

# LIVING WITH YOUR PACEMAKER



# Introduction

The steady, rhythmic pumping of the heart muscle delivers oxygen and nutrients to all organs and tissues of your body. A healthy heart beats steadily and rhythmically at a rate of about 60 to 90 beats per minute when at rest and increases that rate during strenuous exercise and emotional stress.

The heart's pumping action or 'heart beat' is controlled by the heart's own electrical system. This electrical system controls the rate and rhythm of your heart beat. With each heart beat, an electrical signal spreads from the top of your heart to the bottom. As the signal travels through the heart muscle, it causes the heart to contract (squeeze) and pump blood.

An irregularity or disturbance in the heart's electrical system is called a heart rhythm disorder or arrhythmia. Heart rhythm disorders can cause the heart to beat too slowly (bradycardia) or too fast (tachycardia). Bradycardia is an abnormally slow heart

rhythm that may result in not enough blood and oxygen being pumped throughout the body.

If you have this condition called bradycardia, you and your doctor may decide a pacemaker is the right choice for you. The goal of cardiac pacing is to treat bradycardia and restore a normal heart rate.

This booklet is designed to serve the patients and families of Halton region.

Sincerely,

Your Pacemaker Team

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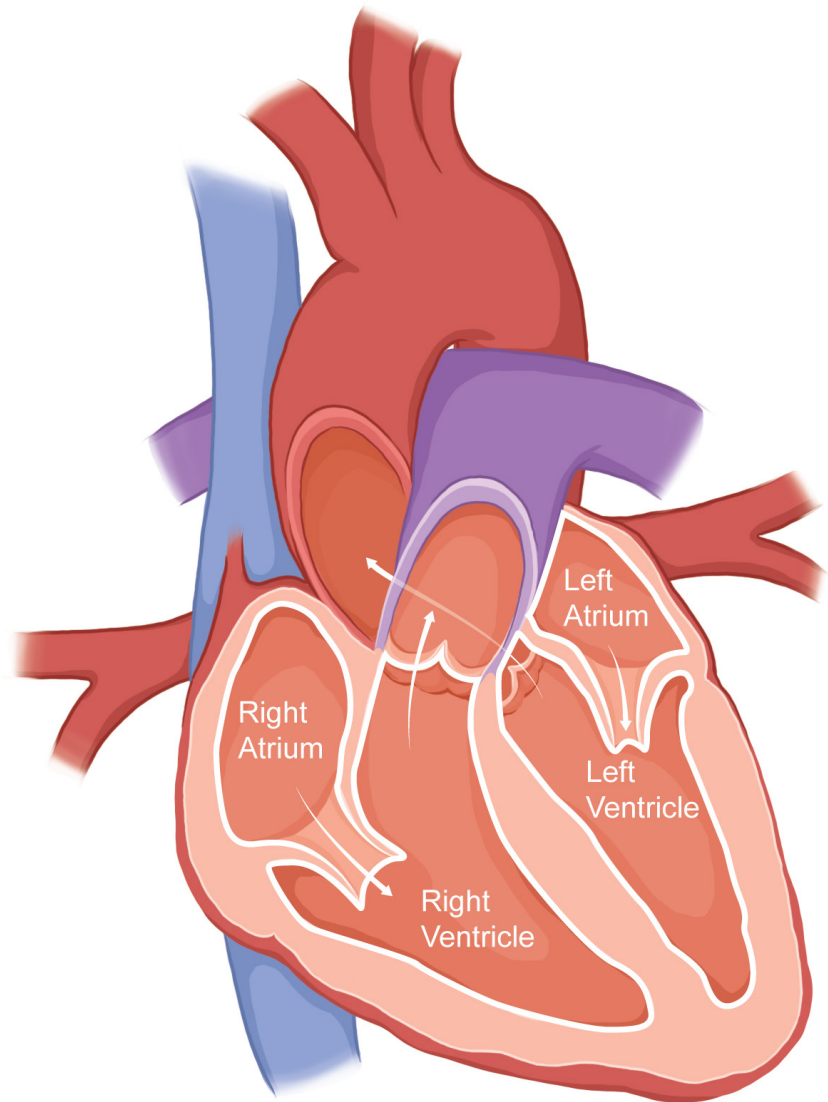
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# The Healthy Heart

The heart is a muscular organ that is about the size of your fist. The main job of your heart is to pump blood throughout your body. The pumping of your heart is regulated by its own electrical system.

