

PATIENT INFORMATION

GUIDE TO ATRIAL FIBRILLATION



- Atrial Fibrillation (AF)
- Rate and Rhythm Control
- Stroke Prevention

A Comprehensive Resource from the Heart Rhythm SocietySM

This information is not intended to cover all aspects of any medical condition. It is generalized and is not intended as specific medical advice. Those with questions or who need more information should check with their physician. HEART RHYTHM SOCIETY is a service mark of the Heart Rhythm Society. All Rights Reserved. Copyright © 2014 Heart Rhythm Society.

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WHAT IS ATRIAL FIBRILLATION?

The heart has four chambers, which usually beat in a steady rhythm. An abnormal heart rhythm, or arrhythmia, is when the heart doesn't beat in a steady or regular pattern. Atrial fibrillation (AF) is one type of arrhythmia. AF occurs when the upper chambers of the heart (the atria) fibrillate, or "quiver," which causes a rapid, irregular heart rhythm. The normal heart rate for an adult is between 60 and 100 beats every minute. When the heart is in AF, the atria can beat over 300 times every minute.

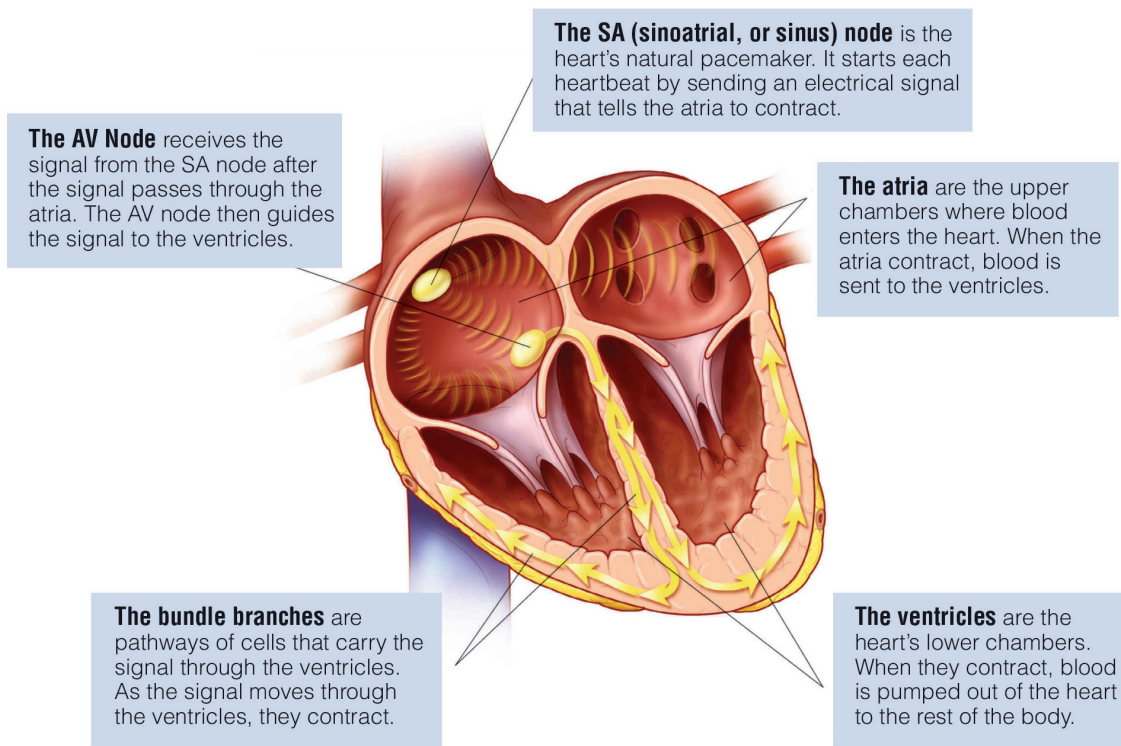
AF itself is not dangerous; however, if left untreated, the side effects of AF can be life-threatening. When the atria are fibrillating, the flow of blood to the lower chambers of the heart (the ventricles) is slowed, which increases the risk of a blood clot forming. If a blood clot were to break loose, it could result in a stroke or a heart attack. Without treatment, AF can also cause the ventricles to beat too fast. Over time, this can weaken the heart muscle and lead to heart failure.

AF is the most common type of arrhythmia. There are approximately 2.3 million people in the United States who have AF, with 160,000 new cases diagnosed every year. Approximately nine out of every 100 people over the age of 65 have AF. Although it usually occurs in people older than 60, younger people can develop AF, too.

Your Heart's Electrical System and AF

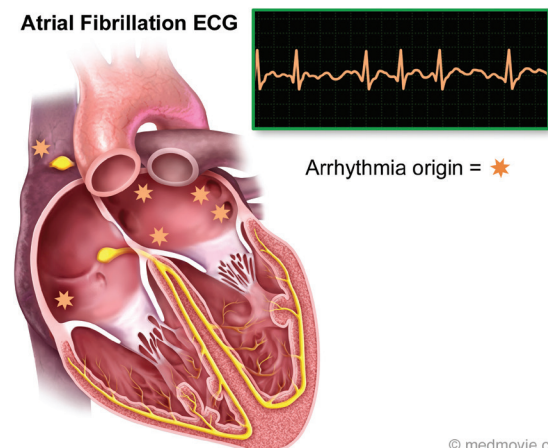
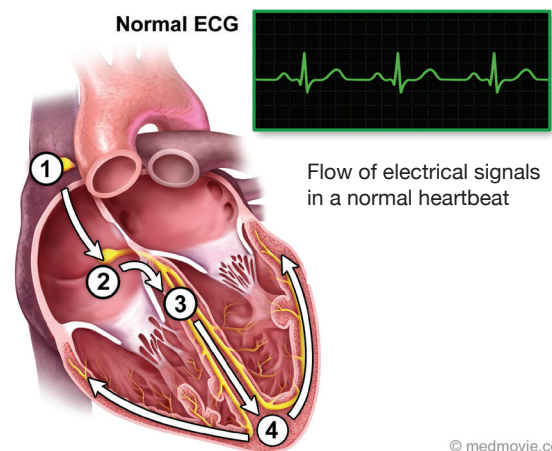
The electrical system of the heart is the power source that makes the heart beat. Electrical impulses travel along a pathway in the heart and make the atria and the ventricles work together to pump blood through the heart.

