Medtronic was founded in 1949 by Earl Bakken, a graduate student in electrical engineering, and his brother-in-law, Palmer J. Hermundslie. Today Medtronic is the world leader in medical technology, pioneering therapies that restore health, extend life and alleviate pain.

From its modest beginnings in a 600-square-foot Minneapolis garage, we have transformed Medtronic into a worldwide company that serves customers in more than 120 countries. Each year, millions of patients are treated with Medtronic products and therapies. We invest almost $500 million each year in research and development, working closely with the world’s leading physicians and scientists to enhance our current products and therapies, and to develop new ones. Although we are a large company, individual patients and their needs are still the driving force behind what we do and how we do it.

Our goal is to improve the quality of your life. This booklet, which provides information about your pacemaker, is one small way we try to help.

Welcome to the Medtronic family. We wish you well.
**INTRODUCTION**

Your doctor or doctors should be your first source of information regarding your heart condition and your general health. This handbook is for people who are about to have or already have an implantable cardioverter defibrillator (ICD). This handbook explains what the heart device is, how it is implanted, what it feels like when you receive therapy from the heart device, and what you can expect after you have your heart device. It’s a good idea to encourage your family and caregivers to review this handbook.

As you read through this information, you may find words and terms that are new to you. A list of words and their meanings are located in the Glossary at the back of this booklet.

We hope this booklet will answer many of the questions you have about your Medtronic ICD. Your doctor or nurse can provide more details.

### 1| LIVING WITH YOUR HEART DEVICE

Many people resume their normal daily activities after full recovery from surgery. (See “Your implant procedure and recovery” on page 21.) However, there may be certain situations that your doctor will ask you to avoid. Your doctor and nurse will provide the most important guidance for your particular condition.

**Recommendations about your physical activity**

Upon the advice of your physician, you can gradually return to your normal lifestyle. Such activities might include:

- Pursuing hobbies or recreational activities
• Returning to your job
• Resuming strenuous activity
• Resuming sexual activity
• Traveling

Your doctor might ask you to avoid situations where a few seconds of unconsciousness could be dangerous to you or others. Such activities might include driving, swimming or boating alone, or climbing a ladder.

**Recreation and activities**
Avoid rough physical contact that could cause you to fall or hit your implant site. Your implanted heart device can be damaged or your leads could be detached from the heart device during rough contact.
- If you use a rifle or shotgun, rest the butt on the shoulder on the side opposite from your heart device.
- In activities that use a shoulder harness, protect the heart device and leads from jolts or rough rubbing.
- If you plan to scuba dive, discuss your medical condition with your doctor.

General recommendations about scuba diving vary depending on many factors. Ask your doctor to contact Medtronic Technical Support for the most up-to-date information about scuba-diving recommendations. If you have additional questions about any recreational activities you normally pursue, contact Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at canada.patientservices@medtronic.com.

**Driving a car**
Discuss with your doctor whether you can safely drive a car or other vehicle. You may be able to resume driving, depending on the laws in your area and on your individual medical condition. Your doctor will decide what is best for your safety and the safety of others. Seat belts are a very important safety device and should always be worn while driving or riding in a vehicle. While you are driving or riding in a vehicle, the shoulder seat belt strap may feel uncomfortable during the first few weeks after surgery. You can place a soft towel between the seat belt strap and your implant site to cushion the area.

**What you need to know about electromagnetic compatibility (EMC)**
Everything that uses electricity produces an electromagnetic energy field. This energy field surrounds the electrical item while it is connected to a source of electricity (even a battery source). The energy field is strongest near the item and weakens with distance.
from the item. The relationship between these energy fields and your heart device is called electromagnetic compatibility (EMC).

Most electromagnetic energy fields are small and weak and do not affect your heart device. Most small and weak energy fields are compatible with your heart device. Electrical items that generate strong electromagnetic energy fields may not be compatible with your heart device. Because your heart device is designed to sense the electrical activity of your heart, it is possible that it may sense a strong electromagnetic energy field outside your body and deliver a therapy that is not needed or withhold a therapy that is needed. Several safeguards are built into your heart device to shield it from strong electromagnetic energy fields. For example, the metal case of your heart device acts as a shield against electromagnetic energy fields.

There are also electronic filters built into your heart device that help your heart device distinguish between external electromagnetic energy fields and the internal electrical pulses of your natural heartbeat. Because the electromagnetic energy fields surrounding an electrical item get weaker the farther you are from the item, you can avoid potential EMC problems by keeping your heart device a minimum distance away from the electrical item. See the following pages for more information, including the recommended safe distances for certain types of electrical items.

**How could electromagnetic energy fields affect my heart device?**

High electromagnetic energy fields could affect how your heart device senses your heart rhythm. Because your heart device is designed to sense the electrical activity of your heart, it may also sense a strong electromagnetic energy field outside your body. If your heart device is exposed to a strong electromagnetic energy field, it may not detect an abnormal heart rhythm or it may deliver a therapy shock when your heart does not need it.

Any effects of electromagnetic energy fields on your heart device are temporary and will stop when you move away from the source of the electromagnetic energy field.

**What do I do if I think that an electrical item is affecting my heart device?**

If you feel dizzy or feel rapid or irregular heartbeats and you suspect your heart device is being affected by an electromagnetic energy field, move away from the electrical item. Your heart device will immediately return to its normal operation. If you receive a therapy shock or if your symptoms do not improve when you move away from the item, you should contact your doctor.
What about static electricity or shocks from household outlets?
Static electricity shocks and a “momentary” shock from an electrical outlet (110/220 volts) will not damage your heart device.

What items are safe and what kind of precautions do I need to take?
Most electrical items are safe for you to use. However, you should keep some items that produce a stronger electrical field a minimum distance away from your heart device. This minimum distance can range from 6 to 12 inches or more, depending on the type of item. Refer to the tables starting on page 5 for recommended safe distances.

General rules for safe use of electrical items
The following pages provide some tips on how to avoid any possible effects of electromagnetic energy fields on your heart device. If you have questions about EMC or the safe use of a specific item that is not listed, please call Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at canada.patientservices@medtronic.com.

Your home and work place contain a variety of electrical items. Most are safe to use, and some should be kept a minimum distance from your heart device.

Proper grounding of electrical items
To protect yourself from electrical current that may leak from improperly grounded electrical items and pass through your body, follow these suggestions:
- Make sure that all electrical items are properly wired and grounded.
- Make sure that electrical supply lines for swimming pools and hot tubs are properly installed and grounded according to local and national electrical code requirements.

Wireless communication devices
Follow these guidelines when using wireless communication items. If you experience dizziness or palpitations, move further away from the item or turn it off.

Mobile phones
Your heart device has been tested with many types of mobile phone technologies to ensure that it will operate correctly while you are using a mobile phone. Keep the antenna of the mobile phone at least 6 inches away from your heart device. This is easily done by holding the phone to the ear farthest away from your implant. Don’t carry the phone in a pocket over your heart device when the phone is turned on.
Two-way pager or mobile mailbox
Hand-held devices that let you send messages use the same type of transmitter as a mobile phone, so follow the same guidelines.

Wi-Fi enabled laptop computers and devices
Wi-Fi enabled laptop computers and devices contain small transmitters. Keep them at least 6 inches away from your heart device.

Kitchen appliances
One kitchen appliance that could possibly affect your heart device is an induction cooktop. An induction cooktop uses an alternating magnetic field to generate heat. You should keep your heart device at least 24 inches away from the heat source when the induction cooktop is turned on. Call Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or e-mail at canada.patientservices@medtronic.com, for the latest information about this appliance.

