

THE PATIENT'S GUIDE TO THE IMPLANTABLE CARDIOVERTER DEFIBRILLATOR



The ICD Support Group of Manitoba

For Information contact:
The Pacemaker / Defibrillator Clinic at 204.237.2431

Cardiac Sciences Defibrillator Program

Your physicians have advised that you receive an implantable cardioverter defibrillator (ICD). This package was prepared to help you better understand your heart condition and the treatment used to control your rhythm problem. Also contained in this package are instructions and precautions that you should follow in addition to any specific instructions from your physician and the Defibrillator Clinic. Keep this book handy. It will help answer your questions and advise you what to do if you have a problem.

Important notes for people who don't read the book!

1. Bring all of your medications in the original bottles with you each time you come to see us.
2. Any signs of infection (redness, heat, pain, etc.) please call the Defibrillator Clinic to discuss.

Defibrillator Program

The implantable cardioverter defibrillator (ICD) is a device that monitors and treats abnormal heart rhythms. When a rapid heart rhythm is detected, the device sends out electrical impulses to stop the rapid beat and help the heart return to its normal rhythm.

The Defibrillator Program was established in 1989 by Dr. J.S. Geddes at the Health Sciences Centre.

The Defibrillator Clinic provides patients with follow-up care after their device is implanted. At the clinic, a patient's defibrillator is checked for proper function and information stored in the device is retrieved and reviewed ("Interrogation"). Medication and any symptoms are also reviewed. The Clinic also provides an opportunity for patients to discuss any questions or concerns they may have.

Whichever treatment you receive was chosen to treat your heart condition. Remember, the ultimate goal in the delivery of any medical therapy is to provide a treatment that would allow you to lead a longer and more fulfilling life than you would if your condition was left untreated.

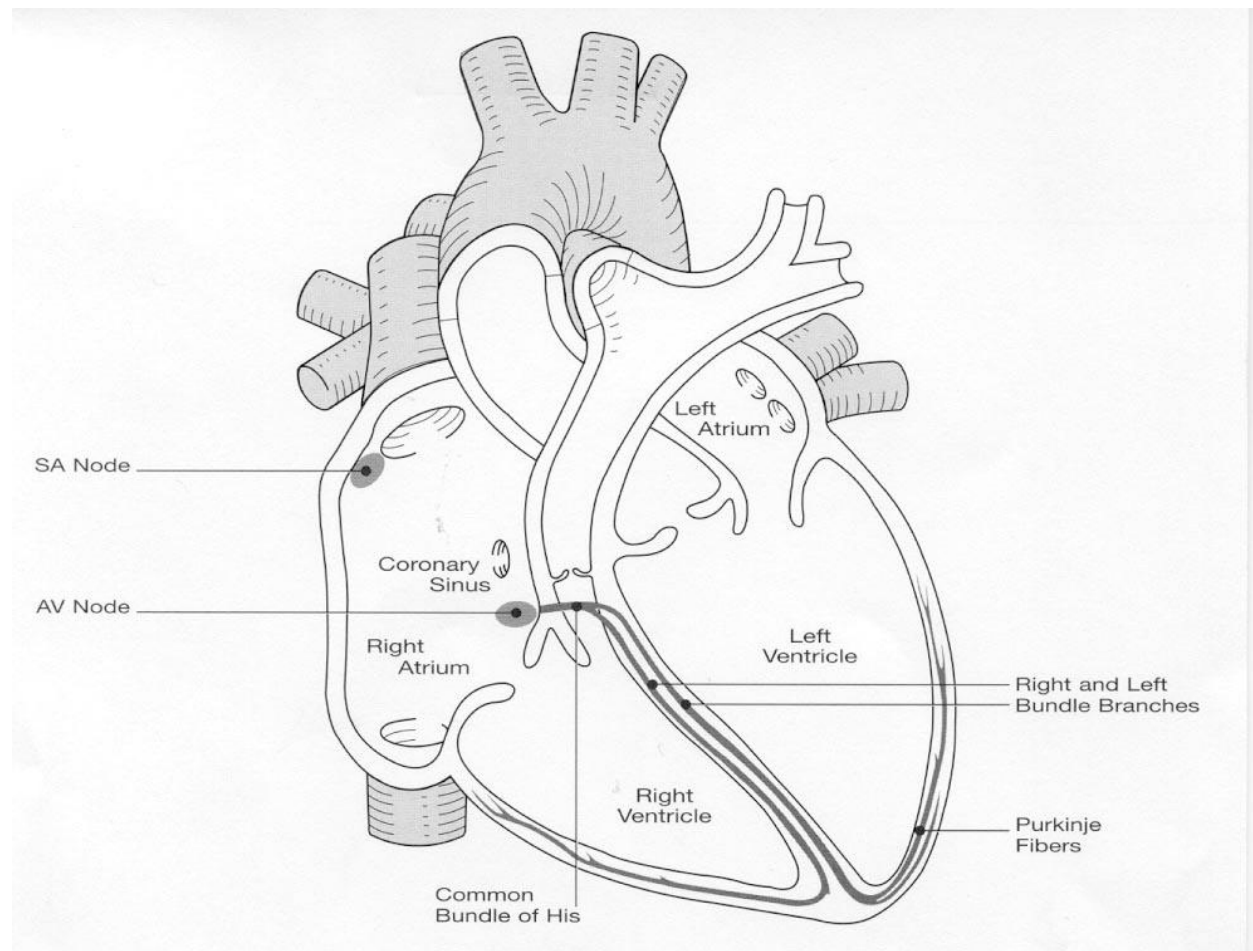
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I. YOUR HEART

