

## Patient information factsheet

# Pulmonary vein isolation (PVI) radiofrequency ablation

### The normal electrical system of the heart

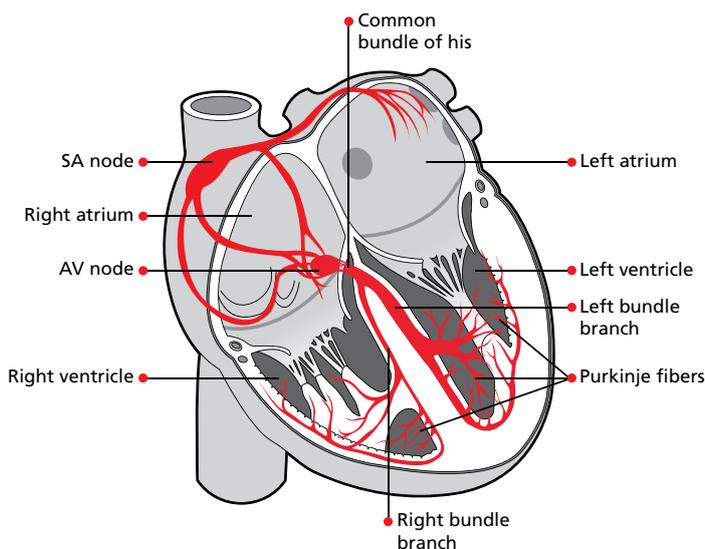
The heart has its own electrical conduction system. The conduction system sends signals throughout the upper chambers (atria) and lower chambers (ventricles) of the heart to make it beat in a regular, coordinated rhythm. The conduction system consists of two nodes that contain conduction cells and special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



### 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.

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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.

The type of rhythm disturbance you have is called atrial fibrillation (AF). It is one of the most common types of arrhythmia. Atrial fibrillation occurs in the atria. In atrial fibrillation, the SA node alone does not produce the electrical impulses. Instead many impulses begin and spread chaotically through the atria. As a result, your heartbeat is usually fast and irregular. The atria are said to be fibrillating when they beat too quickly and irregularly. During this time they are unable to completely empty all of the blood they receive into the ventricles below. This can cause blood to pool and potentially clots can form. Therefore, to prevent you being at an increased risk of stroke your doctor will prescribe you with a blood-thinning drug (anticoagulant) called warfarin or an alternative. You must continue to take your anticoagulant after the procedure.

In many patients with atrial fibrillation it has been found that the extra electrical signals responsible start in the area around the pulmonary veins on the left side of the heart.

## Pulmonary vein isolation ablation

Your doctor has advised you to have a pulmonary vein isolation (PVI) ablation as you have been diagnosed with an abnormal heart rhythm (atrial fibrillation), which has proved difficult to treat with medication. A PVI ablation will regulate your heart rate and provide relief from the symptoms you have been experiencing. This procedure stops the fast, irregular impulses from the atria reaching the ventricles.

It is not uncommon to experience palpitations (extra heartbeats) on and off for a few months after the procedure, until the small scars created in the heart heal. Sometimes, you may also feel as if your abnormal heart rhythm is returning, but then it suddenly stops. These sensations are normal and you should not be alarmed. However, if you feel your abnormal heart rhythm has returned, you should call your GP.

## The procedure

There are four pulmonary veins that carry blood from the lungs back to the left atrium and where the two types of tissue from the atrium and veins meet is where the extra electrical signals that cause AF originate. Pulmonary vein isolation is a catheter ablation technique where the doctor uses an energy source, either radiofrequency energy (heat) or cryo (cold) energy to destroy this small area of tissue and form scar tissue. The resulting scar tissue blocks the extra electrical signals from the pulmonary veins reaching the left atrium, so the area can no longer generate or conduct the fast, irregular impulses. This process is repeated around the opening of each of the four pulmonary veins. This procedure is performed under a local anaesthetic, with sedation, which will help you to relax.

X-ray screening is used during the procedure so if you think you may be pregnant you should let us know before the procedure.

## Risks of the procedure

Pulmonary vein isolation ablation is a safe procedure, however as with any procedure, there are potential risks. The risks will be fully explained by the doctors before you have your procedure.

If you are known to have underlying coronary heart disease the procedural risks are slightly increased. The risks outlined below can all be treated and are rarely life threatening.

The Updated Worldwide Survey on the Safety of Catheter Ablation (2010) found that the risks were very rare, as shown in the table on the next page.