A normal heartbeat begins with an electrical impulse in the sinoatrial (SA) node, a small bundle of tissue located in the right atrium. The impulse sends out an electrical pulse that causes both atria to contract (squeeze) and move blood into the ventricles. The electrical



current then passes through a small bundle of tissue called the atrioventricular (AV) node (the electrical bridge between the upper and lower chambers of the heart), which makes the ventricles squeeze (contract) and release in a steady rhythm. As the chambers relax and contract, they draw blood into the heart and push it back out to the rest of the body. This is what causes the pulse we feel on our wrist or neck.

AF occurs when the atria begin to fibrillate, or “quiver,” rapidly. Instead of one electrical impulse moving through the heart, many impulses begin in the atria and fight to get through the AV node. There are several factors that allow this abnormal electrical rhythm to occur and continue. Certain medical conditions, such as poorly treated high blood pressure (hypertension), coronary artery disease, and heart valve disease, can change the electrical properties within the heart, making it more likely for AF to occur. Many of these conditions become more common as people age. As the electrical pathway changes, one or more “triggers” may develop. Triggers are electrical circuits that send extra impulses at a faster-than-usual rate. These extra impulses force the atria to fibrillate, or “quiver,” in a fast and disorganized way.



Three Types Of Atrial Fibrillation

Paroxysmal – Paroxysmal AF refers to AF that comes and goes on its own. The AF may last for seconds, minutes, hours, or even several days before the heart returns to its normal rhythm. People with this type of AF may have more symptoms than others. As the heart goes in and out of AF, the pulse rate may change from slow to fast and back again in short periods of time.

Persistent – Persistent AF is when the AF does not stop by itself and lasts for more than 7 days. Medications or a special type of electrical shock (called a cardioversion) are needed to help the heart return to a normal rhythm. If no treatment is given, the heart will stay in AF. If the persistent AF lasts for more than 1 year, this type of AF is called long-standing persistent AF.

Permanent – Permanent AF is when a normal heart rhythm cannot be restored. Medications, procedures, and controlled electrical shocks do not help return the heart to a normal rhythm.

Symptoms Of Atrial Fibrillation

The symptoms of AF are different for each person. Some people with AF can tell as soon as AF begins. Others don't have any symptoms. They do not even know they have AF. This is because the symptoms depend on the rate of the heartbeat while in AF, the cause of AF (other heart problems, diseases, etc.), and on how much AF affects the pumping of the heart. The symptoms of AF include:

- Feeling over-tired or not having energy (most common)
- Having a pulse that is faster than normal or one that changes between fast and slow
- Being short of breath
- Experiencing heart palpitations (feeling like your heart is racing, pounding, or fluttering)
- Having trouble with everyday exercises or activities
- Experiencing pain, pressure, tightness, or discomfort in your chest
- Feeling dizzy or lightheaded
- Fainting
- Having to use the bathroom more often (increased urination)

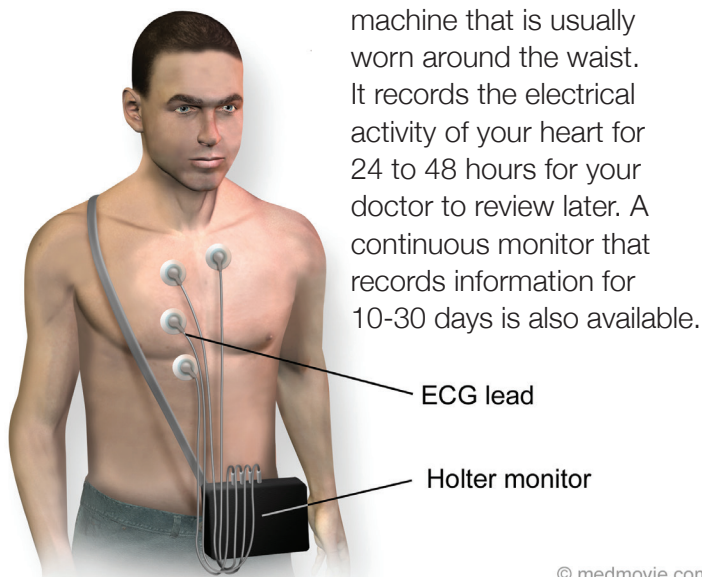
How Is Atrial Fibrillation Diagnosed?

There are several tests that are done when someone has a fast or irregular heartbeat. Your doctor may order these tests if you are having signs or symptoms of a heart problem. The symptoms include heart palpitations (feeling like your heart is racing, pounding, or fluttering), shortness of breath, or dizziness. After a physical examination, your doctor may order one or more of the following tests:

Electrocardiogram (ECG) – An ECG is a snapshot of your heart's electrical activity. It is often performed in a doctor's office. Stickers (electrodes) are attached to your chest, arms, and legs. These electrodes measure the rate and rhythm of your heart. An ECG is commonly used to diagnose AF.



