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Arrhythmia Alliance

AFAssociation

www.heartrhythmalliance.org

Pacemaker Patient Information

Working together to improve the diagnosis, treatment and quality of life for all those affected by arrhythmias

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Registered Charity No. 1107496

Glossary

Arrhythmia An abnormal heart rhythm

Atria The two upper chambers of the heart

AV node Part of the electrical pathway between the atria and the ventricles

Bradycardia A slow heart rate, normally less than 60 beats per minute

Cardiologist A doctor who has specialised in the diagnosis and treatment of patients with a heart condition

Electrocardiogram (ECG) Records the electrical activity within the heart

Heart block Electrical impulses are slowed or blocked as they travel from the top to the bottom chambers of the heart

Tachycardia An abnormally fast heart rate over 100 beats per minute

Ventricles The two lower chambers of the heart, providing most of the pumping force

Sinoatrial node The electrical origin of every heart beat

Important Information

This booklet is intended for use by people who wish to understand more about pacemakers. The information comes from research and previous patient experiences and offers an explanation of the pacemaker procedure.

Contents

The heart during normal rhythm

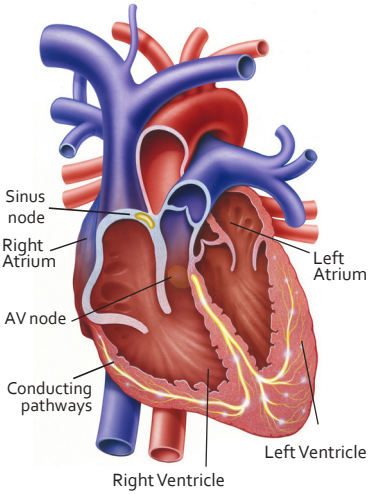
If your doctor has suggested that you have a pacemaker fitted, it is because you have an abnormality in the electrical conduction system of your heart. To help you understand this, it may be useful for you to know how the electrical conduction system in your heart works normally.

The heart is a muscle; its function is to pump blood and oxygen to all of your vital organs. A normal healthy heart usually beats in a regular fashion at around 50 to 100 times a minute.

It has four chambers, two at the top (the right and left atria) and two at the bottom (the right and left ventricles). The heart also has an electrical system, which sends impulses to the heart causing it to contract and pump blood around the body. Each normal heartbeat begins in the natural pacemaker of the heart (the sinus, sino-atrial or SA node), which lies at the top of the right atrium. It then travels across the two top chambers and down through a small junction box (the atrio-ventricular or AV node), which lies between the upper and lower chambers. It then spreads rapidly through a special conducting system through the ventricles causing the heart to contract and pump.

Sometimes the electrical system in your heart does not work as well as it should. This can cause the heart to beat too slowly, irregularly, or the upper and lower chambers to be out of synchrony. A pacemaker can treat some of these abnormal heart rhythms.

The heart and normal conduction



What is a pacemaker?

A pacemaker is a small device that is placed in the chest to help control abnormal heart rhythms (arrhythmias). It uses a battery and electronic circuits connected to the heart by one or more insulated wires (leads) to prompt the heart to beat at a normal rate.

An example of a leadless pacemaker next to a € 1 Euro coin

These leads are passed along a vein to your heart and the pacemaker box is usually implanted under the skin in your upper chest. The pacemaker can monitor your heart and produce electrical impulses to treat abnormal heart rhythms.

Pacemakers may be single (one lead), dual (two leads) or triple (three leads) and you will be fitted with the device appropriate for your particular condition.

Pacemakers are largely used to treat slow heart rhythms (bradycardia). One type of pacemaker, the biventricular pacemaker or cardiac resynchronisation therapy pacemaker, is increasingly being used to treat patients with heart failure; this is not suitable for all but can be discussed with your doctor.

Recently leadless pacemakers have become available for use in specific patients. These are very small devices that are implanted directly into the heart and there are no leads required. Your doctor will know whether this is something that would be suitable for you.

There are approximately 70,500 pacemakers implanted in the UK every year.

Why do I need a pacemaker?

There are several different common conditions which cause the heart to beat and the rhythm to be abnormal. These are:

Bradycardia

Bradycardia is a term that describes a number of different conditions in which the heart beats at an unusually slow rate. If impulses are sent from the sinoatrial node at a slow rate, or if the impulses are delayed as they travel through the conduction system, the heartbeat will be slow.

