

Medtronic

Engineering the extraordinary

Treating atrial fibrillation with catheter ablation



What is atrial fibrillation?

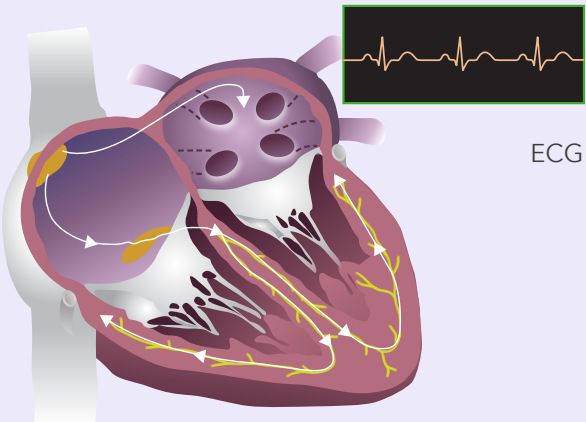
Atrial fibrillation, also known as AF, is an irregular heart rhythm that affects the upper chambers (atria) of the heart. In AF, the atria quiver instead of beating normally. AF can also lead to rapid heart rhythm, where the heart can beat as much as 300 times a minute or more in the atria, and up to 150 times a minute or more in the lower chambers (ventricles).

The importance of treating atrial fibrillation

As a result of the quivering rhythm in the atria during AF, blood is not completely pumped out of the upper chambers of the heart, which may cause it to pool and clot. Treating AF is important because it may negatively impact your quality of life or cause a stroke. During AF, the blood clot may form because blood is not completely pumped out of atria. This clot can travel to the brain causing a stroke.

Flow of electrical signals in a normal heartbeat.

Normal
heartbeat



In fact, people with AF are five times more likely to form blood clots and suffer a stroke.¹

Atrial fibrillation is also associated with fatigue and heart failure.^{1,2} The rapid and irregular heartbeats associated with atrial fibrillation can make your heart larger and weaker over time. A larger and weaker heart which does not pump blood to all the areas of your body very efficiently is called heart failure.

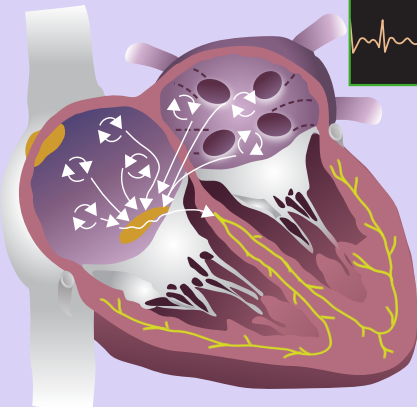
Fortunately, these risks can be reduced dramatically if they are monitored and treated. By working closely together, patients with the help of doctors can choose the most appropriate course of care for the treatment of atrial fibrillation.

Why does atrial fibrillation occur?

AF is commonly associated with structural heart disease but can also be associated with diabetes, heart failure, obesity, coronary artery disease, high blood pressure, ageing, and can have a genetic pre-disposition.

Atrial fibrillation with abnormal signals originating in the atria.

Atrial
fibrillation



ECG

How do I know if I might have AF?

Some people experience the following symptoms of atrial fibrillation:

- A feeling that the heart is racing
- Fatigue, shortness of breath, or weakness
- Heart sensations, sometimes called palpitations, which may include irregular, thumping, or pounding heartbeats
- Chest discomfort or pain
- Fainting or lightheadedness

Others have no symptoms and discover that they have AF at a doctor's appointment.

Even without symptoms, atrial fibrillation is a serious medical condition.

Book an appointment with your doctor if you have symptoms such as those above. Your doctor can help determine if those symptoms are related to AF or another health concern.

Are there different types of AF?

There are four main types of AF:

Paroxysmal AF

Paroxysmal AF refers to AF that can last up to seven days. Paroxysmal AF may last for seconds, minutes, hours and ends spontaneously or requires a cardioversion (a type of electrical shock) to return to normal rhythm. As the heart goes in and out of AF, the pulse rate can change from slow to fast and back again in short periods of time, which often causes more symptoms.

Persistent AF

Persistent AF lasts longer than seven days. Persistent AF includes those episodes that require a cardioversion (either electrically or with drugs) to return the heart back to normal rhythm, after seven days.

