

YOU CAN LIVE WITH IT!

ARRHYTHMIA
PALPITATIONS
SKIPPED BEATS
HEART FLUTTERING

A guide to living a better, more comfortable life

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Introduction

Most people have had an irregularity of the heart's rhythm at one time or another. These changes are hardly ever noticed and are seldom serious. An irregular heart rhythm does not necessarily mean that heart disease is present or that elaborate medical tests or treatments are required.

Doctors call any irregularity of the heart rhythm an "arrhythmia" (pronounced ah-rith'me-ah). Whenever a person is aware of the heart's beating, doctors speak of this feeling as "palpitations."

You can be sure that doctors know more about heart rhythms today than ever before. In most cases simple tests provide a diagnosis and often no treatment is necessary, especially when the heart is otherwise healthy and free of damage. In other cases, when heart problems are truly present, newer diagnostic tests, medications and devices are making these problems totally manageable.

This contains information for patients and their families and loved ones. It can help answer many of the common and important questions about palpitations and arrhythmia that all too often trouble patients or those caring for them. The information can relieve much anxiety and fear that come from "not knowing." It can give patients a better understanding of arrhythmia, their doctors' approach to diagnosis and treatment and guide them to a more active role in caring for their own health.

Please understand that this contains a great deal of information. It is not supposed to be read quickly or all at one sitting. It can be referred to over and over again. So, take your time. First, go to the sections you are most interested in. Then, when time permits and more questions occur to you, look into other chapters. The advantage of having this all "written down" is that you can get to know and understand more *at your own pace!*

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Medication card

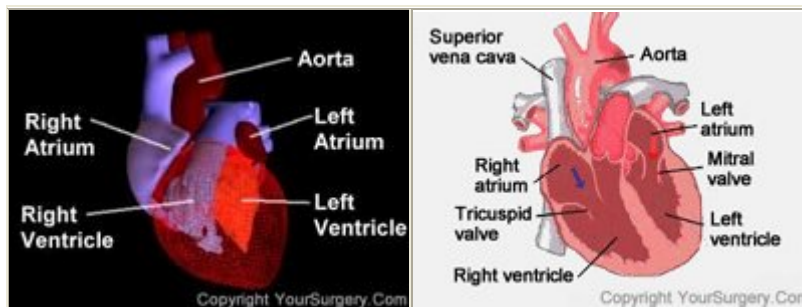
Normal heart function: The beat goes on and on



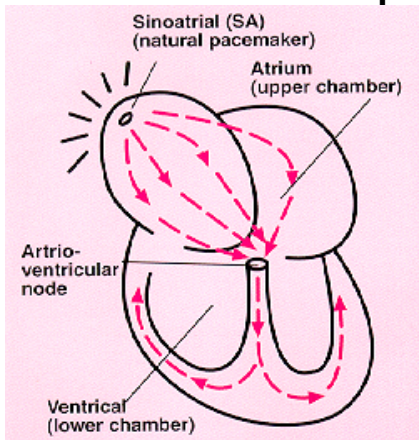
- **The heart is a pump**

The normal heart functions as a pump. It has four chambers, or cavities: two on the right side and two on the left. The chambers on the right (called the right atrium and right ventricle) receive blood from the body and pump it to the lungs to get oxygen and get rid of carbon dioxide. Blood coming back from the lungs, laden with oxygen, comes first to the left atrium and then to the left ventricle, which pumps the blood throughout the body. *The left ventricle is the most powerful chamber in the heart.*

Arteries carry blood away from the heart; veins carry blood from the body back to the heart. The four valves of the heart separate the chambers from each other and separate the chambers from the blood vessels they pump blood into. The heart's valves are delicate but strong “one-way doors” that prevent the backflow of blood into the chamber it was just pumped from.

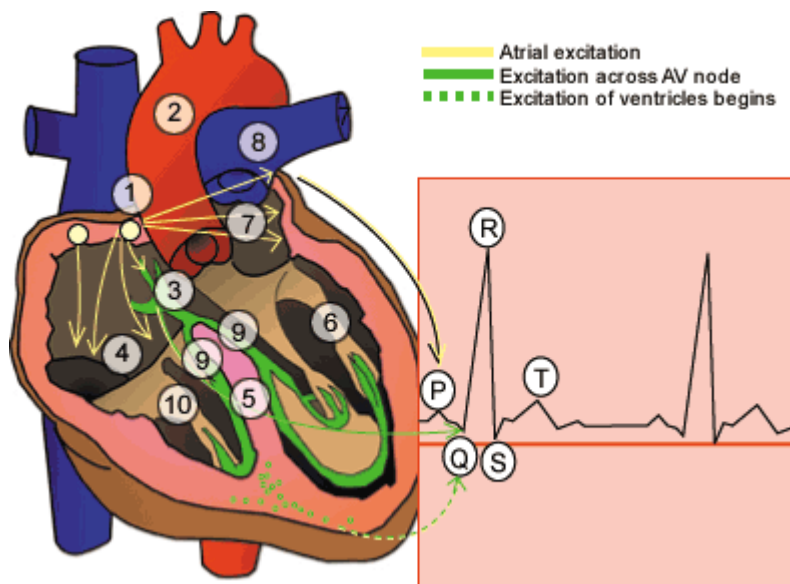


- The heart has a “spark plug”



Without an electrical “jump start” for each beat, the heart muscle would not move. The essential “spark of life” is provided by a small group of cells called a “node” that acts like a “spark plug” or natural pacemaker. Located near the top of the right atrium, this structure is called the SA (for sinoatrial, pronounced “sigh”no-ay’tree-al”) node or “sinus node” for short.

Every second or so, the SA node produces a tiny electrical impulse that starts the heart beat. The electrical impulse travels along pathways starting at the top of the heart muscle, then through the middle of the heart (junction) and to the bottom. The junction between the top of the heart (atrium) and bottom of the heart (ventricle) is called the AV (atrioventricular) junction. The impulse leaves the junction and travels onto the pathways of the ventricle. As the impulse travels along it spreads throughout the muscle, which responds with a contraction (squeeze) that pushes the blood through the one-way valves. The entire sequence takes about three-tenths of a second at usual heart rates. After a brief recovery, the process starts all over again for the next beat.



- 1 Sinoatrial (SA) node
- 2 Aorta
- 3 Atrioventricular (AV) node
- 4 Right atrium
- 5 Interventricular septum
- 6 Left ventricle
- 7 Left atrium
- 8 Pulmonary artery
- 9 Atrioventricular bundle
- 10 Right ventricle

Palpitations: Often normal

- A “fast heart”

Running up a flight of stairs, you feel your heart “pounding.” The awareness that your heart is beating is referred to as “having palpitations.” The hard, fast breathing has a regular rhythm because it is caused by the normal action of our natural pacemaker, the sinus node. The increased pace of the heart is simply a response to the increased needs of your body.

This palpitation symptom is not abnormal; that is, it is not caused by an arrhythmia (abnormal heart rhythm). It is called *sinus tachycardia* (pronounced “tak”ee-kar’dee-ah”), which means a fast heart rate, usually above 100 beats per minute. The SA node has responded to the body’s need for more blood and oxygen by increasing the number of impulses it generates per minute. The heart simply beats more quickly in response to it and gets more oxygen circulating to the parts of the body in need.

Common causes of a rapid heart rate (sinus tachycardia)

- Exercise
- Emotional stress (anger, anxiety, fear, excitement)
- Pain
- Fever
- Anemia (low red blood cell count and hemoglobin)
- Overactive thyroid
- Medications such as:
 - Caffeine (coffee, tea, chocolate, cola drinks)
 - Stimulants (amphetamines, cocaine)
 - Cold and asthma remedies
 - Diuretics (water pills)
 - High blood pressure medications: Vasodilators
 - Angina (chest pain) medications: Nitrates

• A “slow heart”

Lying in bed, you notice your heart beat. It seems it is beating very slowly at 45 to 50 beats a minute. Is it normal to have such a slow heart rate? In fact, it's quite normal when the body is at rest and the need for circulating blood and oxygen is at a minimum.

The regular, slow rate you're able to feel is called *sinus bradycardia* (pronounced “brad”ee-kar’dee-ah”), which means a slow heart rate. The SA node has responded to the body's reduced needs by initiating fewer impulses per minute. The heart is simply beating less frequently in response to the reduced rate of the natural pacemaker.

Common causes of a slow heart rate (sinus bradycardia)

- Rest and relaxation (“dozing,” sleeping, lying down)
- Good physical conditioning (frequent, regular exercise)
- High blood pressure medications such as calcium channel blockers, beta blockers or clonidine

Some of these medications may be used to treat angina, (chest pain), which is caused by poor blood flow to the heart muscle itself.

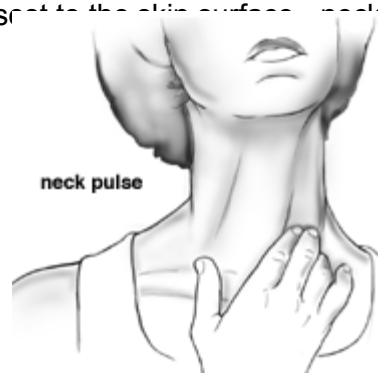
Certain eye drops for glaucoma can rarely be absorbed and in some individuals, slow the heart rate.

• A “varying heart”

A normal fluctuation of the heart rate occurs with changes in breathing and is generally so slight as not to be noticed, except in some individuals. It is called *sinus arrhythmia*. As we breathe *in*, our heart rate *quickens* just a little. When we breathe *out*, our heart rate *slows*.

You can observe this yourself by resting quietly with your finger on your pulse. Note that your pulse rate quickens when you take a sudden, deep breath. This is a normal response that is mistakenly called arrhythmia because in some patients, especially children, the changes are more than expected and appear almost as a true irregularity. You can be sure this is a “normal arrhythmia” and never requires concern or treatment.

It's easiest to “find the pulse” where arteries are closest to the skin surface—wrist, groin and ankles.



Step-by-step: From symptoms to diagnosis

- **Understanding the visit to the doctor**

As a person troubled by a symptom and possibly anxious concerning what lies ahead, you may find it helpful to know the approach your doctor will take to arrive at an accurate diagnosis and treatment appropriate for you.

The doctor's goal is to find out if any heart disease is truly present and to do so in the least difficult manner.

The *medical history* is the first step, usually completed through a discussion with the patient that gives the doctor an understanding of the major problem. This is usually supplemented by a written questionnaire that asks for background information about the patient's health, including details about previous health problems, hospitalizations, operations, medications, allergies, and cardiac risk factors such as high blood pressure and cholesterol levels, smoking, diabetes and family history.

The physical examination



The physical examination is performed next in an effort to find any abnormalities that could indicate the existence of a heart problem. The examination may be limited to the heart and circulatory system (cardiovascular system) if the problem is solely arrhythmia. However, since other health problems can cause arrhythmias, a complete physical examination may be performed and general medical problems may be reviewed. The search for signs of heart disease includes an evaluation of blood pressure, heart rate and rhythm. The condition of the neck veins and arteries as well as the blood vessels in the back of the eye

are assessed; and the lungs, heart, abdomen and extremities are evaluated as well.

By listening to the chest for breath sounds, the physician can determine if there is fluid in the lungs (a sign of heart weakness or failure). Listening to the heart can provide not only information about the rate and rhythm of the heart, but also whether a mechanical problem exists with the heart's pumping action. If a heart valve problem is present, such as a *blocked* or *leaking valve*, the flow of blood through the heart may be disturbed, causing heart *murmurs* that can be heard.



The sound of a murmur is much like the sound of water running through a kinked garden hose. Often, even the normal flow of blood will produce a sound loud enough to be called a murmur (especially in thin people or children). Therefore, detection of a heart murmur alone does not necessarily mean there is a problem with the heart or any of its valves. More information will be needed before it can be labeled a problem.

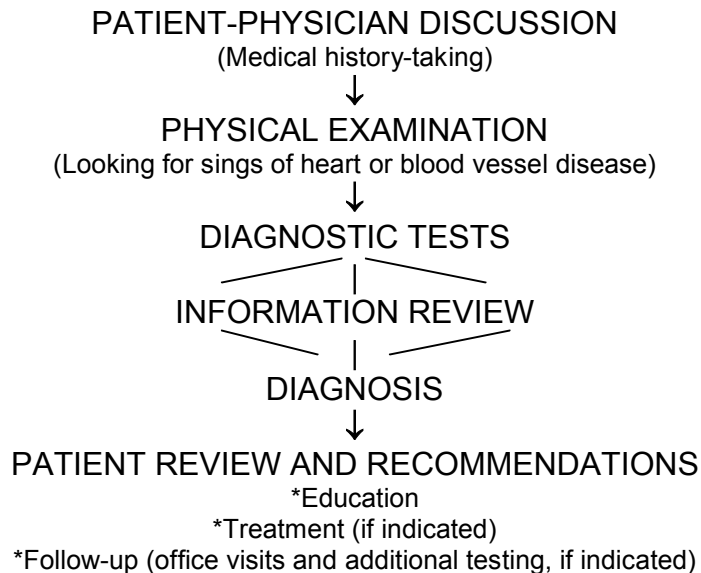
The next step is to schedule one or more routine non-invasive tests designed to identify heart problems with a minimum of risk, inconvenience and discomfort to the patient. When the problem is palpitations, the four most common and informative tests are likely to be the EKG, or ECG (electrocardiogram), exercise stress test, 24-hour Holter (ambulatory ECG) recording, and echocardiogram. These are described later in this manual.

After the history, physical exam and initial testing are completed, the physician will review the results and determine the proper follow-up or treatment. It may be that the diagnosis is definite and no treatment at all is necessary. On the other hand, the diagnosis may still be unknown and require additional testing. If the evaluation is done by your regular doctor (primary care doctor, family doctor or generalist), a consultation with a cardiologist (heart specialist) may be considered. If the evaluation has been done by a specialist at the request of your regular doctor, a report will be sent to your doctor summarizing the findings and recommendations. A cardiologist and primary care physician will generally work together if ongoing consultation is needed.

