

## Arrhythmia

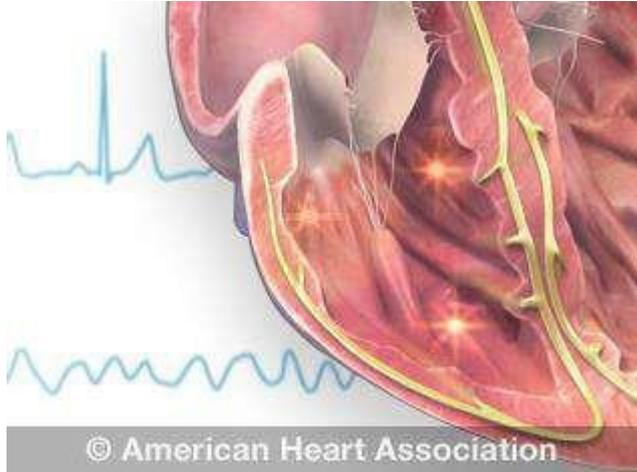
- [About Arrhythmia](#)
- [Types of Arrhythmias](#)
- [To understand how the heart pumps, learn about: Structure of the heart](#)
- [Electrical system of the heart](#)
- [Why Arrhythmia Matters](#)
- [Understand Your Risk For Arrhythmia](#)
- [Are you at risk?](#)
- [Atrial fibrillation and its risk factors](#)
- [Children and Arrhythmia](#)
- [Symptoms, Diagnosis and Monitoring of Arrhythmia](#)
- [Common Tests for Arrhythmia](#)
- [Syncope \(Fainting\)](#)
- [Prevention and Treatment of Arrhythmia](#)
- [Living with Arrhythmias](#)

## Arrhythmia

### About Arrhythmia

The term "arrhythmia" refers to any change from the normal sequence of electrical impulses. The electrical impulses may happen too fast, too slowly, or erratically – causing the heart to beat too fast, too slowly, or erratically





The term "arrhythmia" refers to any change from the normal sequence of electrical impulses. The electrical impulses may happen too fast, too slowly, or erratically – causing the heart to beat too fast, too slowly, or erratically. When the heart doesn't beat properly, it can't pump blood effectively. When the heart doesn't pump blood effectively, the lungs, brain and all other organs can't work properly and may shut down or be damaged. [View an animation of arrhythmia.](#)

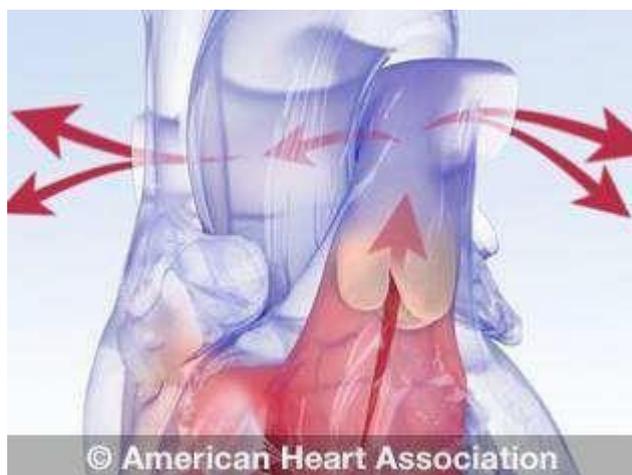
## Types of Arrhythmias

- [Atrial Fibrillation](#) = upper heart chambers contract irregularly
- [Bradycardia](#) = slow heart rate
- [Conduction Disorders](#) = heart does not beat normally
- [Premature contraction](#) = early heart beat
- [Tachycardia](#) = very fast heart rate
- [Ventricular Fibrillation](#) = disorganized contraction of the lower chambers of the heart
- [Other Rhythm Disorders](#)
- [Types of Arrhythmia in Children](#)

The normal heart is a strong, muscular pump a little larger than a fist. It pumps blood continuously through the circulatory system.

Each day the average heart beats (expands and contracts) 100,000 times and pumps about 2,000 gallons of blood through the body. In a 70-year lifetime, an average human heart beats more than 2.5 billion times.

## To understand how the heart pumps, learn about: Structure of the heart



[Watch an animation of heart valve anatomy](#)

## **The heart: four chambers, four valves**

The heart has four chambers, two on the right and two on the left:

- Two upper chambers are called atria (one is called an atrium).
- Two lower chambers are called ventricles.

