Heart Disease

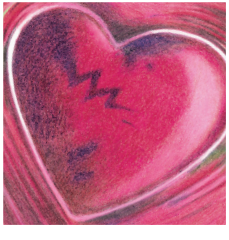
what you should know

Vital information about:

- your heart
- cardiac risk factors
- lifestyle modification
- treatment options

Dean J. Kereiakes, MD, FACC, and Douglas Wetherill, MS

Heart Disease



what you should know

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Dedicated to my family.

—Douglas

"No matter what accomplishments you achieve, somebody helps you."
—Althea Gibson

Treatment Disclaimer

This book is for education purposes, not for use in the treatment of medical conditions. It is based on skilled medical opinion as of the date of publication. However, medical science advances and changes rapidly. Furthermore, diagnosis and treatment are often complex and involve more than one disease process or medical issue to determine proper care. If you believe you may have a medical condition described in the book, consult your doctor.

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Introduction

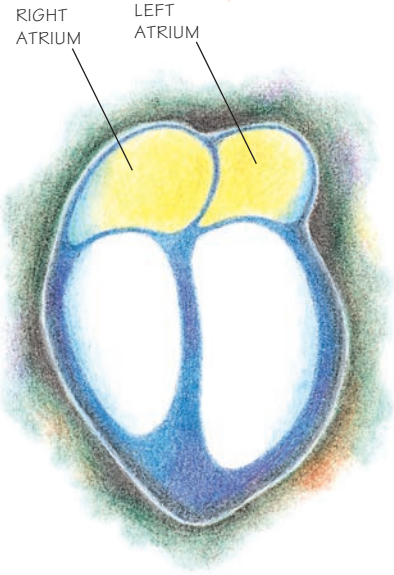
Heart disease, especially coronary heart disease, is an everyday part of our culture. It is also the most common cause of death. What can be done to reverse this trend? A large percentage of cardiovascular disease is genetic or inherited. However, there are things you can do to reduce your chance of having a heart attack. You can start by understanding what cardiovascular disease is and making the necessary changes in your life. If you have had a cardiac event, or if you think you may be at risk of cardiovascular disease, **now** is the time to take command of your life.

— Dean and Douglas

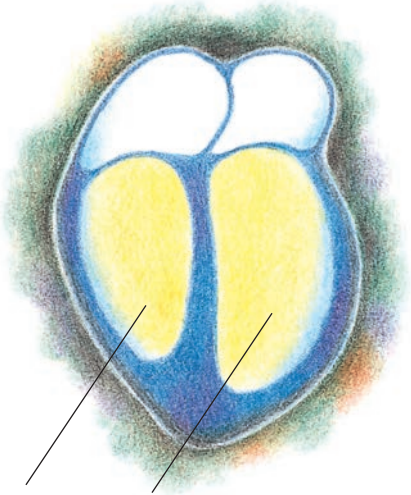
Heart Anatomy

The heart

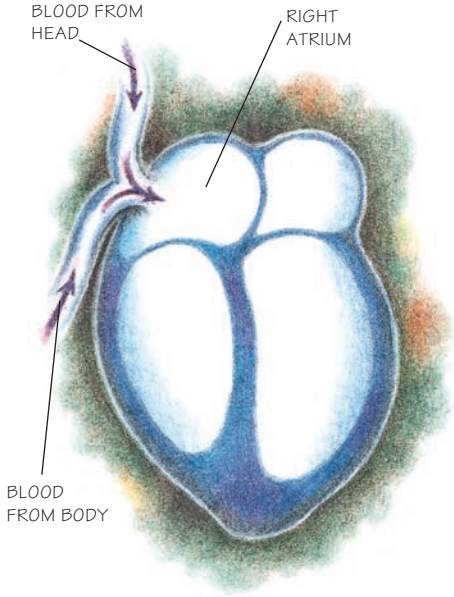
The heart is a muscle.
It pumps blood to the
head and the body.
It is about the size of
your fist and sits just
to the left of the
middle of your chest.



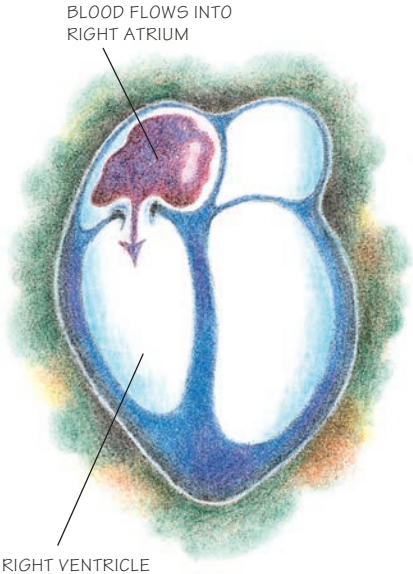
The heart is asymmetrical. It is made up of 4 chambers. The top 2 chambers are called the **atria**. The atria collect blood returning to the heart. The atria then dump the blood into the ventricles.



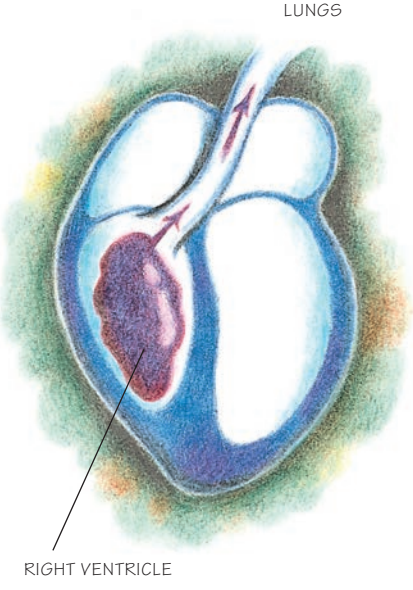
The bottom 2 chambers are called the **ventricles**. The ventricles are larger than the atria, and the left one is more muscular. When the ventricles contract, they force blood out of the heart to different parts of the body.



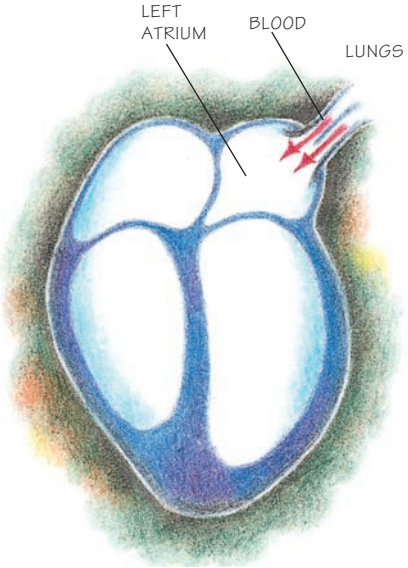
The body uses nutrients and oxygen carried by the blood. The blood returning to the heart has had oxygen removed. This "deoxygenated" blood collects in the **right atrium**.



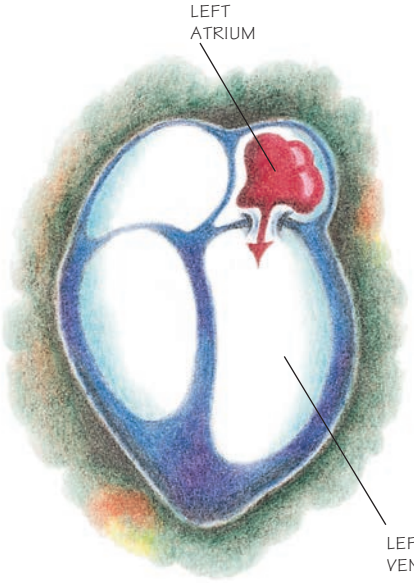
The blood in the **right atrium** goes into the **right ventricle**.



