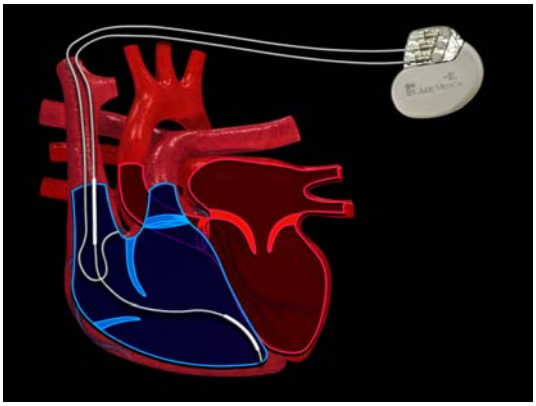
Pacemaker
Fact Sheet

WHAT IS A PACEMAKER?

A pacemaker is a small implantable device that sends electrical pulses to the heart whenever it senses that the heartbeat is too slow.

HOW DOES A PACEMAKER WORK?

A pacemaker works as a part of a pacing system consisting of three components: the pulse generator, the pacing leads and the programmer.



Pulse generator: a device implanted just below the skin near the collarbone. The pulse generator contains the battery and the electronic circuitry, or brain, which directs the battery to send electrical pulses to the heart. This stimulates the heart and causes it to beat at a normal rhythm.

Leads: thin wires that are inserted through a vein, which connects the generator to the heart. The leads also pick up the patient's own heart rhythm and transmit this information to the generator, which adapts its responses to the patient's needs.

Programmer: an external tabletop computer that physicians use to change pacemaker settings. Programmers allow physicians to adjust therapy based on a patient's needs over time without the need for further surgery.

> **FAST FACT**
> **Pacemakers "pace" hearts that beat too slowly. Newer pacemakers also treat heart failure by resynchronizing the electrical impulses in the heart's four chambers and improving its ability to pump blood to the body.**

WHO NEEDS A PACEMAKER?

A pacemaker is prescribed when a heart's electrical conduction system malfunctions and causes the heart to beat too slowly (called bradycardia). Sometimes a dangerously slow rhythm is discovered during a routine checkup without the patient being aware of a problem (indicating that the condition developed slowly and enabled the body to adapt).

Symptoms, when present, vary significantly. They often include lightheadedness, shortness of breath, fatigue, weakness, fainting or near-fainting spells, and an inability to participate in heavy physical activity. While symptoms may be due to many different causes, pacing is indicated only when symptoms are caused by a persistent or intermittently slow heart rhythm.

HOW DO PHYSICIANS DETERMINE WHETHER A PATIENT NEEDS A PACEMAKER?

To determine whether a pacemaker is needed, doctors administer an electrocardiogram (ECG) which provides a graphic representation of the heart's rhythm. Often, a recording of the heart rhythm is taken over many hours to catch infrequent symptomatic episodes.

St. Jude Medical, Inc.
Global Headquarters
One St. Jude Medical Drive
St. Paul, MN 55117

sjm.com

Media Contact

Amy Jo Meyer
Tel: 651-756-3029
ameyer@sjm.com

WHAT CAUSES BRADYCARDIA?

There are two types of bradycardia, sick sinus syndrome and heart block. The result of both sick sinus syndrome and heart block is a heart rate that is too slow to meet the normal needs of a healthy person.

Sick sinus syndrome: In patients with sick sinus syndrome or sinus node disease, the heart beats too slowly because the electrical impulses generated by the heart at the sinus node are created too slowly or too ineffectively. In the healthy heart, the electrical impulses that govern the heartbeat originate in the sinus node (the sinus node is sometimes called the heart's "natural pacemaker").

Heart block: There are three degrees of heart block that depend on severity. In all degrees of heart block, the sinus node initiates the electrical impulse properly and the atria contract properly, but there is a delay (or block) between the atrial beat and the corresponding ventricular beat.

- When there is a slight delay, the condition may be classified as first-degree heart block.
- When this delay is so long that the impulses fall out of one-to-one synchrony (causing the atria to beat more often than the ventricles), the condition is labeled second-degree heart block.
- When the impulse is totally blocked so that the atria do not beat in harmony with the ventricles, the condition is classified as third-degree heart bock, or complete heart block.

Some patients have intermittent third-degree heart block, meaning the impulses from atrium to ventricle are normal at times and completely blocked at other times.

WHAT TYPES OF PACEMAKERS ARE THERE?

Pacemakers are generally defined as single chamber (working only in an atrium or in a ventricle) or dual chamber (working in both an atrium and a ventricle). Most single-chamber pacemakers are ventricular; atrial-only pacemakers are quite unusual.

IN ADDITION TO PACING, WHAT OTHER THERAPIES DO CARDIAC PACEMAKERS PROVIDE?

Pacemakers can provide cardiac resynchronization therapy (CRT), which is a treatment for people with heart failure.

For the heart to work correctly, the main pumping chambers (the ventricles) must beat in coordination. In some heart failure patients, this coordination may be interrupted as the right and the left sides fail to beat in synchrony.

With a CRT pacemaker, leads are connected to both the right ventricle and the left ventricle. Most of the time, a third lead is placed in the right atrium as well. The device sends out electrical impulses to allow the pacemaker to coordinate the upper and lower chambers of the heart. In addition, both ventricles are paced to improve the synchrony of the contraction. This improves the heart's ability to pump blood to the body.

Many studies have shown that CRT pacemakers can improve quality of life or even reverse some of the physical damage to the heart caused by heart failure.

St. Jude Medical, Inc.
Global Headquarters
One St. Jude Medical Drive
St. Paul, MN 55117

sjm.com

Media Contact

Amy Jo Meyer
Tel: 651-756-3029
ameyer@sjm.com