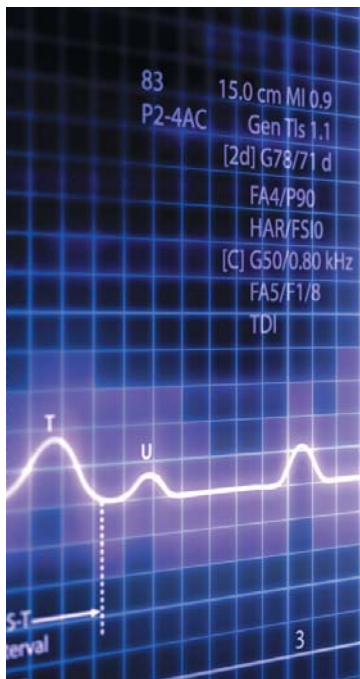
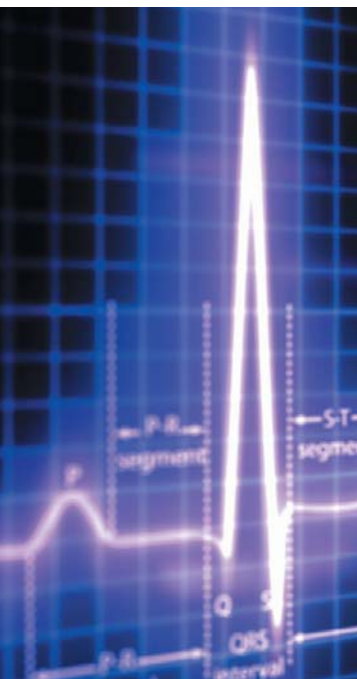


CRT/pacemaker patient information



Promoting better understanding, diagnosis, treatment and quality of life for those affected by heart rhythm disorders (cardiac arrhythmias)

Glossary

Atria are the two upper chambers of the heart.

AV node is part of the electrical pathway located between the atria and the ventricles.

CRT or cardiac resynchronisation therapy is the use of either a pacemaker or implantable defibrillator to treat heart failure.

Echo or echocardiogram is an ultrasound scan of the heart.

Heart failure is when the heart fails to pump blood to the body's organ systems and keep organs working efficiently.

ICD or implantable cardioverter defibrillator is a mini-computer which contains a battery and electronic circuits. It is fitted in patients who are deemed at risk of sudden cardiac death. An ICD can recognise and monitor your heart rhythm, delivering various electrical treatments if needed.

Pacemaker is a small metal device implanted under the skin, which produces electrical impulses to treat an abnormal heart rhythm.

Sinoatrial node is the natural pacemaker of the heart.

Ventricles are the main muscular pumping chambers of the heart.

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What is a pacemaker?

A pacemaker is a small, metal-covered box-shaped device, which contains a battery and electronic circuits. The device is connected to your heart by one or more wires (called leads). The leads are passed along a blood vessel to your heart and the pacemaker box is usually implanted under the skin in your upper chest, near your collarbone.

The pacemaker can monitor your heart and produce electrical impulses to treat abnormal heart rhythms. Pacemakers are used to treat slow heart rhythms (bradycardia), and some fast heart rhythms (tachycardia), that come from the top chambers of the heart (also known as the atria).

Pacemakers may have a single lead (wires inserted into a single chamber of the heart), dual leads (wires inserted into two chambers of the heart) or triple leads. This depends upon the underlying problem.

There are approximately 35,000 pacemakers implanted in the UK every year.

This booklet gives some details of the triple lead pacemaker which is usually known as cardiac resynchronisation therapy or CRT.

Important information

This booklet is intended for use by people who wish to understand more about CRT/pacemaker. The information within this booklet comes from research and previous patients' experiences.

Why might I need a CRT/pacemaker?

Is CRT pacing always successful?

How is the pacemaker implanted?

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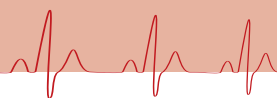
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What is Cardiac Resynchronisation Therapy?

CRT devices are used to help treat heart failure and can be either a permanent pacemaker or an implantable cardioverter defibrillator (ICD).

They work by making the the walls of the main heart pumping chamber (the left ventricle) contract or squeeze at the same time and improve the overall function of the heart so that you feel less breathless and have more energy.



Why do I need a pacemaker?

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 around your body to all of your vital organs. A normal healthy heart usually beats in a regular fashion at around 60 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 (beats) through the heart causing it to contract and pump blood around the body.