If follow-up testing or treatment is recommended, you can help your doctor care for you by “joining the team” and actively assisting in your own care. Here are a few simple ways to help:

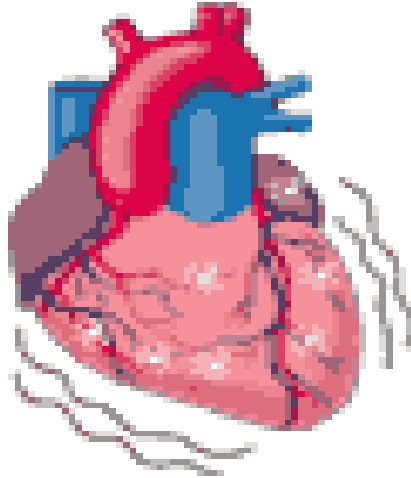
- Follow instructions carefully.
- Be sure to have questions about treatment clarified (write the answers down, or, if you are still doubt, ask for them in writing).
- Know each medication you are taking and its dosage.
- Keep regular follow-up appointments.
- Report problems in getting or taking your medications.
- Be a careful observer, reporting relief of symptoms with treatment as well as any new problems that may appear.
- Learn as much as you can about your problem and its treatment, but don't diagnose yourself-that's the doctor's responsibility.

From symptoms to diagnosis



Abnormal heart rhythms- How you might feel

- Awareness of the heart's beating (palpitations)



Abnormal heart rhythms (arrhythmia) might be reported by different individuals as “palpitations,” “skipped beats,” “extra beats” or “heart fluttering.” Some have called it:

- “flip-flopping inside my chest”
- “a little tickle, that makes me want to cough”
- “a sudden strong and hard beat”
- “a throbbing in my neck”
- “a nervous (jittery) feeling inside”
- “like a car with a rough idle”
- “a feeling of anxiety”
- “like my heart is stopped”

It's difficult to describe a sensation coming from inside the chest with ominous implications. *The anxiety and stress can often reduce our ability to observe and think clearly.*

During an arrhythmia, patients have reported watching their neck veins “quiver” or “jump up and down.” Others report seeing the front of their chest wall move, just under the left nipple. This is where the heart touches the inside of the chest wall. Try to detect your heart's motion by lying quietly on your left side with your right hand under your left nipple. Can you feel it? It's easy to understand how this might be worrisome if the heart beat is very fast, slow or irregular.

- **Effects of abnormal rate and rhythm on the circulation**

Lightheadedness is a symptom that may result from a temporary drop in blood pressure and may be caused by an arrhythmia if the heart's pumping capacity is sufficiently disturbed. Sometimes referred to as "fainting," "giddiness" or "dizziness," the symptom is similar to the sensation you feel when you "stand up too fast." You think you're going to faint, but you don't.

Fainting (syncope, pronounced "sin'ko-pee) is a severe form of lightheadedness that is generally the result of inadequate circulation of blood to the brain. It can result from a severe drop in the heart's pumping capacity, caused by an arrhythmia that is either too fast or too slow, that results in a significant fall in blood pressure. This symptom is *very important* to relate to your doctor.

Chest discomfort (pressure, tightness or pain) may be caused by an irregular heart rhythm. The discomfort may be felt in the neck, jaw, back, shoulders or arms, or may spread to these places. It may result from the high workload placed on the heart by a very rapid heart rate or be caused by too little blood flow through a diseased artery that supplies the heart muscle with blood and oxygen. In either case, the pain results from too little oxygen to the heart muscle.

Shortness of breath may result from an arrhythmia that sufficiently reduces the heart's ability to pump blood. If the heart rate is too slow there may be too few beats to circulate enough blood. On the other hand, a very fast heart rate may cause the heart muscle to contract so rapidly that it cannot fill properly, or the walls become weak, causing an ineffective squeeze.

Increased sweating may occur during abnormal rhythms, especially if they cause a sluggish circulation, low blood pressure or chest pain (angina).

Increased urination may be produced by certain fast heart rhythms (tachycardias). It may be the result of a hormone released by the heart muscle and acting on the kidneys, causing them to make extra urine.

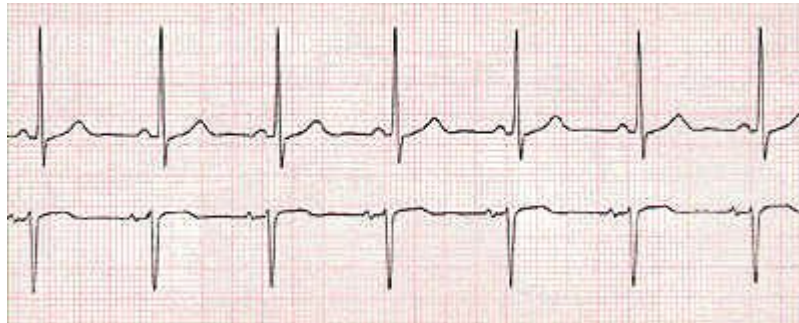
Abnormal heart rhythms- How many are there?

Classifying an irregular heart rhythm provides information that may help the cause of the arrhythmia and the reason for its persistence (the so-called “mechanism”).

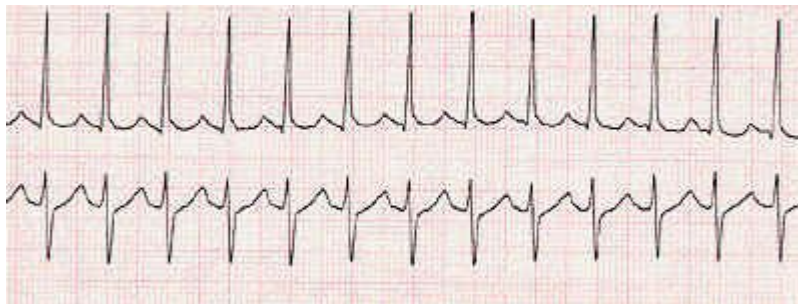
- **Classified by rate**

“Fast” (Tachycardia) vs. “Slow” (Bradycardia)

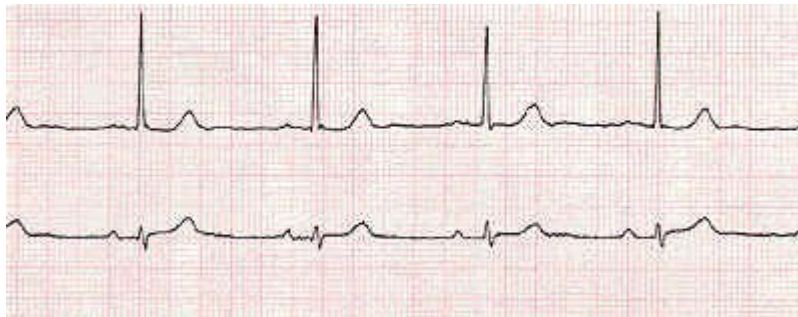
Normal rate (60-100 beats per minute)



Tachycardia



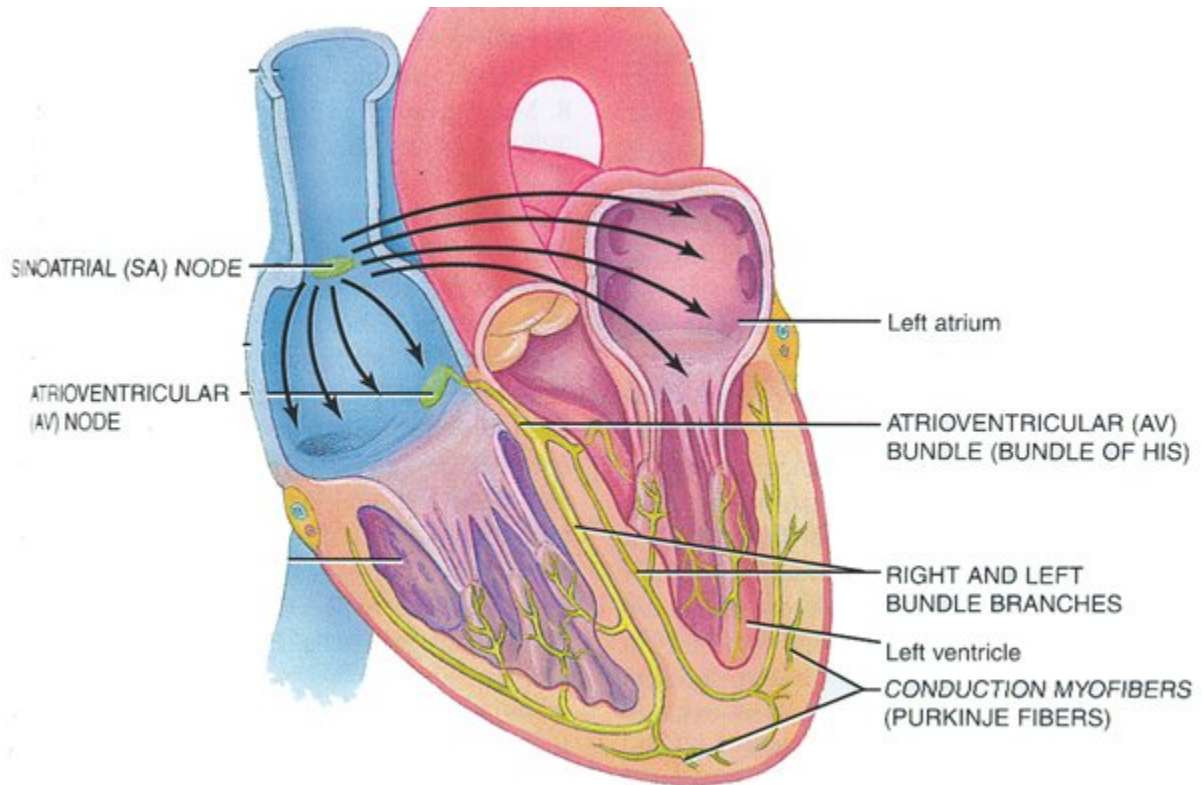
Bradycardia



Probably the two most common terms used in discussions of arrhythmia are tachycardia, usually over 100 beats per minute, and bradycardia, usually less than 60 beats per minute. These terms describe only the rate of the heart rhythm, and although important, the rate by itself doesn't tell you much. Learning *which part* of the heart is involved in causing arrhythmia is even more valuable.

- **Classified by location**

Arrhythmias are easily classified according to their location in the heart. Dividing the heart into three major areas—the top (atria), middle (AV junction), and bottom (ventricular)—makes most arrhythmias understandable.



From the “TOP”

Abnormal heart rhythms from the top of the heart are called “atrial arrhythmias.” They are caused by abnormal electrical impulses from different places on the top of the heart. Because they usually cause the heart muscle to squeeze *early*, they are referred to as *premature atrial contractions* (PACs) or beats. These abnormal beats may be single, double, or three or more in sequence. The latter, three or more abnormal beats in sequence may be called PAT (paroxysmal atrial tachycardia), “atrial flutter” or “atrial fib” (atrial fibrillation) depending on the type of problem.

From the “MIDDLE”

Normally, electrical impulses pass from the top of the heart to the bottom of the heart through the middle, or junction (also called AV junction), of the heart. There the impulses may be slowed or even blocked completely. This can be considered a *protective* mechanism that prevents the major pumping chambers on the bottom of the heart, the ventricles, from beating too fast when the top of the heart has a fast rhythm (tachycardia). Abnormally fast rhythms can result in the ventricles not filling or pumping properly. The overall result can be poor circulation of blood. At times, there is an *abnormal* slowing or block of the electrical impulses as they pass through the AV junction (called Heart Block or AV Block). These “conduction delays” or blocks almost always result in a slow heart rate. Excessively slow heart rates may cause fatigue, lightheadedness or even fainting that may require a permanent pacemaker.

From the “BOTTOM”

Abnormal heart rhythms from the bottom of the heart are called “ventricular arrhythmias.” These are caused by abnormal electrical impulses from different places in the bottom of the heart. Because they usually cause the heart muscle to contract early, they are referred to as PVCs, or premature ventricular contractions. These abnormal beats may be single, double or three or more in sequence. The latter, three or more abnormal beats in sequence, is usually called VT (ventricular tachycardia). When the rhythm is so chaotic that the muscle can no longer contract, the abnormality is called VF (ventricular fibrillation).

Still interested?

For those who want to know even more (characteristics of specific arrhythmias)

Fast heart rates that are abnormal (Tachycardias)

From the “top” (Atrial arrhythmias)

- PACs- Premature Atrial Contractions (or beats PABs)
- PAT- Paroxysmal Atrial Tachycardia
- “Atrial flutter”
- “Atrial fib”- Atrial fibrillation

From the “bottom” (Ventricular arrhythmias)

- PVCs- Premature ventricular contractions (or beats PVBs)
- VT- Ventricular Tachycardia
- Vf- Ventricular fibrillation

Slow heart rates that are abnormal (Bradycardias)

A “sick starter” (Sick Sinus Syndrome; SSS)

Problems getting through the middle (junctions) of the heart are called “Heart Blocks”

- Mild (1st degree)
- Moderate (2nd degree)
- Severe (3rd degree or “Complete” heart block)

• Fast heart rates that are abnormal (Tachycardia)

Before we describe the abnormal fast rhythms of the heart, it is useful to review the normal fast rhythm, which is medically called **Sinus Tachycardia** (See Normal Heart Function). Whenever the natural pacemaker of the heart (sinus or SA node) is caused to increase to greater than 100 beats a minute, it is called a sinus tachycardia. Generally the rate doesn't exceed 150 beats per minute. If you're aware that your heart is racing, and many people can feel this change, you are experiencing “palpitations.” As you can see, not all “palpitations” therefore mean there is an abnormal rhythm (arrhythmia) present. It is a normal response of the heart to the body's needs (such as with exercise, stress or fever associated with illness), certain medications (including cold remedies or stimulants) or certain foods such as coffee, tea, colas, or other caffeinated foods. Generally when we say something is exciting, it's likely we're talking about something that can cause our heart rate to increase naturally (that is, produce a sinus tachycardia).