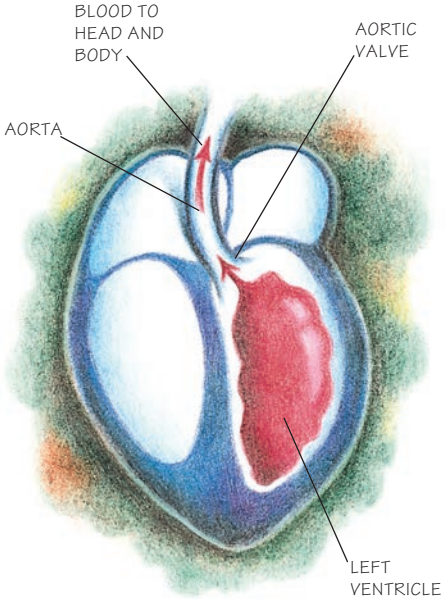
The **right ventricle** pumps blood to the **lungs** where the blood picks up oxygen.



Once the blood picks up oxygen in the lungs, it is ready to be used by the body again. The oxygen-rich blood returns to the heart and collects inside the **left atrium**.



The **left atrium** contracts and sends the blood to the **left ventricle**.



The **left ventricle** contracts and pumps oxygenated blood through the **aortic valve** into the **aorta**. The blood then travels through the **aorta**, providing life-sustaining oxygen and nutrients to the body.

So:

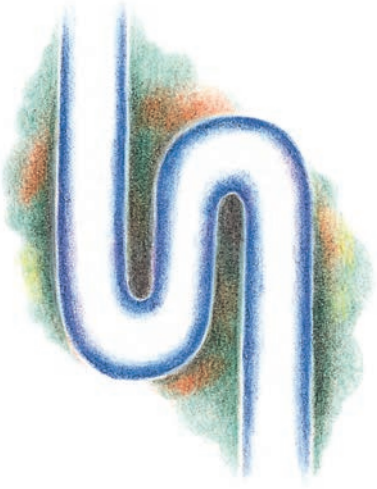
1) Blood with lower oxygen content collects in the right atrium.

2) The right ventricle pumps blood to the lungs where it picks up oxygen.

3) Oxygen-rich blood collects in the left atrium.

4) The left ventricle pumps oxygen-rich blood to the head and the rest of the body.

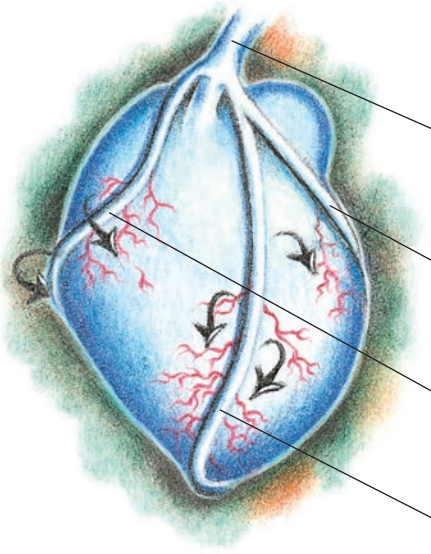
Arteries and Coronary Arteries



Arteries carry blood much the same way a plumbing system carries water throughout a house.

Over time, debris traveling through the pipes may collect in a bend. Debris that collects and restricts water flow is known as a clog or a blockage.

Arteries and veins wind throughout the body carrying blood. Arteries carry blood away from the heart. Veins carry blood back to the heart.



The heart has its own arteries to provide blood to the heart muscle.

The **aorta** supplies blood to the arteries of the heart as well as to the rest of the body.

The **circumflex artery** supplies blood to the lateral or side aspect of the heart.

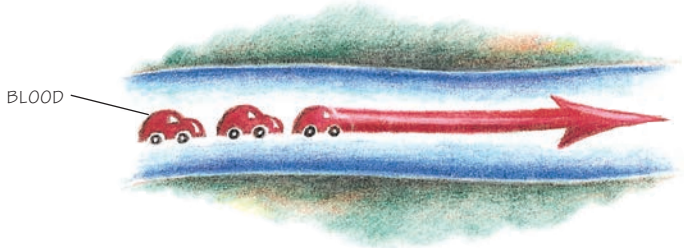
The **right coronary artery** provides blood to the back or underside of the heart.

The **left anterior descending artery** supplies blood to the front of the heart.

To give you some idea of their size, the **coronary arteries** are only about the size of a strand of spaghetti.

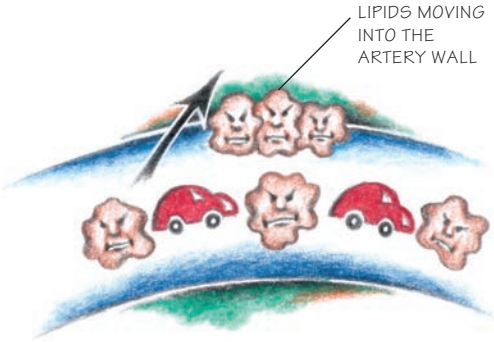
(APPROXIMATE SIZE OF SPAGHETTI)

At birth, the inside of the arteries, including the coronary arteries, is slippery — similar to a nonstick pan. The blood cells (represented by the small cars) flow smoothly through the arteries.

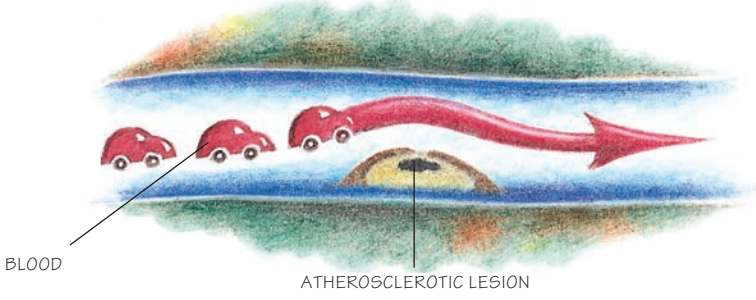


What happens to an artery during a person's lifetime?

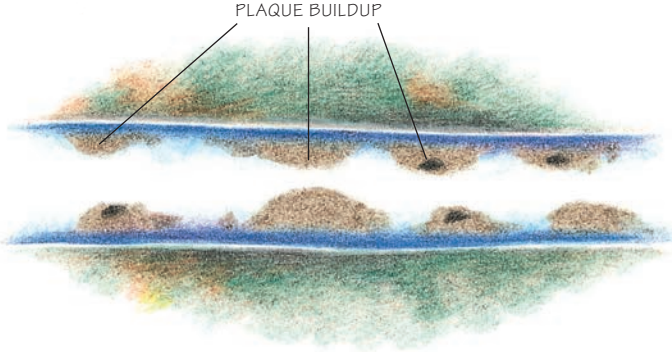
Fatty streaks in the arteries start to develop in the first decade of life as a result of lipids moving into cells in the wall of the artery.



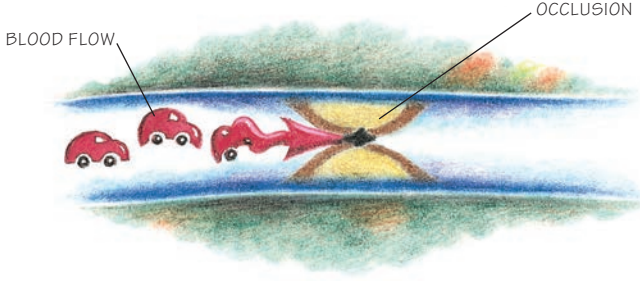
These fatty streaks may become more advanced **atherosclerotic lesions** in the presence of risk factors such as smoking, high blood pressure, obesity, high cholesterol, and physical inactivity. The fatty streaks may then progress to **atheromas** and **fibroatheromas**, which are more "advanced lesions" and are often referred to as **plaque**.



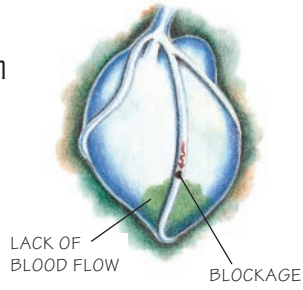
Buildups may occur at different points along the length of the artery. Plaque buildups are not limited to the arteries of the heart. They can occur and restrict blood flow in arteries throughout your body.



The total blockage of the artery may occur due to: a) the **buildup** of plaque, b) the formation of a blood clot on the plaque, or c) the plaque **rupturing** and causing a larger blood clot to form. The complete blockage of the artery is called an ***occlusion***.



