

# Aurora Cardiovascular Services

Electrophysiology



## *What you need to know about* **Atrial Fibrillation**

Atrial  
Fibrillation  
Ablation  
Center



Aurora Health Care®

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Electrophysiology Department

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## About atrial fibrillation

**Atrial fibrillation** is a common heart rhythm disorder. Since the name is difficult to recall for most people, you will often hear it called **AF** or **A-fib**. It is the most common arrhythmia of concern to the person who has it, and to physicians.

**It is the most common heart rhythm seen by physicians and the most common rhythm causing hospital admission.**

Over two million people in the United States have atrial fibrillation.

### *Risk factors for AF include:*

- Congestive heart failure (weakened heart muscle)
- High blood pressure
- Age – the number of people with AF doubles for every 10 years of age, and about 5% of the population over the age of 65 has the disorder
- Diabetes
- Prior history of a stroke or mini-stroke
- Heart valve disease
- Coronary artery disease

AF may also occur following heart surgery or heart attack, and in people with overactive thyroid. Excess caffeine, stimulant drugs (such as cocaine), tobacco use and excess alcohol may increase the tendency to develop AF, even in people with normal hearts. In some of these situations, AF may be temporary.

## Why is it important to know about atrial fibrillation?

Atrial fibrillation causes your heart to beat irregularly and can cause your pulse to race or be very slow. Sometimes this interferes with the normal circulation of blood to your head, body and heart muscle. It can cause the work of your heart to increase.

However, not all people feel symptoms when they are in AF. About one person in five has no symptoms. For some, the symptoms may be mild, while others may have uncomfortable, severe or even frightening symptoms.

*The most common symptoms associated with AF include:*

- Tiredness – more than usual
- Heart palpitations – feeling irregular, hard or fast beats in the chest (this may start and stop suddenly)
- Dizziness, lightheadedness and sometimes fainting
- Shortness of breath occurring at rest or with slight activity
- Chest discomfort or pressure-like feeling in the chest

### **Atrial fibrillation can have serious consequences to your health**

Atrial fibrillation is usually not immediately life threatening. However, it can lead to problems such as stroke and heart failure.

Studies have shown that people with AF carry a 1½ to 2 times higher risk of death compared to those who do not have AF.

### **Stroke can be a devastating result of atrial fibrillation**

Approximately 700,000 people in the United States have strokes or “brain attacks” each year. Of these, 80,000 (11%) are thought to be a direct result of atrial fibrillation.

The risk for stroke is three to five times higher with AF and increases with age.

Underlying heart disease, history of heart failure, high blood pressure, being over 75 years old, diabetes, and prior history of stroke or mini-stroke increases the risk of stroke in people with AF even more. The risk of stroke is lower in patients who are less than 65 years old and who do not have the above risk factors.

AF can cause stroke because blood cannot flow through the upper chambers of the heart (atria) smoothly. With sluggish blood flow, blood clots may form in the atria, especially the left atrium.

These blood clots can break away from the heart and travel through the blood vessels. If a blood clot lodges in a blood vessel in the brain, the result is a stroke.

### **Heart failure is another serious consequence**

Atrial fibrillation causes the lower heart chambers (ventricles) to beat rapidly and irregularly, decreasing the heart’s ability to pump blood, causing heart failure. Long periods (weeks to months) of rapid AF stresses the heart muscle. Over time, this may decrease the heart’s ability to pump blood.

In patients who already have low heart pump function, AF can increase the incidence of heart failure by more than 20%.

Treating AF can help improve the heart's pumping function.

AF can occur even when there is no heart disease found. In these cases of "lone atrial fibrillation," heart function can still weaken. Because the heart is otherwise healthy, treating AF can help the pump function get better, even help it return to normal.

### **The psychological consequences of atrial fibrillation can be considerable**

Atrial fibrillation has a strong emotional impact on people whose peace of mind and lifestyles are disturbed by:

- Frequent hospital admissions or emergency room visits
- Uncertainty about if and when symptoms may occur
- Significant costs due to clinic visits, emergency room visits, hospitalizations, lab tests and changes in medications

With proper care, most people with AF can continue to lead normal, active lives.

## How doctors diagnose atrial fibrillation

**The tools doctors use to diagnose atrial fibrillation include:**

### Electrocardiogram (ECG)

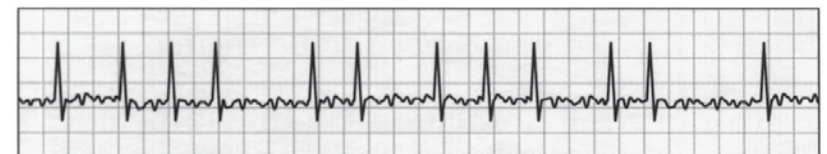
#### 12-lead ECG

An electrocardiogram, also called an ECG for short, is an easy and reliable method to diagnose atrial fibrillation. Ten sticky electrodes placed on the skin detect the electrical heartbeat. A computer records 12 standardized electrical views of the heart and prints a 12-second sample.

