REVIEW of MIDTERM 1 QUESTIONS

1. **Which of the following mature cells do not have nuclei?**

   A. White blood cells
   B. Red blood cells
   C. Astrocytes
   D. Neurons
   E. Columnar epithelial cells

2. **The Golgi apparatus:**

   A. is involved in lipid synthesis
   B. packages, modifies and concentrates proteins
   C. is missing in children with Tay-Sachs disease
   D. is made of flattened sacks with ribosomes
   E. is involved in break-down of non-useful tissue

3. **Peroxisomes:**

   A. store proteins and lipids produced at the endoplasmic reticulum
   B. contain proteolytic enzymes
   C. neutralize free radicals
   D. contain their own DNA
   E. produce mucus that protects parts of the digestive organs from the effects of powerful enzymes

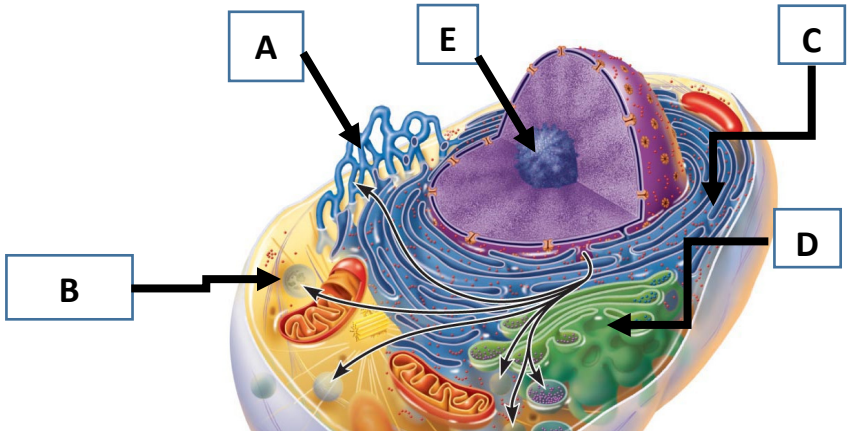
4. **Mitochondria:**

   A. are double membrane structures involved in breakdown of ATP
   B. are single membrane structures involved in production of ATP
   C. synthesize proteins
   D. are the organelles involved in energy production
   E. are found only in skeletal muscle cells

5. **Cellular cytoskeleton may include the following protein(s):**

   A. myosin
   B. tubulin
   C. actin
   D. keratin
   E. all of the above

6. **Which of the following structures (A, B, C, D or E) is the site of protein synthesis?**



7. The plasma membrane of human cells:

A. is a semi-solid structure
B. is constructed of phospholipids, proteins and cholesterol
C. often contains glycolipids and glycoproteins on the cytosolic side of the cell
D. is permeable to most substances regardless their size or polarity

8. Movement of water through a selectively permeable membrane:

A. requires transport proteins
B. occurs through the gaps in lipid bilayer and through aquaporins
C. requires energy
D. occurs against the concentration gradient
E. occurs via endocytosis

9. Glucose and amino acids can cross cellular membranes of the intestinal epithelium and enter the epithelial cells together with sodium ions:

A. via simple diffusion
B. via facilitated diffusion
C. via active transport
D. using clathrin-coated vesicles that capture glucose and sodium molecules via pinocytosis
E. via a secondary active transport

10. Which of the following describe tight junctions?

A. Cell junctions in the areas that are subjected to great mechanical stress, such as skin and heart muscle
B. Junctions within electrically excitable tissues, such as the heart and smooth muscle
C. Junctions where cells are held together by cadherins
D. Junctions among epithelial cells lining the digestive tract

11. Once clathrin coated membrane pit ingests a substance, which of the following statements best describes what happens to this substance?

