Medtronic

Heart Failure Pacemaker with Defibrillation

Patient Manual

Caution: Federal Law (USA) restricts this device to sale by or on the order of a physician.

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How to contact Medtronic

Contact us by phone

Our experienced Patient Services group is available to answer any questions or concerns you may have about your heart device. To speak directly with a Patient Services Specialist, call 1-800-551-5544. Our staff is available Monday through Friday from 8:00 AM to 5:00 PM (Central Time).

Contact us online

Medtronic is dedicated to providing you with the most up-to-date information available about your Medtronic heart device. Website information is available 24 hours a day.

- Medtronic website: www.medtronic.com
- Patient Services website: www.medtronic.com/rhythms

If you would like to submit questions, suggestions, or requests to us online, you can use the online form provided at www.medtronic.com/corporate/contact.jsp.

Contact us by mail or fax

Medtronic, Inc.
Patient Services Department
Mail Stop MVS 14
8200 Coral Sea Street NE
Mounds View, MN 55112

Fax: 763-367-5809

Contacting Medtronic about your ID Card

To update information on your ID card or if you have questions about your ID card, see “Your heart device ID card” on page 97.

Information about you and your device

Your personal information

Your name_____

Your doctor's name_____Specialty_____

Your doctor's name_____Specialty_____

Doctors' phone_____

Your medications_____

_____

Emergency contact information

Name/address Phone_____

Name/address Phone_____

Your heart device information

Type of heart device_____Serial #_____

Lead 1 model number_____Serial # _____

Lead 2 model number_____Serial #_____

Lead 3 model number_____Serial # _____

Date of implant_____Hospital where implanted_____

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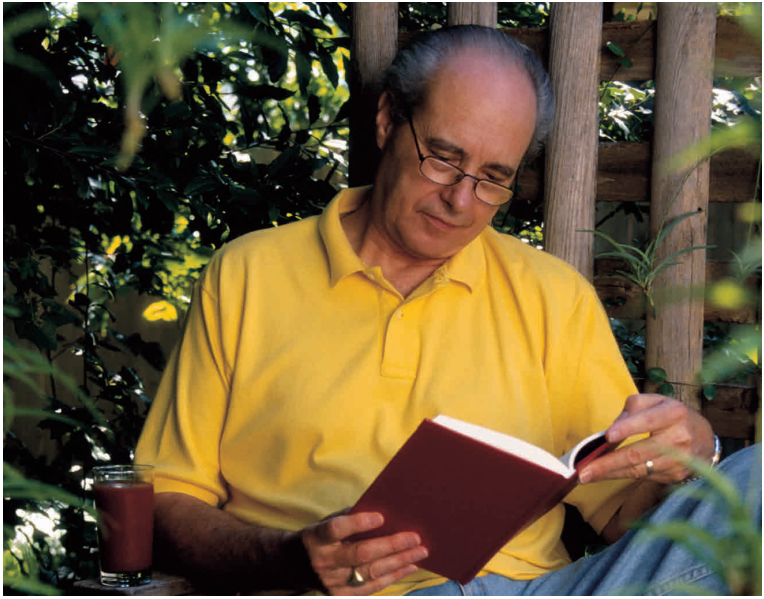


1 Why read this manual?

Your doctor or doctors should be your first source of information about your heart condition and your general health.

If you have questions about your heart device that are not covered in this manual, contact Medtronic Patient Services (see “How to contact Medtronic” on page 3).

For Spanish translations of patient manuals, contact Medtronic Patient Services, or go to www.medtronic.com to view or download English and Spanish patient manuals.

This manual is for people who are about to have or already have a heart failure pacemaker with defibrillation (also called cardiac resynchronization therapy with defibrillation, heart failure heart device, biventricular heart device, and three-lead heart device). This manual 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 manual.

For your convenience, words that appear in **bold** are defined in the glossary starting on page 121.

Frequently asked questions

New patients often have the same initial concerns about their heart devices. Here are some of the questions new patients frequently ask.

? Why do I need this heart device?

A **heart failure pacemaker with defibrillation** is designed to relieve heart failure symptoms for most patients. It improves the heart's ability to pump blood and oxygen to the body. Although this heart device does not prevent or cure your underlying heart rhythm condition, it should improve your quality of life and help you get back to doing things that you haven't been able to do for a while.

Heart medications and surgical procedures may be prescribed instead of, or in addition to, a heart failure pacemaker with defibrillation. Based on your individual health condition, your doctor has determined that

the treatment provided by a heart device may help to improve your symptoms.

Although your heart device is not a cure, it does help to protect you from heart rhythms that can weaken or even endanger your health. Many patients say that this heart device gives them and their families a sense of security. See “Caring for yourself” on page 111 for guidance on dealing with anxiety and other concerns.

? Will I be able to drive?

Whether you will be able to drive or not depends on your individual heart condition. The concern about driving is that you might faint if your heart starts to beat dangerously fast. Many people with a heart failure pacemaker with defibrillation are able to resume driving if their doctor approves and if allowed by the laws and insurance regulations in their state. For more information, see “Driving a car” on page 27. If you have concerns, talk with your doctor.

? Will I be able to travel?

Most people who have a heart device can travel without taking special precautions if they follow their doctor's instructions.

Wherever you travel, your heart device will monitor your heart and provide therapy whenever it is needed. You can travel knowing that resources for your device are available in 120 countries (see the back cover of this manual for information on contacting Medtronic headquarters located worldwide). When you travel, your doctor may also be able to check your heart device remotely with the **Medtronic CareLink Service** (see page 103 for more information).

It is unlikely that your heart device will trigger the security gates at airports or other secure buildings. If it does, present your heart device ID card. If a handheld screening wand is used, ask the security operator not to hold it over your heart device and not to wave the wand back and forth over your heart device. See "Security systems" on page 40 for more information.

A multilanguage heart device travel card is available that provides instructions in several languages for safe security scanning; the card is

especially useful for international travel. See page 98 for more information about the multilanguage heart device travel card.

If you have any other travel-related questions, contact Medtronic Patient Services (see page 3) or consult the Medtronic travel website at www.medtronic.com/traveling.

? Can I walk through antitheft systems found in public places?

Yes, simply walk through the antitheft system at a normal pace. Under some circumstances, the systems located in stores, libraries, and other places may temporarily interfere with your heart device if you stop or linger near this equipment. The interference stops when you move away from the equipment.

? Can I use a mobile phone?

Yes, you can use mobile phones (including cellular phones and other wireless phones). However, mobile phones may cause electrical interference with your heart device when the phone is turned on and held too close to your heart device. Any effect is temporary, and simply moving the phone away will return the heart device to its previous state of operation.

To avoid any possible interference between mobile phones and your heart device, keep all mobile phones at least 6 inches (15 centimeters) away from your heart device. When using a mobile phone, hold it to the ear that is farthest away from your heart device. Also, do not carry a mobile phone close to your heart device, such as in a shirt pocket (or in a pants pocket if your heart device is implanted in your abdomen). For more information about using mobile phones and other wireless communication devices, see page 32.

? Can I use a microwave oven and other electrical items?

Yes, you can use a microwave oven as well as major appliances, electric blankets, and heating pads. See "Living life with your heart device" on page 25 for information about electrical items and any restrictions or cautions you should know about.

? Will my heart device need to be replaced?

Yes. Because your heart device operates using a battery sealed inside the heart device, the entire heart device will need to be replaced when battery power falls to a low level. Battery power is affected by many factors, including how often your heart device provides therapy to your

heart. The battery for your type of heart device typically lasts 4 to 7 years after it is implanted.

The battery power is checked at each heart device follow-up appointment. Your doctor or nurse will let you know when you need to have your heart device replaced.

