

St. Michael's

Inspired Care. Inspiring Science.

**The Patient's Guide to the
Electrophysiologic Study (EPS) and
Catheter Ablation**

Table of Contents

Introduction	
How the Heart Works	3
How the Heart's Electrical System Works	3
Commonly Used Heart Rhythm Terms	4
Electrophysiology Study (EPS) & Ablation	5
Reasons for Performing an EPS	6
Description of the Procedure	6
Catheter Ablation	8
Risks and Benefits	9
Getting Ready for the Procedure	9
The Day Before the Procedure	9
The Day of Your Procedure & What To Expect	9
Frequently Asked Questions and Answers	11
After the Procedure	
The Cardiology Ward	11
Going Home	11
The Test Results	12

Contact Information

Cardiac Arrhythmia Service
 30 Bond Street
 7th floor Donnelly Wing, Robert McRae Heart Health Unit
 Toronto, ON M5B 1W8
 T: (416) 864-5152
 F: (416) 864-5348
www.stmikesEP.com

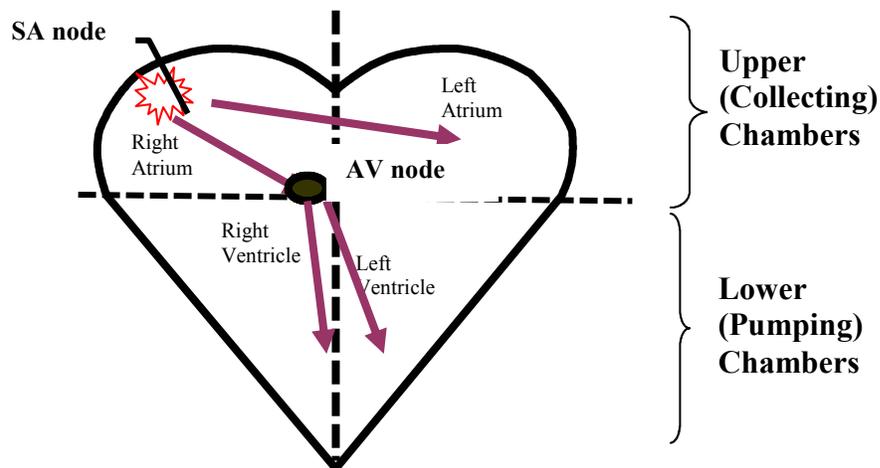
How the Heart Works

- ♥ Your heart lies in the centre of the chest and slightly to the left. The breastbone and the ribcage protect it. The heart is a muscle that pumps blood to all parts of the body
- ♥ The heart has two upper chambers and two lower chambers. The upper chambers, called the atria, are used as collecting chambers. The lower chambers, called the ventricles, pump blood to the lungs, brain and the rest of your body.

How your Heart's Electrical System Works

- ♥ In order for the heart to do its work (pump oxygen rich blood throughout the body), it needs a sort of "spark plug" or electrical impulse to generate a heart-beat.

Normal Electrical Activation of the Heart



- ♥ The electrical impulse begins its journey in the sinus node (SA node), which is located in the upper right chamber of the heart (atria) and it is the natural pacemaker of the heart.
- ♥ The SA node gives off electrical impulses that normally make your heart beat 60-100 times per minute. Depending on your activities, your heart may beat slower (when sleeping or if you are a trained athlete) or faster (when exercising). From the SA node, the impulse travels down specialized tissues of the conduction system causing the heart muscle to contract in an orderly sequence:

- ♥ The SA node impulse first causes the two upper chambers (atria) to squeeze blood into the two ventricles. It then travels to the atrioventricular node (AV node), where the impulse pauses for a brief moment and then travels down to the ventricles by conduction pathways (called the bundle of His). When this impulse reaches the ventricles, this causes them to contract and create what you feel as a pulse.

Commonly used heart rhythm terms

Arrhythmias

- ♥ An arrhythmia is any form of heart rhythm disturbance. It is a term that is used when the heart is too slow or too fast, and can also be used to describe an irregular heartbeat, or extra/missed heart beats.

Bradycardia

- ♥ Bradycardia is the term used to describe a slow heartbeat. It is normal for the heart to beat slower at rest or when sleeping. Occasionally, the heartbeat can be “too slow” or “inappropriately slow”. This type of slow heartbeat can make people feel lightheaded, dizzy, or faint because the heart is not pumping the blood through the heart fast enough.