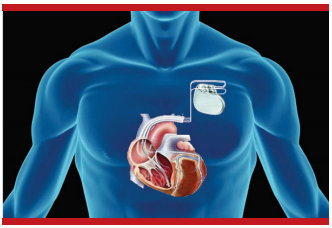
The severity of and treatment for bradycardia depends on the area of the heart affected. The goal of using a pacemaker to treat bradycardia is to keep your heart rate at a level high enough to allow sufficient blood flow to the body.

Complete or intermittent heart block

Heart block accounts for about 60% of patients who have pacemakers implanted. This is a condition where the AV node and conduction system does not transmit the electrical pulse from the top to the bottom of the heart. It may be complete or partial. When this happens the heart usually beats very slowly and you may have symptoms of dizziness or blackouts.

A pacemaker is required to restore a normal heart rate and correct the slowing of the natural electrical conduction tissue. This is most commonly due to the conduction system 'affected by the ageing process', but can also occur as a congenital (in-born) problem or as the result of a heart attack, infection, or particular medications.

Sick sinus syndrome



This is a condition where the sinoatrial node natural pacemaker does not function properly and results in your heart going either too slowly or too fast or a combination of both An implanted pacemaker is used to support the slow heart rate and medicine is usually given to control the fast heart rhythms.

Pace and ablate for atrial fibrillation (AF)

Pacemakers are also used following a procedure called catheter ablation that involves applying radiofrequency (special catheter procedure for uncontrolled AF called 'pace and ablate') energy to the AV node in your heart, which destroys the cells in this area. This means that the heartbeats can no longer travel from the top to the bottom of the heart and a pacemaker is then used to deliver electrical impulses to the ventricles. This procedure is performed when your atrial fibrillation causes fast heart rates that cannot be controlled using standard medication or other therapies. You can read more about the ablation procedure in the Arrhythmia Alliance booklet: Treatment options for an arrhythmia.

Heart failure

Some people who experience heart failure (when the heart does not pump as well as it should) can benefit from having a particular type of pacemaker, which is known as a biventricular pacemaker or **cardiac resynchronisation therapy**. This type of pacemaker may involve three leads in the heart.

If you have heart failure, this therapy may improve some of your symptoms. However, not all people who experience heart failure will benefit from this treatment and careful assessment is needed before this type of pacemaker is implanted.

His bundle pacing

The electrical pathways beyond the AV node split into right and left. Some patients have an electrical delay on only one of these, and a pacemaker might be appropriate to treat this. In practice, a pacemaker for His bundle pacing has two leads: one on the atrium, and the other, which would normally be implanted in the right ventricle, is placed just below the AV node, in an area called the His bundle, before the electrical conduction pathways split into two. This is a very specific procedure which may only suit a small proportion of people.

New leadless pacemaker

A new-style pacemaker is now available, designed to be placed directly in the heart without the visible surgical pocket, scar and insulated leads required for conventional pacemakers. The device offers a less invasive approach for patients compared to traditional pacemaker procedures and leaves no visible sign of a medical device under the skin, which can mean fewer post implant activity restrictions and no obstructions to shoulder movement. The leadless pacemaker is only suitable for some people at this time. Your doctor will be able to tell you if a leadless pacemaker is suitable for you.

Even with miniaturisation, the device battery is expected to have an average lifespan of 10-12 years.

How is the pacemaker implanted?

On the day of your procedure, you will be taken to the cardiac pacing theatre or catheter lab. Once you are in the pacing theatre, a nurse will check your details and you will be asked to lie on a trolley or narrow operating table.

The procedure is not usually performed under a general anaesthetic, but you may be given sedation, which will make you relaxed and sleepy. Before the procedure starts, the doctor will clean the skin with some antiseptic solution and inject some local anaesthetic under the skin just below your collarbone.

This will numb the area and allow the doctor to pass a small lead or electrode through a vein into your heart. You may have one, two or three leads inserted depending on what type of pacemaker you need. The lead(s) are then connected to the pacemaker box. This will usually be placed under the skin on your chest wall. The area will then be closed with dissolvable or non-dissolvable stitches.

If your stitches need to be removed by your GP, practice nurse or district nurse you will be informed before you leave hospital. The whole procedure should take approximately 60 to 90 minutes.

What happens after the pacemaker is fitted?