Rx (=treatment) of Sinus Tachycardia. Since this is a normal rhythm, treatment is generally not indicated except as it is focused on identifying the cause and trying to reduce or eliminate it. The heart rate generally will respond as the cause is withdrawn.

PACs (=Premature Atrial Contractions) or Beats (PABs) are early beats that are initiated in the atria by some cause and location other than the natural pacemaker. They can be single (one at a time) or double (two in a row also called a “pair”) and occur before the next expected sinus beat; hence they are early or premature! Many people have PACs and are entirely unaware of them. Others are aware of each PAC as an irregularity or skipping of their heart. Rarely can other symptoms (such as shortness of breath, weakness, or lightheadedness) be clearly attributed to PACs; since these beats do not disturb cardiac function greatly. The causes of PACs are similar to the causes of Sinus tachycardia in one individual and PACs in another.

Rx (=treatment) of PACs, which is harmless though at times very disturbing condition, generally focuses on identifying the possible cause and trying to eliminate or reduce it.

PAT (=Paroxysmal Atrial Tachycardia) or SVT (=Supraventricular Tachycardia) refer to episodes (so-called “paroxysms”) of 3 or more PACs in a row. This is one of the most common types of sudden, rapid, arrhythmias and often very variable in their length, time of occurrence and symptoms. They can occur as only 3 beats and be entirely unnoticed or persist for prolonged episodes (hours and even days if not treated). PAT usually causes symptoms of “heart racing,” “fluttering” and at times complaints of shortness of breath, tiredness or weakness, and chest comfort. This is rarely a cause of fainting or collapse. A number of patients have reported that they were alarmed to see their chest wall or clothing (in the area of the left nipple) move rapidly in a tapping-like motion. Generally the rate is between 150 and 250 beats a minute and is very noticeable as it starts suddenly. The causes of PAT are similar as the causes of Sinus Tachycardia but the mechanisms (that is how they actually stimulate the heart to beat rapidly) are entirely different. There are several different mechanisms of PAT resulting from different locations in the atria or junctional area. These can at times be suspected from the ECG but at other times require additional testing.

Rx (=treatment) of PAT (SVT) can take many forms. Medications may be used occasionally in patients with rare episodes as a kind of “medication cocktail” to stop an episode already in progress. For patients with more frequent bouts of PAT, medications may be prescribed for daily use to prevent the episodes from occurring. Medications used to treat PAT include digoxin, beta blockers, calcium channel blockers (such as verapamil or diltiazem), and less frequently Class I or III antiarrhythmic agents (See Prescription Medications).

The newest treatment for PAT is not a medication but rather involves studying the patient in a specialized hospital laboratory test called an “EP” Test (ElectroPhysiologic test). In this testing procedure described in (Specialized Tests- Electrophysiologic Study), the electrical pathways in the heart used by the PAT mechanism are identified. After identifying the specific pathway with a wire catheter that gets to the heart through the blood stream, the wire catheter is placed next to it and a small dose of radiofrequency energy can be sent through the wire to damage the pathway and prevent the PAT from ever occurring again. This procedure can eliminate the need for medication entirely in most cases.

Flutter (or more correctly Atrial Flutter) is an arrhythmia in which the electrical activity of the top of the heart is very fast but also very chaotic and disorganized. As a result, the actual pumping action of the upper heart chambers which helps blood “to load” into the lower chambers is lost. The upper chambers act only to hold blood for the next beat rather than push it forward into the major lower pumping chambers (or ventricles). It is often easily recognized on the standard ECG because of its distinctive changing and “irregular pattern – which distinguishes it from atrial fibrillation and atrial flutter are many. It is unclear why some individuals in response to a particular problem will develop atrial flutter where as another person will develop atrial fibrillation.

Atrial flutter and atrial fibrillation may be caused by:

- Heart diseases (valve problems, muscle damage from heart attack, virus or alcohol, heart failure, following heart surgery).
- Lung diseases (chronic bronchitis, emphysema, pneumonia)
- Overactive thyroid gland
- Excesses of alcohol, caffeine or other stimulants
- Low blood potassium or magnesium (sometimes resulting from use of water pills [diuretics] without adequate supplements, chronic diarrhea or laxative use).

Rx (=treatment) The goals in treating Atrial Fib or Flutter include slowing the heart rate so the heart will function better, stop the irregularity and reduce the chance of it reoccurring. Digoxin, beta blockers and two of the calcium channel blockers (verapamil and diltiazem) can be used to slow the heart rate if it is fast. Other drugs can be used to correct the problem (see Medications for the bottom of the heart). These medications are often used in combination and require careful monitoring by your doctor. In addition to drug treatment a carefully controlled electric shock can be used to “convert” (change) either Atrial Fib or Flutter back to normal (sinus) rhythm (see Hospital treatments Cardioversion).

• Bradycardias (=Slow heart rates)

A slow heart rate (bradycardia pronounced brad'-ee-card-ee-a) can be normal or abnormal. It may occur normally because our natural pacemaker (the sinus or SA node) is firing slowly in response to the reduced needs of the body for added circulation. An appropriately slow heart rate may occur while we are at rest, sleeping or relaxing (see Palpitations are not always caused by arrhythmias; Sinus bradycardia).

If the sinus or SA node is damaged or has problems forming electrical impulses, the heart rate may be abnormally slow, irregular, or show gaps or pauses between beats. These gaps between impulses are referred to as “sinus pauses generally if they occur for only one beat and as “sinus arrest” if more prolonged.

Sinus Pause or Arrest

A slow heart rate may also result from an inability of the electrical impulse produced by the sinus node to travel though the upper chambers and AV junction to the lower chambers of the heart. This block in the electrical impulses pathway almost always occurs in the middle of the heart in the area of the AV junction and is almost always abnormal. It is referred to as “heart block” and may vary in severity.

Junctional problems including Heart Blocks

“Heart block” is a scary term that often confuses people who immediately worry that the “block” that’s being discussed is in a coronary artery and can lead to a heart attack. In fact, *“heart block” has nothing to do with the arteries or blood*

supply of the heart and is not a cause of the common heart attack. Heart block refers to the slowing or complete stopping of electrical impulses as they travel through the middle (junction) of the heart. It can be present in different degrees:

Severity	Medical Term	Explanation and Treatment
Mild	1 st degree heart block	Is a trivial problem that is really no problem at all and requires no treatment. It represents a slowing of the electrical impulse as it travels through the middle (junction) of the heart.
Moderate	2 nd degree heart block	Is rarely a normal finding. This always causes a slowing of the heart beat and may require a pacemaker to be implanted if symptoms of lightheadedness, dizziness or a faint result.
Severe	3 rd degree heart block	This is also known as <i>complete heart block</i> . It represents complete blockage of all electrical impulses from the top of the heart as they travel through the middle (junction) of the heart. This requires the placement of a permanent pacemaker as a guarantee that there will always be a heart beat.

Causes of abnormal heart rhythms

What's behind it all?

There are many possible reasons for an abnormal electrical impulse to occur. The heart muscle may be "irritable;" that is, it may be overly sensitive to changes in the amounts of natural substances in the body such as adrenaline and oxygen or minerals such as potassium and magnesium. These substances may be either overabundant or in short supply as a result of general health problems. The imbalances may result in damage to the heart muscle, with areas of injury or scar causing overactivity or underactivity of the impulse-producing cells. This is why abnormal heart rhythms and rates are so common during a heart attack.

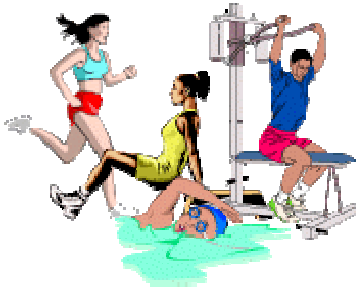
Although "arrhythmia" always means that there is an irregularity of the heart rhythm, *the presence of arrhythmia does not always mean that heart disease or damage has occurred, nor does arrhythmia mean that the heart's pumping function or blood supply is impaired.* In many cases the overall pumping function of the heart is unchanged and the heart is found through testing to have a normal structure and function despite the presence of an arrhythmia. In these instances, if a cause can be found and corrected, the arrhythmia may be totally eliminated.

The *absence* of heart damage is a very important finding. It may allow discovery of a cause such as stress, mineral deficiency or excessive intake of caffeine or

alcohol that can be eliminated, and often allows the physician to reassure the patient that the anticipated consequences of the arrhythmia are minor.

- **Common causes**

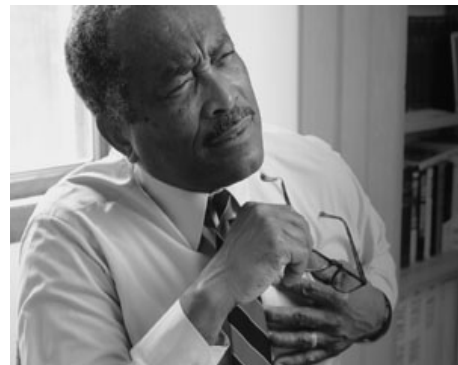
- Physical stress (exercise)



- Emotional stress



- Heart diseases (heart attack, abnormal heart valves, enlarged heart, heart failure)



- Lung diseases (emphysema, chronic bronchitis and other smoking-related disorders)



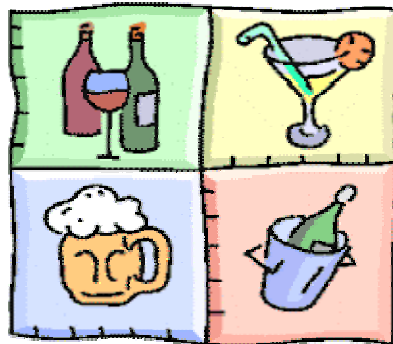
- Other diseases (overactive or underactive thyroid, disorders involving vomiting or diarrhea that cause loss of potassium or magnesium)
- Medications (diuretics, some asthma drugs and cold remedies, diet pills, “stay awake” pills, stimulants)



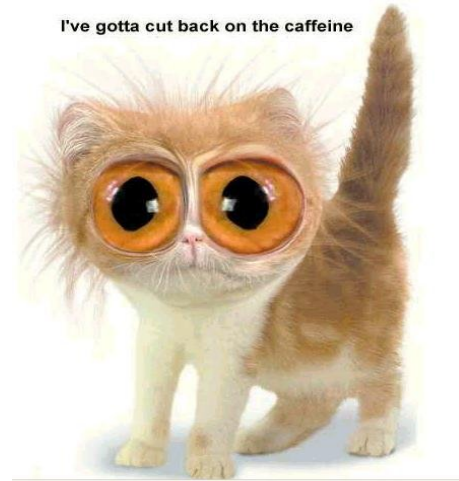
- Dietary (low potassium, low magnesium; “fad diets,” often with inadequate mineral intake or supplementation)



- Toxins (such as alcohol or nicotine)



- Stimulants (caffeine, amphetamines, cocaine)



Tests to help diagnose the type of arrhythmia

In evaluating the condition of your heart, tests that do not require inserting wires, tubes or devices into the body are called *noninvasive*, and are preferred since they carry little risk and cause little discomfort.

Invasive tests, on the other hand, involve the insertion of wires or tubes and the use of x-ray dye or devices. They are usually done in laboratories or operating rooms equipped to deal with the risks of bleeding, infection and blood vessel blockage. Invasive tests almost always require you to sign a “consent form,” indicating that you understand the test, its benefits and any potential risks.

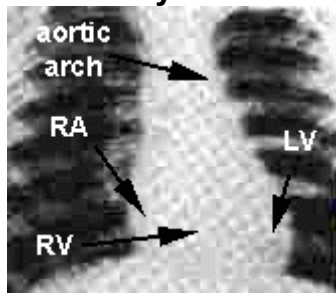
No one is likely to need all these tests. Your doctor will select the easiest and clearest route to arrive at your diagnosis. If you have questions about any test ordered for you, be sure to ask your doctor.

In patients with arrhythmia, testing the heart has two main purposes:

- diagnosing the specific type of arrhythmia.
- determining whether the heart has other problems that will affect the importance of arrhythmia.

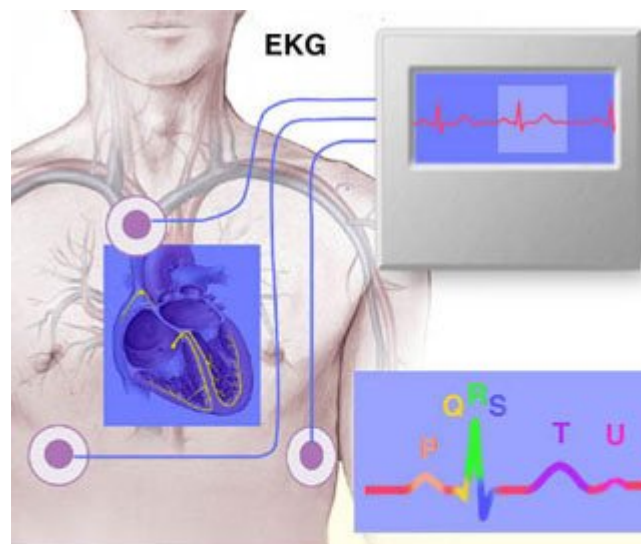
- **Standard Tests**

Chest x-ray.