The heart is the muscle that pumps blood throughout your body. Blood supplies the brain, the heart, the lungs and every other part of your body with oxygen and nutrients. Your heart has four chambers: two atria (left and right atrium) and two *ventricles* (left and right ventricle). The 2 *atria* are located in the upper half of the heart and the two ventricles are in the lower half.



Your heart is about the size of your fist.

The left and right atria are the "collecting chambers" and simultaneously fill with blood. The blood is then emptied into the left and right ventricles, the

"pumping chambers". The right ventricle sends blood to the lungs to pick up oxygen. The left ventricle sends blood throughout the remainder of the body. It is the contraction of the ventricles that forces the blood out of the heart to the rest of the body.

II. NORMAL HEART RHYTHMS

Located in the right atrium is a small collection of cells called the *sinoatrial node* (SA node). This SA node is the normal pacemaker of the heart. A normal heartbeat originates in the upper right chamber of the heart and travels down to the lower chambers (the ventricles). The SA node produces an electrical signal that reaches another node called the *atrioventricular node* (AV node). After pausing at the AV node, the electrical signal travels down to the ventricles via conduction pathways called the His Bundle and the Purkinje fibers. This electrical signal causes the ventricles to tighten and contract. These regular contractions of the heart are felt as your pulse. If something goes wrong with your heart's electrical system the normal heartbeat can become irregular, too slow or too fast. An abnormal or irregular heartbeat is called *arrhythmia*.

III. ABNORMAL HEART RHYTHMS

An *arrhythmia* (abnormal heart rhythm) is the condition where the heart either beats too quickly, too slowly or irregularly. Arrhythmias can be normal but some prevent your heart from efficiently pumping blood throughout your body. Types of arrhythmias that will be described here are *ventricular tachycardia* (VT), *ventricular fibrillation* (VF) and *bradycardia*.

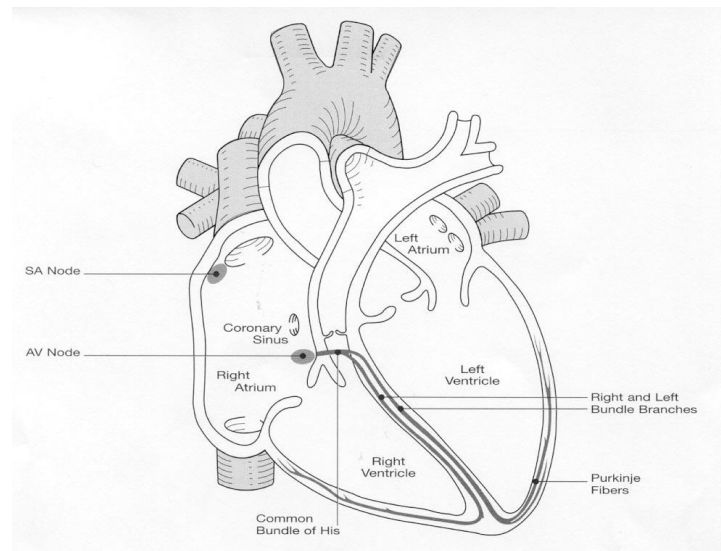
Arrhythmias may occur because of a scar on the heart (from a heart attack), because of weakened heart muscle, heart valve defects or by congenital (present at birth) abnormalities.