Items that contain magnets
Strong magnets can interfere with the normal operation of your heart device. Avoid holding strong magnets, or items that use strong magnets, close to your heart device.

Note: You may not suspect it, but stereo speakers have magnets inside them. Be careful not to carry or hold speakers close to your heart device. Even if the power for the speakers is disconnected, you should keep speakers at least 6 inches away from your heart device.

EMC with household or hobby items
Table 1 and Table 2 provide the recommended minimum distances for electrical household and hobby items.

<table>
<thead>
<tr>
<th>Table 1: EMC with household items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low risk</strong></td>
</tr>
<tr>
<td>Microwave oven; clothes washer or dryer; electric gas; or convection oven; toaster; blender; electric can opener; food processor; cordless electric knife; clothes iron; salon hair dryer; cordless shaver;</td>
</tr>
</tbody>
</table>
electric blanket heating pad; portable space heater; treadmill; vacuum cleaner. Standard home or public telephone; desktop or laptop computer; AM and FM radio; pager; cassette tape recorder; CD player; video recorder (VCR); MP3 player; television; stereo; DVD player; remote control for television or garage door.

pad; magnetic bracelet or magnetic clasp stereo speakers; home cordless telephone; mobile phone, two-way pager, or mobile mailbox; personal digital assistant (PDA); modem; bluetooth devices; Wi-Fi enabled laptop computers and devices.

(uninterruptable power source) up to 200 Amps—keep at least 12 inches away, if operating by battery source, keep at least 18 inches away. Electronic pet fences/invisible fence—keep at least 12 inches away from the buried wire and/or the indoor antenna.

Table 2: EMC with hobby items

<table>
<thead>
<tr>
<th>Keep heart device at least 6 inches away</th>
<th>Special cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanic’s extractor wand (uses a magnet to pick up metal items); bingo wand; radio-controlled toys (antenna); two-way walkie-talkie (less than 3 watts).</td>
<td>Citizen Band (CB) radio antenna, HAM radios, amateur radios, and other radio transmitters, for distance information, see “EMC and radio transmitters” on page 8. “Beach comber” metal detector—keep the detector end at least 24 inches away.</td>
</tr>
</tbody>
</table>

EMC with home power tools
Most home power tools are safe to use, if they are used according to the following guidelines:

- Keep all power tool equipment in good working order to avoid electrical shock.
- Be certain that plug-in tools are properly grounded (or double insulated). If you use power machinery often, installing a ground-fault-interrupt outlet is a good safety measure. This inexpensive device prevents a sustained electrical shock.
- Keep hand-held electric tools at least 6 inches away from your heart device.
- Avoid using a power tool in the locked “on” position.
- Avoid any power tool or appliance that could harm you if you become dizzy or receive a therapy shock from your heart device.
- Avoid using power tools when you are alone.

Table 3 lists the recommended safe distances for home power tools.
Table 3: EMC and home power tools

<table>
<thead>
<tr>
<th>Keep at least 6 inches away</th>
<th>Special cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small power tools; electric yard tools; battery operated hand tools and battery charger.</td>
<td>Gas-powered tools and car repair— turn off the motor if you need to lean close to the motor. Keep the ignition system at least 12 inches away from your heart device. For detailed information about electric arc and resistance welding, contact Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at <a href="mailto:canada.patientservices@medtronic.com">canada.patientservices@medtronic.com</a></td>
</tr>
</tbody>
</table>

Avoid using a chainsaw

- You could be seriously injured if you become dizzy or lose consciousness.
- You should keep the ignition system of the chainsaw at least 12 inches away from your heart device. For most chainsaws, it is difficult to maintain this 12 inch distance between the ignition system and your heart device while operating the saw.
- The ignition system, specifically the spark plug, on some chainsaws is actually inside the hand grip area. If the insulation covering the spark plug is faulty, electrical current could pass through your body and affect your heart device.
- The vibration of a chainsaw can affect the rate of pacing you receive from your heart device.

EMC with industrial equipment

After recovering from surgery, most heart device patients can return to work or school. However, if you use or work near high-voltage equipment or sources of high electrical current, consult with your doctor.

Table 4: Industrial equipment that is not recommended

Check with your doctor before working with the following equipment. If you experience dizziness or palpitations, move farther away from the equipment.
- Electric furnaces used in the manufacturing of steel.
- Induction heating equipment and induction furnaces used to heat metal.
Industrial magnets or large magnets, such as those used in surface grinding and electromagnetic cranes.
- Dielectric heaters, used in industry to heat plastic and dry glue in furniture manufacturing.
- Broadcasting antennas of AM, FM, shortwave radio, and TV stations.
- Power plants, large generators, and transmission lines. Lower voltage distribution lines for homes and businesses are unlikely to affect your heart device

**EMC and radio transmitters**
Determining a safe distance between the antenna of a radio transmitter and your heart device depends on many factors such as transmitter power, frequency, and the antenna type. If the transmitter power is very high, or if the antenna cannot be specifically directed away from you, you may need to stay further away from the antenna. Table 5 lists safe distances from radio transmitters.

<table>
<thead>
<tr>
<th>Transmitter Type</th>
<th>Safe Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-way radio transmitter (less than 3 watts)</td>
<td>at least 6 inches</td>
</tr>
<tr>
<td>Portable transmitter (3-15 watts)</td>
<td>at least 12 inches</td>
</tr>
<tr>
<td>Commercial and government vehicle-mounted transmitters (15-30 watts)</td>
<td>at least 24 inches</td>
</tr>
<tr>
<td>HAM transmitter (200 watts)</td>
<td>at least 9 feet</td>
</tr>
</tbody>
</table>

**EMC and security systems**
Follow these guidelines when traveling through an airport or any other secured building.

**Note:** Always carry your Medtronic heart device ID card. This card is helpful should your heart device set off a metal detector or security system.

**Theft detection systems**
The anti-theft antennas or columns found at the entrance of some retail stores and libraries may affect your implanted heart device if you stop or linger near this equipment. Simply walk between these columns at a normal pace. Do not stand near or lean against any anti-theft columns.

**Airport security**
It is unlikely that a walk-through security archway would interfere with your implanted heart device, although the metal case of the heart device may set off the alarm. Show
your Medtronic heart device ID card and multi-language heart device travel card to the security operator.

There may be instructions posted near the security archway for people with implanted heart devices. Follow these instructions, if available. If necessary, you can request a hand search. There are also instructions printed on the heart device travel card.

**Caution:** Ask the security operator to avoid holding the screening wand over your heart device for longer than 1 to 2 seconds and should also avoid waving the wand back and forth over your heart device. If held too long over your heart device, a hand-held screening wand may cause your heart device to deliver a therapy shock to your heart when it is not needed. The attendant should wait at least 30 seconds after passing the wand over the heart device before passing over it again.

You can request a Medtronic travel card from Medtronic Patient Services. This card provides instructions in several languages for safe security screening procedures. Contact Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at canadapatientservices@medtronic.com to request the Medtronic travel card.

**Precautions about medical procedures**
Before undergoing any medical procedure, always tell the doctor, dentist, or technician that you have an implanted heart device. They may need to speak with your doctor, especially if the procedure is new or unusual. Your doctor should weigh any potential risk against the benefits of the medical procedure.

Most dental and medical procedures are unlikely to affect your heart device. However, some procedures may require precautions to reduce or prevent any electromagnetic effects on your heart device.

**Acceptable medical procedures**
Many medical procedures will not affect your heart device. However, the equipment used for the procedure must be used correctly and must be properly maintained. For more information, see Table 6.

Always tell your doctor or dentist that you have an implanted heart device.

