

Patient Information Sheet – Electrophysiological study

Your doctor has recommended performing an electrophysiological study (also called EPS). EPS is a **diagnostic procedure** designed to test and evaluate your heart's electrical system. It is usually recommended as a test in cases of palpitations, racing heart, arrhythmias, syncope, faints, black outs, near black outs and other specific symptoms and conditions.

The procedure is generally very safe. Potential complications can occur but are generally uncommon. The individual and specific risks and benefits of having an EPS will be discussed with you prior to the procedure.

You must notify your doctor if you take **blood thinners** such as aspirin, clopidogrel, warfarin, pradaxa (dabigatran), apixaban (eliquis), rivaroxaban (xarelto), clexane, enoxiparine and others or if you have **allergies** to antibiotics or medical contrast dyes.

You will generally need to stop taking certain **heart medications** for a few (approximately 5) days prior to the procedure and **you will be advised of this** prior to the procedure.

You must notify your doctor if you are pregnant, if you think you may be pregnant or are planning to become pregnant. The EPS procedure uses x-rays and it **cannot be performed if you are pregnant**. For women of child bearing age, a pregnancy test will need to be performed prior to the procedure.

Prior to the procedure:

You will be admitted to the hospital usually on the day of your procedure and blood tests may need to be performed. The details of the exact procedure will be explained to you by your doctor and a consent form will need to be signed. You will then be taken to the catheter laboratory ("cath lab"). There you will be moved onto a specialised x-ray table. In the cath lab there will be a number x-ray screens, monitoring screens as well as various specialised equipment. A number of electrodes (like an ECG) will be applied to your chest, arms and legs. Immediately prior to the procedure you will be given light sedation which may make you drowsy or sleepy. In some cases little or no sedation is used, and in other cases a general anaesthetic is used. The level of sedation administered will depend on your condition and the procedure.

During the procedure:

Local anaesthetic is injected into the skin in the upper part of your leg. You may feel a "sting" from the local anaesthetic for a few moments, following which the area will feel numb. Thin tubes (sheaths) will then be inserted into the vein in your leg. Catheters (specialised flexible wires) will be passed through the tubes into specific locations within the heart. Typically, between one and four such catheters are inserted, depending on your condition. Inserting the tubes/wires and performing the electrical test is generally not painful. Once the catheters are in place, your doctor will test the electrical wiring of your heart to look for abnormal heart rhythms. You may feel your heart racing and bumping during the test, however this is not usually painful.

After the procedure:

The catheters (wires) and sheaths (tubes) are removed from the heart and the vein. Pressure will be applied onto the top part of your leg (on the vein) to minimise any bleeding and bruising. You will be transferred onto your bed and taken to the recovery ward. Mild discomfort or pain can sometimes be felt in the top part of the leg, after the local anaesthetic wears off, however in most cases this is mild. If all is well, you will be able to go home a few

hours later. Sometimes you will be asked to stay overnight and be discharged the following morning. **You will not be able to drive your self home after the procedure.** You should have someone that you can go home with after the procedure.

What else might happen?:

Depending on the results of the test, your doctor may recommend further tests or treatments. In some cases an “ablation procedure” will be suggested to fix an arrhythmia (electrical short circuit in the heart). See additional ***“Patient information sheet – Ablation of arrhythmias”*** for more information. In other instances a pacemaker/defibrillator or an implantable loop monitor may be recommended. This depends on each individual case and will be discussed with you.

Activity restrictions:

It is important to avoid heavy lifting and over-exertion for a few days following the procedure, but you should be able to return to normal activity after that. You will not allowed to drive for 24 hours after the procedure. Longer driving restrictions may apply in some cases and these will be discussed with you.

Dr Maros Elsik

Patient information sheet – Ablation of arrhythmias

An ablation is a **treatment procedure** performed to treat cardiac arrhythmias, by applying radiofrequency energy to “cauterise” a specific (abnormal) part of the heart. Cardiac arrhythmias can present as palpitations, fast heart rhythm, missed or skipped beats, irregularity of the heart as well as in other ways such as with dizziness, blackouts, weak hearts and other symptoms. The ablation is in most cases a curative treatment for these arrhythmias. An ablation is performed at the same time as an electrophysiological study (EPS) – see “*Patient information sheet - Electrophysiological study*” for further information.