Are there any risks associated with the procedure?

There are some small risks associated with having a pacemaker fitted. Your doctor/specialist nurse will discuss these with you in more detail before you sign your consent form. The most common risks are:

- A small risk of infection, bleeding and bruising to the pacemaker site.
- A small risk of lead displacement – the pacemaker lead can move and would then need to be repositioned.
- A small risk of perforation of the lung during the procedure (a pneumothorax) – this is often detected on the chest x-ray that is performed following the pacemaker implant and can sometimes rectify itself without treatment. Very occasionally a small drain may need to be inserted through your side into the lining around the lung (in the space between your ribs) to allow the punctured lung to re-inflate. This is a simple procedure and the drain will be removed prior to your discharge home.

After the procedure, you will be taken back to the ward. You will be asked to lie in bed for a couple of hours before you can get up, eat and drink. Your heart rhythm may be monitored for a while to make sure that the pacemaker is doing its job, so you may be attached to an ECG monitor. As the wound can feel quite bruised and sore, especially for the first day or two, it is recommended that you take regular painkillers. It is important that you tell your nurse immediately if you have any pain or discomfort. You may also be given some antibiotics to take before and after the procedure to minimise the risk of infection.

The wound should be kept clean and dry until it has fully healed, although it is fine to have a bath or shower after the first three or four days. Ask your nurse for a protective dressing so that you can bathe without getting the wound wet. Report any wound problems to your nurse.

You will probably be allowed to go home the same or the next day provided your pacemaker is checked, there are no complications and your doctor assesses it is safe. Your pacemaker may be checked before you go home by a cardiac physiologist. This check may involve the use of a special computer, called a programmer, that can look at the device settings and make sure the pacemaker is working properly, or a simple magnet over the pacemaker with ECG recording may be sufficient.

This check takes about 15 minutes and can either be done on the ward or in the pacemaker clinic. You will also have a chest x-ray to check lead positions and make sure all is well following the implant procedure. Please ask the physiologist or specialist nurse if you have any questions or worries about the device. Depending on local policies, this check may happen a few hours after having your pacemaker implanted, or a few weeks. In the latter, you will receive an appointment letter to attend the pacemaker clinic in 4 to 8 weeks' time.

You will be given a pacemaker identity card which has details of the make and model of your pacemaker. You should always carry this card with you. If you require any further medical treatment in the future it is important that you show this card to the health care professionals treating you.

Arm movements

Extra tissue will grow around the lead(s) in your heart after a few weeks, which will prevent the wire(s) moving out of place. Patients should not interfere with the area of the implant, but follow the instructions given until the first follow up visit. As a general guide, you should not raise the arm on the same side as the pacemaker above shoulder height for the first week. For the next two weeks full, gentle shoulder movement is allowed. After three weeks you can exercise gently. Once you have had your first pacemaker clinic check you will be able to return to normal activity.

Wound site

Your wound site should take about six weeks for healing to be completed. Try to avoid wearing tight clothing over the wound until it has healed completely to avoid excess rubbing over the area.

If you notice any redness, soreness or swelling of the area, or any signs of bleeding or oozing from the wound, report this immediately to your implanting centre as these may be a sign of wound infection.

You will probably be able to feel the pacemaker box under your skin as well as other lumps close by. These are the leads that are attached to the box, curled up beside the box under the skin. It is extremely important that you don't try to move the box or leads, but do let someone at the implant centre know if they continue to bother you.

Will I feel the treatment from the pacemaker?

The device will be programmed to the best settings for you. This will be done before you leave hospital, but the settings can be modified during your follow up appointments in the clinic, as and when necessary.

You should not be aware of the pacemaker working, so if you feel body muscles twitching you should report it to the implanting centre.
The pacemaker will not usually stop the heart from speeding up so if you had fast palpitations before then they may continue. If this occurs the palpitations are usually treated by medicine.

The pacemaker will be set to enable your own heart to work as much as possible on its own and will only come in if your heart rhythm slows down to a certain level. It works 'on demand', pacing the heart right before it becomes too slow, so you don't experience any symptoms. If your heart rate is within normal limits, the pacemaker monitors this activity, only acting when it starts to get too slow. This allows your heart to work on its own, and saves battery, preventing you from needing a battery replacement too early.

Will I be able to stop my tablets after I have my pacemaker implanted?