? How often will my doctor need to check my heart device?

When you go home after your implant surgery, your doctor will periodically check your heart device. These follow-up appointments can be performed at your clinic, or if your clinic subscribes to the **Medtronic CareLink Service**, you can send your heart device information directly to your doctor or clinic from home. For more information about follow-up services, see "Follow-up care" on page 101.

? How do I know if my heart device battery is still working?

The strength of your heart device battery is checked during your follow-up appointments, either in the clinic or through built-in device monitoring. **Medtronic CareAlert monitoring** is a safety feature built into your heart device that can be set up by your doctor to alert you with a beeping sound when the heart device battery power is getting low. For

more information about the Medtronic CareAlert monitoring feature, see “What is Medtronic CareAlert monitoring?” on page 82. Because the battery is sealed inside your heart device and cannot be recharged, your heart device will need to be replaced when the battery power is low. For more information about heart device replacement, see “What is Medtronic CareAlert monitoring?” on page 82.

? What if my heart device is making a beeping sound?

Your heart device may make a beeping sound if the Medtronic CareAlert monitoring feature is turned on. Your doctor can have your heart device alert you with a beeping sound under certain conditions, such as the following conditions:

- The number of therapies you have received has increased.
- The battery power of your heart device is low.

The beeping tone will sound for approximately 10 seconds and will repeat periodically. Some alerts sound at the same time every day. The alerts will continue until your heart device is checked by your doctor or nurse. Do not be alarmed by the beeping. This alert feature is designed to get your attention. If you hear beeping tones from your heart device,

call your doctor for instructions. For more information about the Medtronic CareAlert monitoring feature, see “What is Medtronic CareAlert monitoring?” on page 82.

? Will my device deliver a therapy shock during normal activity?

This can happen, but it is unlikely. Your heart device is designed to respond to abnormal heart rates and rhythm patterns. Normal exercise or physical activity shouldn’t trigger your heart device to deliver a **therapy shock.**

If this ever happens, stop the activity and notify your doctor. Your doctor may change the settings of your heart device to prevent this from happening.

? Can others feel a therapy shock if they are touching me?

Though it is very unlikely, if you receive a therapy shock, anyone touching you may feel the shock as a muscle spasm or tingle. This can be startling, but it will not hurt the person.

? What if I receive a therapy shock?

Ask your doctor or nurse what you should do if your heart device delivers a therapy shock. Your doctor or nurse should provide you with specific instructions about when you should contact your doctor if you have received a therapy shock.

In general, follow these four 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.
3. If you receive more than one therapy shock or if you remain unconscious for more than 1 minute, have a companion call 911 for an ambulance.

   If you remain unconscious and you have no pulse, a companion trained in **cardiopulmonary resuscitation (CPR)** 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.

4. If you do not feel well after the shock, have someone call your doctor and take you to the hospital emergency room.
5. Follow your doctor's or nurse's directions about when to call your doctor after receiving a shock. You may be asked the following questions:
   - 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?

? Can I have sexual relations?

People often have questions about resuming sexual relations after receiving a heart device. Most people resume sexual activity, based on their doctor's guidance. You and your partner should be able to enjoy all the benefits of intimacy.

Any kind of physical activity is not likely to cause your heart device to deliver a shock. But if it does happen during intercourse, stop and notify your doctor just as you would if it happened during exercise. Your

partner will not be hurt by the shock. They may feel a tingle or slight muscle spasm, but nothing more.

2 Living life with your heart device

Many people resume their normal daily activities after full recovery from surgery (see “Your implant procedure and recovery” on page 87). However, there may be certain situations that your doctor will ask you to avoid. Your doctor will provide the most important guidance for your particular condition.

This chapter has important information about the following topics:

- Food and medications (see page 26).
- Your physical activity now that you have a heart device (see page 26).
- Information and instructions about any electrical equipment that may cause interference with your heart device (see page 28).
- Precautions about certain types of medical procedures (see page 44).

Food and medications

Your doctor may instruct you to eat or avoid eating certain foods. For information about food, talk with your doctor.

Your doctor may prescribe medications that will treat your heart condition. Please talk with your doctor about medications.

Recommendations about your physical activity

Upon the advice of your doctor, you can gradually return to your normal lifestyle and to activities such as these:

- 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 situations 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 to hit your implant site. Your heart device can be damaged or your **leads** could become detached from the heart device during rough contact.

- If you use a rifle or shotgun, rest the butt on the shoulder of the side opposite from your heart device.
- In activities that use a shoulder harness, protect your 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 Services 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 (see page 3).

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 local laws

and insurance regulations and on your 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. 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.

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, feel rapid or irregular heartbeats, or receive a shock while using an electrical item, release whatever you are touching or move away from the item. Your heart device should 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, consult with your doctor or contact Medtronic Patient Services (see page 3).

? What about static electricity or shocks from household outlets?

Static electricity shocks will not damage your heart device.
A “momentary” shock from an electrical outlet (110/220 volts) is unlikely to damage your heart device, depending on how long you stay in contact with the outlet.

? 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 (15 to 30 centimeters) or more, depending on the type of item. Refer to the information beginning on page 32 for recommended safe distances. Also, before entering an area where signs are posted prohibiting persons with an implanted heart device such as a pacemaker or defibrillator, consult with your doctor.

General guidelines for avoiding interference from electrical items or magnets

The following pages provide tips on how to avoid any possible temporary effects of electromagnetic energy fields on your heart device. If you have questions about electromagnetic energy fields or the safe use of a specific item that is not listed in this chapter, contact Medtronic Patient Services (see page 3).

Proper grounding of electrical items

To avoid interference from electrical current that may leak from improperly grounded electrical items and pass through your body, observe the following precautions:

- 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

Wireless communication devices include transmitters that can affect heart devices. When using wireless communication devices, keep them

at least 6 inches (15 centimeters) away from your heart device. The following items are examples of such devices:

- Handheld cellular, mobile, or cordless telephones (wireless phones); two-way pagers; personal digital assistants (PDAs); smartphones; and mobile email devices.
- Wireless-enabled devices such as laptop, notebook, or tablet computers; network routers; MP3 players; eReaders; gaming consoles; televisions; DVD players; and headsets
- Remote keyless entry and remote car starter devices

? What else do I need to know about using a wireless device?

Heart devices have been tested with many types of wireless device technologies. To ensure your heart device operates correctly when you are using a wireless device that is turned on, you can keep your heart device at least 6 inches (15 centimeters) away from the antenna of the device, such as a telephone, by holding the telephone to the ear farthest away from your heart device. Do not carry the telephone in a pocket over the device or in a shoulder bag near the device.

Household and hobby items

Caution: Household and hobby items that have motors or magnets or that generate electromagnetic energy fields could interfere with your heart device. You should move away from the interference source or turn off the source if you experience any dizziness or heart palpitations.

Keep your heart device at least 6 inches (15 centimeters) away from the following household and hobby items:

- Handheld kitchen appliances, such as electric mixers
- Sewing machines and sergers
- Personal care items, such as corded handheld hair dryers, corded electric shavers, electric or ultrasonic toothbrushes (base charger), or back massagers
- Items that contain magnets, such as bingo wands, mechanic's extractor wands (which use magnets to pick up metal items), magnetic bracelets, magnetic clasps, magnetic chair pads, or stereo speakers (even if the power for the speakers is disconnected)

- Radio-controlled toys (antenna)
- Two-way walkie-talkies (less than 3 watts)

To avoid interference with your heart device, the following household and hobby items require special precautions:

Magnetic mattress pads or pillows– Items containing magnets can interfere with the normal operation of your heart device if they are within 6 inches (15 centimeters) of the device. Avoid using magnetic mattress pads or pillows because they cannot easily be kept away from the device.