Tachycardia

- ♥ Tachycardia is the term used to describe a fast heartbeat. It is normal for the heart to beat faster when we are exercising or under some form of emotional stress. An abnormally fast heartbeat can be the result of a short circuit in the heart or an abnormal focus of rapid firing inside the heart. Fast heartbeats can cause some people to feel palpitations, lightheaded, short of breath, dizzy, or faint.

Supraventricular Tachycardia (SVT)

- ♥ Supraventricular tachycardia is the term given to fast heart beats that originate in or are driven by the upper chambers (atria) of the heart. Generally this is a benign, non-dangerous type of fast heartbeat. Supraventricular tachycardia may be caused by an extra electrical connection joining the upper and lower chambers of the heart, or may be caused by one or many rapidly firing focuses found in the upper chambers.

Wolff-Parkinson-White Syndrome (WPW)

- ♥ WPW refers to the presence of an extra electrical connection between the upper and lower heart chambers associated with symptoms of

palpitations. The electrical connection in WPW is "special" because it can be detected on a routine ECG (electrocardiogram) whereas most electrical connections cannot.

Atrioventricular Reciprocating Tachycardia

- ♥ This is a type of SVT (see above) which is caused by an abnormal electrical connection between the upper and lower heart chambers. It can also be seen in people with WPW.

Atrioventricular Nodal Reentrant Tachycardia

- ♥ This is a common type of SVT (see above) which is caused by an abnormal electrical connection close to the normal conduction system (AV node).

Atrial Fibrillation

- ♥ This is a rapid, irregular rhythm of the upper heart chambers (the upper chambers beat at 300-500 beats per minute). When this occurs, the upper chambers of the heart begin to quiver or fibrillate, instead of contracting normally. Not all the electricity makes it to the lower pumping chambers (ventricles) which usually beat rapidly and irregularly at a rate of 70-200 beats per minute.

Atrial Flutter

- ♥ Atrial flutter is an abnormal rapid, regular circuit of electricity in the upper chambers of the heart that usually causes the upper chambers to beat at 200-300 beats per minute. Not all the electricity makes it to the lower pumping chambers (ventricles) which usually beat rapidly (and usually regularly) at 60-150 beats per minute

Ventricular Tachycardia

- ♥ Ventricular tachycardia refers to a fast heart rate that comes from the lower chambers of the heart (ventricles).

Electrophysiology studies (EPS) and Ablation

- ♥ An **electrophysiology study (EPS)** is a term for diagnostic tests and procedures used to evaluate documented or suspected abnormal fast heart rhythms. Long wires called "catheters" are inserted and guided into the heart to assess the electrical system of your heart and record the electrical activity from within the heart chambers.
- ♥ At the end of the diagnostic EPS, a decision is made whether or not to proceed to catheter ablation. Catheters are used to burn or "ablate"

certain heart cells that are causing the heart rhythm problem. Frequently, the diagnostic and ablation procedures are done at the same time.

- ♥ Fast heart rhythms can be treated in a variety of ways including medications, implantable cardioverter defibrillators (ICDs), or catheter ablation techniques.

Reasons for Performing Electrophysiology Study

A person may have this procedure for one of several reasons:

- ♥ ***To investigate symptoms such as:***
 - Palpitations
 - Fainting or blacking out (loss of consciousness)
 - Shortness of breath
 - Lightheadedness or dizziness
- ♥ ***To investigate heart rhythm problems, such as:***
 - Supraventricular tachycardia (SVT)
 - Wolff-Parkinson-White Syndrome (WPW)
 - Atrial Flutter
 - Atrial Fibrillation
 - Atrial Tachycardia
 - Ventricular Tachycardia
 - Inherited Arrhythmia Syndromes (Brugada, Long QT, Hypertrophic Cardiomyopathy)

Description of the Procedure

- ♥ The procedure is performed in an electrophysiology (EP) laboratory, which is part of the cardiac catheterization laboratory located on 7 Cardinal Carter Wing.
- ♥ A typical EPS and catheter ablation takes 2-3 hours but may last from 60 minutes to 6 hours, depending on your diagnosis and the procedure. If your procedure is one that may be longer than most, you may require the insertion of a Foley catheter (to drain urine from your bladder during the procedure)
- ♥ When you arrive in the catheterization laboratory, you will be taken to the EP laboratory and be asked to move onto the x-ray table.