(a) Ventricular Tachycardia (VT)

In a normal heartbeat, the electrical signal originates from a single location in the right atrium and travels downward to the ventricles. In VT, the electrical impulse originates in the ventricle (the bottom of the heart) instead of the atrium (the top of the heart). VT usually causes your heart to beat faster than normal and, since the impulse originates in the bottom of the heart, the heart may not pump blood efficiently through the body. As the VT continues, your brain, heart and body may not receive enough blood (oxygen) to function properly. As a result, you could experience pounding in the chest (called palpitations), dizziness, weakness, fainting spells, temporary blind spots, blackouts and eventually

unconsciousness. An ICD detects these fast abnormal heart rhythms and sends electrical impulses that help re-organize the heart rhythm back to normal.

(b) Ventricular Fibrillation (VF)



In VF, the heart is not actually beating, but rather it is quivering and, very little or no blood is effectively pumped out to the organs. This is why you may fall unconscious very quickly. Your

ICD can detect the VF and send an electrical shock to re-organize the rhythm allowing the heart to resume normal beating.

(c) Bradycardia

Bradycardia is where the heart beats slowly. Bradycardia is not necessarily a problem and trained athletes usually have Bradycardia. It may occur as a problem with the heart's conduction system or because of medication. However, if your heartbeat is too slow, the pacemaker in your defibrillator will also treat this problem and stimulate ("pace") your heart to beat at a slightly faster rate. Again, all of the changes made are done based on your symptoms.

IV. TESTS THAT MAY BE DONE TO DETERMINE YOUR HEART CONDITION

A variety of tests may be performed on your heart to help determine how it is functioning and which treatment would best suit you. The following is only a brief description of a few common tests that may be done. Other tests not listed in this package may also be performed and can be discussed with your physician or the Defibrillator Service.

► ECG/EKG (electrocardiogram)

An ECG is a diagnostic test that measures and records your heart rhythm. This test is designed to show how electrical signals travel throughout your heart. Your particular heart rhythm can be determined from the information gathered from an ECG. You will usually have an ECG each time you visit the defibrillator clinic as a part of your routine follow-up.

► ECHOCARDIOGRAM (ECHO)

An ECHO uses high-frequency sound waves (ultrasound) to produce a picture of your heart. An ECHO allows your physician to see structures of your heart such as the walls of the heart, the heart valves and the large blood vessels.

▶ **EPS** (electrophysiology study)

An EPS is an ECG test done inside the heart. ECG readings are made from the interior of the heart using catheters and the effects of medication on the heart rhythms are observed. Sometimes, rapid rhythms are induced to check whether your abnormal rhythm can be brought on, the rate of the rhythm if it is brought on, and the effectiveness of your medications and your defibrillator.

▶ **GXT** (graded exercise test)

This diagnostic test continuously monitors your heart rate, heart rhythm and blood pressure while walking on a treadmill. If this test is done, the information gathered may be used to help program your defibrillator.

▶ **MUGA** (multi-gated angiography) or **RNA** (radio nuclide angiogram)

This diagnostic test involves the intravenous injection of a substance that would allow an image of your heart to be produced. This test is often used to determine the strength of your heart's pumping ability.

V. WHAT IS THE IMPLANTABLE CARDIOVERTER DEFIBRILLATOR (ICD)?

The implantable cardioverter defibrillator (ICD) is a device that monitors your heart rhythms. If the ICD detects any abnormalities in your heartbeat, it will decide if the detected rhythm should be treated. The type of treatment delivered by the device will depend on the settings programmed into your ICD. The ICD also has a pacemaker in it to ensure your heart does not beat too slowly.

Remember, the ICD TREATS the rhythm problem when it occurs, it doesn't prevent it.

The ICD system consists of a pulse generator connected to wires (leads) that sense and pace your heart rhythm. The pulse generator and the leads are surgically implanted. There is also a programmer that is used to communicate with your ICD.

