

About Atrial Fibrillation

What is atrial fibrillation?

Atrial fibrillation (also known as AFib or AF) is a condition in which the upper chambers of the heart beat in an uncoordinated and disorganized fashion, resulting in a very irregular and fast rhythm (i.e., an irregular heartbeat). It occurs when the heart's two small upper chambers (the atria) quiver instead of beating effectively. When the blood is not completely pumped out of these heart chambers, it can pool and clot. If a blood clot forms in the atria, exits the heart and blocks an artery in the brain, a stroke results. Consequently, about 15 percent of strokes occur in people with AFib¹.

While there are three types of AFib, the pattern of AFib can change over time. It is practical to categorize a given patient by his or her most frequent presentation.

- **Paroxysmal AFib** – In paroxysmal atrial fibrillation (AFib), the abnormal electrical signals and rapid heart rate begin suddenly and then stop on their own. Symptoms can be mild or severe and last for seconds, minutes, hours, or days.
- **Persistent AFib** - Persistent AFib is a condition in which the abnormal heart rhythm continues until it's stopped with treatment.
- **Permanent AFib** - Permanent AFib is a condition in which the normal heart rhythm can't be restored with the usual treatments. Both paroxysmal and persistent atrial fibrillation may become more frequent and eventually result in permanent AFib.

These categories are not mutually exclusive, and a particular patient may have several episodes of paroxysmal AFib and occasional persistent AFib, or the reverse.

How prevalent is it?

There are approximately 2.5 million Americans with AFib² and 4.5 million people living in the European Union are affected³. As the number of elderly people increase, this number is expected to grow to 5.6 million in the US by the year 2050, with more than 50 percent of affected individuals older than 80 years of age⁴. It is the most common cardiac arrhythmia seen by physicians and accounts for about one-third of hospital admissions³. AFib is considered to be one of the three growing cardiovascular epidemics in the 21st century in conjunction with congestive heart failure, type 2 diabetes and/or metabolic syndrome⁴.

The likelihood of developing AFib increases with age¹:

- AFib is present in less than 1 percent of the general population³
- About 5 percent of the population over the age of 65 has AFib¹
- AFib afflicts about 8 percent of people 80 years of age or older³

Other possible risk factors for developing AFib include:

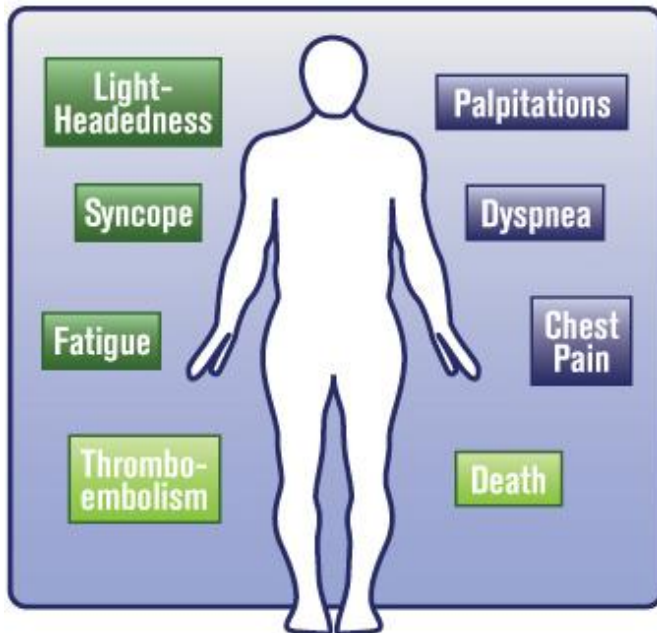
- High blood pressure
- Heart valve disease
- Coronary artery disease⁶
- Obesity⁵
- Diabetes³
- Heart failure⁶

What are the symptoms?

Not all people with AFib experience symptoms, and the symptoms experienced may vary from mild to severe. Common symptoms include:

- Tiredness or fatigue
- Feeling of overall weakness
- Palpitations (rapid, irregular, “flopping” movement or pounding sensation in the chest/neck)
- Irregular heartbeat
- Shortness of breath
- Difficulty breathing
- Dizziness
- Lightheadedness
- Chest pain or discomfort⁵
- Heart failure

Clinical Presentation of Atrial Fibrillation



What causes AFib?

