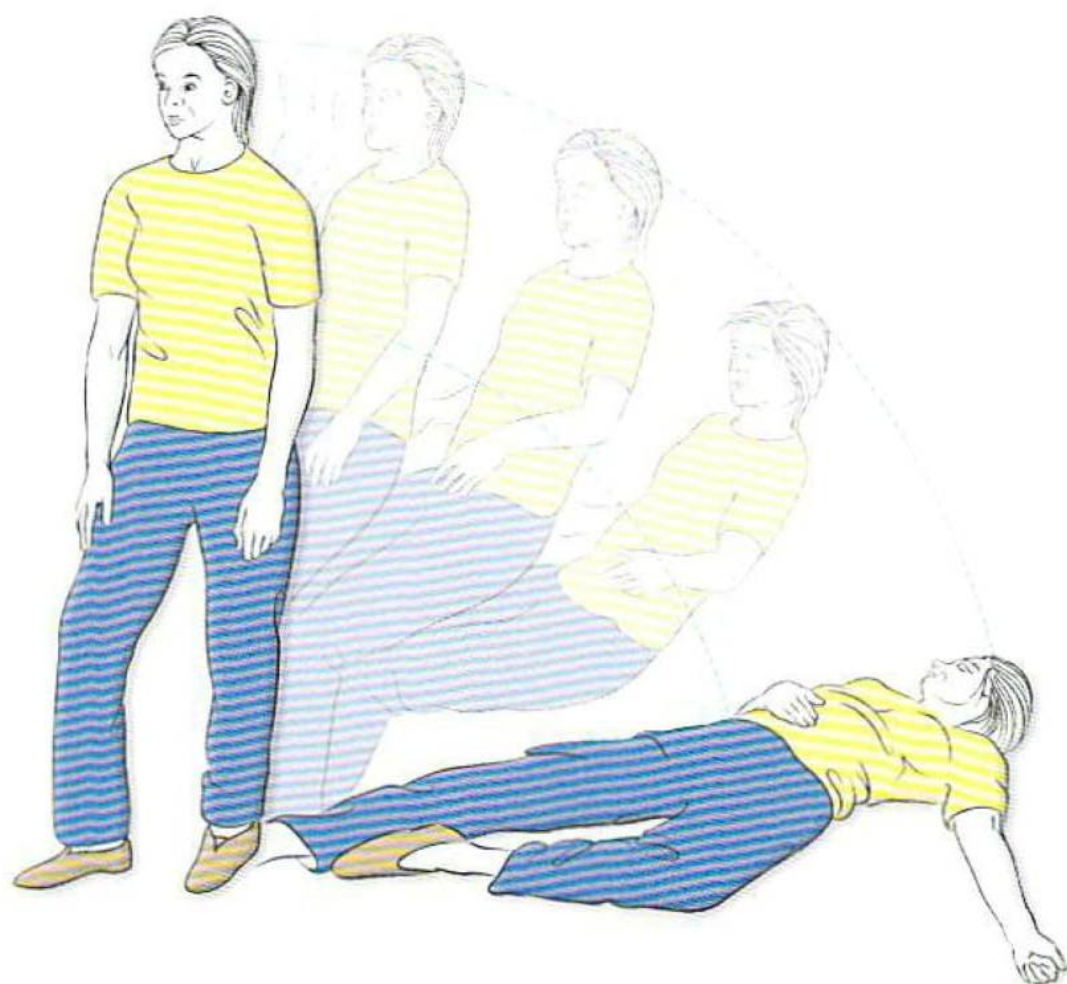



Syncope (Fainting)



A Patient's Guide

This booklet is not intended to replace professional medical care. Only your doctor can diagnose and treat medical problems.



Perhaps your doctor has told you that you have had syncope. Now, you probably have questions and concerns about it. This booklet can help answer many of your questions.

What Is Syncope?

Syncope is commonly known as fainting. It refers to a sudden loss of consciousness, which is followed by a rapid and complete recovery. Syncope occurs when the brain does not get enough blood and oxygen.

In the most common type of syncope, the nerves that control the function of the heart and blood vessels do not work properly. This can cause the heartbeat to slow down and blood pressure to drop, which in turn may cause a loss of consciousness.

Is Syncope Serious?

People who have had syncope but are otherwise in good health usually have a good outlook. However, people whose syncope is caused by underlying heart disease generally have a serious condition.

In most cases, syncope can be treated. Your doctor can explain the treatment options and help you decide the best way to manage your condition. With proper care, most people with syncope can continue to lead normal, active lives.

Understanding Syncope

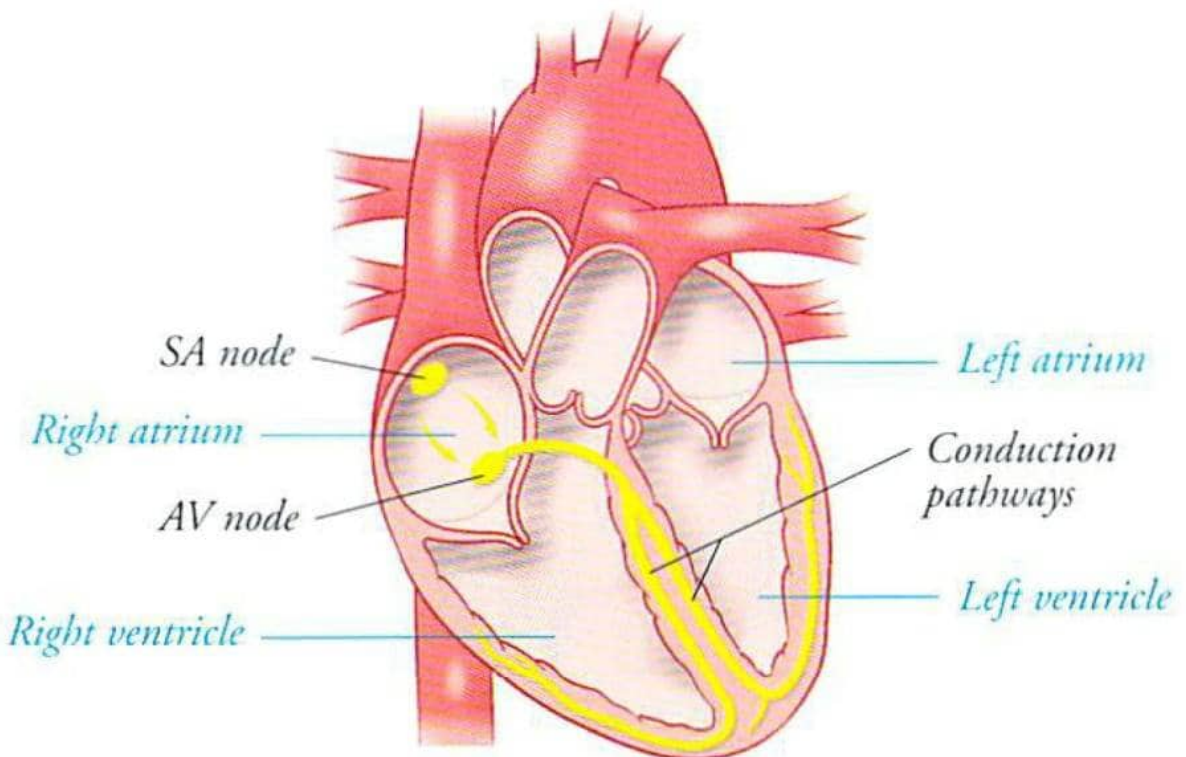
Before discussing the details of syncope, it helps to understand how the heart and the body work.