Induction cook tops– An induction cook top uses an alternating magnetic field to generate heat. You should keep your heart device at least 24 inches (60 centimeters) away from the heating zone when the induction cook top is turned on. Most glass-topped or ceramic-topped ranges use conventional heating elements beneath their flat cooking surfaces. If you can use aluminum or glass cookware on your range and the cooking area stays hot after the burner has been turned off, your stove has conventional heating elements. This type of cook top will not affect your heart device. If you need the latest information about kitchen appliances, contact Medtronic Patient Services (see page 3).

Electronic body fat scale–Using this type of scale is not recommended for heart device patients because it passes electricity through the body and can interfere with the device.

UPS (uninterruptable power source) up to 200 amperes–Keep your heart device at least 12 inches (30 centimeters) away from a UPS. If the UPS is operating by battery source, keep your heart device at least 18 inches (45 centimeters) away.

Electronic pet fences or invisible fences–Keep your heart device at least 12 inches (30 centimeters) away from the buried wire and the indoor antenna of electronic pet fences or invisible fences.

Home-use electric kilns–Keep your heart device at least 24 inches (60 centimeters) away from home-use electric kilns.

"Beach comber" metal detectors–Keep your heart device at least 24 inches (60 centimeters) away from the detector end.

Boat motors–Keep your heart device at least 12 inches (30 centimeters) away from electric trolling motors or gasoline-powered boat motors.

Portable electric generators up to 20 kilowatts–Keep your heart device at least 12 inches (30 centimeters) away from portable electric generators.

Home power tools

Most home power tools should not affect heart devices; however, some home power tools could affect heart device operation. Consider the following guidelines to reduce the possibility of interference.

- To avoid electrical shock, keep all equipment in good working order.
- Be certain that plug-in tools are properly grounded or double insulated. Using a ground fault interrupter (GFI) outlet is a common safety measure.

Gasoline-powered tools and gasoline-powered yard equipment–Keep your heart device at least 12 inches (30 centimeters) away from ignition system components in tools and equipment such as lawn mowers, tractors, snowblowers, leaf blowers, chain saws, and weed eaters. Turn off the motor before making adjustments.

Electric yard and handheld power tools (plug-in and cordless)–Keep your heart device at least 6 inches (15 centimeters) away from these tools.

Car engine repair–Turn off car engines before making any adjustments. When the engine is running, keep your heart device at least 12 inches (30 centimeters) away from components of the ignition system.

Soldering guns and demagnetizers–Keep your heart device at least 12 inches (30 centimeters) away from these tools.

Industrial equipment

After recovering from implant surgery, you likely will be able to return to work, school, or daily routine. However, if you use or work near high-voltage equipment, sources of high electrical current, magnetic fields, or other electromagnetic sources that may affect device operation, consult with your doctor or contact Medtronic Patient Services (see page 3). You may need to avoid using, or working near, the following types of industrial equipment:

- Electric furnaces used in the manufacturing of steel
- Induction heating equipment and induction furnaces, such as kilns

- 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
- Electric arc and resistance welding equipment
- Broadcasting antennas of AM, FM, shortwave radio, and TV stations
- Microwave transmitters. Note that microwave ovens are unlikely to affect heart devices.
- Power plants, large generators, and transmission lines. Note that lower voltage distribution lines for homes and businesses are unlikely to affect heart devices.

Radio transmitters

Determining a safe distance between the antenna of a radio transmitter and a heart device depends on many factors such as transmitter power, frequency, and the antenna type. If the transmitter power is high or if the antenna cannot be directed away from your heart device, you may need to stay farther away from the antenna. Refer to the following guidelines for different types of radio transmitters:

Two-way radio transmitter (less than 3 watts)–Keep your heart device at least 6 inches (15 centimeters) away from the antenna.

Portable radio transmitter (3 to 15 watts)–Keep your heart device at least 12 inches (30 centimeters) away from the antenna.

Commercial and government vehicle-mounted radio transmitters (15 to 30 watts)–Keep your heart device at least 24 inches (60 centimeters) away from the antenna.

HAM radio transmitter (125 to 250 watts)–Keep your heart device at least 9 feet (2.75 meters) away from the antenna.

Transmission power levels higher than 250 watts–For more information, contact Medtronic Patient Services (see page 3).

Security systems

Home security systems–It is unlikely that your device will be affected by home security systems.

Electronic antitheft systems, such as in a store or library, and point-of-entry control systems, such as gates or readers that include radio frequency identification equipment–These systems should not affect

your heart device, but as a precaution, do not linger near or lean against such systems. Simply walk through these systems at a normal pace. If you are near an electronic antitheft or entry control system and experience symptoms, promptly move away from the equipment. After you move away from the equipment, the heart device resumes its previous state of operation.

Airport, courthouse, and jail security systems–Given the short duration of security screening, it is unlikely that metal detectors (walk-through archways and hand-held wands) and full body imaging scanners (also called millimeter wave scanners and three-dimensional imaging scanners) in airports, courthouses, and jails will affect your heart device. When encountering these security systems, follow these guidelines:

- Always carry your heart device ID card. This card is helpful if your heart device sets off a metal detector or security system.
- Minimize the risk of temporary interference with your heart device while going through the security screening process by not touching metal surfaces around any screening equipment.
- Do not stop or linger in a walk-through archway; simply walk through the archway at a normal pace.

- If a hand-held wand is used, ask the security operator not to hold it over or wave it back and forth over your heart device.
- If you have concerns about security screening methods, show your heart device ID card to the security operator, request alternative screening, and then follow the security operator's instructions.

Examples of items that have low or no risk of interfering with your device

Patients frequently have questions about the items in the following list, which have low or no risk of temporarily interfering with your heart device. If you have questions about items not listed in this manual, contact Medtronic Patient Services (see page 3).

Kitchen items–Microwave oven; electric, gas, or convection oven; toaster; blender; electric can opener; food processor; cordless electric knife.

Personal care items– Salon hair dryer; cordless shaver; electric blanket; heating pad.

Communication devices–Corded home or public telephone.

Home office items–Desktop or laptop computer; home-use copier, printer, fax and scanner.

Home electronics items–AM and FM radio; cassette tape recorder; CD player; camcorder; video recorder (VCR); MP3 player; television; video game system; stereo; DVD player; remote control for entertainment system.

Miscellaneous items– Laundry and cleaning items, such as clothes iron, vacuum cleaner, and electric broom; pager that only receives messages; remote control for garage door; portable space heater.

Precautions about medical procedures

Caution: Before you undergo any medical procedure, tell the health care professional, such as the doctor or nurse, that you have an implanted heart device.

- The health care professional may need to speak with your heart doctor before performing the procedure. Showing them your heart device ID card may be helpful.
- Some procedures may potentially affect the function of your heart device, and such procedures may require precautionary measures to prevent or minimize impact on your heart device.

Talk with your health care professional to weigh any potential risk against the benefits of the medical procedure. See the following pages for more information. Refer to the Glossary for definitions of medical procedures and other terms that appear in **bold**.

Medical procedures that are not recommended

Some medical procedures should not be performed on anyone with a heart device. Talk to your health care professionals about finding alternatives to these procedures. Your doctor may decide to contact your heart doctor or Medtronic Technical Services for more information.

Table 1 lists procedures that are not recommended for someone with your heart device.

Table 1: Medical procedures that are not recommended

Warning: People with metal implants such as an implanted heart device and accompanying leads should not receive the following medical procedures:

Diathermy treatment (high frequency, short wave, or microwave)
This treatment can result in serious injury and damage to your heart device.

MRI (magnetic resonance imaging) **scan**
This procedure can result in serious injury and damage to your heart device. If you are in a room where an MRI scanner is kept, the function of your heart device can be affected.

