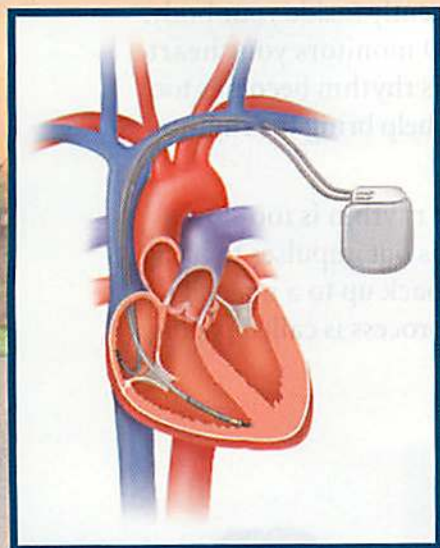


Implantable Cardioverter Defibrillators (ICDs)



- How ICDs Treat Fast Heart Rhythms
- Before, During, and After Implantation
- Living Well with an ICD



An ICD Could Save Your Life

Based on your health and medical history, your doctor has recommended an ICD (implantable cardioverter defibrillator). This device will protect you if your heart rhythm suddenly becomes too fast. A very fast heart rhythm can be dangerous—even deadly. An ICD can stop a fast rhythm and save your life. Read this booklet to learn what an ICD can do for you.

What Is an ICD?

An ICD is a small electronic device that's placed permanently inside your body. It's like a pacemaker with some extra features. An ICD monitors your heart rhythm (the speed and pattern of your heartbeat). If this rhythm becomes too fast or too slow, the ICD sends out electrical signals that help bring the rhythm back to normal. This device does the following:

- If your heart rhythm becomes dangerously fast, the ICD may send impulses to slow it down. Or, the ICD may briefly shock the heart. This allows the heart to return to a normal rhythm.
- If your heart rhythm is too slow, the ICD sends out impulses to bring the rhythm back up to a normal speed. This process is called pacing.



This booklet is not intended as a substitute for professional medical care. Only your doctor can diagnose and treat a medical problem.

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Why You Need an ICD

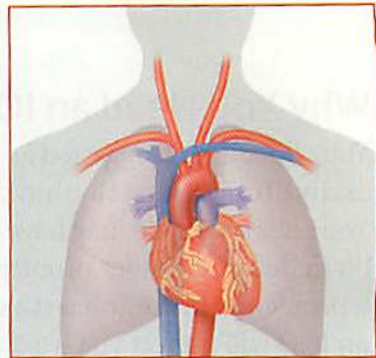
Your doctor has suggested an ICD because you are at risk of having a dangerous **arrhythmia** (heart rhythm problem). This risk can be due to various factors. Your heart muscle may have been damaged by a heart attack, virus, infection, birth defect, or other problem. This damage puts you at risk. Or, there may be a problem with your heart's electrical system that puts you at risk. Either way, an ICD will protect you if a dangerous arrhythmia does develop. You may have even had a life-threatening heart rhythm before. If so, the ICD will protect you if this happens again.

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Your Heart's Electrical System

Your heart pumps blood throughout your body. The heart has an electrical system that sends out signals. These tell the heart when to pump. If a problem occurs with these signals, the heart rhythm can become too fast. As a result, the heart may not pump as it's supposed to. A heart rhythm that's too fast can even be deadly. **Ventricular tachycardia (VT)** and **ventricular fibrillation (VF)** are two types of very fast, life-threatening heart rhythms.



The heart is near the center of the chest, between the lungs. A healthy heart is about the size of your fist.

How the Heart Pumps Blood

The heart is a muscle. By contracting (squeezing), it pumps blood to all parts of the body. The heart is divided into four chambers. The two upper chambers are called **atria**. These fill with blood entering the heart. The atria contract to move blood into the **ventricles** (the two lower chambers). These are the heart's main pumping chambers. They contract to pump blood out of the heart.

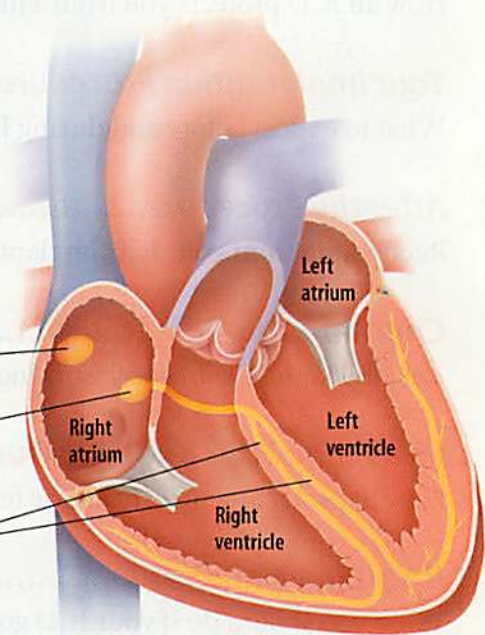
How the Electrical System Works

The heart's electrical system tells the chambers when to contract and relax. Groups of electrical cells in the right atrium send out the signals that start each heartbeat. These signals travel to the ventricles along pathways of electrical cells.