What is an ablation used for?:

An ablation can be used to treat various arrhythmias including: supraventricular tachycardia (AVNRT, Wolf Parkinson White syndrome, atrial tachycardia), atrial flutter, atrial fibrillation, ventricular ectopics and ventricular tachycardia.

Supraventricular tachycardia (SVT): There are three main types of supraventricular tachycardias.

- **AVNRT** sometimes called AVJRT is the most common type of SVT. This occurs due to there being 2 (or more) rather than the usual one connection within the electrical system of the heart, in the region of the AV node (central electrical junction box of the heart). You were born with these connections and for unknown reasons in some people at various times they start to cause symptoms. A microscopic short circuit can develop between these electrical connections resulting in an arrhythmia and palpitations. This abnormal short circuit occurs on the right side of the heart. Ablation in this case is targeted at eliminating the abnormal (slow) conducting electrical pathway, leaving intact the normal (fast) conducting electrical pathway.

- **Accessory pathway/Wolf Parkinson White syndrome** is the second most common reason for SVT. This occurs due to an abnormal connection (called an accessory pathway – because electricity can pass along it) between the atria (top chamber of the heart) and the ventricle (bottom, pumping chamber of the heart), that does not involve the usual electrical system of the heart. Because electricity can pass along the abnormal accessory pathway, it can create an abnormal bypass or short circuit of the electrical system of the heart, resulting in an arrhythmia or palpitations. You were born with this abnormal accessory connection, and for unknown reasons, in some people at various times it causes symptoms. This accessory connection can occur anywhere in the left or right side of the heart. Ablation in this case is targeted to eliminate the abnormal accessory pathway between the top and bottom part of the heart.

- **Atrial tachycardia** is a less common type of SVT. This occurs due to an overactivity usually within a very small part of the atria (the top part of the heart). It is most commonly due to microscopic abnormalities (“hot spot”) in the atria, causing it to beat automatically/spontaneously and often much faster than the heart's own natural pacemaker. This abnormality is due to a localised abnormality in the atria alone, and does not directly involve the ventricle (the pumping chamber). This abnormality can occur on the left or right side of the heart. It is not fully understood why this occurs in some patients but it may be related to an abnormality (such as scarring) affecting other parts of the atria. Specialised equipment is required to identify with great accuracy the specific overactive part of the atrium. Ablation is targeted at eliminating the overactive “hot spot” to treat this arrhythmia. Ablation is targeted at identifying with great accuracy the specific overactive part of the atrium.

Atrial flutter: There are essentially two types of atrial flutter. These are called “typical atrial flutter” and “atypical atrial flutter”. Both involve abnormal short circuits within the atria (the top part of the heart) and do not involve the ventricles (the bottom pumping chamber).

- **Typical atrial flutter** is a short circuit involving a large part of the right atrium. It occurs in a very specific part of the heart (the same part of the heart in the vast majority of people). The short circuit can travel in a “clockwise or anti-clockwise” direction within a very specific part of the right atrium. It is not always clear why flutter happens in some but not other people, but it can be related to age as well as various medical conditions such as high blood pressure, obstructive sleep apnoea, atrial fibrillation and others. Ablation of this arrhythmia is performed in a very specific part of the heart called the “cavo-tricuspid isthmus”. Ablation interrupts (blocks) the short circuit, preventing it from occurring again.
- **Atypical atrial flutter** is a short circuit affecting a large part of the atrium, but unlike typical flutter which occurs in a very specific location, atypical flutter can involve either the left or the right atrium. It most commonly occurs in patients who have had previous heart operations, previous cardiac problems and previous complex ablation. In some cases the cause is unknown. Specialised mapping equipment is usually required to locate the large short circuit. Sometimes patients have multiple of these short circuits. Ablation is targeted at interrupting (blocking) the short circuits. It is a more complex procedure than that used for the treatment of typical atrial flutter.

Atrial fibrillation (AF) is an arrhythmia that originates in the atria and the veins that connect to the atria. It is a disorganised heart rhythm. It can be treated with an ablation called “*pulmonary vein isolation (PVI)*” in selected patients - the information for this procedure is provided elsewhere. An alternative ablation is called the “AV node ablation”.