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	<b>Complication</b>	<b>Rate (%)</b>
1	<b>Tamponade</b> Occasionally the catheter electrodes may puncture the heart muscle causing blood to collect around the heart. This is called a cardiac tamponade and can lead to the heart being compressed. If this happens the doctor may need to insert a drain to remove the blood.	1.31
2	<b>Pseudo aneurysm</b> Occasionally, the catheter electrodes can accidentally damage the blood vessels when being inserted. The risk of this happening to you is between 3 and 5%. Serious injury to the blood vessels requiring a surgical procedure to repair the damage is extremely rare.	0.93
3	<b>Transient ischaemic attack (TIA) / cerebrovascular accident (CVA) commonly called a stroke</b> The brain cells in the part of the brain served by the affected blood vessel die of lack of oxygen and nutrients due to the vessel being blocked. Symptoms can be slurred speech, limb/ facial weakness and loss of memory or recall depending on the area of the brain affected. The difference between a TIA and CVA is the duration of your symptoms. Less than forty eight hours is usually classified as a TIA.	0.71
4	<b>Arterial-venous fistulae</b> An abnormal connection between an artery and vein can be caused by the doctor inadvertently puncturing both vessels simultaneously. This may require surgical intervention.	0.54
5	<b>Pulmonary vein stenoses (requiring intervention)</b> If the pulmonary veins are affected by the scar tissue then blood flow through the veins may become restricted, leading to potential breathing difficulties.	0.29
6	<b>Permanent diaphragm paralysis</b> The nerves that control the diaphragm (one of the muscles involved in expanding the chest to enable efficient breathing) run alongside the heart and can sometimes be damaged by the procedure leading to potential breathing difficulties.	0.17
7	<b>Death</b> All invasive procedures carry a risk of death to a lesser or greater degree.	0.15
8	<b>Pneumothorax</b> Very occasionally, the catheter electrodes can puncture the lung wall. Air leaks out of the lungs and collects in the space between the lung and chest wall, resulting in partial or complete collapse of the lung. If this happens the doctor may need to insert a drain to reinflate your lungs.	0.09
9	<b>Valvular damage</b> Occasionally, the catheter electrodes can accidentally damage the valves when being moved into position within the heart.	0.07
10	<b>Atrial-oesophageal fistulae</b> Due to the close proximity of the atria to the oesophagus (the tube from the mouth to the stomach) a hole can sometimes be made joining them together.	0.04
11	<b>Haemothorax</b> The catheter electrodes can sometimes damage the chest wall causing blood to collect in the chest cavity. If this happens the doctor may need to insert a chest drain.	0.01
12	<b>Sepsis, abscess, endocarditis</b> These terms refer to infection with endocarditis being the inner layer of the heart which may require treatment with antibiotics.	0.01

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## Success rate

The PVI ablation procedure is not always successful on the first attempt. Your doctor will discuss the success rate with you on an individual basis before you sign your consent form. If the procedure is unsuccessful it may be possible to repeat it at a later date.

## Before admission

If you are taking warfarin (blood thinner) regular blood tests will be needed for at least four weeks before the procedure, usually at your GP surgery. We ask that you keep your INR between 2.0 and 3.0. A record of this should be kept in your yellow warfarin book. You should also check your INR three days before your admission (contact the admissions office on the number given on the last page of this information sheet) to confirm it is in range to enable the procedure to go ahead.

If you are taking an alternative anticoagulant then you will be given an individual management plan to follow.

If you are taking medication to control your heart rhythm you may continue to take your tablets before the procedure.

**The above advice should be followed unless your admissions letter advises otherwise.**

Before the procedure, your doctor will run a number of tests to check that you do not have any blood clots in the atria or any other structural heart problems. These tests will include a magnetic resonance imaging scan (MRI) and a transoesophageal echo (TOE).

## Before the procedure

On your arrival to the ward a nurse will talk to you and your family about your hospital admission and answer any questions you may have. Before the procedure, you will have blood tests taken and another ECG recorded. A doctor will also see you to explain the procedure to you and ask you to sign a consent form. If you have any worries or concerns please do not be afraid to ask questions. It is important to tell your nurse or doctor if you have any allergies or have had a previous reaction to drugs or other tests. If you are having the procedure done under a general anaesthetic, you will also talk to an anaesthetist. A doctor or nurse will need to insert a small needle into a vein in your hand (cannula) in order to give you drugs during the test. You will also be asked to shave your groin and if appropriate, your upper chest. You will then be given a hospital gown to wear.