Holter monitor – A Holter monitor is a portable ECG. It is typically worn for 24 hours, but can be worn for several days. Stickers (electrodes) are placed on your chest and are then connected to a small recording



machine that is usually worn around the waist. It records the electrical activity of your heart for 24 to 48 hours for your doctor to review later. A continuous monitor that records information for 10-30 days is also available.

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Mobile Cardiac Monitoring – A continuous event monitor is similar to a Holter monitor but it is worn for up to 30 days. It monitors your heart beat when it is normal and will trigger a recording when it senses an abnormal rhythm (arrhythmia). The results are automatically sent to your doctor. Your physician uses this information to evaluate your symptoms and determine what is causing the arrhythmia. This type of monitor is helpful to diagnose AF in “asymptomatic” patients (people who don’t have common symptoms) or in patients who have AF only occasionally.

Intermittent Event Monitor – An intermittent event monitor is a portable ECG that is used for patients who have an irregular heart rhythm every once in a while. You will carry the monitor with you at all times and place it on your chest when you feel symptoms. This lets your doctor check your heart rhythm at the time of your symptoms. The recording can then be transmitted over the phone for review.

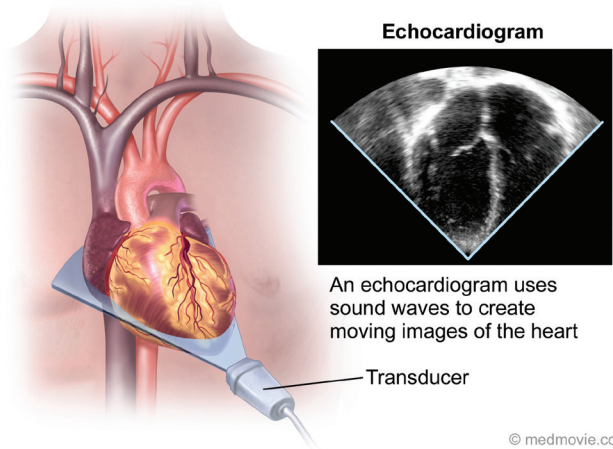
Implantable Loop Recorder – Implantable loop recorders (ILRs) are small devices that continuously record the heart’s rate and rhythm. The newer ILRs can be as small as a match stick. These are implanted under the skin in the chest area. The ILR transmits information on your heart’s rate and rhythm to a small stand-alone receiving unit that can be placed on a table top. Data are transmitted to a monitoring center that shares the information with your doctor. ILRs are most commonly used for patients who have an irregular heart rhythm every once in a while. The battery used in the ILR typically lasts three years.

Other Tests

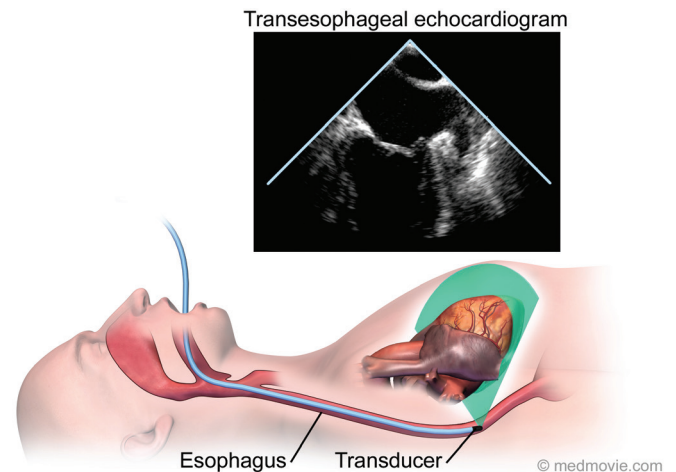
Your doctor may order other imaging tests. These are not used to diagnose AF. Instead, they can help your doctor choose the right treatment plan for you.

Echocardiogram – An echocardiogram uses sound waves to produce images of your heart. This test allows your doctor to see how the chambers of your heart are working. There are two types of echocardiograms:

- **Transthoracic echocardiogram (TTE)** – This is the standard echocardiogram that gives your doctor a picture of your beating heart. It is non-invasive,



which means that there are no cuts, and nothing goes inside your body. A technician spreads a special gel on your chest and then moves a device, called a transducer, across your chest. The transducer picks up sound waves that bounce off the walls and valves in your heart. A computer then creates a video image of your heart. This video can show the size of your heart, how well your heart is working, if the heart valves are working, and if there are blood clots in your heart.



- **Transesophageal echocardiogram (TEE)** – A transesophageal echocardiogram, or a TEE, is done when the doctor needs to get a good picture of the back of your heart. A probe, called a transducer, is inserted through your mouth and moved down your esophagus (the tube that connects your mouth to your stomach). Having the transducer positioned in the esophagus allows for a better picture of the atria. (The esophagus passes right behind the heart.) This procedure can be uncomfortable,

so you will be given a small amount of sedation through an intravenous (IV) line to make you sleepy. A topical spray is used to numb the back of your throat so the transducer can be moved into your esophagus with minimal discomfort. Once the transducer is in place, it works the same way as described above (TTE). Since this test gives a better picture of the atria, it is often used to rule out the presence of a blood clot in the heart.

Cardiac computerized tomography (CT) – Cardiac computed tomography, or cardiac CT, uses an X-ray machine and a computer to take clear, detailed pictures of the heart. During a cardiac CT scan, you will lie on a table. An X-ray machine will move around your body. The machine will take pictures of your heart and chest. A computer will put the pictures together to make a three-dimensional (3D) picture of your heart and chest.