(a) The Pulse Generator

The pulse generator is about the size of a pager, is powered by a battery, and monitors the electrical signals in your heart. When an arrhythmia is detected in your heart, the pulse generator will determine whether the abnormal rhythm is to be treated. If so, the generator will pace the heart and/or deliver electrical shock(s) to your heart via the leads (the implanted wires). Depending on the

programming of your ICD, different types of treatments are delivered and different amounts of information can be stored.

(b) The Lead System

The leads are wires threaded into veins under your collarbone and implanted into your heart that actually detect your heart rhythm. The tip of the lead(s) has a sensor that "sees" your heart rhythm all the time and this information is then sent to the computer in the generator. As well, any electrical energy that the pulse generator sends to the heart travels along the leads. Depending on the make and model of your ICD system you might have separate leads that monitor and deliver shocks, or you may have leads that perform both functions.

(c) The Programmer

The programmer is a lap-top computer like device that communicates with your ICD in the same fashion that a remote control communicates with a television set. Using the programmer, the functions and settings of your ICD are programmed and tested after implant. Also when you visit the ICD clinic, the programmer is used to retrieve information about your heart rhythms stored in the pulse generator. This is called "Interrogation".

Every time you have what your ICD considers to be a fast abnormal rhythm, the ICD stores the:

1. Date and time it occurred,
2. An ECG taken before, during and after the rhythm, and
3. Measurements taken during the episode

This information helps the Clinic staff to determine if all of your settings (and medications) are correct.

(d) ICD Therapies

Antitachycardia Pacing (ATP). When a rapid regular rhythm such as a VT is recognized, the device can deliver a series of rapid pacing pulses at a rate slightly faster than your VT rhythm. This alone is often enough to correct the rhythm. You may not even be aware this has happened or you may feel a slight fluttering feeling.

Shock. If the ATP does not correct the rhythm (VT) or if the rhythm is VF, the ICD will deliver a high energy shock to restore the rhythm to normal.

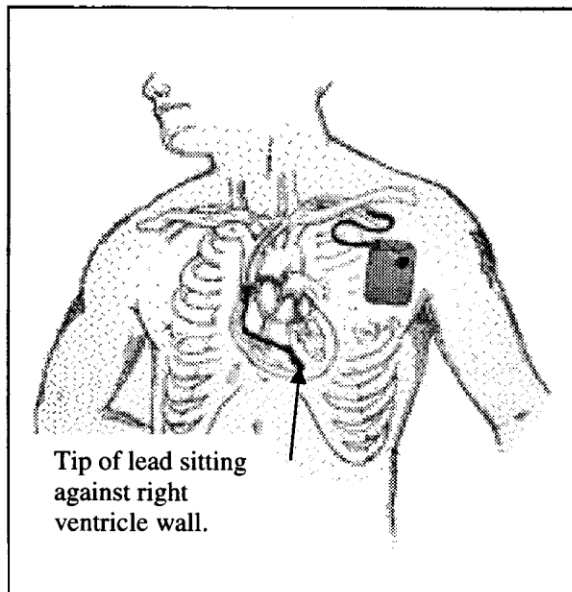
(e) What a Shock Feels Like

When your ICD sends a shock you will feel a distinct "kick" in the chest. This is usually unpleasant but not dangerous and usually not extremely painful. There may

be times that you do not feel a treated arrhythmia, but your ICD will treat any irregular rhythms it detects.

PLEASE REVIEW "WHAT TO DO IF YOU RECEIVE A SHOCK" ON PAGE 21

VI. IMPLANTING THE ICD



Usually the pulse generator is implanted in the upper chest area on the left side, but it may also be implanted in the abdomen. How and where the pulse generator is implanted will depend on your size, anatomy, and medical history. An ICD implantation is generally considered

relatively minor surgery and the operation itself usually takes about 2 hours.

- In general, a small incision is made in the skin near your collarbone and 1 or 2 lead(s) are inserted into a vein. The tip of one of the leads is advanced through the vein until it is sitting inside the heart (against the inner wall of the right ventricle). An X-ray camera is used to help find the correct location. Some patients may require pacing in both the upper and lower chambers of the heart in addition to ICD treatment. With dual-chambered

pacing (DDD) both the atrium and ventricle can be monitored and paced.

