CG APPROVED

PERMANENT PACEMAKER IMPLANTATION

NHS
Liverpool University Hospitals
NHS Foundation Trust

Cardiology Department

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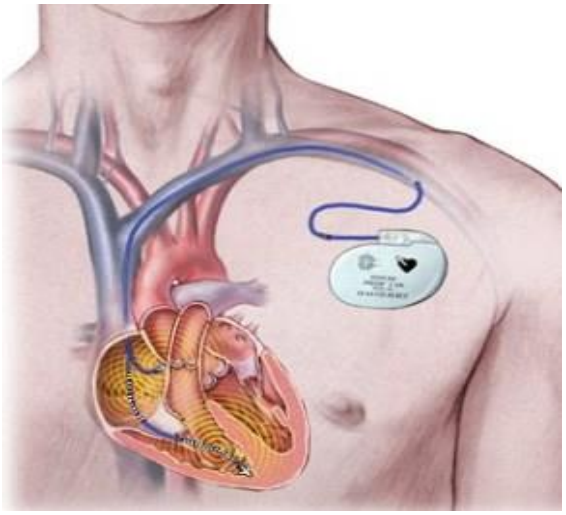
Your cardiologist has suggested that you may benefit from an electrical device called a pacemaker in order to fix your heart's electrical rhythm



What is a Pacemaker?

A pacemaker is a device that sends small electrical impulses to the heart muscle to maintain a suitable heart rate or to stimulate the lower chambers of the heart (ventricles).

A pacemaker may also be used to treat fainting spells (syncope). There are different types of cardiac devices and pacemakers for congestive heart failure and hypertrophic cardiomyopathy.

So there are different types of pacemakers and heart devices?

Yes, there are .Your doctor will determine what type of pacemaker you need based on your heart condition. Your doctor also determines the minimum rate (lowest heart rate) to set your pacemaker.

When your heart rate drops below the set rate, the pacemaker generates (fires) an impulse that passes through the lead to the heart muscle. This causes the heart muscle to contract, creating a heartbeat.

The decision will be between whether you have a pacemaker with one lead or two leads. This decision is usually made before the day of the procedure and you should be made aware of the choice and the reasoning behind it.

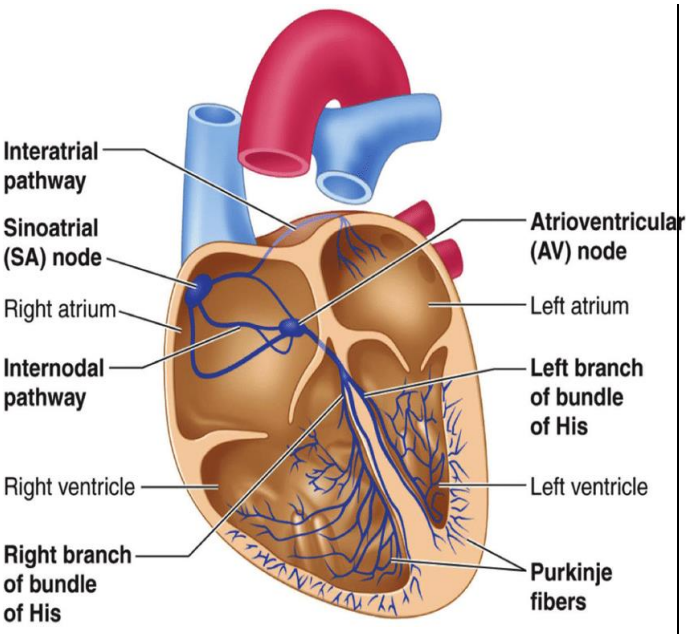
Electrical System of the Heart

The atria and ventricles work together, alternately contracting and relaxing to pump blood through the heart. The heart's electrical system is the power source that makes this possible.

Normally, the electrical impulses start at the sinoatrial (SA) node, situated in the right atrium. The electrical activity spreads through the walls of the atria, initiating contraction of these chambers.

These impulses travel through the AV (atrio-ventricular) node, located between the atria and ventricles. This node acts like a gate that slows the electrical signal before it enters the ventricles. This delay gives the atria time to contract before the ventricles do.