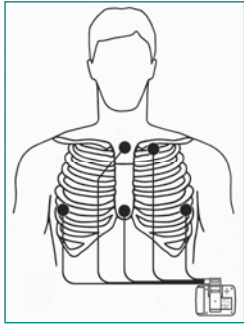
Since the ECG takes only a few seconds, it is possible that the results will appear normal if AF is not present at that moment. Even if we "run" the ECG the entire time you are in the office, we have a low chance of seeing AF that comes and goes.



ECG tracing of a normal heart rhythm.



With AF, the tracing shows tiny, irregular "fibrillation" waves between large signals. The rhythm is irregular and erratic.



### Holter monitor

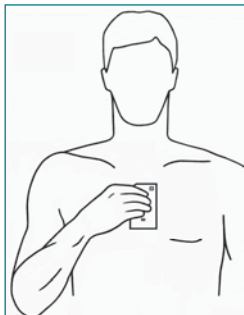
If a patient has atrial fibrillation every day, a continuous 24-hour Holter monitor can record it.

Holter monitors can show how an episode begins, which is helpful in deciding treatment options.

Several adhesive electrodes are stuck on the chest and side, and are attached to a pager-sized recorder carried on a belt or in a pocket.

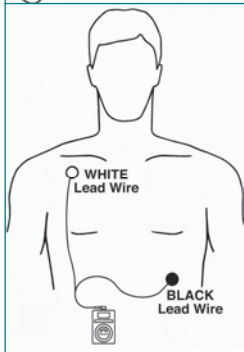
### Event monitor

These portable monitors may be useful if atrial fibrillation symptoms occur less than daily.



**Patient-activated monitor:** If an episode of AF lasts more than 30 seconds, the patient can use a simple pager-sized monitor, placing it on the skin of the chest when symptoms occur.

**Looping or continuous monitoring recorder:** If an episode lasts less than 30 seconds or the patient is unsure of when AF is occurring, a monitor with patches is worn and a button pressed when symptoms occur.



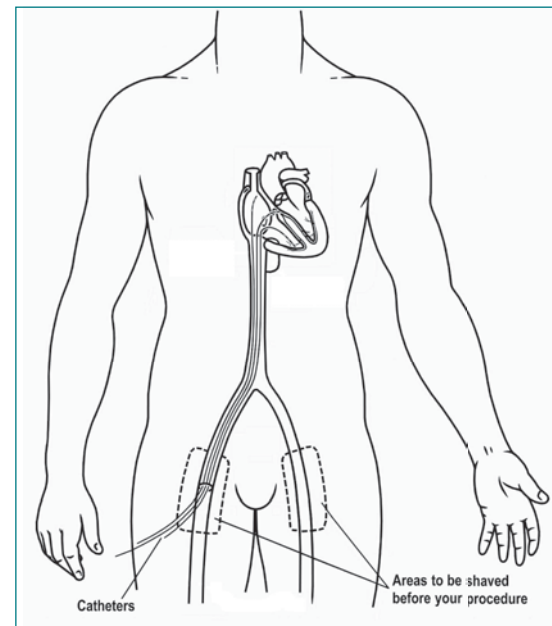
Each monitor can send (transmit) the recording over telephone lines to a receiving station where they are read as an ECG.

### Electrophysiology (EP) studies

This test is rarely needed to diagnose atrial fibrillation.

An electrophysiology (EP) study is recommended to test for other conditions or irregular heartbeats that may also be present or be causing AF. For example, in some young patients, an abnormal fast rhythm degenerates into AF and it may be important to diagnose this arrhythmia further with an EP study.

On the other hand, persons with heart conditions can have irregularities in the lower chambers (ventricles) that may need study to plan for pacemakers or implantable automatic defibrillators.



During an EP study, the physician places catheters (soft wires) through blood vessels directly into the heart. These electrodes record the electrical signals of the heart to a receiving station where they are read as an ECG.

## How we care for patients with atrial fibrillation

Treatments for atrial fibrillation target two main areas:

1. Stroke prevention
2. Rhythm treatment:
  - a. Control of the heart rate, or
  - b. Conversion to normal heart

### How can stroke be prevented?

Prevention of stroke is very important in treating patients with atrial fibrillation.

