

Patient information factsheet

Tachyarrhythmias (fast heart rhythms)

The normal electrical system of the heart

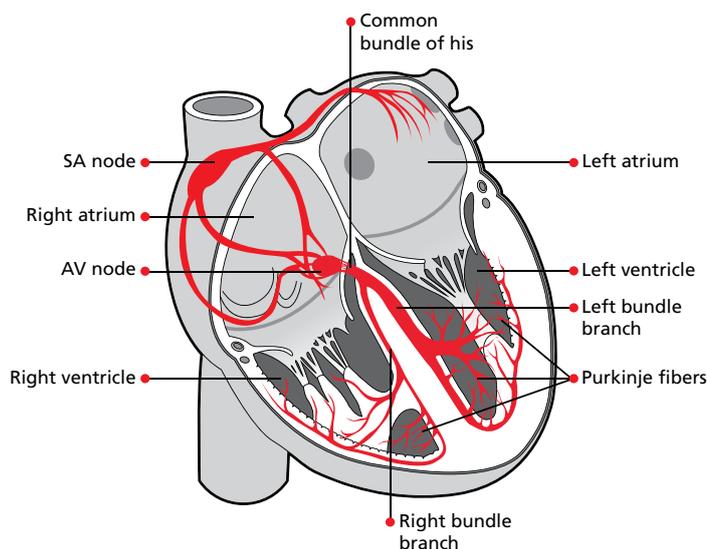
The heart has its own electrical conduction system. The conduction system sends signals throughout the upper chambers (atria) and lower chambers (ventricles) of the heart to make it beat in a regular, coordinated rhythm. The conduction system consists of two nodes that contain conduction cells and special pathways that transmit the impulse.

A normal heartbeat begins when an electrical impulse is fired from the sinus node (also called sino-atrial or SA node), in the right atrium. The sinus node is responsible for setting the rate and rhythm of the heart and is therefore referred to as the heart's pacemaker.

The electrical impulse fired from the SA node spreads throughout the atria, causing them to contract and squeeze blood into the ventricles. The electrical impulse then reaches the atrioventricular node (AV node), which acts as a gateway, slowing and regulating the impulses travelling between the atria and the ventricles. As the impulse travels down the pathways into the ventricles the heart contracts and pumps blood around the body. The cycle then begins again.

A normal adult heart beats in a regular pattern 60 to 100 times a minute; this is called sinus rhythm.

Diagram of the heart's electrical system



What is an arrhythmia?

Sometimes if the conduction pathway is damaged, blocked, or an extra pathway exists the heart's rhythm changes. The heart may beat too quickly (tachycardia), too slowly (bradycardia) or irregularly. This may affect the heart's ability to pump blood around the body. These abnormal heartbeats are known as arrhythmias. Arrhythmias can occur in the atria or in the ventricles.

Causes of an arrhythmia

Any interruption in the heart's electrical system can cause an arrhythmia. For example, an irregular heartbeat may begin with an abnormal impulse in a part of the heart other than the normal pacemaker (the sinus node). Or the sinus node may develop an abnormal rate or rhythm.

Common causes of arrhythmias include stress, caffeine, tobacco, alcohol, diet pills and cough and cold medicines. If your heart tissue is damaged as a result of acquired heart disease, such as myocardial infarction (heart attack) or congenital heart disease you may be at risk of developing arrhythmias. Occasionally it may be a familial or inherited disorder. For some patients, however, doctors cannot identify a cause of their arrhythmias.

Diagnosing your arrhythmia

If your doctor suspects that you may have an arrhythmia, one or more of the following tests may be performed to determine the cause of your symptoms.

Electrocardiogram (ECG)

An electrocardiogram is a recording of the electrical activity of your heart. Electrode stickers are placed on your chest and connected by wires to a recording machine. Your heart's electrical signals produce a pattern on graph paper in the ECG. By analysing the pattern of these waves, your doctor can often determine what type of arrhythmia you have. ECG testing may be done while you are resting, or while you are exercising on a treadmill.