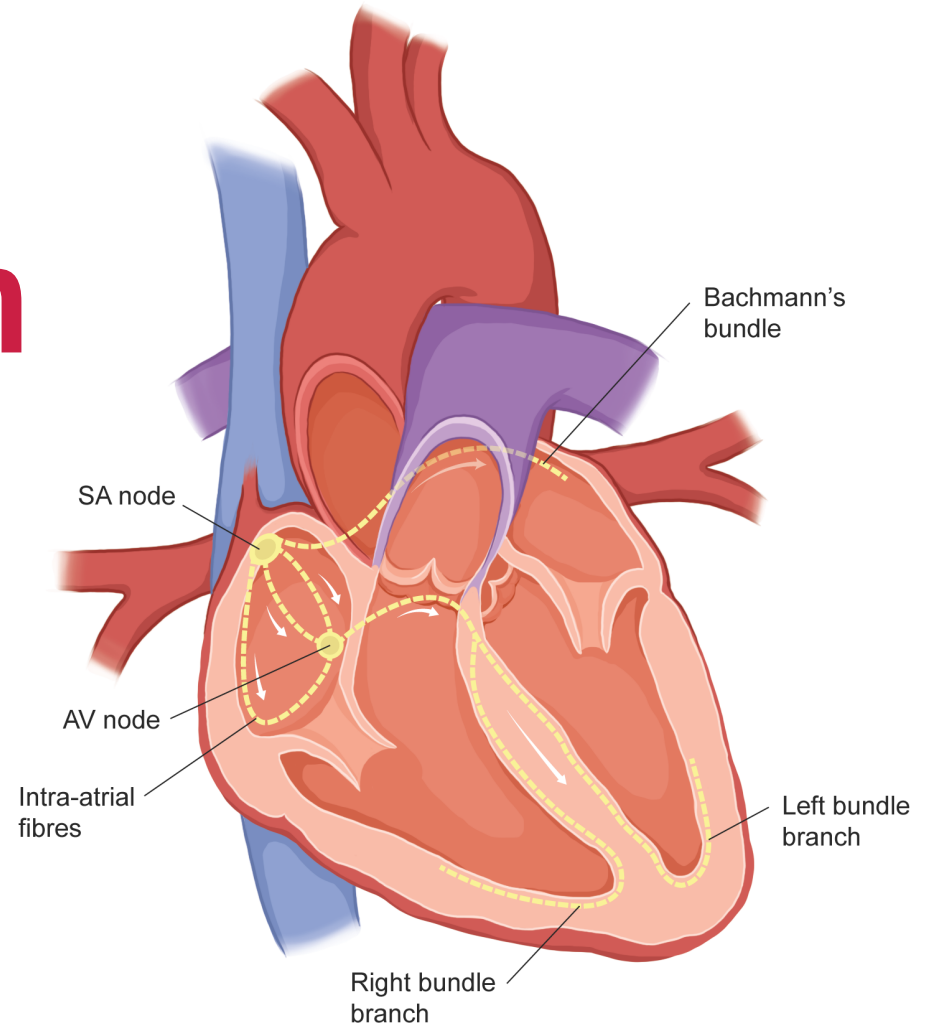
The heart's structure has four chambers with one way flaps called valves. The two upper chambers are the right atrium and the left atrium (plural atria). They receive blood that is being returned to the heart from the body and the lungs. The atria pump (contract) and push blood through the valves into the ventricles. The right and the left ventricles receive blood from the atria and they in turn pump (contract) and push blood out through valves to the lungs and the rest of the body.



# The Heart's Natural Rhythm

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The heart has its own electrical system that causes the heart to beat. A normal heart beat begins in a group of cells called the *sino-atrial (SA)* or *sinus node*. This is the heart's natural pacemaker and it is located in the right atrium. This SA node sends an electrical signal throughout the atria which then contract and squeeze blood into the two lower chambers of the heart; the ventricles. Meanwhile, the electrical signal that made the atria contract has reached the *atrio-ventricular (AV) node* in the lower part of the right atrium. The AV node functions as a relay station, holding the electrical signal for a moment so the blood from the atria can fill the ventricles. The electrical signal then travels along *conduction pathways* to the ventricles, which in turn causes them to contract and push blood out to the rest of the body. This sequence of contractions is what you know as a heart beat.



## The four parts of each heart beat are as follows:

- an atrial contraction
- a short pause while the ventricles fill with blood
- a ventricular contraction
- another short pause while the blood is pumped to the lungs and the body

The co-ordination of the atria pumping and then the ventricles pumping is often referred to as ***atrial-ventricular (AV) synchrony***. The electrical system of the heart is very effective. It reacts to the needs of the body quickly, speeding up the heart rate when more blood is needed and slowing it down when the body is at rest. At rest a normal heart beat can occur 60 to 90 times per minute. During exercise or emotional stress, the body has a greater need for oxygen and can increase the heart rate to 100 beats or more per minute.



# Disturbances in the Heart's Natural Rhythm

A heart rhythm disturbance (*arrhythmia*) occurs when something goes wrong in the heart's electrical system.

- 10** Sometimes certain conditions can cause the heart's electrical system to make the heart beat too slowly (*bradycardia*) or too quickly (*tachycardia*). If the arrhythmia continues, it may prevent the heart from pumping enough blood throughout your body.

## Some potential causes of heart rhythm disturbances (arrhythmias) include:

- congenital heart disease (a condition you were born with)
- the ageing process
- scar tissue from a heart attack
- certain illnesses and heart diseases
- certain medications
- sometimes the result of other cardiac surgery
- Neurocardiogenic Syncope – an abnormality in the control and regulation of the heart rate and vascular tone by the nervous system
- sometimes the precise cause is not known

## Diagnosing your heart rhythm disturbance.

Your care team uses different types of electrocardiogram (ECG) tests to measure and record the electrical activity (rhythm) of your heart. The precise test used will depend on your condition.

A **resting ECG** is a simple painless test that measures and records the electrical activity of your heart. The resting ECG uses small electrodes that are attached to your chest, arms and legs. These electrodes are connected to a machine that records your heart's electrical activity for a few seconds.

The **Holter ECG** is a portable device that records your heart's electrical activity for a 24, 48, 72 hour and 14 day period. Electrodes are attached to your chest and connected to a small, portable ECG machine (about the size of a smart phone), which is then placed in a plastic holder and worn on a belt. You will need to keep a diary of your activities and symptoms while wearing this device.