The Heart as a Pump

The heart is a hollow organ made of muscle that constantly pumps blood throughout the body. Blood circulates in blood vessels, which are elastic-like tubes that carry blood to every part of the body. Blood leaves the heart in **arteries** and returns to it in **veins**.

The heart has four chambers: two chambers on the left side and two on the right. The upper chamber on each side, called an **atrium**, receives and collects blood. The lower chamber on each side, called a **ventricle**, pumps blood out of the heart.

The heart chambers work together to pump blood. As it circulates, blood delivers oxygen and nutrients to all parts of the body, including the brain.



The Heart's Electrical System

The heart has an electrical system that produces tiny electrical impulses. These impulses travel from the upper to the lower chambers and tell the chambers to contract and pump blood.

The heart's electrical impulses normally begin at the sinoatrial node, or **SA node**. This cluster of special cells, also known as the heart's natural pacemaker, is located at the top of the right atrium. It produces electrical impulses at regular intervals and sets the proper rhythm for the heartbeat.

Each electrical impulse spreads throughout the atria (plural of atrium), causing them to contract and pump blood into the ventricles.

From the atria, the electrical impulse reaches the atrioventricular node, or **AV node**, which is located between the atria and the ventricles. The AV node slows down each electrical impulse before it passes through to the ventricles.

The impulse then travels to the ventricles through **conduction pathways**. The impulse stimulates the ventricles, causing them to contract and pump blood out of the heart.

How Blood Pressure Is Regulated

The heart pumps blood into the arteries with enough force to keep the blood flowing. **Blood pressure** is the amount of force blood exerts on the walls of the arteries as the heart beats.

Your brain and body need a steady supply of oxygen-rich blood. Your body has several ways to **regulate** (adjust) the blood pressure to maintain this steady supply, day and night:

- The heart adjusts blood pressure by varying how fast and how forcefully it beats.
- Small arteries can **constrict** (narrow) or **dilate** (widen) to raise or lower blood pressure.
- Veins also can constrict or dilate to change how much blood they hold.
- The kidneys can increase or decrease the amount of salt and water they discharge in the urine. This helps maintain the right volume of blood in the body.

The autonomic nervous system is the part of the nervous system that controls involuntary functions in the body, such as breathing, blood pressure, and heart rate.

Special nerve endings in the walls of arteries, called **baroreceptors**, monitor and regulate blood pressure through reflexes. (A reflex is an automatic reaction to a stimulus. An example of a reflex is the way the pupils in your eyes get smaller in bright light.)

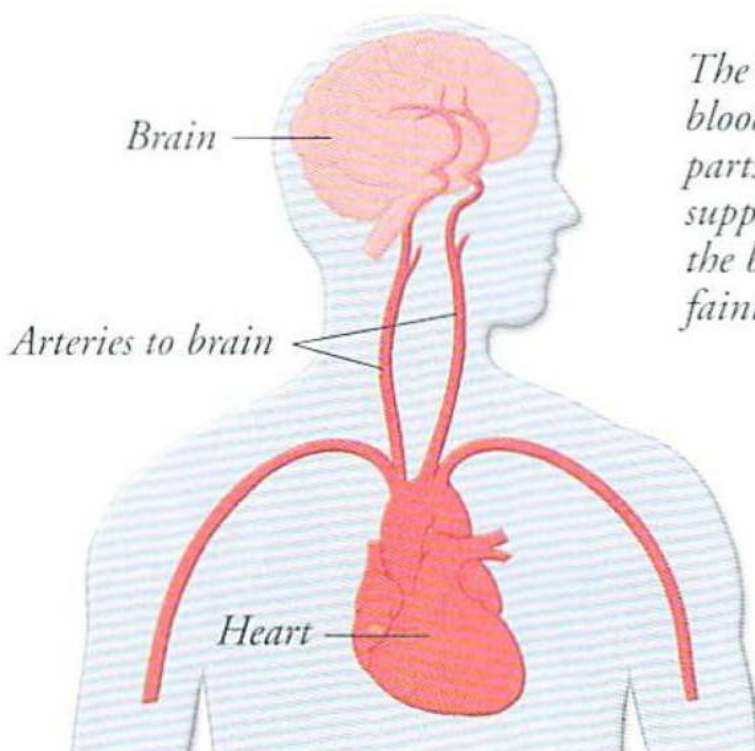
How the Body Normally Works

The natural reflexes that regulate blood pressure help make sure that your brain gets enough blood and oxygen to keep you from fainting.

Normally, when you stand up, gravity causes blood to pool (settle) in the lower part of the body. The veins in the legs dilate to hold the blood. As a result, less blood returns to the heart, less blood is available for the heart to pump, and blood pressure starts to drop.

The baroreceptors in the walls of the arteries sense that the blood pressure is beginning to drop, so they send signals to the autonomic nervous system.

