

## Leads

Your pacemaker or implantable defibrillator is essential to maintaining your heart's health. The leads connecting your heart device to your heart also are critical as they are necessary to complete the electrical pathway.

### What is a lead?

A lead is a soft, thin insulated wire connecting to your heart device – a pacemaker or implantable defibrillator. The outside covering is usually made from silicone or polyurethane material. The thickness of leads today is similar to the size of a cooked spaghetti noodle. Leads are needed to carry the electrical signal from the heart device to your heart. They also carry information about your heart's natural activity back to your heart device.

One or more leads are used with your heart device. The number of leads depends on the type of device your doctor has prescribed. They may be implanted in the right atrium, right ventricle, and/or the left ventricle. There are different ways in which a lead may be attached in the heart. An "active fixation" lead will have a very small corkscrew securing it in the heart tissue. Other leads may be attached to the inside of the heart wall with soft silicone tines and this is called a "passive fixation" lead. Often, a steroid drug is emitted from the attached lead tip to reduce inflammation of the heart wall.

### How are leads implanted?

One end of each lead is connected securely to the heart device. The other end of the lead is attached to your heart.

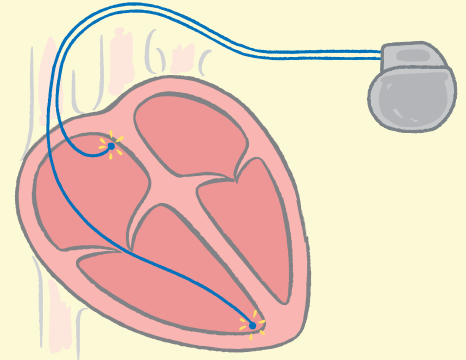
Your doctor inserts a lead one at a time. Leads are most often placed on the inside wall of the heart and are called endocardial leads. You may also hear them described as transvenous leads because they are inserted into a vein leading to the inside wall of a heart chamber. A lead positioned on the left side of the heart is implanted in a vein that runs on the outer wall of the left ventricle and is called a coronary sinus lead.

Sometimes, if it is necessary to place a lead on the outside wall of the heart, then an epicardial lead is used. Your doctor inserts it by making an incision between your ribs just over your heart.

### How long do leads last?

Unlike a pacemaker or an implantable defibrillator that is battery-powered, how long a lead will last cannot be predicted. A patient's heart condition, medical complications, anatomical differences, and surgical technique all can have an effect on a lead. Leads must withstand the twisting and bending caused by body movement and heartbeats.

Your physician will determine when or if your lead(s) need to be replaced. Leads are evaluated during a scheduled heart device



replacement and may be replaced during that same surgery. A lead also may be replaced if your doctor determines it is not meeting your medical needs, or if there is a performance issue. Leads and heart devices are compatible with each other to offer highly reliable connections no matter which medical device company manufactures them.

Usually leads are not removed from the implant site when a new lead is implanted. If necessary, however, your doctor may remove the lead but this may require a special surgical procedure.

### How is the performance of leads monitored?

Pacemakers, implantable defibrillators, and leads are very reliable. After implant, your physician continues to monitor your heart device and leads to ensure they are working well for you and your heart. No surgery is required to check a lead and the process is painless. Today's leads are built to also perform their own self-checks even when you are in-between scheduled doctor visits.

## How do manufacturers ensure lead performance?

Manufacturers of heart devices and leads use very strict standards during the process of designing, manufacturing, and performance testing to ensure safety. In addition, Medtronic collects performance data on its leads and reports this information to the Food and Drug Administration and to physicians. Physicians are able to use this reported data as they manage the medical care of you and other patients.

## How can I learn more about my leads?

If you have specific questions regarding your leads, please ask your doctor or nurse. You can also call Medtronic Patient Services toll-free at 1 (800) 551-5544, x41835 (7:00 a.m. to 6:00 p.m., Monday–Friday, Central Time) with non-medical questions.

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