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1. **Most exocrine glands in the human body are classified as:**
   A. acinar
   B. apocrine
   C. holocrine
   D. merocrine
   E. endocrine

2. **Cell types likely to be found in areolar connective tissue include all EXCEPT:**
   A. chondrocytes
   B. fibroblasts
   C. macrophages
   D. mast cells

3. **Which of the following is NOT found in the matrix of cartilage but IS found in bone?**
   A. live cells
   B. lacunae
   C. blood vessels
   D. collagen fibers

4. **Select the most correct statement regarding epithelia:**
   A. Simple epithelia form impermeable barriers.
   B. Stratified epithelia are tall, narrow cells.
   C. Stratified epithelia are present where protection from abrasion is important.
   D. Pseudostratified epithelia consist of at least two layers of cells stacked on top of one another.

5. **Which of these is NOT considered connective tissue?**
   A. cartilage
   B. muscle
   C. adipose
   D. blood

6. **Which statement best describes connective tissue?**
   A. usually contains a large amount of matrix
   B. always arranged in a single layer of cells
   C. primarily concerned with secretion
   D. usually lines a body cavity

7. **Pseudostratified cuboidal epithelium:**
   A. lines the respiratory tract
   B. aids in digestion
   C. possesses numerous goblet cells
   D. is not an epithelial classification

8. **Which of the following is considered a unicellular exocrine gland?**
   A. mast cell
   B. plasma cell
   C. fibroblast
   D. adipocytes
   E. goblet cell

9. **The shape of the external ear is maintained by:**
   A. adipose tissue
   B. elastic cartilage
   C. hyaline cartilage
   D. fibrocartilage

10. **The suffix "blast" in a cell name indicates a(n):**
   A. cell that has ruptured
   B. mature cell with reduced capacity for cell division
   C. cell that is part of an exocrine gland
   D. immature cell that can still divide
   E. cell that is part of the stroma of an organ

11. **The embryonic connective tissue from which all other connective tissues arise is:**
   A. areolar connective tissue
   B. mucous connective tissue
   C. hyaline cartilage
   D. neuroglia
   E. mesenchyme

12. The fiber type that give connective tissue great tensile strength is:
   A. elastic
   B. collagen
   C. reticular
   D. muscle

13. Which of the following is NOT a function of plasma membrane proteins?
   A. determine the fluidity of the membrane
   B. serve as channels
   C. serve as carriers
   D. serve as membrane-bound enzymes
   E. serve as receptor sites

14. Crenation (cell shrinking) occurs when a blood cell is placed in a(n) ..... solution.
   A. isotonic
   B. hypertonic
   C. hypotonic
   D. merotonic

15. Smooth muscle is characterized by all of the following EXCEPT:
   A. lacks troponin
   B. no sarcomeres
   C. intermediate filaments attach to dense bodies
   D. more thick filaments than thin filaments

16. Connexons are:
   A. the typical cells of connective tissue
   B. fibers that provide nutrient, waste and gas exchange for epithelial cells
   C. proteins found in muscle fibers
   D. proteins that form the channels of gap junctions
   E. proteins that attach epithelial cells to basal laminae

17. Which of the following does NOT cross the plasma membrane by simple diffusion?
   A. oxygen
   B. urea
   C. alcohol
   D. glucose
   E. carbon dioxide

18. A cell placed in a solution swells. This means that when the cell was first placed in this solution, the solution was ..... compared to the cytoplasm of the cell.
   A. isotonic
   B. hypertonic
   C. hypotonic
   D. hyperosmotic
   E. B) and D)

19. **Which of the following statements is TRUE?**
   A. Cardiac muscle cells have many nuclei.
   B. Smooth muscle cells have T tubules.
   C. Skeletal muscle cells are long and cylindrical with many nuclei.
   D. Cardiac muscle cells are found in the heart and in the walls of blood vessels.