The autonomic nervous system responds by making the heart beat faster and more forcefully. It also causes blood vessels to constrict. These actions bring the blood pressure back toward normal.



The heart pumps oxygen-rich blood to the brain and other parts of the body. The steady supply of blood and oxygen to the brain helps keep you from fainting.

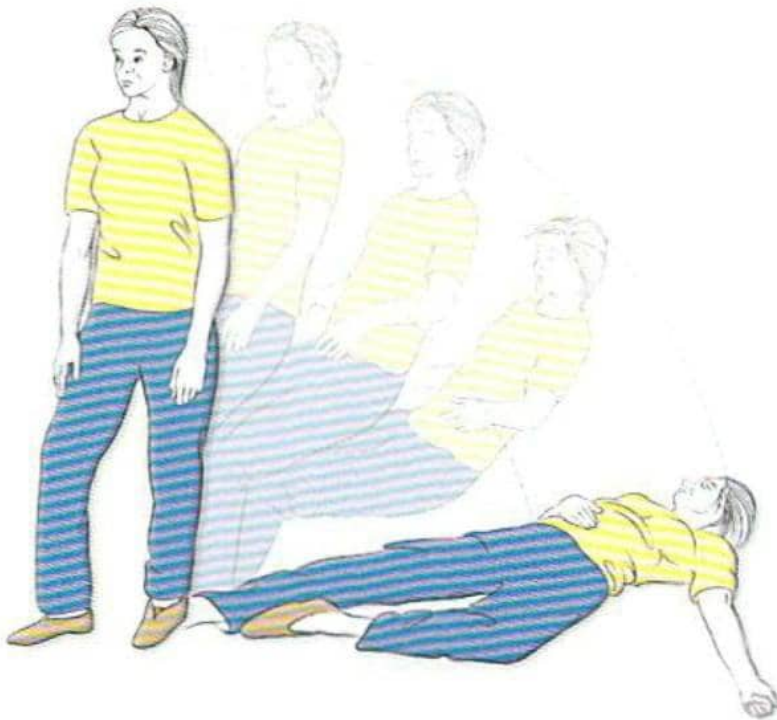
What Happens in Syncope?

For you to remain conscious, your heart must pump a steady supply of oxygen-rich blood to your brain. If your brain is deprived of this blood supply, even for a brief period, you will lose consciousness.

In the common type of fainting (vasovagal syncope, see page 10), the natural reflexes that normally help regulate the heart rate and blood pressure do not work properly.

As a result, in some situations (such as standing for long periods), the heartbeat slows down, the blood vessels dilate, and blood pressure drops. This, in turn, causes less blood to flow to the brain, and you faint.

Once you have fainted and are lying down, blood flow to the brain increases (because it is not fighting gravity), and you regain consciousness.



Symptoms of Syncope

People who have syncope often report **premonitory symptoms** before they faint. These symptoms give a warning that fainting is about to occur. They usually include one or more of the following:

- lightheadedness
- nausea
- pale appearance
- sweating
- feeling of warmth
- weakness
- dimmed vision
- difficulty hearing

Sometimes, however, loss of consciousness occurs without a warning.

A typical episode of syncope is brief, usually lasting less than 20 seconds. Rarely, an episode may last up to several minutes. If you are standing, you may fall down. The loss of consciousness is followed by a rapid and complete recovery. After fainting, you may feel tired for up to several hours.

Near-syncope, also called pre-syncope, refers to a situation in which a person suddenly feels dizzy, lightheaded, and weak, as if about to pass out. The sensation usually lasts for only a few seconds, and then you feel normal again.

Common Causes of Syncope

A number of medical conditions can cause fainting. These are some of the most common ones.

Reflex Syncope

Reflex syncope, also called neurally-mediated syncope, is brought on by a faulty reflex. When triggered, this reflex causes the heartbeat to slow down and/or blood vessels to dilate, when they should not.

There are several types of reflex syncope, depending on what triggers (brings on) the fainting spell.

■ *Vasovagal Syncope*

This is the most common and best known type of syncope. It is also called neurocardiogenic syncope, or the “common faint.” Vasovagal syncope may be triggered by standing for long periods, heat, pain, fear, the sight of blood, or emotional distress.

Vasovagal syncope often occurs in young, healthy people. Usually there are warning symptoms such as nausea, sweating, and pale appearance.

■ *Situational Syncope*

Situational syncope is similar to vasovagal syncope, but fainting is triggered by specific situations or activities, such as:

- coughing or sneezing
- urinating
- having a bowel movement
- swallowing
- diving, lifting weights



■ *Carotid Sinus Syncope*

In carotid sinus syncope, fainting is triggered by pressure on the carotid sinus (an area of the carotid artery, in the neck, that contains sensors that monitor blood pressure). Fainting can occur if you turn your head to one side, shave, or wear clothes that are too tight around the neck. Carotid sinus syncope is more common in older people.

Postural Syncope

Postural syncope, also called orthostatic syncope, occurs when a person is lying or sitting and stands up quickly. The normal reflex that causes blood vessels to constrict does not work properly. As a result, blood pressure drops and you faint.

Postural syncope is more common in people who are older and/or frail, who have underlying medical problems (such as diabetes or neuropathy), or who are dehydrated.

Drugs that lower blood pressure (antihypertensives), increase urine flow (diuretics), or dilate blood vessels (vasodilators) can also make a person more likely to have postural syncope.

Arrhythmias

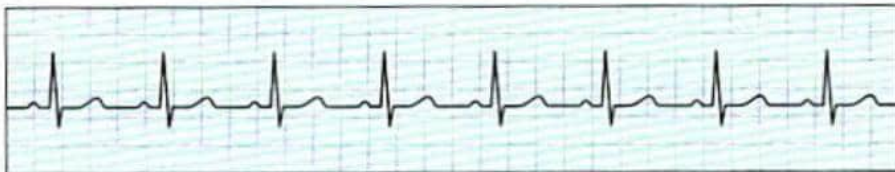
Normally, the SA node sets the pace for the heartbeat (see page 5). At rest, the SA node normally starts 60 to 100 beats a minute. During exercise, a healthy SA node responds by increasing the **heart rate** (the number of beats per minute).