AFib is associated with a variety of causes and associated conditions which can adversely affect the normal functioning of the upper heart chambers. These include:

- Alcohol⁵
- Psychological stress⁵
- Agents that stimulate the heart, including caffeine and some common cold medications⁵
- Heart surgery
- Heart attacks
- Cardiomyopathy (disease of the heart muscle)
- Heart valve disease (either genetic or caused by infection or degeneration/calcification of the valves with age)
- Pericarditis (the inflammation of the sac that surrounds the heart)
- Hyperthyroidism (the over activity of the thyroid gland)
- Pulmonary embolism (a large blood clot in the lung)
- High blood pressure (hypertension)
- Atrial flutter (a rapid heart rate that starts in the heart's upper chambers and is conducted to the lower chambers)
- Other heart conditions that stretch, scar or thicken the heart muscle³

What are the associated risks?

AFib is a major cause of morbidity and mortality, increasing the risk of death, congestive heart failure and embolic phenomena, including stroke⁷.

- The mortality rate of patients with AFib is about double that of patients with normal sinus rhythm and is linked to the severity of underlying heart disease³.
- AFib aggravates heart failure and in turn heart failure promotes AFib. Individuals with either condition who develop the alternate condition share a poor prognosis³.

AFib is associated with an increase in the rate of ischemic strokes with 1 in every 6 strokes occurring in a patient with AFib.

- Furthermore, quality of life is considerably impaired in patients with AFib, mainly because of their inability to perform normal daily activities due to risk of or exacerbation of symptoms^{3,8}.

How is AFib diagnosed?

A patient's medical history would be collected along with a physical examination and an electrocardiogram (EKG)³, a test that records the electric activity of the heart.

Another common test is the echocardiogram³, which examines the heart by detecting the echoes of very high frequency sound waves in order to give images and detailed measurements of the heart⁹. Other general tests include chest x-rays to identify heart enlargement or anything unusual with the lungs, including fluid build-up, that could contribute to AFib. Metabolic testing and blood tests can help assess a patient's condition and will look at thyroid function, levels of electrolytes and anemia, all of which can cause or contribute to atrial fibrillation in certain cases³.

How is AFib treated?

Treatment of atrial fibrillation has three common goals. These include the restoration and maintenance of sinus rhythm, controlling the heart rate and preventing stroke³. There are two general approaches to treating the irregular heartbeat. The first is to attempt to restore and maintain sinus rhythm ("rhythm-control" approach), while the second is to control the ventricular response rate to prevent deterioration of ventricular function and to minimize the symptoms ("rate-control" approach)¹⁰. The initial AFib management decision involves primarily a rate control or rhythm control strategy or a combination of both, but the initially chosen strategy may prove unsuccessful and the alternate adopted¹¹.

Specifically, the various approaches to treating or preventing a recurrence of AFib include:

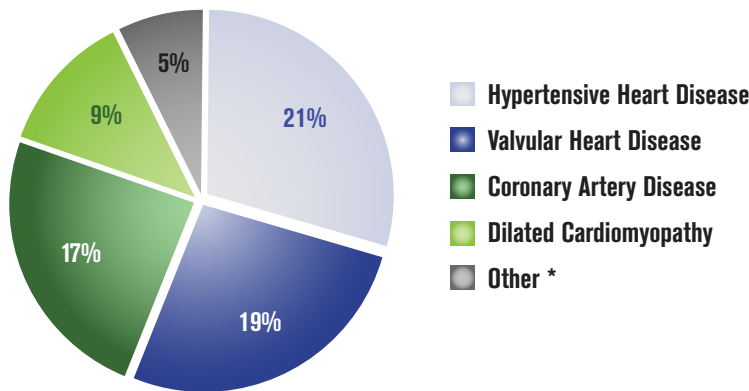
- Medications
 - Anti-arrhythmic drugs are available to normalize the heart back to a normal rhythm.
 - Rate control agents including beta-blockers, calcium channel blockers, and digoxin are available to slow down rapid heart rates^{1,10}.
 - Anticoagulants or antiplatelets such as aspirin are used for the prevention of stroke¹.
- Cardioversion
 - Electrical cardioversion uses an electric shock to restore normal heart rhythm when medication doesn't improve symptoms.
 - Chemical cardioversion refers to the use of antiarrhythmia medications to restore the heart's normal rhythm¹².
- Radiofrequency ablation is an increasingly employed nonsurgical procedure which uses radiofrequency energy (similar to microwave heat) to carefully destroy selected small areas of heart muscle which either trigger or maintain the abnormal rhythm.
- Surgery can be used to disrupt electrical triggers and pathways that generate and maintain AFib.
- Atrial pacemakers can be implanted under the skin to regulate the heart rhythm¹.