<table>
<thead>
<tr>
<th><strong>Table 6: Acceptable medical procedures</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dental procedures, including use of dental drills, ultrasonic probes to clean teeth. Dental x-rays can be performed.</td>
</tr>
</tbody>
</table>
• Diagnostic x-rays, including chest x-rays and mammograms. If you feel pressure on your heart device, the technician can usually adjust the equipment.

Medical procedures that require some precautions
Some medical procedures can be safely performed if certain precautions are taken by the doctor performing the procedure. These precautions should be available in the heart device information provided to your heart doctor. See Table 7 for a list of these procedures.

If you or your doctor have any concerns about these necessary precautions, your doctor should contact a Medtronic representative or Medtronic Technical Services. The doctor should make sure that your heart device is operating correctly after completing the procedure.

Table 7: Medical procedures that require precaution

<table>
<thead>
<tr>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computerized Axial Tomography (CT or CAT) scan. This procedure uses a special type of x-ray equipment that provides a cross-section view.</td>
</tr>
<tr>
<td>• External defibrillation (other than during an emergency) to stop a very fast heart rate.</td>
</tr>
<tr>
<td>• Electrocautery to control bleeding during surgery.</td>
</tr>
<tr>
<td>• Electrolysis to remove unwanted hair.</td>
</tr>
<tr>
<td>• High-energy radiation therapy for cancer treatment should not be directed at the heart device. Your doctor should consult with a Medtronic representative before performing any type of radiation therapy.</td>
</tr>
<tr>
<td>• Lithotripsy to remove stones from the gallbladder or urinary tract.</td>
</tr>
<tr>
<td>• Mechanical ventilation with respiration rate monitors—to support breathing during surgery.</td>
</tr>
<tr>
<td>• Radio frequency ablation to change the heart’s electrical structure.</td>
</tr>
<tr>
<td>• Transcutaneous Electrical Nerve Stimulation (TENS) used on the torso. Using TENS on extremities is low risk.</td>
</tr>
<tr>
<td>• Ultrasound (diagnostic or therapeutic). Keep the transducer at least 6 inches away from the heart device.</td>
</tr>
<tr>
<td>• MRI (magnetic resonance imaging) can only be undertaken if you have a Medtronic MRI Conditional ICD System (ICD and leads).</td>
</tr>
</tbody>
</table>

Medical procedures that are not recommended
Some medical procedures should not be performed on anyone with an implanted heart device. Talk to your doctors about finding alternatives to these procedures. See Table 8 for a list of procedures that are not recommended.
Caution: Before undergoing any of the following procedures, talk with the treating doctor and your heart doctor. Together, you need to determine the risks versus the benefits. The doctor may be able to reduce the risk by taking appropriate precautions.

### Table 8: Medical procedures that are not recommended

<table>
<thead>
<tr>
<th>Warning: People with metal implants such as an implanted heart device and accompanying leads should not receive:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Frequency Diathermy</strong> treatment — The interaction between an implanted heart device and diathermy can cause tissue damage, fibrillation, or damage to the heart device components, which could result in serious injury, loss of therapy, and possibly a need to reprogram or replace the heart device.</td>
</tr>
<tr>
<td><strong>MRA</strong> (magnetic resonance angiography) — Your doctor should contact Medtronic Technical Support for more information.</td>
</tr>
<tr>
<td><strong>Catheter Microwave Ablation</strong> — This treatment can cause heating of the tissue near the heart device possibly leading to tissue damage, fibrillation, or damage to the heart device components, which could result in serious injury, loss of therapy, and/or the need to reprogram or replace the heart device.</td>
</tr>
<tr>
<td><strong>Transurethral Needle Ablation (TUNA)</strong> — This procedure is not recommended. Your doctor should contact Medtronic Technical Support for more information.</td>
</tr>
</tbody>
</table>

### 2 | HOW YOUR ICD WORKS

To help you understand how your heart device works, it is helpful to understand how the heart functions and how abnormal heart rhythms can affect the heart. This chapter describes the anatomy of the heart and some of the most common types of abnormal heart rhythm conditions.

For details about your health and individual heart condition, always talk to your doctor.

The anatomy of the heart

The heart is a fist-sized organ that acts as a pump to circulate blood through the body. Arteries are the blood vessels that carry blood with oxygen and nutrients to all parts of the body. Veins are the blood vessels that carry blood depleted of oxygen and nutrients back to the heart and lungs. The heart is actually a large hollow muscle divided into four chambers. The two upper chambers are referred to as the right atrium and the left atrium.

The term atria, the plural of atrium, refers to both the right and the left atrium.
The lower chambers of the heart are called the ventricles and are referred to as the right ventricle and the left ventricle. The muscled wall dividing the right and left sides of your heart is called the septum.

The right atrium draws blood in from your body and pumps it into the right ventricle. The right ventricle then pumps the blood into the lungs to be reoxygenated. The left atrium draws oxygen-rich blood in from the lungs and pumps it into the left ventricle. The left ventricle then pumps the blood out to the rest of your body.

Each chamber of the heart contracts by squeezing its muscles together. Each contraction pushes blood from one chamber to the next chamber or out into the body. Heart valves regulate the flow of blood between each chamber and keep the blood flowing in only one direction. It is the actual opening and closing of the valves that creates what we hear as our heartbeat.

After each chamber contracts completely, pushing out most of the blood, it relaxes and is filled with more blood again. In a healthy heart, each chamber contracts in a coordinated effort with the other chambers of the heart.

The atria contract first, filling the ventricles with blood. When the ventricles are filled, they both contract at the same time, moving the blood into the lungs and the rest of the body.

**Electrical conduction in the heart**

The muscle cells of the heart, just like all the muscle cells throughout your body, contract and relax in response to electrical impulses. The electrical impulses that cause your heart muscle to contract are generated by the heart’s natural pacemaker, called the sinoatrial node (or SA node). The SA node is located on the upper inside wall of the right atrium. These natural electrical impulses move through the muscle of your heart in tiny thread-like paths, from the top of the atria to the bottom of the ventricles, then up the outer walls of the ventricles.
After the SA node releases an electrical impulse, the impulse travels across the top of the right atrium and the left atrium. The impulse then travels down through both atria. As the atria are stimulated, they contract from the top down, pushing blood into the ventricles.

When the electrical impulse reaches the lower wall of the atria, the (or AV node) is stimulated. The AV node delays the impulses just long enough for the atria to finish pushing blood into the ventricles, then it passes the impulse along organized pathways into the ventricles.

The AV node controls how quickly the impulse travels through the rest of the heart. This controlled impulse release helps coordinate when each chamber contracts. Without this control, the heart would not pump blood very productively. The coordination between the contracting chambers of the heart is very important for maintaining adequate blood flow between your heart and the rest your body.

The electrical impulse passes down to the bottom of the ventricles. From here the pulse sweeps across the surface of the right and left ventricles from the bottom up, causing the ventricles to contract in the same bottom up direction. This action pushes the blood out of the valves at the top of the ventricles to the lungs (from the right ventricle) and to the rest of the body (from the left ventricle).

The heart is very sensitive to the body’s needs
The heart rate at which the chambers of the heart contract is controlled by your brain and your autonomic nervous system. If, for example, you start to jog instead of walk, your body’s demand for blood increases. Your heart automatically contracts faster when you are active in order to increase the amount of blood supplied to your body.

How abnormal heart rhythms affect the heart
There are many reasons why a heart might not beat “normally.” Whether due to disease, defect, or injury, the heart’s conduction system can become unreliable. The areas of the heart that control the heart rhythm can malfunction, causing slow, fast,
erratic, or uncoordinated heart rhythms. Any of these abnormal heart rhythms can affect the amount of blood supplied to the body.