From the AV node, the electrical impulse travels through the His-Purkinje network, a pathway of specialized electricity-conducting fibres. The impulse then travels into the muscular walls of the ventricles, causing them to contract. This sequence occurs with every heartbeat (usually 60-100 times per minute).



Why do I need a pacemaker?

If the electrical pathway is interrupted for any reason, changes in the heart rate and rhythm occur that make a pacemaker necessary as this can lead to collapses, injurious falls and in some cases, put you at risk of sudden cardiac death.

Pacemakers are used to treat brady-arrhythmias (slow heart rhythms) that may occur as a result of disease in the heart's conduction system (such as the SA node, AV node or His-Purkinje network).

Should I bring my medications?

If you take Warfarin, the results of your INR test (a blood test to evaluate the blood clotting) must be within a suitable range before the implant procedure can be performed. Usually you will be instructed to stop taking Warfarin, Edoxaban, Dabigatran, Apixaban and Rixaroxaban 2 days before the procedure.

We also advise that you do not take Clopidogrel 5 days prior to the procedure.

Your doctor may also ask you to stop taking other medications, such as those that control your heart rate. Ask the doctor/pre-op nurse which medications you should stop taking and when to stop taking them.

If you have diabetes, we will counsel you about what medications to take and which to omit.

Can I eat before the procedure?

This procedure does not require general anaesthetic and we try to avoid using sedation therefore you can eat and drink as normal.

Should I bring anything?

You will not need a robe or toiletries when you first arrive. Your family member can keep these items to give you after the procedure.

Bring a one-day supply of your prescription medications. Do not take these medications without first talking with the doctor or nurse.

Where is the procedure performed?

The pacemaker implant procedure takes place in the cardiac catheterization lab on the first floor.

What happens before the procedure?

Before the procedure begins, a nurse will help you get ready and the doctor will go over the procedure with you again to allow for any questions or concerns to be raised. You will lie on a bed or sit in a chair whilst the nurse will insert an IV (intravenous) cannula in a vein in your arm or hand. The cannula is used to deliver medications and fluids during the procedure.

To prevent infection and to keep the pacemaker insertion site sterile:

- Antibiotics will be given through the IV cannula before the beginning of the procedure.
- The left or right side of your chest will be shaved
- A special disinfectant will be used to cleanse the surgical site
- Sterile drapes are used to cover you from your neck to your feet
- The procedure will be fully treated as a surgical procedure

Will I be given general anaesthetic before the procedure?

No, a medication may be given through your cannula to relax you and make you feel drowsy if it is required we try to avoid this as much as possible, you will be awake during the procedure.

How will I be monitored during the procedure?

The nursing team will connect you to several monitors that allow the healthcare team to check your heart rhythm, oxygen levels and blood pressure during the procedure. The doctor and nurses continually monitors you during the procedure.

Monitors Used During the Procedure

Electrocardiogram (ECG): This is attached to several sticky electrode patches placed on your chest. This provides a picture on the monitors of the electrical impulses going through the heart.

Blood pressure monitor: Connected to a blood pressure cuff on your arm that checks your blood pressure throughout the procedure.

Oximeter monitor: Attached to a small clip placed on your finger that checks the oxygen level of your blood.

Fluoroscopy: A large X-ray machine will be positioned above you to help the doctors see the leads on an X-ray screen during the procedure.

Defibrillator/pacemaker/cardioverter: If needed, a monitor that works as a defibrillator/pacemaker/cardioverter may be attached to one sticky patch placed on the centre of your back and one on your chest. This allows the doctor and nurse to pace your heart rate if it is too slow, or deliver energy to your heart if the rate is too fast. This is not always required

How is the pacemaker implanted?

A local anaesthetic (pain-relieving medication) is given to numb the surgical site. An incision is made in the chest where the leads and pacemaker are inserted.

The lead(s) is inserted through the incision and into a vein and then guided to the heart with the aid of the fluoroscopy machine. The lead tip attaches to the heart muscle, while the other end of the lead (attached to the pulse generator) is placed in a pocket created under the skin in the upper chest.

How are the leads tested?

After the leads are in place, they are tested to make sure they function appropriately and can increase your heart rate. This lead function test is called “pacing.” Small amounts of energy are delivered through the leads into the heart muscle. This energy causes the heart to contract.

