

For each of the following multiple choice questions, select the **BEST** answer.

1. Muscle spindles are
 - A. found in all smooth muscle.
 - B. usually located at musculotendinous junctions.
 - C. enclosed within a Schwann cell plasma membrane.
 - D. a special type of encapsulated receptor.
 - E. Both A and D above are correct statements.
2. Nodes of Ranvier
 - A. have neurotransmitter-containing vesicles.
 - B. have acetylcholine receptors.
 - C. are located between adjoining Schwann cells.
 - D. are present in both myelinated and unmyelinated fibers.
 - E. Both B and D are correct statements.
3. Which of the following features distinguishes the myelin sheath associated with peripheral nerves from that manufactured by the oligodendrocytes in the central nervous system?
 - A. Clefts of Schmidt Lanterman
 - B. Nodes of Ranvier
 - C. Major dense lines
 - D. Intraperiod lines
 - E. Both C and D above
4. Which two cell types that are present in normal peripheral blood are capable of killing other cells infected with a virus?
 - A. basophils and small-medium lymphocytes
 - B. eosinophils and megakaryocytes
 - C. monocytes and helper (CD4) T cells
 - D. neutrophils and large lymphocytes
 - E. cytotoxic (CD8) T cells and natural killer (NK) cells
5. Which of the following blood values is **abnormal** for a healthy adult woman?
 - A. hematocrit of 40%
 - B. 20% reticulocytes
 - C. 7,500 leukocytes per μl
 - D. 5% monocytes
 - E. erythrocyte count of 4.0×10^6 per μl
6. Which component of neutrophilic secondary (specific) granules hydrolyzes glycosides in the cell wall of bacteria?
 - A. alkaline phosphatase
 - B. lysozyme
 - C. cathepsin
 - D. collagenase
 - E. lactoferrin

7. Which of the following blood cells infiltrates the bronchial mucosa and contributes to the pathogenesis of asthma?
- A. eosinophils
 - B. monocytes
 - C. basophils
 - D. large agranular lymphocytes
 - E. natural killer (NK) cells
8. If you administer penicillin to an individual who is allergic to the drug, which blood cell is largely responsible for the anaphylactic shock that may occur in your patient?
- A. eosinophil
 - B. neutrophil
 - C. monocyte
 - D. lymphocyte
 - E. basophil
9. The presence of which of the following is **uncharacteristic** of a blast?
- A. large, euchromatic nucleus
 - B. numerous free ribosomes
 - C. primary (azurophilic) cytoplasmic granules
 - D. a large nucleus relative to the size of the cell
 - E. a prominent nucleolus within the nucleus
10. Which of the following is characteristic of **both** neutrophilic metamyelocytes and normoblasts?
- A. large euchromatic nucleus
 - B. presence of both azurophilic and specific granules
 - C. inability to synthesize nucleic acids
 - D. presence in normal peripheral blood
 - E. indented (or notched) nucleus
11. The presence of which of the following in the peripheral blood of your patient would be of concern?
- A. reticulocyte
 - B. eosinophilic band
 - C. monocyte
 - D. neutrophilic metamyelocyte
 - E. adult basophil
12. During which stage of basophil development do specific (secondary) cytoplasmic granules first appear?
- A. myelocyte
 - B. promyelocyte
 - C. band
 - D. blast
 - E. metamyelocyte

13. An electron micrograph of an active chondrocyte resembles most closely that of a
- A. smooth muscle cell.
 - B. endothelial cell.
 - C. plasma cell.
 - D. macrophage.
 - E. eosinophil.
14. Hyaline cartilage is able to absorb considerable compressive force. Which component of its extracellular matrix is most responsible for this physical property of the tissue?
- A. elastic fibers
 - B. type II collagen
 - C. proteoglycan aggregates
 - D. keratan sulfate
 - E. type I collagen
15. Most strategies to prevent or arrest osteoporosis involve attempts to inhibit the activity of
- A. osteocytes.
 - B. chondrocytes.
 - C. osteoprogenitor cells.
 - D. chondroblasts.
 - E. osteoclasts.
16. Which of the following is a difference between osteocytes and chondrocytes?
- A. Osteocytes reside in lacunae and chondrocytes do not.
 - B. Chondrocytes communicate via gap junctions, and osteocytes do not.
 - C. Osteocytes produce the components of the extracellular matrix, and chondrocytes do not.
 - D. Active chondrocytes have considerable rough endoplasmic reticulum, and active osteocytes do not.
 - E. Osteocytes have long cytoplasmic processes, and chondrocytes do not.
17. Which of the following statements is **incorrect** regarding the macula densa?
- A. It is located in the wall of the distal convoluted tubule.
 - B. It produces and releases renin into the peripheral circulation.
 - C. Its columnar cells are closely packed together.
 - D. It can be observed near the vascular pole of a renal corpuscle.
 - E. It is one of the components of the juxtaglomerular apparatus.
18. Epithelial cells lining which component of a uriniferous tubule respond to anti-diuretic hormone?
- A. proximal convoluted tubule
 - B. collecting (papillary) duct
 - C. distal convoluted tubule
 - D. thin segment of the loop of Henle
 - E. collecting tubule

