HEALTH BASICS

Heart pacemaker

A heart pacemaker is an implanted device that helps control slow heartbeats.

WHAT IT IS
An implanted device that sends electrical signals to the heart

WHERE IT COMES UP
Slow heart rhythms, heart block, or heart failure treatment

WHY IT MATTERS
Helps the heart maintain a suitable rate and rhythm

WHAT IT IS NOT
Not a disease or a diagnosis

WHO TO ASK
A cardiologist or cardiac device clinic

HOW IT IS CHECKED
Device interrogation and heart rhythm testing

Overview

A heart pacemaker is a small medical device that helps control the heartbeat. Most pacemakers are placed under the skin of the upper chest. They use electrical signals to prompt the heart to beat when its natural electrical system is too slow or unreliable.

The heart normally produces its own electrical signals. These signals begin in a group of cells called the sinus node and travel through the heart in an organised way. This makes the upper and lower chambers squeeze in sequence.

A pacemaker may be considered when this system does not work properly. Examples include sinus node dysfunction , in which the heart's natural pacemaker works too slowly, and heart block , in which electrical signals are delayed or fail to reach the lower chambers.

Some people with heart failure receive a specialised pacemaker called cardiac resynchronisation therapy , or CRT. It coordinates the lower heart chambers so they pump together more effectively. CRT is suitable only in particular clinical situations.

A pacemaker is not the same as an implantable cardioverter defibrillator, or ICD. An ICD can deliver stronger treatment to stop certain dangerous fast rhythms. Some devices combine pacing and defibrillator functions.

How it works

A traditional pacemaker has two main parts:

The generator is usually placed beneath the skin near the collarbone. The leads pass through a vein into one or more heart chambers. A lead can detect, or "sense," the heart's electrical activity and deliver a small electrical impulse when needed.

Pacemakers can work in different ways. Some pace one heart chamber, while others coordinate two or three chambers. The device team chooses and programs the system based on the rhythm problem and the person's heart function.

Many modern pacemakers work only when the heart rate falls below a programmed level. Some also adjust the rate during activity by sensing body movement or breathing patterns. You may not feel the pacing impulses.

A leadless pacemaker is a small device placed directly inside a lower heart chamber through a blood vessel, usually from the groin. It has no separate chest generator or conventional leads. Leadless devices are not suitable for every pacing need.

Pacemakers run on sealed batteries. The battery cannot be recharged at home. Its remaining life is estimated during device checks. When it becomes low, the generator can usually be replaced while working leads remain in place.

A device check, also called interrogation , uses a programmer or remote monitor to read stored information. It can show battery status, lead performance, pacing activity and recorded rhythm events. Interrogation does not involve surgery.

- A pulse generator , containing the battery and electronic circuits
- One or more leads , which are thin insulated wires connected to the heart

Why it matters for your health

A pacemaker can prevent the heart rate from becoming too slow. In someone whose symptoms are caused by a slow rhythm, pacing may reduce fainting, near-fainting, tiredness or breathlessness. These problems can have many causes, so testing is needed before linking them to a heart rhythm.

The device can also protect against pauses in the heartbeat caused by some forms of heart block. It does not remove the underlying electrical conduction problem. Instead, it provides ongoing support when the heart does not produce or conduct a reliable signal.

CRT may help selected people whose lower heart chambers contract out of step. Its purpose is

different from basic treatment for a slow heart rate.

Having a pacemaker affects some future medical care. Clinicians may need to know the device model, when it was implanted and whether it is approved for magnetic resonance imaging, or MRI, under specified conditions. "MRI-conditional" does not mean every MRI can proceed without planning. The scanner settings, leads and device programming may all matter.

Most everyday electrical equipment does not interfere with a modern pacemaker when used normally. Strong magnets or electromagnetic fields can temporarily affect some devices. Medical procedures such as MRI, surgery using electrical cautery, radiation therapy and certain heart procedures may require advance planning.

What can go wrong

Pacemaker implantation is a procedure, and complications are possible. Early problems can include bleeding, a collection of blood under the skin called a hematoma, infection, lead movement, damage to a blood vessel, a collapsed lung called pneumothorax, or rarely a hole in the heart wall.

Later problems can include device infection, lead damage, poor lead contact, battery depletion or incorrect sensing and pacing. A pacemaker may also need reprogramming as a person's health or pacing needs change.

These situations do not mean the pacemaker itself is a disease. They are complications of implantation, problems with the equipment, or changes in the heart condition for which pacing was prescribed.

Contact the device clinic promptly if the implant area becomes increasingly red, swollen, warm, painful or starts draining fluid. Fever after implantation also needs timely medical advice. New persistent hiccups, muscle twitching near the device, a change in the skin over it, or an alert from a remote monitor should also be reported.

Seek emergency help for severe chest pain, severe difficulty breathing, fainting that does not quickly resolve, or signs of a stroke such as sudden facial drooping, arm weakness or trouble speaking. These symptoms have several possible causes and should not be assumed to come from the pacemaker.

Occasional awareness of a heartbeat does not by itself show that a device has failed. New fainting, repeated near-fainting or a very slow pulse should be assessed urgently, particularly if these resemble problems present before implantation.

What you can do

Keep the pacemaker identification card available. It should include the manufacturer and device details. You can ask the device clinic for a replacement if it is lost.

Attend scheduled in-person or remote checks. These are routine even when you feel well because they assess the battery, leads and stored rhythm information. Ask the clinic how follow-up results will be communicated and what type of monitor you have.

Before an operation, scan or procedure, tell the healthcare team that you have a pacemaker. Ask whether both the generator and leads are MRI-conditional if an MRI is being considered. Do not assume that carrying a pacemaker automatically rules MRI in or out.

At airport or building security, tell staff about the device and show your identification card if asked. Do not linger against security equipment or allow a handheld scanner to remain directly over the pacemaker.

Keep strong magnets away from the implant site. Follow the device manufacturer's instructions for mobile phones, headphones, smartwatches and magnet-containing accessories. If an object appears to affect your heartbeat or causes light-headedness, move away from it and contact the device clinic.

After implantation, follow the hospital's instructions about wound care, driving, lifting and arm movement. These restrictions are usually related to healing and lead stability, and their timing is specific to the procedure and local rules.

There is usually nothing you can do to inspect or adjust the pacemaker yourself. Do not press repeatedly on the generator or try to test it with a magnet. Questions about settings or battery life require device interrogation.

Common questions

Can I exercise with a pacemaker?

Many people return to regular physical activity after recovery. The safe timing and type of exercise are influenced by the implant site, leads, underlying heart condition and reason for pacing. Ask the implanting team when you can restart activity. Contact sports may damage the device or the tissue over it.

Can I feel the pacemaker working?

Most people do not feel individual pacing impulses. You may be able to feel the generator beneath the skin. New twitching, repeated hiccups, pain or movement of the device should be discussed with the device clinic.

How long does a pacemaker last?

Battery life is influenced by the device, programmed settings and how often pacing is needed. Interrogation provides an estimate. Replacement is normally planned before the battery is exhausted.

Can household appliances interfere with it?

Most common household appliances are safe when working properly and used as intended. Strong magnets, industrial electrical equipment and some medical equipment need more care. Use the manufacturer's device-specific advice rather than relying on a general list.

Does a pacemaker fix every abnormal rhythm?

No. A pacemaker mainly prevents rates that are too slow and can coordinate heart chambers in selected cases. It does not treat every fast or irregular rhythm. Other medicines, procedures or an ICD may be needed for a separate rhythm condition.

Sources

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