The effects of abnormal heart rhythms can range from severe fatigue to sudden cardiac arrest (SCA).

If the heart is not beating normally because of a problem with its conduction system, then the problem may be one of two common abnormal heart rhythm conditions. The two common heart rhythm conditions include:

• tachyarrhythmia – when the heart beats too fast
• bradycardia – when the heart beats too slow

These conditions can be treated with medications or by implanting a heart device. Sometimes they are treated with both methods. Your heart device is capable of treating:

• ventricular tachyarrhythmia
• bradycardia

Tachyarrhythmia – When the heart beats too fast
A heart rate that is faster than what the body needs is called a tachyarrhythmia or tachycardia. A normal heart at rest beats between 60 and 100 beats per minute. Exercise or stress can cause the heart to beat faster, but this is a normal response to the body’s need for more blood. During a tachyarrhythmia, the heart beats at more than 100 beats per minute and can beat as fast as 400 beats per minute making it an ineffective pump.

![Normal heart rate](image1) ![Tachyarrhythmia heart rate](image2)

*Figure 3: A normal heart rate compared to a tachyarrhythmia rate.*
Types of tachyarrhythmias
Tachyarrhythmias occur when overly sensitive cells in the heart release electrical impulses faster than the normal heart rate. Sometimes just a few cells of the heart are responsible for starting an abnormally fast heart rhythm. Tachyarrhythmias can start in either the upper heart chambers (atria) or lower heart chambers (ventricles).

Atrial tachyarrhythmias – Atrial tachyarrhythmias start in the atria and are called atrial flutter or atrial fibrillation (AF). Your heart device may treat atrial tachyarrhythmias. Ask your doctor if your heart device treats atrial tachyarrhythmias

Ventricular tachyarrhythmias – Ventricular tachyarrhythmias start in the ventricles and are called ventricular tachycardia (VT) and ventricular fibrillation (VF). Because the ventricles pump blood to the body, both of these conditions can lead to a quick depletion of oxygen-rich blood to the body – a life-threatening condition.

• Ventricular tachycardia (VT) is a heart rhythm that is regular but very fast. This condition causes the heart to beat too fast to pump blood effectively.
• Ventricular fibrillation (VF) is a ventricular tachyarrhythmia that has become unstable and irregular. VF causes the heart muscles to quiver in place, without a detectable rhythm. During ventricular fibrillation the body is quickly starved of oxygen, and the person usually passes out within a few seconds. VF is always life-threatening.

Symptoms of tachyarrhythmia include:

• shortness of breath
• dizziness
• sudden weakness
• fluttering or pounding in the chest
• light-headedness
• fainting

The causes of tachyarrhythmias include:

• Heart-related conditions such as high blood pressure (hypertension), poor blood supply to the heart muscle due to coronary artery disease, heart valve disease, heart failure, tumors, and infections.
• Other medical conditions such as thyroid disease, certain lung diseases, electrolyte imbalance, and alcohol or drug abuse.
Bradycardia - When the heart beats too slowly
Bradycardia is a slow or irregular heart rhythm, usually less than 60 beats per minute. When the heart rate is this slow, not enough oxygen-rich blood is pumped to the body. With this extremely slow heart rate, the heart cannot pump enough blood to the body to support daily activities or mild exercise.

Bradycardia can be caused by the delayed release of electrical impulses from the heart rate determining mechanism (SA node) or when the normal pathway for electrical impulses in the heart is interrupted (heart block).

Symptoms of bradycardia include:
- dizziness
- shortness of breath
- extreme fatigue
- fainting spells

The causes of bradycardia include:
- Hereditary defects
- Certain illnesses
- Some cardiac drugs
- The aging process
- The aftermath of a heart attack
- The precise cause can be unknown

Figure 4: A normal heart rate compared to a bradycardia rate
3 | ABOUT YOUR ICD

Your doctor has prescribed a Medtronic implantable cardioverter defibrillator (ICD) to treat your heart disease symptoms. Although this heart device does not prevent or cure your underlying heart rhythm condition, it may improve the quality of your life.

What is an ICD?
Your ICD is part of complete treatment system that includes:
- an implanted heart device
- two implanted leads

Your implanted heart device
Your heart device contains a very small computer that is powered by a tiny lithium battery. All electronic components of your heart device are sealed inside a metal case made of titanium. It is designed to monitor your heart rate and deliver immediate treatment for any irregular heart rhythms when necessary.

The heart device provides two types of treatment or therapy for your heart, bradycardia pacing and defibrillation.

Implanted leads
A lead is soft, insulated wire that monitors your heart rate and delivers therapies to your heart when necessary. When your heart device is implanted, your doctor threads one end of the lead through a vein into your heart, then connects the other end of the lead to your heart device.

Your heart device constantly monitors your heart rate using the implanted leads.

If your heart device detects an irregular heart rhythm, it provides therapy to the heart by releasing an electrical pulse or multiple pulses from the tip of the lead to the heart.

The heart device uses two leads. One lead is placed inside the right atrium and another lead is placed inside the right ventricle (see Figure 5). This is the best way to deliver the type of therapy needed to help relieve your heart disease symptoms.
**What does my heart device do?**
Your heart device constantly monitors your heart rhythm. If your heartbeat is too slow, too fast, or uneven, your heart device delivers pulses of electricity from the tip of the implanted lead directly to your heart. This therapy is designed to help your heart beat in a regular rhythm. There are a few different types of therapy that your heart device can deliver. The therapy provided depends on the type of abnormal heart rhythm detected by your heart device.

**What kind of therapy does my heart device provide?**
Your heart device can provide several types of therapy. Because your heart device is constantly monitoring the rhythm of your heart, it can detect irregular rhythms and automatically deliver the most appropriate type of therapy when it is needed.

In response to irregular heart rhythms, your heart device provides the following specialized therapies:
- Antitachycardia pacing (ATP), cardioversion, and defibrillation therapies for a fast or uneven heart rhythm
- Pacing therapy for a slow heart rhythm

**Therapies for a fast heart rhythm**
Your heart device provides several therapies to treat a fast heart rhythm. Your doctor has set up your heart device to deliver the most effective type of therapy for your specific heart rhythm condition.

There are three kinds of therapy used to treat fast heart rhythms:
- Antitachycardia pacing (ATP)
- Cardioversion
- Defibrillation

**Antitachycardia pacing (ATP) therapy**
Antitachycardia pacing (ATP) is often the first type of therapy used by your heart device to treat a fast heart rhythm.

During antitachycardia pacing therapy, your heart device releases several short bursts of pacing pulses; then it pauses to check for a normal heart beat. If the heart rhythm is still irregular, the ATP therapy is repeated. If a normal rhythm is restored, no further treatment is delivered. If your heart rate is still too fast or uneven, your heart device delivers either cardioversion or defibrillation therapy to restore a normal heart rate.
Cardioversion therapy
Cardioversion therapy is used to treat an extremely fast but stable heart rhythm. Cardioversion therapy involves delivering a low level shock to the heart at the same time as your natural heart beat. This therapy may increase to higher energy levels if the initial treatment is not successful. Cardioversion therapy is typically used if an abnormally fast heart rhythm does not respond to ATP therapy.

Defibrillation therapy
If your heart device detects a very fast and unstable heart rhythm, it delivers a therapy shock to your heart. The clinical term for this therapy is defibrillation. This therapy is similar to the treatment provided by an external defibrillator, which uses paddles placed on the outside of the body over the heart. However, a much lower level of electricity is delivered by the implanted heart device because this therapy is applied directly to the heart.