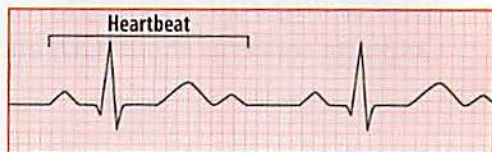
The **SA node** (or sinus node) sends a signal that travels through the atria. This signal starts each heartbeat.

The **AV node** receives the signal from the atria and guides it to the ventricles.

The signal travels down **pathways** of electrical cells and into the ventricles.



During a normal heartbeat, electrical signals are organized and sent out at a constant speed. An electrocardiogram (ECG or EKG) records the heart's electrical signals (as shown on the readout at right).

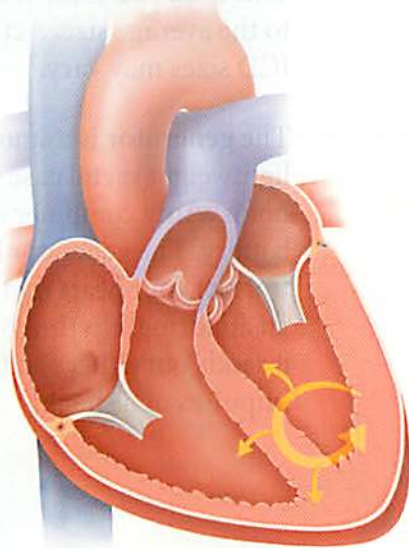


Problems with Electrical Signals

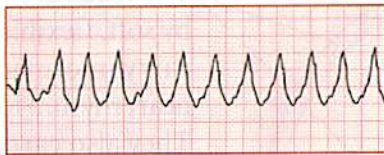
Sometimes electrical signals don't travel correctly through the heart. Instead of starting in the right atrium, signals may start in the ventricles. These signals create an abnormal heart rhythm.

Ventricular Tachycardia (VT or "v-tach")

During VT, signals start and travel around inside the ventricles. The ventricles beat so fast they don't have time to fill with blood. The heart can't pump as much blood as the body needs. Left untreated, VT can be life-threatening. It can also progress to a more serious arrhythmia, VF.

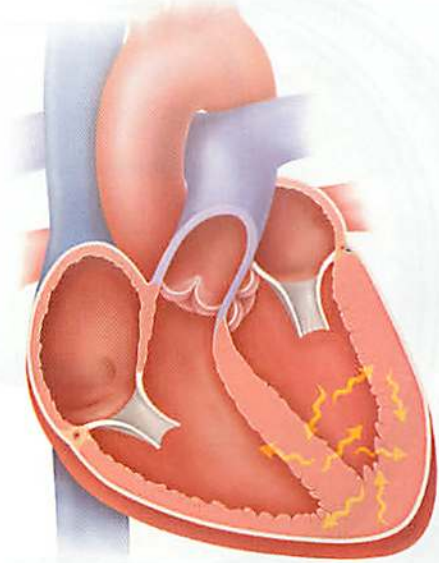


During VT, the heartbeat is very fast but still organized.



Ventricular Fibrillation (VF or "v-fib")

During VF, electrical signals are very fast and irregular. The heartbeat can be so fast and chaotic that the heart muscle quivers rather than pumps. If the abnormal heart rhythm is not treated right away, VF is almost always fatal.



During VF, the heartbeat is very fast and chaotic.