Long-standing Persistent AF

This is continuous AF lasting longer than one year.

Permanent AF

Permanent AF occurs when the AF cannot be fixed and it is accepted by patient and doctor not to use rhythm control strategies.

What are my treatment options if I have AF?

The European Society of Cardiology¹ recommends proactive treatment for AF whether you can feel symptoms or not. You and your doctor can discuss which treatment would be best for you and your heart condition.

The major goals in treating atrial fibrillation are to:

- Relieve AF symptoms and improve a patient's quality of life
- Prevent blood clots to decrease the risk of stroke
- Control the heart rate to allow the ventricles (lower heart chambers) enough time to fill with blood
- Reset the heart rhythm to allow the atria (upper chambers of the heart) and ventricles to work together more efficiently.

The following treatments may be prescribed to treat atrial fibrillation:

- Anticoagulation or “blood thinning” therapy to prevent clots from forming
- Medication to control the heart rate or rhythm
- Restoration of normal heart rhythm either through an electrical cardioversion or medication. Electrical cardioversion itself does not generally have lasting effects
- Catheter ablation to create lines of scar tissue to block abnormal electrical circuits causing AF
- Pacemakers and defibrillators, although not used as stand-alone treatment, may be used in conjunction with medication or catheter ablation. Some pacemakers and defibrillators have features that detect AF early and help suppress episodes
- Open-heart surgery to create lines of scar tissue to block abnormal electrical circuits causing AF

The continuation of this guide will focus on the treatment of atrial fibrillation using catheter ablation.

What is catheter ablation?

Catheter ablation is a minimally invasive procedure that can be used before or when medication fails to control the heart rhythm. Catheter ablation is performed in an electrophysiology lab in the hospital by a team of highly skilled nurses and technicians who work alongside the electrophysiologist (a doctor who specializes in treating heart rhythm conditions).

The goal of catheter ablation is to prevent electrical pathways from traveling from the pulmonary veins to the atrium. The pulmonary veins are large blood vessels that carry blood from the lungs to the left atrium. The pulmonary veins are the primary source of the electrical triggers causing AF.

The recommended ablation technique for accomplishing this goal is called Pulmonary vein isolation (PVI). During the procedure, catheters are used to terminate (ablate) these abnormal electrical pathways by eliminating targeted heart cells and stop them from continuing to cause AF.

There are 3 main technologies available to perform pulmonary vein isolation: Cryoablation (Cryo), Pulsed Field Ablation (PFA) and Radiofrequency (RF) ablation. Although all 3 are used for the same purpose of PVI, the main difference between them is the energy source. RF uses heat, whilst Cryo introduces cold temperatures. By contrast, PFA uses controlled electrical pulses to create tiny openings in the heart cells. The 3 methods involve heart cell ablation and result in the formation of scar tissue around the pulmonary veins which help to stop the abnormal signals that create atrial fibrillation.

What can I expect to experience with a atrial fibrillation ablation procedure?

Before the ablation procedure

Preparing for ablation is like preparing for any other type of planned procedure. Typical instructions include not drinking or eating after midnight the night before the procedure. Certain medication may need to be stopped; your doctor will advise you accordingly. Moreover, you will need to tell your doctor immediately of any health changes before the scheduled procedure, as infections can increase the risks involved in the procedure.

During the ablation procedure

During the procedure, you will receive fluids and any necessary medication through an intravenous (IV) line inserted in your arm. You may be anesthetized ('put to sleep') or sedated for the procedure.

A local anesthetic will be applied to the site where the ablation catheters will be inserted.

In most cases, the blood vessels in your groin are used for catheterisation.

In the procedure, the physician makes a needle-stick or a small cut in the groin area through which to insert the catheter. The physician threads the catheter to the right atrium of the heart. Then he or she crosses the wall that separates the right and left sides of the heart. This provides access to the left atrium. You will receive anticoagulants (blood thinners) to help prevent blood clots during the procedure.