During an arrhythmia, there is a change in either the rate or the pattern of the heartbeat. The heart may beat too slowly, resulting in **bradycardia**; it may beat too fast, resulting in **tachycardia**; or the rhythm may become irregular or erratic.

An arrhythmia may be felt as a skipping or fluttering sensation in the chest (palpitations). It may also cause dizziness, chest pain, or shortness of breath.

Arrhythmias can cause syncope if the heart rate is very slow (usually less than 40 beats a minute) or very fast (greater than 180 beats per minute). There is a loss of consciousness because the heart is unable to pump enough blood and oxygen to the brain.

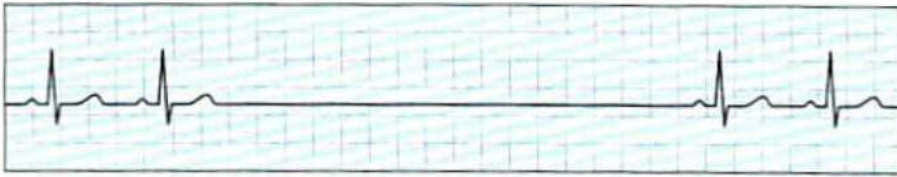
An electrocardiogram, or ECG, is the most basic test for diagnosing arrhythmias (see page 17). It records the electrical activity of the heart as a wavy line.



An ECG recording of a normal heart rhythm at rest

Here are a few examples of arrhythmias that may cause dizziness or syncope.

- In **sick sinus syndrome**, the SA node does not work properly. It may not send electrical impulses often enough, or it may skip some. As a result, the heart may beat very slowly or it may pause too long between beats.



A very long pause between beats

- In **heart block**, electrical impulses that travel from the atria to the ventricles (along the conduction pathways) are either delayed or blocked. As a result, the heartbeat is often very slow and unreliable.



A very slow heartbeat in heart block

- In **ventricular tachycardia**, one or more electrical pathways exist in the ventricles, usually in an area of the heart muscle that was damaged by heart attack or disease. This can cause a rapid heart rhythm that sometimes becomes life-threatening.



A very fast heartbeat in ventricular tachycardia

Structural Heart Disease

Syncope can also be caused by a defective heart valve, a diseased heart muscle, or other abnormal structures in the heart. Here are two examples.

- In **aortic stenosis**, the valve that regulates blood flow between the heart and the body's main artery (the aorta) is narrowed. As a result, the heart may not be able to pump enough blood through the narrow valve to the brain. This may result in syncope.
- In **hypertrophic cardiomyopathy**, parts of the heart muscle become thick and stiff. This may obstruct (block) the flow of blood out of the heart, and may lead to loss of consciousness.

It is particularly important to identify fainting spells caused by structural heart disease because these spells are often warning signs of a life-threatening condition.

Conditions That Mimic Syncope

Some conditions resemble syncope but are not truly syncope. Here are a few examples:

- epilepsy (seizures)
- intoxication
- hypoglycemia (low blood sugar)
- stroke
- hyperventilation
- accidental falls
- anxiety attacks, psychiatric disorders

Is Syncope Serious?

If you fall after you faint, you may get cuts or bruises or break a bone. If syncope occurs while you are driving, you may injure yourself or others.

People who have had syncope but are otherwise in good health *generally* have a good outlook. On the other hand, people whose syncope is caused by arrhythmias or structural heart disease *generally* have a serious condition.

Your doctor will tell you if your type of syncope is serious, and what type of treatment it requires.

Syncope should not be confused with **sudden cardiac death**. With sudden cardiac death, a person also loses consciousness suddenly but will die without immediate medical attention. With syncope, a person recovers quickly, almost always without treatment.

In people with heart disease, syncope can be a warning sign of a future episode of sudden cardiac death.

Your Medical Evaluation

To help diagnose your problem, your doctor will take a thorough **medical history**. Here are some of the questions you are likely to be asked:

- What were you doing when you fainted?
 - sitting, standing, exercising?
 - coughing, urinating, moving your bowels?
 - feeling fear, severe pain, upset?
- Did you have premonitory symptoms (see page 9)?
 - lightheadedness, nausea, sweating, weakness, dimmed vision, difficulty hearing?
- What happened *during* the attack (as seen by an eyewitness)?
 - were you pale, sweaty, flushed?
 - did you have seizures?
 - how long did the loss of consciousness last?
- What happened *after* you woke up?
 - were you confused, tired?
 - did you lose control of your bladder or bowels?
 - were you injured?

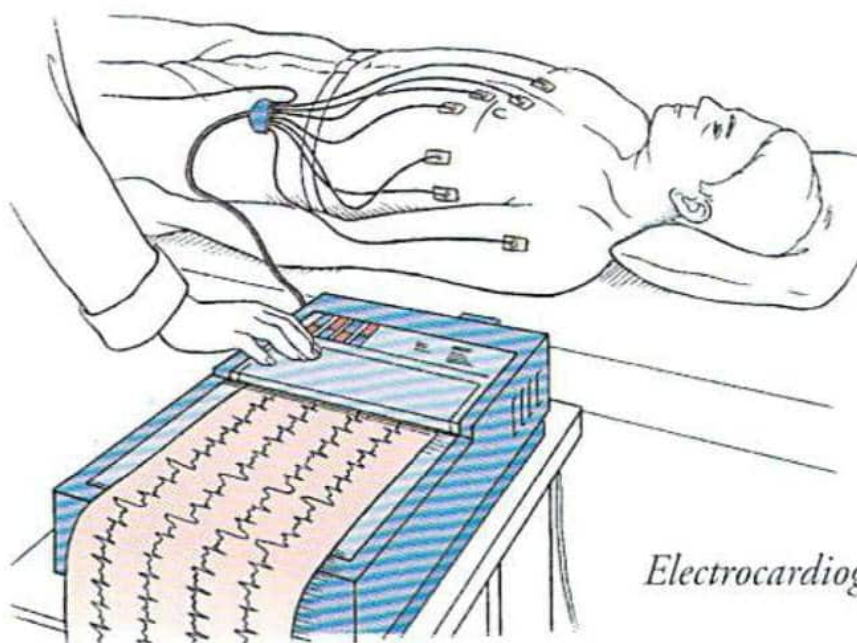
You will also be asked about your past medical history (such as heart disease, diabetes, or neurological disease); the medications you take (such as diuretics and antihypertensives); and your family history.