The heart also has four valves that open and close to let blood flow in only one direction when the heart contracts (beats). The four heart valves are:

- Tricuspid valve, located between the right atrium and right ventricle
- Pulmonary or pulmonic valve, between the right ventricle and the pulmonary artery
- Mitral valve, between the left atrium and left ventricle
- Aortic valve, between the left ventricle and the aorta

Each valve has a set of flaps (also called leaflets or cusps). The mitral valve has two flaps; the others have three. Blood flow occurs only when there's a difference in pressure across the valves, which causes them to open. Under normal conditions, the valves permit blood to flow in only one direction.

The heart pumps blood to the lungs and to all the body's tissues by a sequence of highly organized contractions of the four chambers. For the heart to function properly, the four chambers must beat in an organized way.

## **Electrical system of the heart**

### **Electrical signals control the pump**

The heart beat (contraction) begins when an electrical impulse from the sinoatrial node (also called the SA node or sinus node) moves through it. The SA node is sometimes referred to as the heart's "natural pacemaker" because it initiates impulses for the heartbeat.

The normal electrical sequence begins in the right atrium and spreads throughout the atria to the atrioventricular (AV) node. From the AV node, electrical impulses travel down a group of specialized fibers called the His-Purkinje system to all parts of the ventricles.

This exact route must be followed for the heart to pump properly. As long as the electrical impulse is transmitted normally, the heart pumps and beats at a regular pace. In an adult, a normal heart beats 60 to 100 times a minute.

[Electrocardiography \(ECG or EKG\)](#) is a painless, non-invasive procedure that records the heart's electrical activity and can help diagnose arrhythmias.

### **Abnormal heart rhythms (arrhythmias)**

Arrhythmias are abnormal beats. The term "arrhythmia" refers to any change from the normal sequence of electrical impulses, causing abnormal heart rhythms. Arrhythmias may be completely harmless or life-threatening.

Some arrhythmias are so brief (for example, a temporary pause or premature beat) that the overall heart rate or rhythm isn't greatly affected. But if arrhythmias last longer, they may cause the heart rate to be too slow or too fast or the heart rhythm to be erratic – so the heart pumps less effectively.

- A fast heart rate (in adults, more than 100 beats per minute) is called [tachycardia](#).
- A slow heart rate (less than 60 beats per minute) is referred to as [bradycardia](#).

### **Causes**

- Normally, the heart's most rapidly firing cells are in the sinus (or sinoatrial or SA) node,

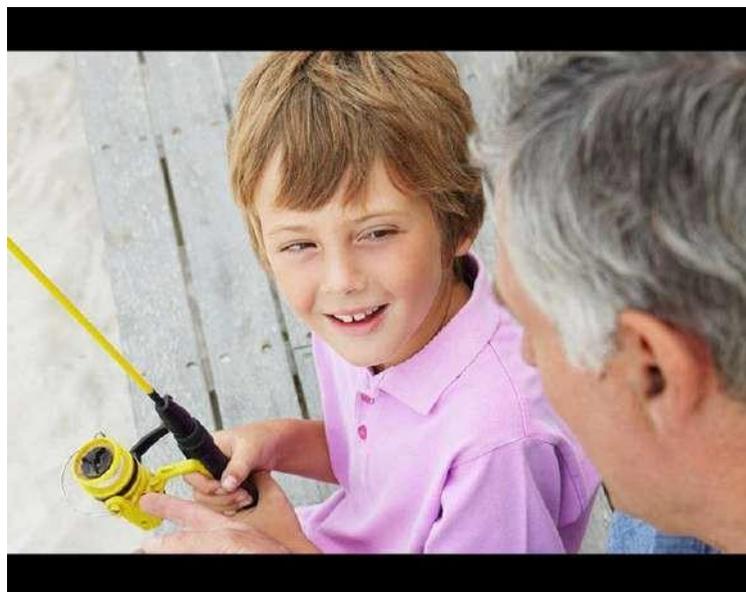
making that area a natural pacemaker.

- Under some conditions almost all heart tissue can start an impulse of the type that can generate a heartbeat.
- Cells in the heart's conduction system can fire automatically and start electrical activity. This activity can interrupt the normal order of the heart's pumping activity.
- Secondary pacemakers elsewhere in the heart provide a "back-up" rhythm when the sinus node doesn't work properly or when impulses are blocked somewhere in the conduction system.

An arrhythmia occurs when:

- The heart's natural pacemaker develops an abnormal rate or rhythm.
- The normal conduction pathway is interrupted.
- Another part of the heart takes over as pacemaker.

## Why Arrhythmia Matters



No question – your heart is a crucial organ. And [arrhythmia](#) causes your heart to beat too quickly, too slowly or erratically. Hijacking your heart's vital rhythm and pumping function can have serious consequences. So arrhythmia matters.

[View an animation of an arrhythmia.](#)

Here are just two scenarios resulting from arrhythmia:

### **When the heart beats too fast**

[Tachycardia](#) is when your heart beats too fast. In adults, that's generally more than 100 beats per minute. It can last just seconds or for minutes or hours.