Symptoms of a Fast Heart Rhythm

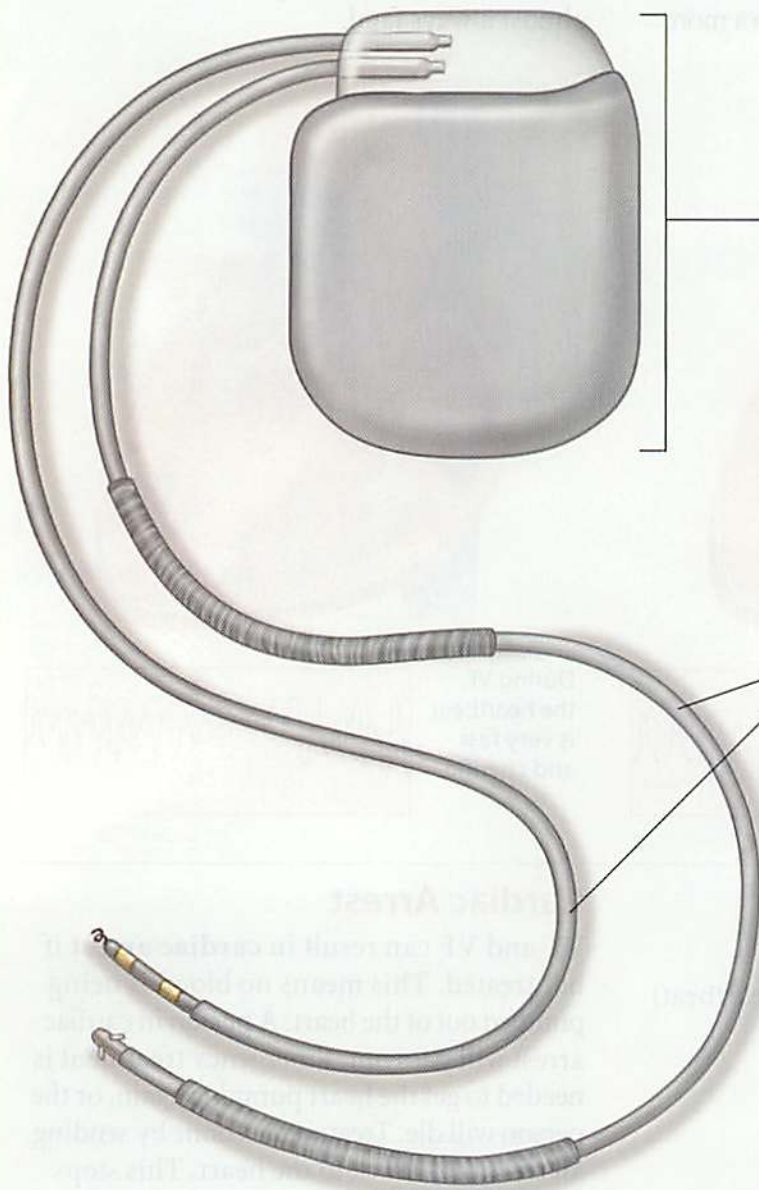
- Palpitations (a fluttering, fast heartbeat)
- Dizziness or lightheadedness
- Fainting spells
- Weakness
- A warm, flushed feeling
- Shortness of breath

Cardiac Arrest

VT and VF can result in **cardiac arrest** if not treated. This means no blood is being pumped out of the heart. A person in cardiac arrest will pass out. Emergency treatment is needed to get the heart pumping again, or the person will die. Treatment is done by sending an electrical shock to the heart. This stops the heartbeat for a moment, allowing it to return to a normal rhythm.

How an ICD Works

An ICD can sense when your heart rhythm becomes dangerously fast. Depending on the arrhythmia, the ICD will either send electrical impulses to override the fast rhythm and bring it back to normal, or it will interrupt the fast rhythm by briefly shocking the heart. After this shock, the heart rhythm usually returns to normal. ICDs have different capabilities. Your doctor will choose the type of ICD that's best for you and your heart.



The Parts of an ICD

This is an ICD shown close to the average size. Actual ICD sizes may vary.

The **generator** is a smooth, lightweight metal case that holds a tiny computer and a battery. The generator keeps track of your heart rhythm. If an abnormal rhythm occurs, it sends out either electrical impulses or a shock.

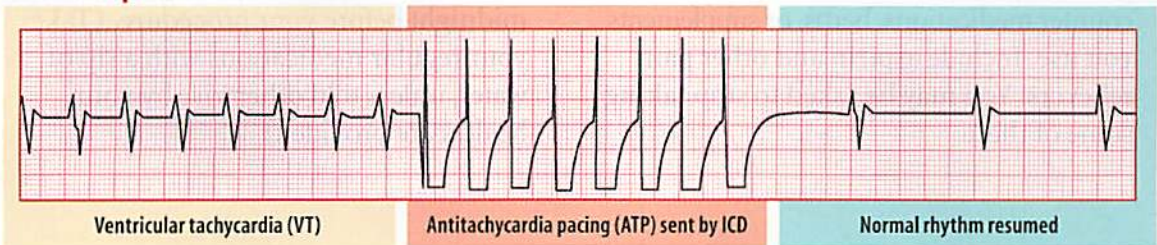
The **leads** are wires covered by soft, flexible plastic. These carry information about the heart rhythm to the generator. They also carry impulses or a shock to the heart when needed. All ICDs have at least 1 lead, which goes into the right ventricle. Some ICDs have 1 or 2 more leads going into other chambers.

What an ICD Does

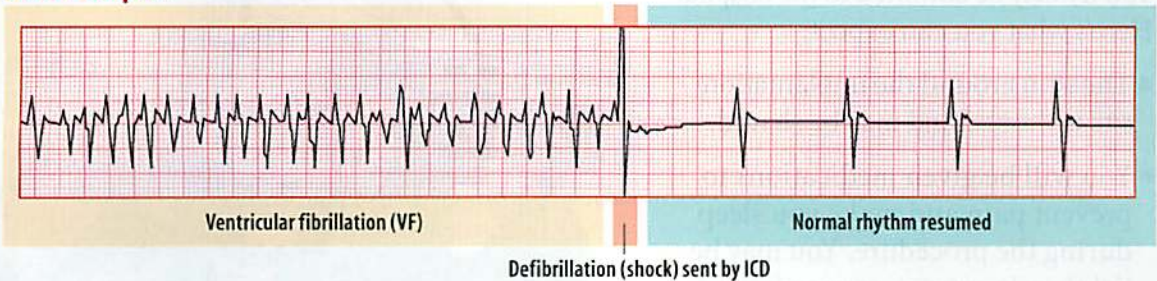
An ICD can do one or more of the following:

- **Antitachycardia pacing (ATP):** When VT occurs, the ICD sends out a series of impulses. These may make the rhythm return to normal. ATP may feel like fluttering in your chest, or may not be felt at all. (See ECG strip A.)
- **Cardioversion:** In some cases, the ICD can't correct VT as described above. When this happens, the ICD gives the heart one or more small shocks. These stop the fast rhythm for a moment. When the heart rhythm resumes, it usually goes back to normal.
- **Defibrillation:** If the ICD senses VF, it quickly sends a strong shock to the heart. This stops the heart for a second, giving it a chance to go back to a normal rhythm. (See ECG strip B.)
- **Bradycardia pacing:** An ICD's main job is to slow a fast heart rhythm. At times, though, your heart might beat too slowly. The ICD can help by sending out pacing impulses. These get the slow heartbeat back to the right speed.

ECG Strip A



ECG Strip B



If You Have Heart Failure

With heart failure (a weakened heart muscle), the ventricles' contractions may not be coordinated (timed correctly). If you have heart failure and are also at risk of developing a life-threatening heart rhythm, a special type of ICD may be used to treat both problems. This ICD has leads in both ventricles (unlike a standard ICD, which has a lead in only the right ventricle). The ICD senses and corrects the timing of the ventricles' beats. This treatment is called cardiac resynchronization therapy (CRT) or biventricular pacing. This ICD also treats fast heart rhythms, just like a regular ICD.

Your Implantation Procedure

The ICD is put into your body during a process called **implantation**. This is done in an electrophysiology lab or operating room. You'll be admitted to the hospital on the day of your procedure. In most cases, implantation takes around 1 to 3 hours.

Before Implantation

You'll be given instructions on how to get ready for implantation. Before your procedure:

- Have any recommended tests.
- Tell your doctor about all your prescribed medications. Include daily medications such as warfarin (Coumadin), clopidogrel (Plavix), and insulin. You may be given special instructions for these.
- Also tell your doctor about any over-the-counter medications, herbs, or supplements you use. Include aspirin and other pain relievers. You may be asked to stop taking some of these.
- Tell your doctor if you're pregnant (or think you could be). This could affect part of the implantation process.
- Talk to your doctor (or another healthcare provider) about the pain medications that will be used during the procedure.
- Do not eat or drink anything after the midnight before your procedure. (Take your regular medications with a sip of water, unless told otherwise by your healthcare provider.)

The Day of Implantation

You'll likely be admitted to the hospital. Here's what you can expect:

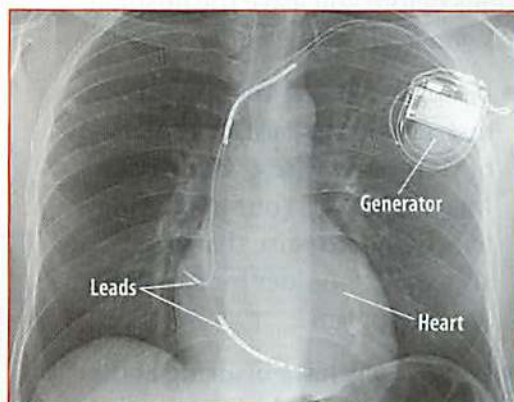
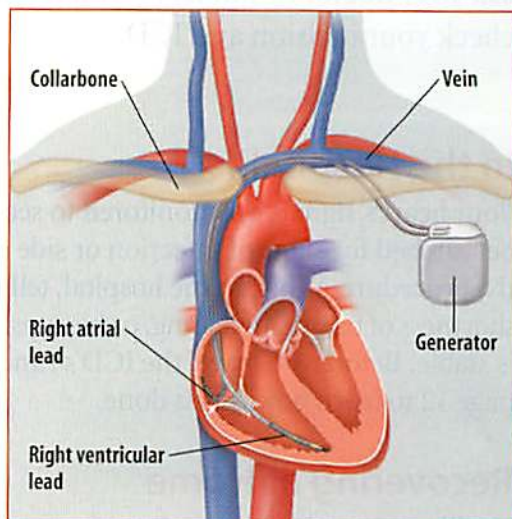
- The skin around the implantation site is washed and may be shaved.
- You will be given medications to prevent pain and make you sleep during the procedure. You may be lightly asleep (conscious sedation) or deeply asleep (general anesthesia).
- Medications and fluids will be given to you through an IV (intravenous) line.
- Your body will be draped with sheets during the procedure. Only the area where the device is being implanted is exposed. This helps keep the implantation site sterile (germ-free).



