

## Abnormal Heart Rhythms and Pacemakers

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The normal, healthy heart has its own pacemaker that regulates the rate that the heart beats.

However, some hearts don't beat regularly. Often a pacemaker can correct the problem. A pacemaker is a small device that sends electrical impulses to the heart muscle to maintain a suitable heart rate and rhythm. A pacemaker may also be used to treat fainting spells (syncope), congestive heart failure, and hypertrophic cardiomyopathy.

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Pacemakers are implanted just under the skin of the chest during a minor surgical procedure.

The pacemaker has two parts: the leads and a pulse generator. The pulse generator houses the battery and a tiny computer, and resides just under the skin of the chest. The leads are wires that are threaded through the veins into the heart and implanted into the heart muscle. They send impulses from the pulse generator to the heart muscle, as well as sense the heart's electrical activity.

Each impulse causes the heart to contract. The pacemaker may have one to three leads, depending on the type of pacemaker needed to treat your heart problem.

There are different types of pacemakers:

- Single chamber pacemaker uses one lead in the upper chambers (atria) or lower chambers (ventricles) of the heart.
- Dual chamber pacemaker uses one lead in the atria **and** one lead in the ventricles of your heart.
- Biventricular pacemaker uses three leads: one placed in the right atrium, one placed in the right ventricle, and one placed in the left ventricle (via the coronary sinus vein).

Your doctor will decide what type of pacemaker you need based on your heart condition.

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

Pacemakers are also used to treat the following:

- Pacemakers are used most commonly to treat bradyarrhythmias, which are slow heart rhythms that may arise from disease in the heart's electrical conduction system (such as the SA node, AV node, or HIS-Purkinje system).
- Heart failure. This device is called cardiac resynchronization therapy (CRT) or biventricular pacing.
- Hypertrophic cardiomyopathy.
- Syncope (fainting spells).

## **How Should I Prepare to Get a Pacemaker?**

Before your procedure to get a pacemaker implanted:

- Ask your doctor what medications you are allowed to take. Your doctor may ask you to stop taking certain medications one to five days before the procedure. If you have diabetes, ask your doctor how you should adjust your diabetes medications.
- Do not eat or drink anything after midnight the evening before the procedure. If you must take medications, take them only with a small sip of water.
- When you come to the hospital, wear comfortable clothes. You will change into a hospital gown for the procedure. Leave all jewelry and valuables at home.

## **How Are Pacemakers Implanted?**

Pacemakers are implanted two ways:

- **Endocardial approach.** This is the most common technique used.
  - This procedure is performed by an electrophysiologist (cardiologist specializing in catheter procedures to treat abnormal heart rhythms) in a Pacemaker or Electrophysiology lab.
  - A local anesthetic (pain-relieving medication) is given to numb the area. 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, 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.
- **Epicardial approach.** This technique is more commonly used in children than adults.
  - This procedure is performed by a surgeon in a surgical suite. General anesthesia is given to put you to sleep.
  - The surgeon attaches the lead tip 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 abdomen.
  - Although recovery with the epicardial approach is longer than that of the transvenous approach, minimally invasive techniques have enabled shorter hospital stays and quicker recovery times.

The doctor will determine which pacemaker implant method is best for you.

## **What Happens During the Pacemaker Procedure?**

The endocardial pacemaker implant takes about one to five hours to perform.