Some ventricular tachycardias can be tolerated without serious results. But if the ventricles (the heart's lower chambers) quiver during tachycardia, that can interfere with the heart's ability to pump blood. An abrupt loss of heart function, or sudden [cardiac arrest](#), can result, which is a medical emergency. Without immediate treatment, organ damage, organ failure and even death are likely.

[Recognize the signs of cardiac arrest.](#)

[Know the causes of cardiac arrest.](#)

### **When the heart beats irregularly**

[Atrial fibrillation](#) (AFib or AF) causes your heart to beat irregularly.

When you have AFib, an abnormal electrical signal keeps the heart's chambers from pumping in a synchronized way. This incomplete cycle allows blood to pool in the atria (the heart's upper chambers). When blood pools, clots can form.

If one of these blood clots leaves the heart and travels toward the brain, it can block a vital artery. This prevents oxygen from reaching the brain via the bloodstream. This causes a [stroke](#). Deprived of nourishment, the affected brain tissue starts to die.

Stroke can be devastating because the parts of the body controlled by the damaged parts of the brain are affected as well. These disabilities are often permanent, because damaged or dead brain cells aren't replaced.

There are two types of strokes. Ischemic stroke is caused by a blocked blood vessel to the brain. Hemorrhagic stroke is caused by a ruptured blood vessel, which allows blood to escape into the brain tissue.

The good news is, many [treatment options for AFib](#) can reduce your risk of stroke.

If you have AFib, discuss your [treatment goals](#) with your doctor, and be aware of other [stroke risk factors](#) you may have.

Clearly, any type of arrhythmia matters. So it's important to [understand your risk](#).

## **Understand Your Risk For Arrhythmia**



Some changes in heart rate and rhythm are normal during sleep, physical activity and moments of stress.

But other times, irregular heart rhythm, or arrhythmia, may be a serious problem. Untreated arrhythmias such as [tachycardia](#) or [atrial fibrillation](#) (AFib or AF) can have serious consequences,

including cardiac arrest and stroke.

[View an animation of an arrhythmia.](#)

## Are you at risk?

Risk factors for arrhythmia include:

**Heart disease:** Some types of heart disease, such as high blood pressure, are risk factors for AFib, which is a type of arrhythmia. Scarring or abnormal tissue deposits can also cause [bradycardia](#) (slow heart rate) or [tachycardia](#) (rapid heart rate) by interfering with the heart's electrical system.

**Age:** The prevalence of arrhythmia and AFib increases with age.

**Congenital conditions:** Certain conditions from birth may make a person prone to arrhythmia. For example, a congenital heart defect that affects the organ's built-in electrical system can cause bradycardia. And those born with extra electrical pathways can be prone to tachycardia.

**Chemical agents:** Different kinds of chemical agents can cause arrhythmias, sometimes with serious consequences. Minerals such as potassium, magnesium and calcium play a vital role in the heart's normal function. But those same minerals may cause arrhythmias when their levels are too high or too low. Addictive substances, including [alcohol](#), [cigarettes](#) and recreational drugs, can also provoke arrhythmias. Even various [cardiac medications](#) may cause arrhythmia.

**Other factors:** Talk to your doctor to control other factors that may lead to arrhythmia:

- [Reduce high blood pressure.](#)
- [Control cholesterol levels.](#)
- [Lose excess weight.](#)
- [Eat a heart-healthy diet.](#)
- [Stop smoking and avoid secondhand smoke.](#)
- [Do regular physical activity.](#)
- [Drink alcohol only in moderation.](#)

## Atrial fibrillation and its risk factors

Atrial fibrillation (AFib or AF) is a type of arrhythmia that occurs when an abnormal electrical signal interferes with the heart's normal pumping function. A wide range of factors can make you prone to AFib:

- Underlying [heart disease](#)
- Underlying lung disease
- Past [heart attack](#) or [heart failure](#)
- Heart surgery
- [High blood pressure](#)
- [Diabetes](#)
- [Sleep apnea](#)
- [Cigarette](#) and stimulant drug use (such as caffeine)
- [Family history](#)

Men and older people are more likely than women and younger people to develop AFib.

### Talk to your doctor

Know your risk factors and talk to your doctor to lessen your chances of arrhythmia or to treat it if it occurs.

Knowledge is power. Being aware of arrhythmia, its dangers and risks can give you the upper hand when it comes to heart health.

## Children and Arrhythmia

If your child has been diagnosed with [arrhythmia](#), or an abnormal heart rhythm, you're likely quite concerned. That's understandable.