Treating atrial fibrillation: proven experience and new choices

Today, three key technologies are shaping the treatment of atrial fibrillation:

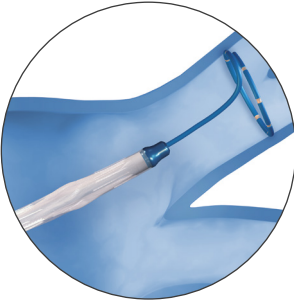
- **Arctic Front Advance™ Cryoablation:**
For nearly 20 years, doctors have trusted the Arctic Front Advance™ cryoballoon to treat AF. With ~ 1.5 million patients treated worldwide, cryoballoon ablation is one of the most widely studied and commonly used treatments, giving patients confidence in its proven safety and lasting results –

In addition, two innovative technologies are now expanding treatment options:

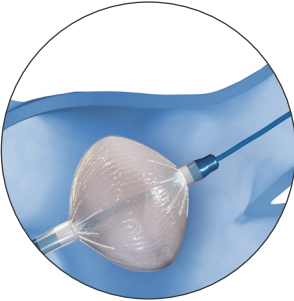
- **PulseSelect™ pulsed field ablation (PFA)** – received European approval in **November 2023**. PFA delivers short bursts of electrical energy to treat only the heart cells causing AF. Since PFA is a non-thermal energy source (not heat or cold), PFA allows for specific areas within the heart to be treated where the unwanted electrical signals are coming from while reducing risk of damage to other parts of the body.
- **Sphere-9™ catheter** – received European approval in **March 2023**. This innovative tool is part of the Affera Mapping and Ablation system, and combines two energy treatment options (PFA and radiofrequency energy) in one device, giving doctors the flexibility to tailor the procedure to each patient's needs.

Different catheter types and ablation techniques can be chosen for a procedure, helping your physician select the treatment best suited to your individual needs.

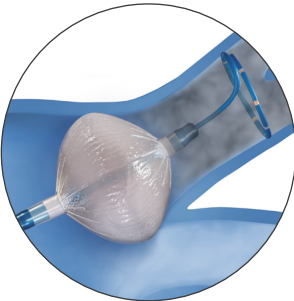
The following three images describe what happens specifically with the cryoballoon catheter:



The cryoballoon catheter enters the left atrium.



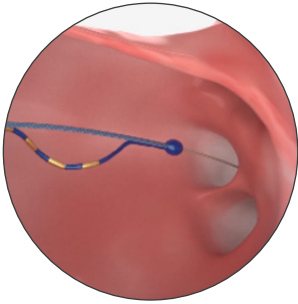
The physician inflates the balloon and moves it to the opening of the pulmonary vein.



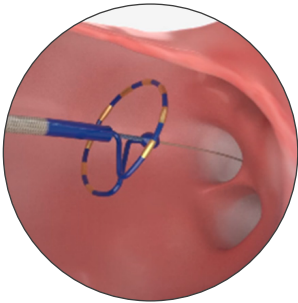
The goal is to close off the opening of the pulmonary vein completely, which stops the flow of blood between the vein and the atrium (this is called occlusion).

Once occlusion is confirmed, the physician introduces liquid refrigerant into the balloon. The refrigerant evaporates in the balloon and removes heat from the heart tissue at the opening of the pulmonary vein. As a result, the tissue is scarred and may no longer spread the electrical currents that cause atrial fibrillation.²

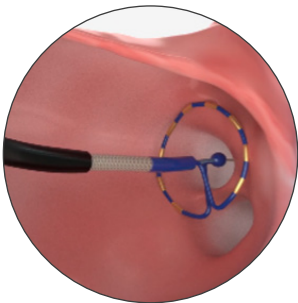
The following images describe what happens specifically with the PulseSelect™ PFA catheter:



The PulseSelect™ catheter enters the left atrium.



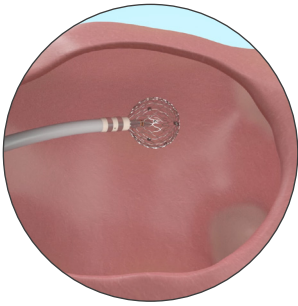
The physician activates the PulseSelect™ catheter loop shape and once its fully formed, moves it the opening of the pulmonary vein.



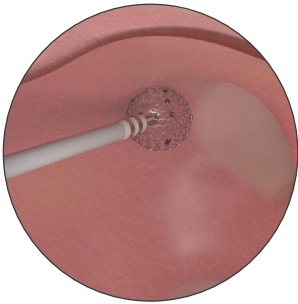
The goal is to position the catheter at the opening of the vein and make sure the circular part of the catheter is in contact with the tissue.