Medical procedures that require some precautions

If health care professionals take certain precautions to avoid serious injury, damage to your heart device, and device malfunction, the medical procedures listed in Table 2 can be safely performed.

If you or your doctor have any concerns about the precautions that should be taken, 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 2 lists procedures that require some precautions.

Table 2: Medical procedures that require some precautions

Ablation (specifically, microwave ablation and radiofrequency ablation) This treatment can result in serious injury, damage to your heart device, or device malfunction.
Computerized axial tomography (CT or CAT) scan This procedure can affect the function of your heart device.

Table 2: Medical procedures that require some precautions (continued)

Electrolysis
This procedure can affect the function of your heart device.

Electrosurgery
This procedure and other procedures that use an electric probe to control bleeding, cut tissue, or remove tissue can result in serious injury, damage to your heart device, or device malfunction.

External defibrillation and **elective cardioversion**
These procedures can affect the function of your heart device.

Hyperbaric Oxygen Therapy (HBOT)
This procedure can damage your heart device and leads.

Lithotripsy
This procedure can damage your heart device.

Radiotherapy (including high-energy radiation therapy)
This procedure can damage your heart device and lead, or affect the function of your heart device.

Stereotaxis
This procedure can affect the function of your heart device.

Table 2: Medical procedures that require some precautions (continued)

Therapeutic ultrasound
This procedure can result in permanent damage to your heart device.

Transcutaneous Electrical Nerve Stimulation (TENS), including neuro muscular electrical stimulation (NMES)
A TENS device is not recommended for in-home use because it can affect the function of your heart device. If use of a TENS device is determined to be medically necessary, your doctor should contact a Medtronic representative for more information.

Transmitting loop for digital hearing aid
Using a transmitting loop can affect the function of your heart device.

Transurethral needle ablation (Medtronic TUNA® therapy)
This treatment can affect the function of 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.

Tell your doctors and dentist you have an implanted heart device before beginning any medical or dental procedure.

Table 3 lists some of the acceptable medical procedures.

Table 3: Examples of acceptable medical procedures

Capsule endoscopy and pH capsule procedures are acceptable.
Dental procedures that use dental drills or ultrasonic probes to clean teeth are acceptable. Dental x-rays are also acceptable.
Diagnostic radiology, such as x-rays and mammograms, are acceptable. For precautions on CT scans, see Table 2 on page 46.
Diagnostic ultrasound, such as echocardiogram, are acceptable.

3 Your heart has a natural rhythm

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 fills 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, as illustrated in Figure 1 on page 54.

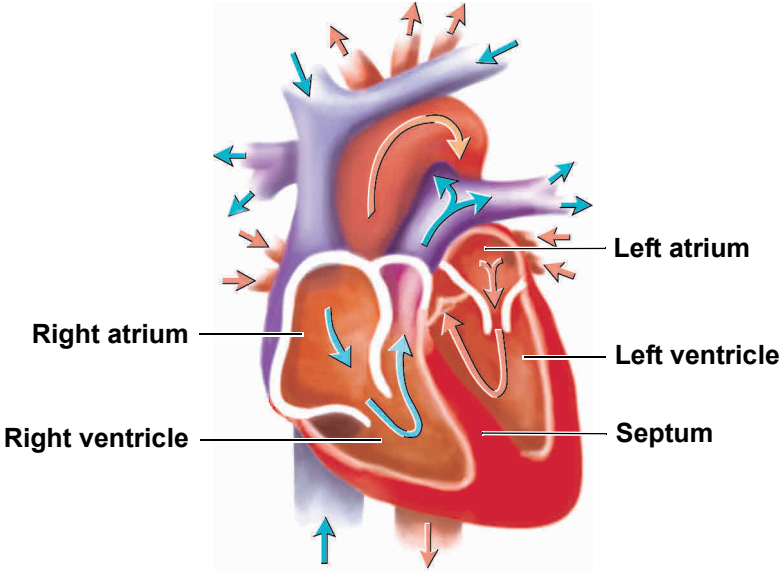


Figure 1: Four chambers of the heart contracting in a controlled sequence to circulate blood throughout the body

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 ventricles' outer walls.

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 **atrioventricular node** (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.

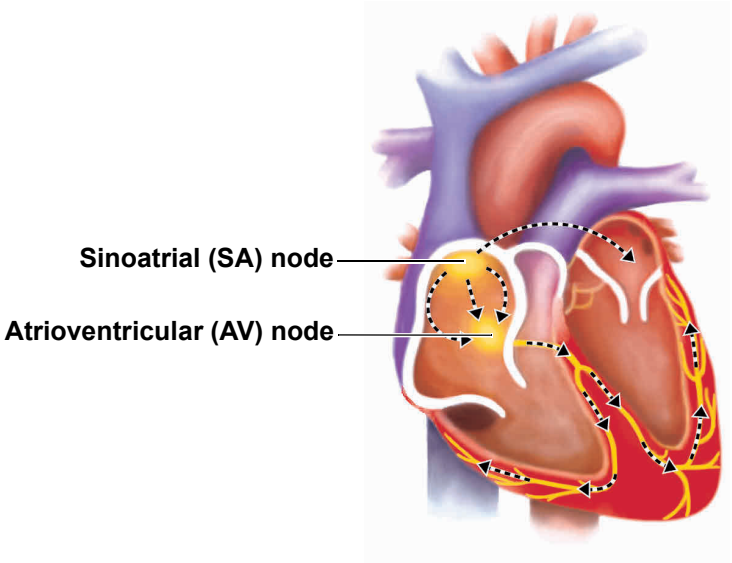


Figure 2: The electrical impulses that cause the heart to contract start at the SA node and move through the atria to the AV node. The AV node controls when the impulse is released to travel through the ventricles.

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 of 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 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 three common abnormal heart rhythm conditions.

Here are the three most common heart rhythm conditions:

- **Heart failure** – when the heart pumps poorly
- **Tachyarrhythmia** – when the heart beats too fast
- **Bradycardia** – when the heart beats too slowly

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 the following heart conditions:

- **Heart failure**
- **Tachyarrhythmia**
- **Bradycardia**

Heart failure – When the heart pumps poorly

The term "heart failure" (also called **congestive heart failure**) is used to describe a heart condition or collection of symptoms that indicate the heart is not pumping enough blood to meet the energy demands of the body. This term can be misleading because heart failure may sound like the heart suddenly fails or stops. Heart failure typically develops slowly after the heart muscle is injured by a **heart attack**, coronary artery disease, untreated high blood pressure, or an abnormal heart valve. Sometimes the cause of heart failure is unknown.

Heart failure conditions can affect the heart's normal electrical conduction, causing the individual chambers of the heart to beat at the wrong time. These delays in electrical conduction are sometimes

referred to as **interventricular conduction delays**. An uncoordinated heart rhythm causes strain on the heart and produces an inadequate supply of blood to the body.

If the heart rhythm is uncoordinated, or out of sync, then the amount of blood pumped by the heart decreases over time. As the amount of blood pumped to the body decreases, the heart muscle itself is not supplied with enough blood, and it becomes even weaker.

This condition can cause the heart to enlarge and fluid to build up in the heart and bloodstream, which in turn reduces the amount of blood pumped by the heart. Without treatment, this cycle of reduced blood flow and weakening heart muscle continues over time.

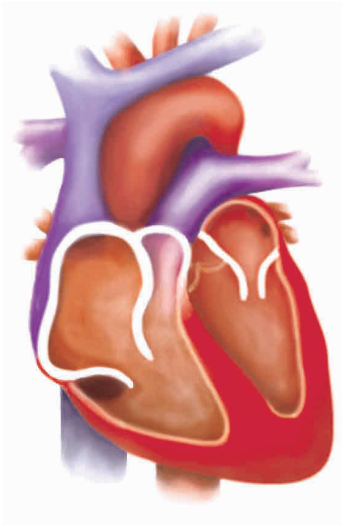
Ejection fraction

One way to measure how well the heart is pumping blood is to calculate the **ejection fraction (EF)**. The EF is the amount of blood pumped out of the heart during each beat or contraction.