A. The protein coated vesicle remains separated from the cytoplasm and the ingested substance persists unchanged
B. The ingested substance is stored until further breakdown occurs several days later
C. Ingested substance may either be digested by the lysosomal enzymes or delivered to the opposite side of the cell and released via exocytosis
D. A ribosome enters the vacuole and uses the amino acids from the ingested substance to form proteins
E. Both the ingested substance and the clathrin containing “coat” are digested by the lysosomal enzymes

12. The principal function of cholesterol within the cell membrane is to:

A. provide an energy source
B. provide a means of communication among cells
C. stabilize the membrane and regulate its fluidity
D. act as transporter
E. form channels

13. Which of the following statements is CORRECT regarding diffusion?

A. The rate of diffusion is independent of temperature
B. Molecular weight of a substance does not affect the rate of diffusion
C. The lower the difference in concentration gradient between two sides of the membrane, the faster the rate of diffusion
D. The greater the difference in concentration gradient between two sides of the membrane, the faster the rate of diffusion

14. Which of the following is true about membrane proteins?

A. Integral proteins are located in the cytosol
B. Glycoproteins and lipoproteins play a role in cell-cell recognition
C. Membrane proteins easily flow from one side of the phospholipid bilayer to the other side
D. Membrane proteins are absolutely required for lipid transport across the membrane

15. Microvilli:

A. Are often seen in both the epithelial and connective tissues
B. Are composed of cadherins and keratin fibers
C. Are crucial for synchronization of cardiac and smooth muscle contractions
D. Are usually located on the basolateral side of the epithelial cells
E. Increase surface area for absorption in cells of the digestive system

16. Which of the following most accurately characterize epithelium?

A. Polarized, avascular, innervated, able to regenerate
B. Polarized, vascularized, innervated, able to regenerate
C. Avascular, not polarized, bound to the underlying structures by connective tissue
D. Vascularized, innervated, bound to the underlying structures by connective tissue, does not need to respect boundary

17. Which of the characteristics of loose connective areolar tissue (connective tissue proper) is TRUE?

A. It is usually arranged in a single layer of cells
B. It is primarily concerned with secretion
C. It lines all of the body's cavities and chambers
D. It contains mainly fibroblasts and collagen fibers
E. It contains gel-like matrix with all types of connective tissue cells and fibers

18. Which of the following is true about the adipose tissue?

A. Brown fat is located around the neck, back and kidneys of infants and adults
B. Brown fat is important for heat production in infants
C. Excess body fat content has been associated with chronic inflammation and elevated CRP levels
D. Both (A) and (B)
E. Both (B) and (C)

19. What does the central nervous system use to determine the strength of a stimulus?

A. origin of the stimulus
B. type of stimulus receptor
C. frequency of action potentials
D. size of action potentials

20. In the contraction of smooth muscle, which of the following is NOT true

A. electrical coupling of the muscle cells is via gap junctions
B. contractions are not synchronized
C. smooth muscle actin & myosin interact by a sliding filament mechanism
D. the final trigger for contraction is the rise in intracellular Ca++
E. the filament sliding process is energized by ATP

21. The part of a neuron that conducts impulses away from its cell body is called a:

a. axon
b. dendrite
c. neurolemma
d. Schwann cell
e. Nissl body

22. Which of the following statements is TRUE?

A. A. When a skeletal muscle fiber contracts strongly, the I bands diminish is size, the H zones disappear and the A bands move closer together but do not diminish is length.
B. B. Smooth muscle cells are relatively short, tapering cells with multiple, centrally located nuclei.
C. The thin filaments (actin) contain a polypeptide subunit G-actin that seems to have no function.
D. A nerve cell and all the muscle cells it stimulates are referred to as a postsynaptic end plate.
E. A smooth muscle is fast acting

23. Which of the following is a characteristic of a graded potential?

A. produced at axon hillock
B. all-or-none
C. current decreases with distance travelled
D. always induces membrane hyperpolarization
E. causes release of neurotransmitter

24. A second nerve impulse cannot be generated until

A. the membrane potential has been re-established
B. the Na+ ions have been pumped back into the cell
C. proteins have been resynthesized
D. all sodium gates are closed
E. all potassium gates are closed

25. An inhibitory postsynaptic potential (IPSP) is associated with:

A. a change in sodium ion permeability
B. hyperpolarization
C. opening of voltage-regulated channels
D. lowering the threshold for an action potential to occur
E. a change in membrane sensitivity

26. Collections of nerve cell bodies outside the central nervous system are called:

A. nuclei
B. nerves
C. ganglia
D. tracts
E. nerve trunks

27. Which statement regarding synapses is correct:

A. Cells with gap junctions use chemical synapses.
B. The release of neurotransmitter molecules gives cells the property of being electrically coupled.
C. Neurotransmitter receptors are located on the axons terminals of cells.
D. The synaptic cleft prevents an impulse from being transmitted directly from one neuron to another.