How the ICD Is Put into the Body

The ICD is usually implanted on the left side of your chest. Implantation does not require open heart surgery (your chest will not be opened). During implantation:

- An incision is made in the skin below the collarbone. This creates a “pocket” to hold the ICD.
- A lead is threaded through the incision into a vein in the upper chest. With the help of x-ray monitors, the lead is then guided into one of the heart’s chambers. Depending on how many leads your ICD has, this process may be repeated to guide leads into other chambers.
- The leads are attached to the heart muscle so they will stay in place.
- The generator is attached to the leads. Then, the generator is placed in its pocket under the skin.
- A fast heart rhythm may be induced (started) to test the ICD.
- When everything else is done, the incision is closed with sutures, medical glue, or staples.



X-ray showing an implanted ICD

Other Implantation Sites

In some cases, the ICD can be put elsewhere in the body. This could be in the abdomen, on the right side of the chest, or on the left side under the muscle. If one of these is an option for you, your doctor will explain more.

Risks and Complications

The risks of ICD implantation are very low. Some of the risks include:

- Bleeding, bruising, or severe swelling at the incision site
- Infection of the incision
- Puncture and partial collapse of the lung
- Irregular heartbeat
- Damage to nerves, blood vessels, or heart muscle requiring surgery or blood transfusions
- Heart attack, stroke, or death (very rare)

After the Procedure

You'll stay in the hospital at least overnight. Before you go home, you'll be given discharge instructions. These will describe how to care for your incision and any special precautions you must take. If you have questions, ask your doctor or nurse. As you recover, you'll have follow-up visits to check your incision and ICD.

In the Hospital

Your heart's signals are monitored to see how the ICD is working. You will also be watched for signs of infection or side effects of the medications used during the procedure. While in the hospital, tell your nurse if you notice any chest pain, shortness of breath, twitching, or hiccups. You can go home when your condition is stable. Before you leave, the ICD's function and settings may be checked. See page 12 to learn how this is done.

Recovering at Home

You'll be given discharge instructions before you leave the hospital. As you heal:

- Be sure to follow any special instructions to care for the side of your body where your device was implanted. Your doctor may tell you not to raise that arm above the shoulder for a certain amount of time.
- You'll likely have bruising at the incision site for about a month. This is normal. It will go away as the incision heals.
- You can probably return to your normal routine soon after implantation. Ask your doctor when you can return to work.
- You may be instructed not to drive for a certain amount of time. Your doctor will tell you more about this.



You may be told not to raise your arm above the shoulder at first. Ask family members for help reaching high shelves.

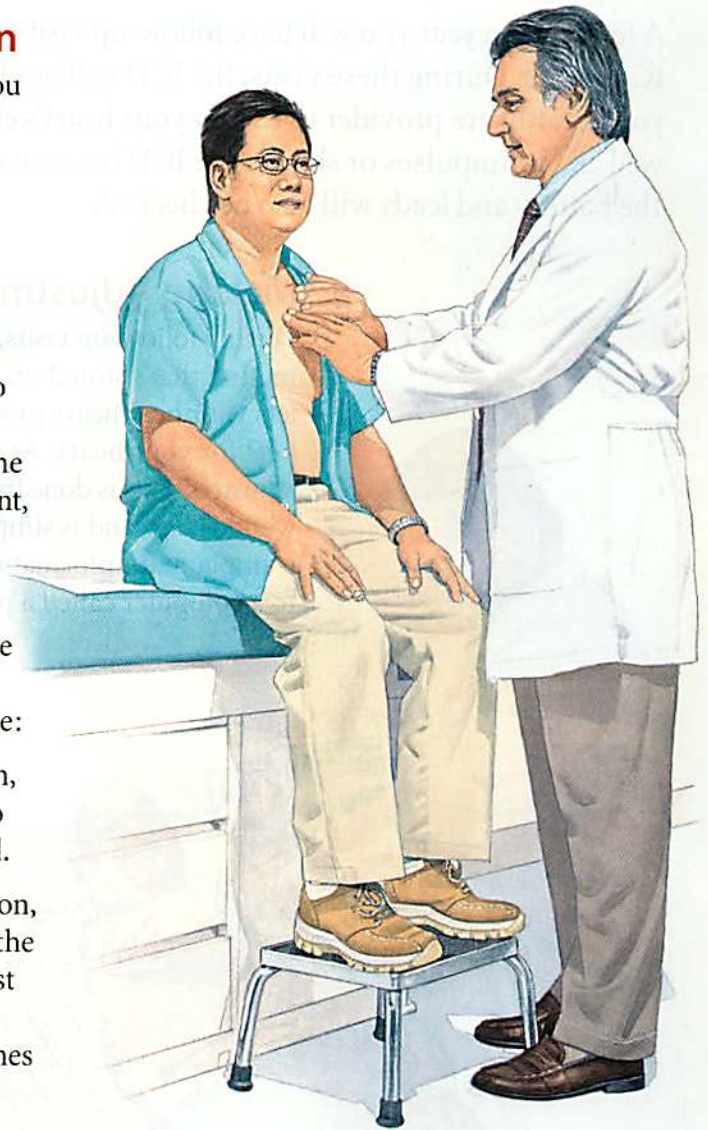
Taking Care of Your Incision

Your discharge instructions will tell you how to care for your incision. Change the dressing once a day, or as often as instructed. Keep the area around the incision clean and dry. And avoid getting the incision wet until your healthcare provider says it's okay. You may be told to take sponge baths for the first few days. After that it's okay to shower, but don't let the shower spray directly on the incision. Don't scrub the incision. And don't use lotion, ointment, or powder on the incision while it heals.

