardiac muscle fibers?

A. Large size
B. Numerous nuclei
C. Triads are present
D. A and B only
E. All of the answers

629. What is different in cardiac muscle fibers in comparison to skeletal muscle fibers?

A. Size of the cell
B. Number of nuclei
C. Absence of triads
D. Presence of gap junctions
E. All of the answers

630. What is typical for cardiac muscle tissue but not for skeletal muscle tissue?

A. Nuclei are at peripheral part of the fibers
B. Atypical myocytes are present

C. Intercalated discs are present
D. Both A and B
E. Both B and C

631. What does the term "automaticity "of cardiac muscle tissue mean?
A. Contraction without excitation
B. Work without contraction
C. Contraction only after neural stimulation
D. None of the answers
E. Contraction without neural stimulation

632. The fibers of smooth muscle tissue may be stimulated by…
A. Neurotransmitter
B. Hormone
C. Autorhythmic signal
D. Only A and B
E. All of the answers

633. In smooth muscle cells contraction is initiated by Ca^{++} that comes mainly from…
A. A) Rough endoplasmic reticulum
B. B) Smooth endoplasmic reticulum
C. Both A and C
D. Both B and C
E. C) Interstitial fluid

634. The smooth muscle tissue can be found in…
A. Walls of arteries
B. Walls of veins
C. Walls of hollow organs
D. Only A and B
E. All of the answers

635. Which type of filaments is present in smooth muscle fibers?
A. Thin filaments
B. Thick filaments
C. Intermediate filaments
D. Only A and B
E. All of the answers

636. Which of the following is TRUE for smooth muscle fibers?
A. Have T tubules
B. Have no scattered myosin fibers
C. Have no thin filaments attached to dense bodies
D. Have more than one nucleus located in the center of the cell
E. None of the answers

637. The smooth muscle tissue can be found in…
A. Walls of airways
B. Muscles that attach to hair follicles
C. Heart muscle
D. All of the answers
E. Only A and B

638. Which of the following is true for smooth muscle cells?
A. Have sarcomers
B. Have the striation
C. Have only actin filaments
D. Have only myosin filaments
E. Have no T tubules

639. The smooth muscle tissue can be found in…
A. Muscles that adjust pupil diameter
B. Muscles that adjust focus of the lens in the eye
C. Muscles that close the eyelids
D. All of the answers
E. Only A and B

640. Dense bodies of smooth muscle fibers have the same function as _____ in skeletal muscle fiber.
A. M-line
B. H-zone
C. I-band
D. A-band
E. Z-line

641. How many nuclei does smooth muscle cells usually have?
A. 2
B. 10
C. Hundreds
D. Thousands
E. 1

642. Which organelles are very well developed in smooth muscle cells?

A. Rough endoplasmic reticulum
B. Smooth endoplasmic reticulum
C. Mitochondria
D. A and C
E. B and C

643. Where are the nuclei of smooth muscle cells located?

A. At the periphery of the cell
B. In the I-band part of sarcomere
C. In the A-band part of sarcomere
D. There are no nuclei in smooth muscle cell
E. In the center of the cell

644. What is typical for skeletal muscle tissue but not for cardiac muscle tissue?

A. A) Nuclei are at peripheral part of the fibers
B. B) Intercalated discs are absent
C. C) Diads are present
D. Both A and C
E. Both A and B

645. What is typical for skeletal muscle tissue but not for cardiac muscle tissue?

A. A) Nuclei are in the centre of the fibers
B. C) Desmosomes are present
C. Both A and C
D. Both A and B
E. B) Intercalated discs are absent

646. What is typical for skeletal muscle fibers but not for cardiac muscle fibers?

A. Actin and myosin arrangement
B. Presence of T tubules
C. Both A and B
D. Both E and C
E. Number of nuclei

647. Which type of muscle tissue has the ability to hypertrophy?

A. Smooth
B. Skeletal
C. Cardiac
D. Only B and C
E. All of the answers

648. What is typical for skeletal muscle tissue but not for cardiac muscle tissue?

A. A) Nuclei are in the center of the fibers
B. B) Nuclei are at peripheral part of the fibers
C. C) Intercalated discs are absent
D. Both A and C
E. Both B and C

649. What is typical for skeletal muscle tissue but not for cardiac muscle tissue?

A. A) Nuclei are in the center of the fibers
B. B) Intercalated discs are present
C. Both A and B
D. Both B and C
E. C) Nuclei are at peripheral part of the fibers