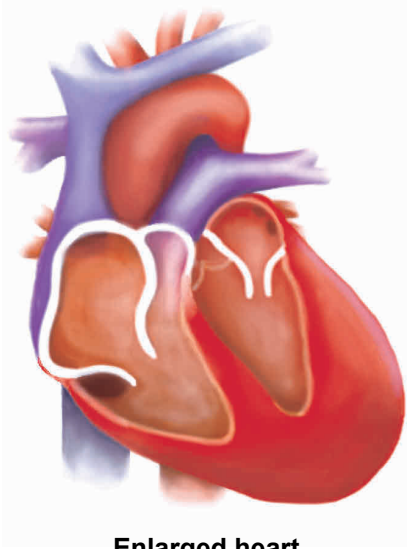
In a healthy heart, 50% to 75% of the blood is pumped out during each beat. This indicates that the heart is pumping well and is able to deliver an adequate supply of blood to the body and brain. Pumping 36% to

49% of the blood is considered below normal, and less than 36% is considered low. Many people with heart failure and heart disease pump out less than 50%.

By measuring the amount of blood held in the ventricle before it contracts and then measuring again after it contracts, your doctor is able to determine how much blood is pumped out of the heart. If more blood remains in the chamber than is pumped out of the chamber, then the heart has a low ejection fraction. A low ejection fraction indicates that the heart is not pumping efficiently.



Healthy heart



Enlarged heart

Figure 3: Heart failure can cause the heart to enlarge because it is working harder to pump blood to the body.

Here are some symptoms of heart failure:

- Shortness of breath
- Swelling of the feet and legs
- Chronic lack of energy, feeling tired
- Difficulty sleeping at night due to breathing problems
- Cough with "frothy" sputum
- Swollen or tender abdomen with loss of appetite
- Increased urination at night
- Confusion, impaired memory

Many people don't know they have heart failure because they think that feeling tired and being short of breath is just a sign of growing older.

Here are some causes of heart failure:

- Damage to the heart from lack of blood supply to the heart muscle caused by a heart attack or coronary artery disease, infection of the heart, or toxic exposure to chemicals (which can include alcohol and drug abuse).
- Too much strain on the heart because of high blood pressure (hypertension) or heart valve problems.

Tachyarrhythmia – When the heart beats too fast

A heart rate that is faster than what the body needs is called a **tachyarrhythmia**. 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.

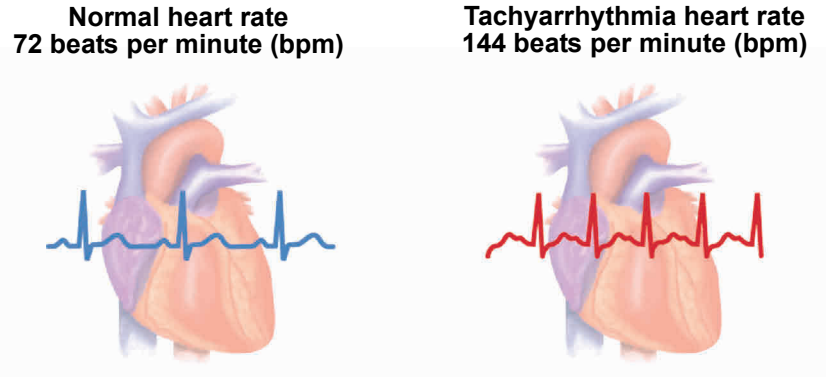


Figure 4: A normal heart rate compared to a tachyarrhythmia rate.

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.

Here are some symptoms of tachyarrhythmia:

- Shortness of breath
- Dizziness
- Sudden weakness
- Fluttering or pounding in the chest
- Light-headedness
- Fainting

Here are some causes of tachyarrhythmias:

- 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 SA node (the heart rate determining mechanism) or when the normal pathway for electrical impulses in the heart is interrupted (**heart block**).

Here are some symptoms of bradycardia:

- Dizziness
- Shortness of breath
- Extreme fatigue
- Fainting spells

Here are some causes of bradycardia:

- Hereditary defects
- Certain illnesses
- Some cardiac drugs
- The aging process
- A heart attack
- An unknown cause

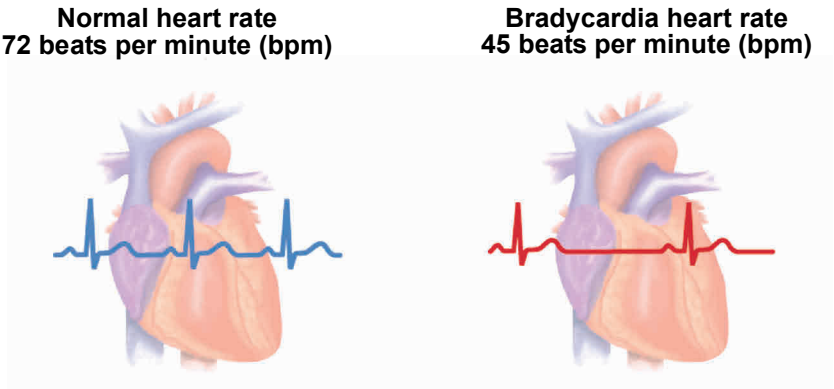


Figure 5: A normal heart rate compared to a bradycardia rate.

4 About your heart device

Your doctor has prescribed a Medtronic heart failure pacemaker with defibrillation to treat your heart failure symptoms. (Your doctor may use other terms to describe this type of device, such as cardiac resynchronization therapy with defibrillation, heart failure heart device, biventricular heart device, and three-lead heart device.) A heart failure pacemaker with defibrillation can help relieve the symptoms for most patients affected by heart failure. Although this heart device does not prevent or cure your underlying heart rhythm condition, it may improve the quality of your life.

This chapter should answer many of your questions about your heart device, including the following questions:

- What is a heart failure pacemaker with defibrillation?
- What types of therapies does my heart device provide?
- What does my heart device therapy feel like?
- Are there any special features I need to know about my heart device?

If you have questions that are not answered in this manual, ask your doctor or call Medtronic Patient Services at 1-800-551-5544.

What is a heart failure pacemaker with defibrillation?

Your heart failure pacemaker with defibrillation is part of a complete treatment system that includes the following components:

- An implanted heart device
- Three implanted leads
- A **Medtronic CareLink Programmer** used by your doctor to monitor and adjust the settings of your heart device

Your 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. Your device is designed to monitor your heart rate and deliver immediate treatment for any irregular heart rhythms when necessary.

The heart failure pacemaker with defibrillation provides three types of treatment or therapy for your heart: bradycardia pacing, defibrillation,

and **cardiac resynchronization therapy (CRT)**. For details about these therapies, see "What types of therapies does my heart device provide?" on page 74.

Implanted leads

A lead is a soft, insulated wire that relays electrical signals from your heart to your device to monitor your heart; a lead also 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.

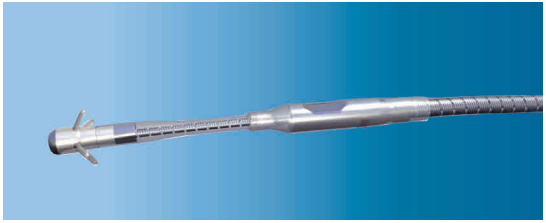


Figure 6: Example of a lead

The heart failure pacemaker with defibrillation uses three leads. One lead is placed inside the right atrium, another lead is placed inside the

right ventricle, and the third lead is placed inside a vein on the outside of the left ventricle (see Figure 7 on page 73). This is the best way to deliver the type of therapy needed to help relieve your heart failure symptoms.