Once the leads have been tested, the implanting doctor will connect them to the pacemaker. The rate and settings of your pacemaker are determined by the implanting doctor or pacing technician. After the pacemaker implant procedure, the pacing technician uses an external device (programmer) to program final pacemaker settings.

Will it hurt?

You will feel an initial burning or pinching sensation when the doctor injects the local numbing medication. Soon the area will become numb. You may feel a pulling sensation as the doctor makes a pocket in the tissue under your skin for the pacemaker. When the leads are being tested, you may feel your heart rate increase or your heart beat faster. Please tell the implanting team what symptoms you are feeling. You should not feel pain. If you do, tell the implanting doctor and nurse right away.

How long does the procedure last?

The pacemaker implant procedure may take about 1 hour

Will I have to stay in the hospital overnight?

This is a day case procedure and you will most likely be sent home the same day consider On occasion, there may be a reason to stay in hospital overnight if the doctors feel necessary to monitor you.

What tests will be done after the pacemaker implant?

A chest X-ray will be done after the pacemaker implant to check your lungs as well as the position of the pacemaker and lead(s). Before you are discharged, your chest X-ray and device will be checked. You will then go to the Device Clinic in 2-6 weeks.

How will I feel?

You may feel discomfort at the pacemaker implant site during the first 48 hours after the procedure. The doctor may advise you on what medications you can take for pain relief. Please contact us if your symptoms are prolonged or severe.

What instructions will I receive before I leave the hospital?

We will discuss the results of the procedure with you and answer any questions you may have.

You will receive specific instructions about how to care for yourself after the procedure including medication guidelines, wound care, activity guidelines, pacemaker care and maintenance, and a follow-up schedule.

You will also receive a card that indicates what type of pacemaker and leads you have, the date of implant and the doctor who performed the implant.

Carry this card with you at all times in case medical care is needed. You may also want to wear a MedicAlert bracelet or necklace engraved with important information about your pacemaker

On the day, we will discuss your medication with you and see what is to be continued and what is to be stopped.

Can I drive myself home?

No. For your safety, a responsible adult will need to drive you home.
If you have an ordinary Class 1 driving licence, you can start driving after 1 week as long as

: You do not have any symptoms, such as dizziness or fainting, that would affect your driving

: You have regular check-ups at the pacemaker clinic

You have not recently had a heart attack or heart surgery

You must inform the DVLA (Driver and Vehicle Licensing Agency) and your insurance company that you have a pacemaker.

If you drive a large or passenger-carrying vehicle, you will have to wait 6 weeks after you pacemaker is implanted before you can drive again

Is the procedure safe?

A pacemaker implant is commonly a very safe and straightforward procedure. However, as with any invasive procedure, there are risks. Special precautions are taken to decrease your risks of complications.

Potential complications
Blood around the heart - **0.5-1%** - this condition (cardiac tamponade) occurs as a result of perforation of the heart muscle due to the lead placement. If this were to occur then this blood with need to be removed with a large needle and a drain site around in the sac that your heart sits in, this is a rare but well known and treatable complication. You would need to stay in hospital for another day or two if this happened.

Lead displacement -1-8% - dislodgement of the lead is a known complication occurring in 1-8% of patients. If this were to occur then a subsequent procedure would be required to resite the lead

Blood clots – 1% risk of occurring

These can develop in one of the veins in the arm on the side of the body where the pacemaker was fitted. This may cause some swelling in the affected arm, but it usually settles in a few days and is rarely a serious problem. In some cases, you may be given anticoagulant medication, which stops the clot getting bigger.

Pacemaker infection – 1% risk of occurring

Some people with a pacemaker can develop a pacemaker infection. This usually happens within the first 12 months of having the device fitted.

Symptoms of a pacemaker infection include a high temperature of 38C or above and pain, swelling and redness at the site of the pacemaker.

Call your GP or cardiologist as soon as possible for advice if you are concerned that you have developed an infection. If this is not possible, call NHS 111 or your local out-of-hours service.

A pacemaker infection is usually treated using a combination of antibiotics and surgery to remove and then replace the pacemaker. If an infection is not treated, it could spread into your lungs (pneumonia), the lining of your heart (endocarditis), or your blood (sepsis).

