

# *High Cholesterol and High Blood Pressure*



## what you should know

---

Vital information about:

- cholesterol
- risk factors
- lifestyle modification
- treatment options

*This book may discuss pharmaceutical products and/or uses of products that have not been approved by the United States Food and Drug Administration. For approved product information, please consult the manufacturer's complete prescribing information for the product.*



*Provided as an Educational Service by  
The Christ Hospital Health Network*

Copyright © 2019 by Robertson & Fisher Publishing Company. First Edition. All rights reserved.

Published by Robertson & Fisher Publishing Company, Cincinnati, Ohio

Authors: Charles J. Glueck, MD, and Dean J. Kereiakes, MD, FACC

Contributing Editors: Ian J. Sarembock, MD, FACC, FAHA, FSCAI; Paul Ribisl, PhD;

Rona Wharton, MEd, RD, LD; and, Douglas Wetherill, MS.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the publisher. Requests to the publisher for permission should be directed to the Permissions Department, Robertson & Fisher Publishing Company at [info@yourhealthseries.com](mailto:info@yourhealthseries.com).

The information contained in this book is not intended to serve as a replacement for professional medical advice. Any use of the information in this book is at the reader's discretion. The authors and the publisher specifically disclaim any and all liability arising directly or indirectly from the use or application of any information contained in this book. A health care professional should be consulted regarding your specific situation.

ISBN 1-892807-33-5

# 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.

# Table of Contents

About Cholesterol and Blood Pressure	7
Risk Factors	9
How Does Cholesterol Damage an Artery?	71
Exercise	86
Nutrition	100
Medications, Angioplasty, and Bypass Surgery	110
What Should I Do After My Heart Attack, Bypass Surgery, or Angioplasty?	133
And now for some heartfelt thoughts...	139

# Introduction

In the early 20th century, there was little need for a book devoted solely to cholesterol and blood pressure because the life expectancy of Americans was only 47 years of age — and coronary heart disease was not a leading cause of death.

However, our standard of living and treatment of infectious disease and trauma have improved substantially, prolonging life span. Our technological advances have created both a sedentary lifestyle and a diet that is characterized by overabundance. Consequently, we have a disproportionate prevalence of cardiovascular disease and an increasing incidence of diabetes.

High cholesterol and high blood pressure are 2 of the leading risk factors for heart disease. This book explains how cholesterol and blood pressure work within the body. It also explains how too much cholesterol and/or elevated blood pressure can damage the body and produce serious health consequences.

This book does not replace the need for discussing your medical condition with your doctor. Please remember, your doctor will know how to help you manage your cholesterol, blood pressure, and other risk factors for coronary heart disease. — Charles and Dean

# About Cholesterol and Blood Pressure

# High cholesterol and high blood pressure

Cardiovascular disease generally develops as a result of poor lifestyle habits with or without inherited disorders. Behaviors that increase our chances of developing heart disease are called **risk factors**.

**High cholesterol and high blood pressure** are major risk factors for heart disease. By controlling **your** risk factors, you can potentially reduce the chance of having a cardiac event. Please remember, it is important that you discuss **your** specific medical history with your doctor.



# Risk Factors

# The primary risk factors for cardiovascular disease include:

- 1) Elevated cholesterol
- 2) Hypertension or high blood pressure
- 3) Smoking
- 4) Diabetes
- 5) Metabolic syndrome (pre-diabetes)
- 6) Obesity
- 7) Vascular injury and inflammation
- 8) Age
- 9) Family history
- 10) Physical inactivity

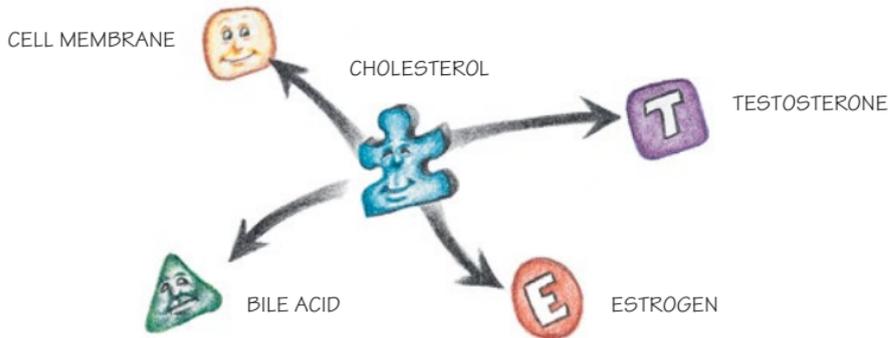
# 1. Elevated cholesterol

A small amount of **cholesterol** is good for our bodies. Like a piece of a puzzle, cholesterol fits into our lives by serving many useful purposes in our bodies.