As part of your **physical exam**, the doctor will check your heart, blood vessels, and nervous system. He or she will also check your blood pressure—lying down, then standing up. A significant drop in blood pressure when you stand up suggests that your fainting spells may be caused by postural syncope (see page 11).

One or more of the following diagnostic tests may also be done to help determine the cause of your syncope, determine how severe the problem is, and find the proper treatment.

- An **electrocardiogram (ECG)** is a simple test that records the electrical activity of your heart. Several electrodes (small pads) are placed on your chest, arms, and legs. The heart's electrical impulses cause a needle to trace the heartbeat as a wavy line.

By examining the ECG tracing, doctors can diagnose arrhythmias (see page 12). The tracing can also help detect abnormalities that provide clues to underlying heart problems. For example, it can show a previously damaged heart muscle, a thickened heart muscle, and enlarged heart chambers.



Electrocardiogram test

- **Holter monitoring** is a continuous recording of your heart rhythm, usually for 24 or 48 hours, while you go about your usual daily activities. It is useful for detecting arrhythmias that may not appear during a resting ECG at the doctor's office.


The recorder is small and portable. You wear it on a strap over your shoulder or at your waist. The device records the electrical signals of your heart on tape or on a memory card.

Most recorders are equipped with an event marker. When you feel symptoms, you press the event marker button to mark the event on the ECG recording.

While you are wearing the recorder, you will be asked to keep a diary of your activities and symptoms. After the monitoring period, the doctor will compare the timing of your activities and symptoms with the recording.



Holter Monitor Diary		
Time	Activity	Symptoms
8:20 AM	walking 2 miles	racing heart
12:35 PM	having lunch	a few skipped heartbeats
2:50 PM	meeting with client	sweating, dizzy spell
5:45 PM	driving home	a few skipped heartbeats
...

- 
- A **loop recorder** records your heart rhythm when you have symptoms, or an “event.” It helps detect arrhythmias that do not occur very often.

You carry a small, lightweight recorder over a period of days or weeks. When you feel symptoms (such as dizziness or palpitations), you press a button to activate the recorder and “capture” the event.

The recorder has a “memory loop” that captures the heart’s electrical activity that occurred *before* an event. If you lose consciousness, you can activate the recorder soon after you regain consciousness. The ECG pattern from the previous few minutes is saved in the device’s memory and can be retrieved.

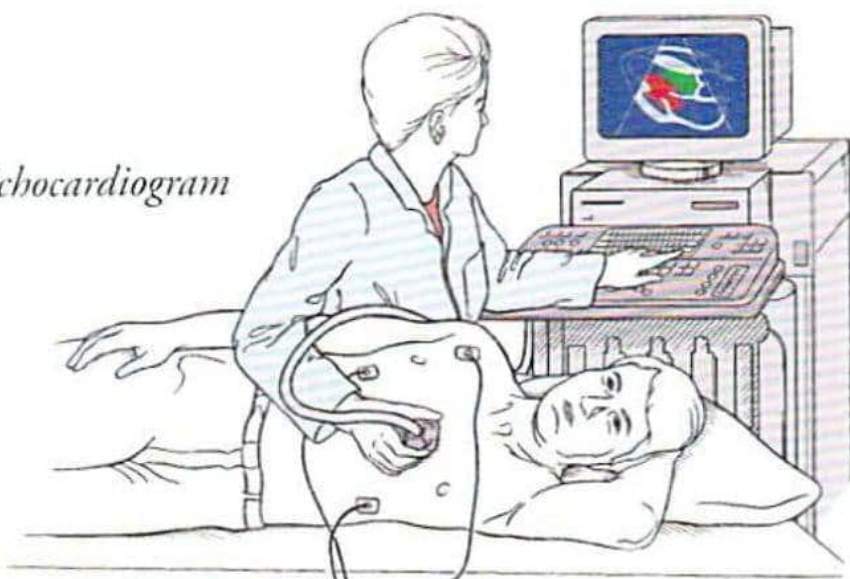
- In patients who have syncope that is difficult to diagnose, an **implantable loop recorder** may be an option. This small device is implanted under the skin in the upper chest area. Implanting the recorder in your chest takes little time and is done as an outpatient procedure. The device records the heart rhythm continuously for up to two years.

After you wake up from a fainting spell, you activate the recorder by pressing a button on a hand-held device (called an activator). This captures and stores the ECG as it occurred at the time you fainted.

- An **echocardiogram** uses ultrasound waves to create an image of the heart and the pattern of blood flow through it. It is a safe and painless test that helps doctors diagnose many kinds of heart problems.

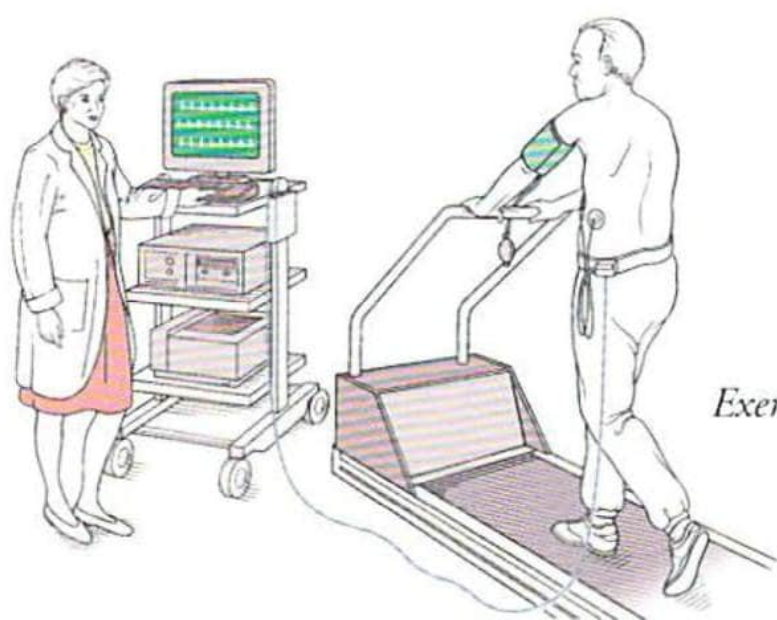
The echocardiogram shows how well your heart is pumping blood and whether your heart valves are too narrow or leaking. It can help determine whether your syncope is linked to a heart problem.

