

# An Introduction to Heart Rhythm Disorders

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## What is an Arrhythmia?

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The heart is a pump made up of muscle tissue. Like all muscle, the heart needs energy and oxygen to function. The heart's pumping action is regulated by an electrical conduction system that controls the contraction of the various chambers of the heart.

An arrhythmia is an abnormal rhythm of the heart. In an arrhythmia, abnormal electrical signals through the heart muscle may cause the heart to beat too fast (tachycardia), too slow (bradycardia), or irregularly.

Some arrhythmias can cause problems with contractions of the heart chambers by:

- Not allowing the lower chambers (ventricles) to fill with enough blood, because an abnormal electrical signal is causing the heart to pump too fast or too slow.
- Not allowing the top chambers (atria) to work properly.

## What are the Symptoms of an Arrhythmia?

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A disturbance to the heart's rhythms can cause a wide range of symptoms that may include:

- Palpitations
- Fainting spells
- Fatigue
- Shortness of breath
- Chest discomfort

“Some heart rhythm disturbances—namely ventricular tachycardia and ventricular fibrillation—can cause sudden death,” says Thomas Tadros, MD. “Other rhythm abnormalities, such as atrial fibrillation and atrial flutter, can put patients at risk for stroke or heart failure. Supraventricular tachycardia isn't life-threatening.”

Dr. Tadros is an arrhythmia specialist, or electrophysiologist, at the Brigham and Women's Heart Rhythm Disorders Program. He and his colleagues are known worldwide for their expertise in the evaluation and treatment of abnormal heart rhythms that affect a wide range of patients, particularly those with complex arrhythmias.

## Arrhythmias of the Heart's Upper Chambers (Atria)

Arrhythmias that occur in the sinus node, the atria, or the atrioventricular node are known as supraventricular arrhythmias.

Atrial Fibrillation	Atrial Flutter	Supraventricular Tachycardia
<p>Atrial fibrillation (AF, or “afib”) is the most common type of serious arrhythmia. The condition affects four million people in the United States.</p> <p>Atrial fibrillation involves a very irregular and fast contraction of the atria. In atrial fibrillation, the atria wiggle ineffectively without pumping properly, and with chaotic rather than orderly contraction.</p> <p>Many people with atrial fibrillation experience a rapid, irregular heartbeat that can be bothersome or even frightening, and also can sometimes cause low blood pressure, low heart output, and faintness or fatigue.</p>	<p>Atrial flutter is less common than atrial fibrillation but has similar symptoms and complications.</p> <p>During atrial flutter, electrical activity doesn't start with the sinus node as it should, but rather begins in another large circuit.</p> <p>This causes the atria to beat very rapidly—at a rate of 150 to 300 beats per minute, well above the normal rate of 60 to 100 beats per minute.</p>	<p>Supraventricular tachycardia (SVT) refers to a fast, abnormal heart rhythm that involves both the heart's atria and ventricles. With SVT, the problem originates either in the atria or an area in the middle region of the heart (the atrioventricular node).</p> <p>There are different types of SVT that are classified by the path that the electrical signal takes from the area of the heart where they originate, including sinus tachycardia, atrioventricular nodal reentry (AVNRT), atrioventricular reentry tachycardia (AVRT), and ectopic atrial tachycardia.</p> <p>SVT isn't typically life-threatening but may require treatment as it may cause heart palpitations, dizziness or lightheadedness.</p>

Atrial fibrillation (Afib) specialists within the Heart Rhythm Disorders Program provide access to the most innovative treatments, utilizing the latest treatment guidelines.

## Arrhythmias of the Heart's Lower Chambers (Ventricles)

A ventricular arrhythmia is caused by an abnormal electrical rhythm within the ventricles. This results in abnormal conduction of electrical signals within the ventricles.

Brigham and Women's Heart & Vascular Center is a leader in the field for treatment of ventricular tachycardia. VT specialists at the Heart Rhythm Disorders Program provide expert evaluation and diagnosis with the aid of the latest imaging technologies.