Magnetic resonance imaging (MRI) – A cardiac MRI uses radio waves, magnets, and a computer to create pictures of your heart. During a cardiac MRI, you will lie on a table inside a long tube-like machine. Cardiac MRI creates detailed pictures of your heart and can also take videos of your heart beating. Doctors use cardiac MRI to see the beating heart, the parts of the heart, and how the heart is working.

Risk Factors For Atrial Fibrillation

Some people who have a healthy lifestyle and don't have any other medical problems develop AF. However, there are common causes and risk factors for AF. These include:

- Age older than 60 years
- Heart problems
 - High blood pressure (hypertension)
 - Coronary artery disease
 - Prior heart attacks
 - Congestive heart failure
 - Structural heart disease (valve problems or congenital defects)
 - Previous open heart surgery
 - Untreated atrial flutter (another type of abnormal heart rhythm)

- Diabetes
- Thyroid disease
- Chronic lung disease
- Sleep apnea
- Excessive alcohol or stimulant use
- Serious illness or infection
- Blood clots in the lung

Complications From Atrial Fibrillation

AF is usually not life threatening. However, AF can have serious complications, including heart failure and stroke. Thus, AF needs to be treated whether or not you are having any symptoms. To help prevent these complications, AF treatment includes medications to keep the pulse from going too fast or to keep the rhythm normal. In addition, some patients need to take a medication (an anticoagulant) to prevent blood clots from forming.

Cardiomyopathy (enlarged heart muscle)

AF can cause a fast pulse rate for long periods of time. This causes the ventricles to beat too fast. When the ventricles beat too fast for long periods of time, the heart muscle first gets bigger and then becomes weak. This condition is called cardiomyopathy. Cardiomyopathy can lead to heart failure and long-term disability. Because of the potential for a weakened heart muscle, it is important to make sure that the rate of the heartbeats while in AF is not too fast.

Stroke

The most common risk for people with AF is having blood clots form in the heart. One out of every 4 strokes in the US is due to AF. People with AF have a stroke risk that is 5 times higher than people who do not have AF. When the atria are fibrillating, the flow of blood to the ventricles is slowed. Since blood is not pumping effectively, blood in the atria may pool and clot. If the clot is pumped out of the heart, it could travel to the brain and lead to a stroke. A stroke caused by AF is usually more severe and disabling than a stroke due to other causes. In addition, strokes caused by AF have double the mortality rate of strokes not caused by AF. Because of this, stroke prevention is a primary treatment goal for AF.

Measuring Stroke Risk: The CHA₂DS₂-VASc Risk Scoring Tool

Your stroke risk depends on your age and whether you have other risk factors for stroke, such as heart disease, high blood pressure (hypertension), diabetes, or vascular disease, among others. The CHA₂DS₂-VASc stroke risk tool helps doctors quickly measure your risk of stroke. Points are assigned for each major stroke risk factor. By adding the points, your doctor can determine your stroke risk. Higher total points mean a higher risk of stroke.

CHA ₂ DS ₂ -VASc Risk Criteria	Points
Congestive Heart Failure	1
Hypertension (high blood pressure)	1
Age > 75 Years	2
Diabetes Mellitus	1
Prior stroke or mini stroke (“transient ischemic attack”)	2
Peripheral Vascular Disease or Coronary Artery Disease	1
Age 65-74 Years	1
Sex Category (i.e., Female Sex)	1

Preventing Stroke

If you have an increased risk for a stroke, your doctor may ask you to take anticoagulation medicine. These medications are sometimes called “blood thinners” and make it harder for your blood to clot. Anticoagulation medications include warfarin (Coumadin®), dabigatran (Pradaxa®), apixaban (Eliquis®), and rivaroxaban (Zarelto®). If you have a low risk of stroke or cannot take anticoagulants, your doctor may recommend aspirin to prevent clots from forming. Aspirin does not offer the stroke protection that blood thinners do.

Anticoagulants are very good at preventing stroke. However, these blood thinning medications increase the risk of excess bleeding. Your doctor must carefully weigh the risks and benefits of blood thinners for you.

Your doctor has to decide if the risk of a stroke from AF is higher than the risk of major bleeding from blood thinning medicine. For many patients, the risk of bleeding is small compared to the risk of stroke. In other words, many people with AF should take an anticoagulant.

Anticoagulants do not work the same way for every person. Many factors, including other medications that you take and your diet, can affect how well they will work for you. As with any medical treatment, there are risks and side effects. You should discuss the benefits and risks of the different anticoagulation medications with your doctor.

Measuring Bleeding Risk

There are several bleeding risk scoring tools, which help doctors measure your bleeding risk. Like stroke risk scoring tools, each risk factor for bleeding is given a point. By adding the points, your doctor can determine your bleeding risk. Higher total points mean a higher risk of bleeding.

It’s not uncommon for people with a high stroke risk to also have a high bleeding risk. In this case, you should talk to your doctor about your preferences and priorities. For many patients with AF, avoiding a disabling stroke is their top priority.

Stroke Symptoms And Response

If you or someone you know experiences any of the following stroke symptoms, call 911 immediately:

- **Sudden** numbness or weakness of face, arm or leg, especially on one side of the body
- **Sudden** confusion, trouble speaking, or understanding
- **Sudden** trouble seeing in one or both eyes
- **Sudden** trouble walking, dizziness, loss of balance, or coordination
- **Sudden** severe headache with no known cause

Use this simple test to help identify symptoms and properly respond!