Atrial Fibrillation: A Debilitating and Life-Threatening Disease

In patients with AFib, underlying cardiac disease often is present and according to a study, underlying structural heart disease was present in more than 70 percent of patients as seen in the figure below.¹⁴

Disease States Associated With Atrial Fibrillation: *ALFA Study*

>70% of AF patients have cardiovascular disease



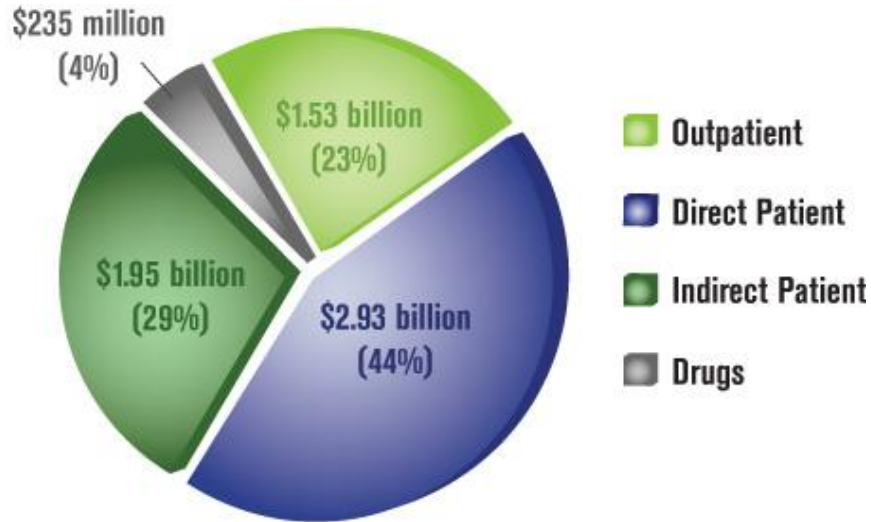
**Other includes sinus node dysfunction and diagnosis of structural heart disease classified as miscellaneous*

- AFib also has a sobering clinical impact as it can be a risk factor for other cardiovascular-related diseases and pathology such as:
- Cardiovascular events
- Stroke (the most common and debilitating AFib complication, AFib increases the risk of complications approximately 5-fold¹⁵ and worsens its severity)¹⁶
- Hemodynamic impairment (when an artery becomes severely narrowed or completely occluded;¹⁷ reduced cardiac output)
- Cardiomyopathies^{13,18} (a type of heart disease in which the heart becomes abnormally enlarged, thickened and/or stiffened)¹⁹

Atrial Fibrillation: A Prevalent and Costly Disease

The economic impact of AFib is significant, both in terms of service utilization and costs. AFib substantially increases utilization rates for inpatient, emergency, and other medical services, while per-patient medical costs have been found to be 5-fold higher in patients with AFib than in those without the disease.²⁰

Distribution of \$6.65 billion (2005 U.S. dollars) in Annual Atrial Fibrillation Treatment Costs:



The costs of AFib are substantial. Total U.S. costs in 2005 are estimated at \$6.65 billion. Among these:

- Direct inpatient: \$2.93 billion
- Indirect inpatient: \$1.95 billion
- Outpatient: \$1.53 billion
- Pharmacy: \$235 million²¹

The following summarizes the impact of AFib on the use of healthcare services by site within the U.S.²¹

Atrial Fibrillation-Attributable Utilization (Annual) of Key Health Care Resources

- 350,000 hospitalizations
- 5.0 million office visits
- 276,000 emergency department visits
- 234,000 hospital outpatient department visits

AF Stat[™] A Call to Action for Atrial Fibrillation is an initiative sponsored by sanofi-aventis U.S. LLC

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