What happens if an artery becomes completely blocked?



An artery that is completely blocked has no blood flowing through it. If the heart muscle does not receive blood, then it does not receive nutrients and oxygen. When the heart does not receive oxygen, it experiences **ischemia**. This may result in **heart pain** (angina) or a **heart attack**. **Ischemia**, if prolonged and severe enough, may cause a portion of the heart muscle to die (heart attack).

What are some symptoms of a possible heart attack?

- **Angina**, or heart pain, usually felt as a pressure, ache, tightness, squeezing, or **burning sensation** under the breastbone and often extending to the neck, jaw, shoulders, or down the arm (most frequently the left arm)
- **Nausea**
- **Shortness of breath** and/or **sweating**

Interestingly, **people who have diabetes** may not "feel" angina in the same way and, consequently, have a greater risk of experiencing a "silent" or unrecognized heart attack.

Quite often, people who are having a heart attack say they feel like "an elephant is standing on my chest."

Preventing coronary artery disease

What can be done to reduce your chances of developing heart disease? Generally, cardiovascular disease takes a long time to develop. You may reduce your chances of developing heart disease by changing certain habits or "risk factors."

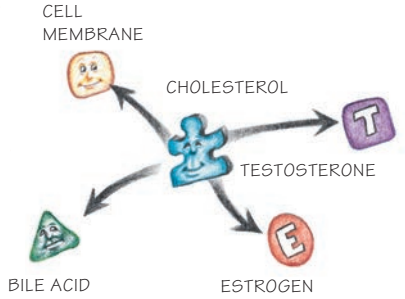
Risk Factors

The primary risk factors for cardiovascular disease include:

1) Elevated cholesterol
2) Smoking
3) Diabetes
4) Metabolic syndrome
5) Hypertension
6) Obesity
7) Age
8) Family history
9) Physical inactivity
10) Vascular injury and inflammation

1. Elevated cholesterol

Cholesterol is a "waxlike substance" that serves as a "building block" within the **cell membrane**.



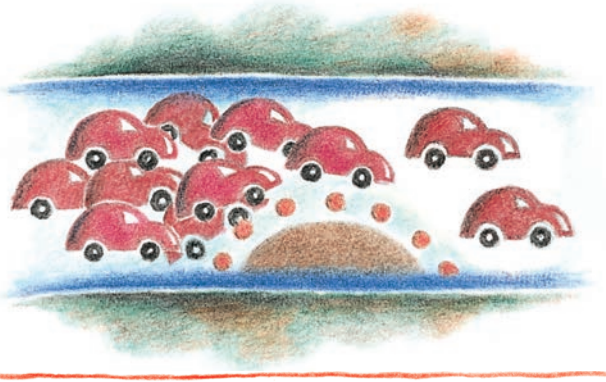
Cholesterol is used to make **bile acids** that help break down fat in our intestines.

Cholesterol is also used to make **hormones**, especially those found in reproduction: **estrogen** and **testosterone**.

Why is cholesterol so harmful?

As mentioned, **fatty streaks** in the arteries start to develop in the first decade of life as a result of **lipids** moving into the cell wall of the artery. These fatty streaks may become more advanced **atherosclerotic lesions** and may then progress to "advanced lesions" often referred to as **plaque**.

Plaque restricts the flow of blood through the artery, similar to orange construction barrels you have seen on the highway. Plaque reduces the flow of blood (traffic) and increases pressure in the artery (construction zone).



What should my cholesterol levels be?

The American Heart Association (AHA) and the American College of Cardiology (ACC) have revised the the guidelines for managing blood cholesterol, focusing on assessing risk and which individuals should be on a type of cholesterol-lowering medications called statins. Unlike the previous guidelines that focused on certain cholesterol levels, the new AHA/ACC guidelines focus on your health history (considerations include age and a history of diabetes, high blood pressure, or heart attack) and other risk factors. Although cholesterol levels are not part of

the new medication guidelines, your doctor may use your cholesterol levels to help guide therapy.

The AHA/ACC cholesterol guidelines also stress the importance of lifestyle modifications such as adhering to a heart-healthy diet, exercising regularly based on your doctor's recommendations, and avoiding tobacco products.

Ask your doctor to use the "Risk Calculator," which gives you a risk score, and from that, if necessary, your doctor can discuss your cholesterol-lowering treatment plan.

2. What about smoking?

Don't do it. Smoking is bad for the entire cardiovascular system because it:

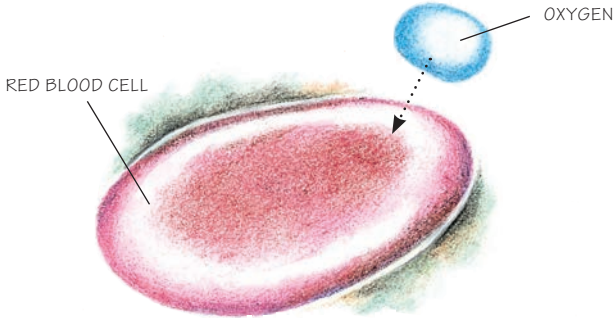
A) Introduces carbon monoxide into the body

B) Lowers the "good" HDL-cholesterol

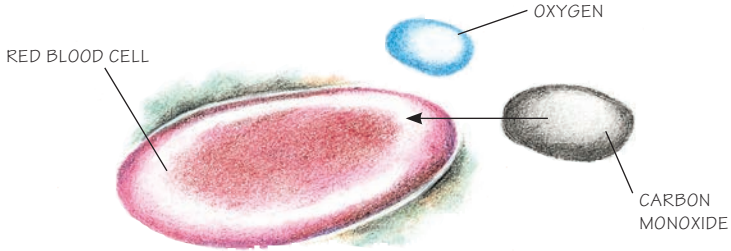
C) damages the lining of the arteries

A. Carbon monoxide

Oxygen attaches to the red blood cells in the lungs. Red blood cells transport the oxygen throughout the body.



When you smoke, you inhale carbon monoxide into your lungs. Carbon monoxide binds to the red blood cells at the site where oxygen normally binds.



Therefore, less oxygen is carried by the blood, resulting in less oxygen available for use in the heart, muscles, and throughout the body. People who smoke may have abnormal heartbeats as well.

Understandably, smoking has harmful effects, especially for anyone who has already had a heart attack or bypass surgery. More importantly, there is an increased likelihood of a second heart attack or need for another bypass surgery if you continue to smoke after an initial cardiac incident.

Smoking is also a risk factor for peripheral vascular disease (blockages of the arteries to the brain, kidneys and legs).

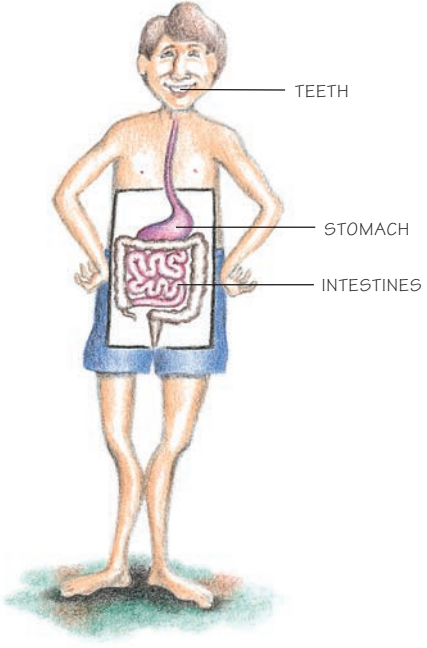
B. Lower HDL-cholesterol

Three other reasons for not smoking are that it reduces the amount of HDL-cholesterol or "good cholesterol" in your bloodstream, it makes your blood clot more easily, increasing the potential for an arterial blockage (heart attack or stroke) and smoking may also cause damage to the lining of the arteries, making them more susceptible to cholesterol deposits.