Echocardiogram



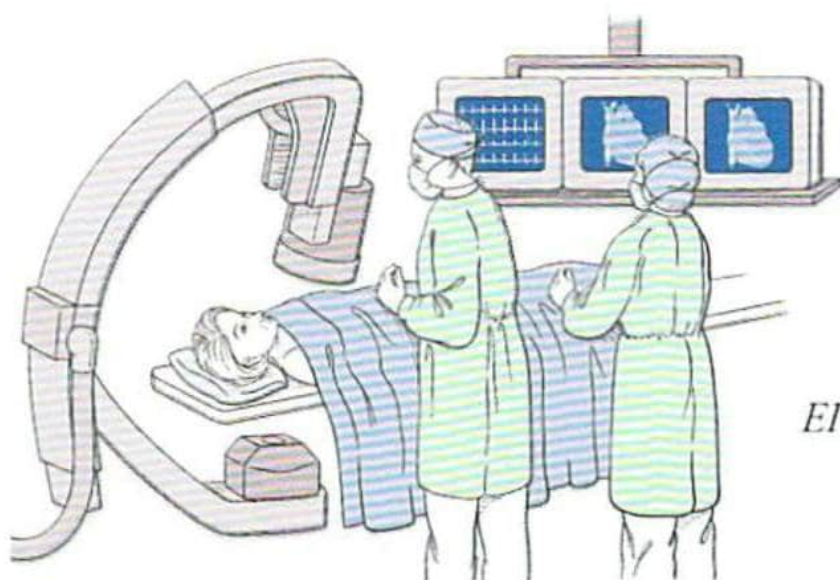
- An **exercise ECG test** (stress test) may be done if you have had syncope during or shortly after exercise. During the test, you either walk on a treadmill or pedal a stationary bicycle while your heart rhythm and blood pressure are monitored.

The exercise ECG test is done to determine how well your heart responds to the demands of exercise. It can help detect heart problems that may not show on the ECG while you are resting.

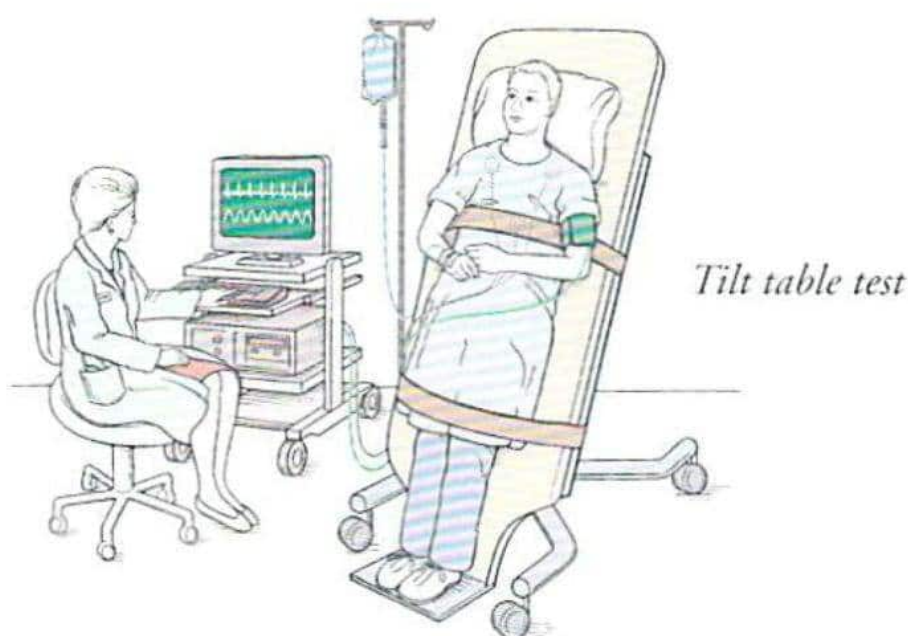


Exercise ECG test

- If your doctor suspects that your syncope is caused by an arrhythmia, an **electrophysiology (EP) study** may be done. During an EP study, electrode catheters (long, flexible wires) are inserted into the heart. The test allows doctors to find abnormal sites inside the heart that may be causing serious arrhythmias.



EP study




- **Tilt table testing** helps determine if your fainting spells are caused by vasovagal syncope (see page 10). During the test, you lie on a special table that can be moved to a nearly upright position. This causes blood to pool (settle) in the lower part of the body.

As a result of the tilt, less blood returns to the heart, less blood is available for the heart to pump, and blood pressure starts to drop.

Normally, the natural reflexes that help regulate the function of the heart and blood vessels are able to maintain proper blood pressure (see page 7).

In people who have vasovagal syncope, these reflexes do not work properly. As a result, the heart slows down and/or the blood pressure drops. Symptoms (such as dizziness or fainting) may also occur.

- 
- To help determine if your fainting is caused by carotid sinus syncope (see page 11), your doctor may do **carotid sinus massage**. During this test, the doctor gently rubs your neck just below the angle of the jaw, while your heart rate, blood pressure, and symptoms are monitored.

The test is called “positive” (abnormal) if it brings on your symptoms *and* either causes your heart to pause or your blood pressure to drop significantly.

- If the above tests do not give doctors all of the information they need, **other tests** may be done. These may include a neurological examination, an EEG (of the brain), a CT scan of the head, or a psychiatric evaluation.

Treatment Options

The type of treatment that your doctor recommends depends on a number of factors, including what causes your syncope, how severe your symptoms are, and how likely you are to injure yourself or others.

