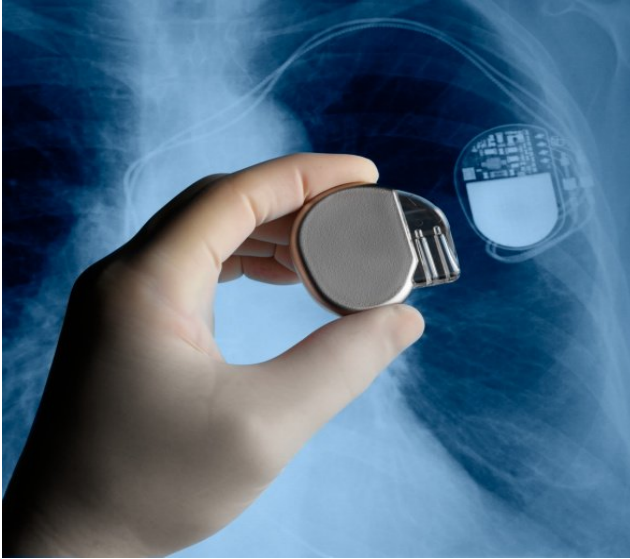


## Pacemaker



Heart rhythm is controlled by a small group of heart cells called the sinus (sinoatrial or SA) node. This specialized group of cells emits an electrical signal that reaches the heart muscle after going through a system of circuits that make the heart beat normally. The sinus node is the heart's natural "pacemaker" and determines the speed at which the heart beats. When the system stops working properly, it may be necessary to place a pacemaker for the heart to beat normally again.

A pacemaker is a small battery-powered device that helps the heart beat at a regular rhythm. It is used to replace a defective natural pacemaker or a blocked conduction path that prevents the electrical signal from reaching the heart muscle. There are two types of pacemakers, permanent and temporary. Permanent pacemakers are called internal, while temporary types are called external.

- Pacemakers use batteries to send electrical impulses to the heart and so help it pump properly. An electrode is placed next to the heart wall, and the pacemaker transmits small electrical charges that reach the electrode through a wire and make the heart contract.
- Most pacemakers have a sensor device that deactivates the pacemaker when the natural heartbeats are over a certain level. It is activated again when the beats are too slow. This is known as on-demand pacemaker.

A pacemaker has two parts: a battery-powered generator and wires (also called leads) that connect it to the heart. The generator normally has a useful life of seven to twelve years. An incision is made in the skin below the clavicle, generally on the left side. The wires are then threaded through the large vein under the clavicle that goes to the heart. The generator is then placed under the skin, is connected to the wires and held in place with a suture. The entire implantation procedure only requires local anesthesia and takes about an hour. During the procedure you may be given a mild sedative, but you will remain awake.

Most patients who need a pacemaker suffer from a condition in which the heart beats too slowly (bradyarrhythmia). This is generally the result of impairment of

the heart's own stimulation system in elderly patients. Arterial hypertension, heart disease or scar tissue due to a heart attack may also cause bradyarrhythmia. The pacemaker most commonly implanted is the on-demand pacemaker. It monitors the heart's activity and takes control only when the heart rate falls below a programmed minimum, generally around 60 beats per minute.

Other conditions that require pacemakers include heart blockage, in which the electrical signal from the heart's natural pacemaker is blocked and cannot reach the heart muscle, which causes a very low heart rate. Tachyarrhythmia, a condition in which the heart beats too fast, is another of the problems that can sometimes be treated with a pacemaker.

There are different types of pacemakers. The single-chamber pacemaker has a single electrode that is placed in the ventricle. This makes the ventricle (the pumping chamber in the lower part of the heart) contract independently from what the atria (the chambers in the upper part of the heart) are doing. Dual-chamber pacemakers have two electrodes, one in the atria and another in the ventricle. These pacemakers first make the atria contract and pump blood to the ventricles, and then they stimulate the ventricle for it to contract. This is more effective and allows a greater volume of blood to be pumped with each beat. Another more sophisticated type of pacemaker monitors physical changes in the body, which are a sign of increased or decreased activity. If the heart's own stimulation system does not respond to these changes in activity, these rate-response pacemakers raise or lower the heartbeats to the appropriate level of 60 to 150 beats per minute.

The pacemaker generator can be reprogrammed if the patient's condition changes. The cardiologist can send signals to the pacemaker's tiny computer with an electromagnetic device that is placed on the surface of the skin on top of the pacemaker.

#### Daily life

Most patients can return to their daily activities after recovering from pacemaker implantation surgery. However, people with pacemakers need to be aware of important recommendations and precautions about electricity and magnets.

Always tell medical or dental office personnel that you have a pacemaker. The recommendations will help you know what medical procedures represent a risk for the proper functioning of your pacemaker and which do not.

When going through an airport or other type of security system, people with pacemakers must know that certain security systems can detect the metal in the device.

Knowing all this will help you achieve a greater level of comfort and ease after your pacemaker is implanted.

Most modern pacemakers are protected from outside interference, and patients are protected from the possibility of their pacemakers malfunctioning as a result of the daily electrical signals to which we are exposed. Daily devices that do not cause problems include cellular telephones, small electrical devices and tomography examinations. Warnings recommending that patients with

pacemakers exercise caution when using a microwave oven are no longer necessary. However, some devices can cause enough interference to affect pacemakers. Magnetic resonance imaging is one example of what is contraindicated in patients with pacemakers.

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