650. What is the same in cardiac and skeletal muscle fibers?

A. A) Actin and myosin arrangement
B. B) Number of nuclei per cell
C. C) Presence of T tubules
D. Both B and C
E. Both A and C

651. Which organelles are very well developed in striated muscle fibers?

A. A) Rough endoplasmic reticulum
B. B) Smooth endoplasmic reticulum
C. C) Mitochondria
D. A and C
E. B and C

652. Which protein binds Ca^{++} during the contraction in smooth muscle fiber?

A. Myosin
B. Troponin
C. Tropomyosin
D. Desmin
E. Calmodulin

653. In smooth muscle fibers the Ca^{++}–calmodulin complex initiates the contraction by…

A. Exposing myosin-binding sites on actin filaments
B. Exposing actin-binding sites on myosin filaments
C. Phosphorylation of actin light chain by actin light chain kinase
D. None of the answers
E. Phosphorylation of myosin light chain by myosin light chain kinase

654. Which ion is critical for initiating of muscle contraction?

A. Na^{+}
B. K^{+}
C. Mg^{++}
D. Cl^{-}
E. Ca^{++}

655. The contraction of muscle fiber is triggered by…

A. Increase of Na^{+} ions in sarcoplasm
B. Decrease of Na^{+} ions in sarcoplasm
C. Decrease of Ca^{++} ions in sarcoplasm
D. Increase of K^{+} ions in sarcoplasm
E. Increase of Ca^{++} ions in sarcoplasm

656. Which of the following takes place during the contraction?

A. Increase of Ca^{++} concentration in sarcoplasm
B. Phosphorylation of thin filaments
C. Actin-myosin interaction
D. Both B and C
E. Both A and C

657. Which ion is released from sarcoplasmic reticulum in response of neural stimulation of sarcolemma?

A. Na^{+}
B. K^{+}
C. Mg^{++}
D. Cl^{-}
E. Ca^{++}

658. Which of the following takes place during the relaxation?

A. Increase of Ca^{++} concentration in sarcoplasm
B. Actin-myosin interaction
C. Both A and E
D. Both B and E
E. Decrease of Ca^{++} concentration in sarcoplasm

CHAPTER 4
NERVE TISSUE

4.1. Structure of neurons

659. Analysis of a histological specimen was performed in order to estimate the overall damage to neural cells. All of the following are structures that can be found exclusively in neurons, EXCEPT:

A. Tigroid
B. Neurofibrils
C. Axon
D. Dendritic spines
E. Microtubules

660. Microscopic examination of neurons was performed at a pathohistological lab. Which of the following cannot be found in a neuron's perikaryon?

A. Mitochondria
B. RER
C. Neurofibrils
D. Golgi apparatus
E. Synaptic vesicles

661. Description of neuron's morphology requires specific definition of this cell's parts. Which of the following is NOT a component of a neuron?

A. Tigroid
B. Axon hillock
C. Dendrtic spine
D. Soma
E. Myelin

662. Examination of a histological specimen of cerebral cortex revealed presence of multiple neurons enriched in Nissl substance. Nissl substance can be found at:

A. Terminal bouton
B. Initial segment

C. Myelinated nerve fibers
D. Non-myelinated nerve fibers
E. Dendrites

663. Mechanical injury of a nerve bundle resulted in the loss of ability to receive sensory inputs from the part of patient's skin. Processes that receive external stimuli are named:
A. Axons
B. Nuclei
C. Tigroids
D. Neurofibrils
E. Dendrites

664. Researcher wants to estimate the development of Nissl substance in sample neurons. This structure can be visualized with:
A. Acidic dyes
B. Hydrophobic dyes
C. Silver
D. Gold
E. Basic dyes

665. Description of neuron's morphology requires specific definition of this cell's parts. The part of the neuron that contains its nucleus is called:
A. Process
B. Axon
C. Dendrite
D. Karyon
E. Soma

666. Histological examination of spinal cord after the mechanical injury revealed decrease in amont of Nissl substance in neurons. The main function of Nissl substance is:
A. Generation of action potentials
B. Synthesis of lipids
C. Accumulation of lipofuscin
D. Storage of ions
E. Synthesis of proteins

