

# Arrhythmias / Rhythm Disorders

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## What is an arrhythmia?

**A**N ARRHYTHMIA IS A CHANGE IN THE REGULAR beat of the heart. The heart may seem to skip a beat or beat irregularly or very fast or very slowly.

## Does having an arrhythmia mean that a person has heart disease?

No, not necessarily. Many arrhythmias occur in people who do not have underlying heart disease.

## What causes arrhythmias?

Many times, there is no recognizable cause of an arrhythmia. Heart disease may cause arrhythmias. Other causes include: stress, caffeine, tobacco, alcohol, diet pills, and cough and cold medicines.

## Are arrhythmias serious?

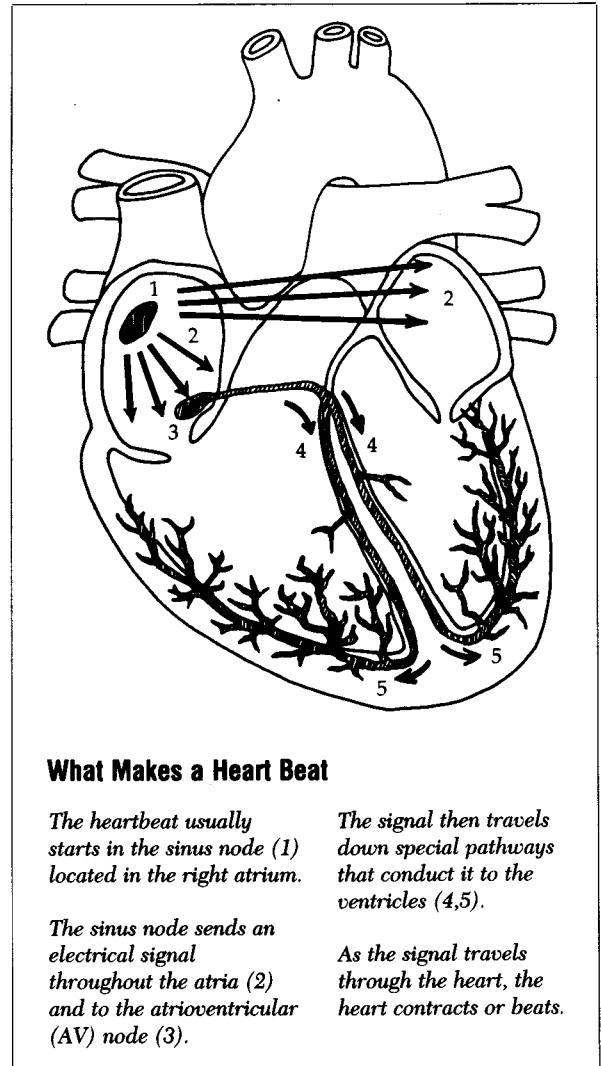
The vast majority of people with arrhythmias have nothing to fear. They do not need extensive exams or special treatments for their condition.

In some people, arrhythmias are associated with heart disease. In these cases, heart disease, not the arrhythmia, poses the greatest risk to the patient.

In a very small number of people with serious symptoms, arrhythmias themselves are dangerous. These arrhythmias require medical treatment to keep the heartbeat regular. For example, a few people have a very slow heartbeat (bradycardia), causing them to feel lightheaded or faint. If left untreated, the heart may stop beating and these people could die.

## How common are arrhythmias?

Arrhythmias occur commonly in middle-age adults. As people get older, they are more likely to experience an arrhythmia.



## What Makes a Heart Beat

The heartbeat usually starts in the sinus node (1) located in the right atrium.

The sinus node sends an electrical signal throughout the atria (2) and to the atrioventricular (AV) node (3).

The signal then travels down special pathways that conduct it to the ventricles (4,5).

As the signal travels through the heart, the heart contracts or beats.

## What are the symptoms of an arrhythmia?

Most people have felt their heart beat very fast, experienced a fluttering in their chest, or noticed that their heart skipped a beat. Almost everyone has also felt dizzy, faint, or out of breath or had chest pains at one time or another. One of the most common arrhythmias is sinus arrhythmia, the change in heart rate that can occur normally when we take a breath. These experiences may cause anxiety, but for the majority of people, they are completely harmless.

You should not panic if you experience a few flutters or your heart races occasionally. But if you have questions about your heart rhythm or symptoms, check with your doctor.



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## **Arrhythmia Types**

### **Originating in the Atria**

**Sinus arrhythmia.** Cyclic changes in the heart rate during breathing. Common in children and often found in adults.

**Sinus tachycardia.** The sinus node sends out electrical signals faster than usual, speeding up the heart rate.

**Sick sinus syndrome.** The sinus node does not fire its signals properly, so that the heart rate slows down. Sometimes the rate changes back and forth between a slow (bradycardia) and fast (tachycardia) rate.