Your heart device responds automatically with life-saving defibrillation during the first crucial seconds of a tachyarrhythmia when an emergency team may be minutes away or not available. The therapy shock stops the abnormal electrical impulses causing your heart to beat too fast. After each therapeutic shock, your heart device monitors your heart for a normal rhythm and delivers another therapy shock if the rhythm is still too fast. When a normal heart rhythm is restored, no further therapy is delivered.

Therapy for a slow heart rhythm
Bradycardia is a heart condition where the heart beats too slow to provide enough blood for the body’s needs. Your heart device provides pacing therapy to treat a slow heart rhythm.

Pacing therapy
If your heart’s rhythm becomes too slow, your heart device delivers a steady pattern of small electrical pulses to your heart to encourage a regular heartbeat. This is called pacing your heart. Pacing therapy was one of the very first treatments available from an implanted heart device commonly known as a “pacemaker.” The pacing therapy provided by your heart device ensures that your heart maintains a heart rhythm that supports your body’s needs.

What do the therapies feel like?
The experience of receiving heart device therapies varies from person to person. In general, people have reported feeling the following sensations during the different therapies.
Pacing therapy – Most people do not feel pacing therapies when they are delivered. The few that report feeling this type of therapy describe it as painless.

Antitachycardia pacing (ATP) – This therapy is often not felt at all and only lasts a short period of time. It may cause a rapid heart beat sensation, but the feeling is generally not reported as uncomfortable.

Cardioversion – This therapy is often described as “a thump on the chest” and can cause mild discomfort.

Defibrillation – Some people lose consciousness as a result of their rapid heart beat and are not aware of receiving defibrillation (or “therapy shock”). Others who are awake during a therapy shock describe it as a “kick in the chest.” They say it startles them and that the feeling passes very quickly. Some people find the therapy shock a reassuring reminder that their heart device is protecting them from a sudden cardiac arrest, while others find it fleeting but also distressing.

Does my heart device have any special features?
Your heart device has the ability to monitor itself and your lead system for proper function. This is called the Medtronic CareAlert™ monitoring system. This feature can also be used to monitor changes in your heart rhythm.

If your doctor programs your device to monitor proper function or changes in your heart rhythm using the Medtronic CareAlert monitoring system, the device may alert you to contact your doctor. Medtronic CareAlert monitoring system can notify you by emitting a beeping sound. After you hear this sound and contact your doctor, your doctor can discuss what has occurred and can further evaluate changes pertaining to the device or particular rhythms. If you have a home monitor, your doctor can also program the device to automatically send the information through the monitor without having your heart device beep.

Whether your doctor chooses to monitor device function, your heart rhythm, or both, using Medtronic CareAlert monitoring, ask your doctor if this feature is turned on and which conditions are being monitored. You should discuss whether there is likely to be a beeping sound. This will help you understand the purpose of Medtronic CareAlert monitoring and how your doctor has programmed the feature to meet your needs. But remember, if your device makes a sound you should always contact your physician unless otherwise directed.
Medtronic CareAlert™ monitoring
At the time your heart device is implanted or during a routine follow-up appointment, your doctor can set Medtronic CareAlert monitoring to alert you if certain conditions exist. These conditions can include heart device battery status, the status of your leads, and the number of therapies detected. Additionally, your heart device can monitor for changes in your rhythm that your doctor may want to be aware of. If one of these conditions is detected by your heart device, it will make a beeping sound for about 10 seconds, at least once a day. The beeping sound will be the same for all of the alerts your doctor selects. Call your doctor if your heart device starts to make a beeping sound.

Checking your Medtronic CareAlert status
Your doctor may give you a Patient Magnet to check your Medtronic CareAlert status. To check if the Medtronic CareAlert monitoring feature is turned on, place your Patient Magnet over your heart device.

Please note that the Patient Magnet is a special magnet and should be used only as directed by your doctor. Other magnets should never be placed over or held close to your heart device.

- If an alert has occurred, your heart device will play an alert sound.
- If no alert has occurred, your heart device will play a steady “OK” sound when a Patient Magnet is applied.

Caution: Never carry, store, or leave the Patient Magnet over your heart device. Your heart device cannot treat a tachyarrhythmia, or fast heart rhythm, while the magnet is placed over it. Your nurse or doctor will explain how to use the Patient Magnet, and you can also refer to the Patient Magnet manual for additional information.

4 YOUR IMPLANT PROCEDURE AND RECOVERY
Being told you need a heart device can be frightening, but knowing what to expect about your implant procedure can help reduce your concern. The implant procedure does not require open heart surgery. You will be given medication to make you sleepy and comfortable, but the surgery will be done under local anesthesia.

You will usually stay in the hospital overnight and go home the next day with instructions on caring for your incision. For a short time after surgery, your doctor may want you to limit how much you move the arm that is closest to your implant site.
Potential risks after the implant procedure
Your doctor and Medtronic have attempted to minimize the risks associated with implanting a heart device. However, as with any kind of surgery, there are potential risks. The risks associated with implanting a heart device include:

- Punctures of the heart muscle, vein, or lung space while implanting the leads
- Infection
- Blood clots
- Stroke
- Heart attack
- Bleeding
- Pain, swelling, or bruising around the implant site

Your doctor should discuss these and other potential risks of this surgical procedure with you.

After the implant procedure is finished, there is a potential risk of additional hospitalization or surgery to modify or adjust your implanted heart device. Some conditions that would require additional hospitalization include:

- Movement of the heart device from its original location or wearing away of the skin over the heart device.
- Changes in your heart rhythms that require adjustment or changes to the lead system.
- Changes in the lead system that prevent the heart device from detecting the heart rhythm or delivering therapies.
- Stimulation of muscles other than the heart muscle by the heart device.

The implant procedure
The general steps of an implant procedure include:
1. Making the incision and inserting the leads.
2. Testing the leads.
3. Implanting the heart device and closing the incision.

Making the incision and inserting the leads
Your doctor will make a small incision just below your collarbone, on the left or right side of your chest. (Sometimes heart devices are implanted in the abdominal area in children or small adults.) The doctor inserts the 2 leads, one at a time, into a vein, threading each through the vein into your heart. The tip of each lead is positioned so that it touches the inside wall of your heart. This type of lead is called a transvenous lead.
Sometimes a lead needs to be placed on the outside of the heart. This type of lead is called an epicardial lead or patch lead. If this type of lead is needed, your doctor inserts it by making a small incision between your ribs just over your heart.

In general, leads are referred to by their location in your heart.
- An atrial lead is placed in the right atrium.
- A right ventricular lead is placed inside the right ventricle.

**Testing the leads**
After each lead is placed in your heart, it is tested to make sure that it will operate effectively. Your doctor tests each lead to make sure that it can accurately monitor your heart rate and deliver heart rhythm therapies.

**Implanting the heart device and closing the incision**
After testing, the leads are attached to your heart device. The heart device is then implanted under the skin. Your doctor tests the heart device and implanted leads to confirm that they are operating effectively, then closes the incision.

Before you leave the hospital, your doctor may check the heart device by starting a rapid heart rhythm and allowing the heart device to correct it. Your doctor will give you medication to let you sleep while this check is performed.

**Recovering after your implant surgery**
Some time after your heart device is implanted, your doctor may order some tests such as an ECG, blood tests, or x-rays to verify that your leads are in the proper position inside your heart. The operating settings for your heart device may also be checked again to make sure that your heart device is providing the best treatment for your heart condition.

As you recover, follow your doctor’s suggestions about resuming normal activities. Expect a gradual recovery. It is normal to see a slight bulge under your skin where the heart device is located.

