Physiology test bank

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1. Which of the following contributes to the depolarization phase (Phase 0) in cardiac cells?

A. Opening of slow calcium channels
B. Rapid influx of sodium ions into the cell
C. Rapid efflux of potassium ions from the cell
D. Closing of sodium channels

2. What is the primary purpose of the plateau phase (Phase 2) in the cardiac action potential?

A. To rapidly repolarize the cell
B. To ensure a prolonged contraction necessary for pumping blood
C. To allow a brief depolarization period
D. To close potassium channels and prevent calcium influx

3. Which ion's permeability decreases significantly during the cardiac action potential plateau phase, helping maintain depolarization?

A. Sodium
B. Calcium
C. Potassium
D. Chloride

1-B / 2- B / 3-C

4. What causes the repolarization phase (Phase 3) in cardiac cells to occur?

A. Opening of fast sodium channels
B. Increase in potassium efflux as potassium channels open
C. Continuous influx of calcium ions
D. Closing of potassium channels

5. Why does the left side of the heart have a thicker muscle wall compared to the right side?

A. It pumps blood through a high-resistance, high-pressure system
B. It pumps blood only within the lungs
C. It receives blood from high-pressure arteries
D. It requires less force to push blood through the systemic circulation

6. In cardiac pacemaker cells, which ion channel is responsible for the initial phase of slow depolarization towards the threshold?

A. T-type calcium channels
B. Fast sodium channels
C. Potassium channels
D. Funny sodium channels (If channels)
E. A+D

4-B / 5-A / 6-D

7. Which phase of the cardiac action potential involves the closing of calcium channels and the opening of potassium channels?

A. Phase 1
B. Phase 2
C. Phase 3
D. Phase 0

8. Why do cardiac pacemaker cells not have a stable resting membrane potential like skeletal muscle cells?

A. Due to constant potassium influx
B. Because of leaky sodium and calcium channels causing slow depolarization
C. Due to rapid sodium efflux
D. Because they lack any ion channels

9. What function do the 'funny' sodium channels (If channels) serve in the cardiac pacemaker cells?

A. They maintain the resting membrane potential
B. They open during hyperpolarization to initiate the next depolarization
C. They close during depolarization
D. They prevent potassium influx

7-C /8-B / 9-B

10. What is the primary role of autorhythmic fibers in the heart?

A. To provide structural support
b. To generate action potentials that trigger heart contractions
c. To supply blood to the heart muscle
d. To transport oxygen throughout the body

11. Where does the action potential from the SA node first spread?

A. Directly to the ventricles
b. To the Purkinje fibers
c. Through the entire atrial muscle mass
d. To the left atrium only

12. What is the significance of the delay in the A-V node?

A. It prevents the heart from contracting
b. It allows the atria to empty blood into the ventricles before ventricular contraction
c. It speeds up the transmission of impulses
d. It causes cardiac arrhythmias

10-B / 11-c / 12- B

13. Which of the following statements about cardiac muscle T-tubules is correct?

A. They are less wide and more abundant than in skeletal muscle.
B. They are wider but less abundant than in skeletal muscle.
C. They are the same width as those in skeletal muscle.
D. They are located at the M-line in cardiac muscle.

14. The presence of desmosomes in intercalated discs helps cardiac muscle cells to:

A. Conduct electrical signals.
B. Maintain mechanical integrity by adhering to each other.
C. Perform aerobic respiration.
D. Store calcium ions.

15. Calcium ions in cardiac muscle fibers come from which of the following sources?

A. Only the sarcoplasmic reticulum.
B. Only the extracellular fluid.
C. Both the sarcoplasmic reticulum and extracellular fluid.
D. Only mitochondria.

13- B / 14- B / 15- C

16. The heart is divided into two functional syncytia, which allows:

A. The atria and ventricles to contract simultaneously.
B. The ventricles to contract before the atria.
C. The atria to contract slightly before the ventricles.
D. Contractions to be regulated by the AV node.

17. What role does the SERCA2 pump play in cardiac muscle relaxation?

A. It pumps calcium ions out of the cell into the T-tubules.
B. It transports calcium ions back into the sarcoplasmic reticulum.
C. It exchanges sodium for calcium in the extracellular space.
D. It stores calcium ions for the next contraction.

16- C / 17- B