Follow-up Visits

See your heart doctor and primary care doctor as often as recommended. Here are some follow-up visits you may have:

- About 1 to 2 weeks after implantation, you'll see your healthcare provider to make sure the incision is healing well.
- About 1 to 2 months after implantation, your healthcare provider may check the ICD to make sure it's working the best for your heart. From now on, you'll continue to have these visits a few times each year. See page 12 to learn more.



When to Call Your Healthcare Team

Call if you have any of these after the procedure:

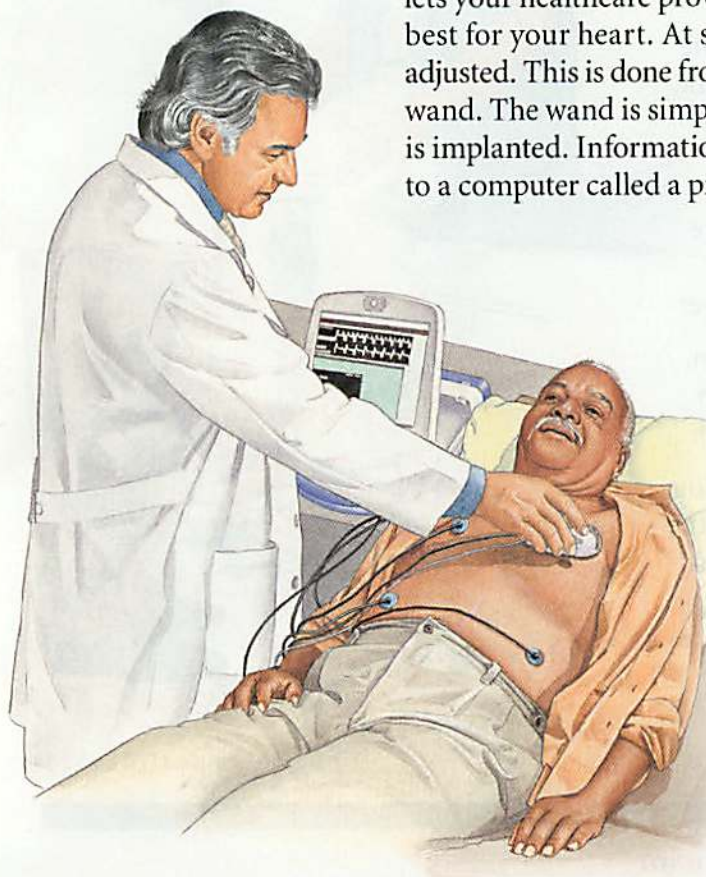
- Signs of an infection, such as: fever over 100°F (37.7°C); drainage from the incision; redness, swelling, or warmth at the incision site
- Twitching chest muscles
- Pain around your ICD that gets worse, not better
- Bleeding from your incision
- Swelling in the arm on the side of the incision site
- Severe swelling of the incision site (bulging up like a golf ball)
- Chest pain or shortness of breath

Checking Your ICD

A few times a year you will have follow-up visits with your doctor or ICD clinic. During these visits, the ICD will be checked. This allows your healthcare provider to review your heart's electrical activity, as well as any impulses or shocks the ICD has sent out. At these visits, the battery and leads will also be checked.

Making Adjustments

During follow-up visits, your healthcare provider checks information that's stored on the ICD's computer. Checking the ICD lets your healthcare provider make sure the ICD is working its best for your heart. At some visits, the ICD's settings may be adjusted. This is done from outside the body using an electronic wand. The wand is simply placed over the skin where the ICD is implanted. Information from the ICD is sent from the wand to a computer called a programmer.



Replacing the Battery

Most ICD batteries last about 4 to 6 years. The battery level is checked during follow-up visits. Some ICDs have alarms that sound when the battery is low. There's still plenty of time to replace the battery before it wears out. To do this, the entire generator must be replaced. This requires a procedure that's usually simpler and shorter than ICD implantation. In rare cases, leads wear out and need to be replaced. This is done during a procedure similar to the first implantation.

Checking the ICD from Home

You may be asked to help check the ICD from home. To do this, you subscribe to a service that lets you send the ICD's signals over the phone. Your healthcare provider reviews the information and decides if you need to come in for an adjustment. (This service is not yet available in all areas.)