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. For descriptions of the available types of therapies, see “What types of therapies does my heart device provide?” on page 74.

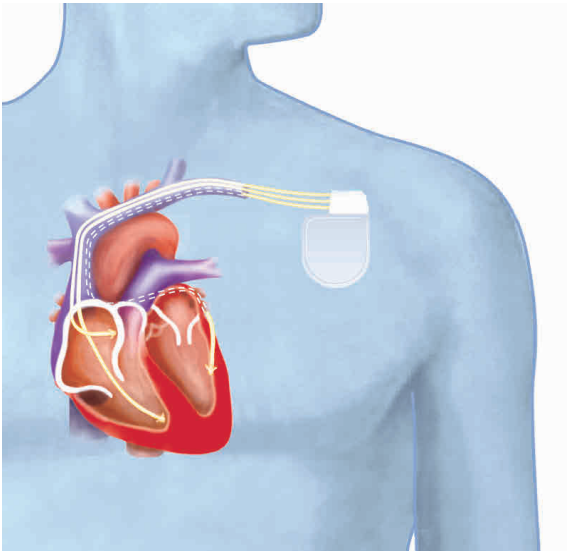


Figure 7: The leads are attached to your heart device. Leads sense your heart rate and deliver therapies to your heart when needed.

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 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 therapies that your heart device can deliver. The therapy provided depends on the type of abnormal heart rhythm detected by your heart device.

What types of therapies does my heart device provide?

Your heart failure pacemaker with defibrillation can provide several types of therapies. 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:

- **Cardiac resynchronization therapy (CRT)** for an uncoordinated and irregular heart rhythm
- **Antitachycardia pacing (ATP)**, cardioversion, and defibrillation therapies for a fast or uneven heart rhythm
- **Pacing therapy** for a slow heart rhythm

Therapy for an uncoordinated and irregular heart rhythm

Common heart failure symptoms are a result of the heart not pumping enough blood to meet your body's needs. In a healthy heart, the upper chambers (atria) of the heart contract first, then the lower chambers (ventricles) contract. These coordinated contractions distribute blood between your lungs and heart to the rest of your body. If the contractions of the heart are not coordinated, then the body does not receive enough blood to function normally.

Cardiac resynchronization therapy (CRT)

Cardiac resynchronization therapy can help restore a normal coordinated heart rhythm by delivering pacing therapy to both sides of the heart.

Pacing therapy consists of delivering a steady pattern of small electrical pulses to the heart muscle through the leads.

As illustrated in Figure 8 on page 77, cardiac resynchronization therapy generally first stimulates the right atrium and then both the left and right ventricles. The time between the stimulation of the right atrium and the left and right ventricles is programmed to maximize the pumping action of the heart.

These small pulses encourage the heart to beat in a regular rhythm. Because cardiac resynchronization therapy paces both the right and left ventricles, your heart device controls when each side of the heart contracts. This can help your heart maintain a normal heart rhythm.

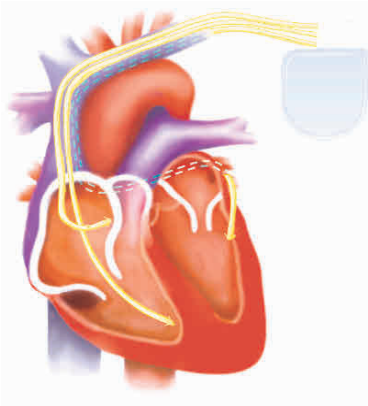


Figure 8: How CRT works

Improving the coordination of your heart rhythm helps your heart pump the amount of blood needed by your body and can help reduce the symptoms of heart failure.

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 therapies 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 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 (fast heart rhythms) when an emergency team may be minutes away or not available.

The therapy shock usually stops the abnormal electrical impulses that are 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.

For information on what to do if you receive a therapy shock, see "What if I receive a therapy shock?" on page 22.

Therapy for a slow heart rhythm

Bradycardia is a heart condition where the heart beats too slowly 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 a 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. The sensations people have reported feeling during the different therapies are described next.

Cardiac resynchronization therapy (CRT) – Since cardiac resynchronization therapy uses small pacing pulses to resynchronize the heart, most people are not aware of the therapy when it is delivered.

Antitachycardia pacing (ATP) – This therapy is often not felt at all and lasts only 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 sudden cardiac arrest, while others find it fleeting but also distressing.

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.

What is Medtronic CareAlert monitoring?

Your heart device has the ability to monitor itself and your lead system for proper functioning. This ability is provided through the Medtronic CareAlert monitoring feature. With the Medtronic CareAlert monitoring feature, your doctor can program your heart device to monitor itself for proper functioning and to monitor your heart for changes in your heart

rhythm. Your heart device may alert you to contact your doctor by emitting a beeping sound. If you hear a beeping sound, 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 **Medtronic CareLink Monitor**, your doctor can also program your heart device to automatically send heart information through the monitor to your clinic without having your heart device beep.

Using the Medtronic CareAlert monitoring feature, your doctor chooses to monitor device function, your heart rhythm, or both. 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 device to meet your needs. But remember, if your device makes a sound, you should always contact your doctor unless otherwise directed.

Conditions that Medtronic CareAlert monitoring can detect

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 about things such as the following:

- Heart device battery status
- The status of your leads
- The number of therapies detected

Additionally, your heart device can monitor for changes in your heart 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 at least 10 seconds, at least once a day. 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.

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

Cautions:

- **Never carry, store, or leave the Patient Magnet over your heart device. Your heart device cannot treat a tachyarrhythmia (fast heart rhythm) while the magnet is placed over it.**
- **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 (see "Wireless communication devices" on page 32 for more information).**

Your nurse or doctor will explain how to use the Patient Magnet; you can also refer to the Patient Magnet manual for additional information.

5 Your implant procedure and recovery

Being told you need a heart device can be upsetting, 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 is typically performed using 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.

This chapter has important information about the following topics:

- The implant procedure
- Potential risks after the implant procedure
- Recovering after your surgery and keeping follow-up appointments

The implant procedure

The implant procedure includes these general steps:

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 first two 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.** The third lead is inserted in a vein that lies on the outside of the left ventricle, where the lead tip can deliver pacing pulses to the left ventricle.

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 atria.
- A right ventricular lead is placed inside the right ventricle.
- A left ventricular lead is placed in a vein on the outside of the left 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.

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 following potential risks are associated with implanting a heart device:

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

- Heart attack
- Stroke

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 system. Additional hospitalization may be required under some conditions, such as these:

- 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

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 confirm 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.

Here are general recommendations 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.
- Use 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 (5 to 7 kilograms).

- 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. For more information about these appointments, read Chapter 7, “Follow-up care” on page 101.

6 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.

The Food and Drug Administration (FDA) requires that medical device companies keep track of their devices implanted in the United States. The registration information must be accurate and current. This information is always kept confidential.

This chapter has important information about the following topics:

- Heart device registration form
- Heart device identification (ID) card
- Heart device travel card

Heart device registration form

In the United States and its territories, the heart device registration form is completed by your doctor, nurse, or Medtronic representative at the time of your implant. This form is then sent to Medtronic.

The form includes this information:

- Your name and contact information
- Heart device model and serial number
- Date of implant
- Your follow-up care doctor's name and phone number

This same information is included on your temporary and permanent heart device ID card.