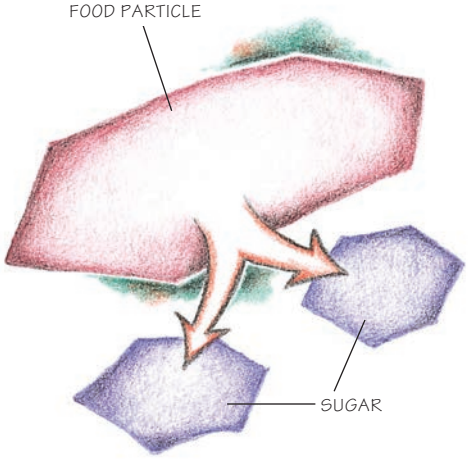
SMOKING REDUCES HDL-CHOLESTEROL

3. Diabetes

What exactly is diabetes? The working cells need sugar for energy. Sugar is absorbed through the digestive system after a meal or snack. **Insulin** is released by the **pancreas** to allow the body to use sugar as a source of nutrition and energy. That may be hard to visualize. This may help ...

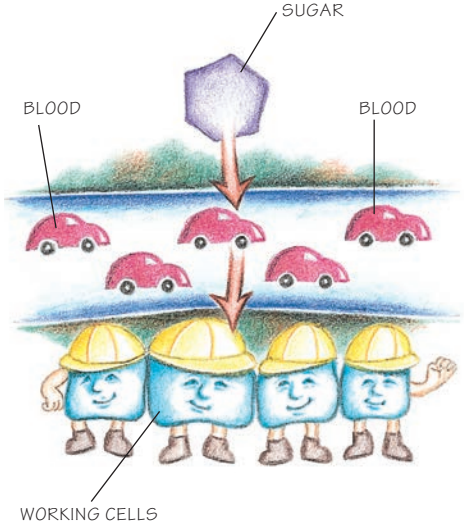


While you eat, the digestive system (teeth, stomach, and intestines) breaks your food down into smaller particles that are used by your body.

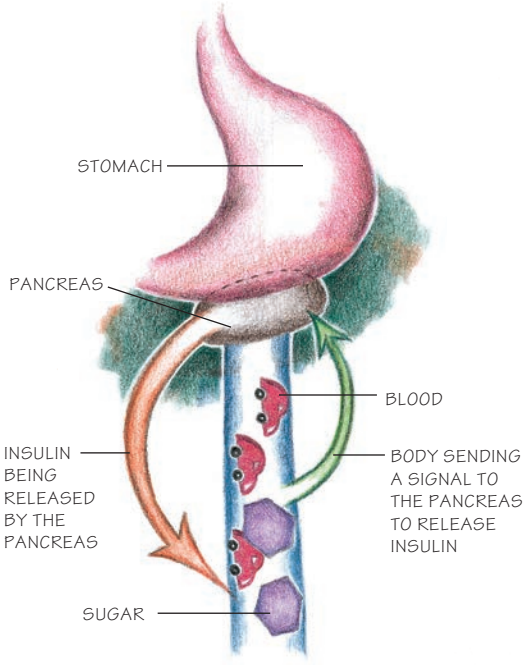


Some food is broken down into particles of **sugar.** Sometimes this sugar is referred to as **carbohydrates** or **glucose.**

Sugar moves from the digestive system to the blood and travels throughout the body to feed the working cells. The sugar is the energy packet the cells need to do work like running and breathing.



At the same time, the body sends a signal to the **pancreas** telling it to release **insulin** into the bloodstream. Insulin is released from the "beta" cells of the pancreas.



Insulin acts like a **key** that unlocks the doors of the cells to let sugar move in. The working cells can then use the sugar for energy to do their jobs. This is how your body uses sugar. However ...

Without the key (insulin), the sugar cannot get out of the bloodstream and into the working cells. The sugar builds up in the blood, and the working cells get hungry. This is what happens in diabetes: the body cannot move sugar from the blood into the cells.

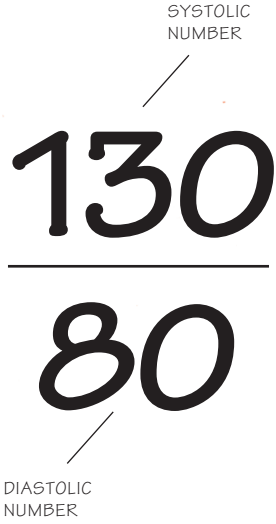
Diabetes is a major risk factor for cardiovascular disease. It is estimated that half of all diabetes patients have some form of coronary heart disease prior to being diagnosed with diabetes. Approximately 80% eventually die of cardiovascular disease.

4. Metabolic syndrome

Metabolic syndrome affects 1 of every 3 Americans (1 of every 2 people over age 60). Individuals who have at least 3 of the following criteria are considered to have this condition:

1) Large waistline
2) Elevated triglyceride levels
3) Low HDL-cholesterol
4) High blood pressure
5) Elevated fasting blood glucose levels

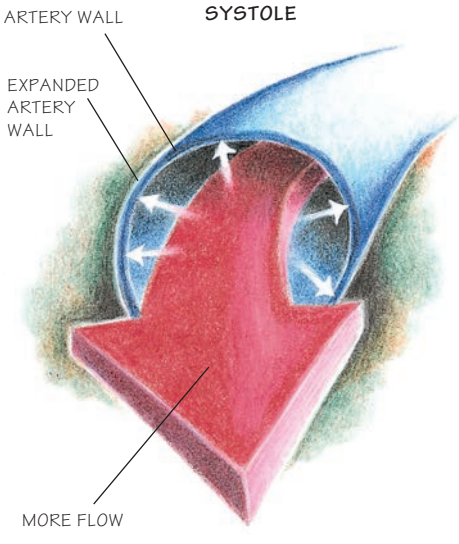
Those with metabolic syndrome are at increased risk for heart attack, stroke or even death.



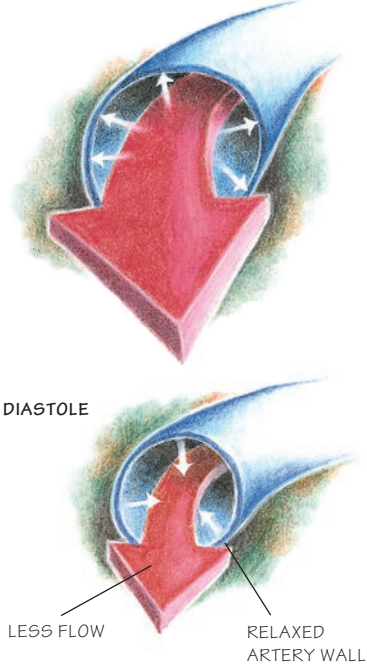
5. Hypertension

Hypertension is commonly referred to as high blood pressure. The recommendation for appropriate levels of blood pressure is determined by your age. Individuals who are 60 years or older should talk to their doctor about possible treatment options if their

systolic blood pressure is 150 mmHg or higher, or if their **diastolic blood pressure** is 90 mmHg or higher. Similarly, individuals between 18 and 60 years old should talk to their doctor about possible treatment options if their systolic pressure is 140 mmHg or higher or if their diastolic pressure is 90 mmHg or higher.



What is **systolic pressure**? Blood comes out of the heart in 1 big thrust. The artery expands to handle the blood. The amount of pressure put on the expanded artery wall is called **systolic pressure**.

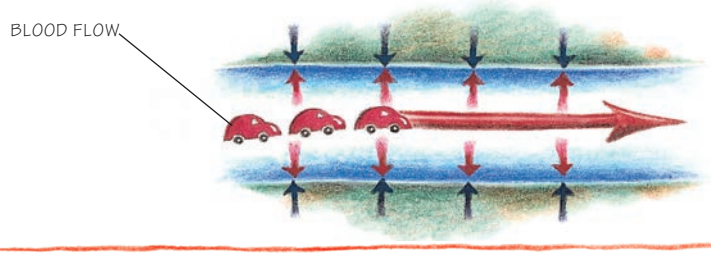


After the artery expands during systole, it relaxes back to its normal size. It is similar to a rubber band that goes back to its normal shape after being stretched. Normal pressure on the artery wall during relaxation is called **diastolic pressure**.