- ♥ In the EP laboratory, you will be attached to several monitoring devices. Electrodes will be put on your chest, back, arms and legs (like an ECG). If you have a hairy chest, small areas may be shaved.
- ♥ Your heart rate and blood pressure will be continually monitored. An intravenous (IV) line will be started in your arm usually before coming to the EP laboratory. This IV is useful for giving you fluids, and for given you medication during the procedure to keep you comfortable. Overall, we do not want you to experience any significant discomfort. If this occurs, please tell us.
- ♥ The room is darkened so the doctor can watch and guide the catheters on the monitors. You will need to lie as still and relaxed as possible because movement or tensing of your muscles can interfere with the procedure.
- ♥ Because the staff are exposed to x-rays on a daily basis, they will be wearing protective lead aprons.
- ♥ The groin and neck areas are first cleansed with an antiseptic solution that is cold and may sting for a few moments. You will be covered with sterile sheets, exposing only the areas where the catheters will be inserted.
- ♥ The skin is first frozen with a local anesthetic (similar to what a dentist uses to numb your gums). You may feel some stinging for a brief moment, but once the local anesthetic takes effect, you should not feel any significant discomfort. Please let the staff know if you do experience any discomfort.
- ♥ Once the skin is numb, the doctor will insert small intravenous tubes into the veins and/or artery in the groin and/or neck. Through these tubes, the doctors will insert catheters which will travel through your veins into your heart.
- ♥ These catheters are thin, solid, flexible wires that are placed in various locations in the heart and visualized under an x-ray camera for placement in the heart. These catheters are used to electrically stimulate your heart and both diagnose and treat your heart rhythm problem.
- ♥ You will probably feel some extra beats as the heart is stimulated during the study. As well, it is likely that your rapid rhythm problem will be produced. You may feel the same symptoms you have experienced

in the past. If you feel any pain, nausea, dizziness or palpitations tell the staff. Although you may not look forward to this sensation, you can help the medical team by describing what you feel.

- ♥ Remember too, that you are in an extremely controlled environment. There will be trained doctors, nurses and technicians, present with you at all times. Often, rapid heart rhythms can be turned on and off like a switch. Whatever heart rhythms are turned on, can be turned off, usually using the very same pacing techniques that paced you into your rhythms in the first place.

Catheter Ablation

Catheter ablation is the process of destroying electrical tissue inside the heart that is responsible for abnormal heart rhythms. One of the catheters inside your heart is capable of ablation using either radiofrequency energy (burns the abnormal tissue – like cautery) or cryothermal energy (freezes the abnormal tissue).

- ♥ Catheter ablation maybe beneficial for people with multiple different heart rhythm problems. Your doctor will discuss whether or not you are a candidate for ablation.
- ♥ During the actual ablation, the energy application is usually from 10 to 60 seconds long. Occasionally, more than one energy application is required to fix the problem. Generally, there are no significant painful feelings during the actual energy application, although sometimes there is a bothersome burning feeling. If you do have any discomfort, please let us know.
- ♥ Once the ablation has been performed, we will re-test to see if we can still turn on your heart rhythm problem, the same way as before ablation. During this time, we leave all the wires in place for an extra 30 minutes or so after the ablation procedure to make sure that the area was completely destroyed, and not simply “wounded”. If the rhythm does not recur, this is a good sign that the ablation has been successful.
- ♥ After the test is completed, the catheters will be removed, and someone will press on the puncture sites for about 10 minutes. Once there is no bleeding, you will go to the recovery room for about one hour. The puncture sites are monitored before you are moved to your

room on the Cardiology ward for one night. Occasionally, patients may be discharged the same evening after the procedure.

- ♥ Following the procedure you may continue to experience occasional extra beats, which may be normal. After your ablation procedure, these extra beats will most likely not be able to initiate the rapid rhythm that has been affecting you.

Risks and Benefits

- ♥ Although catheter ablation is generally very safe, it is important to understand that there are some risks associated with this procedure. Your doctor will discuss these details with you. In general, these include:
 1. You may bleed from the puncture site.
 2. You may develop a very fast heart rhythm and need an electrical shock to get the rhythm back to normal.
 3. The ablation may not work and you might need to have it done again.
 4. You may develop a blood clot.
 5. It is very rare to get an infection or have a collapsed lung.
 6. The risk of any major complications including stroke, permanent pacemaker, requiring emergency surgery, or death is altogether less than 1%.

Getting Ready for the Procedure

- ♥ Please have your blood work done within 30 days of your procedure. We will give you blood requisitions that you can use at any outpatient laboratory of your choice. The results must be faxed to the Procedure Coordinator at (416) 864-5744.
- ♥ If you are of childbearing age, a pregnancy test will also be performed to ensure that you are not pregnant.
- ♥ If you are diabetic, or have any other health problem, please be sure to let the doctors know.