20. **Which of the following is NOT a characteristic of facilitated diffusion?**
   A. movement of solute down concentration gradient
   B. specificity
   C. ATP-requiring
   D. can be saturated
   E. involves a plasma membrane carrier

21. **Filtration:**
   A. moves fluid down a solute gradient
   B. moves fluid up a solute gradient
   C. is specific
   D. moves fluid down a pressure gradient
   E. doesn't occur in the body

22. **Which of the following is the major positive ion OUTSIDE cells?**
   A. nitrogen
   B. hydrogen
   C. potassium
   D. sodium
   E. chloride

23. **You have a 2.0 M solution of NaCl. You want to make a solution of glucose that is the same osmolarity as this NaCl solution. What concentration should the glucose solution be?**
   A. 0.5 M
   B. 1.0 M
   C. 2.0 M
   D. 3.0 M
   E. 4.0 M

24. **Which of the following statements is TRUE?**
   A. Saltatory conduction occurs because of the presence of salt (NaCl) around the neuron.
   B. Strong stimuli cause the amplitude of action potentials to increase.
   C. Myelination of neuronal axons in the central nervous system is the job of the oligodendrocyte.
   D. The two major classes of graded potentials are transmitter potentials and receptor potentials.
   E. During depolarization, the inside of the neuron's membrane becomes more negative.

25. **Immediately after an action potential has peaked, which cellular gates open?**
   A. sodium
   B. chloride
   C. calcium
   D. potassium
   E. none of the above

26. There is one-way conduction at a synapse because:

A. only postsynaptic dendrites contain synaptic vesicles.
B. acetylcholine prevents nerve impulses from traveling in both directions.
C. only the postsynaptic dendrites possess neurotransmitter receptors.
D. only postsynaptic dendrites release neurotransmitters.

27. Calcium ions play an essential role in chemical synapses because they are necessary for:

A. the release of neurotransmitters by exocytosis.
B. the diffusion of neurotransmitters across the synaptic cleft.
C. the opening of the chemically-gated ions channels of the postsynaptic membrane.
D. the generation of the action potential on the postsynaptic membrane.

28. Dendrites of postsynaptic neurons:

A. have chemically-gated channels
B. conduct impulses away from the cell body
C. are the site of synthesis of neurotransmitters
D. have voltage-gated channels
E. are also called axon terminals

29. The term that refers to a measure of the potential energy of separated electrical charges is:

A. conductance
B. resistance
C. current
D. voltage

30. Which of the following will occur when an excitatory postsynaptic potential (EPSP) is being generated on the dendritic membrane?

A. specific sodium gates will open
B. specific potassium gates will open
C. sodium gates will open first, then close as potassium gates open
D. a single type of channel will open, permitting simultaneous flow of sodium and potassium

31. The threshold of the neuron is the:

A. time between binding of the neurotransmitter and firing of an action potential
B. voltage at which the inflow of sodium ions causes the spike of an action potential
C. total number of sodium ions that enters the cell before the sodium inactivation gates close
D. total amount of neurotransmitter it takes to cause an action potential
E. voltage across the resting cell membrane

32. Which of the following statements about resting membrane potential is TRUE?

A. The cell membrane is more leaky to Na+ than to K+.
B. K+ tends to diffuse out of the cell.
C. K+ tends to diffuse toward the axonal terminals.
D. The resting membrane potential exists because the cell membrane is more permeable to Cl- than it is to K+.
E. Na+ tends to diffuse out of the cell.

19. Which of the following ...

33. The electrochemical gradient for ..... is enhanced by the resting membrane potential of a neuron.
   A. Na+
   B. K+
   C. Ca+
   D. none of the above

34. Which of the following statements is TRUE?
   A. A myelin sheath increases conduction velocity because it contains many ions channels.
   B. The conduction velocity of an axon increases with increasing axon diameter.
   C. Neurons are the only polarized cells in the body.
   D. A myelinated fiber conducts impulses more slowly than an unmyelinated fiber.
   E. The conduction velocity of axons is always the same.

35. The term saltatory conduction refers to the:
   A. leaping of an action potential across the synapse.
   B. movement of sodium ions into the cell during depolarization.
   C. one-way conduction of a nerve impulse across a synapse.
   D. propagation of a nerve impulse along a myelinated axon.
   E. action of the sodium potassium pump.

36. Which of the following statements about an action potential is TRUE?
   A. Threshold is usually 0 mV.
   B. The hyperpolarization undershoot occurs because K+ gates are slow to close.
   C. Inactivation Na+ gates respond more rapidly than activation Na+ gates.
   D. Action potentials decrease in amplitude with distance travelled.
   E. A second depolarization can occur during the absolute refractory period if the stimulus is greater than threshold.