As mentioned before, AF puts people 65 and older at risk of stroke. Those who have a history of heart failure, high blood pressure, diabetes, previous strokes or mini-strokes<sup>1</sup>, narrow or leaky heart valves, or are over 75 years old are at highest risk of stroke. Having more than one of these conditions makes the risk of stroke high and makes anticoagulation very important.

### Medications can reduce the risk of stroke

The drug warfarin (generic) or Coumadin (brand name) can reduce the risk of stroke from clots in AF patients. Several important clinical research studies have shown that this blood-thinning medicine reduces the risk of stroke by about two-thirds.

<sup>1</sup>Also called transient ischemic episodes (TIAs)

Regular blood tests called INR are needed to check that the dose is safe. An INR that is safe and effective should be between 2 to 3. A slightly higher INR between 2.5 and 3.5 is recommended for patients with artificial mechanical valves.

Higher INR numbers can cause bleeding problems. You need to report unusual bleeding gums, bruises or blood in the urine to your doctor immediately. INR numbers lower than 2 can mean increased risk of stroke.

It is important to monitor and adjust the dose of blood-thinning medication when any changes are made to other medications you take.

Always check with your physician or pharmacist before starting any new medications or over the counter supplements. Let your other physicians know about medication changes as soon as possible, especially the doctor who regulates your blood thinner and monitors your INR.

If serious side effects of warfarin occur or if there are other reasons not to take this medication, then your doctor may recommend one adult aspirin (325 milligrams) per day. There is no benefit to taking baby aspirin (81 milligrams) for the prevention of stroke when AF is present.

### Some side effects of warfarin or Coumadin:

- Bleeding or bruising easily
- Vasculitis (*inflamed blood vessels with red, purple or black areas, or ulcers on legs or arms*)
- Rash
- Cold intolerance
- Taste changes
- Nausea, vomiting or diarrhea

It is important to keep in mind that several medications can change the effect of warfarin (Coumadin).

Medicines are listed by generic names first, followed by brand names in parentheses.

**Medications or substances that increase the INR and risk of bleeding include:**

- Antiarrhythmic medications: *Amiodarone, propafenone*
- Antibiotics: *Azithromycin (Zmax, Zithromax), cefazolin (Ancef, Kefzol), erythromycin (E-mycin, Ery-Tab, Eryc, E.E.S., Erythrocin), aspirin*
- Alcohol in beverages or cough medicines
- Beta adrenergic blockers: *Propranolol (Inderal)*
- Diabetic agents
- Herbal supplements
- Thyroid drugs

**Medications that decrease the INR and increase the risk of stroke include:**

- Antacids
- Anti-anxiety agents
- Antibiotics: *Dicloxacillin (Dynapen), nafcillin*
- Cortisone (Cortef)
- Oral contraceptives
- Spirolactone (Aldactone)
- Vitamin C (high-dose)
- Vitamin K (green, leafy vegetables)

**Medications or substances that have unpredictable effects:**

- Alcohol
- Antidepressants
- Gastric acidity and peptic ulcer agents

**Stroke prevention devices**

More than 90% of blood clots occur in a pouch-like area of the left upper chamber of the heart called the left atrial appendage. Tests are in progress with new devices designed to close off or filter the pouch. Patients who cannot take blood thinners, such as warfarin, or who are at very high risk of stroke may be able to benefit from these devices that prevent clots from getting into the blood stream.

## How do we treat the atrial fibrillation?

The first thing we need to do together is explore your condition. Some of the tests used to diagnose your irregular heartbeat are described previously in this booklet.

We also want to try to determine why you have atrial fibrillation and what the appropriate goal is:

- To control the heart rate, or
- To restore your normal rhythm

### Considerations for treatment

Treatment is patient specific. A plan of care will address things like your heart rate (pulse rate) and blood pressure. We will modify treatments for you if we find any heart disease, heart failure, kidney disease, liver disease, abnormal thyroid function or other conditions you may have or develop. Some of our first efforts to treat atrial fibrillation will be identifying and trying to correct or control primary causes of AF, like thyroid disease.

Simple lifestyle changes can help some people. For example, eliminating caffeine and stimulants or getting treatment for sleep apnea can sometimes reduce the frequency or severity of some episodes.

**The benefits of the therapy always need to be balanced with possible side effects or complications.**

Persons who have continuous AF of long-standing duration and have a large left upper chamber (left atrium) may have the lowest success eliminating AF using available treatments. AF that cannot be converted to a normal rhythm is called permanent AF. There are treatments geared to the patient who has permanent AF.

