

What is the Cardiac Conduction System?

Worksheet

The cardiac conduction system is a network of specialized cells - SA node, AV node, Bundle of His, and Purkinje fibers - that generates and conducts electrical impulses to make the heart beat in a coordinated rhythm.

Questions

1. Which structure is the heart's primary pacemaker?
 - A) AV node
 - B) SA node
 - C) Bundle of His
 - D) Purkinje fibers
2. What is the role of the AV node?
 - A) Pump blood
 - B) Delay the signal before it reaches the ventricles
 - C) Generate the fastest impulses
 - D) Form heart valves
3. Which structures conduct the impulse fastest through the ventricles?
 - A) Endocardium
 - B) AV node
 - C) Purkinje fibers
 - D) Epicardium
4. If the SA node fails, which structure typically becomes the backup pacemaker?
 - A) Epicardium
 - B) AV node
 - C) Aorta
 - D) Vena cava
5. A patient's SA node fires at 75 beats per minute with no conduction block. What is their heart rate and rhythm?
6. An ECG shows a PR interval (SA node to ventricles) of 0.20 s, at the upper normal limit. What does this reflect?
7. If the SA node fails, the AV node takes over as pacemaker at 40-60 bpm instead of 60-100 bpm. Why is the new rate slower?
8. Define: What is the cardiac conduction system?
9. Define: What is the heart's natural pacemaker?
10. Define: Why does the AV node delay the signal?

Answer Key

1. B) SA node - The SA node has the fastest intrinsic firing rate and normally sets heart rhythm.
2. B) Delay the signal before it reaches the ventricles - The AV node briefly delays conduction so the atria can finish contracting first.
3. C) Purkinje fibers - Purkinje fibers conduct rapidly, spreading the signal through both ventricles almost simultaneously.
4. B) AV node - The AV node has the next-fastest intrinsic rate and takes over if the SA node fails.
5. The SA node is the dominant pacemaker It fires 75 signals per minute, so every SA impulse produces one heartbeat Heart rate = 75 bpm, regular sinus rhythm
6. The PR interval is the time from atrial depolarization (P wave) to ventricular depolarization (QRS) Most of this delay happens at the AV node (about 0.1 s of the 0.12-0.20 s total) 0.20 s is still within the normal 0.12-0.20 s range, so conduction is normal but slow
7. The SA node has the fastest intrinsic firing rate (60-100 bpm) so it normally sets the pace The AV node has a slower intrinsic rate (40-60 bpm) When the SA node fails, the AV node becomes the backup pacemaker at its own slower intrinsic rate
8. The network of specialized cells (SA node, AV node, Bundle of His, Purkinje fibers) that generates and conducts the electrical impulses controlling heartbeat.
9. The SA (sinoatrial) node, located in the right atrium, firing 60-100 times per minute.
10. To let the atria finish contracting and empty into the ventricles before the ventricles contract.

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