An **implantable loop recorder** is a small, pencil-thin device placed just under the skin in the chest. It is used when symptoms occur infrequently and are not captured by one of the above cardiac rhythm recording methods. Implantable loop recorders can monitor cardiac events for up to three years. They require the use of a hand held activator that records the electrical activity of the heart before, during and after it is activated.

Other methods, such as **tilt tests and electrophysiology studies** may be used to diagnose people who faint without explanation or when ECG tests show no arrhythmia.



## Bradycardia

The most common condition requiring a pacemaker is a heart rhythm disturbance called '*bradycardia*'. Bradycardia is a heart rate that is too slow to meet the body's demands. A pacemaker is designed to restore a normal heart rate, thereby relieving the symptoms of bradycardia.

**Symptoms of bradycardia may include, but are not limited to, the following:**

- dizziness
- extreme fatigue
- lightheadedness or fainting spells
- shortness of breath

## Two types of rhythm disturbances that cause bradycardia symptoms are SA Node Disease and Heart Block

### **Sinoatrial (SA) Node Disease – (Sick Sinus Syndrome)**

Rhythm disorders of the SA node are described as 'sick sinus syndrome'. Sometimes the SA node (your heart's natural pacemaker) beats too slowly or does not increase its rate in response to exercise.

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### **Heart Block**

Heart block exists when there is a problem with the electrical pathway between the atria and the ventricles. In this condition, signals from the SA node are either blocked completely or are significantly delayed as they pass through the AV node to the ventricles. Heart block is described as first, second or third degree. How slow the heart rate becomes depends on the degree of heart block.

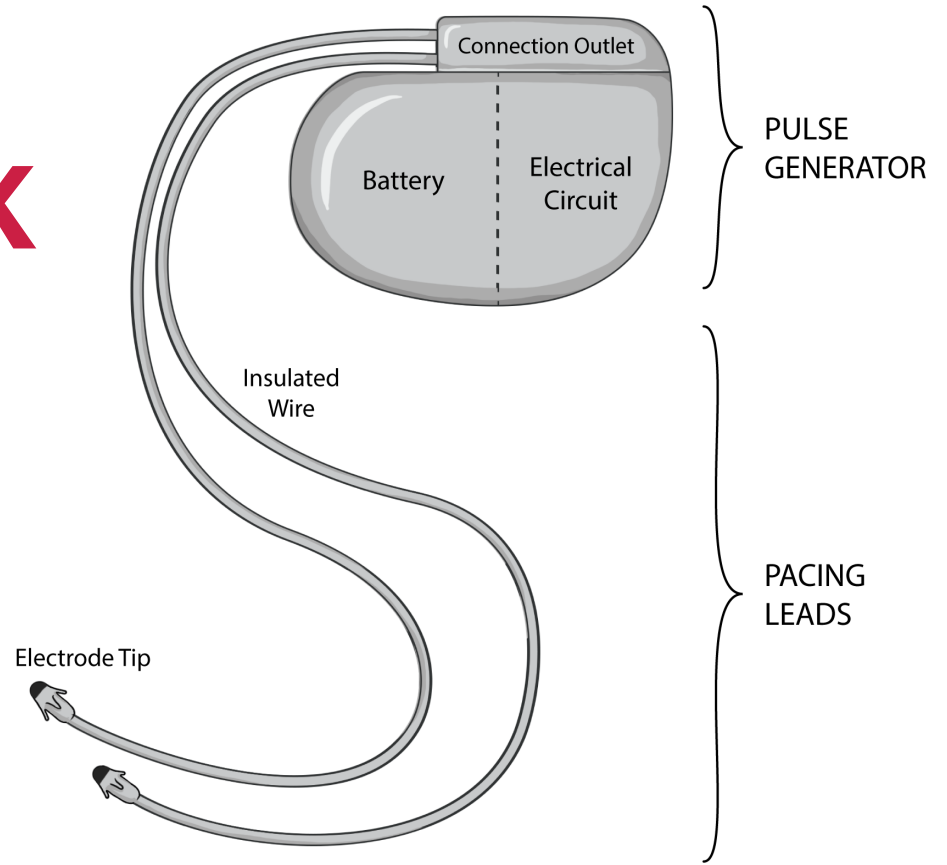


# Pacemakers & How They Work

Pacemakers have two basic parts: the pulse generator and one or more wires called leads.

14 **The Pulse Generator** is a small metal container that contains the battery and electronic circuitry and is placed under the skin, most often below the collar bone. The pulse generator stores information about your heart, the battery and leads.

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**The Pacing Leads (Wires)** are flexible insulated wires that are placed in one or two chambers of your heart. They detect the heart's natural rhythm and deliver the electrical signal from the pulse generator to the heart when necessary.



## The pacemaker has two main purposes – pacing and sensing

### **Pacing**

A pacemaker will send an electrical signal to the heart through a pacing lead when the hearts own rhythm is too slow or interrupted. This electrical impulse starts a heart beat.

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### **Sensing**

A pacemaker will also monitor (sense) the hearts natural electrical activity. When the pacemaker senses a natural heart beat, it will not deliver a pacing pulse. Pacemakers only stimulate the heart when needed. They are therefore known as 'demand' pacemakers.

## Types of Pacemakers

Most physicians will prescribe either a single or a dual-chamber pacemaker to treat bradycardia. This refers to the number of heart chambers that need to be paced or sensed.