667. Severe genetic disorder resulted in abnormal formation of neurons in human embryo. All neurons originate from:

A. Mesoderm
B. Entoderm
C. Mesenchyme
D. Trophoblast
E. Ectoderm

668. Description of neuron's morphology requires specific definition of this cell's parts. The part of the neuron that contains Golgi apparatus is called:

A. Terminal bouton
B. Synapse
C. Glia
D. Myelin
E. Perikaryon

669. Chromatophilic granules that can be found inside a neuron and tend to be intensively stained by basic dyes are called:

A. Schmidt-Lantermann clefts
B. Purkinje fibers
C. Meissner corpuscules
D. Schwann granules
E. Nissl substance

670. Influence of toxic substances often results in abnormal structure of perikarya. Perikaryon is a:

A. Part of a neuron that is responsible for the conducting of impulses to the neuron's body
B. Part of a neuron that is responsible for the conducting of impulses from the neuron's body
C. Place of contact between two neurons
D. Place of contact between a neuron and a muscle fiber
E. Part of a neuron that contains the majority of organelles

671. Histological examination of cerebellar cortex revealed numerous cells with intensively stained Nissl substance. Nissl substance is a highly developed:

A. Golgi apparatus
B. Cytoskeleton

C. Smooth endoplasmic reticulum
D. Network of mitochondria
E. Rough endoplasmic reticulum

672. Propagation of hereditary neurogenerative disorder is accompanied with changes in shape of neuronal processes. The part of the neuron that is responsible for the conduction of impulses to the neuron's body is called:
A. Soma
B. Axon
C. Perinuclear region
D. Perikaryon
E. Dendrite

673. Neuron's processes are mechanically supported by:
A. Tigroid
B. Myelin
C. Synapses
D. Spines
E. Neurofibrils

674. Immunocytochemical investigation of a tumor revealed presence of neuron-specific cytoskeletal components. Intermediate filaments of neurons consist of:
A. Keratin
B. Lamin
C. Vimentin
D. Desmin
E. Neurofilament proteins

675. Autopsy results of a 60-year-old man stated presence of structural pathologies of neurofibrils. Neurofibrils can NOT be found at:
A. Axon hillock
B. Dendrites
C. Neuron's body
D. Axon
E. Neuron's nucleus

676. Experimental application of fungal toxin resulted in neuron's inability to conduct fast retrograde transport. Fast retrograde transport is provided by:

A. Myosin
B. Protein of neurofilaments
C. Actin
D. Kinesin
E. Dynein

677. Administration of a novel neurostimulative substance resulted in a significant increase in the rate of production of neurotransmitters. Protein-based neurotransmitters are synthesized at:

A. Golgi apparatus
B. Presynaptic terminal
C. Synaptic cleft
D. Free polysomes
E. Chromatophilic substance

678. Prolongated stimulation of neuronal activity with an experimental substance resulted in increased velocity of fast anterograde transport. This type of transport is provided by:

A. Myosin
B. Protein of neurofilaments
C. Actin
D. Dynein
E. Kinesin

679. Primary culture of neurons was obtained from a brain tumor of a 33-year old patient. The cells had multiple splitted processes. The structure that is formed when an axon branches is called:

A. Synapse
B. Axon hillock
C. Node of ranvier
D. Terminal
E. Collateral

680. Investigation of generation of neuronal impulses was focused on a specific membrane protein on processes of neurons. Processes that transmit signals from the body of neuron are called:

A. Nuclei
B. Dendrites

C. Tigroids
D. Neurofibrils
E. Axons

681. Description of neuron's morphology requires specific definition of this cell's parts. The part of the neuron that is responsible for the conduction of impulses to other cells is called:
A. body
B. dendrite
C. perinuclear region
D. cytosol
E. axon

682. Severe poisoning with polluted crops resulted in thedevelopment of degenerative disorder that is manifested through the formation of neurons with truncated axons. The part of a neuron's body from which an axon originates, is called:
A. Initial segment
B. Trigger zone
C. Collateral
D. Terminal bouton
E. Axon hillock

683. Description of neuron's morphology requires specific definition of this cell's parts. The very first portion of an axon is called:
A. Trigger zone
B. Collateral
C. Axon hillock
D. Terminal bouton
E. Initial segment

684. How many axons can be found in the majority of human neurons?
A. 0
B. 2
C. 4
D. Numerous
E. 1

685. According to the modern paradigm, the neurophysiologic basis of memory is concentrated within dendritic spines. These are:

A. structures that are responsible for the mechanical support
B. places on the neuron's body, where dendrites were located previously
C. specific apical processes at terminal boutons
D. short unbranched dendrites
E. structures, whose number correlates with the number of synapses

686. Propagation of various neurogenerative disoders frequently depends on the structure of neurofibrils. Neurofibrils can be easily visualized with:

A. Hematoxylin-eosin stain
B. Osmium stain
C. Nissl stain
D. Romanowsky stain
E. Silver-based stains

4.2. Types of neurons

687. One of the main features of neurons is their ability to generate impulses. Choose a neuron that can NOT produce action potentials:

A. Pseudounipolar
B. Bipolar
C. Multipolar
D. Unipolar
E. Anaxonic

688. A 53-year-old patient was delivered to a hospital with partial loss of locomotive functions. Further examination revealed massive necrotic death of motor neurons. These cells are:

A. Anaxonic
B. Pseudounipolar
C. Bipolar
D. Unipolar
E. Multipolar

689. A patient with loss of tactile sensation was administered to a hospital. It was found that this person for a long time inhaled toxic fumes, which resulted in facilitated neuronal death. The majority of sensory neurons (in particular those located at dorsal root ganglia) are:

A. Anaxonic
B. Bipolar
C. Multipolar
D. None of them
E. Pseudounipolar

690. Regular examination of a 78-year-old patient with progressive neurodegeneration revealed absence of some somatic reflesex that depend on interneurons. Interneurons in the central nervous system are:

A. Anaxonic
B. Pseudounipolar
C. Bipolar
D. Unipolar
E. Multipolar

691. A 22-year-old patient with paraplegy was delivered to a hospital. Examination revealed neuronal loss of function. Neurons that innervate striated muscles are:

A. Anaxonic
B. Pseudounipolar
C. Bipolar
D. Unipolar
E. Multipolar

692. A 35-year old patient with a heavy head trauma was delivered to a hospital. This person had amnesia and partial loss of cognitive functions. Neurons of the cerebral cortex that are responsible for cognition, are:

A. Anaxonic
B. Pseudounipolar
C. Bipolar
D. Unipolar
E. Multipolar

693. According to the number and structure of processes, there are such types of neurons as:

A. Unipolar, bipolar
B. Motor sensory, interneurons
C. Myelinated and non-myelinated
D. Axonic and anaxonic
E. Pseudounipolar, bipolar, multipolar

694. Comparative evaluated of cellular composition of human brain was performed. Human neurons are mainly:

A. Unipolar
B. Pseudounipolar
C. Pseudobipolar
D. Bipolar
E. Multipolar

4.3. Action potential

695. Membrane potential of a neuron can be easily affected by various substances. At rest, the passive flow of ions across the plasma membrane of neurons takes place through:

A. membrane directly (diffusion)
B. gated channels'
C. ion pumps
D. untiporters
E. leak channels

696. A 43-year-old patient with a neural failure was delivered to a hospital. Subsequent examination revealed inhibition of membrane transport the resulted in charge changes at the surface of neurons. Which ion pump plays major role in the formation of resting membrane potential?

A. Na^+/H^+
B. K^+
C. Na^+
D. Ca^{2+}
E. $Na^+/K+$

697. Ion flows across cell membrane can be artificially blocked with application of various pharmaceutical substances. At rest, K^+ ions are passively transported across the neuron's membrane through:

A. voltage-gated channels
B. ion pumps
C. neuromediator-gated channels
D. antiporters
E. leak channels

698. Ion flows across cell membrane can be artificially blocked with application of various pharmaceutical substances. At rest, Na^+ ions are passively transported across the neuron's membrane through:

A. voltage-gated channels
B. ion pumps
C. neuromediator-gated channels
D. antiporters
E. leak channels

699. A 38-year-old patient with cramps was administered to a hospital. Examination revealed prior injections of a substance that resulted in change of neuron's threshold potential. What is "threshold potential"?

A. the peak potential during the propagation of action potential
B. the lowest potential that can be observed during the propagation of action potential
C. the average potential that can be
D. the lowest potential that is needed to maintain synaptic activity
E. the minimal potential that is needed to initiate the production of action potential

700. Artificial blockade of membrane ion transporter resulted in sharp change of resting potential. Which ion contributes the most to the generation of resting membrane potential?