For the first few weeks after your surgery:
- Call your doctor immediately if any swelling, warmth, or drainage appears around your incision or if you develop a fever.
- Take care when exercising and bathing, according to your doctor's directions.
- Avoid tight clothing that may irritate your incision.
- Limit arm movements as directed by your doctor.
- Avoid lifting more than 10 to 15 pounds.
- Avoid excessive twisting of your torso.
• Avoid pushing or pulling heavy objects.
• When you are driving or riding in a vehicle, the shoulder seat belt strap may feel uncomfortable. You can place a soft towel between the shoulder seat belt strap and your implant site to cushion the area during the first few weeks after surgery. In any case, seat belts should be worn at all times.

Tell your other doctors and your dentist that you have a heart device. They may choose to prescribe antibiotics for you to take before and after surgery or dental work to prevent infection.

**Follow-up appointments**
Your doctor or nurse will work with you to schedule follow-up care appointments.

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**5 | REGISTERING YOUR HEART DEVICE**

Registering your heart device is important. Registration ensures that medical information related to your heart device is on file and that Medtronic can notify your doctor with any relevant device information if necessary.

After your surgery, Medtronic provides you with a device identification (ID) card. Medtronic also assists with registration of your implant.

**Device Identification (ID) Card**
The device identification (ID) card identifies you as the wearer of an implanted device. It is helpful to have this card with you at all times. It is especially helpful for follow-up appointments, to clear airport security, and in case of a medical emergency. You will receive a copy of your temporary registration information during your hospital stay. Approximately six to eight weeks after surgery, you will receive a permanent ID card from Medtronic. Your ID card will show the following information:

- Your name, address, and phone number.
- Model and serial numbers of your ICD and lead(s) and the date they were implanted.
- Your follow-up clinic/doctor’s name and phone number.

**Registration**
In Canada, a Medtronic device registration form is completed at the time of your surgery. The information is sent to Medtronic and entered into a patient registry. This allows Medtronic to notify your clinic/doctor of any relevant information about your pacemaker.

Medtronic registration information is confidential and includes the following:
• Model and serial numbers of your ICD and lead(s).
• Your name, address, and telephone number.
• The date your device was implanted.
• The hospital where the implant was performed and/or followed up with phone number

**Carry your heart device identification card with you at all times**
Your heart device identification card is especially helpful during your follow-up appointments and when traveling. It could be essential in case of a medical emergency.

If you do not have your heart device identification card with you during a medical situation, your doctor or nurse can call Medtronic (or the medical records department of the hospital where your heart device was implanted) to request information about your heart device.

**If you change your doctor or your address**
Always notify Medtronic if you change your heart doctor or if you change your address, area code, or telephone number.

**To request a new heart device ID card or update your information**
If you lose your heart device identification card or need to update your personal information, contact Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at canada.patientservices@medtronic.com

**Medtronic heart device travel card**
A special Medtronic heart device travel card is also available from Medtronic. This multi-language card identifies you as having an implanted heart device and provides instructions for security personnel on how to properly scan your heart device with a handheld scanner.

You can use this card, along with your heart device identification card when you pass through security gates at airports and other secured buildings such as some libraries and government buildings.

You can request the Medtronic heart device travel card by contacting Medtronic Patient Services at 1-888-660-4616 Monday through Friday 9:00 AM to 5:00 PM (Eastern Standard Time) or by e-mail at canada.patientservices@medtronic.com
Before you leave the hospital, your doctor will tell you when you need to schedule a follow-up appointment. Follow-up appointments are important to ensure that your heart device settings are working well for you. No surgery is required, and the procedure is painless. The appointment usually takes the same amount of time as a regular doctor’s appointment.

In the past, follow-up appointments had to be done at a clinic or in your doctor’s office. Today, you and your doctor have more options. Most Medtronic heart devices are supported by the Medtronic CareLink® Service. This service allows you to provide your heart device follow-up information to your doctor from your own home, from work, or even while traveling.

**Follow-up information**
The purpose of follow-up appointments is to:
- Assess your general medical condition.
- Check the operation of your heart device. This includes checking the battery power and the status of your implanted leads.
- Review the information saved by your heart device.
- Adjust your heart device settings, if necessary, to provide the best treatment for your heart condition.

Your doctor or nurse will review your current medications with you and can answer any questions you have during the visit. Your doctor will tell you how often your heart device should be checked.

Your first follow-up appointment is usually scheduled for 1 month after your heart device is implanted. Depending on your doctor’s normal practice and your medical condition, additional follow-up appointments are scheduled every 3 to 6 months. More frequent appointments are usually scheduled as your heart device gets near its expected replacement time.

**Remote follow-up service**
Your clinic may offer the Medtronic CareLink Service for your heart device. The Medtronic CareLink Service allows you to send your heart device information over a standard telephone line to your clinic instead of visiting in person. The information you send is available for your doctor’s review within minutes.
The Medtronic CareLink® Service is convenient and provides peace of mind. One obvious advantage of using the Medtronic CareLink Service is that you will not have to leave your home for most follow-up appointments. Another benefit of this service is that it allows you to travel (within the US) and send your heart device information from wherever you have access to a standard telephone. The Medtronic CareLink Service cannot transmit data over a mobile phone.

If your doctor prescribes this service, Medtronic will send a Medtronic CareLink® Monitor to you at your home address. The monitor comes with complete instructions and is simple for you, your family, or your care provider to use. Using wireless communication with your heart device, the monitor automatically sends follow-up information to the Medtronic CareLink Service at a time set up by you and your doctor.

The monitor is easy to take with you if you plan to travel. It weighs about one pound and fits inside a suitcase. If the heart device information that is automatically sent to your doctor indicates that you should be seen in person, your doctor or clinic will contact you to set up an appointment. The doctor may need to adjust your heart device settings or adjust your medications. Your heart device settings cannot be adjusted unless you see the doctor in person.

**Will the Medtronic CareLink Service replace all clinic visits?**

The Medtronic CareLink Service and Medtronic CareLink Monitor are not meant to replace all clinic visits. If you feel that you need to see your doctor, do not hesitate to contact your clinic. Sometimes, in order to determine the best course of action for you, your doctor may ask you to transmit your heart device information before coming to the clinic.
Can I use the Medtronic CareLink Monitor to contact my doctor in an emergency?
In any emergency situation, always call 911. Unless instructed by your doctor, do not use the Medtronic CareLink Monitor to send heart device information during an emergency.

Medtronic CareLink® Programmer

Your doctor or nurse will use the Medtronic CareLink Programmer during every follow-up appointment to make sure that your heart device is operating correctly and to check for any changes in your heart rhythm condition. The Medtronic CareLink Programmer is a specialized computer designed to work specifically with your Medtronic heart device.

Your doctor or nurse uses the programmer during the implant procedure and follow-up appointments to initially set up and change the heart device settings. Using radio waves to “read” your heart device, the programmer displays information that is collected and stored in your heart device.

Reviewing information saved by your heart device

During a follow-up appointment in the clinic or hospital, your doctor or nurse will use the Medtronic CareLink Programmer to read data collected by your heart device or to change the operating settings of your heart device.

Information saved by your heart device includes:
- ECG recordings of any unusual heart rhythms
- a list of any therapies you have received
- the status of the heart device battery
- the status of your implanted leads

Based on this information and a review of your medications, your doctor may adjust the settings of your heart device to fit your individual needs.