**Therapy will depend on the nature of your AF.**

Some people have AF episodes that come and go. These episodes are called paroxysms. When the episodes come and go spontaneously (on their own), AF is referred to as being paroxysmal. A first-line treatment at this stage is usually medication.



Some people have episodes of AF that do not stop unless something is specifically done to treat the problem. This stage is called persistent atrial fibrillation.

AF usually starts with short episodes. Over a period of time, the episodes tend to last longer and occur more frequently. Treatment for AF is tailored to the stage that each patient is in at the time.

## Conventional treatments include:

### Heart rate control

Medications are used to slow the heart rate. Some of these medications are beta-blockers, calcium channel blockers and digoxin.

These medications try to block some of the chaotic impulses of atrial fibrillation from traveling into the lower chambers. Although these drugs may relieve symptoms by slowing down the heart rate, it is important to remember that they do not prevent atrial fibrillation from happening. There is still risk of stroke and a need for a blood thinner.

### Cardioversion and heart rhythm control

#### *Maintaining normal rhythm*

Normal sinus rhythm may be restored using either medication or electrical cardioversion.

### Medications

Medications belonging to a group called antiarrhythmics change the natural electrical properties of the heart.

These medications can also help you stay in the normal rhythm after you convert. It is important to continue them unless you are specifically told not to do so.

## Common antiarrhythmic medications

*Medicines are listed by generic names first, followed by brand names in parentheses.*

### Amiodarone (Cordarone, Pacerone)

Amiodarone takes four to six weeks to reach its full effect.

Amiodarone is a strong medication with side effects that can be seen in the skin, thyroid, liver and lungs.

- Sun sensitivity: Sunscreens that are SPF 15 or greater should be worn in the sun. Amiodarone can cause severe sunburn, sometimes even on days that are not sunny.
- Discoloration: In some persons, a blue tinge can be seen in the skin, especially around the nose and cheeks.
- Eyes: Deposits in the eyes can create glare, reducing the ability to see well at night. Drive with caution.
- Thyroid and liver will be checked with blood tests every six months.
- Lungs will be checked on chest X-rays once a year or if you report problems with breathing.
- Warfarin dosage must be lowered while taking amiodarone.

### Sotalol (Betapace)

Few people have serious side effects.

A 48-hour hospital admission with heart monitoring is required for sotalol start-up as 2% of people are at risk for a lethal heart rhythm.

Fatigue is the most frequently reported discomfort.

## Common antiarrhythmic medications *(continued)*

### Dofetilide (Tikosyn)

A serious side effect is a change in the heart's electricity that can cause a lethal heart rhythm during the first few doses. Hospitalization is required to monitor the drug in the beginning. Less severe but discomforting side effects include headache, chest discomfort and flu-like symptoms.

### Dronedarone (Multaq)

This new medicine is similar to amiodarone but does not affect the thyroid. It may increase heart failure in patients who have severe heart failure or are not well controlled.

### Flecainide (Tambocor)

Flecainide cannot be given to patients with coronary artery disease. Lethal arrhythmias have occurred in persons who have had heart attacks. Less severe reactions are dizziness, blurred vision, shortness of breath and headache.

### Propafenone (Rhythmol)

Serious lethal arrhythmias can occur with this medication making hospitalization important in the beginning. Serious reactions include congestive heart failure and heart block. Constipation, anxiety, upper respiratory infections and headaches are potential side effects.

## Rate versus rhythm control

You and your physician need to discuss these two choices. Sometimes the process to change your heart rhythm back to normal requires time and effort, and can be discouraging if you think it is a quick fix. Many people find the effort to be worth it. Our patients often tell us they feel better when their heart beats in a normal rhythm.

Antiarrhythmic medications for rhythm control work in different ways and may be stronger than those used for rate control. This means they may have side effects that are more significant. Close follow-up is recommended. Some medications can only be started during hospital stays.

Rhythm control is not for everyone. Sometimes the atrial fibrillation cannot be stopped and the patient can have side effects from the medication. The electrophysiologist has the most experience in using antiarrhythmic medications. Sometimes, newer medications are only available from the electrophysiologist.

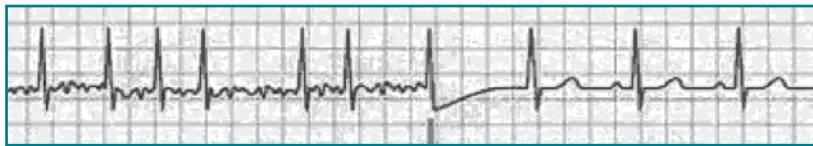
### Restoring normal rhythm

**Medications** are used to change the electricity in the heart. Some are given in intravenous (IV) solutions to act quickly. They are used in the emergency room or hospital to bring the rate and rhythm under control quickly. Most of the time, the medication needs to be taken by mouth regularly for several days or weeks before the change in rhythm can take place.