Regardless of the number of leads, they are all implanted in a location where they will optimally "see" your heart rhythm. Once a good location has been found for your lead (s), your defibrillator will be tested to ensure it:

- 1) Sees any abnormal rhythm,
- 2) Recognizes it as abnormal and
- 3) Treats it appropriately and quickly.

Following this you will go to the recovery area for 1-2 hours and then back to your room or referring hospital.

- **ICD Replacement**

Your ICD runs on a battery that lasts between 4-8 years. When it becomes necessary for your ICD to be replaced, we will discuss this with you in greater detail. In general an ICD replacement procedure is much easier and quicker than the original implantation of your device. During a replacement, your existing lead (s) will be tested and then attached to a new generator.

VII. POST-OPERATIVE INSTRUCTIONS

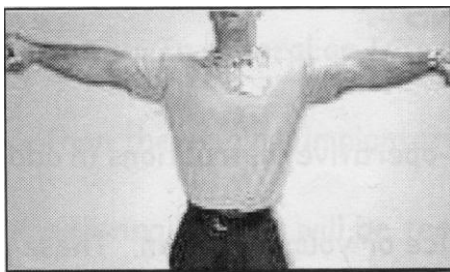
It is important that you follow these post-operative instructions in addition to other instructions from the Defibrillator Office or your physician. These instructions and precautions are necessary for a full recovery from your surgery.

(a) Wound Care

- Your incision will have invisible sutures. Invisible sutures will dissolve on their own and will not need removal.
- If you notice *any* signs of redness, swelling, localized pain, oozing from the incision or opening of the incision, **YOU MUST REPORT IT TO US IMMEDIATELY**. If you are unsure, call us anyway.
- You may not shower for 5 days until the outer bandage comes off.

(b) Exercise

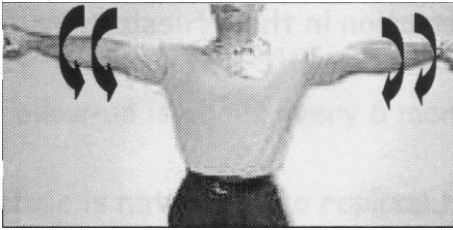
- Do not raise the arm on the side with the incision above the level of



DO NOT raise the arm on the operative side above the level of your head.

your head until your first clinic visit (usually about 4 weeks after your surgery). You must however, use that arm. If you don't, the shoulder will give you problems that may require up to 6 months of physiotherapy.

- Hold your arms outstretched at your sides and make small circles in



With arms outstretched at your sides make small circles in the air.

the air. Do this exercise **10-15 times, 4 times per day**. Push the palms of your hands together in front of your chest. Do this exercise **10-15 times, 4 times per day**.

(c) Pain Management

You should be able to manage the pain with either plain Tylenol or Extra Strength Tylenol for a few days. If you find that your pain is still unmanageable, please call us.

(d) Resuming Activities and Returning to Work

You and your physician will decide when you may resume your regular activities and return to work. If you have been hospitalized for a period of time, try to increase your activity slowly.

(e) MedicAlert

A MedicAlert bracelet/necklace identification should be worn at all times. Should you fall unconscious, the MedicAlert identification will let people know that you have an ICD and also give information about any other health problems you have. You should receive a MedicAlert application before leaving the hospital at the time of your implant. If you

already have a MedicAlert, you must contact them so the information in their files can be updated.

(f) ICD Identification Card, Interrogation Report and Medication List

You should carry your ICD Identification card at all times. Also, you should always carry a complete list of the medication you are currently taking, including the dosage, and your most recent interrogation report as provided by the clinic.

(g) Diary

Please keep a diary with the following information:

- Your current medications including the dosage (the amount), doctor appointments or tests performed.
- Any treatment given by the ICD device. Include the time and what you were doing when you received the shock.

**** Be sure to bring all this information with you to every**

Defibrillator Clinic visit**

VIII. DEFIBRILLATOR CLINIC HOURS

The clinic is open Monday - Friday from 8 - 4. Some days are busier than others and we ask that you be patient. Remember, one day you may be the reason why the clinic is running slowly. After you have received your ICD, you will be given your first appointment with the Defibrillator office for a clinic visit. Your first clinic appointment is usually about 4 weeks after your ICD device is implanted.

Follow-up is about every 6 months, unless there is a problem. Please note that the clinic is not meant to replace the care you receive from your family doctor and your cardiologist in your community. A letter will be sent to your doctors after each clinic visit.