How does hypertension relate to cardiovascular disease?

Blood pressure is a result of the blood flowing through the artery (cardiac output) and the resistance of the artery wall (vascular resistance). If that sounds too technical, here ... this may help:

Blood pressure = Cardiac output x vascular resistance



If a lot of resistance is created by either the blood or the artery wall, then there is more pressure as the blood travels through the artery. If it takes more energy to get the blood through the arteries, then your heart has to work harder with each beat. Most people with high blood pressure do not realize they have it. No wonder hypertension is called the "silent killer."

What contributes to hypertension?

Several factors may contribute to hypertension and cardiovascular disease. These include:

- Excess dietary salt
- Excess alcohol intake
- Stress
- Age
- Genetics and family history
- Obesity
- Physical inactivity
- High saturated fat diet

Salt

Salt helps conserve water in your body. The American Heart Association Step II Diet recommends that the average person consume no more than 2,400 mg of salt per day, especially those individuals who are salt sensitive. Excess dietary salt may contribute to both hypertension and to your body retaining too much water.

If you are retaining too much water, then you are increasing your blood volume (cars) without adding space. This increase will result in more pressure in the arteries.

Alcohol consumption

A common concern for individuals with cardiovascular disease is alcohol consumption — mainly because there seems to be conflicting evidence about the benefits versus the risks of drinking. Experts agree that excess alcohol consumption over time can lead to many harmful effects, including high blood pressure, cirrhosis of the liver, and damage to the heart. The issue is the balance between **moderate** and **excessive** alcohol consumption.

While the evidence shows that there is a protective effect for moderate alcohol consumption, this benefit disappears with excessive intake. Men should consume no more than 2 drinks* daily, and women, because of their smaller body size, should not consume more than 1 drink* each day. The 7 to 14 allowable drinks in a week should not be consumed in a few days or during a weekend of binge drinking.

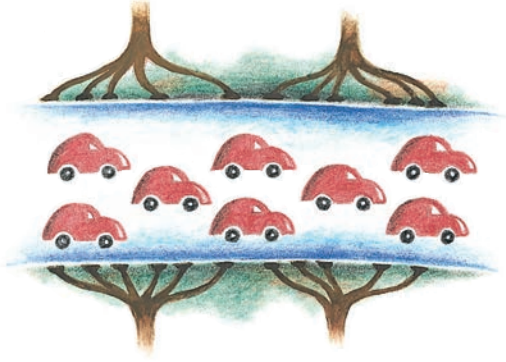
***A guide**: One drink is defined as 5 ounces of wine, 12 ounces of beer, or 1-1/2 ounces of 80-proof liquor.

People who should not drink include individuals with high levels of triglycerides in their blood (over 300 mg/dL), women who are pregnant, individuals who are under age, people with a genetic predisposition for alcoholism or who are recovering from alcoholism, and those taking certain medications.

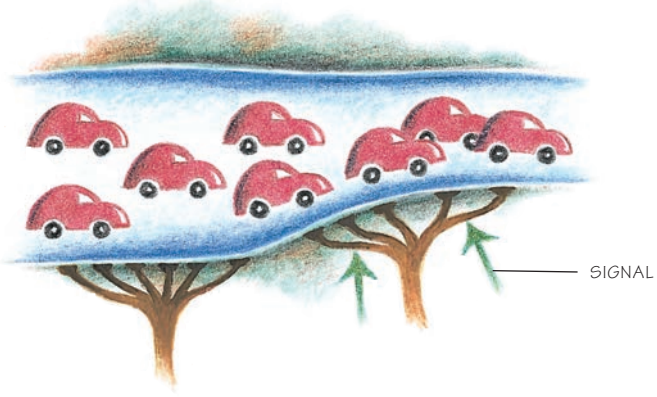
What about stress?

When you are under stress, your brain releases signals to the body through the nerves. These signals allow your body to respond to various situations.

Arteries have nerves attached to them. The nerves can either cause the arteries to relax or can put more tension on the walls of the arteries. If you are under a lot of stress, the nerves send signals to tighten or narrow the arteries.



Narrowing the artery is like taking away a lane of traffic. There is still the same number of cars (blood) with less space (artery). This increases the pressure inside the artery.



So,

something you can do to improve your blood pressure is reduce stress. You can accomplish this by practicing meditation, doing deep breathing exercises, or doing exercise, such as going for a walk, riding a bike, or taking a swim.

6. Obesity

The American Heart Association has described obesity as a major risk factor for cardiovascular disease. What exactly is obesity?

Metropolitan Life's height/weight tables are often used to determine a recommended weight for an individual based on age and gender. Generally, those who are 20% over the recommended weight for their height are considered to be overweight — but not necessarily obese. Obesity refers to

fatness rather than weight. Men who have greater than 25% of their body weight as fat and women who have more than 35% are considered to be obese. Obesity and being overweight carry significant health risks, are directly related to cardiovascular risk factors, and may:

1) raise triglycerides (a "bad" blood fat)
2) lower HDL-cholesterol (the "good" cholesterol)
3) raise LDL-cholesterol (the "bad" cholesterol)
4) raise blood pressure and
5) increase the risk of developing diabetes

Obesity may be related to both genetics (nature) and lifestyle (nurture). Generally speaking, obesity occurs

when the calories we consume exceed the calories we burn through activities of daily living and exercise. We store the excess calories as fat reserves, thus contributing to obesity and ultimately increasing the risk of coronary disease. Obesity has increased in men and women in every decade over the past 50 years.

There is a misconception that Americans are overeating and eating too much fat. In fact, as a nation we are eating less fat, fewer calories, and still gaining weight — primarily due to the lower levels of physical activity in our youth and adult lives. A sedentary lifestyle could be the real culprit.

Recently, a dramatic increase in obesity has been observed in children and adolescents. According to the Centers for Disease Control, obesity rates in adolescents age 12–19 has quadrupled from 5% to 21% since 1980. Obesity in children may lead to high blood pressure and pre-diabetes, and it may also lead to chronic conditions, such as heart disease, type 2 diabetes, stroke, several types of cancer, and osteoarthritis.

7. Age

Aging has an effect on the risk of cardiovascular disease because aging causes changes in the heart and blood vessels. As people age, they become less active, gain more weight, and the effects of a sedentary lifestyle, smoking, and poor diet continue to damage the heart and circulation by increasing blood pressure and cholesterol levels. Blood pressure increases with aging, in part because arteries gradually lose some of their elasticity and, over time, may not be as resilient.

8. Family history

A **family history** of cardiovascular disease could reflect genetics and/or an unhealthy family lifestyle. If most of your family members smoke, are sedentary, and have a poor diet — then these are harmful habits that increase the risk of heart disease in your family. However, unlike your genes, these behaviors can be changed.

On the other hand, if your family has a healthful lifestyle but there is still a high incidence of cardiovascular disease, then it is likely that genetics is playing a role. We are learning more about the importance of genetic risk for vascular disease. In the future, treatment may be tailored to an individual's own genetic makeup. In either case, by practicing a healthful lifestyle, you can help reduce your risk rather than giving up and thinking you have no control over your destiny.

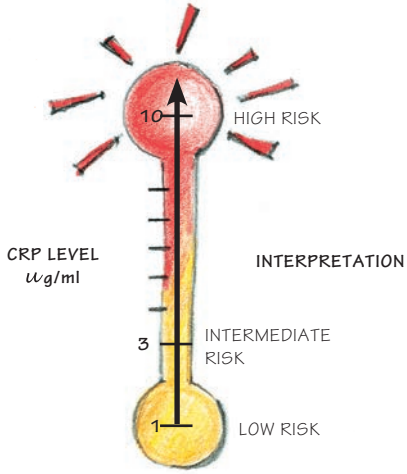
9. Vascular Inflammation and C-Reactive Protein

Vascular inflammation is another risk factor for cardiovascular disease. Smoking, high cholesterol, high blood pressure and diabetes can all result in inflammation, which then causes plaque to grow in the artery walls. If the plaque ruptures, blood clots can form, leading to increased risk for heart attack or chest pain.