Air leak – 1/100% risk of occurring

As the vein the pacemaker wires are inserted into lies very close to one of the lungs, there's a risk of the lung being accidentally punctured during the procedure.

This means air can leak from the affected lung into the chest area. This problem is known as pneumothorax. This is very treatable. In most cases, the leak is very small and gets better on its own without treatment. If a lot of air leaks into the chest, this may need to be sucked out using a needle and placing a special drain into the chest area. If a drain is required, you may need to stay in hospital for an extra day or two.

Problems with the pacemaker

As with any electronic device, there's a very small chance your pacemaker could stop working properly. This is known as a pacemaker malfunction.

A pacemaker can go wrong if:

- the lead gets pulled out of position
- the battery of the pulse generator fails
- the circuits that control the pacemaker are damaged after being exposed to strong magnetic fields
- the pacemaker has not been properly programmed

Signs your pacemaker may have failed include:

- your heart begins beating more slowly or quickly
- dizziness
- hiccups
- fainting/nearly fainting

Seek immediate medical advice if you are concerned that your pacemaker has failed.

If there was a problem with the pacemaker that could not be fixed with reprogramming of the settings, then the pacemaker may need to be removed and replaced, depending on the clinical situation.

Will I be able to feel or see the pacemaker?

You may be able to feel the pacemaker and it may feel uncomfortable when you lie in certain positions, but you'll soon get used to it. Modern pacemakers are now so small they're almost completely hidden by the chest tissue and are barely noticeable although this may depend on individual body shape.

How soon will I be back to normal?

It's best to avoid reaching up on the side you had your operation for 4 to 6 weeks. That means not hanging out washing or lifting anything from a high shelf, for example.

But it's important to keep your arm mobile by gently moving it to avoid getting a frozen shoulder.

You'll usually be able to do all the things you want to do after around 4 weeks.

The time you need off work will depend on your job. Your cardiologist will usually be able to advise you about this. Usually, people who have had a pacemaker implanted are advised to take 3-7 days off.

People who drive for a living, such as bus and lorry drivers, won't be allowed to drive these types of vehicles for 6 weeks after the pacemaker is fitted.

When can I exercise or play sports again?

You should avoid strenuous activities for around 4-6 weeks after having your pacemaker fitted. After this, you should be able to do most activities and sports. Should you play contact sports such as football or rugby, it's important to avoid collisions. You may want to wear a protective pad.

We would advise that you avoid very energetic activities, such as squash.

How can I care for my wound?

Don't get your wound wet until your stitches have been taken out. After that, avoid wearing anything that rubs against the area of your wound, such as braces.

Women may require a new bra with wider straps. Avoid exposing your wound to sunlight in the first year as this may cause a darker scar.

Will I have to have my stitches removed?

No. On the Aintree University Hospital site, we use soluble stitches that dissolve on their own therefore no stitches will need to be removed.

What problems should I look out for?

Signs that your pacemaker is not working as it should or you have developed an infection or blood clot include:

- breathlessness
- dizziness and/or fainting
- prolonged weakness
- a swollen arm on the side of the pacemaker
- chest pains
- prolonged hiccups
- a high temperature of 38C or above
- pain, swelling and redness at the site of the pacemaker

Contact your GP or cardiologist as soon as possible for advice if you experience any of these problems after having a pacemaker implanted.

If this is not possible, call NHS 111 or your local out-of-hours service.

Will my pacemaker be affected by electrical equipment?

Anything that produces a strong electromagnetic field, like an induction hob, can interfere with a pacemaker.

Most common household electrical equipment, such as hairdryers and microwave ovens, will not be an issue, as long as you use them at least 15cm (6 inches) away from your pacemaker.

If you feel dizzy or feel your heart beating faster while using an electrical appliance, simply move away from it to allow your heart beat to return to normal.

Mobile phones – It is safe to use a mobile phone, but make sure you keep it more than 15cm (6 inches) from your pacemaker. Where possible, please use a headset or the ear on the opposite side to the pacemaker.

Shop security systems - Walking steadily through an anti-theft detector in a shop doorway should not affect your pacemaker, but do not stand too close to this type of security device for long.

Airport security systems - Airport security systems do not usually cause problems with pacemakers, but carry your pacemaker identification card with you and tell security staff you have a pacemaker.