**Premature supraventricular contractions or premature atrial contractions (PAC).** A beat occurs early in the atria, causing the heart to beat before the next regular heartbeat.

**Supraventricular tachycardia (SVT), paroxysmal atrial tachycardia (PAT).** A series of early beats in the atria speed up the heart rate (the number of times a heart beats per minute). In paroxysmal tachycardia, repeated periods of very fast heartbeats begin and end suddenly.

**Atrial flutter.** Rapidly fired signals cause the muscles in the atria to contract quickly, leading to a very fast, steady heartbeat.

**Atrial fibrillation.** Electrical signals in the atria are fired in a very fast and uncontrolled manner. Electrical signals arrive in the ventricles in a completely irregular fashion, so the heart beat is completely irregular.

**Wolff-Parkinson-White syndrome.** Abnormal pathways between the atria and ventricles cause the electrical signal to arrive at the ventricles too soon and to be transmitted back into the atria. Very fast heart rates may develop as the electrical signal ricochets between the atria and ventricles.

### **Originating in the Ventricles**

**Premature ventricular complexes (PVC).** An electrical signal from the ventricles causes an early heart beat that generally goes unnoticed. The heart then seems to pause until the next beat of the ventricle occurs in a regular fashion.

**Ventricular tachycardia.** The heart beats fast due to electrical signals arising from the ventricles (rather than from the atria).

**Ventricular fibrillation.** Electrical signals in the ventricles are fired in a very fast and uncontrolled manner, causing the heart to quiver rather than beat and pump blood.

## **What happens in the heart during an arrhythmia?**

Describing how the heart beats normally helps to explain what happens during an arrhythmia.

The heart is a muscular pump divided into four chambers—two atria located on the top and two ventricles located on the bottom (see diagram on page 1).

Normally each heartbeat starts in the right atrium. Here, a specialized group of cells called the sinus node, or natural pacemaker, sends an electrical signal. The signal spreads throughout the atria to the area between the atria called the atrioventricular (AV) node.

The AV node connects to a group of special pathways that conduct the signal to the ventricles below. As the signal travels through the heart, the heart contracts. First the atria contract, pumping blood into the ventricles. A fraction of a second later, the ventricles contract, sending blood throughout the body.

Usually the whole heart contracts between 60 and 100 times per minute. Each contraction equals one heartbeat.

An arrhythmia may occur for one of several reasons:

- Instead of beginning in the sinus node, the heartbeat begins in another part of the heart.
- The sinus node develops an abnormal rate or rhythm.
- A patient has a heart block.

## **What is a heart block?**

Heart block is a condition in which the electrical signal cannot travel normally down the special pathways to the ventricles. For example, the signal from the atria to the ventricles may be (1) delayed, but each one conducted; (2) delayed with only some getting through; or (3) completely interrupted. If there is no conduction, the beat generally originates from the ventricles and is very slow.

## **What are the different types of arrhythmias?**

There are many types of arrhythmias. Arrhythmias are identified by where they occur in the heart (atria or ventricles) and by what

happens to the heart's rhythm when they occur.

Arrhythmias arising in the atria are called atrial or supraventricular (above the ventricles) arrhythmias. Ventricular arrhythmias begin in the ventricles. In general, ventricular arrhythmias caused by heart disease are the most serious.

Different types of arrhythmias are described in the box on page 2.

### How does the doctor know that I have an arrhythmia?

Sometimes an arrhythmia can be detected by listening to the heart with a stethoscope. However, the electrocardiogram is the most precise method for diagnosing the arrhythmia.

An arrhythmia may not occur at the time of the exam even though symptoms are present at other times. In such cases, tests will be done if necessary to find out whether an arrhythmia is causing the symptoms.

### Tests for Detecting Arrhythmias

- **Electrocardiogram (ECG or EKG).** A record of the electrical activity of the heart. Disks are placed on the chest and connected by wires to a recording machine. The heart's electrical signals cause a pen to draw lines across a strip of graph paper in the ECG machine (see diagram below). The doctor studies the shapes of these lines to check for any changes in the normal rhythm. The types of ECGs are:

- Resting ECG.** The patient lies down for a few minutes while a record is made. In this type of ECG, disks are attached to the patient's arms and legs as well as to the chest.

- Exercise ECG (stress test).** The patient exercises either on a treadmill machine or bicycle while connected to the ECG machine. This test tells whether exercise causes arrhythmias or makes them worse or whether there is evidence of inadequate blood flow to the heart muscle ("ischemia").

- 24-hour ECG (Holter) monitoring.** The patient goes about his or her usual daily activities while wearing a small, portable tape recorder that connects to the disks on the patient's chest. Over time, this test shows changes in rhythm (or "ischemia") that may not be detected during a resting or exercise ECG.