Holter monitor

A Holter monitor shows changes in your heart rhythm over the course of a 24-hour period that may not be detected during a resting or exercise ECG. You will be asked to go about your daily activities as usual (except for showering or bathing) while you wear a small, portable recorder that connects to electrode stickers on your chest. You will then come back to the hospital the next day so that the information can be retrieved and analysed.

Cardiac event monitor

If your doctor feels you need to be monitored for several days or weeks, you may need to have a cardiac event monitor. This type of recording device is used if your arrhythmias are infrequent. This device is about the size of a large pager, and can be clipped to your belt or waistband or carried in your bag or pocket. When you feel symptoms, you simply hold the recorder against your chest and press a button. The device then records up to 70 seconds of ECG readings.

Types of arrhythmia

Arrhythmias that occur in the atria are either atrial or supraventricular (above the ventricles) in origin, whereas ventricular arrhythmias start in the ventricles. While some arrhythmias are merely a nuisance, others can be life threatening. In general, ventricular arrhythmias caused by heart disease are the most serious kind, and require prompt medical attention.

Supraventricular tachycardia (SVT)

This type of arrhythmia commonly occurs in young, healthy people. Doctors often refer to SVT as re-entry tachycardia. This is because the electrical impulse does not fade out as with the normal heartbeat, but continues to move in a rapid circle within the conduction system. This is due to an extra electrical pathway that can form a short circuit within the heart's conduction system. SVT is usually a

rapid, regular rhythm. The two most common types of SVT are AV-nodal re-entry tachycardia and AV re-entry tachycardia (AVRT), most commonly known as Wolff-Parkinson-White syndrome (WPW).

AV nodal re-entry tachycardia (AVNRT)

This type of arrhythmia occurs when a problem arises in the way the electrical impulses pass through the AV node. Normally, the AV node acts as a gateway, slowing and regulating the impulses as they travel between the atria and the ventricles. In AVNRT there are two pathways, known as dual conduction pathways that can pass impulses to and from the AV node. This type of arrhythmia usually starts following an early beat (ectopic). An electrical short circuit then occurs where the electrical impulse rotates around the circuit and with each cycle pass to the ventricles, resulting in a very fast heartbeat.

AV re-entry tachycardia (AVRT) or Wolff-Parkinson-White syndrome (WPW)

In AVRT an extra electrical pathway exists that bypasses the normal conduction system. The pathway directly connects the atria to the ventricles. This extra pathway is known as an accessory pathway. The electrical impulses travel along the accessory pathway, bypassing the AV node. The tissue in the pathway does not slow the impulse down, as in the AV node. Therefore the electrical impulses reach the ventricles before the normal electrical impulse (this is known as pre-excitation). An ECG recording of a patient with WPW syndrome will often show a delta wave, which shows the existence of an extra electrical pathway. Very fast heart rates may occur as the electrical impulse bounces between the atria and ventricles.

Atrial fibrillation

Atrial fibrillation (AF) is one of the most common types of arrhythmia. AF occurs in the atria. The electrical impulse normally originates at the SA node. However in atrial fibrillation, many electrical impulses are fired rapidly and at random throughout the atria down to the ventricles. The resulting heartbeat is irregular and usually fast. When the atria are beating rapidly and irregularly (fibrillating) they are unable to completely empty all of the blood they receive into the ventricles. This can cause blood clots to form. Therefore, to prevent you being at an increased risk of stroke you will be treated with an anticoagulant (blood thinner).

Atrial flutter

Atrial flutter also occurs in the atria. The electrical impulses fire rapidly but the resulting rhythm is regular and organised. The rhythm is due to a re-entry circuit within the atria, where the electrical impulse travels in circles leaving and arriving back at the same point.

Ventricular tachycardia (VT)

VT occurs when the electrical impulses arise in the ventricles. The ventricles start beating at an abnormally fast, regular rate. When the ventricles are beating rapidly the heart does not work as efficiently, causing symptoms of weakness, dizziness, chest pain, shortness of breath or even collapse. There are several different types of VT and the seriousness of the condition can vary. VT can be a potentially life threatening heart rhythm as it can progress to ventricular fibrillation and cause the heart to stop beating (cardiac arrest).