**Electrical cardioversion** is a controlled jolt of electricity (shock) delivered to the heart through the chest wall by adhesive patch electrodes or metal paddles. The shock stops all electrical activity in the heart for an instant and this allows the normal heart rhythm to take over.

Before a cardioversion, care is taken to protect against stroke. If the AF episode lasts longer than 48 hours, warfarin is prescribed to keep INR values between 2 and 3 for two to three weeks before the cardioversion can be done.

In some situations, a transesophageal echocardiogram (TEE) is done before a cardioversion to detect any blood clots that can possibly cause a stroke. The TEE is done while a person is sedated. A tube is passed through the mouth into the passage (esophagus) that leads to the stomach. Since the TEE tube is directly behind the heart, this test permits a good view of the inside of the heart. If the TEE does not show blood clots, the cardioversion may be done safely without the need for warfarin for the preceding two to three weeks.



*Heart rhythm  
atrial fibrillation*

*Cardioversion  
shock*

*Normal heart  
rhythm*

Side effects of an electrical cardioversion usually relate to skin reactions at the adhesive electrode sites because of the electrical energy that passed through to the heart. The skin can look irritated or red. If this is discomforting, ask your doctor for lotions, ointments or creams that will assist in healing.

There is a small risk of stroke from a cardioversion despite all the precautions that are taken.

Electrical cardioversion will not prevent AF from recurring, so medications are often a necessary part of the pre-procedure routine and may need to be continued afterward for some time.

## When to seek a specialist

Sometimes the usual treatments are not helpful. Physicians with special training in heart rhythm disorders can then assist by offering specialty treatments. The specialty, called electrophysiology, is the study of the natural electrical forces that create and transmit the signals responsible for the heartbeat or pulse.

### Electrophysiologists can offer:

- Ablation therapies to try to eliminate the atrial fibrillation (rhythm restoration)
- Ablation therapies to eliminate the symptomatic and stressful rapid heart beating: AV nodal ablation with permanent implanted pacemaker (rate control)
- Combination therapies, including special medications and pacemakers

We have developed a careful protocol for AF ablation throughout our many years of experience, shortening procedure time and improving success while minimizing the chance of complication.

Our Atrial Fibrillation Ablation Center operates on the cutting edge because we are doing innovative research with some of the leading medical research companies in the U.S.

We are using new technologies such as virtual-reality mapping and advanced CT imaging to simplify and improve the ablation procedure.

## Your heart's electrophysiology

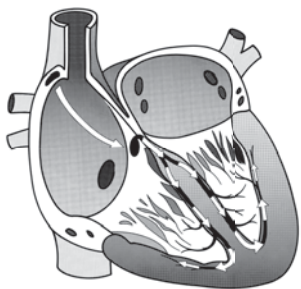
### The heart and its electrical system

The driving force of the heart is the electrical impulse. The electrical impulse starts in the right upper chamber called the right atrium. The human pacemaker from which the electrical impulse starts is called the sinus node (also called the SA node).

From the sinus node, the electrical impulse travels to the rest of the heart through a network of electrical paths in the heart.

An electrical path called the AV node allows the electrical impulse to travel from the upper chambers (atria) to the lower chambers (ventricles) of the heart.

As the electrical impulse travels, it makes the heart pump. A normal heart usually pumps blood 60 to 100 times per minute. The upper chambers contract or beat first as the electrical impulse travels through those chambers first. The lower chambers then contract as the impulse travels to them from the upper chambers. The chambers of the heart beat in an organized (synchronized) fashion. This is called regular or normal sinus rhythm.



**Normal Sinus Rhythm**



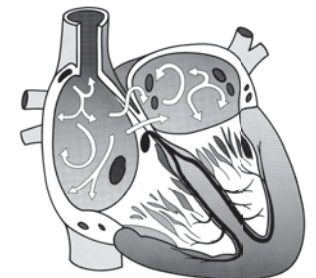
*The natural pacemaker is called the sinus node. Normal sinus rhythm starts in the upper right atrial chamber and flows through the heart via special conduction pathways.*

In atrial fibrillation, the upper chambers of the heart (the atria) quiver or fibrillate. Electrical impulses are scattered throughout the atrium instead of coming from the normal SA node in the right atria. This causes abnormal muscle movement in the upper chambers that can affect the movement in the lower chambers (ventricles) of the heart.