A. Na^+
B. Cl^-
C. Ca^{2+}
D. Mg^{2+}
E. K^+

701. Artificial blockade of membrane ion transporter resulted in sharp change of resting potential. The resting membrane potential of human neurons is closest to the equilibrium potential of:

A. Na^+
B. Cl^-
C. Mg^{2+}
D. Ca^{2+}
E. K^+

702. Neurophysiological lab investigates the molecular mechanisms of generation of membrane potential. To reach their aim, researchers modify activity of different membrane transporters. At rest, neuron's plasma membrane is permeable mostly to:

A. Na^+
B. Cl^-
C. Mg^{2+}
D. $Ca2^+$
E. K^+

703. A 45-year-old patient has an abnormal neuronal burst activity as a result of food poisoning. Action potential is produced mainly due to the:

A. passive efflux of Na^+ from the cell
B. active influx of Na^+ into the cell
C. active efflux of Na^+ from the cell
D. simultaneous influx and efflux of Na^+
E. passive influx of Na^+ into the cell

704. The directivity of neural impulses (they travel along the nerves in only one direction) is mainly due to the:

A. presence of "driving force" the "pushes" impulses from the body of neuron
B. release of neurotransmitters
C. asymmetrical structure of plasma membrane
D. differential activation of ion channels and pumps
E. existence of refractory periods

705. Generation of action potential was investigated in the primary culture of neurons. Recording revealed the presense of after-potential during the propagation of normal action potential. After-potential is usually:

A. higher than resting membrane potential
B. almost equal to resting membrane potential
C. almost equal to threshold potential
D. after-potential cannot be directly compared to resting membrane potential
E. lower than resting membrane potential

706. An extract from the frog's skin blocks propagation of action potential along neuronal processes. Saltatory conduction in CNS requires:

A. depolarization of nodes of Ranvier between adjacent Schwann cells
B. continuous step-by step depolarization of the nearest portions of plasma membrane
C. depolarization of outer layers of myelin sheath
D. depolarization of inner layers of myelin sheath
E. depolarization of nodes of Ranvier between adjacent oligodendrocytes

707. A newly synthesized substance specifically blocks K+-flow. At rest, potassium ions are transported from the neuron to the outside with:

A. simple diffusion
B. active transport
C. all of them
D. symporter
E. facilitated diffusion

708. Disruption of ion homeostasis may lead to abnormal neuronal activity.Concentration of which ion is bigger inside the axon, comparing to the extracellular fluid?

A. Na^{+}
B. Cl-
C. Mg^{2+}
D. Ca^{2+}
E. K^{+}

709. A 17-year-old patient was delivered to a hospital in critical condition. It was found tha he accidentally stepped on poisonous fish, whose toxin is known to block repolarization of neurons. Membrane is repolarized after the depolarization mainly due to:

A. active influx of K^+ into the cell
B. active efflux of K^+ from the cell
C. simultaneous influx and efflux of K^+
D. passive influx of K^+ into the cell
E. passive efflux of K^+ from the cell

710. Consider the following: A – repolarization B – hyperpolarization C – depolarization.Choose the correct sequence of events that take place during the generation of action potential

A. C → B → A
B. B → C → A
C. B → A → C
D. A → C → B
E. C → A → B

711. Pharmaceutical regulation of ion conductance may affect membrane potential with different effectiveness, depending on the chosen ion. At rest, the neuron's membrane is almost impermeable to:

A. Na^+
B. Cl^-
C. Ca^{2+}
D. Mg^{2+}
E. All of them

712. Which of the following statements is INCORRECT?

A. disregarding the power of initiatory stimulus, amplitude of action potential is always the same
B. hyperpolarization develops when membrane's conductivity to potassium increases
C. the frequency of produced action potentials is limited by the neuron's refractivity inactivated (insensitive to additional stimuli)
D. production of action potentials is associated with inversion of membrane's charge
E. after short initial activation, voltage-gated K+ channels quickly become closed

713. The "All or Nothing" rule states that:
A. every neurons can be either active or inactive
B. there is a limited number of impulses that can be generated by a neuron per unit of time
C. action potentials are generated only after overcoming the threshold potential
D. every neurons needs to be stimulated to generate action potential
E. every action potential has the same amplitude disregarding the power of initial stimulus

714. The type of conduction of neuronal impulses, when only nodes of Ranvier are depolarized, is called:
A. stimulatory
B. inhibitory
C. partial
D. accelerated
E. saltatory