When to call your doctor

Contact your doctor or nurse if you:
- Notice any swelling, warmth, or drainage around your incision or if you develop a fever while your incision is healing.
- Notice new, unexplained heart symptoms or if you experience the same heart symptoms you had before receiving your heart device.
• Have heart rhythm symptoms that last longer than three minutes (or any length of time specified by your doctor). These symptoms can include extreme fatigue, racing heart, pounding heart, or feeling faint or dizzy.
• Hear beeping tones coming from your heart device. For more information on the Medtronic CareAlert monitoring feature, see page 21.
• Receive a shock from your heart device and your doctor has instructed you to call.

Heart device replacement
Your implanted heart device is powered by a lithium battery. This battery is sealed inside the titanium case of your heart device. Eventually, when the battery power is low, your heart device will need to be replaced. How long the battery lasts depends on many factors, including how often your heart device provides therapy to your heart. The average heart device battery lasts 4 to 7 years after it is implanted.

Replacing your heart device is typically easier and quicker than your first implant procedure. Your doctor makes a new incision, removes your current heart device, and checks the leads. Your implanted leads may be used with your new heart device if they are still in good working condition. If not, your doctor will implant new leads. At the time of heart device replacement, you should discuss lead replacement with your doctor or nurse.

The leads are connected to your new heart device, and the heart device is tested and usually implanted in the same place as your first heart device. Then the doctor closes the incision and sets the features of your new heart device.

7 | CARING FOR YOURSELF
Caring for yourself is one of the most important parts of your follow-up care. Talk with your family and caregivers about how you are feeling, and share the information in this handbook with them so that they can help you return to your normal activities.

Give yourself and your family a few months to adjust to living with your heart device. Most people report that they have a wide range of emotions after receiving an implanted heart device. It is natural and normal to feel a little cautious and nervous about how your heart device will affect your life.

With time, your confidence will return as you return to work and get back to your normal fun activities and family life. Studies have shown that having a positive attitude toward your heart device and the therapies provided by your heart device enhances the quality of your life long-term.
Recognize and support your own needs
After receiving a heart device, many people report a positive change with feelings of relief, comfort, and well-being. Yet, experiencing feelings of anger, fear, and guilt are also natural and expected. You may want to talk with your doctor or nurse about anything that is causing you worry. It often helps to talk with other people who have an implanted heart device and ask them how they have adjusted to it. Ask your doctor or nurse if there is a support group for heart device patients at your clinic or a nearby hospital.

Medical care
Be sure to follow your doctor’s instructions about diet, medications, and physical activity.
- Keep your heart device follow-up appointments and other general health checkups.
- If your doctor prescribes the Medtronic CareLink Service1 for you, be sure to keep that follow-up schedule as well.
- Tell any new doctor, dentist, or other health professional that you have a heart device implanted.

Planning for an emergency
Because you have an implanted heart device, it is important to be prepared in case of any emergency. Talk to your doctor or nurse about planning for emergencies. They may suggest that you develop a plan with your family and friends that includes the following points:
- Carry your heart device identification card in an easy-to-find place such as a wallet.
- Carry a list of medications and dosages.
- Keep emergency phone numbers in an easy-to-find place.
- Know what to do if you receive a therapy shock.
- Inform significant coworkers, traveling companions, etc., that you have a heart device.
- When traveling by air, inform airline security personnel that you have an implanted heart device.
- You may also want to post this information near your phone.

What your family and friends should know
Your family and friends can be a big support for you during your hospital stay and after you get home. Encourage them to learn about your heart device and about how they can continue to support you. If your family or caregivers have any questions or concerns, have them call your doctor or nurse.
Some friends and family members may want to receive training in cardiopulmonary resuscitation (CPR). They may also want to attend support group meetings with you.

**What to do if you receive a therapy shock**

Ask your doctor or nurse what you should do if your implanted heart device delivers a therapy shock. They should provide you specific instructions about when you should contact them if you’ve received a therapy shock.

In general, follow these steps if you feel the symptoms of a rapid heart rhythm or if you receive a therapy shock:

1. Stay calm and move to where you can lie down or sit comfortably.
2. Have someone stay with you until you feel better.

   If you receive more than one therapy shock or if you remain unconscious for more than one minute, have a companion call 911 for an ambulance.

   If you remain unconscious and you have no pulse, a cardiopulmonary resuscitation (CPR) trained companion should begin CPR immediately. When your heart starts beating again, your companion should stop CPR.

   **Note:** Anyone touching you during a therapy shock might feel your muscles contract slightly; they also might see you jump with a sudden start. A therapy shock will not harm a person touching you.

3. If you do not feel well after the shock, have someone call your doctor and take you to the hospital emergency room.

4. Follow your doctor’s or nurse’s directions about when to call them after receiving a shock. You may be asked:
   - What were you doing right before the shock?
   - What symptoms did you notice before the shock?
   - How did you feel right after the shock?
   - How are you feeling right now?
<table>
<thead>
<tr>
<th>Glossary of Terms</th>
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<tbody>
<tr>
<td><strong>antitachycardia pacing (ATP)</strong> – Small, rapid pacing pulses delivered by an implanted heart device to treat an abnormally fast heart beat.</td>
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<tr>
<td><strong>atrial fibrillation (AF)</strong> – A heart rhythm that causes the atria to quiver in one place rather than contract. <strong>Note:</strong> Your heart device may treat atrial fibrillation. Speak with your doctor to learn more.</td>
</tr>
<tr>
<td><strong>atrial flutter</strong> – An atrial heart rhythm that is regular but very fast. <strong>Note:</strong> Your heart device may treat atrial flutter. Speak with your doctor to learn more.</td>
</tr>
<tr>
<td><strong>atrial tachyarrhythmias</strong> – Abnormally fast heart rhythms that start in the atria. Atrial flutter and atrial fibrillation (AF) are atrial tachyarrhythmias. Your heart device may treat atrial tachyarrhythmias. Speak with your doctor to learn more.</td>
</tr>
<tr>
<td><strong>atrioventricular (AV) node</strong> – An area of cardiac muscle fibers located in the middle of the heart. Electrical signals from the sinoatrial (SA) node travel through the AV node before moving to the rest of the heart. The AV node helps keep the upper and lower heart chambers beating in a balanced rhythm.</td>
</tr>
<tr>
<td><strong>atrium (plural = atria)</strong> – The two upper chambers of the heart are referred to as the right atrium and the left atrium. The term atria is the plural of atrium, and refers to both the right and the left atrium.</td>
</tr>
<tr>
<td><strong>autonomic nervous system</strong> – The autonomic nervous system regulates internal body processes that require no conscious effort, such as heart rate and blood pressure. This system is made up of the sympathetic and parasympathetic systems. These systems work together; for example, the sympathetic division increases pulse, blood pressure, and breathing rates, and the parasympathetic system decreases each of them.</td>
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<tr>
<td><strong>bradycardia</strong> – A type of heart condition in which the heart beats less than 60 beats a minute.</td>
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<tr>
<td><strong>cardiopulmonary resuscitation (CPR)</strong> – A life saving procedure that includes the timed external compression of the chest wall (to stimulate blood flow), alternating with mouth to mouth breathing to provide oxygen.</td>
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<td><strong>fibrillation</strong> – See ventricular fibrillation, atrial fibrillation.</td>
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<tr>
<td><strong>heart attack (myocardial infarction)</strong> – When some of the heart’s blood supply is reduced or cut off, causing the heart muscle (myocardium) to die because it is deprived of its oxygen supply.</td>
</tr>
<tr>
<td><strong>heart block</strong> – A type of heart problem where the electrical impulses traveling from the upper chambers to the lower chambers of the heart are slowed (first degree heart block), irregular (second degree heart block), or blocked (third degree heart block).</td>
</tr>
<tr>
<td><strong>heart failure (congestive heart failure)</strong> – A condition in which the heart can’t pump enough blood to meet the needs of the body. Symptoms may include shortness of breath and tiredness from daily activities.</td>
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<tr>
<td><strong>high-energy radiation therapy</strong> – Using radiation to control cells in cancer treatment.</td>
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<tr>
<td><strong>high frequency diathermy</strong> – A treatment involving the heating of various areas of the body.</td>
</tr>
<tr>
<td><strong>lead, leads, lead system</strong> – A flexible wire surrounded by insulation material (urethane or silicone). The lead delivers the electrical impulse or therapy to the heart from an implanted device. It also senses the electrical activity of the heart and provides this information to the implanted device.</td>
</tr>
<tr>
<td><strong>lithotripsy</strong> – A medical technique that uses electrically produced shock waves to break-up kidney and gallbladder stones.</td>
</tr>
<tr>
<td><strong>mechanical ventilation</strong> – Medical devices that assist breathing.</td>
</tr>
<tr>
<td><strong>MRA (magnetic resonance angiography)</strong> – A test within an MRI scan that is used to examine organs and soft tissues.</td>
</tr>
<tr>
<td><strong>MRI (magnetic resonance imaging)</strong> – A type of medical imaging that uses magnetic fields to create an internal view of the body.</td>
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<tr>
<td><strong>pacemaker, artificial</strong> – An implanted medical device that stimulates the heart muscle with timed pulses of electricity. These very small amounts of electricity cause the heart to contract, mimicking a naturally occurring heart rhythm.</td>
</tr>
<tr>
<td><strong>pacemaker, natural</strong> – See SA node.</td>
</tr>
<tr>
<td><strong>pacing, pacing therapy</strong> – A type of therapy</td>
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</tbody>
</table>
cardioversion – A therapy provided by an implanted heart device to treat an extremely fast but stable heart rhythm. Cardioversion therapy involves delivering a low level shock to the heart at the same time as your natural heart beat. This therapy may increase to higher energy levels if the initial treatment is not successful.