### Single–Chamber Pacemakers

A single-chamber pacemaker has one lead to monitor signals from, and deliver pacing pulses to one chamber of your heart (most commonly the right ventricle and occasionally the right atrium). This type of pacemaker is often selected for a person who has atrial fibrillation or sinus node dysfunction.

### Dual–Chamber Pacemakers

A dual-chamber pacemaker has two leads. One lead is placed in the right atrium, and the other is placed in the right ventricle. Because there are leads in two chambers, the pacemaker can monitor signals from and deliver pacing impulses to either or both of these chambers.

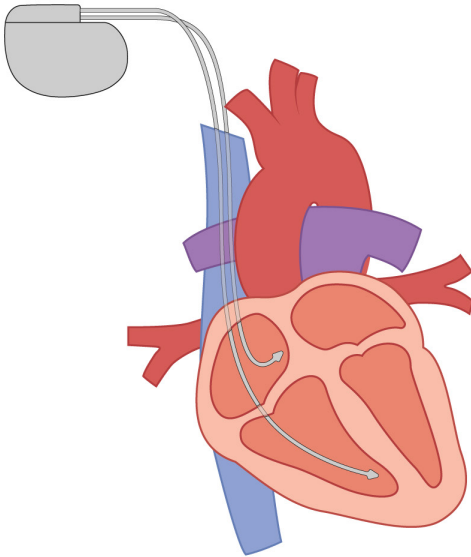
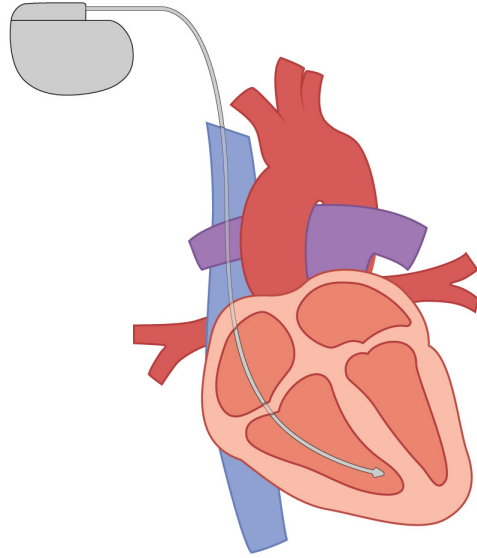
A dual-chamber pacemaker may be selected for a few reasons. For some people, the SA node signals are too slow and/or the electrical pathway to the ventricles is partly or completely blocked. A dual-chamber pacemaker can help treat both problems and can restore a normal timing sequence (also called AV synchrony).

### Biventricular Pacemakers

A biventricular pacemaker is a unique pacing system and has three wires which are connected to the right atrium, the right ventricle and the left ventricle. This pacing system is a treatment option only for a select group of people with advanced heart failure. *These pacemakers are indicated for reasons other than treating bradycardia and therefore will not be discussed further in this booklet.*

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**Single  
Chamber  
Pacing**



**Dual  
Chamber  
Pacing**

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# Pacing Features & Technology

Pacemaker technology is rapidly evolving. Here are a few of the features that are available with pacemakers:

## **Programmability**

Your pacemaker has the ability to have some of the settings adjusted to fit your individual needs, such as changes in your lifestyle or medical condition.

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## **Data Storage**

Most modern pacemakers store a lot of information about your heart. This information can show how your pacemaker and heart are working together. Based on this information, your doctor may want to change your pacing or medical therapy. While the pacemaker collects information regarding the amount of pacing therapy needed for slow heart beats, they can also record information (but not treat) episodes of fast heart beats (tachycardia).

This information can help your physician treat your fast heart beats with medications or other devices like an Implantable Cardioverter-Defibrillator (ICD). Other useful information regarding the battery and the lead(s) is retained in the pacemaker memory. This information will help your doctor monitor the function of the pacemaker system and plan for a pacemaker replacement well in advance.

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## **Rate Responsive Pacing**

Today's pacemakers are capable of having their settings adjusted to provide variable heart rates that support a wide range of lifestyles and activities. The normal heart beats slower while resting or sleeping; it beats faster in response to exercise and excitement. Rate responsive pacing is needed when your heart cannot adjust its rate to meet these needs. Many pacemakers use special sensors to monitor changes in the levels of activity, respiration rate (breathing) and other factors, such as stress. Rate responsive pacing can be part of single-chamber or dual-chamber pacemaker system.

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## **MRI Conditional Pacemakers**

Magnetic resonance imaging (MRI) conditional pacemakers are an emerging technology that is not available to every pacemaker patient at this time. MRI conditional means that it is designed to allow patients to undergo an MRI under specified conditions for use. Previously, patients with implanted pacemakers and leads were denied access to MRI procedures because the interaction could be harmful. At the present time, MRI conditional pacemakers require MRI conditional leads (wires). There is ongoing research to determine if older pacemaker and lead technology will be safe within an MRI environment in the future.

**Always check with your Pacemaker Clinician if you have been scheduled for an MRI.**





# The Pacemaker Procedure

## Before Your Outpatient Pacemaker Surgery

- You will visit the Pre-operative Clinic where blood and urine tests as well as an electrocardiogram (ECG) will be done.
- Make sure all the forms in your pre-operative package are completed, including the history and physical form (which is to be completed by your family physician).
- Report allergies to your physicians and hospital staff.
- Bring your Health Card and medications to any hospital visit.
- Ask your physician if any blood thinners need to be stopped prior to your surgery. Follow his or her instructions about stopping and restarting these medications, if necessary.
- Do not eat or drink anything after midnight before the day of your surgery. You may take medications (except those you were told to stop) with sips of water.