Each normal heartbeat begins in the natural pacemaker of the heart (the 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. Finally, it spreads across the bottom chambers 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, too quickly or irregularly. A pacemaker can treat some of these abnormal heart rhythms.

There are several different, common conditions which cause the heart to beat abnormally. These are:

Complete or intermittent heart-block

This accounts for about 60% of patients who have pacemakers implanted.

A condition where the AV node or junction box breaks down and does not transmit the electrical pulse from the top to the bottom of the heart. This is called heart-block and 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 bypass the block.

Sick sinus syndrome

This is a condition where the natural pacemaker does not function properly and results in your heart beating either too slowly, too quickly 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.

Pacemakers are also used following a procedure called cardiac catheter ablation that involves applying radiofrequency energy to the AV node 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 heart. Your doctor will inform you if you need this procedure. You can read more about the ablation procedure in our *Catheter ablation patient information booklet*.

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 device.

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. Your doctor will discuss this with you.

What can CRT do?

There are 2 different types of CRT device:

- ♥ CRT pacemakers
- ♥ CRT ICDs (see separate booklet)

CRT pacemakers

These devices work in the same way as traditional pacemakers. They help the heart to beat in a regular rhythm and are especially useful when the heart's natural pacemaker stops working properly. An implanted pacemaker sends out electrical signals which make the heart beat in a normal way.

A traditional pacemaker has either one or two leads which are put into the right side of your heart. One lead will be put into the lower right chamber (right ventricle) and a second lead may be put in the upper right chamber (right atrium). However, if you have heart failure you may need a more advanced type of pacemaker.

The main pumping chamber of the heart is on the left side, called the left ventricle. In a normal heart, both the right and left ventricles pump out blood at the same time in a coordinated way. In heart failure the left side may not pump at the same time as the right, meaning the two sides of the heart lose their coordination. This leads to the heart being unable to pump effectively and you may become breathless, dizzy and have no energy. Over time, the heart could get even weaker and you may feel more unwell.

In this case, your doctor may feel that you could benefit from having a CRT pacemaker implanted. The main difference is that an additional lead is placed on the left side of the heart via a vein in the heart (known as the coronary sinus). Electrical signals are delivered simultaneously to both sides of the heart to make the left ventricle beat at the same time as the right. This can improve the heart's coordination and make the heart pump more efficiently. In most people who have a CRT pacemaker implanted, symptoms of breathlessness improve and they have more energy and generally feel more healthy. They may also live longer than if they did not have a CRT implanted.

Who may benefit from a CRT device?

These devices do not work for all types of heart failure, you may need to have a heart scan (echocardiogram) and some other tests to check the pumping function of your heart to find out whether you would be suitable for a CRT device. It is also important to note that any device is NOT a replacement for your heart failure medication.

Why might I need a CRT Pacemaker?

- ♥ You may have a problem with the electrical pathways in the heart, which means your heart beat is too slow, and you may also have heart failure that causes the two ventricles to beat out of time.
- ♥ If your overall heart function is markedly less than normal. Although your rhythm may be normal you may suffer with symptoms of heart failure despite medication and lifestyle changes.

Is CRT pacing always successful?

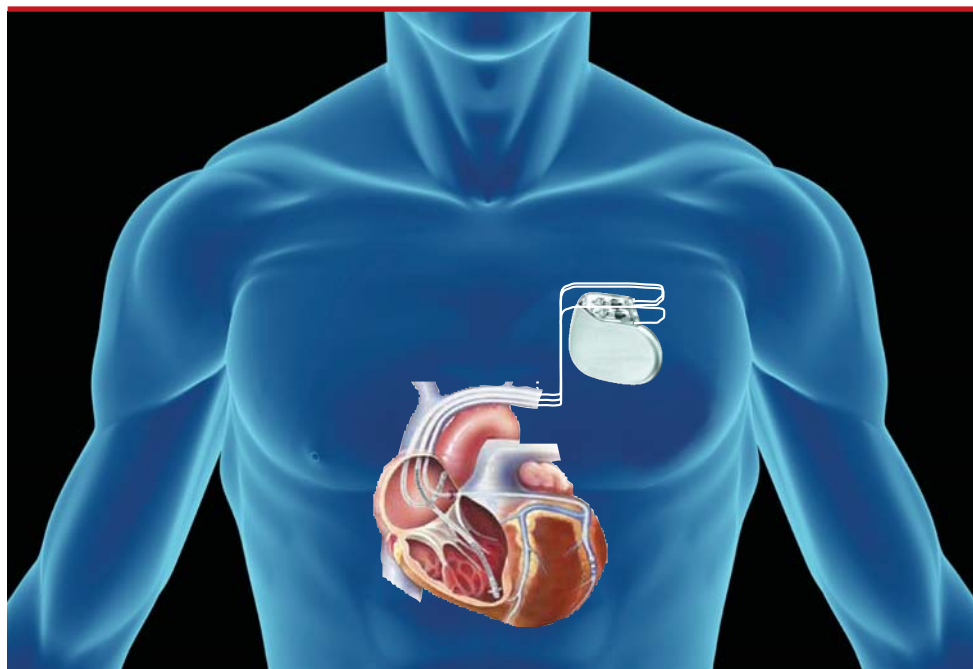
- ♥ 2 out of 3 people find it improves their symptoms but some find little or no difference at all.