Your doctor may order a simple blood test to check your C-reactive protein (CRP) levels, which can reflect the degree of vascular inflammation.

You can reduce your CRP levels by losing weight, closely controlling diabetes, exercising regularly and quitting smoking. Certain medications – such as aspirin, statins, ACE-inhibitors and others – are also effective in lowering CRP levels.

Using Inflammation Markers in Cardiology



REPEAT TEST IN ONE MONTH. EXCLUDE OTHER PROCESSES*

*Infection, Rheumatologic disease, Autoimmune diseases, and Cancer.

Yeh, Willerson. *Circulation* 2003; 107:363

10. Physical inactivity

Lack of exercise is a major contributor to obesity, diabetes, and hypertension. Beginning an exercise program may help you feel better, help you have more energy, help you lose some weight, lower your cholesterol, lower your blood pressure, help you look better, and improve your muscle tone. Also, beginning an exercise routine can increase your HDL-cholesterol or "good cholesterol" — especially if exercise is associated with weight loss. A physical exercise program is associated with a reduction in systemic markers of vascular inflammation such as C-reactive protein levels.

Exercise

Currently, only 22% of adults in the United States exercise at a level that benefits their cardiovascular systems. What are some important considerations?

1) Type of exercise

2) Amount and regularity of exercise

3) Intensity of exercise

1. Type of exercise

Aerobic exercise

To meet your general fitness goals, the best type of exercise is **aerobic** exercise.

Aerobic exercise does not necessarily require special equipment or a health club membership. Aerobic exercises are those that require a lot of oxygen. These exercises include walking, jogging, cycling, swimming, cross-country skiing, or rowing.

20-30 minutes a day, 5 days a week

2. Amount and regularity of exercise

The U.S. Surgeon General recommends that healthy adults exercise 20 to 30 minutes, 5 days a week.

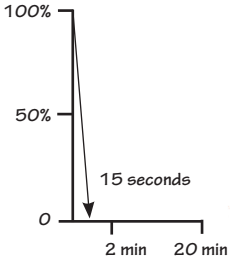
There are nearly 50 half hours in a 24-hour day. Exercising for 30 minutes daily requires **only about 2%** of your total day. Try to find 1, or 2, or 3 exercises you like to do. You'll enjoy the variety.

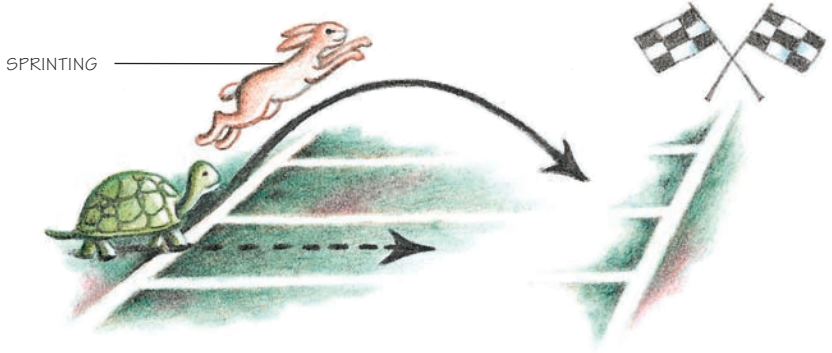
3. Intensity of exercise

Warm up

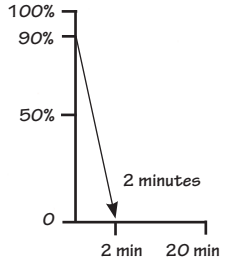
By walking or cycling slowly, you move the blood out to the working muscles. A warm-up should start slowly and last 5 to 10 minutes.

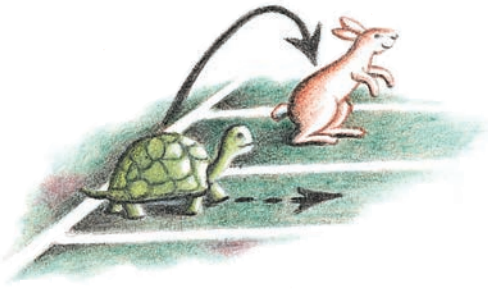
You cannot maintain "all out" exercise (100%) for very long. An example of an "all out" exercise is sprinting. Actually, you may only maintain a sprint for about 15 seconds.



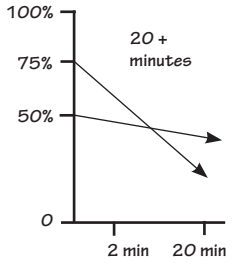


If you slow the exercise down a bit, to about 90%, you may still only go for about 2 minutes!





What if you slow your exercise down to 75% or even 50%? There is a **huge** difference. Now you may easily go more than 20 minutes.



Simply —

By slowing down the pace, you may be able to exercise for a longer period of time.

Many exercise physiologists use the following generally accepted formula to determine the exercise target heart rate of a healthy individual. If you have a history of cardiovascular disease, or if you are just starting a program, **check with your doctor before starting an exercise routine**.

Your doctor is aware of the many factors that may need to be considered in modifying your exercise intensity. Please be sure to ask your doctor for a recommended Target Heart Rate Range."

Important!

To begin your exercise program, it may be advantageous for you to exercise only 15 to 20 minutes daily for the first few weeks. This may help you more easily establish a consistent exercise routine. Check with your doctor for input on your exercise program.

If you are just starting an exercise program, probably the simplest exercise to try is walking. It is fairly easy to do for 20 minutes.

How hard and how often should I exercise?

When you are just starting out, try to exercise very comfortably. Here are 4 quick tips.

1) Try to exercise so that you are breathing noticeably but are **not** out of breath. Remember this simple rule: you should be able to carry on a conversation while you are exercising.

2) Sweating is a good thing. This means that your body is working hard enough and receiving the necessary stimulus for the muscles and the heart.

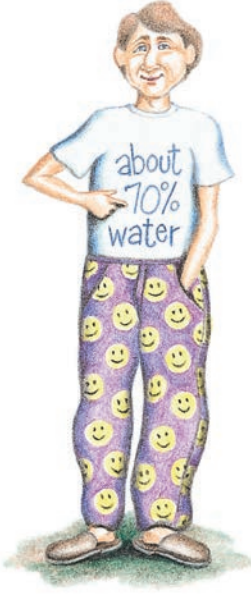
3) If you are not fatigued and are completely recovered from exercising on the previous day, then you should exercise **daily**.

4) Give yourself a **warm-up** before exercise (several minutes of easy walking) and a **cooldown** at the end of exercise (again, several minutes of easy walking). Ask an exercise specialist for some recommendations for stretching after your workout, and discuss the intensity of the exercise with your doctor.

VERY, VERY important

Cool down. As important as the warm-up and the aerobic exercise are to improving your fitness, you must also include a cooldown as part of your exercise routine.

Your cooldown should be just like your warm-up. At the end of your exercise routine, give yourself 5 to 10 minutes of nice, easy walking. You also may want to include some mild stretching.



Another consideration — water

Water is needed for virtually every function of the body. The body is approximately 70% water.

During the course of the day, you lose water through sweating, breathing, and waste. Replacement of water (rehydration) is important — especially when participating in an exercise program.

A prudent recommendation is that you should drink 6 to 10 glasses of water per day. Sorry, caffeinated drinks and alcohol do not count. They are "diuretics," meaning that they actually may cause you to lose even more water.

Nutrition

Proper nutrition is an important aspect of our lives – especially for individuals who have heart disease. For example, it is possible to lower your blood cholesterol by changing what you eat. Things that you can do to reduce your cholesterol vary by food group. Start by making changes in one area at a time.

Here's a brief review of the different food groups and a few simple recommendations for healthier eating.

Fats

Not all fats are bad.

Monounsaturated fats are "good" fats. Examples of monounsaturated fats include olive and canola oils, peanut butter, and nuts.

MONOUNSATURATED FAT

POLYUNSATURATED FAT

Polyunsaturated fats are "acceptable" fats. Examples of polyunsaturated fats include margarine made with corn or safflower oils and some nuts.