715. Changes in ion conductance directly affect membrane potential. Depolarization of neuron's membrane results from:
A. closure of K^+ leak channels
B. opening of K^+ voltage-gated channels
C. closure of K^+ voltage-gated channels
D. opening of Na^+ leak channels
E. opening of Na^+ voltage-gated channels

716. A newly synthesized drug affects neuronal activity through changes in value of the resting membrane potential. This potential of human neurons is about:
A. +35 mV
B. –90 mV
C. –35 mV
D. –90 mV
E. –70 mV

717. The opening of voltage-gated K+ channels during the propagation of action potential results in:
A. depolarization with subsequent hyperpolarization
B. depolarization with subsequent repolarization

C. hyperpolarization with subsequent repolarization
D. repolarization with subsequent depolarization
E. repolarization with subsequent hyperpolarization

718. During the absolute refractory period:
A. neuron's plasma membrane is at rest
B. new action potential can be produced if the stimulus is strong enough
C. neuron's plasma membrane becomes highly hyperpolarized
D. voltage-gated K^+ channels close
E. no new action potential can be produced disregarding the power of stimulus

719. In myelinated axons depolarization can be observed:
A. at every part of membrane
B. at myelin-covered part of plasmalemma
C. at plasmalemma of insulating glial cell
D. at Schmidt-Lanterman incisures
E. at nodes of Ranvier

720. During the relative refractory period:
A. neuron's plasma membrane is at rest
B. no new action potential can be produced disregarding the power of stimulus
C. neuron's plasma membrane becomes highly depolarized
D. voltage-gated K^+ channels remain closed
E. new action potential can be produced if the stimulus is strong enough

721. The maximal membrane potential that can be observed during the generation of action potential, is about:
A. about –70 mV
B. about –35 mV
C. 0 mV
D. about +55 mV
E. about +35 mV

4.4. Nerves

722. The myelin sheath speeds up the conduction of neuronal impulses through:

A. Feeding the axon
B. Providing additional sources of ions (as a depot)
C. Reducing the internal electrical resistance of an axon
D. Providing additional electrical stimulation
E. Blocking electrical currents across the plasmalemma

723. Which structure can only be seen on the cross-sections through myelinated nerves (the plane of section is perpendicular to the axis of nerve)?

A. Node of Ranvier
B. Schmidt-Lanterman cleft
C. Axon
D. Nucleus of glial cell
E. Mesaxon

724. Electrical synapses, in contrary to chemical synapses:

A. Have wider synaptic cleft
B. Require presence of neurotransmitters
C. Depend on the vesicular transport
D. Include specific receptors on the postsynaptic membrane
E. Allow bidirectional conduction of impulses

725. Postsynaptic membrane in motor end plates is represented by:

A. Plasma membrane of neuron
B. Plasma membrane of glial cell
C. Sarcolemma of smooth muscle cells
D. Sarcoplasm of striated muscle fiber
E. Sarcolemma of striated muscle fiber

726. Activation of excitatory synapses results in:

A. Repolarization of postsynaptic membrane
B. Hyperpolarization of postsynaptic membrane
C. Hyperpolarization of presynaptic membrane
D. Repolarization of presynaptic membrane
E. Depolarization of postsynaptic membrane

727. Schmidt-Lanterman clefts are needed to:
- A. Improve electrical properties of nerves
- B. Increase effectiveness of depolarization
- C. Facilitate the conduction of neural impulses
- D. Maintain ion homeostasis during the production of action potentials.
- E. Provide metabolic support to the inner parts of schwann cells

728. Synaptic vesicles in motor end plates contain mainly:
- A. Glutamate
- B. Glycine
- C. Gamma-aminobutyric acid
- D. Serotonin
- E. Acetylcholine

729. In non-myelinated nerves, Schwann cells:
- A. Are needed to compose myelin sheath
- B. Act as non-differentiated cells and can give rise to neurons in case of injuries
- C. Act as a depot for different ions
- D. Antigen presenting cell
- E. Are needed to provide metabolic support

730. Activation of inhibitory synapses results in:
- A. Depolarization of postsynaptic membrane
- B. Repolarization of postsynaptic membrane
- C. Hyperpolarization of presynaptic membrane
- D. Repolarization of presynaptic membrane
- E. Hyperpolarization of postsynaptic membrane