Learning about arrhythmias can help you understand what your child's doctor has told you. It's also the best first step in caring for your child, as you work with your pediatrician to determine the best treatment.

### Normal ranges for children

Usually, a child's heart beats (or **heart rhythm**) regularly. That is, the heart muscle pumps blood in a synchronized, uniformed way, at regular intervals.

For children as well as for adults, the **heart rate**, or number of times a heart beats each minute, can vary. Exercise, for example, makes the heart beat more often, while the heart rate slows down during sleep.

The "normal" heart rate for an older child or teenager at rest is about 70 beats per minute. In an infant, the heart beats 140 times a minute on average.

Some arrhythmias, or irregular heartbeats, are normal. For example, in many children, the heart rate speeds up while breathing in, then slows back down when exhaling. This heartbeat variation with breathing is called **sinus arrhythmia**, and it's no cause for concern.

If your child's doctor discovers an arrhythmia, he or she will likely perform tests to learn more. You could also be referred to a **pediatric cardiologist**, who specializes in heart issues in children.

[View an animation of an arrhythmia.](#)

### Arrhythmias and medical history

Arrhythmias may occur at any age, although the condition is far more common in adults.

Many times, children with arrhythmias experience no symptoms, or they can't articulate the problem. Often, these heart rhythm abnormalities are revealed as part of a child's periodic wellness exam, or through another encounter with your child's doctor.

Arrhythmias are investigated methodically, much like other health questions. Your pediatrician will likely inquire about your child's medical history to understand everything possible about the arrhythmia, its origins and its implications.

You may be asked questions such as:

- Is your child aware of unusual heartbeats?
- Does anything bring on the arrhythmia? Is there anything your child or you can do to make it stop?
- How fast is your child's heartbeat?
- Does your child feel weak, lightheaded or dizzy?
- Has your child ever fainted?

Your child's doctor may also ask about prescribed and over-the-counter medicines because some may make arrhythmias worse.

By knowing all that you can about arrhythmias, you can take an active role in your child's care. And rest assured, several treatment options are available. Together, you and your child's doctor can determine the right course of action.

[Learn about types of arrhythmias in children.](#)

[Learn about arrhythmia treatment options for children.](#)

## Symptoms, Diagnosis and Monitoring of Arrhythmia



Arrhythmias should be evaluated thoroughly by your doctor, who may ask about various symptoms and your medical history.

### Many different symptoms

Arrhythmias can produce a broad range of symptoms and results. Your experience with arrhythmia may also differ depending on the type. For instance, a single premature beat may be felt as a "palpitation" or a "skipped beat." Premature beats that occur often or in rapid succession may increase awareness of heart palpitations or a "fluttering" sensation in the chest or neck.

That same "fluttering" or "quivering" is associated with [atrial fibrillation](#) (AFib or AF), which is a particular type of arrhythmia.

[View an animation of arrhythmia.](#)

When arrhythmias (including AFib) last long enough to affect how well the heart works, more serious symptoms may develop:

- Fatigue or weakness
- Dizziness or lightheadedness
- Fainting or near-fainting spells
- Rapid heartbeat or pounding in the chest
- Shortness of breath and anxiety
- Chest pain or pressure
- In extreme cases, collapse and [sudden cardiac arrest](#)

**Important note:** If you have chest pain or pressure, you may be having a heart attack. Call 911 immediately.

### **How do heart attack symptoms differ?**

Fluttering and heart palpitations are telltale signs of arrhythmia, including AFib. Other serious heart problems, such as heart attack, have similar warning signs.

A heart attack occurs when blood flow to the heart is blocked. This denies oxygen to the heart muscle — possibly damaging or destroying organ tissue.

The symptoms for heart attack can vary widely, just like symptoms for arrhythmia.

Some heart attacks are sudden and intense. But most heart attacks start slowly, with mild pain or discomfort. Other symptoms can include:

- Chest discomfort or pressure that may come and go
- Discomfort in the upper body, including both arms, the back, stomach, neck and jaw
- Shortness of breath, with or without chest discomfort
- Cold sweat, nausea or lightheadedness

[Symptoms of heart attack in women](#) can be even subtler. Often, those affected by heart attack — men and women alike — aren't sure what's wrong and wait too long before getting help.

**If you think you may be having a heart attack, don't delay.** Get emergency help by calling 911 immediately.

Arrhythmia and stroke symptoms

People with AFib are five times more likely to suffer stroke than those without AFib. So it's vital to be familiar with [stroke symptoms](#).

**Call 911 immediately if you notice one or more of these symptoms, even if the symptoms are temporary or seem to disappear.**

Do you suspect that you or a loved one may have arrhythmia? See your doctor. [Several tests can diagnose and monitor arrhythmia](#).