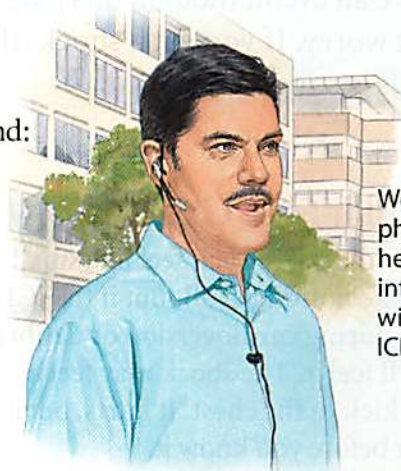
Protecting Your ICD from Outside Signals

ICDs are well protected. Most machines and devices will not interfere. Microwave ovens and other appliances should not cause problems. Neither should computers, hair dryers, power tools, radios, televisions, electric blankets, or cars. Signals from a few devices might cause problems with your ICD, though. Take care to avoid these.

Signals That Cause Problems

To protect your ICD, take special precautions around:

- **Cellular phones.** Always carry a cell phone on the side opposite your ICD and at least 6 inches away from it. While using a cell phone, wear a headset or hold the phone to the ear opposite your ICD.
- **Electromagnetic anti-theft systems.** These are often near entrances or exits in stores. Walking past one is okay, but avoid standing near or leaning against one.
- **Strong electrical fields.** These can be caused by radio transmitting towers and heavy-duty electrical equipment (such as arc welders). A running engine also produces an electrical field. It's okay to ride in a car, but avoid leaning over the open hood of a running car.
- **Very strong magnets.** Never have an MRI (a medical test that uses magnets). Magnets in big speakers (such as on a stereo or at a concert) and in hand-held security wands (such as those used at airports) can cause problems if they come too close to the ICD.



Wearing a cell phone headset helps prevent interference with the ICD's signals.

If a Signal Interferes

If it's near one of the signals described above, the ICD could turn off or its settings could reset. You could even get a shock. If you think you were exposed to a signal like this, call your doctor and explain what happened.

Carry an ID Card

Your ICD comes with an ID card. You'll be given a temporary card when you get your ICD. The permanent card will be mailed to you in about 6 weeks. Show the card to any doctor, dentist, or other medical professional you visit. Also show it to guards at the airport. This way, they know to follow special procedures that prevent the security wand from interfering with your ICD.



If You Have an Event

An **event** is the name for what happens when the ICD sends signals or shocks to fix a dangerous heart rhythm. If you never have an event, this doesn't mean the ICD isn't doing its job—just that you haven't needed it. As long as you don't have symptoms, it's fine if you never get a shock. If you do have an event, though, this page will help you know what to do. And don't worry. If you get a shock, this doesn't mean your heart condition is getting worse.

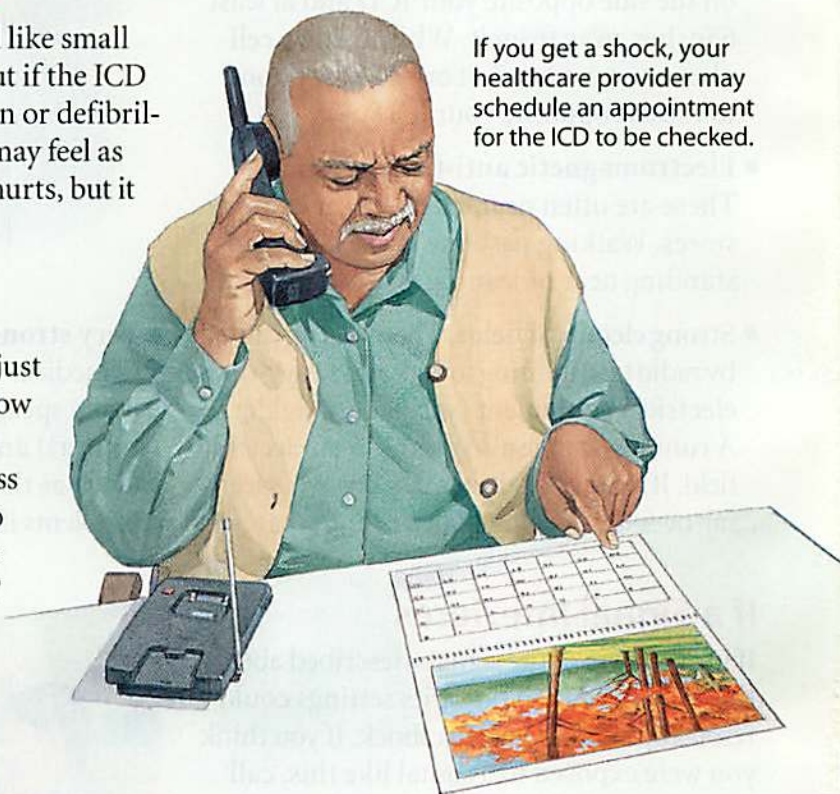
What Will It Feel Like?