CHOLESTEROL

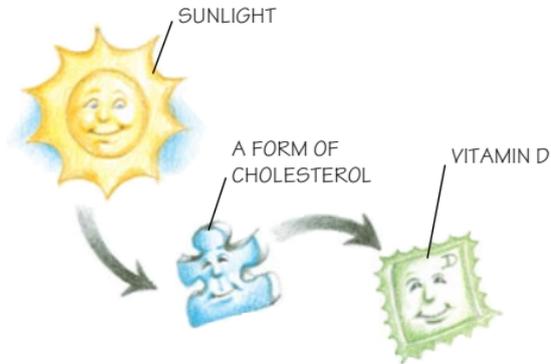
Cholesterol is a waxlike substance that serves as a building block within the normal **cell membrane**. Cholesterol is also used to make **hormones**, especially **estrogen** and **testosterone**. It is also used to make **bile acids** that help break down fat in our intestines. Drugs that lower total and LDL-cholesterol have been shown to be very safe, not affecting normal hormone and bile acid production.



Cholesterol has other functions in the body.

**Vitamin D** is made when the body absorbs sunlight in skin and combines it with a form of cholesterol.

Vitamin D is needed to absorb calcium into the body.

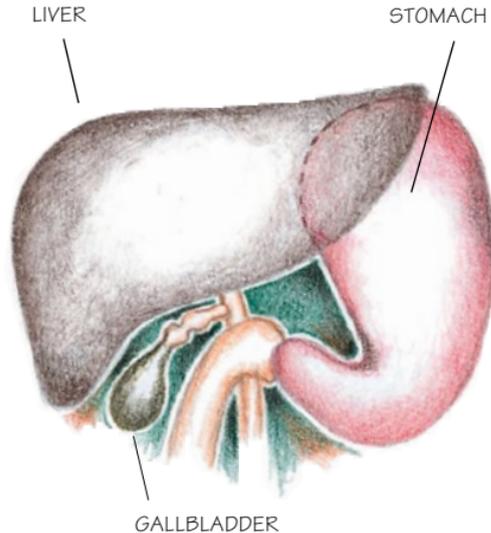


Excessive sun exposure may be harmful, but 30 minutes a day is effective in producing sufficient amounts of vitamin D provided that skin is exposed to natural, outdoor sunlight. People who live in northern climates of the United States may not get enough exposure to sunlight. Contact your doctor to find out if you should take vitamin D supplements. A normal serum vitamin D is important because low serum vitamin D is associated with muscle inflammation (**myositis**) and statin intolerance.

# Where does cholesterol come from?

About two-thirds of all the cholesterol in the body is produced by the **liver**.

The remaining one-third of the body's cholesterol is absorbed by the digestive system from the foods we eat.



Foods that contain cholesterol are those that come from animal products. Sources of cholesterol include chicken, eggs, beef, and dairy products. Foods, especially those high in **saturated fat**, can increase the total cholesterol.



CHICKEN



BEEF



DAIRY PRODUCTS



EGGS

# How does cholesterol move through the body?

Once **cholesterol** and **triglycerides** are digested, they are packaged into bundles that carry them to different parts of the body. **Cholesterol** is used to build cell walls and is used in hormone production. **Triglycerides** are fat molecules that provide energy for the body. Both **cholesterol** and **triglycerides** are carried through the blood by **lipoproteins**.



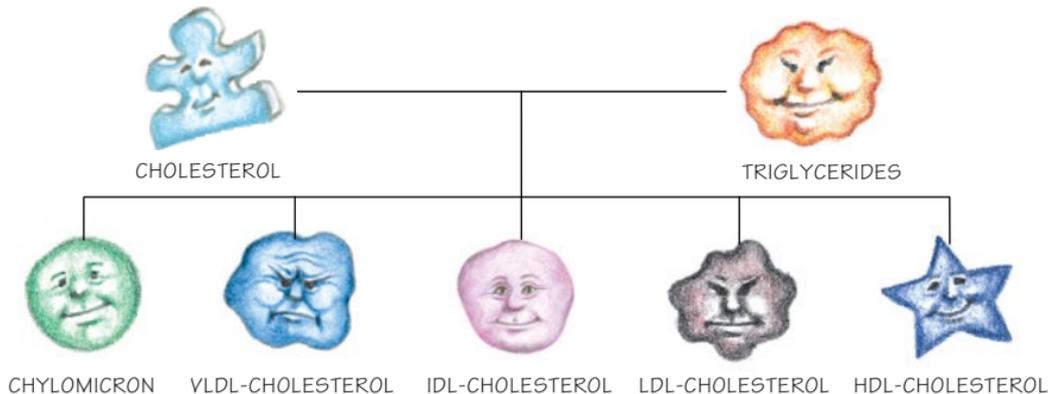
CHOLESTEROL



TRIGLYCERIDES

# Lipoproteins (lipids)

The 5 major classes of lipoproteins are: **chylomicrons**, **VLDL-cholesterol**, **IDL-cholesterol**, **LDL-cholesterol**, and **HDL-cholesterol**.