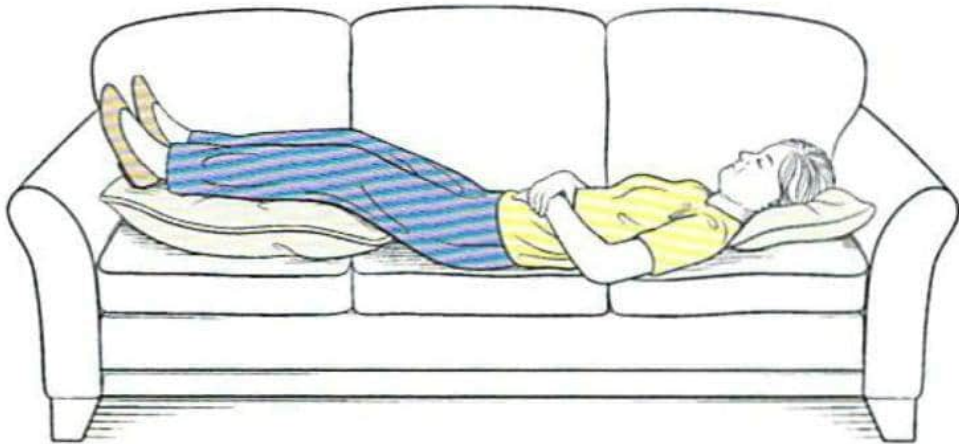
Reflex and Postural Syncope


If your fainting spells are caused by reflex syncope or postural syncope (see pages 10 and 11), the treatment options may include one or more of the following.

- ***Recognizing Symptoms and Preventing Injury***

To help prevent fainting spells, you need to learn to recognize premonitory symptoms, as they often are a warning sign. If you *suddenly* feel dizzy, nauseated, sweaty, or weak, do not ignore or fight the symptoms. Stop what you are doing and lie down immediately.

Continue to lie down until you feel better. Keep your legs slightly elevated (on a pillow, for example). Your symptoms should go away within a few minutes.

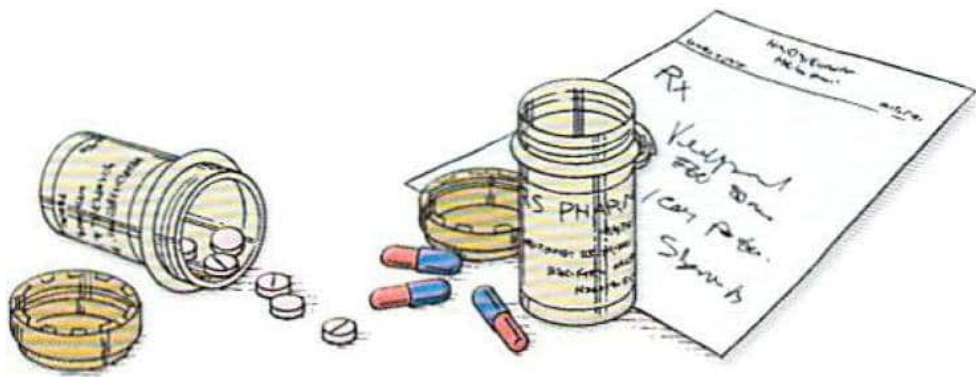




■ *Preventing Fainting Spells from Recurring*

You can help prevent fainting spells by taking some of these common-sense precautions:

- In *vasovagal syncope*, avoid things that can trigger syncope, such as pain or emotional distress, as much as possible.
- If you tend to faint when your blood is being drawn, ask to lie down during the procedure.
- Avoid crowded places, long periods of standing, and exposure to heat.
- In *situational syncope*, sit down to urinate; wait a short while after a bowel movement before you stand up; use stool softeners to prevent straining.
- In *carotid sinus syncope*, avoid clothes that are too tight around the neck.
- In *postural syncope*, get up slowly after you have been lying down, and sit for a moment before you stand up.
- Be careful when you take a hot bath or sauna.
- Drink water often, especially when you exercise in hot weather.
- Wear specially prescribed stockings to keep blood from pooling in your legs.
- Limit your driving if you are told to.



■ *Adjusting Your Medications*

Blood pressure medications, diuretics (“water pills”), and other heart drugs can cause fainting spells. Your doctor may ask you to stop taking these drugs, or change the dose you take.

■ *Prescribing New Medications*

In some cases, your doctor may prescribe medications that can help prevent syncope. Examples include drugs that constrict (tighten) blood vessels and drugs that make your body retain salt and water.

Unfortunately, such medications do not always work, and they often cause side effects.

■ *Increasing Your Salt and Fluid Intake*

If your fainting spells recur, your doctor may ask you to increase the amount of salt and fluids in your diet. For example, you may be advised to take ‘sports’ drinks (such as Gatorade) or salt tablets.

Your doctor may also prescribe fitted elastic stockings. They help keep blood from pooling in your legs.



■ *Doing Isometric Maneuvers*

Isometric maneuvers of the legs and/or arms can help raise blood pressure during the warning phase before you faint. These maneuvers can help prevent or delay fainting in many cases.

Examples of isometric maneuvers include standing with your legs crossed and tensing the leg muscles; or doing hand grips and tensing the arm muscles.

■ *Tilt Training*

If you have recurring fainting spells, your doctor may prescribe tilt training to help prevent recurrences. A typical program consists of standing for gradually longer and longer periods.

■ *Syncope and Driving*

If you continue having fainting spells, you may be advised not to drive for several weeks or months. Many states have laws that say that someone who has fainting spells cannot drive.

Arrhythmias

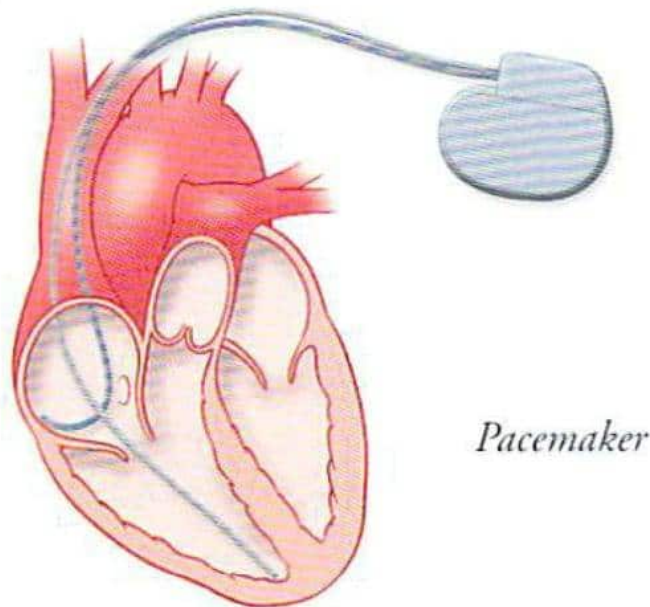
If your fainting spells are caused by an arrhythmia, your treatment will depend, for the most part, on the type of arrhythmia you have.