Security staff in some countries may insist you pass through the scanner. Move quickly through it and don't linger nearby.

Handheld metal detectors should not be placed directly over your pacemaker.

MRI scans - MRI-safe pacemakers and implantable cardioverter defibrillators (ICDs) are becoming more common but please always tell the person treating you that you have a pacemaker. We will aim to always implant an MRI safe device but it usually requires 6 weeks of settling in before an MRI can occur

TENS machines - Should not be used without first consulting your pacemaker clinic. They produce small electrical impulses that could interfere with your pacemaker.

Lithotripsy - A treatment for kidney stones, must be avoided if you have a pacemaker fitted therefore if you would need to tell the urologist that you have a pacemaker

General advice

If your occupation brings you into close contact with strong electrical fields, e.g. arc welding, diathermy or working with high-power radio or TV transmitters, or you have direct contact with car ignition systems, check with your cardiologist or pacemaker technician before returning to work.

Avoid wearing magnetic bracelets and magnets near your chest.

Will I need to have another pacemaker in the future?

Most pacemaker batteries last for 6-10 years depending on how much it is used. After this, you will need to have the batteries changed. This will be done within a year of the battery being depleted so there will be plenty of time to have the new battery exchanged for the old one.

Changing the batteries involves replacing the pacemaker box with a new unit. This is a simple procedure that may or may not require an overnight stay in hospital and is typically a shorter procedure.

The original lead/leads are left in place, although occasionally they'll also need to be replaced if the lead(s) are not working well. If a new lead and a whole new system are needed, you will be told prior to the procedure.

How often will I need follow-up and what check-ups will I need?

You'll have your pacemaker checked after 4-6 weeks at Aintree University Hospital. Provided this check is satisfactory, you'll have your pacemaker checked every 3-12 months, depending on clinical need.

If after having the pacemaker fitted and leaving hospital you feel you're not getting as much benefit as you imagined, your pacemaker may need some minor modifications.

The cardiac technician will be able to do this and will discuss any concerns with one of the pacing cardiologists, if need be.

You'll need follow-up appointments for the rest of your life after having a pacemaker fitted.

At your follow-up appointment, the technician will analyse the discharge rate of your pacemaker, measure the strength of the electrical impulse, the amount of times your pacemaker is pacing and record the effects of the impulse on your heart. Modern pacemakers are always monitoring your heart and can store vast amounts of information about the state of the battery and the performance of the pulse generator.

Your pacemaker can then be reprogrammed to the best settings for you, if necessary.

What happens at the Device Clinic?

You will sit in a chair in the clinic. Small sticky patches (electrodes) will be placed on your chest and connected via wires to a computer. A pacing technician will place a small device (programmer) directly over the pacemaker. The programmer allows the pacing technician to change the pacemaker settings and to check the pacemaker and lead function. You may feel your heart beat faster or slower. Although this is to be expected, please tell the pacing technician what symptoms you are experiencing.

The results of the device check will determine if the settings are appropriate for the pacemaker.

Who should I tell about my pacemaker?

You should tell any healthcare professional involved in your care about your pacemaker, as you may need to avoid some medical investigations and treatments, such as MRI scans and the use of TENS machines.

You should also tell your family and close friends that you have a pacemaker and tell them what to do if you were to lose consciousness or collapse.

Will the pacemaker improve my quality of life?

Most people who have a pacemaker implanted feel it has a vastly positive impact on their life. Having a pacemaker may improve your activity if your symptoms are related to a slow heart rhythm.

It may also help you stay out of hospital. Above all, you should feel better. Previous symptoms, such as breathlessness or dizziness, should disappear if there are related to your slow heart rhythm.

For further information, please contact your family doctor (GP) or:

Dr Homerya Douglas– Consultant Cardiologist – add Sec Number

Dr Malcolm Burgess – Consultant Cardiologist – add Sec Number

Dr Emeka Oguguo – Consultant Cardiologist – add Sec Number

OTHER PEOPLE TO ADD

NHS website - www.nhs.uk

British Heart Foundation – www.bhf.org.uk

If you require a special edition of this leaflet

This leaflet is available in large print, Braille, on audio tape or disk and in other languages on request. Please contact:

Tel No: 0151 529 2906

Email: interpretationandtranslation @liverpoolft.nhs.uk