Once the position has been confirmed the physician targets the area with short bursts of electrical pulses. The catheter is rotated several times to make sure all areas are treated. As a result, the tissue is scarred and may no longer spread the abnormal signals that cause atrial fibrillation.

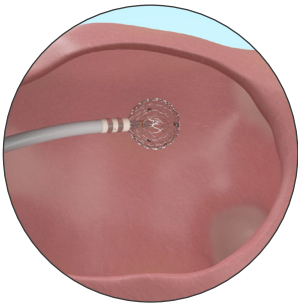
The following images describe what happens specifically with the Sphere-9™ catheter:



The Sphere-9™ catheter enters the left atrium.



The physician positions the spherical catheter at the opening of the pulmonary vein or other areas of interest inside the atrium.



The goal is to ensure the large surface of the Sphere-9™ catheter makes stable contact with the heart tissue at the mapped treatment site.

Once the position has been confirmed, the physician delivers therapy through the catheter. The Sphere-9™ can provide radiofrequency ablation or pulsed-field ablation, depending on the selected mode. During ablation, the physician may rotate or reposition the catheter to cover the full circumference of the vein or target area. As a result, the tissue is scarred and may no longer spread the abnormal signals that cause atrial fibrillation.

What happens after the procedure?

Soon after the procedure is completed, the catheter will be removed and pressure will be applied to the insertion site to reduce any bleeding. You will likely stay overnight in the hospital for observation.

While your activities will need to be limited for a couple of days, most patients return to their normal routine within a few days after the procedure. You may feel some minor soreness in your chest, or bruising or soreness at the insertion site.

Your doctor will talk to you about any activities you may have to stop while you are healing. In most cases, you will be able to return home the day following the procedure.

But some patients may be in the hospital a little longer. Some patients may experience a slight cough following the procedure. Let your physician know any time you have symptoms causing you discomfort.

Follow-up visits

Your doctor will likely want to see you to check on your healing and monitor your heart rhythm.

One catheter ablation is usually enough to treat atrial fibrillation. In some cases, individuals need a repeat procedure to achieve full success.

It's important to have check-ups as recommended by your physician. In addition, many patients may continue anticoagulation medication following an ablation procedure. Monitoring for this therapy may be required.

What are the benefits and risks of catheter ablation?^{1,2,9-12}

Benefits

Catheter ablation is a well-established treatment for restoring and maintaining the normal heart's rhythm.

Catheter ablation may improve your quality of life and eliminate or reduce the unpleasant symptoms of atrial fibrillation like shortness of breath, fatigue, or weakness.

Some patients may require more than one catheter ablation procedure. In some cases, patients may not require further drug treatment after receiving a catheter ablation procedure. Remember to talk to your doctor about all benefits and risks that are specific to your condition, and address any of your concerns. Although many patients benefit from catheter ablation, results may vary.

Risks

As with any medical procedure, there are risks with catheter ablation. Some of the risks include stroke, pericardial tamponade, narrowing of pulmonary veins, damage to the phrenic nerve, damage to the blood vessels in your groin area, and a serious but extremely low risk of atrio-esophageal fistula. Other risks include irritation, infection, or bleeding occurring where the catheter was inserted. In rare cases death may occur.

What to ask your doctor

If you have been diagnosed with atrial fibrillation, or suspect that you may have the condition, here are some questions that you may want to ask your physician:

- What is the cause of my AF?
- How can I be sure I have AF and not a more serious heart rhythm problem?
- Will my condition go away on its own?
- What are the risks that it will become worse (more symptomatic)?
- Am I at increased risk of having a stroke?
- What are my treatment options?
- What are the risks and side effects of medications to control my condition or to reduce the risk of stroke?
- What are the risks and benefits of other treatment options?
- Should I see an electrophysiologist (a specialist in heart rhythm disorders)?

Where can I get more information?

For more information about atrial fibrillation or to read more stories of people who have had a cryoablation procedure, visit:

<https://www.medtronic.com/uk-en/patients/treatments-therapies/catheter-ablation-af.html>

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Information contained herein is not medical advice and should not be used as an alternative to speaking with your doctor.

Discuss indications, contraindications, warnings, precautions, adverse events and any further information with your health care professional.

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