19. Proteins with a net negative charge (-) have difficulty crossing the glomerular filtration barrier because of the
- A. diameter of the pores in the capillary endothelial cells.
 - B. presence of type IV collagen in the lamina densa of the glomerular basement membrane.
 - C. width of the filtration slits.
 - D. activity of the intraglomerular mesangial cells.
 - E. presence of heparan sulfate in the lamina rara of the glomerular basement membrane.
20. You were introduced to the concept of a portal system (e.g. hepatic portal system). In the kidney which of the following functions as a "portal" vessel?
- A. arcuate artery
 - B. interlobular artery
 - C. afferent arteriole
 - D. glomerular capillary
 - E. efferent arteriole
21. After the age of 45, more than 90% of urinary bladder tumors originate in the
- A. dense irregular connective tissue of the adventitia.
 - B. transitional epithelium lining (urothelium).
 - C. smooth muscle of the middle layer of the wall.
 - D. loose connective tissue of the lamina propria.
 - E. glands of Littre.
22. Angiotensin I is enzymatically converted into angiotensin II within the
- A. macula densa.
 - B. zonaglomerulosa of the adrenal cortex.
 - C. juxtaglomerular cells.
 - D. pulmonary capillary endothelial cells.
 - E. blood.
23. In the kidney, blood normally flows directly from the interlobular arteries into the
- A. efferent arterioles.
 - B. arcuate arteries.
 - C. interlobar arteries.
 - D. afferent arterioles.
 - E. glomerular capillaries.
24. Which of the following is **incorrect** regarding T lymphocytes?
- A. They undergo a process of selection within the thymus.
 - B. They make up about 75% of the population of circulating lymphocytes.
 - C. They respond to antigens that exist within the extracellular spaces of the body.
 - D. They may require the help of antigen-presenting cells.
 - E. They inhabit the periarteriole lymphatic sheath within the splenic white pulp.

25. Which of the following is the major physiological event that occurs in the dark zone of a germinal center within a secondary lymphatic nodule?
- A. apoptosis of T lymphocytes
 - B. selection of B lymphocytes
 - C. temporary storage of T lymphocytes
 - D. proliferation of activated B lymphocytes
 - E. differentiation of plasma cells from B lymphocytes
26. Many post-capillary venules with tall endothelium (HEVs) are located within the
- A. peripheral region of a deep cortex unit in a lymph node.
 - B. medulla of a thymic lobule.
 - C. red pulp of the spleen.
 - D. stratified squamous epithelium covering of a tonsil.
 - E. cortex of a thymic lobule.
27. Which of the following is **incorrect** regarding thymic reticular cells of epithelial origin?
- A. They participate in the formation of the blood-thymus barrier.
 - B. They produce thymosin.
 - C. They form Hassall's corpuscles.
 - D. They contain cytoplasmic tonofilaments.
 - E. They are actively phagocytic.
28. The rigorous selection process that T lymphocytes undergo occurs primarily in the
- A. hematopoietic cords of red bone marrow.
 - B. Peyer's patches.
 - C. cortex of thymic lobules.
 - D. dense irregular connective tissue capsule of palatine tonsils.
 - E. red pulp cord within the spleen.
29. Which of the following lymphoid organs is best designed to trap antigens found within the blood?
- A. lymph node
 - B. thymus
 - C. spleen
 - D. pharyngeal tonsil
 - E. Peyer's patches
30. Which of the following is **NOT** a component of the conducting portion of the respiratory tract?
- A. vibrissae
 - B. surfactant
 - C. hyaline cartilage
 - D. Clara cells
 - E. dynein

31. Which of the following is the most numerous cell in the alveolar septum?
- A. endothelial cell
 - B. type I pneumocyte
 - C. type II pneumocyte
 - D. dust cell
 - E. Clara cell
32. In the histologic transition of the epithelium in the respiratory tree from the trachea to the alveolus, which of the following pairs best represents the **first** and **last** respective changes to occur?
- A. loss of regenerative cell type: fusion of epithelial and endothelial basal lamina
 - B. loss of regenerative cell type: loss of Clara cells
 - C. pseudostratified columnar to simple columnar: loss of cilia
 - D. pseudostratified columnar to simple columnar: loss of goblet cells
 - E. loss of cilia: gain of Clara cells