WHAT TO BRING TO EACH & EVERY CLINIC:

- PROVINCIAL HEALTH CARD
- A CURRENT & COMPLETE LIST OF YOUR MEDICATION
INCLUDING THE DOSAGES OR ALL OF YOUR PILLS IN THE
BOTTLES
- YOUR DIARY

At the clinics, the information stored in your ICD will be read through the programmer. (See page 13). Your device and leads will also be checked to ensure

that they are functioning properly and the battery voltage is good. Your wound will be examined and any symptoms you are having will be discussed. Feel free to ask us any questions at that time.

IX. WHAT TO DO IF YOU RECEIVE A SHOCK

When your ICD device delivers a shock, you will feel a *distinct kick* in the chest. Anyone touching you when you get a shock may feel a slight tingling sensation, but *will not get a shock and will not be harmed in any way.*

WHEN YOU RECEIVE A SHOCK:

- (1) Stop what you are doing and ask yourself how you feel.
- (2) **IF YOU FEEL WELL** before and after the shock, call the Defibrillator Clinic to discuss your follow-up. We need to determine whether we feel your device is functioning appropriately. We also need to determine how urgently you need to see us in the clinic.

OR

- IF YOU FEEL UNWELL** and are concerned, go to your local emergency department. Inform the hospital that you have a defibrillator. Bring your list of medications and dosages with you.
- (3) Remember to write down the date, time, symptoms and activities surrounding the shock.

If you receive 2 or more shocks together please go to your local emergency department. If your condition changes in any way and you are worried, please do not hesitate to call to discuss your concerns.

If you feel symptoms of your rapid heart rhythm that do not go away you should contact our office or your physician.

X. LIVING WITH YOUR ICD

Your ICD will automatically monitor your heart rhythms and if it detects an arrhythmia the device will treat it as programmed. Along with the instructions listed in this package, you should follow any further instructions and precautions from your physician.

(a) Other surgery

Before you undergo any surgical procedure you **must** contact the Defibrillator Clinic since reprogramming **may** be necessary. Certain equipment may interfere with the functioning of your ICD device. If you are unsure about any other treatment you may undergo, don't hesitate to call us to discuss your concerns.

(b) Travel

Your ICD will not prevent you from travelling to most countries in the world. If you need emergency care just go to the nearest hospital and show them your wallet ID card and they will be able to contact someone to come and read your defibrillator.

Remember to show your ICD identification card to airport security to avoid being searched with a hand held wand. Plan to add an extra 5-10 minutes to your pre-boarding time to get through security.

(c) Dental Work

If you did not receive antibiotic therapy for dental work prior to having your ICD implanted, you will not need it now.

(d) Things to Avoid

Your ICD device is sensitive to strong electrical and magnetic fields/currents. Strong electrical and magnetic currents will interfere with the proper functioning of your ICD.

Certain tests/areas may cause interference with your ICD.

- **MRI** (magnetic resonance imaging)

This diagnostic test employs strong electromagnetic fields. The strong fields may temporarily turn off your device. **DO NOT GO INTO ROOMS CONTAINING MRI MACHINES.**

Before undergoing any of the following please contact the Defib Clinic:

- **Diathermy**

This test employs electrical currents to bodily tissue. The electrical fields could possibly interfere with device functioning.

- **Electrocautery**

This is a medical instrument used during surgery to stop bleeding. Electrocautery should only be used if your ICD device is turned off.

- **Lithotripsy**

Lithotripsy is the procedure by which stones (e.g. kidney stones) are removed. Your device may require reprogramming.

- **Strong Magnetic Fields**

Can be found, for example, in running electrical engines. Do not lean over these.

- **Anti-theft Devices**

Can be found in the doorways of department stores and libraries. You may walk through them safely, but do not linger in the doorways of these stores.

The following should be kept at least a foot (30 cm) away from your ICD device:

- Large stereo speakers
- Strong magnets

(e) Cellular Phones

Cell phones rarely interfere with your ICD. You are in no danger if others near you use cell phones or if you use a cell phone and hold it to your ear. Cell phone antennae should be kept at least $\frac{1}{2}$ foot (15cm) away from your ICD device. Don't put the cell phone in the breast pocket of your shirt or jacket on the side where your ICD is implanted. If your ICD is in your abdomen, don't clip the phone to your belt near the device.