- Remove all jewelry, eyeglasses, dentures and contact lenses.
- Leave your valuables at home.
- You will receive sedation, so make sure you make arrangements for someone to drive you home after surgery.

## Consent

You will be asked by your doctor to sign a written consent prior to your pacemaker surgery. Once you have read this booklet, be sure to talk with your doctor so that you thoroughly understand the benefits and potential risks associated with your surgery. Be sure to have all your questions answered.

Most people get relief of symptoms such as weakness, light headedness, dizziness, fainting and sometimes shortness of breath. Some people notice they have far more energy as a

result of the increased heart rate, provided by the pacemaker.

As with any surgical procedure, it is important to understand that, while complications are very rare, there are risks associated with the implantation of a pacemaker device or lead.

## Potential Risks of a Pacemaker Procedure

Some of the potential risks associated *with the pacemaker implant (insertion) procedure* include the following:

- bleeding or bruising at the site (especially if you are taking blood thinners)
- puncturing of a lung resulting in collapse of the lung which may require a tube inserted into the chest
- damage to adjacent structures (tendons, muscles, nerves)
- damage to the heart (perforation or tissue damage)
- sometimes other arrhythmias such as tachycardia



Some of the potential risks *after the pacemaker system has been implanted* may include:

- infection
- formation of a clot in the vein containing the lead
- erosion of the skin over your pacemaker
- the leads (wires) may move out of place (dislodge)
- the lead position may cause other muscle stimulation such as the diaphragm or the chest muscle
- hematoma or collection of blood in the pacemaker pocket especially in patients who require reintroduction of blood thinners or with 'bridging' of blood thinners
- although continual efforts to improve pacemakers and leads are a priority by the pacemaker manufacturers, they still remain subject to possible safety advisories for a number of reasons

## Your Pacemaker Procedure

The *pulse generator (pacemaker)* is placed under the skin (below your collar bone) on either the right or left side of your chest. A pacemaker insertion is a surgical procedure that may be done in the Operating Room (OR) or in a sterile cardiac procedure room.

Before your surgery, an intravenous (IV) line will be inserted into one of your veins. You will be given some medication (sedation) through the IV line to keep you comfortable and relaxed during the surgery. ***The surgery is not done under a general anaesthetic.*** You will also receive medication (freezing) to numb the skin in the area where the procedure will be done.

Once this medication has taken effect, the doctor will make a small 2 to 3" cut (incision) in the upper chest below the collar bone. This incision provides access to a very large vein. Your doctor will thread the pacemaker lead through this large vein into the heart, where the tip of the lead will rest directly against your heart's inner wall. An additional lead will be placed if

your doctor decides your condition requires a dual-chamber pacemaker system. One lead will be positioned in the atrial chamber of your heart and the other will be positioned in the ventricular chamber.

The *leads* are guided down the vein using a special type of x-ray machine. After the leads are positioned, they are tested to make sure they clearly sense your heart signal and can adequately pace your heart. The pulse generator (pacemaker) is then attached to the leads (wires). The doctor then places the pulse generator in a pocket created under the skin. The incision is then sutured and covered with a dressing. This procedure can take up to one hour. You will need to lie still for the procedure.

## After Your Pacemaker Procedure

Most pacemaker procedures are done on an outpatient basis. This means you will come to the hospital on the morning of your surgery and go home later that day. In a few cases other medical conditions may require you to stay longer in the hospital. A chest x-ray and an electrocardiogram will be done

prior to discharge. Your doctor will review your medications and tell you when to resume any that were stopped. A nurse will review discharge and follow-up instructions as well as incision care. The nurse will also give you a temporary identification card or a copy of the pacemaker registration card.

## Taking Care of Your Incision

Your sutures (stitches) may or may not need to be removed. This will depend on your doctor and which suture material has been used. If your sutures are removable, you should have them removed in 7 to 10 days by your family doctor. If your suture is dissolvable, it is likely that steri-strips (pieces of white tape) will be applied and covered with a dressing. Keep the dressing dry and intact. Your nurse or physician will tell you when to remove the dressing and when you can shower.

## Recovering at Home

When you are home, the Pacemaker Clinic will call you for a follow-up appointment in 2 to 4 weeks' time.

There will be swelling, tenderness and some bruising at the incision site that may persist for a few weeks, especially if you were taking blood thinners before your procedure. Usually 'over the counter' pain relievers like regular Tylenol may be enough to relieve discomfort. Check the incision site for signs of infection such as warmth, redness, swelling, increased soreness or discharge. Report any other unusual findings to your family doctor such as:

- new chest pain or shortness of breath
- new swelling of the arm on the operative side
- new or unusual palpitations or increased heart rates
- new hiccoughing or thumping in the chest or abdomen
- a return of symptoms like the ones you experienced prior to receiving your pacemaker



## Restrictions for the first 6 to 8 weeks after your surgery:

Most people are surprised at how fast they recover after pacemaker surgery. Your doctor will initially restrict you from certain activities until the incision is healed and the lead(s) are stabilized in the heart. There is a possibility that the lead(s) may move or dislodge in the first **6 to 8 weeks** after surgery. You should adhere to the following:

- do not raise the affected arm above the head
- do not push, pull or lift anything greater than 5 pounds such as groceries or children
- do not engage in activities using the affected arm and shoulder like swimming, golf, tennis, fishing, shovelling, gardening, vacuuming, aerobics or exercise routines
- avoid rough physical contact that could result in blows to your implant site



## A return to normal activities

As you begin to feel better, and with your doctor's approval, you will gradually be able to return to your normal activities such as:

- bathing and showering
- resuming sexual activity
- returning to your job
- engaging in hobbies or recreation
- travelling and driving a car

## Identification (ID) Card

Remember when travelling, you will need to carry your pacemaker ID card with you. Your pacemaker clinic can also provide you with a printout of your pacemaker settings if you plan to travel. Identification bracelets are available to order at your local pharmacy if you so choose.

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## Driving

It is recommended that you do not drive for one week following a new pacemaker and lead(s) insertion. Check with your family physician as you may have other medical conditions that restrict you from driving.

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## Travelling

Although airport screening devices are unlikely to interfere with your pacemaker, they may detect the metal housing of the pacemaker and set off the alarm. The best thing to do is simply show your identification card. Security may choose to perform a pat down or a search with a hand held wand. If a wand is used it should be done quickly and security should avoid holding the wand over the pacemaker for any extended period.

## Follow-up Care

An important part of your follow-up care involves checking your pacemaker system. The **Pacemaker Clinic** is an outpatient clinic designed to care for patients who have had a pacemaker inserted. Clinicians (physician, nurse and technician) will use special equipment to check your pacemaker. On occasion, you may receive support from a representative of the pacemaker company.

Visits to the Pacemaker Clinic allow all elements of the pacing system to be checked, such as the frequency of utilization of the pacemaker, pacemaker settings and their interaction with your heart, the battery life and functioning of the leads. It also provides information about the type of heart rhythm and a history of any abnormal heart rhythms occurring from one visit until the next.

The clerical staff will schedule regular appointments with you. Your first visit to the Pacemaker Clinic may last up to one hour. However subsequent routine pacemaker checks last

approximately thirty minutes. How often your pacemaker and lead(s) need to be checked depends on several factors.

A routine Pacemaker Clinic visit is usually scheduled once each year for single-chamber pacemakers and twice per year for dual-chamber pacemakers. This schedule will change throughout the years. There will be more checks as your pacemaker nears its expected replacement time.

### **At your pacemaker follow-up clinic visit:**

We will review your health history and medications so please bring an updated list of medications with you. If you have had any other pertinent tests done, such as stress tests, Holter monitoring or an echocardiogram (an ultrasound of your heart), please ask for the results to be forwarded to the Pacemaker Clinic.

Electrodes and a monitor will be attached to the chest to visualize your heart rhythm tracing. Using a programmer (a small computer), the clinician will retrieve and look at the information your pacemaker has collected and stored since your last visit.



A wand is placed over the skin above the pacemaker and transfers information from the pacemaker to a programmer and back to the pacemaker.

The pacemaker settings can be adjusted (programmed) on your pacemaker. This may be necessary to fine tune your pacing prescription or to accommodate changes in your condition. Adjusting a pacemaker is done externally and is not uncomfortable for you. Some pacemakers can be checked remotely using wireless technology. During the remote follow-up, the use of a portable transmitter will send information from your pacemaker to a doctor's office where your doctor can assess some data. Remote transmissions are generally reserved for patients who live in remote areas and who are not able to travel as often to their Pacemaker Clinic. Remote follow-up is not a replacement for a scheduled clinic visit as the doctor **cannot** make any 'adjustments' to the pacemaker if needed.

Remember to write down any questions you may have so you don't forget to ask them during your visit and to report any problems or a return of any symptoms.



## A Pacemaker Replacement

Pacemaker batteries have very predictable behaviour over time. At every follow-up visit, the clinician will check to see how much energy is left in the battery. Your pacemaker is designed to operate normally for a few more months after the point when your doctor decides to replace it, allowing you and your doctor to schedule a convenient time for replacement surgery. Pacemaker batteries do not suddenly quit. *The battery is sealed inside the pacemaker and therefore the entire pacemaker is replaced (not just a battery).*

In general, most pacemakers today can last between 8 to 14 years and the pacing leads often last twice as long, up to 25 years. There are many variables that determine how long your pacemaker and leads will last. This is different for each patient.

Prior to your pacemaker's replacement, you will need to follow similar instructions to those of a new pacemaker insertion.

At the time of your pacemaker replacement, your doctor will also check the function of your pacing leads. If the lead function is satisfactory, the existing (old) leads will be connected to the new pacemaker. Usually the pacemaker replacement takes much less time than the original pacemaker insertion as the implanting doctor does not need to place new leads.

## Your Pacemaker Registration & ID Card

Implantable Medical Devices are tracked from the manufacturer to the attending physician and patient. This enables the manufacturers to notify your physician of any relevant information concerning your pacemaker.

This process begins at the time of surgery when a registration form is completed and sent to the manufacturer. The manufacturer maintains a computer database that is continually updated to ensure the information is accurate and current.