Antitachycardia pacing can feel like small flutters or like nothing at all. But if the ICD shocks you during cardioversion or defibrillation, you'll feel it. The shock may feel as strong as a kick to the chest. It hurts, but it will be over before you know it.

What You Should Do

If you feel okay after the event, just let your healthcare provider know what happened. This is not an emergency, so call during business hours. Your doctor may want to check the ICD to make sure the shock was sent in response to VT or VF. If it was not, the ICD's settings can be adjusted to keep this from happening again.

If you get a shock, your healthcare provider may schedule an appointment for the ICD to be checked.



When to Call 911 (Emergency)

If you have a shock and feel okay afterward, you don't need to call 911. Instead, call your doctor's office during business hours. **Do call 911 if:**

- You feel chest pain or symptoms of a fast heart rhythm (page 5) after a shock.
- You feel 2 or more shocks in a row.
- You have symptoms of a fast heart rhythm and feel no shock.
- You are unconscious, even briefly (someone should call 911 for you).

Addressing Your Feelings

It's normal to have fears and strong feelings about getting an ICD. Knowing you're at risk of a dangerous heart rhythm can be scary. And some people are nervous about getting a shock. Remember: The ICD is meant to help you live longer. You may never have a life-threatening heart rhythm. But if you do, the ICD will treat the rhythm much quicker than paramedics could—and, most likely, save your life.

Things to Remember

Having an ICD won't stop you from doing most of the things you want to. It may even help you feel more confident about your heart and your health. If you're worried about the ICD or getting a shock, keep the following in mind:

- If you do get a shock, it's because your life was in danger. The ICD did its job and saved your life.
- The ICD's settings allow it to distinguish between an increased heart rate due to activity and a life-threatening rhythm. So having an ICD won't stop you from exercise or most other physical activities.
- Having an ICD won't interfere with sex or intimacy, either. Again, the ICD can tell the difference between a fast heart rate and a life-threatening one. If the ICD ever does go off during sex, it won't hurt or shock your partner.
- If your ICD ever goes off during physical activity, tell your healthcare provider. If the shock was accidental, the ICD's settings can most likely be adjusted to keep this from happening again.
- You can wear a medical ID bracelet that says you have an ICD. This way you can feel secure that if you have an event and need help from others, you'll get it.

Coping with Depression and Anxiety

Feelings of depression and anxiety are very common when you're diagnosed with a heart problem. If you're having these feelings, help is available. Talk to your doctor about how you feel. Also consider joining a support group. This way, you can get support from others who may feel the same way you do.



Your ICD will not hurt or affect people around you—even if you're touching when it goes off.

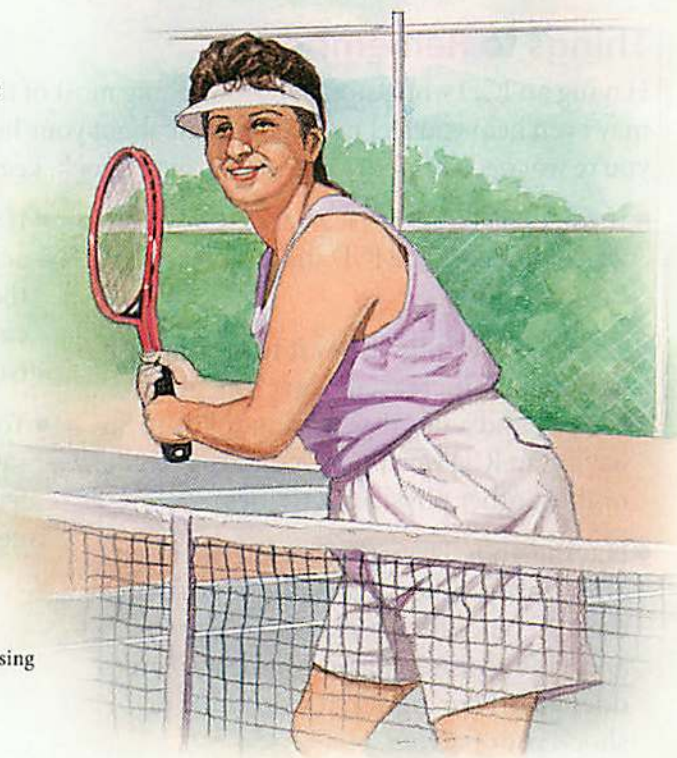
A Healthy Future

An ICD is not a cure for heart rhythm problems. You'll likely still need medications and other forms of treatment. But you can feel confident that your ICD will protect you from a life-threatening heart rhythm. This way, you can be less concerned about your heart and focus more on the rest of your life.

For More Information

If you want to learn more about ICDs and heart rhythm problems, contact the following resources:

- **American Heart Association**
www.americanheart.org
800-242-8721
- **Heart Rhythm Society**
www.HRSpatients.org
- **Your doctor's office or local hospital**
for information on support groups.



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