731. Myelinated nerves can conduct impulses with the velocity up to:
- A. 0,4 m/s
- B. 4 m/s
- C. 10 m/s
- D. 40 m/s
- E. 120 m/s

732. Which part of neuron can NOT act as a postsynaptic terminal?
- A. Perikaryon
- B. Terminal bouton

C. Dendrite
D. Dendritic spine
E. None of them

733. The release of neurotransmitters from synaptic vesicles is directly triggered by:
A. Depolarization of presynaptic membrane
B. Depolarization of postsynaptic membrane
C. Opening of voltage-dependent na+ channels
D. Diffusion of stimulatory molecules from distal parts of axon
E. Opening of voltage-dependent ca2+ channels

734. Neuronal impulses are transferred through electrical synapses by:
A. Release and reception of certain molecules
B. Flow of electrons between two plasmalemmas
C. Stimulation of postsynaptic membrane by electromagnetic fields
D. Local blockade of ion pumps
E. Diffusion of ions from one cell to another

735. Mesaxon is a:
A. Giant axon
B. Axon with a collateral
C. Axon covered by myelin sheath
D. The innermost part of myelin sheath
E. Point of contact between membranes of insulating glial cell

736. Which of the following synapses does NOT exist?
A. Axoaxonic
B. Axosomatic
C. Axodendrtitic
D. Dendrodendritic
E. Somatosomatic

737. Unused molecules of neurotransmitter can be:
A. Re-uptaken to the presynaptic part and reused
B. Re-uptaken to the presynaptic part and destroyed
C. Destroyed in the synaptic cleft
D. Digested by surrounding glial cells
E. All of them

738. How many mesaxons can normally be seen at the cross-section through the myelin sheath?

A. 0
B. 1
C. 3
D. 4
E. 2

739. Neurotransmitters are stored in:

A. Synaptic cleft
B. Synaptic mitochondria
C. Synaptic reticulum
D. Synaptic membrane
E. Synaptic vesicles

740. Motor end plate is:

A. Synapse between interneuron and motor neuron
B. Synapse between sensory neuron and interneuron
C. Synapse between two interneurons
D. Any synapse in the central nervous system
E. Synapse between neuron and striated muscle fiber

4.5. Receptors

741. Receptors of skin that sense touch are called:

A. Interoceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Exteroceptors

742. Receptors that sense blood pressure are called:

A. Exteroceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Interoceptors

743. Receptors of skin that sense cutaneous pain are called:
A. Interoceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Exteroceptors

744. Receptors that sense distension of urine bladder are called:
A. Exteroceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors.
E. Interoceptors

745. Receptors that sense muscle tension are called:
A. Interoceptors
B. Exteroceptors
C. Encapsulated receptors
D. Sensory receptors
E. Proprioceptors

746. According to their structure, Pacinian corpuscles can be considered as:
A. Interoceptors
B. Exteroceptors
C. Proprioceptors
D. Free nerve endings
E. Encapsulated receptors

747. Receptors that sense the temperature of the body are called:
A. Exteroceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors.
E. Interoceptors

748. Receptors that sense the stretching of muscles are called:
A. Interoceptors
B. Exteroceptors
C. Encapsulated receptors
D. Sensory receptors
E. Proprioceptors

749. Receptors that sense the position of different part of the body are called:

A. Interoceptors
B. Exteroceptors
C. Encapsulated receptors
D. Sensory receptors
E. Proprioceptors

750. Receptors that sense smell are called:

A. Interoceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Exteroceptors

751. Receptors that sense taste are called:

A. Interoceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Exteroceptors

752. Receptors that sense the chemical composition of blood are called:

A. Exteroceptors
B. Proprioceptors
C. Encapsulated receptors
D. Sensory receptors
E. Interoceptors

4.6. Neuroglia

753. Which of the following glial cells has no long processes?

A. Fibrous astrocyte
B. Microglial cell only
C. Oligodendrocyte
D. Tanycyte
E. Protoplasmic astrocyte and microglial cells

754. Which of the following functions can NOT be maintained by astrocytes:

A. Regulation of the transport between CNS and blood
B. Modulation of neuronal activity
C. Regulation of extracellular concentration of different ions
D. Destroying of excessive neurotransmitter molecules
E. Production of cerebrospinal fluid