Your heart device ID card

While in the hospital, you will receive a temporary heart device ID card. Your permanent card will be mailed to you within 6 weeks of your implant. If you have not received your card within 6 weeks of your implant surgery, contact Medtronic Patient Registration Services at 1-800-551-5544. Our staff is available Monday through Friday, 7:00 AM to 7:00 PM (Central Time).

Carry your heart device ID card with you at all times

Your heart device ID card is especially helpful during your follow-up appointments, when seeing other doctors or your dentist, and when traveling. It could be essential in case of a medical emergency. You should carry your heart device ID card with you at all times.

If you do not have your heart device ID 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.

To request a new heart device ID card or update your personal information

If you lose your heart device ID card or need to update your personal information, such as your address or name, contact Medtronic Patient Registration Services at 1-800-551-5544 or update your information online at www.medtronic.com/idcard. Also, notify Medtronic if you no longer reside in the United States.

If you change your doctor

If you change your heart doctor or if the contact information for your doctor changes, notify Medtronic Patient Registration Services by calling 1-800-551-5544 or by updating your ID card information online at www.medtronic.com/idcard.

Medtronic heart device travel card

A special Medtronic heart device travel card is also available from Medtronic. This multilanguage 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 ID card, when you pass through security gates at airports and other secured buildings such as some libraries and government buildings. The travel card is especially useful when traveling internationally.

You can request the Medtronic heart device travel card by calling Medtronic Patient Registration Services at 1-800-551-5544 or at www.medtronic.com/rhythms.

7 Follow-up care

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 within the United States.

Medtronic CareLink Service is available for use in the continental United States, Alaska, and Hawaii. For more information about the Medtronic CareLink Service, see “Remote monitoring with the Medtronic CareLink Service” on page 103.

Follow-up information

The purpose of follow-up appointments is to check or monitor the following types of information:

- 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.

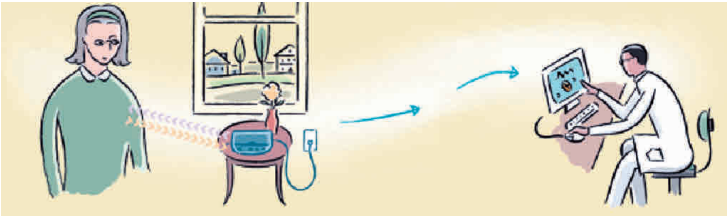
Your doctor will tell you how often your heart device should be checked. Your first follow-up appointment is usually scheduled for 1 month after your heart device is implanted.

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 nears its expected replacement time.

Remote monitoring with the Medtronic CareLink 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 telephone line to your clinic instead of visiting in person. The information you send is available for your doctor's review within minutes.

Medtronic CareLink Service



The Medtronic CareLink Monitor transmits your heart device information over a telephone line. No internet connection is required.

Your clinic reviews your data on the clinician website.

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 United States) and send your heart device information from wherever you have access to a telephone line.

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 through the Medtronic CareLink Network to your heart clinic at a time set up by you and your doctor. The monitor is easy to take with you if you plan to travel within the United States. It weighs about 1 pound (0.5 kilograms) and fits inside a suitcase or carry-on baggage.

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.

? What if I do not have access to a standard phone line or I need remote monitoring while travelling outside the U.S.?

If the remote monitor your doctor prescribes for you requires a standard phone line (land line) and you do not have a land line, or if you need remote monitoring while travelling outside the U.S., you can contact

Medtronic Patient Services (see page 3) or your device clinic to discuss your options.

? 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?

No. 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.

? Is there any additional cost for Medtronic CareLink Service?

Remote monitoring with the Medtronic CareLink Service is provided in the United States as a standard feature with most Medtronic heart devices. Your cost for using the Medtronic CareLink Service will be the same as a normal clinic visit co-payment. There is no cost to you for the Medtronic CareLink Monitor.

For more information about the Medtronic CareLink Service and Medtronic CareLink Monitor, talk with your doctor. You can also find information on the Medtronic website at www.medtronic.com.

Medtronic CareLink Programmer

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 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.

Your doctor or nurse uses 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.

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. Your heart device collects and saves the following information:

- 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 or nurse

Contact your doctor or nurse if you experience any of the following situations:

- You notice any swelling, warmth, or drainage around your incision or if you develop a fever while your incision is healing.
- You notice new, unexplained heart symptoms or if you experience the same heart symptoms you had before receiving your heart device.
- You have heart rhythm symptoms that last longer than 3 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.
- You hear beeping tones coming from your heart device. For more information on the Medtronic CareAlert monitoring feature, see "What is Medtronic CareAlert monitoring?" on page 82.
- You receive a shock from your heart device and your doctor has instructed you to call. For more information, see "What if I receive a therapy shock?" on page 22.

Heart device replacement

Your 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 battery for your type of device typically 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 an 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.

8 Caring for yourself

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

Give yourself a few months to adjust to living with your heart device. Most people report that they have a wide range of emotions after receiving a 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 get back to your normal activities. Addressing your concerns and having a positive attitude toward your heart device and the therapies it provides can enhance the quality of your life over the long term. For guidance on developing a positive attitude, see page 114.

Dealing with anxiety and getting the support you need

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.

? What is one common source of stress for heart device patients and families?

A common worry pertains to the heart device performance. Medtronic medical devices are extremely reliable, and most patients feel that their quality of life improves after the implant because the device can effectively relieve the troubling symptoms. Yet, at times, you may worry about whether the device will work when needed. Follow-up appointments help monitor the performance of your device and provide you with an opportunity to ask questions. With that comes comfort and reassurance, thus reducing the anxiety.

? What are some other ways to relieve stress and get answers to my questions?

It often helps to talk with other people who have a 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.

In addition, Medtronic websites provide information you may find helpful:

- www.medtronic.com: Includes information about Medtronic products and services
- www.medtronic.com/rhythms: Provides information for patients about their heart devices, including patient stories and other resources.

Shaping a positive attitude about living with a heart device

Remind yourself of the benefits
Remind yourself that your heart device protects you from the serious consequences of irregular heartbeats.

Block negative thinking
Catch yourself if you are imagining the worst-case scenarios. Remind yourself that most patients feel positive about having their heart device.

Discuss concerns
Make a list and discuss any worries you might have about your condition or heart device with your doctor and with your loved ones. Develop a plan about how to cope with your concerns.

Explore the unknown
Learn about your medical condition and your heart device from your doctor, nurse, library, device manufacturer, and Internet websites. Often learning about your heart device helps reduce anxiety.

Plan your quality of life
The goal of your ongoing care is to achieve the best quality of life possible. Take an inventory of the activities that are most important to you and discuss plans to return to those activities with your doctor.

Provided by: Dr. Sam Sears of East Carolina University and Dr. Wayne Sotile of Wake Forest University. Both health psychologists are experts who work extensively with heart device patients and provide educational information on www.medtronic.com.

Medical care

- Follow your doctor's instructions about diet, medications, and physical activity.
- Attend all heart device follow-up appointments and other general health checkups.
- Remote monitoring may be prescribed instead of an office visit. Following your remote transmission schedule is as important as an office visit for your medical care. If necessary, you can reschedule your transmission appointment by contacting your doctor's office. For more information about remote monitoring, see "Remote monitoring with the Medtronic CareLink Service" on page 103.
- Tell your doctors, dentists, and other health care professionals that you have an implanted heart device before any medical or dental appointments.

Planning for an emergency

Because you have a 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 ID 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.
- Talk with your doctor and know what to do if you receive a therapy shock.
- Inform significant coworkers, traveling companions, and so on, that you have an implanted heart device.
- When traveling by air, inform airline security personnel that you have an implanted heart device.

You may also want to post information that you want to have readily available 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.

For information on what you should do if your heart device delivers a shock therapy, see “What if I receive a therapy shock?” on page 22.