The Day Before Your Procedure

- ♥ Please do not eat or drink after midnight. If you are a diabetic, please follow your doctor's instructions.

- ♥ Please remove all jewelry, makeup and nail polish.
- ♥ If you have not already done so, please arrange transportation home for the day after the procedure. YOU SHOULD NOT DRIVE.
- ♥ ***You will receive special instructions if you are allergic to x-ray dye or have diabetes.***
- ♥ You may be asked to hold certain medications 2 to 5 days prior to your procedure. The procedure coordinator and/or doctor will give you detailed instructions.

The Day of Your Procedure

- ♥ In most cases you will be asked to come to the ***Cardiac Investigation Unit*** (7th floor, Cardinal Carter Wing).
- ♥ Please arrive at the Cardiac Investigation Unit at your instructed time. Scheduled times may be changed to accommodate emergencies. You may want to bring a book or magazine to read while you are waiting.
- ♥ **In the Cardiac Investigation Unit**, you will be prepared for the EP study.
- ♥ You will be given a gown to wear. Please do not wear any other clothing including underwear to the catheterization laboratory.
- ♥ You should wear your dentures.
- ♥ Please empty your bladder as completely as possible before going to the EP laboratory.
- ♥ Your blood pressure, heart rate and temperature will be taken.
- ♥ You may be given a sedative before coming to the EP laboratory, depending on whether or not you have already signed a consent form for the procedure and what type of procedure you are having.
- ♥ The EP laboratory is a scent free environment. Please refrain from using colognes, perfumes or strong soaps.

Frequently asked Questions

Is the Procedure Painful?

- ♥ The groin area (and if necessary, the neck) is frozen with a local anesthetic where the skin is punctured. You will feel pressure as the doctor finds the artery and veins where the EP catheters are inserted.
- ♥ If you feel any discomfort, please tell the doctor and they will put in more freezing.

Will I be awake for the study?

- ♥ Yes. You may be given a medication to help you relax before and during the test, but it will not put you to sleep.

Will I be asked to do anything?

- ♥ Yes, during the entire procedure, you will be asked to lie still, keep your arms at your sides, and keep your legs straight. You will also be asked to tell us if you feel the arrhythmia that we are investigating.

How long does it take?

- ♥ Your procedure may take several hours, depending on what you are having done. Your Physician will be able to tell you the anticipated length of your procedure.

What is the EP laboratory like?

- ♥ The EP laboratory is a large room with lots of equipment for monitoring your heart. Almost everyone finds the laboratory cold. The temperature is kept cool for the machines and computers that are vital to the laboratory.
- ♥ A nurse, a physician and a technician will be with you at all times.
- ♥ The rooms are fitted with special equipment, such as an x-ray table that moves back and forth and an x-ray camera that moves around you.

After the Procedure

The Cardiology ward

- ♥ Once the puncture site(s) are stable and dry, you will be taken from the recovery room to the cardiology ward, where you will be given something to eat and drink.
- ♥ You will be restricted to lying in bed fairly flat for four to six hours to decrease the chance of bleeding from your groin. The nurses will continue to check you frequently for any signs of bleeding. It is

important that you keep your hip straight, do not lift your head and stay in bed to help prevent bleeding from the puncture site.

- ♥ Coughing and sneezing increase the pressure at the puncture site. Pressing on the bandage when you cough or sneeze may help you prevent bleeding. If bleeding is noted, you should put pressure at the site and call for a nurse.

Going home

- ♥ Instructions are given to restrict activities such as vigorous exercises like walking or running, lifting heavy objects (no more than 10 pounds) or standing for extended periods for 2-3 days following the procedure.
- ♥ We usually recommend returning to work in 3-4 days after your procedure.
- ♥ Do not fly for 6 weeks after the procedure.
- ♥ Do not drive for 24 hours after the procedure.
- ♥ If bleeding is noted:
 - Apply pressure to the puncture site for at least 10 minutes.
 - Find somewhere you can lie down and try to relax.
 - Notify your doctor.
- ♥ You may have a shower the next day. Please allow the water to run over the area, and pat dry. Do not rub the puncture site.
- ♥ You may put on a clean Band-Aid daily until the puncture site has healed.
- ♥ There are no stitches that require removing.
- ♥ If you experience symptoms similar to those which you had prior to your ablation or any other symptoms that concern you, please call us at **416-864-6060 extension 6526**.

The Test Results

- ♥ The Doctor will come and talk to you about the results of the procedure directly afterwards or the next day before you go home.
- ♥ We will send a report of the procedure to your family doctor and referring cardiologist.