SATURATED FAT

Saturated fats are the "bad" fats, particularly the "**trans**" **fats**. Saturated fats are usually solid at room temperature. Examples of saturated fats include lard, butter, and cream cheese. Examples of "trans" fats include partially hydrogenated vegetable oils found in many snack foods.

It is difficult to eat a diet without saturated fat unless you are on a strict vegetarian diet. While we need fats in our diet, we also need to choose our foods wisely, especially meats, eggs, and dairy products.

People who have had a cardiac event, or people who have high cholesterol and are at risk for cardiovascular disease, should contact a dietitian about reducing their saturated fat intake and limiting their intake of alcohol, caffeine, and salt. The dietitian will also be able to review the amount of sugar you are eating — especially sugars found in "no fat" snack foods.

Meats

As mentioned, limit the amount of fatty meats, particularly those foods that are very high in saturated fats (bacon, sausage, and prime rib), to 1 or 2 servings per week. Cook meats using little or no fat, such as baking, broiling, grilling, stewing, or stir-frying without adding fat. Always trim off the obvious fat **before** cooking red meats and remove the skin before cooking chicken.

TRIM FAT OFF
RED MEAT

REMOVE SKIN
FROM CHICKEN

Eggs

It used to be thought that these were the main culprits of elevated cholesterol. This may not be true. However, if you have elevated cholesterol or a history of heart disease, you should limit egg yolks to no more than 3 or 4 per week. Egg whites or "egg substitutes" have no cholesterol and do not need to be limited.

EGGS

Dairy products

Switch from whole milk to 2% and then to 1% or even skim milk. Use low-fat cheeses, yogurt and sour cream. For a healthier dessert, look for low-fat ice cream or sherbet.

DAIRY PRODUCTS

Whole grains, fruits, and vegetables

Another thing you can do to help improve your overall diet is to eat a variety of healthier foods. The American Heart Association recommends that you try to increase the number of servings of foods that are high in whole grains, such as breads and cereals, and try to have at least **5 servings** of fruits and vegetables every day.

WHOLE GRAINS

FRUITS

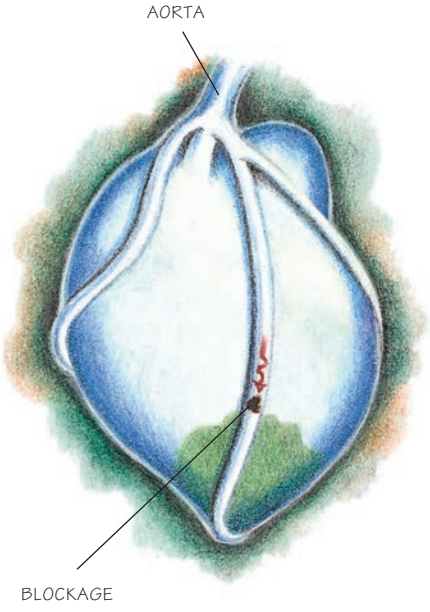
VEGETABLES

What if changing your risk factors, beginning an exercise program, and modifying your diet do not help?

What's next?

Your doctor may refer you to a heart specialist called a **cardiologist**. The cardiologist may have to consider several options including medications or surgical intervention such as **angioplasty** or **bypass surgery**.

Angioplasty, Bypass Surgery, and Medications



Let's suppose there is a blockage in the left anterior descending artery.

The shaded area in the drawing is not receiving blood. If this portion of the heart goes too long without enough oxygen, then the muscle may die.

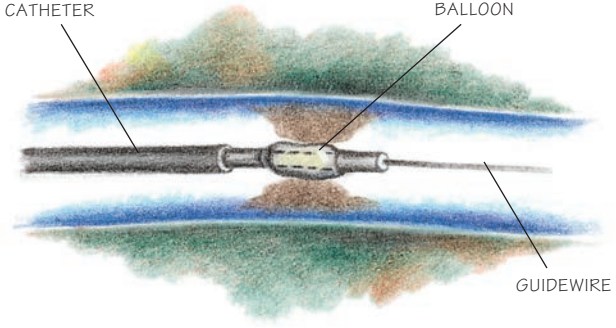
Thrombolytics

Most often, a heart attack is caused by a **blood clot** (thrombus) at a site of **atherosclerotic plaque disruption** within the coronary artery. Blood clots can completely block blood flow in the artery and cause a heart attack. If a person gets to a hospital emergency room, usually within 30 minutes of the onset of chest pain, either coronary angioplasty or clot-dissolving medications called thrombolytics

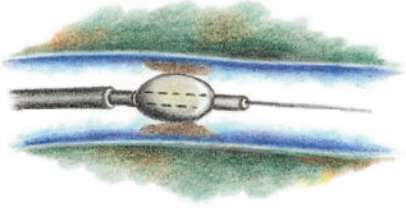
may be used to open the blocked artery and restore coronary blood flow. The restoration of blood flow to the heart muscle can save heart muscle. Coronary angioplasty is currently the preferred treatment for a heart attack.

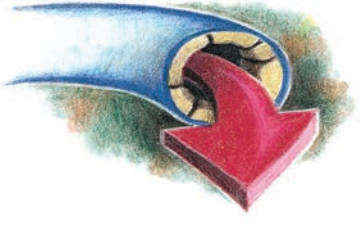
Angioplasty

Angioplasty is a procedure by which the cardiologist inserts a balloon catheter over a thin wire across a blockage of a coronary artery.



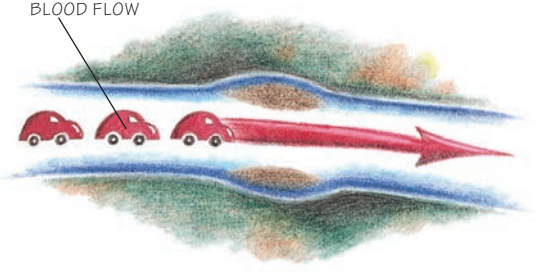
The balloon is inflated to compress the plaque. This is repeated as necessary by the cardiologist.





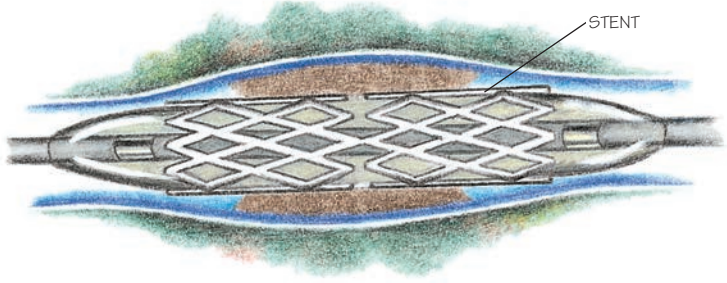
Inflating the balloon catheter compresses and splits open the plaque. This allows more room for the blood to flow.

The balloon catheter also stretches the elastic wall of the artery. Small tears occur on the inside of the artery wall and slightly injure the artery wall as a result of balloon catheter inflation. These issues, which may complicate balloon angioplasty and result in coronary reocclusion, are most effectively dealt with by inserting a stent to better assure continued proper blood flow in the coronary artery.



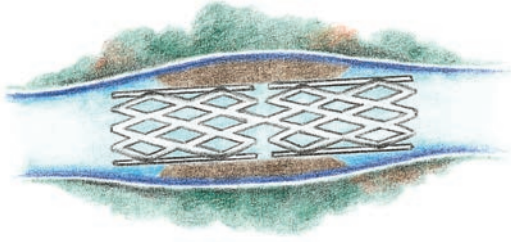
Stents

In most instances, the cardiologist may decide to insert a stent inside the coronary artery. The stent, usually made of stainless steel or other (cobalt chromium or platinum) metal alloys, functions as a scaffold to hold open the inside of the coronary artery.



In most instances, the cardiologist may decide to insert a stent inside the coronary artery. The stent, usually made of stainless steel or other (cobalt chromium or platinum chromium) metal alloys, functions as a scaffold to hold open the inside of the coronary artery. Recently, a stent made of dissolvable polymer has been approved for use by the U.S. FDA. This stent (bioresorbable scaffold) holds open the artery, medicates and heals the artery and then slowly dissolves over 2-3 years, leaving nothing behind.