ACT F.A.S.T.	
Face	Ask the person to smile. Does one side of the face droop?
Arms	Ask the person to raise both arms. Does one arm drift downward?
Speech	Ask the person to repeat a simple sentence. Are the words slurred? Can they repeat the sentence correctly?
Time	If the person shows any of these symptoms, time is important. Call 911 or get to the hospital fast. Brain cells are dying.

Record the time you experienced your first symptom. This information is important to your health care provider and can affect treatment decisions.

Stroke Risk Questions For Your Doctor

If you have been diagnosed with AF, it is important to talk to your doctor about how to reduce your stroke risk. Here are a few suggestions:

- Based on my medical history and any other medical problems, what is my risk level for having a stroke?
- How can I better control my AF and other risk factors for stroke?
- Do I need to take a blood-thinning medication (anticoagulant)?
- Will any of my current medications interact negatively with my treatment for AF?
- What else can I do to further reduce my risk of stroke?
- Do all hospitals treat stroke?

How Does AF Differ From Atrial Flutter?

Atrial flutter (AFL) is the second most commonly diagnosed heart arrhythmia after AF. Both AFL and AF cause the heart to beat too fast. With AFL, the electrical signals in the heart travel in an organized, circular motion in the atrium. Thus, with AFL, the heart beats in a regular pattern, which is the main difference between AFL and AF.

AFL has the same risk factors as AF, such as uncontrolled high blood pressure, coronary artery disease, and diabetes. AFL symptoms are also very similar to those for AF, except that the fast pulse has a steady rhythm. Like AF, people with AFL may not have any symptoms. Patients with AFL face the same complications as those with AF: cardiomyopathy (enlarged heart muscle)—which can lead to heart failure—and stroke.

AFL is diagnosed by an electrocardiogram (ECG), which takes a snapshot of your heart's electrical activity. AFL makes a very distinct "sawtooth" pattern on an ECG. The types of ECG monitors are discussed on page 5.

AFL and AF have the same treatment goals and similar treatments. If you have been diagnosed with AFL, please see the "Treatment Goals" and "Treatment Strategies" sections below. There may be small differences between certain types of medications or procedures for AFL and AF. If you have AFL, ask your doctor which treatments are right for you.

GOALS OF TREATMENT

There are several treatment options for AF. Your doctor and you will decide on a treatment plan based on several factors. These factors include your symptoms, the type of AF (such as paroxysmal or persistent), and the cause of your AF.

The goals of treatment for AF are:

- Prevent blood clots from forming (stroke prevention)
- Control the heart rate
- Return the heartbeat to a normal rhythm, if possible
- Treat the cause(s) of the abnormal rhythm and any complications
- Reduce the risk factors that could make AF or AFL get worse

Medication

Medication is a key part of treatment for AF. If you have AF, you may need to take one or more medicines for the rest of your life, such as:

- Rate control medications – Medications that slow down a fast heart rate and prevent weakening of the heart muscle
- Rhythm control medications (anti-arrhythmic drugs) – Medications that help keep a normal heart rhythm
- Blood thinners (anticoagulants) – Medications that help prevent blood clots and reduce the risk of stroke

Everyone reacts differently to medication. You may need to try more than one medicine before you find what works best for you and has the fewest side effects.

Treatment Strategies — When the heart is in AF, it beats in an irregular pattern and may beat fast. There are two ways to try to control or manage AF. One method, rate control, is used to manage the fast heartbeat. With this strategy, you will continue to have AF. Your physician will try to slow down the heart rate into a normal range using rate control medications. Another



method, rhythm control, is used to manage the irregular pattern of your heartbeat in AF by returning the heart to a normal rhythm.

Rate Control Strategy for AF Treatment

Rate control is one treatment strategy your physician may use to slow your heart rate and pulse to a normal range. This means that although you will still have an irregular heartbeat, your heart should not beat at a faster pace than normal. In order to manage your heart rate, your doctor will use medications or an AV nodal ablation procedure.

Medications

Rate control medications slow the electrical signals passing through the AV node, the electrical bridge between the upper and lower chambers of the heart. These medications are known as “AV nodal blockers” because they allow fewer signals to pass through the AV node. That is, they block the multiple electrical impulses caused by AF, which in turn slows down the rate at which the ventricles are pumping.

There are several types of AV nodal blockers that work in different ways. You and your doctor will decide which medication(s) is the best treatment option for you. You may need to try more than one medication to find the one that works best for you and causes the fewest side effects. In some cases, depending on the person, the type of AF or the cause of the AF, these medications do not work adequately for the patient. If this happens, your doctor may recommend an AV nodal ablation procedure or change your treatment strategy from rate control to rhythm control.

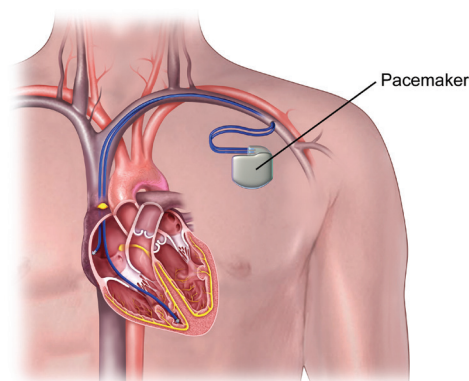
AV Nodal Ablation

A procedure called an AV nodal ablation can also be used to slow down your pulse and help your heart beat at a normal rate. AV nodal ablation is a non-surgical procedure that is done in an electrophysiology lab in the hospital. The procedure is performed by a team of highly skilled nurses and technicians who work alongside an electrophysiologist, a doctor who specializes in treating heart rhythm conditions. The procedure uses catheters (thin, flexible wires) that are inserted

into a vein in your groin and threaded to your heart. An electrode at the tip of the catheter sends out radio waves that create heat. This heat burns, or ablates, the AV node so no signals can travel from the atria to the ventricles.