This will depend on why you had the pacemaker implanted and your cardiologist will advise you what to do.

Safety issues

Can I still drive after I have my pacemaker implanted?

Driving is typically permitted after 1 week from the implantation. The Driving and Vehicle Licensing Agency (DVLA) have guidelines in relation to patients who require a pacemaker and whether or not they are safe to drive. There will be some restrictions, but these will vary depending on why you have had your pacemaker fitted. It is very important that you discuss this with your nurse, physiologist or doctor at your pacemaker centre who will explain this in more detail.

You must inform the DVLA that you have had a pacemaker implanted it is also strongly recommended that you inform your insurance company.

Can I exercise after I have my pacemaker fitted?

A certain level of exercise is needed to keep your heart healthy. You can take part in most sports but it is advisable to avoid contact sports to minimise the risk of damaging your pacemaker.

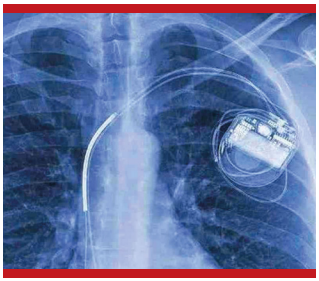
Following your initial recovery, it is advised to avoid strenuous activity in the first four to six weeks after pacemaker implantation but then to partake in regular healthy exercise. Please talk to your pacemaker clinic if you have concerns about physical activity.

Pacemaker infections can be serious. If in between pacemaker checks you notice redness, swelling or can see some of the metal it is very important you contact your pacing clinic right away for them to review the pacemaker.

It is safe to use an automated external defibrillator (AED) on someone who has a pacemaker or implantable cardioverter defibrillator (ICD). It is important not to place the pads in contact with, or directly over the device. The pads are usually placed on the upper right of the chest and on the left side of the rib cage, so a device should not get in the way. If someone has an implanted device, you will notice a scar and a bump. Place the pad 3cm away from the device.

The shock produced could affect the functioning of the pacemaker or device, however the benefits of using the AED to save someone's life outweigh this potential risk. If you receive cardiopulmonary resuscitation or defibrillation, you should have your device checked afterwards to ensure the settings are still accurate. If you have any questions or concerns, please contact your cardiologist. Induction cooking devices are often quoted to be a hazard by manufacturers but in practice usually have no adverse effect.

Is there any equipment that can affect my pacemaker?



Electromagnetic interference will not damage your pacemaker but may temporarily interfere with its settings whilst you are in contact with it. Most mechanical and electrical devices that you use in your normal daily activities will not affect your pacemaker.

Household equipment such as ordinary radios, fridges, cookers, remote controls, televisions, electric razors, computers and microwaves etc. will not affect your pacemaker as long as they are in good working order.

If you buy an electrical appliance you may find that the instructions state 'do not use if you have a pacemaker'. This statement is normally put in to cover the manufacturers and often is not necessarily applicable. It is best to check with your pacemaker clinic for advice. Please note : DO NOT use an AliveCor Kardia Mobile with a pacemaker, ICD, S-ICD, CRT or similar implantable device.

If you feel dizzy or experience palpitations whilst using an electrical appliance, you should move away from the appliance and phone the physiologist, specialist nurse or doctor at the pacemaker clinic for advice.

Magnets and Mobile phones

Do not carry magnets or place a magnet over your chest. Keeping phones and phone cases with magnetic clasps in your shirt or jacket front pocket is advised against. Avoid carrying stereo or hi-fi speakers as they contain strong magnets that can interfere with your pacemaker.

Some studies have shown that some mobile phones can affect the pacemaker if held within six inches of the device. It is therefore recommended that you do not keep a mobile phone in a coat or shirt pocket over the pacemaker. Keep the handset more than six inches away from the pacemaker; ideally hold the phone over the ear on the opposite side to the device.

5G radio frequency signals, used to transmit in mobile systems, can very rarely generate electromagnetic interference with cardiac implanted active electronic devices (CIEDs) and temporarily change their functionality.

Although 5G radio signals are at frequencies not considered by previous regulatory standards, extensive investigation has shown that these different (5G) frequencies pose no greater risk of interference (through electromagnetic mechanisms) than the frequencies specified for the older 3G/4G communication technologies.