The information on the registration form and your ID card includes:

- model and serial numbers of the pacemaker and lead(s)
- your name, address and phone number
- date your pacemaker and lead(s) were implanted
- the hospital where the implant was performed
- the implanting doctor's name, address and phone number
- the follow-up doctor's name, address and phone number

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**Carry your identification (ID) card with you at all times!**

## **Pacemakers & End of Life Issues**

If you have a pacemaker and become terminally ill, you may want to discuss follow-up options with your doctor. If your wishes include cremation, your family or Power of Attorney must advise the funeral director that the pacemaker must be removed.



# Special Precautions

## Electrical Magnetic Interference (EMI)

Things that use electricity and magnets have electromagnetic fields around them. These fields are usually weak and will not affect your pacemaker. There are several safeguards built into your pacemaker, including electronic filters that differentiate natural heart beats signals from electromagnetic field signals. These built-in features protect the device from interference from *most* electrical equipment.

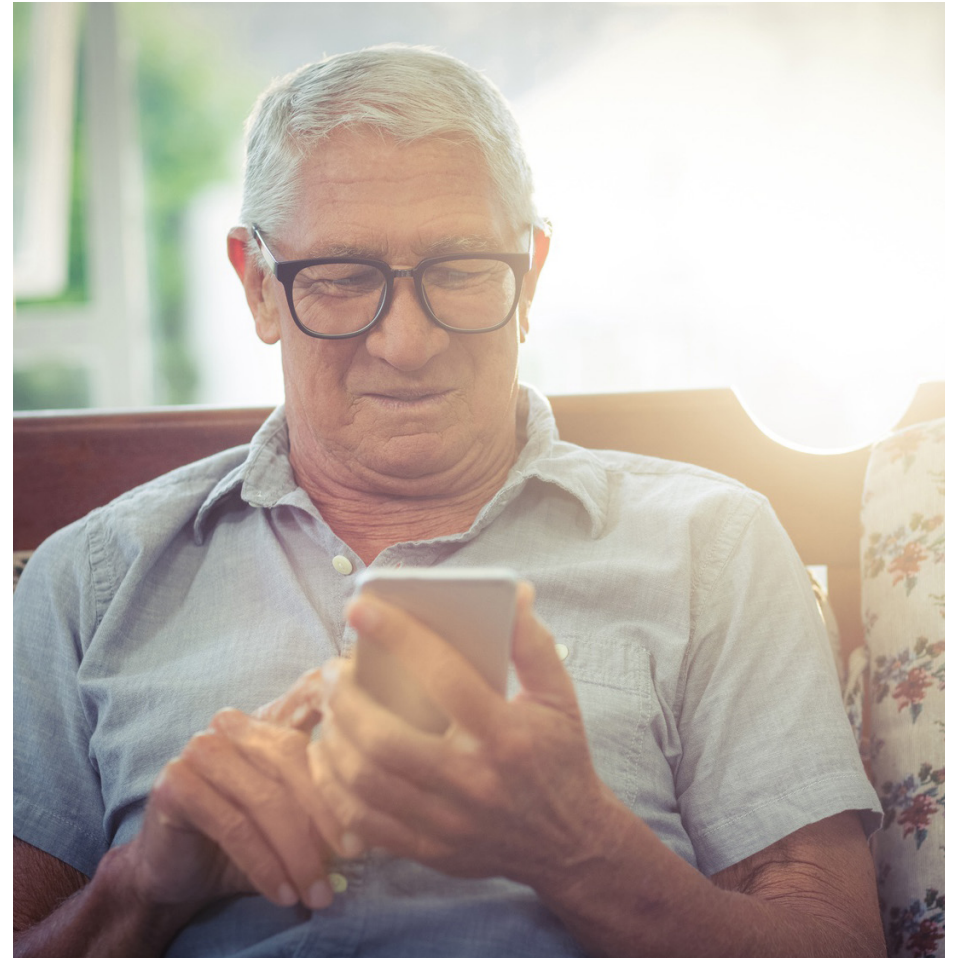
There are however, a *few* strong electromagnetic fields that have the potential to alter the function of your pacemaker. This is called EMI (electromagnetic interference). A very strong magnetic field can blind the pacemaker to your heart rhythm and keep the pacemaker from treating you.

**It is important to know which EMI sources do and do not affect your pacemaker. Please refer to the following guidelines.**

### **Home or work items that are SAFE UNDER NORMAL CONDITIONS:**

- large appliances such as washers, dryers, ovens (electric, convection or gas)
- small appliances such as blenders, food processors, microwave ovens
- vacuum cleaners, air purifiers
- electric blankets, heating pads, portable space heaters
- electric toothbrushes, electric shavers, curling irons, hairdryers
- TV, radios (AM and FM), TV or radio towers (safe outside of restricted areas)

- multimedia players such as iPods, DVD and CD players, video and computer games
- portable or cellular phones (use on the opposite side of the pacemaker, do NOT carry in a pocket over the pacemaker)
- remote controls (TV, garage door, stereo, camera, video equipment)
- pagers, personal digital assistants (PDA)
- personal computers, fax machines, copy machines, scanners
- patient alert devices
- electric invisible fences
- laser tag games
- tanning beds, hot tubs, whirlpool baths
- electric grocery carts, golf carts and wheelchairs
- GPS devices



## Items that are **ACCEPTABLE BUT KEEP 6 to 12" AWAY** from your pacemaker:

- gardening machinery such as a lawn mowers, leaf blowers, snow blowers, hedge trimmers
- corded and cordless drills, power tools, table saws etc.
- slot machines
- remote controls with antennas
- bingo game magnetic wands
- items with magnets around the home such as massagers, bracelets, back supports etc. (keep the items 6" away)
- large speakers
- generators – 20 kw or less (keep 12" away)
- remote car starters and keyless entry, On Star technology from antenna (keep 6" away)