Ventricular Tachycardia	Ventricular Fibrillation
<p><u>Ventricular tachycardia (VT)</u> involves fast, regular beating of the ventricles that may last for only a few seconds or much longer.</p> <p>VT is defined as three or more heartbeats in a row, at a rate of more than 120 beats per minute. VT can become life-threatening if it lasts for more than a few seconds at a time.</p> <p>VT is typically associated with other heart conditions, such as <u>coronary heart disease</u>, <u>heart valve disease</u>, cardiomyopathy, and sarcoidosis, although they sometimes can occur in otherwise normal hearts.</p>	<p>Ventricular fibrillation, also known as “V-fib,” is when electrical signals make the ventricles quiver (fibrillate) instead of pump normally. The quivering means that blood isn't pumping blood out to the body.</p> <p>In some people, ventricular fibrillation may happen several times a day. This is called an “electrical storm.” Since sustained V-fib can lead to cardiac arrest and death, it requires immediate medical attention.</p>

## Diagnosis of Heart Rhythm Disorders

A cardiologist or electrophysiologist can help evaluate and diagnose a heart rhythm disorder with a careful physical examination, the use of imaging technologies, and any one of the following tests or procedures.

- Cardiac ultrasound (echocardiography)
- Cardiac magnetic resonance imaging (MRI)
- Cardiac PET-CT
- Exercise Tolerance Test
- Holter ECG monitor

To effectively diagnose and treat arrhythmias, the Heart & Vascular Center offers one of the few multidisciplinary noninvasive cardiovascular imaging programs in the country that incorporates the use of all available imaging types.

## Treatments for Heart Rhythm Disorders

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“It’s important to treat an arrhythmia, because the condition can worsen over time as the heart muscles become overworked and weak, making it more difficult for the heart to function properly,” says Dr. Tadros.

The Heart Rhythm Disorders Program uses a variety of cutting-edge procedures and techniques to care for patients with irregular heart rhythms.

## Medications

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The frontline treatment for many heart rhythm disorders often involves medications.

1. Antiarrhythmics allow physicians to stabilize the heartbeat and prevent serious complications by returning the heart to a normal rhythm.
2. Anticoagulant medications (blood thinners) are used to prevent blood clots that can form due to atrial fibrillation and can lead to stroke. Examples of commonly prescribed blood thinners include coumadin, heparin, and warfarin.

## Catheter Ablation

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For individuals with heart rhythm disturbances that don’t respond adequately to treatment with medication, catheter ablation is an appropriate option.

This non-invasive procedure involves guiding a small tube through the veins and into the heart, where electrodes are used to eliminate the heart cells causing arrhythmia.

“Catheter ablation is designed to permanently cure an arrhythmia, or if that is not possible, to make them less frequent, slower, and better tolerated,” says Dr. Tadros.

Brigham and Women’s Hospital is one of three hospitals in the US using an investigational needle catheter to treat patients with ventricular tachycardia who have failed available medications and standard ablation techniques.

## Electrical Cardioversion

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Electrical cardioversion is a non-surgical procedure that involves sending an electrical current through the chest wall to “reset” the heartbeat to a normal rhythm. It can help treat several different abnormal heart rhythms and is commonly used to treat sustained arrhythmias such as atrial fibrillation.

Electrical cardioversion is useful for treating other abnormal heart rhythms, such as atrial flutter. It can also be used to treat certain kinds of supraventricular tachycardias and ventricular tachycardia.

## Surgical Procedures

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For patients with persistent heart rhythm disturbances, implantable devices can provide automatic electrical therapy on a continual basis and prevent life-threatening arrhythmias.

“We usually perform surgery for arrhythmias when all other appropriate options, including minimally invasive surgical procedures, have failed,” says Dr. Tadros.

Within the Heart Rhythm Disorders Program, our experienced physicians in cardiac electrophysiology perform more than 3,000 procedures a year, including the implantation of the following devices:

1. Implantable Cardioverter Defibrillator (ICD)
2. Pacemaker
3. Cardiac Resynchronization Therapy (CRT)

For nearly a century, Brigham and Women’s Hospital has been at the forefront of clinical and research investigations for novel mechanical and circulatory assist devices, including HeartMate 3 that was recently approved by the FDA based on results from the innovative MOMENTUM 3 trial, led by Brigham investigators.

## Treating Complex Arrhythmias

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The Heart Rhythm Disorders Program is known worldwide for its expertise treating abnormal heart rhythms that affect patients with complex arrhythmias, such as providing catheter ablation for atrial fibrillation, atrial flutter, supraventricular tachycardia, and ventricular tachycardia.

“Our electrophysiology team is capable of handling the most complex heart rhythm disorders,” says Dr. Tadros.

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