Medtronic Warranty

For complete warranty information, contact Medtronic Patient Services (see page 3).

Glossary

The words that appear in this section are found in **bold** throughout this manual. It may be helpful to familiarize yourself with them.

ablation – See microwave ablation and radiofrequency ablation.

antitachycardia pacing (ATP) – Small, rapid pacing pulses delivered by a heart device to treat an abnormally fast heart beat.

atrial fibrillation (AF) – A heart rhythm that causes the atria to quiver in one place rather than contract.

atrial flutter – An atrial heart rhythm that is regular but very fast.

atrial tachyarrhythmias – Abnormally fast heart rhythms that start in the atria. Atrial flutter and atrial fibrillation (AF) are atrial tachyarrhythmias.

atrioventricular node (AV node) – 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.

atrium (plural = atria) – 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.

autonomic nervous system – 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 system increases pulse, blood pressure, and breathing rates, and the parasympathetic system decreases each of them.

bradycardia – A type of heart condition in which the heart beats less than 60 beats a minute.

capsule endoscopy – A procedure in which a capsule containing a tiny camera is swallowed by the patient. As it follows the entire digestive tract, it takes pictures of sections that are not easily reached by other endoscopic procedures.

cardiopulmonary resuscitation (CPR) – A life saving procedure that includes the timed external compression of the chest wall (to stimulate blood flow), and may include mouth-to-mouth breathing to provide oxygen.

cardioversion – A therapy provided by a 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. See also **defibrillation**.

CareAlert monitoring – See **Medtronic CareAlert monitoring**.

CareLink Monitor – See **Medtronic CareLink Monitor**.

CareLink Service – See **Medtronic CareLink Service**.

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 three-dimensional x-ray image.

congestive heart failure – See **heart failure**.

defibrillation – A type of therapy provided by a heart device or external electronic equipment to treat a fast, irregular heart rhythm. Defibrillation therapy involves delivering a high-energy therapy shock to the heart. See also **cardioversion**.

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

diagnostic radiology – Imaging techniques, such as x-rays and mammograms, that use a radiation beam to produce images used for diagnostic purposes.

diagnostic ultrasound – An imaging technique used to visualize muscles and internal organs, their size, structures, and any pathological lesions. Also used for fetal monitoring and to detect and measure blood flow.

diathermy treatment – A treatment involving therapeutic heating of body tissues.

ECG or EKG – ECG (EKG) is an abbreviation for "electrocardiogram." 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 (electrosurgery) – A process in which an electric probe is used to control bleeding, to cut tissue, or to remove unwanted tissue.

electrolysis – The permanent removal of hair by using an electrified needle that is 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 a 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 a heart device.

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

electrosurgery (electrocautery) – A process in which an electric probe is used to control bleeding, to cut tissue, or to remove unwanted tissue.

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 handheld automated external defibrillator (AED) to deliver defibrillation therapy shocks to treat sudden cardiac arrest or to counteract atrial fibrillation or ventricular fibrillation. External defibrillators deliver therapy to the chest at very high energy levels.

external defibrillation – Use of an **external defibrillator.**

fibrillation – See **ventricular fibrillation (VF), atrial fibrillation (AF)**.

fluoroscopy – A technique for generating x-ray images and presenting them continuously as visible images during a diagnostic or interventional procedure. It is usually used to track the movement of a dye or an object through the body.

heart attack (myocardial infarction) – 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.

heart block – 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).

heart device – An active, implantable cardiac device such as a pacemaker that treats abnormal heart rhythms (arrhythmias). Types of arrhythmias that can be treated include bradycardia, when the heart beats too slowly, or tachycardia, when the heart beats too fast.

heart failure (congestive heart failure) – 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.

heart failure pacemaker with defibrillation – A heart device designed to relieve heart failure symptoms by improving the heart's ability to pump blood and oxygen to the body. The device combines the capabilities of a pacemaker and a defibrillator. See also **pacemaker** and **defibrillator**.

heart rate – The number of contractions of the cardiac ventricles per unit of time (such as beats per minute).

high-energy radiation therapy – A cancer treatment that uses radiation to control cell growth.

hyperbaric oxygen therapy (HBOT) – The medical use of air or 100% oxygen at a higher pressure than atmospheric pressure.

ICD – Abbreviation for "implantable cardioverter defibrillator," sometimes referred to as "defibrillator." An ICD is used to treat abnormal, fast ventricular heart rhythms.

interventricular conduction delays – Disturbances in the conduction of electrical signals between the ventricles, such that the ventricles do not contract at the same time.

lead, leads, lead system – A flexible wire surrounded by insulation material (urethane or silicone). The lead delivers the electrical impulse or therapy to the heart from a heart device. It also senses the electrical activity of the heart and provides this information to the heart device. See also **epicardial lead, patch lead,** and transvenous lead.

lithotripsy – A medical technique that uses electrically produced shock waves to break up kidney and gallbladder stones.

magnetic resonance imaging (MRI) – See **MRI.**

magnetic resonance angiography (MRA) – See **MRA**.

Medtronic CareAlert monitoring – A feature provided by most Medtronic heart devices, which activates a beeping alert when certain conditions occur. The alert sounds at the same time every day until the heart device is reset 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 within the United States.

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

Medtronic CareLink Service – The remote monitoring service for people with Medtronic heart devices. Using the Medtronic CareLink Monitor allows your heart device follow-up information to be sent to your doctor or clinic while you are at home, at work, or traveling in the United States.

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

MRA (magnetic resonance angiography) – A test within an MRI scan that is used to examine organs and soft tissues.

MRI (magnetic resonance imaging) – A type of medical imaging that uses magnetic fields to create an internal view of the body.

neuro muscular electrical stimulation (NMES) – A pain control technique that uses electrical impulses passed through the skin to stimulate nerves.

pacemaker – 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.

pacemaker, natural – See **sinoatrial (SA) node**.

pacing, pacing therapy – A type of therapy provided by a 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. See also **lead.**

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.

radiofrequency (RF) ablation – A surgical technique in which radio waves are used to destroy cells by creating heat.

radiotherapy – A cancer treatment, such as high-energy radiation therapy, that uses radiation to control cell growth.

reoxygenated – To add oxygen back into the blood cells.

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

sick sinus syndrome – A collection of heart rhythm disorders such as sinus bradycardia or a slow heart rate due to the slowing of the natural pacemaker of the heart, tachycardia or a fast heart rate, and bradycardia-tachycardia or an alternating slow-fast heart rate.

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. See also **atrium**.

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.

stereotaxis – A catheter navigation platform that allows clinicians to steer catheter-based diagnostic and therapeutic devices throughout the body by using magnetic navigation.

tachyarrhythmia – A fast or irregular heart rhythm, usually more than 100 beats per minute and as many as 400 beats per minute. See also **tachycardia.**

tachycardia – An abnormally fast heart rhythm, usually between 100 to 250 beats per minute. See also **tachyarrhythmia**.

therapeutic ultrasound – The use of ultrasound at higher energies than diagnostic ultrasound to bring heat or agitation into the body.

therapy shock – A defibrillation delivered by an ICD. See also **ICD** and **defibrillation**.

transcutaneous electrical nerve stimulation (TENS) – TENS (including neuro muscular electrical stimulation or NMES) is a pain control technique that uses electrical impulses passed through the skin to stimulate nerves.

transurethral needle ablation (Medtronic TUNA therapy) – A surgical procedure used for benign prostatic hyperplasia (BPH) in which precisely focused, conducted radiofrequency energy is used to ablate prostate tissue.

transvenous lead – A pacing lead threaded through a vein and placed inside the heart. See also **lead**.

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

ventricle, ventricles – The two lower chambers 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, VF 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. VT may cause dizziness and light-headedness.

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