## **Common Tests for Arrhythmia**

Several tests can help your doctor diagnose an arrhythmia and monitor the effectiveness of your treatment.

### **Holter monitor**

You can think of a Holter monitor (or continuous ambulatory electrocardiographic monitor) as a small, portable [electrocardiogram \(EKG or ECG\)](#) recorder.

Holter monitors can record 24 hours or more of continuous electrocardiographic signals. This gives doctors a “movie” of the heart's electrical activity, as opposed to the much shorter glimpse provided by an EKG.

Your doctor may ask you to keep a diary of your activities and symptoms. Later, the Holter monitor results can be compared to your daily log to see how your activities or symptoms correspond to your measured heart rhythm.

Learn more about [Holter monitors](#).

[Download our printable Holter monitor diary \(PDF\)](#).

### **Transtelephonic monitor**

For suspected arrhythmias that occur infrequently or pass quickly, your doctor might suggest that you wear a transtelephonic monitor, or event monitor.

Various kinds of event monitors attach with bracelets, finger clips or patches worn under the arms for a month or two. The data about your heart's electrical system are recorded and stored. You can then transmit the results to your doctor to be analyzed.

Learn more about [cardiac event recorders](#).

### **Treadmill testing**

A treadmill test, sometimes called a stress test or an exercise stress test, can help diagnose people whose suspected arrhythmias are exercise-related.

In a treadmill test, you walk or run on a treadmill or ride a stationary bicycle while your heart rate and rhythm are monitored. This can provoke an arrhythmia, allowing your doctor to study the abnormal heartbeat.

Learn more about a [treadmill test](#).

### **Tilt-table test**

A tilt-table test, also called a tilt test, may be suggested if you've suffered fainting spells. It reveals how your heart rate and blood pressure respond when changing positions from lying down to standing up.

In this test, a catheter may be placed in an artery to monitor blood pressure from within the blood vessel. An intravenous line (a small plastic tube in a vein) may also be started before the test.

If the cause of the fainting spells is discovered, medications can be supplied through an intravenous line to help prevent the episodes.

Learn more about [tilt-table tests](#).

### **Electrophysiologic testing (EP study)**

Electrophysiologic testing, sometimes called an EP study, can reveal suspected arrhythmias.

In this procedure, performed under local anesthesia, temporary electrode catheters are threaded through peripheral veins (or arteries) into the heart using a fluoroscope. These electrode catheters are positioned in the atria, ventricles or both. They record the heart's electrical signals and "map" the path of electrical impulses during each heartbeat.

This test can provoke known but infrequent arrhythmias, allowing them to be diagnosed. It can especially help trigger latent tachycardia (fast heart rate) or bradycardia (slow heart rate).

### **Esophageal electrophysiologic procedure**

In this procedure, a thin, flexible catheter is inserted into your nostril and positioned in the esophagus (the tube that connects the mouth and stomach). The catheter's lead performs an electrocardiogram (EKG). The catheter's proximity to the heart allows for more accurate results than a conventional EKG.

This procedure can also provoke unpredictable arrhythmias for diagnosis. Medications can be administered as part of the test to determine the most effective approach.

### **Echocardiogram**

An echocardiogram uses ultrasound waves to reveal your heart's size, structure and motion. This type of echocardiography uses sound waves in much the same way that an ultrasound test uses sound waves to monitor a baby's growth in the womb.

A painless procedure, an echocardiogram often provides valuable information about a heart with an arrhythmia. The most common type of echocardiogram is transthoracic echocardiography (TTE).

### **Electrophysiology Studies (EPS)**

Electrophysiology studies (EPS) are tests that help doctors understand the nature of abnormal heart rhythms ([arrhythmias](#)).

#### **Quick facts**

- *Electrophysiology studies test the electrical activity of your heart to find where an arrhythmia (abnormal heartbeat) is coming from.*
- These results can help you and your doctor decide whether you need medicine, a [pacemaker](#), an [implantable cardioverter defibrillator \(ICD\)](#), [cardiac ablation](#) or surgery.
- These studies take place in a special room called an electrophysiology (EP) lab or catheterization (cath) lab while you are mildly sedated.

#### **Why do people have electrophysiology studies?**

When someone's heart doesn't beat normally, doctors use EPS to find out why. Electrical signals usually travel through the heart in a regular pattern. [Heart attacks](#), aging and [high blood pressure](#) may cause scarring of the heart. This may cause the heart to beat in an irregular (uneven) pattern. Extra abnormal electrical pathways found in certain congenital heart defects can also cause [arrhythmias](#).

During EPS, doctors insert a thin tube called a catheter into a blood vessel that leads to your heart. A specialized electrode catheter designed for EP studies lets them send electrical signals to your heart and record its electrical activity.