Because the bottom chambers of the heart no longer receive electrical signals, they do not receive the “commands” to squeeze, which is how blood is pumped out of the heart to the rest of your body. Because of this, you will need to have a permanent electrical pacemaker implanted prior to AV nodal ablation. A pacemaker is a device that sends electrical impulses to the ventricles to keep the ventricles beating. The combination of AV nodal ablation and pacemaker implantation works very well to control the pulse without the need for heart rhythm medications. However, you will remain in AF and will need to continue to take a blood thinner.

It is important to know that you will now depend on the pacemaker to keep your heart beating. You should talk to your doctor about the risks and benefits of an AV nodal ablation.



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Rhythm Control Strategy For AF Treatment

Rhythm control is another strategy your doctor may use to treat the AF. Unlike a rate control strategy, a rhythm control strategy focuses on the pattern of your heartbeats. The goal is to return your heart to a normal rhythm. Medications or an ablation procedure can be used to manage your heart rhythm. There are several benefits to rhythm control. These benefits include:

- A more normal heart rate
- Atria and ventricles working well together
- Proper flow of blood from the atria to the ventricles
- Less discomfort or symptoms from an irregular heartbeat



Medications

There are several types of rhythm-controlling medications, which are sometimes called anti-arrhythmic drugs (AADs). Each type works in a different way to reduce AF by decreasing or eliminating the irregular activity in the upper chambers of your heart (the atria). Since each patient is different, you and your doctor will decide which medication is the best treatment option for you.

While AADs are used to control your heart rhythm, your doctor may also want you to take a medication that blocks the AV node (discussed in the “Rate Control Strategy for AF Treatment” section) to slow down your pulse as well.

You may need to try several medications to find one that works for you. Once you find a drug that works, you may have AF less often, it may be mild, and you may see a decrease in symptoms. However, you will likely experience AF from time to time.

Cardioversion

If you go into AF, your doctor may suggest cardioversion as a treatment option. Cardioversion is a procedure in which an electrical current, or shock, is given to the heart muscle to restore the normal rhythm. It sounds scary, but it is a simple, same-day procedure. You will be given a small amount of sedation through

an IV line. Large pads (electrodes) will be placed on your chest and back. A perfectly timed electrical current will pass through these electrodes to return your heart rhythm to normal.

Catheter Ablation for AF

Catheter ablation is a non-surgical procedure that can be used when medication is not controlling your heart rhythm or symptoms. Catheter ablation is done in an electrophysiology lab in the hospital by an electrophysiologist and team of highly skilled nurses and technicians. The goal of the procedure is to reduce the frequency and duration of AF episodes as well as to reduce AF symptoms.

You will be given sedation through an IV line to keep you comfortable during the procedure (known as conscious sedation). Conscious sedation means that you are still awake, but are very sleepy. You will have enough medication that you will not be aware of what is happening or feel any pain. In some situations, general anesthesia may be used. The type of sedation will depend upon your doctor, the hospital, and your overall health. During the ablation procedure, you will be given a blood thinner to prevent clots from forming in your heart during the procedure.

After you become sleepy, thin, flexible wires called catheters are inserted into a vein in your groin and/

or neck. These wires, or catheters, are threaded up through the vein and into the heart using X-rays to guide the way. There are electrodes at the tip of the wires. The electrodes are able to detect electrical signals from different parts of the heart. The doctor will be able to tell where the abnormal electrical signals causing the AF are coming from. A special catheter, called an ablation catheter, sends out radio waves that create heat. This heat ablates (destroys) targeted tissue in the heart and blocks the abnormal electrical signals, which can trigger AF. Special equipment creates a 3D picture of your heart. This helps the doctor know exactly where to apply the heat. Another option is to use freezing cold to ablate (destroy) the heart tissue; this is called cryoablation. The basic process is the same regardless of whether heat or cold is used to ablate heart tissue.

Catheter ablation for AF usually takes between two and six hours. Your medical team will closely monitor your heart beat, blood pressure, and breathing during this time. After the procedure, pressure will be placed on the area where the catheters were inserted to prevent bleeding. You may need to stay in the hospital for one or two days, which will depend upon your doctor and the medical center. Your doctor will tell you how to take care of yourself when you leave the hospital.

AF ablation is a safe procedure, but there are some risks. On average fewer than four out of every 100 people who have catheter ablation develop a complication. Some of these complications include:

- Stroke
- Collection of blood around the heart (cardiac tamponade)
- Damage to the blood vessels in your groin area
- Narrowing of the veins coming from the lungs to the left atrium (pulmonary vein stenosis)
- Damage to a nerve that affects movement of your diaphragm (phrenic nerve palsy)
- Creation of an opening between the atria and the esophagus (atrio-esophageal fistula, a serious—but extremely rare—event)

After the procedure, you should watch for bleeding or oozing from the catheter insertion sites, discomfort at the catheter sites, aches or discomfort in your chest, and fatigue or lightheadedness.

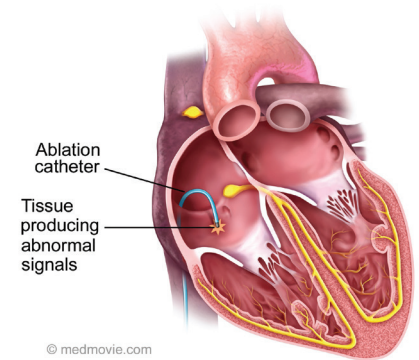
It's not uncommon for AF to resume during the 3 months following catheter ablation, as your heart tissue heals from the procedure. Some patients may need more than one ablation procedure to stop AF. If you have a high risk for stroke, your doctor may want you to continue taking blood-thinning medication (an anticoagulant) even if you have had a successful ablation procedure. Contact your doctor if you have any questions or concerns about any symptoms.