The many impulses cause an uncontrolled rhythm, causing the atria to beat irregularly and fast (600 to 1,000 times per minute). Remember, a normal heart rate is about 60 to 100 beats per minute.

The AV node allows some of the atrial impulses to travel to the ventricles, causing an irregular and, at times, slow or fast heart beat.

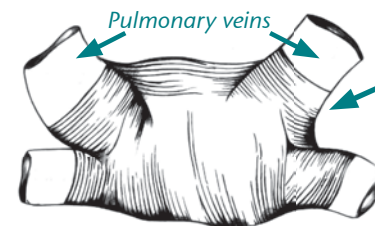
Research has shown that often the abnormal electrical activity of AF can be found in specific areas of the hearts. Most often, the left atrium is the heart chamber involved. The pulmonary veins that bring blood from the lungs to the heart connect in the left atrium. The cells and the physical structures of these vascular connections have important effects on the electricity of the heart.



**Atrial Fibrillation with irregular heartbeats**



*In atrial fibrillation, signals are split into many chaotic, waves that swirl around the upper chambers continuously.*



*Muscle fiber in and around the four pulmonary veins (blood vessels) and left atrium as viewed from the back of the heart. These pulmonary veins are trigger sites for AF.*

*Pulmonary veins*

## Specialty procedures

### Atrial fibrillation and ablation

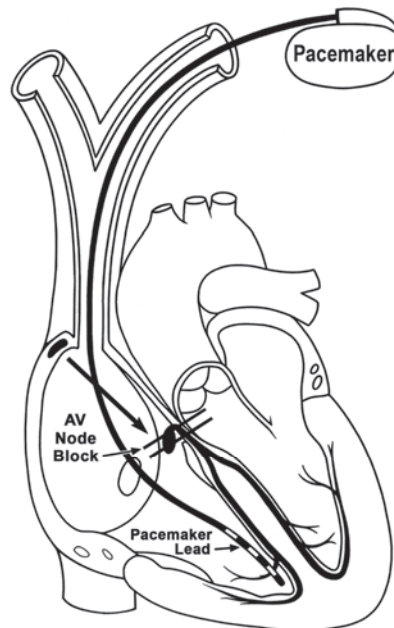
#### Ablation and pacemaker

Some patients who have severe symptoms do not respond to medications and may be helped by a procedure called an AV nodal ablation, which creates a complete interruption or block of the electrical pathway between the upper (atrial) and lower (ventricular) chambers of the heart.

During this specialty electrophysiology procedure, a special catheter is threaded through a vein to the heart. It is positioned at the AV node area (see diagrams on pages 7, 22 and below). Then energy, either hot or cold, is delivered through the tip of this catheter to prevent atrial fibrillation from traveling from the atria to the ventricles. Most often, the energy is heat from a radiofrequency energy generator.

The result is heart block and a slow heart rate, so a pacemaker is needed to provide an adequate heart rate.

Patients who are in AF all the time receive a single lead (ventricular) pacemaker. Patients who are in and out of AF with regular rhythm in between the episodes will benefit most from a pacemaker that has two leads (one in the right atrium and another in the right ventricle).



Other types of pacemakers may be used if you have other needs. Your doctor will talk to you about these needs and devices if necessary.

This procedure causes a lifelong need for a pacemaker. Progress in design increases the lifelike responses of the artificial pacemaker so that most people who have had the procedure tell us their quality of life has improved because of fewer symptoms.

**AF is still occurring so a blood thinner is still needed.**

#### To summarize:

- Heart rate control in atrial fibrillation can be achieved with drugs in many cases.
- Heart rate control in AF still requires the need for a blood thinner (warfarin).
- AV node ablation and pacemaker implantation can be done in patients who continue to have symptoms despite drug therapy.

## The surgical MAZE procedure

One of the first procedures used to treat atrial fibrillation was the surgical MAZE procedure. It requires an open heart or open chest operation with general anesthesia and hospitalization. It is usually performed only in patients having surgery for another reason, such as a valve replacement or repair, and in whom AF cannot be controlled by other therapies. This procedure involves making many incisions in the atria.

The object of the procedure is to make scars along the left atrium that cannot conduct electricity. The scars or lesions circle the pulmonary veins where AF is thought to have beginnings.

Some complications of the MAZE procedures have included death, stroke and the need for a permanent pacemaker. Surgeons are looking at newer techniques to perform the MAZE procedure. They are trying minimally invasive surgical techniques (small incisions) and robotics to make the surgery easier on your body. These decrease complications and procedure time.

