



Electrophysiology Definitions

- **Electrophysiology (EP)** is the study of the heart's electrical system. An Electrophysiology study (EPS) can predict which rhythm disturbance medication or treatment plan is best to suppress the rhythm disturbance and prevent further occurrences. We specialize in pacemakers, bi-ventricular pacemakers, and implantable cardiac defibrillators. Treatment plans include radio-frequency ablation for atrial fibrillation, supraventricular tachycardias and ventricular tachycardia. Rhythm disturbances can occur with or without any symptoms. Here's the question...When do palpitations warrant further investigation?
- **Ventricular tachycardia (VT)** is a condition in which the lower chambers of the heart ventricles beat abnormally fast. This rapid heart rate is caused by electrical signals that arise from the ventricles themselves instead of following the normal pattern of arising in the upper chambers of the heart atria and spreading throughout the heart. Ventricular tachycardias may be sustained or nonsustained, and they may occur in either or ventricles (e.g. left and right) of the heart. There are several different kinds, and their severity ranges from mostly without symptoms to a life-threatening condition that must be treated immediately. The severity is often connected to the presence of underlying heart disease.
- **Atrial fibrillation** is the most common form of irregular heartbeat (arrhythmia). Normally, your heart's electrical system controls the rhythm at which your heart beats. In atrial fibrillation, abnormal electrical impulses cause the upper chambers of the heart (atria) to fibrillate, or quiver, resulting in irregular and rapid beating of the ventricles, the heart's main pump. As a result, the heart pumps less efficiently, reducing blood flow to the body and to the heart muscle itself. For most people, this aspect of atrial fibrillation in itself is usually not life-threatening. However, people with atrial fibrillation are at increased risk for life-threatening strokes, especially if they are not taking anticoagulant medications. Inefficient pumping of the atria allows blood to pool and clot there. If these clots are pumped out of the heart and into the bloodstream, they can lodge in the brain's blood vessels, resulting in stroke. In addition, if the heart rate is fast and uncontrolled over a long period, atrial fibrillation can damage the heart and lead to heart attack and heart failure.
- **Pulmonary Vein Ablation** involves the use of special catheters (soft wires) inserted into the left atrium. The catheters are used for mapping (searching for the electrical impulses that fire abnormally, causing atrial fibrillation) and the delivery of energy (ablation) to the area. Energy is delivered from one catheter into the area of the atria that connects to the pulmonary vein, producing a circular scar. The scar will then block any impulses firing from within the pulmonary vein, thus preventing atrial fibrillation from occurring. The process is repeated on all pulmonary veins.
- **Implantable cardioverter-defibrillators (ICDs)** are devices that are implanted under the skin to treat a potentially life-threatening ventricular arrhythmia. The device is generally used in people who have already experienced a significant ventricular arrhythmia or who are found during an electrophysiology (EP) study to have a significant risk of developing one. Also, recent studies have identified "at-risk" populations, such as some people who have hypertrophic cardiomyopathy, which might benefit from ICDs.¹ This risk is most frequently seen in people with coronary artery disease but may also exist for someone with a congenital abnormality of the heart muscle or electrical system or a problem with the structure of the heart.

The ICD is surgically placed under the skin of your chest wall, usually below the left collarbone. The device is connected to a wire that is placed into the large vein under your collarbone, advanced into your heart, and anchored into your heart muscle.

- **Ablation** is a procedure to restore normal rhythm by destroying very small, carefully selected parts of the heart that cause tachycardia (an abnormally fast heartbeat). Ablation enables the heart to beat more slowly and normally again. Although there are several forms of ablation, the two most common are radiofrequency ablation and cryoablation.
- A **pacemaker** is a battery-powered device about the size of a pocket watch that sends weak electrical impulses to “set a pace” so that the heart is able to maintain a heartbeat. There are two basic types of pacemakers:

Single-chamber pacemakers stimulate one chamber of the heart, either an atrium or ventricle.

Dual-chamber pacemakers send electrical impulses to both the atrium and the ventricle, and pace both chambers. A dual-chamber pacemaker synchronizes the rhythm of the atria and ventricles in a pattern that closely resembles the natural heartbeat.

A **biventricular pacemaker** is a type of implantable pacemaker designed to treat heart failure. This type of therapy becomes necessary when the two lower chambers of the heart, the ventricles, do not pump together. This happens in approximately 20 to 30 percent of patients with heart failure. A biventricular pacemaker helps the ventricles to contract more efficiently. This type of pacing is called cardiac resynchronization therapy (CRT).

Tests Used for Diagnosis...

- A **Holter monitor** is a portable electrocardiogram (EKG) that monitors the electrical activity of an ambulatory (freely moving) patient’s heart for one to five days, 24 hours a day. It is most often used when the physician suspects an abnormal heart rhythm (arrhythmia) or a lack of oxygen-rich blood flowing to the heart (cardiac ischemia).
- **Event Recording** is similar to the holter monitor test. However, it is used to evaluate the rhythm of the heart when episodes are sporadic and cannot be determined over a 24-hour period of time. The recorder is worn by the patient for a period of two weeks to one month. The patient can send in the recording 24 hours a day to a monitoring center. Tracings are faxed to MCVI nurses to review with the doctor.
- **Tilt table testing** is a simple test that helps the doctor pinpoint the cause of your fainting. It checks how changes in body position can affect your blood pressure. To do this, you are placed on a table that is slowly tilted upward. The test tries to recreate fainting symptoms while your blood pressure and heart rate are monitored. The test is done in a hospital outpatient department.
- **Loop Recorder** – Smaller than a pack of gum, the Reveal Insertable Loop Recorder is inserted just beneath the skin in the upper chest area in a brief outpatient procedure that typically takes 15 to 20 minutes.

The Reveal Insertable Loop Recorder continuously monitors the rate and rhythm of the heart. It works much like a black box in an airplane, whereby vital information is recorded during the actual fainting episode and can be played back later for detailed analysis. The Reveal Insertable Loop Recorder can continuously record the heart's rate and rhythm for up to 14 months.

Recordings are reviewed every two months in the office by the Device Clinic staff.