This test lets your doctor look at your lungs, the size of your heart and some of your major blood vessels. When compared to a previous x-ray it can reveal changes that may have occurred. If heart disease is present, your heart may be enlarged or there may be fluid around your heart or in or around your lungs. Some types of heart valve disease result in calcium deposits in the valves that can be seen on x-ray. *Knowledge of structural abnormalities is extremely helpful to your physician since different structural problems often cause specific types of arrhythmia problems.*

Electrocardiogram. The ECG, or EKG, shows your doctor how the electrical impulses travel through the *top* (atria), *middle* (junction) and *bottom* (ventricles) of your heart. You don't feel this test at all. Wires with tiny pads or suction cups, placed at 10 points on your arms, chest and legs, are connected to a machine that records the exact rate and rhythm of the heart's electrical activity and displays the way it spreads through the heart muscle.



The EKG breaks down each heartbeat into a series of electrical waves. Three of the waves, the P wave, the QRS complex and the T wave, are associated with the heart's contractions. The P wave reflects activity in the heart's upper chambers. The QRS complex and T wave reflect activity in the lower chambers.

The ECG may reveal whether the electrical impulse is starting from the right location and traveling along the normal electrical pathways. It can show that you had a heart attack, indicate thickened heart walls or suggest enlarged heart chambers. This is by far *the most important test to obtain at the actual time an arrhythmia or palpitation is occurring*, since it provides the doctor with a specific diagnosis. It is with this accurate and important information, the *diagnosis*, that all decisions about treatment begin.

The SAECG (Signal-Averaged ECG) is a new type of recording to evaluate electrical activity from the bottom of the heart. It is obtained like the standard ECG discussed above except that you have to remain as motion-free as possible for 10 to 20 minutes to permit reliable information to be collected. This test shows the doctor the “average” electrical impulse created by the heart and allows further analysis to help identify which patients are at risk of certain important arrhythmias.

Holter Recording (or 24-hour Ambulatory Electrocardiogram).



By wearing a small portable electrocardiogram recorder with a few thin wires pasted to your skin, you can provide your doctor with a record of your heart rhythm over a 24-hour period at home, at work and wherever you go. During the same period you keep a diary of your symptoms and activities. Your doctor can then determine whether your heart rhythm and rate are responsible for your symptoms by comparing the Holter recording and your diary entries at corresponding times. This can be extremely helpful in proving that disturbances of the heart's rhythm are NOT the cause of certain symptoms or problems.

When 24 or 48 hours are not enough because symptoms do not occur on a daily basis, a *30-day Event Recorder* may be helpful. This unit is very similar to the Holter Recorder, but it can be disconnected from the body for bathing or other purposes. It may be carried, unconnected, until a symptom develops, and then hooked up rapidly in order to detect the heart's rhythm at the time. Merely touching it to the chest or to the wrist permits recording of the heart rhythm by the unit. This record of the heart's rhythm, at the time a symptom is noted, can prove or disprove an association between them.

Exercise Testing



Exercise testing can help determine whether the heart muscle is receiving adequate amounts of blood from the coronary arteries. An abnormal test result usually means that coronary artery disease is present and the patient is at risk for chest pain (angina) or for a heart attack. In patients with arrhythmia, the test can help determine whether exercise is the cause of arrhythmia or makes it worse, or even at times improves it.

The test is designed to monitor the heart's response to increased work performed by the patient in the form of exercise such as walking at different speeds, generally uphill. Of course, fatigue, shortness of breath and a rise in heart rate and blood pressure are to be expected whenever we exercise more vigorously than we used to. Even some mild forms of arrhythmia occurring after strenuous exercise can be considered part of a "normal" response.

If, however, chest pain, a fall in blood pressure, faintness or serious arrhythmia occur, it may indicate that a coronary artery is narrowed or closed, or that a structural or electrical problem with your heart requires treatment. Performing this test in a supervised setting provides a safe environment in which to diagnose such a problem.

To perform the routine exercise test, you simply walk on a treadmill or pedal a bicycle for five to fifteen minutes while your symptoms are noted and your blood pressure and heart rate and rhythm are monitored.



- **For the test, it is recommended that you:**
 - Wear comfortable clothes and shoes.
 - Eat lightly or not at all prior to the test.
 - Check with your doctor about medications you are taking. In some cases the patient is asked to suspend all medications that might alter test results. In others, the test will be performed while the patient is taking medications in order to test the effects of treatment.
 - Have a copy of the test results sent to each of your physicians.

To help make sure that an abnormal test really indicates a problem and that a normal test means a normal patient, the routine exercise test can be combined with others. When exercise and an ultrasound image of the heart are combined it is called an **Echocardiographic Stress Test** and when we add a nuclear scan of blood flow to the heart it is called either a **Thallium Stress Test** or **Sestamibi Stress Test** depending on which medication is used.

In the **Echocardiographic Stress Test**, the heart's function at rest and in response to exercise are compared. When a narrowed coronary artery reduces blood flow to the heart muscle, the strength of contraction is decreased and this can be seen in the echocardiogram, thereby confirming the diagnosis.

In the Thallium (or Sestamibi) Stress Test a small plastic tube is inserted into a vein in your hand or forearm prior to exercise. Following exercise, a small non-allergenic dose of radioactive salt is injected into your circulation; some is deposited in your heart, allowing a scanner to take pictures of your heart muscle. Using a heart scan at rest and a follow-up scan after exercise, your doctor can often determine whether your heart muscle has a normal blood supply and whether a heart attack has occurred in the past.

For patients who cannot perform treadmill or bicycle exercise, various medications can be given intravenously (IV) while the patient is lying comfortably

at rest in order to obtain the same information about blood flow to the heart muscle. These medications increase the blood flow to the heart muscle by temporarily enlarging the coronary arteries, just like exercise! While these medications are generally well tolerated, possible side effects of these so-called **Pharmacologic Stress Tests** include:

- chest pain (angina) that may indicate a blocked or narrowed artery to the heart
- nausea
- headache, dizziness or flushing
- palpitations
- asthma (wheezing)

These tests are not recommended for certain patients:

- Patients who are having frequent pain of increasing severity or duration
- Those taking certain medications for breathing problems
- Pregnant women and mothers who are nursing, since the tests involve the use of radioactivity

As with all medications or tests, a discussion with the doctor will be most helpful in answering your specific questions. Be sure to ask!

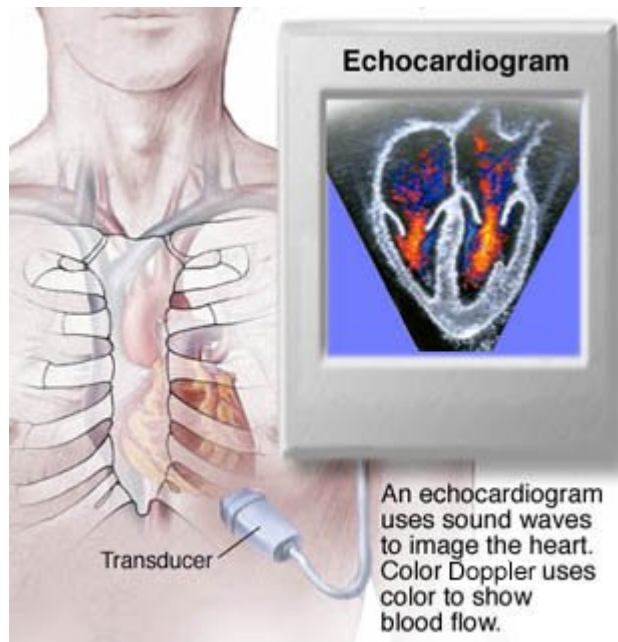
• **Common Blood Tests**

Tests of Mineral Levels (sodium, potassium, chloride and magnesium) are extremely important in evaluating the function of your heart muscle and its electrical system. *Low blood levels of potassium and magnesium are especially common causes of irregular heart rhythms.* Normal blood levels of potassium and magnesium have a stabilizing influence on the heart. The most common causes of abnormal mineral levels include poor nutritional intake, prolonged vomiting, chronic diarrhea and use of diuretic medications (so-called water pills). High blood levels may be due to poor kidney function, excessive intake of supplements or food additives, or medications that encourage retention of these minerals.

Tests of Thyroid Function show the level of thyroid hormone in the blood, since an overactive or underactive thyroid often results in changes in the heart's rate and rhythm. An irregular heart rhythm may be the first sign of an overactive or underactive thyroid gland. *Overproduction* of thyroid hormone generally produces a *faster* heart rate; *underproduction* results in a *slow* heart rate. *Tests for Drug Levels* may be done to determine whether a current dosage of medicine is correct (i.e., whether enough of a prescribed drug is being absorbed by your body). These tests may indicate a need for more or less drug and can provide evidence that the drug is responsible for observed symptoms.

A drug often tested in this way is digoxin, since small fluctuations in the blood level may affect response to the drug. Too little digoxin may result in little or no benefit and in certain patients result in an excessively fast heart rate, while too much may produce side effects such as loss of appetite, visual disturbances or a slowed heart rate. Another use of drug levels is to evaluate “drug interactions”- the effect of a second drug on one already being taken.

- **Tests to evaluate the heart’s structure and function**



Echocardiogram. The “Echo,” as it is called, transmits sound waves to create images of each chamber of your heart, the contracting motion and thickness of the heart muscle, the major blood vessels connected to your heart, the heart valves, and the thin sack around your heart known as the pericardium. This is a non-invasive test. In patients with arrhythmia, the doctor is looking for evidence of structural problems that might cause an arrhythmia or affect its treatment.

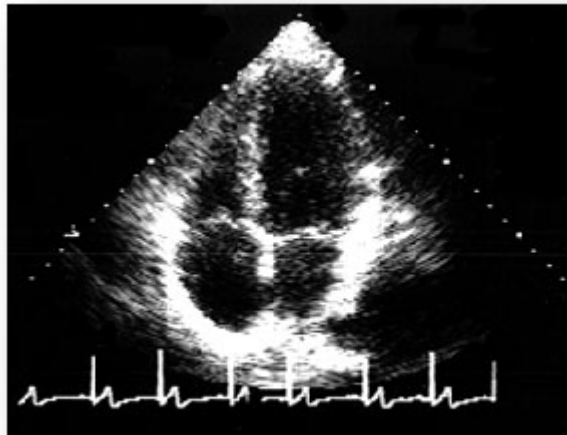
If heart disease is discovered with the Echo, it can help to pinpoint the best treatment. When the heart is shown to be entirely normal by Echo, the arrhythmia problem is usually less serious and the patient can be reassured.

The test uses only sound waves (ultrasound, sonar). No X-rays or needles are used and it is not dangerous. In fact, this same test is used to look at babies inside their mothers’ wombs before they are born. All you have to do is lie down and relax. A skilled technician puts a dab of gel on your chest and passes a sound probe painlessly over it, obtaining pictures of the heart underneath. During the Echo you can watch your heart beating on the video screen. On a clear study, you can watch the muscle walls contract, the valves open and close

and see the relationship of different parts to one another. The Echo at times is used to look for blood clots within the heart chambers.

In certain arrhythmia problems such as atrial fibrillation or flutter, the arrhythmia causes the heart muscle to relax or quiver rather than contract normally. Blood clots can develop along the non-moving walls and later dislodge and travel in the circulation leading to blockages of blood vessels in organs such as the brain (causing stroke) or other problems. Because these blood clots may be quite small and often are in difficult to see areas of the heart, a new technique called **Transeophageal Echo** or “TEE” has been developed. TEE involves passage of the Echo probe down the throat of a sedated patient to the esophagus, which lies directly behind the heart. The Echo images from a TEE are exquisitely clear and sharp because they are obtained from very close and do not have the lungs or chest wall to go through as in the standard Echo test. This test can yield information about *blood clots* in the heart that are otherwise difficult to view as well as *infections* in the heart.

The **Doppler Echocardiogram** uses a special computer to measure the speed and direction of blood flow inside the heart by bouncing sound waves off different locations. It can identify heart valves that are blocked or leaking and can reveal the location, severity and importance of many heart defects. Unfortunately, arteries are too small to “see” with the Echo. Repeat Doppler-Echo studies are used to evaluate changes in the severity of heart valve conditions. In the past this information could be obtained only by invasive tests, including heart catheterization.



- **Nuclear scans**

Two major types of nuclear scans are used to evaluate the heart. The first are the **Thallium or Sestamibi Scans**, described earlier in connection with exercise testing. The second type evaluates how the muscle itself is working and is called by several names: gated blood pool study, MUGA Scan (multiple gated scan), or RVG (radioisotope ventriculogram). The Thallium and Sestamibi Scan may show an area of heart muscle that is not getting enough blood because of scar tissue from a previous heart attack or a narrowed or blocked coronary artery. In stress testing, it records blood flow to the heart immediately following peak exercise and compares it to a scan of blood flow several hours later when the heart is at rest.

The Gated Blood Pool Study (MUGA or RVG) measures the overall performance of the heart; that is, the amount of blood pumped out with each beat and the contribution each section of heart muscle makes to the total pumping action.

These nuclear scans have several advantages:

- They are safe and painless (except for the small injection of radioactive medication in a vein of your hand or arm).

- They take only about 20 to 60 minutes for each scan.

- They are analyzed with the help of computers that make these some of the most accurate cardiac tests performed.

- They require no special preparation by the patient except a 6-hour fast (and awareness of any medications you may be taking).

Caution! Because of exposure to radiation these tests should not be done if you are pregnant or breast feeding.

Cardiac Catheterization



Cardiac Catheterization, or “heart cath,” is a test in which a small tube (catheter) placed in the bloodstream provides the means whereby pressures are measured, blood samples are taken and dye is injected so that x-ray pictures can be made. Sometimes the term “heart catheterization” is used to mean “coronary angiogram” (described below) because these tests are routinely done together. The detailed information derived from this important procedure usually includes measuring pressures (catheterization) looking at the arteries (angiogram), and observing the muscle contraction (ventriculogram).

