THE ELECTRICAL SYSTEM OF THE HEART

WHAT DOES THE ELECTRICAL SYSTEM DO?

Just like your home, your heart needs electricity to work. The good news is that the heart creates its own electrical signals. The electrical system in your heart is what actually causes your heart to beat (contract and relax). The electrical system also controls the speed of your heartbeat.

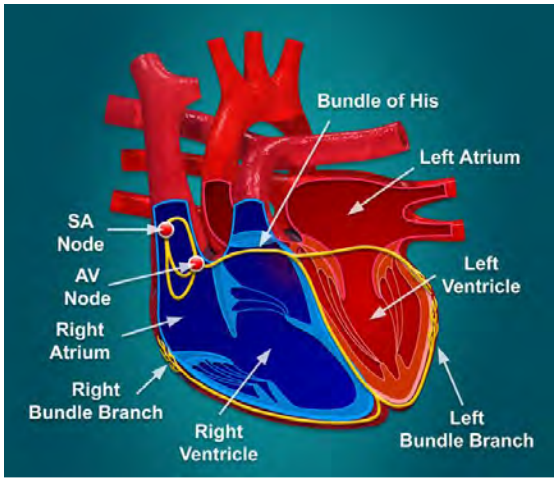
Your heart's electrical system includes a network of pathways, similar to the electrical wiring in your home. The pathways carry electrical signals through your heart. The movement of the signals makes your heart contract and relax. Your heart's electrical system is also called the cardiac conduction system.

When working properly, your heart's electrical system automatically responds to your body's changing need for oxygen. It slows down your heart rate when you sleep, for example. And it speeds up your heart rate as you climb stairs. When your heart rate speeds up, your heart pumps faster and your body gets more oxygen-rich blood.

WHAT ARE THE PARTS OF THE ELECTRICAL SYSTEM?

Your heart's electrical system includes three important parts, or pathways. When the electrical signals travel down these paths as they should, your heartbeat is coordinated and occurs at a normal rate. These pathways include:

- The S-A node (sinoatrial node)
- The A-V node (atrioventricular node)
- The His-Purkinje system



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THE S-A NODE: THE NATURAL PACEMAKER FOR YOUR HEART

The S-A node consists of special cells in your upper right atrium. These cells create the electrical impulses that start your heartbeat. The S-A node normally produces 60 to 80 electrical signals per minute. This results in a heart rate, or pulse rate of 60 to 80 beats per minute. Because the S-A node controls your heart rate, it is called your heart's "natural pacemaker." Electrical signals created by the S-A node travel down pathways to the A-V node.

THE A-V NODE: THE ELECTRICAL BRIDGE FOR YOUR HEART

The A-V node consists of special cells between your heart's upper and lower chambers. The A-V node allows the electrical signals to travel from the atria to the ventricles. You can think of the A-V node as the "electrical bridge"

between the atria and ventricles. Some unusually slow heartbeats (called bradycardia) may be caused by problems in the A-V node.

THE HIS-PURKINJE SYSTEM

Once in your heart's lower chambers, or ventricles, the electrical signals travel down a complex series of pathways called the His-Purkinje system. As this occurs, your ventricles contract. Once your S-A node has created an electrical signal, it takes less than a second for the signal to travel down to the A-V node and through the His-Purkinje system.

ELECTRICAL SIGNALS AND BLOOD FLOW

Electrical signals created by the S-A node follow a natural electrical pathway through your heart walls. The movement of the electrical signals makes your heart's chambers contract and relax. When a signal passes through a chamber wall, the chamber contracts. When the signal has moved out of the wall, the chamber relaxes. In a healthy heart, the chambers contract and relax in a coordinated way, or in rhythm.

THE PATH OF AN ELECTRICAL SIGNAL

Step One: The S-A node creates an electrical signal.

Step Two: The signal follows natural pathways through both atria. This causes the blood to contract, pushing blood into the ventricles.

Step Three: The signal reaches the A-V node. There, the signal pauses very briefly to give the ventricles time to fill with blood.

Step Four: The signal spreads through the His-Purkinje system. This makes the ventricles contract, pushing blood out to your lungs and body.

ARRHYTHMIAS: ABNORMAL HEARTBEATS

When your heart beats at a normal rate and rhythm it is called normal sinus rhythm. A problem in your heart's electrical system can disrupt your heart's normal rhythm. An abnormal heart rate (or heart rhythm) is called an arrhythmia. It is normal and healthy for your heartbeat to speed up or slow down during the day as your activity level changes. But it is not normal for your heart to beat out of rhythm. When your heart beats out of rhythm, it may not deliver enough blood to your body. Two types of arrhythmias in your atria are called sinus tachycardia and atrial fibrillation. Two types of arrhythmias in your ventricles are called ventricular tachycardia and ventricular fibrillation. Slow arrhythmias are called bradycardia. Many of the arrhythmias are serious enough to require treatment. To check for a possible problem in your heart's electrical system, your doctor may order an electrocardiogram (ECG or EKG). An EKG records the electrical activity in your heart. It also shows the timing of your heart's contractions.