There are a number of reasons that people may develop VT. For example, in people who have had a previous myocardial infarction (heart attack) the area of the heart muscle damaged by the heart attack forms scar tissue. This can make the heart susceptible to abnormal heart rhythms. Other people who may experience VT are patients with cardiomyopathy, previous corrective congenital heart surgery or inherited arrhythmias. There is also a small group of people who have VT with a structurally normal heart.

Ventricular fibrillation

Ventricular fibrillation occurs in the ventricles. In ventricular fibrillation, the electrical impulses are fired from multiple sites in the ventricles in a very fast and irregular way, causing the heart to quiver rather than to beat and pump blood. Ventricular fibrillation is a life threatening emergency requiring prompt medical treatment to prevent a fatality.

Treatments

The results of the tests you have had will determine the type and seriousness of your arrhythmia. Your doctor will then discuss your treatment options with you. Many patients with arrhythmias require no further treatment. The most important aspect of any initial evaluation is to determine the significance of the arrhythmia and the need for any type of intervention.

Medicines

There are a number of drugs that can be used to treat your arrhythmia. Anti-arrhythmic drugs are medicines that change the electrical signals in your heart and help prevent irregular or rapid heart rhythms.

Permanent pacemaker

If you have atrial fibrillation, which has proved difficult to treat, your doctor may recommend you have a pacemaker fitted in conjunction with a procedure called an atrioventricular (AV) node ablation. An AV node ablation and permanent pacemaker insertion will regulate the heart rate and provide symptomatic relief.

A pacemaker is a small device used to treat slow heart rhythms. It is implanted beneath the skin below the collarbone and connected to a pacing wire placed inside the heart. The pacemaker delivers a small electrical impulse to stimulate the heart to beat when it is going too slowly.

Radiofrequency (heat) energy / cryo (cold) energy catheter ablation

If you have an extra electrical pathway or group of cells (foci) your doctor may advise you to have a catheter ablation. A catheter ablation creates scar tissue that blocks the area of extra electrical activity causing the arrhythmias. This provides relief for those of you who may not have responded well to medications, or who would rather not or cannot take medications. This technique has a high percentage of success in treating many types of arrhythmias.

Internal cardioversion

Internal cardioversion is a low energy electrical shock delivered inside the heart. Two catheters are inserted into a vein in your groin and a small electrode pad applied to your chest.

During the internal cardioversion, you will be given a short acting sedative to make you sleepy. Internal cardioversion is performed when medications and external cardioversion have been unsuccessful in returning the heart's rhythm back to a normal sinus rhythm.

Implantable cardioverter defibrillator (ICD)

This is a device for people who are at risk of life threatening heart rhythms. It is slightly larger than a pacemaker and usually implanted beneath the skin below the collarbone. The ICD is connected via leads which are positioned inside the heart. It has the ability to determine and stop fast ventricular arrhythmias by using extra paced beats known as anti tachycardia pacing (ATP) or by delivering an electric shock to the heart. It is also capable of pacing the heart to stop it from going too slowly.

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Cancellations

Unfortunately we do sometimes have to cancel procedures. If this happens to you, we will always try to explain the reason. We fully appreciate that this is a stressful time for you and your family and we will do our best to provide you with a new date that is convenient for you as soon as possible.

Further information and contacts

We cannot guarantee that a particular person will perform the procedure. The person will, however, have appropriate experience.

If you have any questions regarding your forthcoming procedure please call **023 8120 8436** to speak to a cardiac rhythm management clinical nurse specialist. If you have a query relating your admission date please contact the cardiac rhythm management coordinator on **023 8120 8772**.

You can also email crmnurses@uhs.nhs.uk

The following websites also provide useful information:

www.bhf.org.uk

www.heartrhythmcharity.org.uk

If you need a translation of this document, an interpreter or a version in large print, Braille or on audio tape, please telephone 023 8120 4688 for help.