Surgical Ablation

Surgical ablation is another approach for treating AF that is uncontrolled by medication. It is a treatment that generally is more invasive than a catheter ablation procedure. There are two types of surgical ablation procedures: concomitant and stand-alone.

Concomitant ablation — Surgical ablation is most often done when a patient with AF needs another type of heart surgery, such as a heart valve replacement or repair. In these cases, the doctor will treat the other heart condition and AF during the same surgery. This type of AF treatment is called concomitant ablation.

During a concomitant ablation, a surgeon burns or freezes the surface of the heart directly, rather than using catheters and X-rays to reach the heart. New techniques have allowed surgeons to use smaller incisions to perform surgical ablations and other open heart surgeries. However, these are usually open heart surgeries.



Stand-alone ablation — Stand-alone ablation is used for AF patients who are not helped by medication, have had a previous catheter ablation, or prefer this type of ablation. This procedure is done “alone”, not during another operation. For most stand-alone ablations, the surgeon does not open the chest to reach the heart. Instead, the surgeon makes incisions on both sides of the rib cage and inserts surgical instruments through these incisions (“ports”) to reach the heart. There will be one port for a surgical camera (thoracoscope), one port for an ablation device, and one or more ports for other surgical instruments. Similar to catheter ablation, the surgeon uses an ablation device that uses heat or freezing cold to ablate (destroy) tissue that causes AF.

Complications associated with surgical ablation include:

- Stroke
- Major bleeding that requires another surgery
- Collection of blood around the heart (cardiac tamponade)
- Lung collapse (pneumothorax)

As with any surgery, complications and risks vary for each patient, so you should discuss all risks with your surgeon.

Reduction Of Stroke Risk

The most common risk for people with AF is having blood clots form in the heart. AF makes it harder for the atria (the upper chambers of the heart) to pump blood to the ventricles (the lower chambers of the heart). With the blood moving more slowly, it can pool and is more likely to form clots. Clots can break free and travel anywhere in the body. Clots can get stuck in arteries and stop blood flow in those arteries. Important organs may be damaged or stop working because of blocked blood flow. If a blood clot travels to the brain, it can cause a stroke. One out of every 4 strokes in the US is due to AF. A stroke caused by AF is usually more severe and disabling than a stroke not caused by AF. The mortality rate for AF-related strokes is double that for strokes not caused by AF. Thus, stroke prevention is a primary treatment goal for AF. Your doctor will ask you about your medical history

to figure out if your AF increases your risk of having a stroke. These questions could include:

- Other medical conditions, such as high blood pressure, diabetes, heart failure, or vascular disease
- Illnesses you have had in the past
- Medications you take or have taken
- Any surgeries or procedures you have had
- Whether you often fall
- Vaccinations (shots)
- Employment or hobbies that could result in injury

It's very important for your doctor to diagnose AF and decide if you need medication to thin the blood and reduce the risk of stroke. AF needs to be treated whether or not you are having any symptoms.

Anticoagulant Medication

If you have a high risk for stroke, your doctor will recommend taking a blood-thinning medication (anti-coagulant). There are several anticoagulants available to reduce the risk of stroke. These medications can be grouped by the part of the blood clotting process that they target. When taken as prescribed, all anticoagulants significantly reduce the risk of stroke. However, anticoagulants increase the risk of excess bleeding, because the medication prevents clotting.

Vitamin K antagonists — Many of the proteins involved in the clotting process rely on vitamin K. Vitamin K antagonists (VKAs) are one type of anticoagulant. They interrupt the production of these clotting proteins. VKAs have had the longest use in AF-related stroke prevention. The first VKA was approved in 1954. Warfarin (Coumadin®) is a vitamin K antagonist.

BENEFITS Most doctors are experienced with treating patients taking a VKA, such as warfarin. If there is an emergency (such as a car accident) or a planned medical procedure, doctors can reverse the level of warfarin in your body so that your blood can clot normally. A VKA is the least expensive type of anticoagulant.

RISKS Certain foods—particularly green, leafy vegetables—have a lot of vitamin K. Eating too many foods that are rich in vitamin K can make warfarin ineffective

at stroke prevention. Some medications also interfere with warfarin. If you start taking warfarin, it is important that you take the correct amount. You will need to have your blood checked regularly to make sure that your blood is thinned to the proper level. If you take too much, you are at risk for excess bleeding. If you do not take enough, you are still at risk to get a blood clot.

Direct thrombin inhibitors — Thrombin is an enzyme needed for clots to form. By stopping thrombin, the clotting process is interrupted. Dabigatran (Pradaxa®) is a direct thrombin inhibitor.

BENEFITS Direct thrombin inhibitors may be easier for some patients to take than a Vitamin K-based anticoagulant like warfarin. With direct thrombin inhibitors, you can eat most foods and not worry if your diet will affect how well your medicine works. In addition, you won't need frequent blood tests. Direct thrombin inhibitors also have a lower risk of bleeding in the brain than vitamin K-based anticoagulation medication.

RISKS There is no approved drug to reverse direct thrombin inhibitors, and doctors are less experienced treating patients taking direct thrombin inhibitors in emergency situations. In addition, direct thrombin inhibitors only offer stroke protection for a certain period of time, so you cannot skip a dose. Direct thrombin inhibitors may also have a higher risk of major bleeding in the stomach and intestines.