The procedure is done in a laboratory, often located in a hospital, that is specially designed for studying the heart. The test may indicate heart problems of various types including valve malfunctioning (blockage or leakage), muscle damage, or abnormal pathways for blood as a result of disease or birth defects. By recommending a “heart cath,” your doctor has determined that the benefits of the test outweigh the risks. Since the risk of a major complication varies and depends on many factors, *the risk for the individual patient may be discussed with the doctor.*

The Coronary Angiogram, or arteriogram, is a special type of “heart cath” (see above) that produces a motion-picture x-ray of the blood vessels to the heart and pinpoints the location and severity of any blockages as well as variations in the size of coronary arteries.

A **Ventriculogram** shows the location and extent of heart muscle damage. It begins with an injection of dye into the left ventricle, the main pumping chamber of the heart. It is usually done during a coronary angiogram to show the function of the heart muscle and to see if any previous damage has occurred.

- **Specialized tests**

The **Electrophysiologic Study** (EPS) is designed to evaluate the electrical system of the heart and is perhaps the most common and specific test for evaluating abnormal heart rhythms (arrhythmia). The EPS is of proven value in the diagnosis of serious arrhythmias and is used to assess the severity of rhythm problems and to guide the physician to the best drug or medical device for treatment, if needed. It is done most often to help diagnose and treat excessively fast (tachycardia) or slow (bradycardia) rhythms of the heart, especially when these abnormal rhythms have been associated with important symptoms such as dizziness, lightheadedness, fainting or collapse.

The test is conducted in a specialized hospital laboratory similar to that used for cardiac catheterization. The patient lies on an x-ray table and one or more fine, flexible wires are placed in an arm or leg vein, much like a needle for intravenous fluids, which is also utilized. The wire is then floated through the bloodstream to the interior of the heart chambers, where the heart's electrical impulses are measured and recorded.

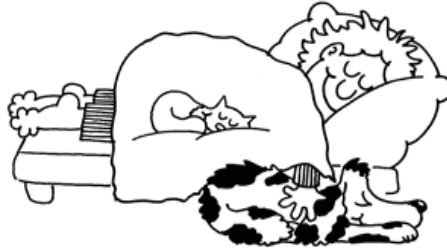
An ECG (electrocardiogram) and heart rhythm are recorded at the same time. The heart may then be challenged by electrical impulses from a pacemaker-like device. The heart's response discloses whether the electrical system is healthy or whether it is at risk for certain types of abnormal rhythms.

The EPS is done frequently and without complications in laboratories with experienced staff. The complications for any individual vary, depending on what is to be done. The benefits and risks should be discussed with the doctor recommending the test as well as with the doctor performing the test.

During an EPS, the pathways traveled by electrical impulses in the heart can be identified and abnormal rhythms of the heart "mapped." After identifying the specific pathway, the wire catheter is placed next to it and a small burst of radiofrequency energy is sent through the wire to permanently inactivate the pathway and interrupt the abnormal rhythm-like placing a "road block" across traffic. This procedure, called **ablation**, can in successful cases eliminate the need for medication entirely.

How much rest and exercise are good for me?

REST



EXERCISE



- **Is rest best?**

Some patients who get palpitations with exertion assume it's the exercise that's the problem, and all that's needed is to cut back on the physical exertion. *Nothing could be further from the truth.* By severely restricting physical activity, you can get "out of shape" and reduce your stamina so that even a short walk may seem like a chore. In short, *it's better to stay active.* By exercising regularly and keeping your body in condition, you'll feel better while accomplishing all exercises more comfortably.

Regular activity is essential for every healthy person, and we should be able to engage in the routines of daily living free of troubling symptoms if we're going to be truly comfortable. For most of us, maintaining a regular level of exercise is something we do without thinking—we notice a problem only when we “overdo it.”

During exercise, the heart is particularly sensitive to our needs. It increases its rate and pumping action in response to the physical stress. When we are “out of shape” this rapid and forceful heart beat is exaggerated. This is because of the increased stress placed on the heart from doing “more than it's used to.” High adrenaline levels play an important role and can sometimes trigger abnormal heart rhythms (arrhythmia) in the process.

The awareness of a rapid and forceful heart beat (palpitations) triggered by exercise can be quite troubling, especially if the rhythm seems irregular as well as fast. One of the best ways to prevent these situations is to stay physically conditioned (“in good shape”) by doing some form of regular exercise. Then our everyday physical requirements will be less likely to “exceed our capacity” and trigger excessively fast heart rates or irregular rhythms.

Under your physician's guidance, a carefully planned exercise program can improve the way you feel and help reduce palpitations. *Exercise doesn't have to be strenuous to be valuable.* Overall, exercise should be guided by common sense. As your level of fitness improves, you'll “feel better,” your heart will have greater capacity without high pulse rates, and the lowered stress on your body will be less likely to trigger irregular heart rhythms.

Age is not an excuse for not exercising. At first, it may be difficult, tiring, and even boring. It may produce headache, shortness of breath, shakiness and excessive sweating, but with time it usually gets easier and more enjoyable. Most people continue exercising because it makes them feel better and makes daily activities easier.

- **Always consult your doctor first!**

It's best to discuss an exercise program with your doctor first, since in some cases a supervised exercise or stress test may be necessary before you start. Also, the doctor may feel that a specific exercise is not advisable because of a particular condition or problem that exists. If any new symptoms occur with your exercise program, be sure to tell your doctor.

- **General exercise guidelines**

Do

- Warm-up with easy stretching exercises before beginning your workout.
- Start at low levels of exercise and progress slowly to longer routines.
- Pick a spot to exercise where you can stretch and be comfortable.
- Do exercise you enjoy or can learn to enjoy.
- Join an exercise class with people you like.
- Vary your workout to avoid overworking the same muscles and joints.
- Walk, swim, or bike when the weather permits.
- Consult your doctor first about the advisability of jogging.
- Use exercise as a way to control stress. When you are anxious or upset, take a “break” and exercise!

Don't

- Exercise if it causes chest pain, dizziness or lightheadedness.
- Exercise shortly after eating.
- Exercise when it's too hot or humid or when you don't feel well.
- Exercise if it requires you to hold your breath, grunt, or bear down (for example, lifting heavy weights or doing “chin-ups” on a bar if you aren't used to it).
- Engage in exercises that demand sudden bursts of energy or in contact or competitive sports unless specifically approved by your doctor.

- **I'm really worried!
What should I do?**

It is not uncommon to be upset, depressed and even angry about your symptoms or illness (if one is found). But remember, there are many many individuals with similar problems and a negative or defeated outlook never helps. Try not to let the problem “get you down.” The importance of your attitude cannot be underestimated - it often determines how you feel. Worrying just wastes time and it doesn't make you feel any better. Channeling “worry energy” into better ways to accomplish daily activities and responsibilities will be more productive as well as satisfying. It will ease some of the emotional stress. Some things that you can do to reduce your emotional stress include:

- Sharing your fears and worries with your family, loved ones and close friends. This truly helps to share the “burden.”
- Learn the ways to control your symptoms from your doctor and follow through on them (diet changes, exercise program, rest, medications).

- As about any self-help groups available at many medical centers.
- Consider counseling if you just can't seem to go beyond a certain point and your troubled.

Most patients with irregular heart rhythms are not limited from activities at work or play. Certainly however, fears of physical limitations, "fear of what's next" and other anxieties are present and need to be recognized. Realize that financial worries including concern about medical costs and earning a living are common to all of us when we become ill. Fears about limitations of physical activity and dependence on others also are common and should be openly discussed in order to make them more manageable.

Even if you have been told that you have a serious arrhythmia problem, it is important to recognize that you can deal with it better if you learn as much as possible. Talk to your doctor or nurse about any specific problems you may have and learn as much as possible about staying healthy and enjoying life.

Diet, caffeine, alcohol and nicotine

- **Habits "dear to your heart" may be harming your heart**

Almost any abnormal heart rhythms are less troublesome and serious in the presence of an otherwise healthy heart. It is therefore extremely important that we try to keep our heart healthy in every way possible. Here are some suggestions with regard to diet, caffeine, alcohol and nicotine.

Diet:

Healthy eating can protect your heart (and other vital organs) by protecting the arteries from the early build-up of plaque and hardening and by keeping the correct balance of essential nutrients. Reducing your intake of fat (especially saturated fat) and cholesterol will help reduce the calories you take in as well as provide a lower risk of developing heart disease.

Overeating and being overweight are major contributors to heart disease today. Overweight individuals are more likely to have high blood pressure, high blood cholesterol and other fats (triglycerides), heart disease, stroke and diabetes. Weight reduction can result in significant improvements in the way you feel. If you are overweight and are trying to lose weight, here are some helpful hints to consider:

(Remember any weight loss program should be reviewed with your physician to be sure its safe and right for you!)

- Start with a realistic plan. Your doctor may recommend a dietician or nutritionist who will work with you to tailor a well-balanced meal plan that suits your taste.

- Eat smaller meals more often, including varieties of vegetables, fruits and grains.
- Keep portion sizes down.
- Eliminate high caloric snacks. These include candies, soft drinks high in sugar content and potato chips etc. high in saturated fats.
- Always avoid excess alcohol. It's best to check with your doctor regarding any amount.
- Reduce fats in your diet. They are not only high in calories but also increase blood cholesterol.
- Substitute fish and poultry (without the skin) for red meats.
- Broil, poach or bake- don't fry (especially in saturated fats).
- Substitute reduced calorie mayonnaise and salad dressings, use low fat cottage cheese or yogurt rather than heavy creams.

The first hurdle is the hardest, but after losing a little weight you'll feel better about yourself and your health. The more you lose, the closer you get to your ideal weight, the more you'll benefit- especially if you have high blood pressure, cholesterol or sugar, since these will almost always show improvement.

The patient with abnormal heart rhythms may be more sensitive to certain dietary changes and it is well known that some diets are particular problems. It is clear that some diets (especially the severe "Fad" diets called "liquid protein diets) have produced dangerous imbalances in the body's minerals (especially potassium and magnesium). This has resulted in dangerous new abnormal heart rhythms in some individuals with catastrophic results. To avoid any mishaps, before embarking on a new diet, ask your physician if its appropriate for you.

Caffeine



Caffeine is a mild stimulant. It makes breathing more rapid, our heart beat faster and stronger and our nervous system react more quickly. We become more alert and responsive. There is often a slight rise in blood pressure.

It should come as no surprise, then, that caffeine is a *common* cause of palpitations. In addition to making the heart speed up (sinus tachycardia), it can trigger so-called “extra-beats” or “premature beats” from the top and bottom chambers of the heart.

A common story...

Consider the busy secretary who has easy access to coffee at the office and begins to get even busier from time to time missing lunch and having an extra cup of coffee in its place or hoping that an extra cup of coffee will provide the “pick-me-up” necessary to get through a long and “boring” afternoon. The increased caffeine may result in palpitations along with bothersome side effects (see below). When this occurs the best advice is to gradually but steadily reduce and eliminate the sources of caffeine. To stop abruptly is not recommended because symptoms of *caffeine-withdrawal* may appear (anxiety, headache, dizziness, irritability, nausea, stuffy nose).

• **Side effects of caffeine include:**

- stomach upset (bloating, nausea, diarrhea, discomfort)
- nervousness, jitters, tremors (shaking), irritability
- sleeplessness (insomnia)
- fast or irregular heartbeat (arrhythmia and/or palpitations)
- headache, ringing in ears, seeing flashes of zig-zag lights
- dizziness

Because caffeine is so readily available it’s easy to lose track of just how much caffeine we’re getting.

• **Sources of caffeine include:**

- Coffee
- Tea
- Cola
- Cocoa
- Chocolate
- Many over-the-counter pain medications and cold remedies

The best advice is to gradually but steadily reduce and eliminate the sources of caffeine. To stop abruptly is not recommended because symptoms of *caffeine-withdrawal* may appear (anxiety, headache, dizziness, irritability, nausea, stuffy nose).

Alcohol.



Consider the effects of alcohol on your heart. Alcohol has been shown to stimulate the nervous system and lead to increased blood levels of adrenaline. If excessive or we are sensitive to it, daily alcohol can lead to high blood pressure, heart muscle damage and arrhythmias.

For many people, alcohol causes palpitations. Like caffeine, alcohol makes the heart speed up (sinus tachycardia) and in many of us will trigger so-called “extra beats” or “premature beats” from the top and bottom chambers of the heart.

A common story...

A person has just been to a party for a “big occasion” and clearly has had “more alcohol to drink” than usual. Although he noticed his heart racing he didn’t think of it as abnormal after sitting down for some 20 minutes, “even after resting his heart was still racing.” He also felt tired, a little weak and when he got up quickly he felt lightheaded. His friends brought him to an emergency room where an electrocardiogram (ECG) revealed he had an abnormal fast rhythm of the heart (tachycardia). In this instance it was from the upper chamber (atrial) and may have been one of several types.

Generally, the effects of alcohol are temporary. However, alcohol can damage heart muscle in much the same way as a virus does, and in some patients irregular rhythms of the heart can be both serious and permanent. It is prudent from a health stand point to avoid more than two ounces of alcohol a day.

Nicotine.



Consider the effects of smoking on your heart. Nicotine absorbed from inhaled smoke (or chewed tobacco) makes more work for your heart. It causes blood vessels to constrict (become narrower). It increases your heart rate and blood pressure and can stimulate abnormal heart rhythms (arrhythmias). In addition, smoking directly contributes to long-term and irreversible heart, lung and vascular problems, including lung cancer. Tobacco in any form should be avoided.