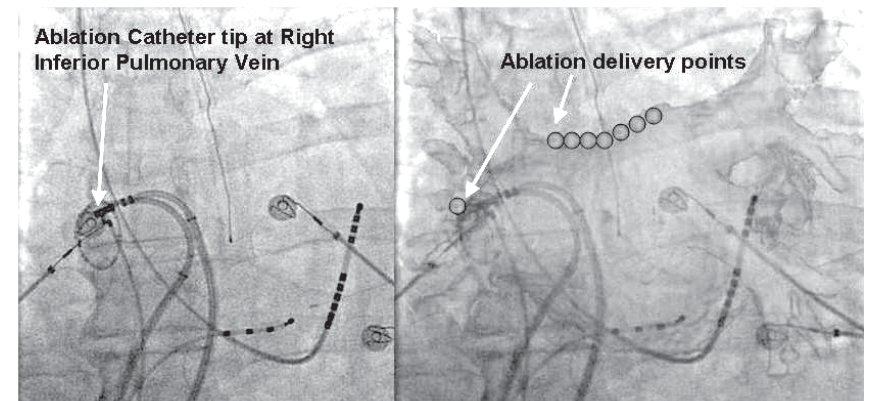
We can recommend surgeons who perform AF procedures if this is an appropriate course for you.

The surgical MAZE procedure may not be appropriate for patients who have organized atrial arrhythmias, like atrial flutter or atrial tachycardia. Specialized electrical mapping needed to identify the circuits of these arrhythmias cannot be performed during surgery.

## Ablation of atrial fibrillation in the electrophysiology lab

The surgical MAZE procedure showed us that making lesions inside the left atrium could successfully abolish (ablate) atrial fibrillation by electrically isolating the blood vessels called pulmonary veins, located in the left upper chamber (left atrium) where AF usually starts. It is possible to accomplish this without surgery by doing a specialty electrophysiology procedure called catheter ablation.

Like in the EP study (page 7), catheters (soft wires) for locating (mapping) and ablating are placed through the leg and neck veins to the right upper chamber (right atrium).

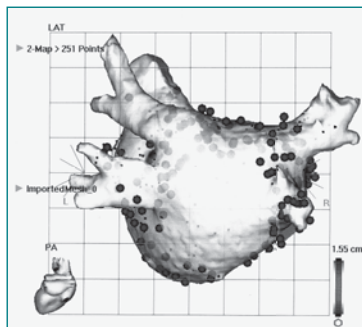
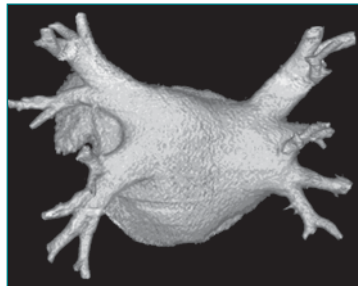


The picture shows an X-ray called fluoroscopy. Catheters show as dark lines. Recording electrodes are the darker spots on the catheters. The dark larger spots are the adhesive electrodes attached to the skin. The panel on the right with the CT scan fused with the X-ray image clearly shows that catheters and ablations are at the left atrium.

Ablation of the epicardium or outer heart surface can also be done in the EP lab with catheters placed with a needle-stick technique if the arrhythmia source is not reachable from the inside of the heart (endocardium).

The physician uses electrical mapping, such as electrocardiogram (ECG) recording, and a catheter localization system somewhat like geographic positioning systems (GPS), to define areas of the heart that need ablation while safely avoiding areas where risk of complication is high.

This is a CT scan image of the left atrium seen from the back. This view shows the pulmonary veins.



The CT image can be imported into 3-D mapping computers that track where the catheter has touched the inside of the heart during a mapping or ablation procedure.

Using 3-D imaging from a CT scan allows us to create an exact picture of each person's actual left atrium instead of using standardized image forms. This picture can be seen in real time on a computer screen, and the catheter used for ablation can be moved in real time over these images to isolate the problem areas.

## The catheter atrial fibrillation ablation procedure

Most people with atrial fibrillation have more than one focus or point. Indeed, we find that there are often many trigger sites and some are deep inside the veins, and therefore, they are difficult to reach or the risk of trauma to the veins is high.

We find increased success when additional ablation lines are made along the inside of the left atrium. We can first draw the pattern onto the patient's CT image to give us a map of his or her heart to follow as we guide the ablation catheter about the heart. The mapping system then tracks the catheter and we can mark the ablation lesions. This helps us be precise and thorough, customized to each individual.