It has long been the advice that recipients of CIEDs (such as pacemakers and implantable defibrillators) should keep communication devices using 3G/4G radio frequencies (such as mobile phones), when in use, a minimum distance of 15 cm from their CIED to further reduce the already very low risk of any temporary electromagnetic interference. This same advice holds good for communication devices using 5G radio frequencies and no additional or new precautions are required.

Shop doorway security systems

It is advised that you walk through shop doorway security systems at a normal pace and not to wait around in this area.

Medical equipment / other hospital treatments

Most equipment used by your hospital or GP surgery will not cause any problems to your pacemaker. However it is advised that you let medical and dental staff know that you have a pacemaker.

It is safe for you to have x-rays, CT scans and mammograms. Increasing numbers of pacemakers are now MRI conditional which means they have been demonstrated to pose no known hazards in a specified MRI environment with specified conditions of use. If you have any concerns, please speak to your pacemaker clinic. If you are referred for a chest or brain MRI, the MRI radiographers will contact the pacemaker clinic asking for advice, on whether your pacemaker is or is not MRI conditional. Even some MRI non-conditional pacemakers can now be scanned safely by MRI using special precautions.

Some electrical nerve and muscle stimulators (TENS units) may cause interference with pacemakers but this depends on where they are being applied, and, if any of these treatments are suggested to you then your pacemaker clinic should be contacted for advice.

Travel

You can safely travel abroad with your pacemaker, but you are advised to show the security staff your pacemaker identification card. Walk through the metal detector archway if asked to do so, but the metal casing of the device may set off the airport security alarm. The detector will not cause any harm to your pacemaker provided you walk briskly through the arch.

Arc welding

Generally, this should be avoided but can be performed under special circumstances. Please ask your pacemaker centre if you need further information on arc welding.

Pacemaker clinic visits

Your pacemaker should be checked regularly and you will be invited to attend your pacemaker clinic as required. You will be seen at least once a year and may be asked to attend more often if necessary. You may also see the consultant cardiologist or their resident doctor at your clinic visit.

During each clinic visit, the physiologist or specialist nurse will examine your pacemaker using a special programmer. This machine will allow them to examine the settings and the battery life of your device.

Special measurements are also done to assess the state of the leads that connect the pacemaker to your heart. If your condition has altered, changes may be made to the pacemaker settings using the special programmer. All the information is confidentially stored in your records.

Your wound will also be checked and you may have other tests done. Please also take this opportunity to ask any questions or let the medical team know if you have any problems or worries.

Most pacemaker checks can now be performed remotely, using a device called a home transmitter, or even your smartphone. Your local pacemaker clinic will be able to advise you on this and help you set up this system if they believe it's appropriate for you. The pacemaker activity and your heart rhythm are then analysed by the clinic in exactly the same manner as when you physically attend the clinic. Remote pacemaker checking is now becoming much more common which is reducing the number of out-patient attendances required.

Changing the pacemaker

Normally a pacemaker battery lasts between six and thirteen years. Your battery will be checked at every visit to the pacemaker clinic and staff at the clinic will be able to predict when you need a new pacemaker box and arrange for you to be admitted at a convenient time for you. Don't worry, it will not be allowed to completely run down.

You will need to be admitted to hospital and the procedure is similar to having your first pacemaker fitted, but it will not usually involve having new leads.

Contacting the pacemaker clinic

Most pacemaker clinics/support services run between 9am and 5pm Monday to Friday. Ask staff at your implant centre about arrangements to contact them outside these hours.

Please take your ID card with you whenever you leave home. It may also be useful to contact your implanting centre for advice before you go into hospital for any investigations or operations that are not associated with your pacemaker. It is important to always mention to any doctors, nurses or dentists that you have a pacemaker before undergoing any investigations or procedures.

Notes

This booklet has been written to support those diagnosed with an arrhythmia and their carers, who struggle to find information on this condition.
Without donations and fundraising, we would not be able to provide support through our award-winning resources and helpline.

Please donate to support our vital work at
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"I was concerned about having a pacemaker, the booklet gave me a step by step guide and advice on some electrical products to be wary of "

Jenny, Devon

To view our patient resources, scan the QR code below:

Please remember that this publication provides general guidelines only. Individuals should always discuss their condition with a healthcare professional. If you would like further information or would like to provide feedback, please contact us.

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If you would like further information or would like to provide feedback please contact Arrhythmia Alliance, AF Association or STARS.