Medications for the TOP of the heart

- **Digoxin: One of the oldest drugs, and still commonly used today**

Digoxine (pronounced “di-jox’in”) is one of the medications most frequently prescribed in the USA for patients over age 65. It is used widely by doctors for two reasons: it slows the rate of some of the common fast abnormal heart rhythms and it can improve the strength of contraction of weakened heart muscles. Digoxin is used almost exclusively for control of abnormal rhythms from the “top” and “middle” of the heart (atrium and AV junction). It works by delaying or blocking some of the many fast electrical impulses from the top of the heart as they go through the middle of the heart.

Digoxin is not generally used if the heart rate is already slow enough. Patients starting on digoxin often monitor their heart rate before each dose in order to avoid slowing the heart rate excessively.

The dose of digoxin depends on your individual needs and is carefully selected by your doctor. Any change in dosage must be reviewed and approved by your physician. Too much digoxin is dangerous, while too little may not provide any benefit. It must be taken exactly as directed because even small changes in daily dose may produce side effects (see below).

Do not skip a dose just because you're feeling well. Never take more than your doctor orders. If you miss a dose, don't take it later when you remember it, or double up on the next dose without asking your doctor's advice. Furthermore, don't take non-prescription medications without your doctor's approval, because some of them may interfere with the action of digoxin.

Call your doctor if you have any of these side effects:

- Loss of appetite
- Nausea, vomiting, diarrhea
- Stomach or abdominal pain
- Weakness, fatigue
- Unusual tiredness or weakness
- Changes in pulse rate: slow, irregular or rapid
- Changes in vision (blurred, blind spots, twinkling, yellow tints or halos around lights)
- Dizziness, headache, confusion, mental depression, fainting

- **Beta blockers: Drugs that reduce heart excitement**

Beta blockers are drugs that interfere with the action of our nervous system on our heart. During physical or emotional stress, increased adrenaline produced by the body causes our heart rate and blood pressure to rise and may at times even produce irregularities in heart rhythm (arrhythmia). Adrenaline (a hormone) does this by stimulating tiny surface structures on the heart cells called receptors, where drugs or hormones "lock in" and cause changes to occur. Drugs that attach to receptors and block adrenaline from acting are called "beta blockers" because the receptors on the heart are known as "beta" receptors (beta is the Greek letter " β ").

Beta blockers can be used to slow the heart rate. They slow the natural pacemaker of the heart (SA node) and delay or block some of the electrical impulses as they pass through the middle of the heart (AV junction). Beta blockers may decrease episodes of abnormal rhythms from the top of the heart.

Typical effects of beta blockers

- A slower heart rate (pulse rate)
- A lower blood pressure
- Under emotional or physical stress, a smaller rise in blood pressure and heart rate than would occur without drug treatment

Generic or chemical names of beta blockers available in the US

Timolol	Propranolol
Carteolol	Betaxolol
Nadolol	Penbutolol

Metoprolol
Acebutolol

Atenolol
Pindolol

Common side effects of beta blockers

- Wheezing or worsened asthma
- Shortness of breath
- Slow heart rate (fatigue, weakness)
- Low blood pressure (lightheadedness, fainting)
- Cold hands and feet
- Depression
- Abdominal discomfort, nausea, diarrhea or constipation
- Impotence

● **Calcium channel blockers: *Helping to slow the abnormally fast heart**

Only two of the many calcium channel blockers available today have actions that are used to treat abnormal rhythms of the heart: verapamil and diltiazem.

These drugs can slow the heart rate by slowing the natural pacemaker (SA node) and delay or block some of the electrical impulses as they pass through the middle of the heart (AV junction). They may decrease episodes of abnormal rhythms from the top of the heart and can keep the heart rate slower and more controlled even when irregular rhythms cannot be totally eliminated.

Combinations of digoxin, beta blockers and calcium channel blockers may be prescribed by your doctor, usually to get better control of difficult arrhythmias. If this occurs, it is important to follow instructions carefully, since a change in one medication will affect the action of another.

Common side effects of verapamil and diltiazem

- Slow heart rate (fatigue, weakness)
- Low blood pressure (lightheadedness, fainting)
- Constipation or abdominal discomfort
- Headache
- Ankle swelling (edema)
- Malaise (tiredness)

*Although "calcium" is in the name, these drugs do not interfere with calcium supplements taken at usual doses and have no effect on calcium in bone. These drugs affect only the small amounts of free calcium that pass into and out of cells- primarily those of the heart and blood vessels.

Medications for the **BOTTOM** of the heart

- **The ventricular antiarrhythmic agents**

Drugs used to treat abnormal rhythms from the ventricles, the bottom chambers of the heart, are called ventricular antiarrhythmic drugs. They are most often used:

- To control distressing (and often disabling) symptoms
- To prevent more dangerous rhythms from occurring
- To prevent life-threatening cardiac arrest if the patient is judged to be at risk

Virtually all these drugs require careful monitoring for maximum effectiveness and the lowest possible risk of side effects. Each can be highly effective in controlling abnormal heart rhythms when chosen carefully, taken according to instructions and monitored for effectiveness. Side effects will occur in some individuals so it is important to be on the alert for them. Since side effects may occur early in use, some patients may be placed on antiarrhythmic medications in the hospital where they can be closely monitored.

Side effects range from “nuisance” discomforts that are not dangerous to more serious problems for which your doctor will invariably be vigilant.

These include:

- Worsening of the arrhythmias already present or production of new ones (called proarrhythmia; that is, promoting rather than eliminating arrhythmia- a serious problem).
- Causing problems with the function of other organs (lung, liver, kidney, thyroid).
- Reducing the pumping capacity of the heart muscle (thereby worsening a “sluggish circulation” as seen in heart failure, and leading to more shortness of breath, fatigue and ankle swelling).

Just as you should report perceived *side effects* to your doctor for evaluation, also be sure to report the *disappearance of symptoms*, which the physician may consider evidence of benefit from the drug.

Remember, nothing can substitute for your doctor’s advice and information, since it will be tailored for your individual needs. Be sure to ask your doctor about important facts you should know if you are on any of these medications.

Side effects

Generic or chemical name	Side effects	Additional facts
Quinidine	Dizziness, lightheadedness, fainting, headache, diarrhea, nausea, vomiting, belly pain, fever, ringing in the ears, rash, loss of appetite	Many known drug interactions. More warfarin effect. More digoxin effect. Can irritate liver. Easy bruising (low blood platelets).
Procainamide	Fever, sore throat, joint pains, rash, confusion, depression, dizziness, lightheadedness, insomnia, loss of appetite	Can reduce white blood cells, causing fever and sore throat. If these occur, notify doctor immediately.
Disopyramide	Difficulty in urination, blurred vision, dry eyes, mouth, throat, constipation, nausea, pain, bloating, gas, muscle weakness, fatigue, headache, malaise, dizziness	Can lower blood sugar producing shakiness, confusion and sweating. Can worsen "sluggish" circulation (heart failure).
Mexiletine	Nausea, vomiting, heartburn, tremor, nervousness, coordination difficulties, dizziness, lightheadedness, numbness ("pins and needles")	Can increase action of theophylline. May rarely affect liver function tests.
Tocainide	Cough, lung irritation, rash, shortness of breath, dizziness, lightheadedness, tremulousness, coordination difficulty	Can reduce white blood cells, producing fever and sore throat. If this occurs, call doctor immediately.
Moricizine	Dizziness, nausea, upset "stomach," vomiting, headache, shortness of breath, pain fatigue, numbness ("pins and needles")	Shown to be of no benefit if taken shortly after a heart attack.
Flecainide	Dizziness, lightheadedness, blurred	Shown to be dangerous if taken shortly after a heart

	vision, "seeing spots," shortness of breath, headache, fatigue, palpitation	attack. Can worsen "sluggish" circulation (heart failure).
Propafenone	Dizziness, headache, nausea, vomiting, unusual taste, fatigue, shortness of breath, blurred vision	Can make asthma (wheezing) worse. In general, should not be used with quinidine.
Amiodarone	Cough, shortness of breath, blurred vision or "halos," sensitivity to sunlight, rash, fatigue, malaise, tremor, poor coordination, nausea, vomiting, constipation	Can cause low or high thyroid gland activity. Can slow the heart rate excessively (especially when used with digoxin). Requires regular follow-up tests to avoid side effects.
Sotalol	Fatigue, weakness, slow heart rate (bradycardia), dizziness (low blood pressure), shortness of breath (wheezing)	In-hospital care usually required before therapy is started.

- **Combination drug treatment**

Don't be surprised if your physician places you on more than one medication to control your arrhythmia, since it may be necessary for improved effectiveness. In some cases, it may permit your physician to reduce the dosage of individual drugs, thereby reducing troublesome side effects.

Other medications

Potassium and magnesium are two of the common minerals most needed by body cells, especially muscle cells and cells of the heart that carry electrical impulses. When our body has too little potassium or magnesium we are at risk for abnormal rhythms of the heart (arrhythmias). For most patients, just maintaining a balanced diet will provide enough potassium and magnesium and there will be no need for supplements. Sometimes, however, a blood test may reveal low levels of one or both of these minerals. When this occurs, the doctor will generally recommend a supplement.

Diuretics (water pills) are in common use for high blood pressure (hypertension), excess water (fluid retention) and certain heart conditions (heart failure). Diuretics cause our kidneys to get rid of salt and water and cause our bodies to

lose excessive amounts of potassium and magnesium. Vomiting, diarrhea, excess laxative use and drugs such as cortisone and steroids can also cause potassium and magnesium loss.

Diuretics work by forcing the kidneys to produce more urine, thus eliminating more salt and water. Unfortunately, these drugs usually cause the loss of potassium and magnesium as well, an unwanted effect that can be very pronounced at times. To avoid problems related to low potassium and magnesium, your doctor may:

- Prescribe diuretics that cause less potassium loss
- Prescribe diuretics in lower doses
- Supplement your diet with extra potassium and magnesium or encourage use of some salt substitutes
- Combine the diuretic with other medications that help conserve potassium

Commonly prescribed diuretics include: (chemical or generic names)

- HCTZ* with spironolactone
- Spironolactone
- Bumetanide
- HCTZ* with triamterene
- Triamterene
- Ethacrynic acid
- HCTZ*
- Chlorthalidone
- Furosemide
- HCTZ* with triamterene
- Amiloride
- HCTZ* with triamterene
- Amiloride
- HCTZ* with amiloride
- Metolozone

[HCTZ* is the abbreviation for HydroChlorThiaZide]

Food sources of Potassium and Magnesium



If your doctor has recommended that you eat a diet rich in potassium or magnesium, consider the following foods:

Rich in potassium	Rich in magnesium
Fruits and their juices	Citrus fruits
Oranges	Oranges
Grapefruit	Grapefruit
Plums (prunes)	Nuts
Grapes (raisins)	Beans
Bananas	Fish
Cantaloupe	Poultry
Honeydew melon	Green vegetables
Dates and figs	Grains
Soybeans	
Potatoes	
Fish (flounder, halibut)	

Common potassium supplements come in both pill and liquid forms and are generally measured in units of 8, 10, or 20 mEq (mEq stands for the chemical measure milliequivalents. 10mEq of one supplies as much potassium as 10mEq of another so if one brand or type upsets your stomach, ask your physician or pharmacist to recommend another. The chemical symbol for potassium is K or K⁺ (standing for kalium), so many of the names have the letter K in them.

- Klorvess
- K-lyte
- K-Dur
- K-Lor
- K-tab

- Kato
- Micro-K
- Slow-K
- Ten-K
- Kay-Ciel
- Klotrix

Common magnesium supplements:

- Mag-Ox
- MagTab SR
- Slow-Mag
- Uro-mag

Foods rich in potassium and magnesium are generally components of a balanced, healthful diet, but on occasion these foods must be limited, since too much potassium and magnesium can result in problems with the heart and muscles. In certain individuals with kidney damage or kidney failure, or those on special drugs that cause the body to retain potassium, excess potassium in the diet or by supplementation can be harmful and even life-threatening. If this is the case, your doctor will give you specific guidelines for avoiding potassium build-up.

- **“Blood thinners” (aspirin and anticoagulants)**

Strictly speaking, medications called “blood thinners” do not “thin” the blood, but rather make the formation of a blood clot less likely. Medically, blood clot formation is called “coagulation;” therefore these drugs are referred to as **anticoagulant** drugs.

You may be surprised to learn that small daily doses of aspirin are recommended by some doctors to prevent blood clotting. Aspirin has been proven to be of benefit in certain situations such as heart attack, severe heart pains (unstable angina) and prevention of stroke. Regular daily use of aspirin as a “blood thinner” should be undertaken only on the advice of your physician, since it can cause excessive bleeding in some people, and in individuals taking other anticoagulants it can increase the risk of bleeding.

The doses of aspirin required for preventing blood clots are generally much lower than those required to relieve pain. Certain arrhythmia patients are sometimes advised by their doctors to take aspirin because of the increased risk of small blood clots forming inside the heart. In other cases, doctors recommend the use of stronger anticoagulants such as warfarin.

Warfarin is the chemical name for a widely prescribed drug that is taken by mouth and used to prevent blood clots from forming in the heart and blood vessels. This medication is commonly used in patients with enlarged heart chambers and sluggish circulations, especially if the heart walls are weakened in areas scarred by heart attack. It is also used in patients with “A. Fib” (atrial fibrillation), since with this abnormal rhythm the walls of the top chambers of the heart (atrium) do not contract and blood clots can form along them as a result of sluggish blood flow.

Patients taking anticoagulants must be carefully monitored to keep the “blood thinning” effect at the proper level. They must be very aware of drugs that can cause an increase or decrease in its “blood thinning” effect. It is important during warfarin use that blood tests be done on a regular basis, as determined by their doctor, to monitor the drug’s effect and thereby maintain the proper dosage. It occasionally takes many blood test (prothrombin time tests) and phone calls to adjust daily dosage before the dose and the effect are at the desired levels.