When using a cell phone, place the phone on the ear that is opposite to the side where your device was implanted. In other words, if your ICD device is on the left side of your chest or abdomen, use the phone on the right side of your head. If your device is on the right side, use the phone on the left side of your head.

(f) Electrical Appliances

General household appliances are safe to use, provided they are properly grounded and are in good condition. Examples of appliances and other household objects that will not interfere with your device include: microwaves, cordless

phones, TV/VCRs, AM/FM radios, computers, toasters, hairdryers, electric razors, lawn mowers and leaf-blowers.

(g) General

- Initially you may not be allowed to drive a car. Restriction of this activity will depend on your particular condition. Remember, the ICD doesn't prevent your rhythm problem. Rhythm problems can still occur and if they do, they will be treated by the device.
- It is a good idea to swim with a buddy
- Avoid lifting heavy objects for the first 4 weeks.

(h) Sexual Relations

The ICD should not deliver therapy for the natural increase in heart rate that happens during sex. However, if this happens, your partner may feel a tingling. The shock won't hurt your partner.

(i) Death and the Defibrillator

As much as possible upon death, we try to interrogate the device. Family are asked to call us so we can arrange this. If you have chosen to be buried, the ICD can be buried with you. If you have chosen to be cremated, the ICD must be removed. Families must inform funeral home personnel of the defibrillator for their protection.

The ICD is designed so that you can carry on as much of a normal lifestyle as possible. The goal of ICD therapy is to allow you to lead a life that is as good as or better than you could before the ICD treatment.

Physicians at other hospitals may not be familiar with the implanted defibrillator. If they have any questions or concerns, please encourage them to call us at any time.

XI. HEART HEALTHY NUTRITION

Some of the risk factors for developing heart disease are affected by your food choices and habits. Now is the time to make the choice for good heart health through healthy eating. We recommend the following, but speak to your physician concerning any changes to your diet.

- **Enjoy a variety of foods.**

Eat a well balanced diet based on *Canada's Food Guide to Healthy Eating*. The key to good nutrition is balance, variety and moderation to ensure that you give your body the best kinds and amounts of nutrients it needs.

- **Emphasize more cereals, breads, other grain products, vegetables and fruit.**

Pasta, rice, potatoes and bread are good choices. Limit high fat foods such as granola, pastries, muffins and croissants. Certain types of fiber such as those found in oats, barley, fruit, legumes, dried beans and lentils help lower blood cholesterol levels.

- **Choose low fat dairy products, lean meats and food prepared with little or no fat.**

Too much fat, especially saturated fat, increases blood cholesterol and triglycerides. Reduce your total fat intake and limit cholesterol-rich foods. A moderate amount of dietary cholesterol is acceptable.

- ▶ Choose low fat dairy products such as skim or 1% milk, yogurt and cottage cheese with less than 2% milk fat (M.F.) and cheeses with less than 10% M.F.
- ▶ Choose lean meat, fish and poultry, trimmed of all visible fat and skin and limit portions to 6 oz per day.
- ▶ Limit added fats, margarine and oils to 15-25 ml (3-5 tsp) per day.

- **Achieve and maintain a healthy body weight by enjoying regular physical activity and healthy eating.**

Regular exercise, as approved by your physician, should be part of your new healthy lifestyle. Make sure your heart as well as your body is fit.

Achieving a healthy weight has other benefits besides helping you look and feel better. Blood lipid levels, blood pressure and diabetes control are improved through weight loss.

- **Limit salt, alcohol and caffeine.**

A high salt diet may be associated with high blood pressure which in turn, increases the risk of heart disease. A small amount of salt may be used in cooking, but extra salt should not be added to the table. Limit processed, convenience and canned foods because of their high sodium content. Herbs, spices and garlic can be used to add flavour to your food.

- ▶ Alcohol provides calories without nutrients. Too much alcohol can lead to weight gain, high blood pressure and high triglycerides. Check with your physician or dietician regarding alcohol use.
- ▶ Caffeine should be used in moderation - no more than 4 servings of coffee, tea or cola per day. Caffeine is also found in foods that contain cocoa and certain over the counter medications.

If you have any further questions or require more specific diet guidelines you can contact the dietician.