## Items that should **BE KEPT AT LEAST 24" AWAY** from your pacemaker:

- welding equipment (with currents under 160 amps)
- CB and police radio antennas
- running motors and alternators (avoid leaning over motors and alternators of a running vehicle)
- induction stoves for cooking (keep your pacemaker two feet from the range & check with the manufacturer for further details)

## Items that should be **AVOIDED AS THEY ARE PROBABLY SOURCES OF EMI:**

- electric arc welding equipment with currents over 160 amps
- dielectric heaters, used in industry to bend plastic
- electric steel furnaces used in factories, induction furnaces such as kilns
- large generators and power plants

- large TV or radio transmitting towers and power lines carrying over 100,000 volts; maintain a distance of 20 to 25 feet between you and the power lines and towers
- body fat measuring scales
- magnetic mattresses or chairs (not recommended since it would be difficult to keep a 6" separation from your pacemaker)
- jackhammers
- stun guns
- ab stimulators
- avoid using a chain saw because your hands and body come into close contact with the electric spark generating components (the chain saw may cause bodily harm if you lose control of the saw)

**If you move away from the source of strong EMI, your pacemaker will return to normal operation.**

## Security Systems & Theft Detection

At the airport, walk through the security archways normally. They will not affect your pacemaker however, the metal in your pacemaker housing may set off the alarm. Tell security personnel you have a pacemaker and show your pacemaker card. The security wand should not be held over your device more than 30 seconds. Ask for a hand search if possible.

When exposed to theft detection systems (often in store and library entrances), walk through at a normal pace. Do not lean against or linger near these systems.





## Medical Procedures

Always be sure to tell any medical personnel about your pacemaker. **Most medical procedures are UNLIKELY to interfere** with your pacemaker. These include:

- diagnostic x-rays
- mammograms (make sure the doctor and the technician know you have a pacemaker)
- CT scans
- dental procedures including drills and ultrasonic probes to clean teeth
- therapeutic ultrasounds as long as they are kept 6" from the device
- acupuncture (no electrical stimulus)
- hearing aids
- sleep apnea machines
- echos, electro-cardiograms (ECG's)

## The following medical procedures are sources of EMI:

Your prescribing physician and cardiologist will evaluate the risks and benefits of such procedures. In some cases the pacemaker can be reprogrammed before the procedure to lessen the chance of interfering with, or damaging the pacemakers function. Some precautions may be necessary with the following medical procedures:

- radiation therapy, depending upon the overall radiation exposure (Often the radiation beam can be directed around the pacemaker. If not, the pacemaker may need to be moved to a different location).
- electro-surgery, electrolysis
- electro-cautery used during surgery to control bleeding
- diathermy – a process that heats body tissues (it may be used during a chiropractic session)

- external defibrillation and cardioversion – a procedure where an electrical shock is applied to the heart to restore a natural rhythm when the rhythm is dangerously fast

The following medical procedures pose a higher risk to the functioning of the pacemaker and should be avoided if possible:

- lithotripsy – a procedure using shock waves to break up large kidney stones or gall stones
- muscle stimulators that sends current into your body
- Transcutaneous Electrical Nerve Stimulation (TENS) unit, a hand held device that uses strong electrical currents and is prescribed for control of chronic pain (TENS units can interfere with your pacemakers function, and are therefore *not recommended* for use on the torso)

Remember, at the time of this booklet’s publication, *most pacemakers are not considered safe in an MRI environment unless you have received a new MRI conditional pacemaker and MRI conditional lead(s)*. The MRI conditional pacemakers have a unique design so that under specific conditions, patients may undergo MRI scans.

# The Pacemaker Clinic

The Halton Healthcare Pacemaker Clinic serves Burlington, Georgetown, Milton, Oakville and surrounding areas. We will guide you through the process of receiving a pacemaker and continue to provide you with pacemaker care following your procedure.

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## Location

Cardio-Respiratory Department, 1st floor  
Oakville Trafalgar Memorial Hospital  
3001 Hospital Gate  
Oakville, ON L6M 0L8

## Hours

8AM to 4PM  
Monday to Friday

## Contact

T 905 338 4363  
F 905 815 5126



# Patient Education & Customer Support

Contact your pacemaker manufacturer for more information. Typically, there is a toll-free number listed on your card. You can also visit the manufacturer's website to learn more about heart conditions and treatment options and to access other resources.

**Boston Scientific** 1-800-CARDIAC (227-3422)  
[www.bostonscientific.com](http://www.bostonscientific.com)

**Biotronik** 1-800-284-6689 [www.biotronik.com](http://www.biotronik.com)

**Medtronic** 1-800-551-5544 [www.medtronic.com](http://www.medtronic.com)

**Abbott (formerly St Jude Medical)**  
1-800-777-2237 [www.sjm.com](http://www.sjm.com)

**LivaNova** (formerly Sorin Group) 416-751-8787  
[www.livanova.com](http://www.livanova.com)

**Heart and Stroke Foundation of Canada**  
[www.heartandstroke.ca](http://www.heartandstroke.ca)

**Heart Rhythm Society** [www.hrsonline.org](http://www.hrsonline.org)

**Canadian Heart Rhythm Society** [www.chrsonline.ca](http://www.chrsonline.ca)



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