- **A quick checklist for patients on warfarin:**

Follow the doctor’s instructions exactly regarding dose and follow-up appointments and blood test.

Do not have any surgery, dental work or medical procedures without alerting the doctor that you are taking warfarin.

Contact your doctor at once if you:

- Have bleeding from the gums, mouth or nose
- Notice blood in urine or stool
- Become pregnant
- Have excessive menstrual flow
- Have black or “tarry-appearing” bowel movements which may represent “digested” blood, indicating bleeding into the stomach or intestines

Don’t change your use of any vitamin supplements, alcoholic beverages or special diets, or change medications, without your doctor’s approval (many foods and drugs can alter the effect of warfarin). Antibiotics may increase warfarin’s effect.

Consult your doctor before engaging in any contact or competitive sports, since the risk of injury and bleeding is increased while taking warfarin.

Easy bruising is commonly seen in patients taking warfarin and may occur even when proper dosage is maintained and the drug is doing just what it is supposed to. Easy bruising, however, may be a sign of “too much” warfarin effect, so this should be reported to your doctor promptly if noticed.

- **Effects of over-the-counter medications**

Cold remedies and asthma medications. Some of the same medications helpful in controlling stuffy nose, sniffles and wheezing also have fairly important effects on our hearts. These medications can speed up the heart just as adrenaline does and can trigger an abnormal heart rhythm. Some of the common ingredients to watch out for are:

- Belladonna alkaloids
- Ephedrine
- Antihistamines (many different types)
- Caffeine

Read the fine print on the label of any over-the-counter medication you're about to take. Alert your doctor so you can be sure it's safe for you.

Prescription medications



- **What are you taking?**

Medications for the treatment of arrhythmias are carefully chosen by your doctor to be appropriate, effective, free of severe side effects and easy to take. They need to be closely monitored. Their effectiveness and safety varies, depending on the type and dosage of medication and combined use with other drugs. The way you can help the most to assure effective treatment and reduce the occurrence of side effects is to be involved with monitoring the effects of the drug. *Stay on the alert* for possible reactions!

To increase the effectiveness and reduce the risks of taking medications:

Follow your doctor's instructions *exactly*. "When in doubt, ask and find out!" This is an excellent rule for questions about medications. Serious unwanted reactions, sometimes requiring hospitalization, can occur when you take too much or too little. Skipping doses may also reduce the benefits.

Therefore:

1. Take your medication regularly
2. Never change the dose on your own
3. Never change the number of times per day you take the medication without your doctor's knowledge

Know what you're taking! See if you can answer the following questions about each of your medications. Remember, answering these questions will help assure your good health and reduce the risk of unfortunate and all-too-common mishaps.

1. What is the brand name and generic (chemical) name?
2. What is the dose of each pill in milligrams (mg)?
3. Why are you taking it?
4. How often should you take it?
5. Where should you keep it?
6. What should you do if you forget a dose?
7. What side effects might you expect?
8. Are there any *special instructions* to follow (such as: take with meals or on any empty stomach; don't drive; don't take with other medication; don't drink alcohol)?

Know why you are taking medications. Understanding why will encourage you to follow your doctor's instructions better!

Keep a written list of your medications at home and in your wallet or purse. A medication card can be extremely helpful. *For your convenience, there is a blank medication card at the end.* Print it out right now. Fill out and keep it with you at all times. This information will come in handy when you call your doctor with problems, or when another doctor treats you in an emergency. Any doctor treating you needs to know exactly what you are taking in order to avoid reactions with any new medication prescribed.

Tell your doctor about any non-prescription medication before you take it, especially those with "warnings for heart patients" such as cold remedies, inhaled asthma medications and strong or frequently-used laxatives.

- Some hints to help you remember to take your medication

Do

Make an easy-to follow schedule (your doctor can help you).

Keep a copy of this schedule handy (where you eat, watch TV or read).

Take your medications at times of other daily activities:

- When you brush your teeth
- At mealtimes
- With evening news or at bedtime
- Keep your pills in a safe place (away from children or elderly household members).
- Find out whether your medication should be taken with meals or on an empty stomach.
- Know what your pills look like and check the label when your prescription is refilled (ask your pharmacist if you are in doubt).
- Be sure each medication you take should be taken *as you are taking it*.
- If you have been taking any medication for a long time, ask your doctor whether your continuing it should be re-evaluated.

Don't

- Skip your medication just because you are feeling good. (Your good health may depend on taking your medication regularly.)
- Try to make up for a missed dose by taking two doses at once unless your doctor so advises.
- Put medications in a cool, dry place unless you are told to do so by your physician or pharmacist (most heart drugs do not have to be kept in the refrigerator-dry room temperatures and shield from direct sunlight are generally best).
- "Stretch out" your medications because they are costly. Discuss this problem with your physician and obtain help from those close to you. Often, shopping around locally for the lowest price can be rewarding.
- Crush or break up your medication unless you're sure it's OK (many long-acting or sustained-release forms must be taken intact if they are to work properly.)

Your doctor has probably stressed the importance of taking your medications "as prescribed." It is crucial that if you have a problem doing this, you discuss it rather than overlook it and hope it doesn't matter. It might be very important!

- **What you need to know about side effects**

Anytime you take a medication, you anticipate a certain desired effect. Unfortunately, additional “unwanted” effects (so-called *side effects*) can occur. These are usually minor and harmless, but in some cases they are disturbing and at times even life-threatening. Most side effects are not predictable, because we are all different, with varied allergies, tolerances and body make-ups. Whenever you feel or suspect any type of side effect from your medications, or anything out of the ordinary-*call your doctor to discuss it!*

- **When you have a major reaction**

If when taking a medication you feel dizzy, confused, faint or lightheaded, have difficulty breathing, wheeze, or develop facial swelling or a rash, take the following steps:

Stop taking the medication.

Contact your doctor immediately.

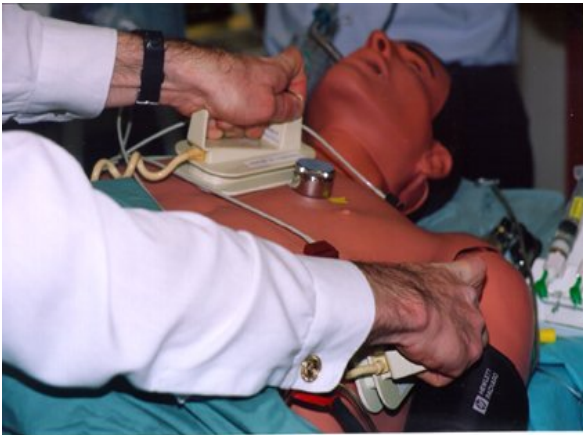
If your doctor is unavailable, and the side effect persists or gets worse, call for assistance and get to the nearest emergency medical facility.

Give your doctor all the answers to questions like:

- What is the exact problem?
- When did it begin?
- What medication did you take?
- How long have you been taking each of your medications?
- How long after taking the medication did the problem arise?
- What were you doing when it began?
- Did you get relief? If so, how?
- Have your list of medications for the doctor’s review
- Include on the list all non-prescription drugs you take
- Check your prescriptions with your pharmacist to be sure no change has been made; ask your pharmacist if your doctor has permitted a generic substitution.
- Report any foods or drinks you may have had.

Hospital treatments

Cardioversion



Cardioversion means changing the heart's rhythm back to normal through the use of a brief electrical shock. It is widely used to treat certain persistent abnormal rhythms that do not respond to medications such as atrial fibrillation or atrial flutter. The procedure is done in a laboratory or intensive care facility where the patient's heart rhythm can be constantly monitored. An intravenous (IV) line is used so that any medications needed can be given promptly.

After the patient is sedated and asleep (so there is no awareness of the brief but uncomfortable electrical shock), a physician places electrode pads or paddles on the chest through which a very brief electrical current is discharged. The electrical impulse "erases" the abnormal rhythm and allows the heart's normal rhythm to take over if it is strong enough. If the natural pacemaker is weak or not functioning properly, the abnormal rhythm will frequently return. Cardioversions may be repeated if unsuccessful. Following the procedure, the patient's heart rhythm is monitored as the patient lies comfortably in bed.

Cardioversions are safe procedures and rarely produce complications. Complications that may result include the appearance of a new abnormal heart rhythm and the possibility of blood clots (called emboli) being released from the heart into the circulation when the heart rhythm is constantly monitored by staff during the procedure and additional medications are available if needed.

Defibrillation is a cardioversion in which the underlying rhythm is ventricular fibrillation (VF). In ventricular fibrillation, or ventricular "flutter," the arrhythmia causes the heart muscle to relax or quiver rather than contract normally. Since VF is always a life-threatening arrhythmia (because it "stops" the heart from pumping blood), defibrillation is always an emergency procedure. It is accomplished as quickly as possible to avoid brain damage or death, which can occur in a matter of minutes as circulation of blood is stopped after the onset of VF.

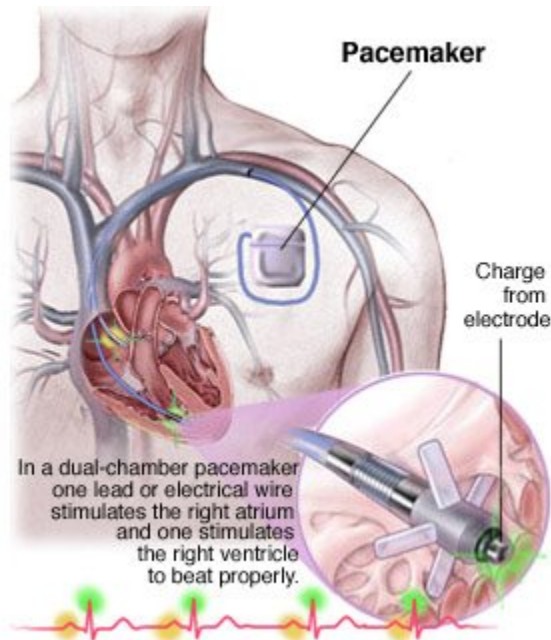
Ablation is a procedure that damages or destroys an electrical pathway in the heart in an effort to correct an abnormal rhythm. It is generally done at the same time as an electrophysiologic study (EPS).

Implant devices: Technology takes yet another giant step!

Pacemakers today are one of the most common cardiac devices to be implanted. They serve to stimulate the heart muscle electrically and cause it to beat when the rate drops below a preset level. These devices are used for preventing episodes of dizziness, lightheadedness or fainting when it is clear that the symptoms result from an excessively slow heart rate. The two most common reasons for pacemaker implantation are:

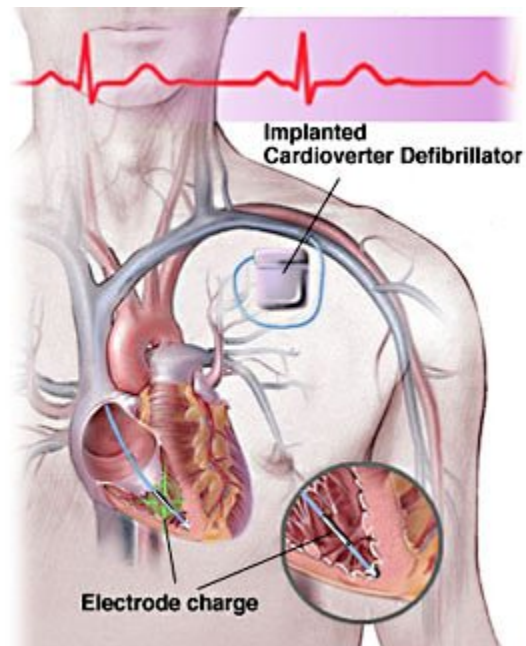
- A poorly functioning sinus node, which is the natural pacemaker (or “spark plug”) of the heart.
- An interruption in the electrical pathways through the middle (junction) of the heart, referred to as “heart block.”

Pacemakers may be either single or double chamber types, depending on how many chambers of the heart are affected.



Automatic Implantable Cardioverter Defibrillator. The “AICD” is a battery-powered device implanted in the body designed to detect and treat life-threatening abnormal rhythms of the heart. It is recommended for control of severe arrhythmias which may occur suddenly and that have been poorly or incompletely controlled by medication or surgery.

Pacemaker Cardioverter Defibrillator. The “PCD” has the capability not only of delivering an electrical shock to the heart to correct ventricular fibrillation (VF), it also has the potential for returning the heart to regular rhythm before the problem becomes severe. By keeping the rate near normal (acting as a pacemaker) or promptly correcting irregular rhythms after they begin (such as “cardioverting” ventricular tachycardia), the PCD prevents the escalation of a serious problem to one that could be catastrophic.



- **Guidelines for patients with an implanted pacemaker, AICF or PCD:**

Always carry identification providing your name, contact person, cardiac condition, primary physician and cardiologist (with emergency phone numbers) and the information about your device (provided by the manufacturer) that lists the name, type and date of implant.

Keep all appointments for follow-up examinations as requested by your physician.

Be sure you understand and follow recommendations about physical exercise. Contact sports are generally not advised.

Avoid contact with, or close proximity to, strong electronic or magnetic equipment that may interfere with your device; for example, magnetic resonance imaging (MRI) scanners used for medical testing, high capacity radio transmitters, airport metal detectors, some anti-theft alarm devices and auto engine parts such as distributor caps and wires, etc.

Avoid holding any electrical appliances close to (directly over) the device.

Whenever troubled or in doubt about symptoms or problems, alert your physician. Also, inquire at your hospital about a support group for you or your family members and friends.

Learn to take your pulse, so that if symptoms appear, you will be able to report on whether your heart rate is fast or slow, regular or irregular.

- **Additional thoughts for the patient with an implanted device:**

Examine the implant site (usually on the abdomen) for signs of infection (warmth, redness, new swelling, tenderness or pain) and alert your doctor promptly if they are present.