755. The most abundant cells in adult human brain are:

A. Neurons
B. Ependymocytes
C. Insulating gliocytes
D. Microglial cells
E. Astrocytes

756. Glial cells that contain small flattened nucleus and a few branched processes are called:

A. Protoplasmic astrocytes
B. Fibrous astrocytes
C. Oligodendrocytes
D. Ependymocytes
E. Microglial cells

757. The shape of organs of nervous system (e.g. brain or spinal cord) is supported by:

A. Neurons
B. Ependymocytes
C. Insulating gliocytes
D. Microglial cells
E. Astrocytes

758. Glial cells that contain small round condensed nucleus and a few slender processes and form myelin sheath are called:

A. Protoplasmic astrocytes
B. Fibrous astrocytes
C. Microglial cells
D. Ependymocytes
E. Oligodendrocytes

759. Cells that are functionally analogous to covering epitheliocytes, are called:

A. Neurons
B. Insulating gliocytes
C. Protoplasmic astrocytes
D. Fibrous astrocytes
E. Ependymocytes

760. The propagation of multiple sclerosis is connected with damage and death of:

A. Protoplasmic astrocytes
B. Fibrous astrocytes
C. Microglial cells
D. Ependymocytes
E. Oligodendrocytes

761. Which cells proliferate and produce scar after the brain injury?

A. Neurons
B. Ependymocytes
C. Insulating gliocytes
D. Microglial cells
E. Astrocytes

762. Glial cells that have cilia on their surface are called:

A. Protoplasmic astrocytes
B. Fibrous astrocytes
C. Microglial cells
D. Oligodendrocytes
E. Ependymocytes

763. Pia-glial membrane is formed by:

A. Schwann cells
B. Ependymocytes
C. Oligodendrocytes
D. Microglial cells
E. Astrocytes

764. The most phagocytically active glial cells are:

A. Protoplasmic astrocytes
B. Fibrous astrocytes
C. Oligodendrocytes
D. Ependymocytes
E. Microglial cells

765. In contrary to neurons, glial cells:
A. Do not have resting membrane potential
B. Do not have active ion pumps in plasmalemma
C. Do not make contacts with neurons
D. Are not influenced by changes in the ion composition of interstitial fluid
E. Cannot produce action potentials

766. Protoplasmic astrocytes can normally be found in:
A. White matter
B. Myelinated nerves
C. Non-myelinated nerves
D. Surface of brain ventricles.
E. Gray matter

767. Which of the following is NOT the example of insulating glia?
A. Satellite cell
B. Astrocyte
C. Oligodendrocyte
D. Schwan cells
E. Neurolemmocyte

768. Which type of neuroglia covers surfaces of brain ventricles?
A. Astrocytes
B. Schwann cells
C. Microglia
D. Satellite cells
E. Ependymal cells

769. Which type of insulating glia can be found around bodies of neurons in dorsal root ganglia?
A. Schwann cells
B. Microglial cells
C. Astrocytes
D. Ependymocytes
E. Satellite cells

770. Which type of neuroglia takes part in the formation of blood-brain barrier?
A. Ependymal cells
B. Scwann cells
C. Microglia

D. Satellite cells
E. Astrocytes

771. Fibrous astrocytes can normally be found in:
A. Gray matter
B. Myelinated nerves
C. Non-myelinated nerves
D. Surface of brain ventricles
E. White matter

772. Tanycytes are:
A. Provide mechanical support to the organs of nervous system
B. Immune cells of nervous tissue
C. Responsible for maintaining the ion homeostasis
D. Neurons that lack axons
E. Specific subtype of ependymal cells

773. In contrary to Schwann cells, oligodendrocytes:
A. Make blood-brain barrier
B. Are active phagocytes
C. Make myelin sheath around one axon only
D. Do not have schmidt-lanterman clefts
E. Can be found in CNS only

774. A 87-year-old patient has progressive dysfunction of Schwann cells that results in multiple functional abnormalities in nervous system. Schwann cells can be found in:
A. Grey matter
B. White matter
C. Myelinated nerves only
D. Non-myelinated nerves only
E. Both myelinated and non- myelinated nerves

775. Which type of glial cells is expected to significantly increase in number after brain injury?
A. Scwann cells
B. Tanycytes
C. Ependymocytes
D. Satellite cells
E. Microglial cells

CONTENTS

Навчальне видання

ГІСТОЛОГІЯ, ЦИТОЛОГІЯ ТА ЕМБРІОЛОГІЯ

Збірник тестових завдань для поточного контролю рівня знань студентів спеціалізації "Медицина"

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