You will be advised not to eat for six hours before your procedure. If you are diabetic, your nurse will discuss your tablets/insulin dose with you, because not eating may affect your blood sugar levels. The PVI ablation procedure could take between two and four hours. You may wish to let your family know so they do not worry.

## During the procedure

While you are in the catheter lab a nurse will stay with you and be there to reassure you throughout the procedure. There is a lot of equipment in the room, which is used to monitor your heart rhythm. You will be awake during the procedure, but to help you relax your doctor will give you a short acting sedative.

The doctor will inject a local anaesthetic into your groin to numb your leg. This may sting a little and you may feel some mild discomfort. When the local anaesthetic has taken effect, the doctor will insert a small tube (sheath) into your groin. You should not feel any pain, but if you do please let your doctor know. Through the sheath the doctor will gently thread several flexible wires (catheter electrodes) into your heart.

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The catheters are about the size of a small drinking straw. The catheters are carefully moved into position. The doctor will make a small hole (transeptal puncture) from the right to the left atrium to gain access to the pulmonary veins. This is performed under x-ray screening. You should not feel pain during this part of the procedure. Once the ablation catheter is in place, the doctor will pinpoint the area where the pulmonary veins join with the left atrium. A small amount of energy is delivered directly onto this area of extra electrical activity to create a scar.

This process is repeated around each of the pulmonary veins. You may feel a slight burning sensation or heaviness in your chest during this part of the procedure. The formation of scar tissue as a result of the ablation stops the extra electrical impulses reaching the left atrium. Therefore after ablation your heartbeat will only follow the normal electrical pathway.

If you do have any uncomfortable symptoms during the procedure, for example, chest pain, dizziness or shortness of breath, please tell your nurse or doctor.

## After the procedure

After the procedure is completed the catheter and IV line will be removed. Firm pressure will be applied to your groin where the catheter was inserted to stop you from bleeding.

You will then be moved to the recovery area where you will be monitored for a short time. On returning to the ward you will need to rest for a few hours. You may feel a little sleepy until your sedative has worn off. The nurse will record an ECG, check your blood pressure, pulse and feel your foot pulses. The nurse will also check your groin for any bleeding. It is important that you remain in bed and avoid bending your affected leg for about two hours after the catheters have been removed. This is to prevent any bleeding from the puncture site. After this period you will be able to get up if there are no complications. You will be able to eat and drink normally as soon as you return to the ward. The nurse will remove the small needle in your hand. You may require a chest x-ray. If you feel any palpitations or dizziness after the test, please let the nurse know.

## Results

Your doctor will usually discuss the results and treatment plan with you and your family after your procedure.

## Going home

You will normally be able to go home the following day. It is important to ask a family member or friend to collect you and drive you home. Before you are discharged, your doctor or CRM nurse will advise you regarding the medicines you will need to take, or stop and your follow-up care.

## Caring for your wound

You will have a small dressing on your puncture site that can be removed the next day. It is important to keep the area clean and dry until it has healed. If you notice any swelling, redness or oozing please let your GP know.

## Resuming normal activities

You can resume your normal daily activities when you leave hospital. You should not strain or lift heavy objects for a few days so that the incision site can heal.

Unless your job requires you to lift heavy objects, you can return to work after a day or two. You are advised not to drive a car for one week. If you hold a Group PSV 2 licence (lorries/buses), you must not drive for six weeks.

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## Medication

After the procedure your doctor will advise you what medications need to be continued. You will need to continue your anticoagulation until you are reviewed post procedure in clinic (approximately three months).

On average, it takes about three months for the heart to fully recover. You may experience atrial fibrillation and palpitations (skipped heartbeats) whilst in hospital and in the first two to three months after the procedure. This does not mean the ablation has failed. If this happens your doctor may need to review your medication to stop your arrhythmia whilst continuing your anticoagulation. If during this period if you continue to experience atrial fibrillation and feel unwell your doctor may suggest you have a cardioversion to regulate your heart rhythm.

The atrial fibrillation and palpitations will gradually decrease. Three months after the procedure the majority of patients are in normal sinus rhythm and your doctor will ask you to stop taking your medications.

It is important to remember that approximately one third of patients require a repeat procedure.

## Follow-up care

The cardiac rhythm management (CRM) team will give you specific follow-up instructions when you leave hospital. The doctor will write a letter to your GP detailing your hospital stay and treatment.

## 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.

## Contact details

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](mailto:crmnurses@uhs.nhs.uk)

The following websites also provide useful information:

[www.bhf.org.uk](http://www.bhf.org.uk)

[www.heartrhythmcharity.org.uk](http://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.**