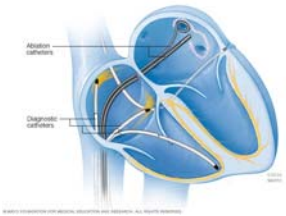
Pulmonary vein isolation

Overview

Pulmonary vein isolation is a procedure used to stop abnormal electrical signals in your heart that cause heart rhythm problems.

Pulmonary vein isolation is a type of cardiac ablation. Cardiac ablation works by scarring or destroying tissue in your heart that triggers an abnormal heart rhythm. In some cases, cardiac ablation prevents abnormal electrical signals from traveling through your heart and, thus, stops the heart rhythm problem.

In pulmonary vein isolation, the procedure creates scar tissue in the part of the left upper chamber of your heart where each of your four pulmonary veins connects. Your pulmonary veins bring oxygen-rich blood from your lungs to your heart. Pulmonary vein isolation can reduce the signs and symptoms of atrial fibrillation, which affects the upper chambers of the heart.



Cardiac ablation
Cardiac ablation is a procedure to scar or destroy tissue in your heart that's allowing incorrect electrical signals to cause an abnormal heart rhythm. Diagnostic catheters are threaded through blood vessels to your heart where they are used to map your heart's electrical signals. Ablation catheters transmit heat or cold to scar or destroy tissue. This illustration shows ablation catheters being applied near the pulmonary veins in a

Mayo Clinic's approach

type of cardiac ablation called pulmonary vein isolation.

Why it's done

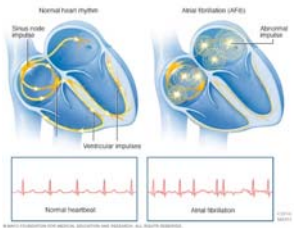
Pulmonary vein isolation is used to reduce signs and symptoms and improve quality of life for people living with atrial fibrillation.

Pulmonary vein isolation usually isn't your fist treatment option. Your doctor may recommend that you try to control your atrial fibrillation with other treatments first.

About atrial fibrillation

During atrial fibrillation, the heart's two upper chambers (the atria) beat chaotically and irregularly — out of coordination with the two lower chambers (the ventricles) of the heart. Atrial fibrillation symptoms often include heart palpitations, shortness of breath and weakness.

For most people with atrial fibrillation, the chaotic electrical signals originate in the pulmonary veins.



Atrial fibrillation
In a normal heart rhythm, a tiny cluster of cells at the sinus node sends out an electrical signal. The signal then travels through the atria to the atrioventricular (AV) node and then passes into the ventricles, causing them to contract and pump out blood. In atrial fibrillation, electrical signals fire from multiple locations in the atria (typically pulmonary veins), causing them to beat chaotically. The AV node — your heart's natural pacemaker — is unable to prevent all of these chaotic signals from entering the ventricles. Your ventricles respond to these extra, chaotic signals by beating faster than normal.

About your pulmonary veins

Each of your lungs has two pulmonary veins that connect to the left upper chamber of your heart. Your pulmonary veins carry oxygenated blood from your lungs to your heart.

The goal of pulmonary vein isolation is to cause scar tissue near where the pulmonary veins connect to your heart. This limits or stops the chaotic electrical signals from reaching the upper chambers of your heart.

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Risks

Pulmonary vein isolation carries a risk of complications, including:

- Bleeding or infection at the site where your catheter was inserted
- Damage to your blood vessels where the catheter may have scraped as it traveled to your heart
- Puncture of your heart
- Damage to your heart valves
- Damage to your heart's electrical system, which could worsen your arrhythmia and require a pacemaker to correct
- Blood clots in your legs or lungs (venous thromboembolism)
- Stroke or heart attack
- Narrowing of the veins that carry blood between your lungs and heart (pulmonary vein stenosis)
- Death in rare cases

Discuss the risks and benefits of cardiac ablation with your doctor to understand if this procedure is right for you.

How you prepare

Your doctor will evaluate you and may order several tests to evaluate your atrial fibrillation. Your doctor will discuss with you the risks and benefits of pulmonary vein isolation.

You'll need to stop eating and drinking the night before your procedure. If you take any medications, ask your doctor if you should continue taking them before your procedure.

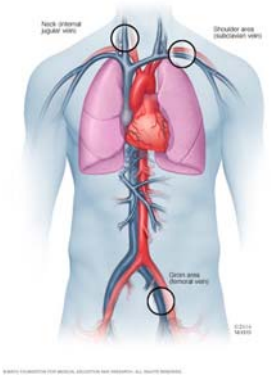
Your doctor will let you know if you need to follow any other special instructions before or after your procedure. In some cases, you'll be instructed to stop taking medications to treat a heart arrhythmia several days before your procedure.

If you have an implanted heart device, such as a pacemaker or implantable cardioverter-defibrillator, talk to your doctor to see if you need to take any special precautions.

What you can expect

During pulmonary vein isolation

Pulmonary vein isolation is performed in the hospital. Before your procedure begins, a specialist will insert an intravenous line into your forearm or hand, and you'll be given a sedative to help you relax. In some situations, general anesthesia may be used instead to place you in a sleep-like state.



Catheter insertion points for cardiac ablation
During cardiac ablation, catheters are passed through a vein in order to reach your heart. Catheters may be inserted in your groin, your shoulder or your neck.

After your sedative takes effect, your doctor or another specialist will numb a small area near a vein in your groin, neck or shoulder. Your doctor will insert a needle into the vein and place a tube (sheath) through the needle.

Your doctor will thread catheters through the sheath and guide them to several places within your heart. Your doctor may inject dye into the catheter, which helps your care team see your blood vessels and heart using X-ray imaging. The catheters have electrodes at the tips that can be used to send electrical impulses to your heart and record your heart's electrical activity.

This process of using imaging and other tests to determine what's causing your arrhythmia is called an electrophysiology (EP) study.

Catheters are moved from the upper right chamber of your heart to the upper left chamber of your heart where your pulmonary veins connect. Heat (radiofrequency ablation) or cold (cryoablation) energy will travel through the catheter tip to the target area and create a scar or destroy the tissue. In most cases, each of the four pulmonary veins is treated during pulmonary vein isolation.

In some cases, ablation blocks the electrical signals traveling through your heart to stop the atrial fibrillation and allow signals to travel over a normal pathway instead.

Pulmonary vein isolation usually takes three to six hours to complete, but complicated procedures may take longer.

During the procedure, it's possible you'll feel some minor discomfort when the dye is injected in your catheter or when energy is run through the catheter tips. If you experience any type of severe pain or shortness of breath, let your doctor know.

After pulmonary vein isolation

Following your procedure, you'll be moved to a recovery area to rest quietly for four to six hours to prevent bleeding at your catheter site. Your heartbeat and blood pressure will be monitored continuously to check for complications of the procedure.

Depending on your condition, you may be able to go home the same day as your procedure, or you may need to stay in the hospital. If you go home the same day, plan to have someone else drive you home after your procedure.

You may feel a little sore after your procedure, but the soreness shouldn't last more than a week. You'll usually be able to return to your normal activities within a few days after having pulmonary vein isolation.

Results

Although pulmonary vein isolation can be successful, some people need repeat procedures.

Pulmonary vein isolation may reduce the signs and symptoms of atrial fibrillation and improve your quality of life. However, it's not been shown to reduce your risk of a stroke, so your doctor may recommend that you continue blood-thinning medications.

Clinical trials

Explore Mayo Clinic studies testing new treatments, interventions and tests as a means to prevent, detect, treat or manage this disease.

By Mayo Clinic Staff

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