#### **Doctors use EPS to see:**

- Where an arrhythmia is coming from.
- How well certain [medicines](#) work to treat your arrhythmia.
- If they should treat a problem by destroying the place inside your heart that is causing the abnormal electrical signal. This procedure is called [catheter ablation](#).
- If a pacemaker or [implantable cardioverter defibrillator \(ICD\)](#) might help you.
- If you are at risk for heart problems such as [fainting](#) or sudden cardiac death due to [cardiac arrest](#) (when your heart stops beating).

During an EPS, about 3 to 5 electrically sensitive catheters are placed inside the heart to record electrical activity.

#### **What are the risks of EPS?**

Risks may include:

- Arrhythmia. During EPS you may have abnormal heart rhythms that make you dizzy. If this happens, your doctor may give your heart an electric shock to bring back a regular heartbeat.
- Blood clots sometimes can form at the tip of the catheter, break off and block a blood vessel. Your doctor may give you medicine to prevent blood clots.
- Infection, bleeding and bruising at the site where the catheter went in (groin, arm or neck). Your doctor or nurse will help you avoid these problems.

#### ***How do I prepare for EPS?***

- Don't eat or drink anything for 6 to 8 hours before the test.
- Tell your doctor about any medicines you take, including over-the-counter medicines, herbs and vitamins. He or she may ask you not to take them before EPS. Don't stop taking your medicine until your doctor tells you to.
- Have someone drive you to your appointment and take you home.
- If you usually wear a hearing aid, wear it during your procedure. If you wear glasses, bring them to your appointment.

#### ***What happens during EPS?***

At a hospital or clinic, doctors and nurses do EPS in a room that has special equipment for the tests. You may hear this room called the electrophysiology laboratory, or EP lab. Some call it the catheterization laboratory (cath lab). During the test:

- A nurse will put an IV (intravenous line) in your arm. You'll get medicine (a sedative) that will help you relax. But you'll be awake and able to follow instructions during the test.
- Your nurse will clean and shave the part of your body where the doctor will be working. This is usually in the groin but may be the arm or neck.
- You'll be given a shot – a local anesthetic will be given — to make the area numb. Your doctor will make a needle puncture through your skin and into your blood vessel. A small straw-sized tube called a sheath will be inserted into your artery or vein. The doctor will gently guide several specialized EP catheters into your blood vessel through the sheath and advance them to your heart. A video screen will show the position of the catheters. You may feel some pressure in the area where the sheath was inserted, but you shouldn't feel any pain.
- Your doctor will send small electric pulses through the catheters to make your heart beat at different speeds. You may feel your heart beat stronger or faster.
- Electrical signals produced by your heart will be picked up by the special catheters and recorded. This is called cardiac mapping and allows the doctor to locate where arrhythmias are coming from,
- Your doctor will remove the catheters and the IV line. Your nurse will put pressure on the puncture site to stop any bleeding.
- EPS usually last 1 to 4 hours.

If the type and location of the arrhythmia is identified and an appropriate therapy decided, cardiac ablation or insertion of a pacemaker or ICD may be performed during or immediately after the EPS.

"I could feel my heart speeding up, which was weird. But it didn't hurt. It was more like hiking up and down hills really fast." Esmerelda, age 38

#### ***What happens after EPS?***

You'll be moved to a recovery room where you should rest quietly for 1 to 3 hours. During this time:

- Stay still as long as your nurse tells you to. Be sure to keep the arm or leg used for the test straight.
- Your nurse will check on you often to see if there is bleeding or swelling at the puncture site.
- After the sedative wears off, your doctor will talk to you about your test results.
- Before you leave, you'll be told what to do at home.

### ***What happens after I get home?***

Follow the instructions your nurse or doctor gave you, including taking any new medicines that were prescribed. Most people can start eating food and taking their medicines within 4 to 6 hours after the test. Most can do their usual daily activities the day after the test. Don't drive for at least 24 hours.

The puncture site may be sore for several days. A small bruise at the puncture site is normal. If the site starts to bleed, lie flat and press firmly on top of it. Have someone call the doctor or EP lab.

### ***What should I watch for?***

Call 911 if you notice:

- A sudden increase in swelling around the puncture site.
- Bleeding doesn't slow down when you press hard on the site.

### ***Call your doctor right away if you notice:***

- Your arm or leg that was used for the sheath feels numb or tingles.
- Your hand or foot feels very cold or changes color.
- The puncture site looks more and more bruised.
- The puncture site begins to swell or fluids begin to come from it.

### ***How do I learn the results of my EPS?***

Most of the time, doctors will ask you to make an appointment to discuss the results of your test. You'll discuss your treatment at that appointment.