Medtronic CareAlert monitoring – A feature provided by some implanted devices which activates a beeping alert when certain conditions occur. The alert sounds at the same time every day until re-set by your doctor or nurse.

Medtronic CareLink Monitor – The monitor used with the Medtronic CareLink Service to send your heart device information to your doctor or clinic. The Medtronic CareLink Monitor plugs into a standard telephone outlet and provides you the convenience of sending follow-up information from home or while traveling.

Medtronic CareLink Programmer – A small laptop-style computer used by your doctor, nurse, or trained technician to check your implanted heart device settings, retrieve information stored by your heart device, and adjust your heart device settings if necessary.

Medtronic CareLink Service – The first and only remote monitoring service for people with Medtronic implanted heart devices. Using the Medtronic CareLink Monitor, it allows your heart device follow-up information to be sent to your doctor or clinic from the comfort of your own home.

catheter microwave ablation – A surgical technique where microwaves are used to destroy cells by creating heat.

computerized axial tomography (CT or CAT) scan – A computerized process in which two-dimensional x-ray images are used to create a threedimensional x-ray image.

defibrillation – A type of therapy provided by an implanted heart device (or external equipment) to treat a fast, irregular heart rhythm. Defibrillation therapy involves delivering a high energy therapy shock to the heart.

defibrillator – An external or internal device used to deliver defibrillation therapy to the heart.

ECG or EKG – ECG (EKG) is an abbreviation for provided by an implanted heart device to treat a slow heart rhythm. Pacing consists of small electrical impulses delivered to the heart to speed up the natural heart rhythm.

patch lead – A lead that is attached to the outside of the heart muscle.

Patient Magnet – A blue-coated, ring-shaped magnet used with certain Medtronic heart devices to test the Medtronic CareAlert monitoring feature or to test for certain heart device operating conditions programmed by your doctor. When the Patient Magnet is held over your heart device, a sound will play. If your doctor prescribes the Patient Magnet for you, complete instructions will be provided. Not all people with implanted heart devices will need to have a Patient Magnet.

radio frequency ablation – A surgical technique where radio waves are used to destroy cells by creating heat.

reoxygenated – To add oxygen back into your blood cells.

septum – The muscled wall dividing the right and left sides of the heart.

sinoatrial (SA) node – The heart’s natural pacemaker located in the right atrium. Electrical impulses originate here and travel through the heart, causing it to beat. Also called the sinus node.

sudden cardiac arrest (SCA) – Also called cardiac arrest. Failure of the heart to pump blood through the body. If left untreated, it will lead to death within minutes.

sympathetic and parasympathetic system – A paired system within the autonomic (or automatic) nervous system. The autonomic nervous system regulates internal body processes such as heart rate and blood pressure that require no conscious effort. The sympathetic and parasympathetic systems work together, usually with one activating and the other inhibiting the actions of internal organs. For example, the sympathetic division increases pulse, blood pressure, and breathing rates, and the parasympathetic system decreases each of them.

tachyarrhythmia – See tachycardia.

tachycardia – An abnormally fast heart rhythm typically between 100 to 250 beats per minute.

therapy shock – See defibrillation.
An electrocardiogram is a test that measures the electrical activity of a person’s heart.

**Ejection fraction (EF)** – EF is the amount of blood pumped out of the heart during each beat or contraction.

**Electrocautery** – A process in which an electric probe is used to remove unwanted tissue and to control bleeding.

**Electrolysis** – The permanent removal of hair using an electrified needle inserted into the hair follicle.

**Electrolyte imbalance** – Electrolytes are nutrients needed for bodily function. An electrolyte imbalance is an abnormal level of electrolytes in the body.

**Electromagnetic compatibility (EMC)** – Fields of energy around certain types of equipment that use electricity and magnets may interfere with the normal operation of other electronic devices, such as an implanted heart device. These energy fields created around electrical items can be strong or weak. The closer to the item you are, the stronger the energy field. Electromagnetic compatibility means that the electrical energy field generated by an electrical item is compatible with other electrically sensitive items such as an implanted heart device.

**Electromagnetic energy field** – A force that certain types of equipment that use electricity and magnets exert on objects in their vicinity.

**Epicardial lead** – A pacing lead attached to the outside surface (epicardium) of the heart.

**External defibrillator** – Emergency personnel use either manual external defibrillator equipment or a hand-held automated external defibrillator (AED) to deliver defibrillation therapy shocks to treat sudden cardiacarrest. External defibrillators deliver therapy to the chest at very high energy.

**Transcutaneous electrical nerve stimulation (TENS)** – A pain control technique that uses electrical impulses passed through the skin to stimulate nerves.

**Transurethral needle ablation (TUNA)** – A surgical technique in which precisely focused radio frequency energy is used to destroy prostate tissue

**Transvenous lead** – A pacing lead threaded through a vein and placed inside the heart.

**Ultrasound** – A medical imaging technique that uses sound waves to create an internal image of the body.

**Ventricle, ventricles** – The two lower chamber(s) of the heart. These are called the left and the right ventricle.

**Ventricular fibrillation (VF)** – A very fast, chaotic heart rhythm that starts in the ventricles. During VF, the heart quivers instead of contracting. If left untreated, it is fatal.

**Ventricular tachyarrhythmia** – Abnormally fast heart rhythms that start in the ventricles. Ventricular fibrillation (VF) and ventricular tachycardia (VT) are ventricular tachyarrhythmias.

**Ventricular tachycardia (VT)** – A rapid heart rate that starts in the ventricles. During VT, the heart does not have time to fill with enough blood between heart beats to supply the entire body with sufficient blood. It may cause dizziness and light-headedness.