Factor Xa inhibitors — Factor Xa is another enzyme involved in the clotting process. By inhibiting Factor Xa, clots don't form as easily. Rivaroxaban (Xarelto®) and Apixaban (Eliquis®) are Factor Xa inhibitors.

BENEFITS Factor Xa anticoagulants may be easier for some patients to take than a vitamin K-based anticoagulant. Like direct thrombin inhibitors, Factor Xa anticoagulants have fewer dietary restrictions, and fewer interactions with other medications, than VKA anticoagulants. Also like direct thrombin inhibitors, you won't need to have frequent blood tests. Factor Xa inhibitors also have a lower risk of bleeding in the brain compared to a VKA anticoagulant medication.

RISKS Doctors are less experienced treating patients taking Factor Xa anticoagulants in emergency situations, and there is no approved drug to reverse Factor Xa medications. Like direct thrombin inhibitors, Factor Xa anticoagulants only offer stroke protection for a certain period of time so it's important to take the medication as prescribed by your doctor and not skip doses. If you have liver disease, Factor Xa anticoagulants may not be appropriate for you.

Determining the appropriate treatment — You should discuss your risk of stroke with your electrophysiologist, cardiologist, or primary care physician. If an anticoagulant is needed, you should discuss the risks and benefits of the different anticoagulants with your doctor. Together you can determine which treatment is the best choice for you.

Device Treatment

Medical devices, which are implanted in the body, have also been created to reduce stroke risk for patients with AF. These are at different stages of review by the Food & Drug Administration (FDA), the federal agency that approves the safety and effectiveness of treatments.

The left atrial appendage (LAA) is a small pouch connected to the left atrium. When blood is pumped into the left atrium, some blood could enter the LAA. The inside of the LAA is rough, which allows blood to become trapped and possibly form a clot. During AF, a clot can break free and enter the blood stream. For people with AF, about 90% of clots come from the LAA.

In order to reduce stroke risk for people with AF, medical devices that stop blood from entering and leaving the LAA have been created. There are two types of stroke prevention devices: those that are placed inside the LAA (endocardial) and those that are placed outside the LAA (epicardial).

Endocardial LAA devices — There are several endocardial LAA devices that are being studied for use in stroke prevention. These devices are implanted by an electrophysiologist while the patient is sedated. Typically, a catheter is inserted into the groin and

threaded up to the heart. The device is then inserted directly into the LAA.

Epicardial LAA surgical devices — Epicardial LAA devices are attached to the outside of the LAA by a surgeon during an open heart surgery. Two epicardial surgical devices are approved for use in the US. There is also an epicardial LAA device that is implanted during a closed-chest procedure by an electrophysiologist. However, the clinical data on whether these devices can prevent strokes is limited.

If you are interested in these approaches to stroke prevention, talk to your doctor about which devices have been approved for use in the US and the risks associated with the procedure.

Other Treatments and Lifestyle Modification

People with AF often have other medical conditions. If you have any of the conditions shown below, your doctor may prescribe additional treatments for you, as these conditions may add to the frequency and severity of your AF.

High blood pressure (hypertension) — If you have high blood pressure, your doctor may prescribe special medication. The scientific names for two commonly prescribed types of blood pressure medication are long and can be difficult to pronounce. These medication types are often called by their abbreviations: ACEI (usually called “ace”) and ARB. ACEI stands for angiotensin-converting-enzyme inhibitor. ARB stands for angiotensin II receptor blocker. The scientific name explains which part of the cell process that each medication targets to lower blood pressure. In choosing a medication for high blood pressure for you, your doctor may consider an ACEI or an ARB, which may have some mild benefits in preventing AF.

High cholesterol — If you have high cholesterol, fatty material can build up in your arteries over time and block the flow of your blood. When your arteries are clogged, your heart and other organs may not get the oxygen they need to work effectively. Your doctor may prescribe a statin to lower your cholesterol to stop the buildup of fatty material in your arteries. Statins may also decrease inflammation, which may have a role in AF.

Sleep apnea — People with AF often have sleep apnea, which is a type of sleep disordered breathing. Sleep apnea can lead to AF or can make AF worse. People with sleep apnea don’t get enough oxygen during sleep and may not be aware of how often they wake up during the night. Restless nights and feeling fatigued are common symptoms. If you have sleep apnea, your doctor may prescribe a mask or a treatment, called a continuous positive airway pressure (CPAP) machine, to make sure you get normal amounts of oxygen while you sleep.

Lifestyle modification — You can reduce your risk of getting other heart conditions that are associated with AF by changing your diet and exercising. Eat more fruits and vegetables. Cut down on fat, especially saturated fats, so you can improve your cholesterol levels. Limit the amount of salt you use so you can lower blood pressure. Regular exercise—even walks around the block or light gardening—will make your heart and arteries healthier. (If you feel tired or short of breath, stop and rest. If you can’t hold a conversation during exercise, you’re pushing yourself too hard.) Eating better and staying active can help you lose weight, which is good for your overall health.

Alcohol and stimulants — You should avoid drinking too much alcohol or using recreational drugs (stimulants). Overuse of alcohol and stimulants can lead to abnormal heart rhythms, such as AF, and stroke.



WHAT TO ASK YOUR DOCTOR

If you have been diagnosed with AF, 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 another serious heart rhythm problem?
- Will my condition go away on its own?
- What are the risks that it will become worse (impact my life more)?
- 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)?



Heart Rhythm Society

1325 G Street NW, Suite 400
Washington, DC 20005

www.HRSONline.org