There are many different types of pacemaker available to suit specific heart rhythm problems. In order to help decide which one is right for you, you may need to have some tests or investigations before the decision to have a pacemaker fitted is made. Your doctor will discuss options with you and provide you with more detailed information.

How is the pacemaker implanted?

Your doctor will have explained to you why you need to have a pacemaker and how you may benefit from having a pacemaker fitted. You need to know how having a pacemaker fitted will affect you, as well as what could happen to you if you do not have one fitted. This will all be explained to you and if you agree to go ahead, you will be asked to sign a consent form. You will also be given a booklet explaining the consent form before you sign.

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 again 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 antiseptic solution and inject some local anaesthetic under the skin just below your collarbone (usually the left side). 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 the type of pacemaker you need. The lead(s) are then connected to the pulse generator box. This will be placed under the skin in your chest. The area will then be stitched 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 procedure for CRT takes between 2-4 hours, sometimes longer.

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. Generally the most common risks are:

- ♥ Occasionally after a CRT implant, patients may experience diaphragmatic twitching (which causes twitching in the abdominal area). This can usually be corrected by resetting the pacemaker.
- ♥ Occasionally when implanting CRT pacemakers it is not possible to position the extra lead in the left side of the heart. If this happens the doctor will discuss other options for placing the lead with you which would involve another procedure.
- ♥ A small risk of infection, bleeding and bruising to the pacemaker site.
- ♥ A small risk of lead(s) 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 air can leak into the lung through the perforation and may need to be drained (this is a simple procedure).

What happens after the pacemaker is fitted?

After the procedure, once all checks have been made, you will be taken back to the ward. You will be asked to lie in bed for a couple of hours and then you can get up, eat and drink. Your heart rhythm could be monitored for a while to make sure that the pacemaker is doing its job, so you may be attached to an ECG monitoring device with some stickers and leads. As the wound can feel quite bruised and sore, especially for the first day or two, it is recommended that you have regular painkillers. It is very 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 wetting the wound. Report any wound problems to your nurse.

You will probably be allowed to go home the next day provided your pacemaker is checked, there are no complications, and your doctor assesses it is safe. Your pacemaker will be checked before you go home by a Cardiac Physiologist or the Specialist Nurse. This check will involve the use of a special programmer that can look at the device settings and make sure the pacemaker is working properly. This check takes about fifteen minutes and can either be done on the ward or in the pacemaker clinic. After this check most patients 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.

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 treatment in the future it is important that you show this card to the healthcare professionals treating you.

Going home

Although most people feel very pleased to be going home, it is only natural that you may feel a bit worried. This is very common, especially if you have been in hospital for a long time and the pacemaker has only just been put in.

Try to make sure that you get the help you need to return to as full and active a life as possible. Please feel free to ask questions at any time. Similarly if you feel upset or down once you are at home it is very important that you talk to someone.

Please contact your pacemaker implanting hospital if you have any concerns.

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. Try to avoid lifting the arm on the same side as the pacemaker above shoulder level or stretching it out behind your back until you have had your first outpatient check. 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 to heal fully. 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 GP as these may be signs 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 please let someone 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. You should not be aware of the pacemaker working but occasionally may be conscious of your heart beating faster, particularly if you had a very slow heart rhythm before the pacemaker was implanted.

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.

Where a pacemaker is implanted for slow heart rates 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'. With CRT the aim is that the pacemaker runs the heart all of the time, whatever the heart rate, to give maximum benefit.

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. With a CRT device it is normal to continue all medication.