Ask whether you are permitted to drive a car (in most states, driving is prohibited after an AICD or PCD is implanted).

Learn whether your unit has a warning sound (usually a beeping sound made when a magnet or electrical device has interfered with the device and reset it either “on” or “off”). Alert your physician immediately if this ever occurs, since it could result in the unit being turned off and failing to provide the necessary protection.

Ask your doctor how to handle any firings (discharges) that you may feel. It may be recommended that you call, or simply keep a diary of the event. In any case, keep a diary of the activity during which the firing occurred, noting especially:

- How you felt at the time (whether you felt well, dizzy or lightheaded; had chest pain, sweating, etc.)
- Whether your pulse was fast or slow, regular or irregular

Consider learning the basics of cardiopulmonary resuscitation with friends or family members. It can be a good way to openly address the fears that all patients have and help reduce anxiety in a very beneficial way. Ask your doctor or hospital about a local course.

Surgery to treat arrhythmia

Surgery for abnormal heart rhythms is uncommon and becoming even less common, thanks to the development of less invasive procedures such as catheter ablation. Surgery when selected is performed in patients where the risk

of operation is acceptably low and the probability of success high. At times, surgery to correct an arrhythmia problem may be combined with other types of heart surgery.

During surgery, in most instances, the location of the pathways of the abnormal rhythms are identified (mapped). They are usually along the inside lining of the heart chamber walls. After they are identified, they can be cut or be damaged by heat (cautery) or by freezing (cryosurgery) so that they no longer carry the electrical impulses of the abnormal rhythm. These pathways may have been present since birth or they may have resulted from heart problems developed later in life (heart attack, for example).

Today, there is less need for surgical treatment of arrhythmia, since many of the abnormal pathways can be diagnosed during Electrophysiologic Study and eliminated (ablated) by sending small bursts of radiofrequency energy through a wire to the pathway location. This does not involve surgical incision or the other risks and complications of surgery that even in the best treatment centers can be substantial. If possible, in most cases, catheter ablation is therefore preferred.

If you want to find out more

Name	Toll free phone #	Website
The American Academy of Family Physicians		www.aafp.org Patients: www.familydoctor.org
The American Cancer Society	1-800-ACS-2345	www.cancer.org
The American Heart Association	1-800-AHA-USA-1 (1-800-242-8721)	www.americanheart.org
The Center for Disease Control		www.cdc.gov/nccdphp
The Food and Drug Administration	1-888-INFO-FDA (1-888-463-6332)	www.fda.gov
Mayo Clinic		www.mayoclinic.com

Glossary

It seems that doctors, especially cardiologists, “can’t wait for the words to be spoken” and often use abbreviations instead. This can be very confusing at times for anyone not familiar with this “verbal shorthand.” For quick reference, here are some common abbreviations, followed by a Glossary of Words.

- **Glossary of Abbreviations**

AF- (or A. Fib) Atrial Fibrillation

AICD- Automatic Implantable Cardioverter Defibrillator

BBB- Bundle Branch Block

CAD- Coronary Artery Disease

ECG- Electrocardiogram (the English equivalent of EKG, which is derived from the German “Elektrokardiogram”)

EPS- Electrophysiologic Study

MI- Myocardial Infarction (the medical term for heart attack)

MVP- Mitral Valve Prolapse

PAC- Premature Atrial Contraction

PAT- Paroxysmal Atrial Tachycardia

PCD- Pacemaker-Cardioverter-Defibrillator

PSVT- Paroxysmal Supraventricular Tachycardia

PVC- Premature Ventricular Contraction

RBBB- Right Bundle Branch Block

SSS- Sick Sinus Syndrome

SVT- Supraventricular Tachycardia

VF- Ventricular Fibrillation

VT- Ventricular Tachycardia

WPW- Wolff-Parkinson-White

- **Glossary of Words**

Ablation (ay-blai'-shun)- the process of damaging (ablating) a part of the electrical system of the heart in order to correct an irregular rhythm.

ACE inhibitors- drugs in common use for high blood pressure and heart failure. Because they work by relaxing the blood vessels they are called vasodilators. They cause some conservation of potassium and magnesium and can therefore in certain patients reduce arrhythmias secondary to low potassium and magnesium.

Angina (an-jine'-ah or anj'-in-a)- chest discomfort that results from too little blood flow (oxygen) to the heart muscle.

Antiarrhythmic (anti-ay-rith'-mic)- a medication or device that controls or corrects abnormal heart rhythms (arrhythmia).

Anticoagulant- medication that prevents the blood from clotting quickly.

Arrhythmia (ay-rith'-me-a)- an abnormal or irregular beat of the heart.

Arteries- blood vessels that carry oxygen-rich blood away from the heart and to the body.

Atherosclerosis- (ath'ero-skli-rosis) (also referred to as arteriosclerosis or "hardening of the arteries") – the process of plaque build-up (clogging) in the arteries of the body, causing reduced blood flow.

Atria (ay-tree-a)- the two upper chambers of the heart, named right atrium and left atrium.

Atrial Fibrillation (or A. Fib)- a common abnormal heart rhythm in which the electrical activity of the top of the heart is chaotic, fast and disorganized. It is seen in various types of heart disease and at times when no cause is apparent.

Atrial Flutter- an abnormal heart rhythm in which the top chambers of the heart beat at approximately 300 beats/minute. Only some of the impulses get through the middle of the heart (AV junction) to the bottom of the heart (ventricles).

Atrial Tachycardia- one of the most common "fast" abnormal heart rhythms. Often occurring in paroxysms (episodes) causing the heart to beat 150 to 250 beats per minute. This condition is also called Paroxysmal Atrial Tachycardia (PAT).

AV node (or atrioventricular node)- part of the “Junction” in the middle of the heart. Sometimes called the “second pacemaker” of the heart because it can cause an electrical impulse if the natural pacemaker (SA node) fails, it also acts to slow impulses as they travel from top to bottom heart chambers.

Block- a slowing or interruption of an electrical pathway.

Bradycardia- a slow heart rate, usually less than 60 beats per minute.

Bundle Branch Block- Often misunderstood because of the name, bundle branch blocks have nothing to do with blocked arteries that cause chest pain (angina) and heart attacks; rather, they refer only to delay or interruption in the passage of electrical impulses along the pathways (or bundles, as they are called) extending from the junction to the ventricles. There are two pathways (bundles)- one on the right and one on the left.

Bundle of His- a part of the electrical pathway that makes up the “Junction” in the middle of the heart.

Cardiac- referring to the heart.

Cardiac Arrest- occurs when the heart stops pumping blood (usually as a result of Ventricular Fibrillation).

Cardiac Catheterization- an invasive test of heart function.

Cardiac Detection Monitor (also known as an Event Recorder)- a device that can record the heart’s rhythm during symptoms. It is used to determine whether symptoms are caused by abnormal heart rhythms.

Cardiomyopathy (card’ee-oh-my-opathy)- heart muscle disease of any type.

Cardioversion- a procedure that uses electrical current to “shock” or “reset” the heart back to regular rhythm.

Congestive Heart Failure (CHF)- a sluggish or reduced circulation resulting from the heart’s poor pumping capacity.

Coronary Arteries- the arteries supplying the heart itself with blood.

Coronary Artery Disease (CAD)- plaques or blockages in the coronary arteries (which supply the heart) resulting from atherosclerosis (“hardening of the arteries”).

Diastole- the relaxation part of the heart’s normal pumping cycle, as distinguished from systole, which is the contraction phase.

Dyspnea- (diss'nee-a or dissp'nee-a)- the medical term for breathlessness.

Dysrhythmia- another medical term for arrhythmia, or abnormal heart rhythm

Ectopy- any abnormal beats of the heart (also called "ectopic beats").

Echocardiogram- a noninvasive ultrasound test of the heart.

Ejection Fraction- the percentage of blood pumped out of the heart (left ventricle) with each beat.

Electrocardiogram- a noninvasive test measuring the heart's electrical activity.

Electrophysiologic Study (EPS)- a diagnostic test using flexible thin wires passed from an arm or leg vein to inside the heart for the purpose of studying the heart's electrical system from within.

Exercise Stress Test (also referred to as a treadmill stress test or bicycle stress test, depending on the type of exercise)- a test to determine the heart's response to exercise work.

Extrasystole- refers to extra beats or premature beats.

Heart Block- a delay or interruption in the passage of electrical impulses through the junction causing slow heart rates. Heart block can be mild requiring no treatment or severe, at times, requiring a pacemaker.

Holter Monitor- a portable device for recording the heart's rhythm continuously.

Ischemia (iss-keem'ee-a)- the name for the imbalance that is produced when too little blood flow goes to any part of the body.

Mitral Valve Prolapse- a common abnormality of the mitral valve, affecting approximately 4% of the population. It is believed to be a cause of arrhythmias, although it is often difficult to prove. In patients with severe degrees of prolapse or complications such as valve leakage (regurgitation), infection or heart failure, more serious arrhythmia problems have also been reported.

Myocardial Infarction- the medical term for a "heart attack" (sometimes called a "coronary"). It means that a scar will replace heart muscle in the area of damage.

Myocardium (my-oh-card'ee-um)- heart (cardiac) muscle

Nitroglycerin- a common medication for treating chest pain from the heart (angina). The rapid way this drug works to relax blood vessels can result in low

blood pressure, causing lightheadedness, headache, dizziness, flushing and palpitations as the heart rate speeds up in response to it. Occasionally it can cause a patient to faint, especially if taken when the patient is standing.

Pacemaker- a small, battery-powered device that is surgically placed under the skin of the chest or abdominal wall. It is connected to flexible wires placed in the heart that provide an electrical impulse, causing the heart to beat when the patient's own heart rate is too slow.

Palpitations- the symptom of being aware that the heart is beating (most often, forcefully, irregularly, rapidly or slowly).

Premature Atrial Contraction (PAC)- an early abnormal beat from the top (atrium) of the heart.

Premature Ventricular Contraction (PVC)- an early abnormal beat from the bottom (ventricle) of the heart.

Proarrhythmia- causing new abnormal heart rhythms or making those already present worse (sometimes called "arrhythmia aggravation").

Pulmonary- pertaining to the lungs

Risk Factors- aspects of an individual's make-up or behavior that can increase the likelihood of having heart or vascular disease.

Sick Sinus Syndrome- symptoms that arise from an abnormally functioning sinus or SA node (natural pacemaker) often involving rapid as well as slow heart rhythms, at times treated with a pacemaker.

Sinus Node- (or SA Node)- the heart's natural pacemaker that produces an electrical impulse, starting the heart muscle contraction.

Sinus Tachycardia- a normal (regular) rapid heart beat faster than 100 beats per minute.

Stroke (also called cerebrovascular accident or CVA)- refers to damage that leads to loss of brain tissue. Most strokes are caused by blocked arteries leading to the brain (just as heart attacks are caused by blocked arteries leading to the heart).

Sudden Death- death that occurs without warning (sometimes referred to as "unexpected") as opposed to death that is culmination of a long and serious illness.

Supraventricular Arrhythmia (also called Atrial Arrhythmia)- abnormal heart rhythms that occur in the upper chambers of the heart, including atrial tachycardia (PAT), atrial flutter or fibrillation (A. Fib or Atrial Fib)

Syncope (sin'cope-ee)- the medical term for fainting or "black-out."

Tachycardia- any fast heart rate, but generally above 100 beats per minute (bpm).

Vascular- referring to blood vessels.

Veins- blood vessels that carry blood back to the heart.

Ventricles- the two lower chambers of the heart. The left ventricle or LV is the major pumping chamber of the heart.

Ventricular Fibrillation (VF)- a very rapid and chaotic electrical activity of the bottom of the heart (ventricles) that results in a total failure of the heart to pump blood. This is a life-threatening arrhythmia.

Ventricular Tachycardia (VT or V-Tach)- an important abnormal heart rhythm that causes the heart to beat at 100 or more beats/minute. Although it may occur without a person's awareness, it can cause important problems such as lightheadedness, fainting or collapse, and usually will require treatment.

Wolff-Parkinson-White Syndrome- an abnormality in which electrical impulses can get from the top to the bottom of the heart by way of an electrical short cut (Bundle of His). It is associated with irregular fast rhythms that may cause various symptoms, sometimes needing treatment.

A personal message

- **This guide has been a success if you:**
 - Have gained some insight into the causes and types of arrhythmias.
 - Have become better informed about approaches and tests your doctor may use to diagnose your palpitations, skipped beats or heart fluttering.
 - Have incorporated some of the information from this guide into your daily activities.
 - Have learned some of the principles behind the treatments being used today in treating arrhythmias.
 - Now better understand your doctor's recommendations.

It is our hope that the benefits provided by the knowledge you have acquired will enhance your physician's efforts - and your own – in keeping you healthy and fit. Arrhythmias are a common problem, and today more than ever it is clear that they can be and are being managed well. They need not cause anxiety because of a lack of understanding. There is every reason to strive for control of bothersome symptoms, better use of medications and prevention of serious complications.

Together with your doctor, we hope that you stay well and that the knowledge you have gained will bring you reassurance and confidence. We wish you every success, and we trust that the beneficial results you experience will continue to motivate and inspire you.

Thank you,

Robert DiBianco, M.D.

Maggie Shand, R.N.

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Medication Card

Name: _____

	Diagnosis	Year
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

	Medications	Dosage	Times a day
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____

Drug Allergies → Type of reaction

1.	_____
2.	_____
3.	_____
4.	_____

Primary Care Doctor: _____

Name: _____

Address: _____

Phone: _____

Other physicians:

Type	Name	Phone
_____	_____	_____
_____	_____	_____
_____	_____	_____

Notify in Emergency

Name: _____

Address: _____

Phone: _____

Relationship: _____

Patient Notes