XII. COMMUNITY CARDIAC RESOURCES¹

Identification

Canadian MedicAlert Foundation

2005 Sheppard Ave. E.	Phone:	1-800-668-1507
Toronto, Ontario	Fax:	1-800-392-8422
M2J 5B4	Website:	www.medicalert.ca

MedicAlert provides a medical information card and I.D. bracelets for members with such things as ICDs, allergies, blood type, drugs, etc. This service provides a 24 hour file on members for emergency medical use by doctors and the hospital. There is a one-time fee and life-time membership.

Information

Heart and Stroke Foundation of Manitoba

6 Donald Street	Phone in Winnipeg:	(204) 949-2000
Winnipeg, Manitoba	Toll Free:	1-888-HSF-INFO
R3L 0K6	Fax:	(204) 957-1365
	Website:	www.heartandstroke.mb.ca

The Heart and Stroke Foundation provides an eight week cardiac rehabilitation program for patients and families with heart disease. The

program is called "heart to Heart" and is offered in several different communities. The classes include discussion of heart function, physical activity, nutrition and stress management. There will be a nominal fee which will be waived or reduced if you are unable to pay. Please contact the foundation for programs in your community.

The Wellness Institute

Seven Oaks General Hospital	Phone:	(204) 632-3900
1075 Leila Avenue	Fax:	(204) 697-2412
Winnipeg, Mb. R2P 2W7	Website:	www.wellnessinstitute.ca

Cardiac Rehabilitation at the Wellness Institute is a second chance for people recovering from a heart attack or chronic heart disease. It's a comprehensive 16-week program of education and guided exercise to help you.

Reh-Fit Centre

1390 Taylor Avenue	Phone:	(204) 488-8023
Winnipeg, Manitoba	Fax:	(204) 488-4819
R3M 3V8	Web:	www.reh-fit.com

The Reh-Fit Centre offers a comprehensive cardiac rehabilitation program that includes: medical therapy, risk factor modification, exercise therapy and psychosocial support.

XIII. GLOSSARY

Abdominal: the portion of the body between the chest and pelvis area.

Arrhythmia: an irregular or abnormal heart rhythm.

Atria: the two chambers in the upper part of the heart. Blood enters the atria and subsequently empties into the ventricles.

Atrioventricular node (AV): the node in the lower part of right atrium that transmits the electrical signal from the SA node to the conduction pathways.

Bradycardia: an arrhythmia caused by the slow beating of the heart.

Catheter: a tubular instrument used that is inserted into a body passage.

Conduction pathways: conducts the electrical signal from the AV node to the ventricles.

Defibrillator: a device that delivers an electrical shock to the heart to reorganize abnormal heart rhythms.

Dual-chambered pacing (DDD): provides pacing in both the upper and lower chambers of the heart.

Electrocardiogram (ECG/EKG): a diagnostic test that measures and records your heart rhythm. This test tracks your heart's electrical system.

Electrocautery: medical instrument which delivers electrical currents through a probe and is used to stop bleeding during surgery.

Electromagnetic fields: magnetism resulting from an electric current.

Electrophysiologist: a cardiologist with a subspecialty in dealing with the diagnosis and treatment of heart rhythm problems.

Electrophysiology study (EPS): a test to assess the electrical functioning of the heart and to evaluate the potential for rhythm disturbances.

Implantable cardioverter defibrillator (ICD): an internal device that uses electrical impulses to reorganize detected abnormal heart rhythms.

Leads: the wires that connect the pulse generator to your heart.

Magnetic resonance imaging (MRI): diagnostic test which employs electromagnetic fields.

Pacing: electrical signals used to speed up a slow heart rhythm.

Programmer: the device that is used to communicate with the pulse generator.

Pulse generator: component of the ICD that contains the battery and electronic hardware.

Radiotherapy: therapy that uses x-rays and radioactive substances to treat cancer and other types of diseases.

Sinoatrial node (SA): a small collection of cells in the right atrium that generates the electrical signal that causes the ventricles to contract.

Ventricles: the two chambers in the lower part of the heart. Blood from the right ventricle goes to the lungs to pick up oxygen. Blood from the left ventricle flows through the rest of the body.

Ventricular fibrillation (VF): a rapid, disorganized arrhythmia characterized by the "quivering" of the heart.

Ventricular tachycardia (VT): a rapid, regular arrhythmia caused by the production of abnormal electrical signals in the ventricles.

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