28. Immediately after an action potential has peaked, which ion channels open:

A. sodium
B. chloride
C. calcium
D. potassium
E. potassium and calcium

29. **Which of the following statements concerning types of muscle contraction is FALSE**?

A. in isometric contractions, the amount of tension produced by the muscle is constant
B. in isotonic contractions, the muscle fiber shortens
C. both isotonic and isometric contractions involve excitation-contraction coupling
D. most body movements are produced by isotonic contractions
E. tetanic contractions are purely isometric

30. The plasma membrane of a resting neuron is more permeable to potassium ions than to sodium ions because the membrane has:

A. more voltage-gated sodium ion channels
B. more ligand-gated potassium ion channels
C. more potassium leakage channels
D. fewer voltage-gated sodium ion channels
E. more carrier molecules for potassium ions

31. The functional role of the T tubules is to:

A. stabilize the G and F actin
B. enhance cellular communication during muscle contraction
C. hold across bridges in place in a resting muscle
D. synthesize ATP to provide energy for muscle contraction
E. none of the above

32. In the contraction of skeletal muscle, calcium apparently acts to:

A. increase the action potential transmitted along the sarcolemma
B. release the inhibition on Z discs
C. remove the blocking action of tropomyosin
D. cause ATP binding to actin
E. all of the above

33. Fused tetanus is:

A. a phenomenon that occurs in all muscle cells
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

34. In <u>a relaxed</u> muscle fiber, which of the following are found in the H zone?

A. thin filaments
B. cross bridges
C. both thick and thin filaments
D. thick filaments
E. thick filaments and cross bridges

35. Detachment of the cross bridges is directly triggered by:

A. repolarization of the T tubules
B. the power stroke
C. attachment of ATP to myosin heads
D. hydrolysis of ATP
E. action of troponin

36. **Which of the following statements concerning the resting membrane potential is TRUE**?

A. Na+ tends to diffuse out of the cell.
B. The resting membrane potential exists because the cell membrane is more permeable to K+ than to Cl-.
C. K+ has the most important role.
D. The cell membrane is more 25x more permeable to Na+ than to K+.
E. K+ tends to diffuse toward the axonal terminals.

37. Which of the following is composed of myosin?

A. thick filaments
B. thin filaments
C. all myofilaments
D. Z disc
E. A) and D)

38. During the depolarizing spike of an action potential:

A. K+ gates are open
B. Na+ gates are open
C. Na+/K+ ATPase is maximally active
D. A) and B)
E. none of the above

39. Which of the following surrounds the individual muscle cell?

A. perimysium
B. endomysium
C. epimysium
D. fascicle
E. epithelium

40. **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.

41. **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. neurotransmitter receptors in the synaptic cleft are usually located on the postsynaptic membrane
D. only postsynaptic dendrites release neurotransmitters.
E. transmitter release utilizes facilitated transport

42. Immediately after the arrival of the stimulus at a skeletal muscle cell, there is a short period called the .....during which the events of excitation-contraction coupling occur:

A. pre-contraction period
B. relaxation period
C. latent period
D. saltatory period
E. none of the above

43. The role of acetylcholinesterase is to:

A. act as transmitting agent
B. amplify or enhance the effect of acetylcholine
C. destroy acetylcholine a brief period after its release by the axonal endings
D. stimulate the production of serotonin
E. catalyze the synthesis of acetylcholine

44. What structure in skeletal muscle cells functions in calcium storage?

A. sarcoplasmic reticulum
B. mitochondria
C. intermediate filament network
D. myofibrillar network
E. microtubules

45. After acetylcholine attaches to its receptors at the neuromuscular junction, the next step is:

A. potassium-gated channels open
B. the T-tubules depolarize
C. cross bridges attach
D. ATP is hydrolyzed
E. chloride channels open

46. The function of myoglobin is to:

A. bind oxygen for aerobic respiration
B. bind actin to shorten myofibrils
C. block the myosin binding sites on thin filaments
D. store ATP
E. A) and D)