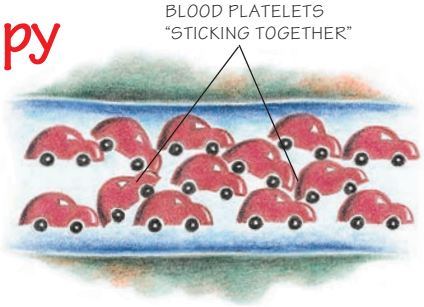
Stents are usually put in place using a balloon angioplasty catheter. Stents can reduce the incidence of both short- and long-term coronary artery re-occlusion. Stents can seal and "tack up" tissue flaps within the artery that are created when a balloon catheter injures the artery. Unfortunately, stents do not eliminate clot formation or the occurrence of heart attack following the procedure.



Newer stents are treated with medicines that reduce inflammation and minimize scar tissue, which could clog the stent. Compared to non-medicated "bare metal" stents, these devices significantly reduce the risk of repeated blockages and the need to have another angioplasty or coronary bypass procedure. Newer medicated stents may also be associated with less risk for clotting than bare metal stents.

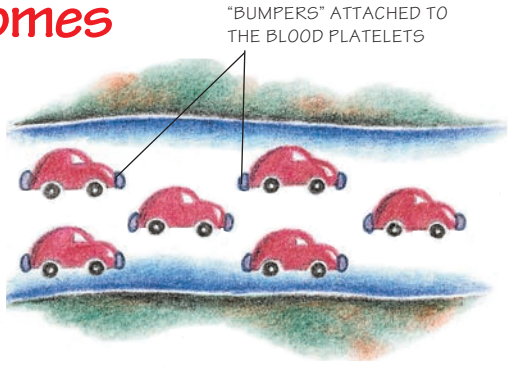
What can be done to reduce blood clot formation and reduce the risk of re-occlusion?

Antiplatelet therapy



After angioplasty, the blood platelets may be susceptible to "sticking together" and forming clots. To reduce this likelihood, cardiologists have historically administered aspirin and "blood thinning" medications called heparin or bivalirudin during the angioplasty procedure. Although these medicines have been shown to reduce the chance of clot formation during and after angioplasty, they have limited effectiveness. Newer medications have been developed to further improve results.

Improved outcomes



A class of medicines called platelet IIb/IIIa receptor blockers has been developed that reduces blood clot formation during and following angioplasty. These medicines are administered intravenously (by vein). These blockers act like "bumpers" attached to the blood platelets and prevent platelets from sticking together and forming blood clots.

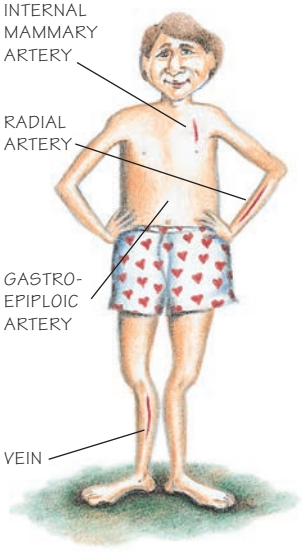
Platelet IIb/IIIa blockers can reduce the likelihood of stent clotting (thrombosis) immediately following stent treatment particularly when the stent was used to treat a heart attack.

In addition, before or immediately after coronary stent placement, oral antiplatelet therapy and aspirin taken together can also prevent blood clots from forming on the stent, thus reducing the risk of heart attack or stroke.

Dual antiplatelet therapy

After angioplasty, unless you have complications, your doctor will most likely prescribe two medications: (a) aspirin *plus* (b) a medication that works with aspirin to reduce the risk of another heart attack. The use of both medications at the same time is called "dual antiplatelet therapy."

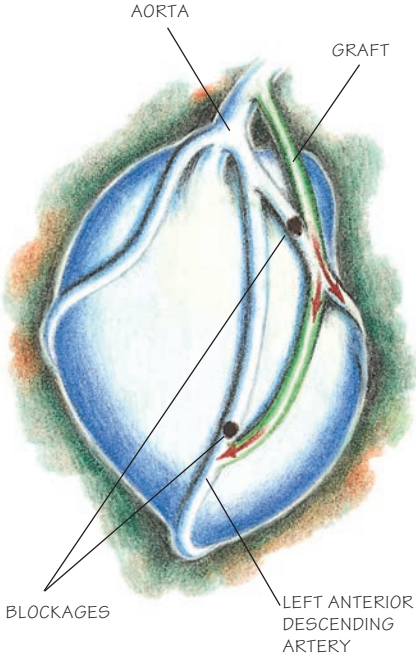
In dual antiplatelet therapy, the two medications work together to prevent clot formation in the stent and reduce the risk of heart attack. The current recommendations suggest that patients should receive both medications for at least one year following a heart attack and for at least 6 months after a stent is placed in someone not having a heart attack.



Bypass surgery

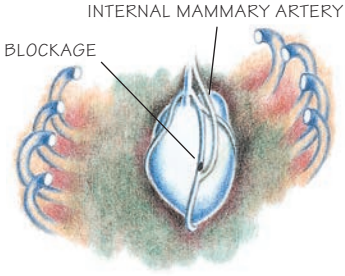
Bypass surgery is a cardiovascular procedure designed to correct blood flow to the heart that angioplasty cannot correct. The cardiovascular surgeon uses a piece of artery and/or vein to reroute blood around the blockage.

The surgeon may use a vein from the leg, and/or the internal mammary artery found in the chest, and/or the gastroepiploic artery of the stomach, and/or the radial artery of the forearm.



The vein is attached to the aorta. The supply of blood is then rerouted around the blockage. One piece of vein may be used for multiple bypasses. The number of blockages where blood has been rerouted — not the number of veins used — determines the number of bypasses.

If the internal mammary artery is used, the artery originates from a branch off the aorta and is re-attached to the coronary artery downstream to the blockage.



Newer techniques allow bypass surgery to be performed "off-pump" (without circulating the blood through the bypass pump "heart and lung" machine) for some patients. Less invasive procedures – including robot-assisted bypass surgery – are also being evaluated. Because they can be used only for a certain number of bypasses, these surgery techniques are not appropriate for many patients.

What should I do after my heart procedure?

Your doctor will manage your care very closely. Generally, the cardiologist may recommend that you:

- quit smoking
- take a beta blocker drug (after a heart attack)
- discuss a cholesterol treatment plan with your physician
- take a daily enteric-coated aspirin (81 mg or greater) unless you have other medical complications
- keep strict control of diabetes
- follow a "heart-healthy diet" and begin a basic exercise program, mainly walking. Always follow your doctor's recommendations.

Questions

Here are some questions you may want to take with you the next time you go to see your doctor.

What are my medications? What is each one for?

Answer _____

_____

_____

_____

_____

_____

_____

_____

List the blood pressure reading for each visit to your doctor and the date:

Date	Blood Pressure

List the total cholesterol (TC), LDL-cholesterol (LDL), triglycerides (Trig), and HDL-cholesterol (HDL) readings for each visit to your doctor.

Date	TC	LDL	Trig	HDL

Do I have any exercise limitations of which I should be aware? What are they?

Answer _____

_____

Should I have a treadmill test before I start to exercise? What is my target heart rate?

Answer _____

_____

Based on my weight, blood pressure, and blood cholesterol level, should I talk to someone about changing my diet?

Yes **No**

Contact your local hospital for the name of a registered dietitian.

Dietitian _____

Address _____

_____

Phone _____

Are there any concerns that I should be aware of before having/resuming sexual activity?

Answer _____

_____

_____

And now for a little heart to heart …

It has been mentioned throughout the book, but the importance of seeing your doctor and having a complete physical exam cannot be stressed enough. If necessary, sit down with a dietitian and review your current eating pattern. Then, if your doctor agrees, get moving. Start a simple exercise program — mainly walking. There are no guarantees you will reduce your risk of having a cardiac event, but at least you will be taking an aggressive approach to improving your health.

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