### Who are candidates for atrial fibrillation ablation?

You may be a candidate for catheter ablation if you:

- Have frequent episodes that come and go or have been recently diagnosed with continuous episodes of atrial fibrillation despite medication or cardioversion, or you do not wish to continue medication.
- Have significant symptoms from the AF such as discomforting palpitations, tiredness or difficulty breathing, or signs of heart failure.

### Before the ablation, you may go through the following steps:

- We will need to be certain that you have AF. If there is no documentation of your AF, you may be given a monitor to take home to record an AF episode.
- You may need to have other cardiac testing, such as an echocardiogram to look at your heart pump function and atrial size if this has not been done recently.
- You may be asked to discontinue some of your AF medications before the procedure.
- Coumadin may be discontinued for at least three days before the procedure and you will be asked to start one adult aspirin daily.
- You will undergo a CT or MRI scan. This helps us see how many pulmonary veins you have and how big they are. The scan may be repeated one to three months after the procedure.

The actual procedure may take three to six hours during which time you are sleeping (under anesthesia). We have experienced anesthesiologists who work with us during the procedure.

After the procedure, all of the catheters are taken out and pressure is applied on the entry area. Generally, you will go home the next day or the day after. You will often have an echocardiogram before you leave to check for any complications.

Coumadin and/or aspirin continue to be given after the procedure. Your doctor will decide when it can be stopped. Other medications may be continued or new medications may be started after the procedure. In some instances, these medications may be stopped after a few weeks or months. You will be given a heart monitor after the procedure and three, six and 12 months later to assess for any recurrence. This is important information to help determine if you need to continue certain medications.

### **What are the risks of catheter ablation procedures for atrial fibrillation?**

Any procedure carries some risk of complications. Please ask questions about the risks if you do not understand them.

The possible complications of electrophysiology tests and ablations include heart attack, stroke, blood vessel injury, allergic reactions, arrhythmias, blood loss with need for transfusions, bleeding around the heart, need for a permanent pacemaker, worsening of heart failure or kidney function, and death. Possible complications of ablation in the left atrium include injury to the pulmonary veins, causing narrowing, injury to the food pipe (esophagus), and injury to the diaphragm (breathing muscle). Emergency surgery may be necessary to repair one or more of these injuries.

Each of the possible risks is rare, but the risks are real and cannot be underemphasized. You need to weigh these risks against the risks and discomforts of continuing with the atrial fibrillation.

There may be other risks that we cannot foresee.

## What are the outcomes of catheter ablation procedures for atrial fibrillation?

Most patients who have the procedure have improvement with half of them able to live free of heart rhythm medications.

Some patients have found they have fewer, milder episodes that they can tolerate, or that medications can now prevent or control episodes even if the same medications were not helpful before the procedure.

Some patients will continue to have and to feel some extra heartbeats. These feelings may have occurred with atrial fibrillation in the past, but the extra heartbeats do not usually start the AF after the procedure. Knowing this makes it easier to manage the sensations without feeling anxiety. Irregular heartbeats are commonly felt after the procedure due to healing.

We cannot guarantee that the procedure will be a success for any single person. We know that people who have AF continuously for years will have less chance of success, while people whose AF comes and goes on its own or with help, have a better chance of success.

We understand that treating AF is a process, not a simple fix, and may take some time or repeat procedures. We may not be able to eliminate all of your symptoms as some may be related to your other conditions. We will work with you to seek the best options and best choices for you.

**Before your procedure**, your cardiac electrophysiology doctor will discuss all of these risks, complications, alternatives and benefits with you.

*If you have any questions, ask your doctor or nurse.*

## What about other procedures?

### Pacemakers

**Atrial pacing:** Studies are being done to find out if pacing with a permanent pacemaker in the right atrium or both upper chambers is a way to decrease the episodes of atrial fibrillation. Early results show a small number of people can benefit. Some patients have extra beats, slow pulses and pauses, or both, that start their AF episodes. A pacemaker may help make the heartbeat more regular and help cut down the number of AF episodes these patients have.

**Ventricular pacing:** Pacing with a permanent pacemaker in the lower chambers may be necessary for some patients who take medications for AF. Sometimes the medications exert strong rate control with the side effect of a slow pulse. The lower chambers then need help keeping the pulse at a rate that is within the normal ranges.

Ventricular pacemakers control the lower chambers by adding in missed beats. Atrial fibrillation can continue to create irregular or rapid beats that travel through the natural conduction system to enter the lower chambers. An AV node ablation procedure can prevent this by interrupting this electrical connection (see page 19).

**Dual chamber pacemakers:** Atrial and ventricular pacing is combined into one device to perform a variety of pacing functions to coordinate the upper and lower chambers.





# Aurora Cardiovascular Services

## Electrophysiology

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