### ***How can I learn more about EPS?***

Talk with your doctor. Here are some good questions to ask:

- Are there medicines that I can use to control my abnormal heartbeats?
- Will I need a pacemaker or implantable cardioverter defibrillator (ICD) now or in the future?
- What caused my irregular heartbeat?
- Am I at risk of serious heart rhythm problems in the future?

### **Learn more:**

- [Cardiac Catheterization](#)
- [Catheter Ablation](#)

## **Syncope (Fainting)**

Syncope is a temporary loss of consciousness usually related to insufficient blood flow to the brain. It's also called fainting or "passing out."

It most often occurs when [blood pressure is too low](#) (hypotension) and the heart doesn't pump enough oxygen to the brain. It can be benign or a symptom of an underlying medical condition.

What causes syncope?

Syncope is a symptom that can be due to several causes, ranging from benign to life-threatening conditions. Many non life-threatening factors, such as overheating, dehydration, heavy sweating, exhaustion or the pooling of blood in the legs due to sudden changes in body position, can trigger syncope. It's important to determine the cause of syncope and any underlying conditions.

However, several serious heart conditions, such as [bradycardia](#), [tachycardia](#) or blood flow obstruction, can also cause syncope.

### **What is neurally mediated syncope?**

Neurally mediated syncope (NMS) is the most common form of fainting and a frequent reason for emergency department visits. It's also called reflex, neurocardiogenic, vasovagal (VVS) or vasodepressor syncope. It's benign and rarely requires medical treatment.

NMS is more common in children and young adults, though it can occur at any age. It happens when the part of the nervous system that regulates blood pressure and heart rate malfunctions in response to a trigger, such as emotional stress or pain.

NMS typically happens while standing and is often preceded by a sensation of warmth, nausea, lightheadedness, tunnel vision or visual "grayout." Placing the person in a reclining position restores blood flow and consciousness, and ends the seizure.

Situational syncope, which is a type of NMS, is related to certain physical functions, such as violent coughing (especially in men), laughing or swallowing.

Other disorders can cause syncope, which also can be a side effect of some medicines.

Some types of syncope suggest a serious disorder:

- Those occurring with exercise
- Those associated with palpitations or irregularities of the heart
- Those associated with family history of recurrent syncope or sudden death

What is cardiac syncope?

Cardiac or cardiovascular syncope is caused by various heart conditions, such as bradycardia, tachycardia or certain types of hypotension. It can increase the risk of [sudden cardiac death](#).

People suspected of having cardiac syncope but who don't have serious medical conditions may be managed as outpatients. Further inpatient evaluation is needed if serious medical conditions are present. Conditions that may warrant hospital evaluation and treatment include various cardiac arrhythmic conditions, cardiac ischemia, severe aortic stenosis and pulmonary embolism. If evaluation suggests cardiac vascular abnormalities, an ambulatory external or implantable cardiac monitor may be required.

[Heart failure](#), [atrial fibrillation](#) and other serious cardiac conditions can cause recurrent syncope in older adults, with a sharp increase after age 70.

### **What are the risk factors?**

Syncope is common, but adults over age 80 are at greater risk of hospitalization and death.

Younger people without cardiac disease but who've experienced syncope while standing or have specific stress or situational triggers aren't as likely to experience cardiac syncope.

Cardiac syncope is a higher risk in: people older than age 60; men; presence of known heart disease; brief palpitations or sudden loss of consciousness; fainting during exertion; fainting while supine; an abnormal cardiac exam; or family history of inheritable conditions. Other existing conditions and medications used are particularly important in older patients.

### **AHA Recommendations**

People who experience the warning signs of fainting of dizziness, nausea and sweaty palms should sit or lie down. Anyone with syncope should receive an initial evaluation, including detailed physical and history examinations and measurement of blood pressure and heart rate, by a physician.

An [ECG](#) (electrocardiogram) also is recommended as part of an initial evaluation to provide information about the cause of syncope. ECG is widely available and inexpensive and can provide information about the potential and specific cause of syncope (for example, abnormal heart rhythms). Other tests, such as [exercise stress test](#), [Holter monitor](#) and an [echocardiogram](#), may be needed to rule out other cardiac causes.

An ECG also is recommended for children and young adults with syncope. Other noninvasive diagnostic testing may be needed if they're suspected of having [congenital heart disease](#), [cardiomyopathy](#) or a [heart rhythm disorder](#).

If the initial evaluation is unclear, it may be useful for patients to undergo a tilt test. The blood pressure and heart rate will be measured while lying on a board and with the board tilted up. People with NMS usually will faint during the tilt, due to the rapid drop in blood pressure and heart rate. When people are placed on their back again, blood flow and consciousness are restored.