- **AV node ablation** is a procedure used to treat AF in some patients, particularly those in whom medications alone are not sufficient to control a fast heart rate or symptoms of palpitations associated with rapid AF. The ablation is directed at the AV node (a central fuse box) located between the atria (top chamber of the heart) and the ventricle (the pumping chamber). Ablating this area creates a permanent scar in a critical part of the hearts electrical system, thereby preventing the electrical signals from the atria (top part of the heart) reaching the ventricle. After an AV node ablation your heart will no longer be able to “race” or beat fast. Actually the heart rate will be very slow and therefore a permanent pacemaker will need to be inserted to maintain a regular and stable heart rate. The pacemaker will usually be implanted a number of weeks before the AV node ablation.

Ventricular arrhythmias involve abnormal heart rhythms in the ventricle (the bottom pumping chamber of the heart). The most common abnormalities include ventricular ectopics and ventricular tachycardia.

- **Ventricular ectopy** is a condition where the ventricle produces extra (abnormal) heart beats. Some people feel these as extra beats, missed beats, irregular heart rhythms or runs of extra beats. In the majority of cases they are not dangerous, but they can cause symptoms and sometimes abnormalities in heart function. The most commonly originate within the right side of the heart but can also occur in the left side of the heart. Their cause in most cases is unknown, however in some cases they can be associated with scarring, microscopic abnormalities and in other cases more significant conditions. Typically a small localised part of the ventricle becomes overactive, resulting in a type of a “hot spot”, responsible for producing extra beats, or

runs of extra beats. Specialised equipment is required to identify with high accuracy the specific overactive part of the ventricle. Ablation is targeted at eliminating the overactive “hot spot”.

- **Ventricular tachycardia** is a condition where the ventricle (the pumping chamber of the heart) is involved in producing abnormal heart rhythms. This can occur as short bursts though at times the bursts can be quite long. Occasionally these bursts can degenerate into more dangerous heart rhythms. Ventricular tachycardia can occur as a result of a single “hot spot” causing the heart to race (similar to ventricular ectopy – as above), or it can occur as a result of a short circuit in the ventricle (similar in mechanism to atrial flutter – see above). Symptoms during ventricular tachycardia vary, and range from mild to life threatening. Specialised equipment is required to identify with high accuracy the specific part of the ventricle involved. The ablation of this arrhythmia is targeted at eliminating the “hot spot” or the short circuit. This can be quite a lengthy procedure.

How is the procedure performed?:

An ablation procedure can be performed using sedation and local anaesthetic or sometimes under general anaesthesia. It is performed at the same time as an electrophysiological study (a diagnostic procedure). (See patient information sheet for “*Electrophysiological study*”) An ablation catheter (special flexible wire) is inserted into the heart via the vein in your leg. Through this catheter, radiofrequency (RF) energy can be delivered to the heart to ablate (cauterize) a very specific part of the heart which is responsible for causing an electrical irregularity. The cauterisation causes scarring. Scars are not capable of allowing electrical signals to pass through them, which results in prevention of further electrical short circuits. The procedure can sometimes be a little uncomfortable, and extra medications will be provided to relieve any discomfort if it occurs. Following the ablation, your heart will be observed for a period of time to determine if the therapy was effective. Further ablation can be performed if needed. At the end of the procedure, all the tubes are removed. In most cases the ablation is a curative procedure, though occasionally it may need to be repeated for complete resolution of arrhythmias.

Risks of the procedure:

Most ablation procedures are generally safe, however potential complications can occur. Generally speaking, the frequency and type of complication depend largely on the procedure being performed and your overall health. As an example, the types of complication that can occur include – bleeding and bruising in the groin (2-3%), small risk of damage to blood vessels and nerves in the groin (1%), small risk of damaging the heart by puncturing it (<1%), risk of needing a pacemaker (1% or less). The risk of strokes depends on the procedure but is generally 1% or less. More serious complications such as heart attacks and death are much lower (<0.1%). However, the majority of patients do not experience any complications. The specifics of each ablation and its unique complications will be discussed with you prior to the procedure.

After the procedure:

The catheters (wires) and sheaths (tubes) are removed from the heart and the vein. Pressure will be applied onto the top part of your leg (on the vein) to minimise any bleeding and bruising. You will be transferred onto your bed and taken to the recovery ward. Mild discomfort or pain can sometimes be felt in the top part of the leg, after the local anaesthetic wears off, however in most cases this is mild. If all is well, you will be able to go home a few hours later. Sometimes you will be asked to stay overnight and be discharged the following morning. **You will not be able to drive your self home after the procedure.** You should have someone that you can go home with after the procedure.

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Please do not hesitate to contact Dr M Elsik, if you require any clarification.