If the problem is a heart rhythm that is too *slow*, your doctor will most likely recommend a pacemaker. If the problem is a rhythm that is too *fast*, he or she may recommend antiarrhythmic drugs, catheter ablation, or an implantable defibrillator.

■ *Pacemaker*

A pacemaker is a small electronic device prescribed for people whose hearts are beating too slowly. It is implanted into the body, usually near the shoulder.

The pacemaker keeps track of the heart's electrical activity. If it senses that the heart is beating too slowly or is pausing for too long, the pacemaker delivers electrical impulses that keep the heart beating at the proper speed.



Pacemaker

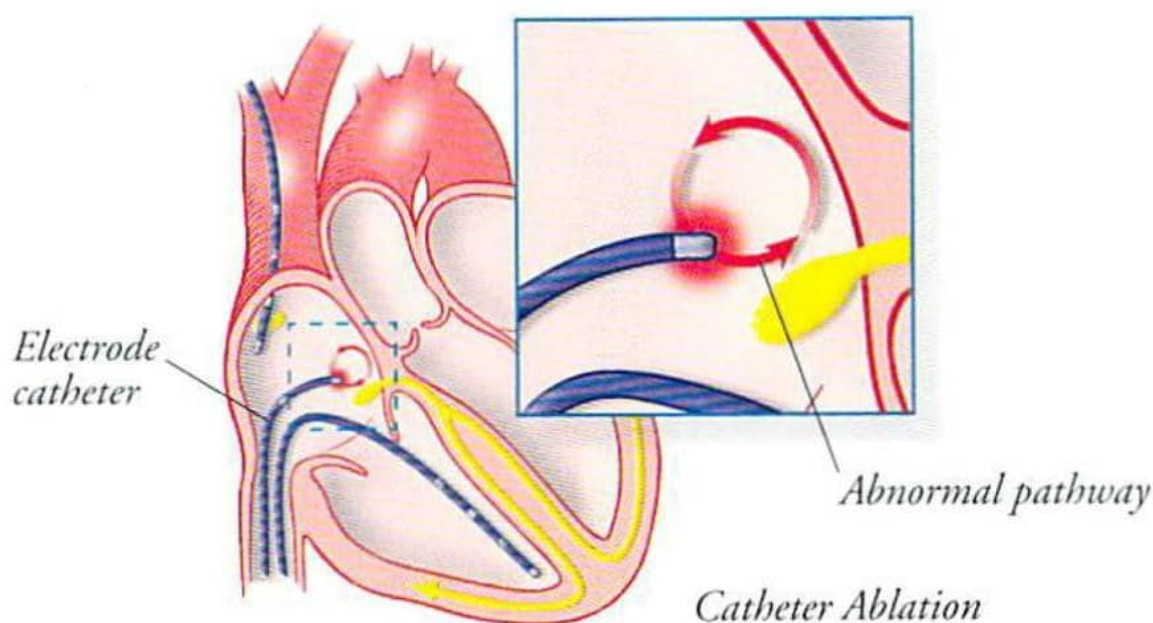
■ *Antiarrhythmic Drugs*

Antiarrhythmic drugs help restore a normal heart rhythm and/or prevent arrhythmias from occurring. Most antiarrhythmic drugs work by changing the electrical signals in the heart. They are generally used for treating rapid heart rhythms.

■ *Catheter Ablation*

Catheter ablation is a non-surgical procedure used to destroy parts of an abnormal electrical pathway that is causing a rapid heart rhythm.

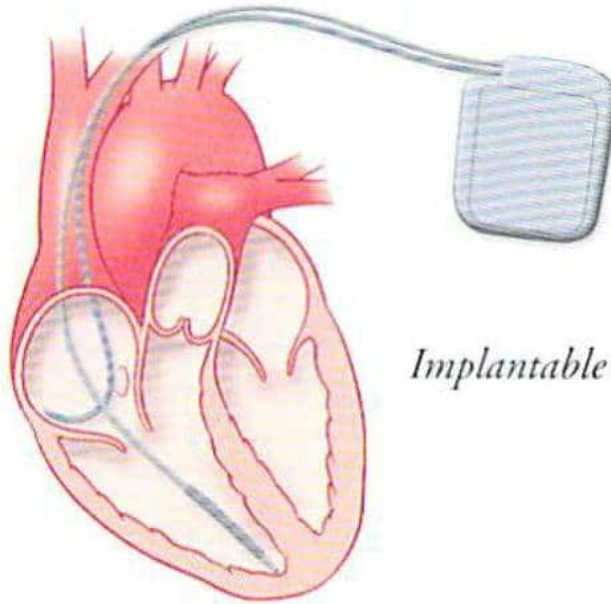
During ablation, doctors insert an electrode catheter (a long, flexible wire) into the heart. They place the catheter so that it lies near the abnormal pathway; then they pass heat energy through it. The tip of the catheter heats up and destroys the small area of heart tissue where the abnormal pathway is.



■ *Implantable Defibrillator*

An implantable defibrillator, like a pacemaker, is a small electronic device that is implanted in the body. It is designed to treat rapid heart rhythms that are life-threatening.

The device monitors the heart rhythm at all times. If it senses a dangerously fast rhythm, it delivers electrical impulses or shocks to the heart and restores a normal rhythm.



Implantable defibrillator

Structural Heart Disease

If you have structural heart disease, your treatment will depend on the type of heart problem you have and how severe your symptoms are.

For example, when syncope is caused by a defective or diseased aortic valve (see page 14), surgeons may replace the diseased valve with an artificial one. In some cases, if the valve is not too deformed, they may be able to repair the valve.



Remember . . .

In most cases, syncope can be treated. Your doctor can explain the treatment options and help you decide the best way to manage your condition. With proper care, most people with syncope can continue to lead normal, active lives.

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