37. A neurotransmitter that changes the membrane potential from -70 to -65 mV causes:
   A. impulse conduction
   B. depolarization
   C. release of neurotransmitter
   D. hyperpolarization
   E. production of an action potential

38. Calcium ions bind to the ..... molecule in skeletal muscle cells.
   A. tropomyosin
   B. troponin
   C. actin
   D. myosin
   E. myoglobin

39. The connective tissue membrane that envelopes a fascicle is called the:
   A. endomysium
   B. epimysium
   C. perimysium
   D. sarcomysium
   E. none of the above

40. **The 100 meter dash is a quick and short run requiring explosive speed. On completion of the dash, the runners will continue to breathe hard for several seconds to minutes even though they have no longer running. Which of the following best explains why this is so?**
   A. Since the exercise was mostly aerobic, the runners' bodies have not yet realized the run is over.
   B. The runners' use of stored oxygen, glucose and creatine phosphate is being replenished.
   C. The runners' fast oxidative muscles are so slow to use oxygen that they only begin aerobic metabolism after the race has finished.
   D. Slow oxidative fibers are recruited last and have only started to work at the completion of the run.

41. **In a RELAXED muscle fiber, which of the following are found in the H zone?**
   A. thick filaments
   B. thin filaments
   C. cross bridges
   D. both thick and thin filaments
   E. thick filaments and cross bridges

42. **Which of the following features of the contraction process does NOT apply to BOTH skeletal and smooth muscle?**
   A. Actin and myosin interact by the sliding filament mechanism.
   B. The trigger for contraction is a rise in intracellular calcium.
   C. Calcium binds to troponin.
   D. ATP energizes the sliding process.

43. **Which of the following is/are most correct?**
   A. Muscle length and tension remain constant during isotonic contractions.
   B. Myofilaments are sliding during isotonic contractions.
   C. Isotonic contractions can be concentric or eccentric.
   D. B) and C)

44. **Fused tetanus is:**
   A. a pathological condition in which stimulation of one muscle triggers contraction of all others in the same motor unit
   B. a sustained contraction with partial relaxation between stimuli
   C. a sustained contraction in which individual twitches cannot be discerned
   D. a brief contraction of all the fibers in a motor unit
   E. a phenomenon that occurs in only muscle cells without refractory periods

45. **What is the role of calcium ions in the contractile response of skeletal muscle?**
   A. trigger the immediate regeneration of creatine phosphate
   B. bind to lactic acid to remove it from the contracting muscle
   C. remove the inhibitory action of tropomyosin on actin/myosin interaction
   D. diffuse across the synaptic cleft to depolarize the muscle membrane
   E. directly activate ATPase in the myosin head region

46. **As an axon enters a muscle, it branches into a number of axonal terminals, each of which forms a junction with a single muscle fiber. A neuron and all the muscle fibers it supplies is called a:**
   A. synaptic knob
   B. neuromuscular junction
   C. synaptic cleft
   D. motor end plate
   E. motor unit

47. Exhaustion of glycogen storage within a muscle fiber would have the biggest effect on:

A. slow oxidative fibers
B. fast oxidative fibers
C. fast glycolytic fibers
D. all three types of muscle fibers would be affected equally

48. Which of the following statements is FALSE?

A. Rigor mortis is caused by the cessation of ATP synthesis and the irreversible cross-linking of actin and myosin.
B. Both isotonic and isometric contractions involve excitation-contraction coupling.
C. Concentric contractions are more forceful than eccentric contractions.
D. Skeletal muscle is called voluntary because it is the only type of muscle usually subject to conscious control.

49. In a skeletal muscle fiber, which of the following best describes the composition of the structure known as a triad?

A. actin, troponin and tropomyosin
B. sarcolemma, sarcoplasm and sarcoplasmic reticulum
C. terminal cisterna, transverse tubule and terminal cisterna
D. ATP, creatine phosphate and glucose
E. A band, I band and H band

50. Myoglobin is:

A. a contractile protein
B. a calcium-binding protein
C. an oxygen-binding protein
D. found in smooth muscle only
E. none of the above

51. Which statement about a RELAXED muscle cell is FALSE?

A. Myosin cross bridges are bound to ATP.
B. Calcium ions are stored in the sarcoplasmic reticulum.
C. Myosin cross bridges are bound to actin.
D. Tropomyosin-troponin complexes are bound to actin.

52. The "cis" face of the Golgi apparatus:

A. is where products are dispatched in vesicles
B. is its concave face
C. receives transport vesicles from the rough endoplasmic reticulum
D. is in the centre of the Golgi stack
E. is continuous with the nuclear membrane

53. Epithelial tissues may contain all of the following EXCEPT:

A. cilia
B. nerves
C. blood vessels
D. a basal lamina
E. a basement membrane