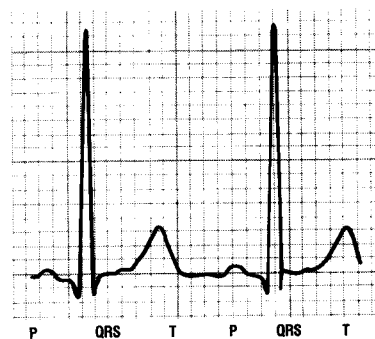
- Transtelephonic monitoring.** The patient wears the tape recorder and disks over a period of a few days to several weeks. When the patient feels an arrhythmia, he or she telephones a monitoring station where the record is made. If access to a telephone is not possible, the patient has the option of activating the monitor's memory

function. Later, when a telephone is accessible, the patient can transmit the recorded information from the memory to the monitoring station. Transtelephonic monitoring can reveal arrhythmias that occur only once every few days or weeks.

- **Electrophysiologic study (EPS).** A test for arrhythmias that involves cardiac catheterization. Very thin, flexible tubes (catheters) are placed in a vein of an arm or leg and advanced to the right atrium and ventricle. This procedure allows doctors to find the site and type of arrhythmia and how it responds to treatment.

### Electrocardiogram (ECG or EKG)

*This ECG shows two complete normal heart cycles. P shows the electrical signal that causes contraction of the atria. QRS shows the signal of the ventricles. T is the heart's return to its resting state.*



### **What tests can be done?**

First the doctor will take a medical history and do a thorough physical exam. Then one or more tests may be used to check for an arrhythmia and to decide whether it is caused by heart disease. The box on the previous page gives details about these tests.

### **How are arrhythmias treated?**

Many arrhythmias require no treatment whatsoever.

Serious arrhythmias are treated in several ways depending on what is causing the arrhythmia. Sometimes the heart disease is treated to control the arrhythmia. Or, the arrhythmia itself may be treated using one or more of the following treatments.

- **Drugs**

There are several kinds of drugs used to treat arrhythmias. One or more drugs may be used.

Drugs are carefully chosen because they can cause side effects. In some cases, they can cause arrhythmias or make arrhythmias worse. For this reason, the benefits of the drug are carefully weighed against any risks associated with taking it. It is important not to change the dose or type of your medication unless you check with your doctor first.

If you are taking drugs for an arrhythmia, one of the following tests will probably be used to see whether treatment is working: a 24-hour electrocardiogram (ECG) while you are on drug therapy, an exercise ECG, or a special technique to see how easily the arrhythmia can be caused. Blood levels of antiarrhythmic drugs may also be checked.

- **Cardioversion**

To quickly restore a heart to its normal rhythm, the doctor may apply an electrical shock to the chest wall. Called cardioversion, this treatment is most often used in emergency situations. After cardioversion, drugs are usually prescribed to prevent the arrhythmia from recurring.

- **Automatic implantable defibrillators**

These devices are used to correct serious ventricular arrhythmias that can lead to sudden death. The defibrillator is surgically placed inside the patient's chest. There, it monitors the heart's rhythm and quickly

identifies serious arrhythmias. With an electrical shock, it immediately disrupts a deadly arrhythmia.

- **Artificial pacemaker**

An artificial pacemaker can take charge of sending electrical signals to make the heart beat if the heart's natural pacemaker is not working properly or its electrical pathway is blocked. During a simple operation, this electrical device is placed under the skin. A lead extends from the device to the right side of the heart, where it is permanently anchored.

- **Surgery**

When an arrhythmia cannot be controlled by other treatments, doctors may perform surgery. After locating the heart tissue that is causing the arrhythmia, the tissue is altered or removed so that it will not produce the arrhythmia.

### **How can arrhythmias be prevented?**

If heart disease is not causing the arrhythmia, the doctor may suggest that you avoid what is causing it. For example, if caffeine or alcohol is the cause, the doctor may ask you not to drink coffee, tea, colas, or alcoholic beverages.

### **Is research on arrhythmias being done?**

The National Heart, Lung, and Blood Institute (NHLBI) supports basic research on normal and abnormal electrical activity in the heart to understand how arrhythmias develop. Clinical studies with patients aim to improve the diagnosis and management of different arrhythmias. These studies will someday lead to better diagnostic and treatment strategies.

### **Where can I find publications about heart disease?**

To obtain publications about heart disease, you may want to contact your:

- local American Heart Association chapter.
- local or state health department.

The National Heart, Lung, and Blood Institute also has publications about heart disease. For more information, contact:

- NHLBI Communications and Public Information Branch, Building 31, Room 4A21, Bethesda, Maryland 20892.