- You will lie on a bed and the nurse will start an intravenous line (IV) into your arm or hand. This is so you may receive medications and fluids during the procedure. You will be given a medication through your IV to relax you and make you drowsy, but it will not put you to sleep.
- The nurse will connect you to several monitors. The monitors allow the doctor and nurse to check your heart rhythm, blood pressure, and other measurements during the pacemaker implant.
- Your left or right side of your chest will be shaved and cleansed with a special soap. Sterile drapes are used to cover you from your neck to your feet. A strap will be placed across your waist and arms to prevent your hands from coming in contact with the sterile field.
- The doctor will numb your skin by injecting a local numbing medication. You will feel a pinching or burning feeling at first. Then, it will become numb. Once this occurs, an incision will be made to insert the pacemaker and leads. You may feel a pulling as the doctor makes a pocket in the tissue under your skin for the pacemaker. You should not feel pain. If you do, tell your nurse.
- After the pocket is made, the doctor will insert the leads into a vein and guide them into position using the fluoroscopy machine.
- After the leads are in place, their function is tested to make sure they can increase your heart rate. This is called "pacing" and involves delivering small amounts of energy through the leads into the heart muscle. This causes the heart to contract. When your heart rate increases, you may feel your heart is racing or beating faster. It is very important to tell your doctor or nurse any symptoms you feel. Any pain should be reported immediately.
- After the leads are tested the doctor will connect them to your pacemaker. Your doctor will determine the rate of your pacemaker and other settings. The final pacemaker settings are done after the implant using a special device called a "programmer."

## **What Happens After the Pacemaker Procedure?**

You may need to be admitted to the hospital overnight. The nurses will monitor your heart rate and rhythm.

You will be shown how to care for your wound. Keep your wound clean and dry. After five days, you may take a shower. Look at your wound every day to make sure it is healing. Call your doctor if you notice:

- Increased drainage, bleeding, or oozing from the insertion site
- Increased opening of the incision
- Redness around the site

- Warmth along the site
- Increased body temperature (fever or chills)

Your pacemaker settings will be checked before you leave the hospital.

You will receive a temporary ID card that tells you:

- The type of pacemaker and leads you have.
- The date of the pacemaker implant.
- The name of the doctor who implanted the pacemaker.

Within three months, you will receive a permanent card from the pacemaker company. **CARRY THIS CARD WITH YOU AT ALL TIMES** in case you need medical attention at another hospital.

### **Will I Be Able to Move Around After the Procedure?**

- You may move your arm normally.
- Do not lift objects that weigh more than 10 pounds.
- Do not hold your arms above shoulder level for a long time.
- Avoid activities that require pushing or pulling heavy objects, such as shoveling the snow or mowing the lawn.
- Stop any activity before you become overtired.
- For six weeks after the procedure, avoid golfing, tennis, and swimming.
- Try to walk as much as possible for exercise.
- Ask your doctor when you can resume more strenuous activities.
- Your doctor will tell you when you can go back to work, usually within a week after you go home. If you have the flexibility at your job, ease back to your regular works schedule.

### **Should I Avoid Certain Electrical Devices With a Pacemaker?**

- Electric blankets, heating pads, and microwave ovens can be used and will not interfere with the function of your pacemaker.
- A cell phone should be used on the side opposite of where the pacemaker was implanted.
- Cell phones should not be placed directly against the chest or on the same side as your pacemaker.
- You will need to avoid strong electric or magnetic fields, such as some industrial equipment; ham radios; high intensity radio waves (found near large electrical generators, power plants, or radiofrequency transmission towers); and arc resistance welders.
- Do not undergo any tests that require magnetic resonance imaging (MRI).
- Your doctor or nurse can provide more information about what types of equipment may interfere with your pacemaker.

If you have concerns about your job or activities, ask your doctor.

### **How Long Will My Pacemaker Last?**

Pacemakers usually last 4 - 8 years, depending on how often it is used. When the battery becomes low, your pacemaker will need to be changed.

### **How Often Will I Need to See My Doctor?**

A complete pacemaker check should be done six weeks after your pacemaker is implanted. This follow-up appointment is **CRITICAL**, because adjustments will be made that will prolong the life of your pacemaker. Then your pacemaker should be checked every three months on the telephone to evaluate battery function. Your nurse will explain how to check your pacemaker using the telephone transmitter. Once a year you will need a more complete exam.

If you have a biventricular pacemaker, you may need to visit the doctor's office or hospital every six months to make sure your device is working properly and the settings do not need to be adjusted.

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