Getting back to normal

Having a pacemaker implanted can be seen as a rather big event in your life. However, with help and support most people can adapt well over time. After a fairly short recovery period you should be able to return to previous activities. Some restrictions will apply for your own safety.

Safety Issues

Driving

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 can access the DVLA guidelines on;

<https://www.gov.uk/driving-medical-conditions>

You will also need to contact your insurance company to let them know that you have had a pacemaker fitted.

Physical activity

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, normally after about four weeks, it is recommended that you try to increase your level of activity if possible.

Please talk to the doctors, nurses or physiologists at your pacemaker clinic if you have concerns about physical activity.

Electromagnetic interference

Electromagnetic interference will not damage your pacemaker but may temporarily interfere with the 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. There are rare exceptions to this rule for example induction hobs

should not be used by people with pacemakers as the device settings can be affected. If you have any doubts about equipment please contact your implanting centre.

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

Do not carry magnets or place a magnet over your chest. Avoid carrying stereo or hi-fi speakers as they contain strong magnets that can interfere with your pacemaker.

Shop doorway security systems

It is advised that you walk through shop doorway security systems at a normal pace and do not 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. Please take your ID card with you whenever you go to hospital. 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 safe for you to have x-rays, CT scans and mammograms

Some programming changes may need to be made before you have certain scans. Generally, you should however avoid magnetic resonance imaging (MRI) machines. Some patients with pacemakers can be scanned with an MRI machine but you need to check this with your pacemaker clinic. 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 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 straight through the arch.

Arc welding

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

Mobile phones

Some studies have shown that 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 fifteen centimetres away from the pacemaker; ideally hold the phone over the ear on the opposite side to the device. Avoid direct contact with the antenna whilst making or receiving a call.

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

Special measurements are also used 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 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 nurse or physiologist know if you have any problems or worries. You may also see the cardiologist or their registrar at your clinic visit.

Changing the pacemaker

Normally a CRT pacemaker battery lasts between 4 and 6 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.

In order to have the box changed, you will need to be admitted to hospital. The procedure is similar to having your first pacemaker fitted, but it will not usually involve having new leads put in.

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.

Useful websites

A list of useful sites can be found at:- www.heartrhythmcharity.org.uk
This list is not exhaustive and it is constantly evolving. If we have excluded anyone, please accept our sincerest apologies and be assured that as soon as the matter is brought to the attention of the Arrhythmia Alliance, we will quickly act to ensure maximum inclusiveness in our endeavours.

If you wish to contact us direct please phone on +44 (0) 1789 450 787 or email info@heartrhythmcharity.org.uk

Please help us to save lives and improve services for all affected by cardiac arrhythmias by making a donation today.

Membership is free to individuals, however, if you would like to make a donation please complete and return to P.O Box 3697, Stratford upon Avon, CV37 8YL or visit www.heartrhythmcharity.org.uk and click on donate.

Name of taxpayer:

Address:

Telephone: Postcode:

I would like to make a donation to A-A and enclose (cash/cheque/CAF) to the amount: £..... (Please make cheques payable to *Arrhythmia Alliance*)

To make a donation over the phone, please call 01789 450 787.

Gift aid

Please tick here if you agree to gift aid your subscription/donation

Please treat as gift aid donations all qualifying gifts of money made:
today in the past 4 years in the future

Please tick all boxes you wish to apply.

I confirm I have paid or will pay an amount of Income Tax and/or Capital Gains Tax for each tax year (6th April to 5th April) that is at least equal to the amount of tax that all the charities or Community Amateur Sports Clubs (CASCs) that I donate to will reclaim on my gifts for that tax year. I understand that other taxes such as VAT and Council Tax do not qualify. I understand the charity will reclaim 28p of tax on every £1 that I gave up to 5th April 2008 and will reclaim 25p of tax on every £1 that I give on or after 6th April 2008.

Name:

Address:

..... Postcode:

Standing order authority

My bank:

Bank address:

Please pay: Arrhythmia Alliance, Account: 02685818 sort code: 30-98-26,
Lloyds TSB Plc, 22 Bridge St, Stratford upon Avon, CV37 6AG

The sum of £/€/£: On (1st date): __ / __ / 20__

And after this, every: Month/Year (delete) Account No.:

Sort code: Signature: Date: __ / __ / ____

Credit card payment

Card type: Expiry date:

Card number: Amount of £/€/£:

Name on card: CVS code (3 digit): _ _ _

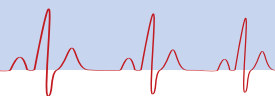
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