Patients with VVS and without a serious medical condition usually can be managed in an outpatient setting. For older adults, a comprehensive approach in collaboration with a geriatric expert can be helpful.

For people who are dehydrated, it may be beneficial to increase their salt and fluid intake to prevent syncope. That recommendation – as well as the removal or reduction of hypotensive drugs and diuretics – also is encouraged when appropriate and safe for people who've experienced situational syncope.

Consuming more salt and fluids can benefit most pediatric patients, but the results are unclear in people with NMS. Other lifestyle changes, such as exercise, also can benefit pediatric patients.

Some patients of any age may need medication.

When it comes to driving after a syncope episode, there are no restrictions for VVS patients who had no fainting spells in the previous year. Still, it may be helpful for healthcare providers to discuss regional driving laws, restrictions and implications with all patients.

For athletes, a cardiovascular assessment by a healthcare provider is recommended before resuming competitive sports. Those with syncope and a structural heart rhythm disorder should

also see a specialist. Extended monitoring may help athletes with unexplained exertional syncope.

### **The Future of Syncope**

Standardized national registries and large databases are needed to gather more data to better understand the incidence and prevalence of syncope, patient risks and outcomes, set lifestyle policies and improve healthcare delivery.

Some studies have shown that with recurrent episodes of fainting, the quality of life is reduced in both adults and in pediatric patients, however more well designed studies that incorporates quality of life, work loss and functional capacity are needed. In addition, more studies incorporate quality of life, work loss and functional capacity as possible results and better understand the relationship of syncope symptoms, causes and underlying diseases to various outcomes.

## **Prevention and Treatment of Arrhythmia**



### **Do you need treatment?**

Most arrhythmias are considered harmless and are left untreated. Once your doctor has documented that you have an arrhythmia, he or she will need to find out whether it's abnormal or merely reflects the heart's normal processes. He or she will also determine whether your arrhythmia is clinically significant – that is, whether it causes symptoms or puts you at risk for more serious arrhythmias or complications of arrhythmias in the future. If your arrhythmia is abnormal and clinically significant, your doctor will set a treatment plan. [View an animation of arrhythmia.](#)

### **Treatment goals**

- Especially for people with AFib, prevent blood clots from forming to reduce stroke risk
- Control your [heart rate](#) within a relatively normal range
- Restore a normal heart rhythm, if possible
- Treat heart disease/condition that may be causing arrhythmia
- Reduce other [risk factors for heart disease and stroke](#)

### **Learn about:**

- [Medications for arrhythmia](#)

- [Ablation](#)
- [Devices to help treat arrhythmias](#)
- [Treating arrhythmias in children](#)

## Living with Arrhythmias

### Taking medications

- Take all medications exactly as prescribed.
- Never stop taking any prescription medication without first consulting your healthcare provider.
- If you have any side effects, tell your healthcare provider about them.
- Tell your healthcare provider about all your other drugs and supplements, including over-the-counter medications and vitamins. Download our [printable medication log \(PDF\)](#).

### Monitor your pulse

You should know how to take your pulse – especially if you have an artificial pacemaker.

- Put the second and third fingers of one hand on the inside of the wrist of the other hand, just below the thumb OR on the side of your neck, just below the corner of your jaw.
- Feel for the pulse.
- Count the number of beats in one full minute.
- Keep a record of your pulse along with the day and time taken and notes about how you felt at the time. Use our [blood pressure/pulse tracker \(PDF\)](#).

Certain substances can contribute to an abnormal/irregular heartbeat, including:

- Caffeine
- Tobacco
- Alcohol
- Cold and cough medications
- Appetite suppressants
- Psychotropic drugs (used to treat certain mental illnesses)
- Antiarrhythmics (paradoxically, the same drugs used to treat arrhythmia can also cause arrhythmia. Your healthcare team will monitor you carefully if you're taking antiarrhythmic medication.)
- Beta-blockers for high blood pressure
- Street drugs such as cocaine, marijuana and “speed” or methamphetamines

If you're being treated for arrhythmia and use any of these substances, be sure to discuss this with your doctor.

### Manage your risk factors

Just having certain arrhythmias increases your risk of heart attack, cardiac arrest and stroke.

Work with your healthcare team and follow their instructions to control other risk factors:

- Reduce [high blood pressure](#)
- Control [cholesterol levels](#)
- Lose [excess weight](#)
- Eat a [heart-healthy diet](#)
- Avoid [tobacco smoke](#)
- Enjoy regular [physical activity](#)



- [Pacemaker ID card \(PDF\)](#)
- [Holter monitor diary \(PDF\)](#)