CHYLOMICRONS

**Chylomicrons** are composed mainly of triglycerides and some cholesterol. They are the original carriers of cholesterol and triglycerides after fat is absorbed from the digestive tract.

**VLDL-cholesterol** (very low density lipoprotein) carries cholesterol from the liver.



VLDL-CHOLESTEROL



IDL-CHOLESTEROL

**IDL-cholesterol** (intermediate density lipoprotein) is made from VLDL-cholesterol and carries cholesterol through the blood.

**LDL-cholesterol** (low-density lipoprotein) is the “bad” cholesterol. It often binds to the inside of the artery wall. In general, the lower your LDL-cholesterol level is, the better.



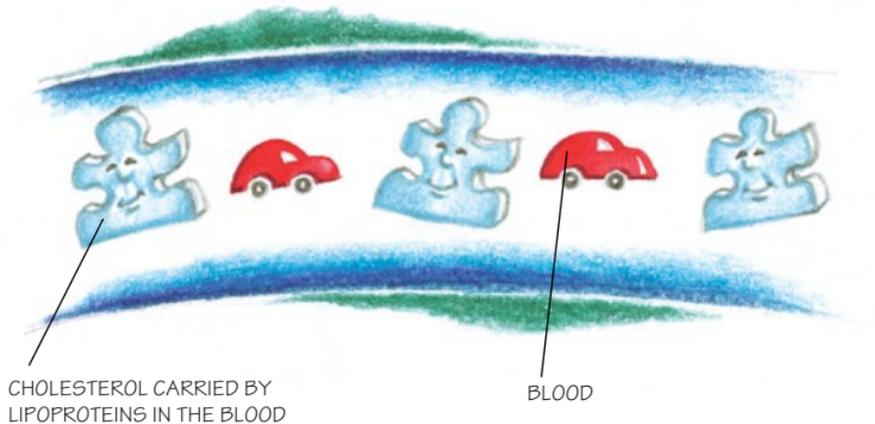
LDL-CHOLESTEROL



HDL-CHOLESTEROL

**HDL-cholesterol** (high-density lipoprotein) is the “good” cholesterol. It removes LDL-cholesterol from the blood. In general, the higher your HDL-cholesterol level is, the better.

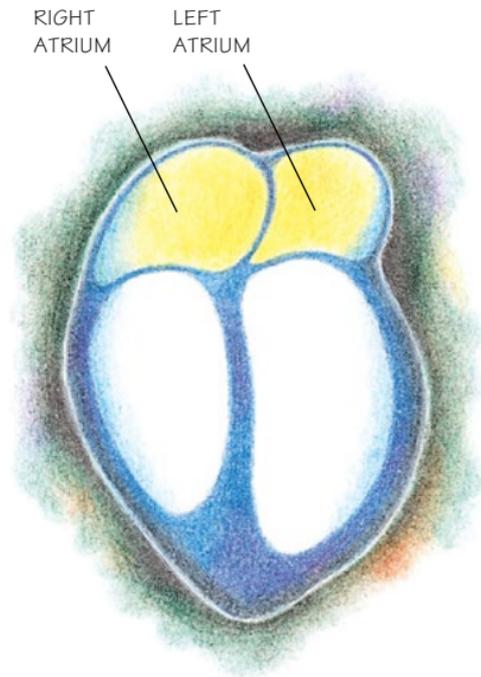
**Total cholesterol** is defined as the total amount of cholesterol in **ALL** the **lipoproteins** circulating in the blood.



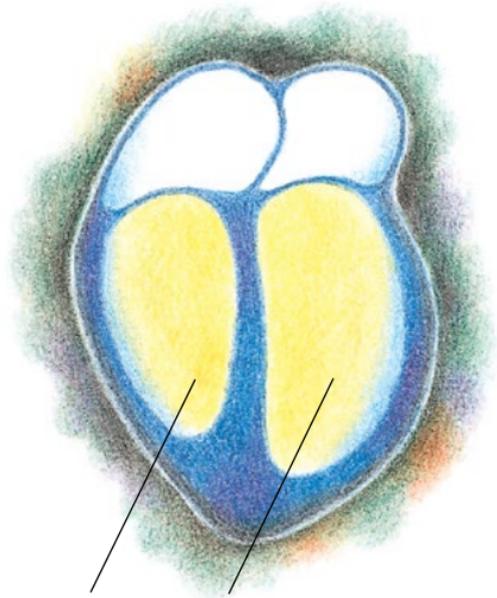
## 2. Hypertension or high blood pressure

Hypertension is commonly referred to as high blood pressure. It is important to know what blood pressure is... and then understand some of the lifestyle modifications you can take to manage your blood pressure. For some people, lifestyle changes are not enough to lower blood pressure. Your doctor may need to add medication(s) to manage your condition.

Let's start with a brief description of the heart.



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

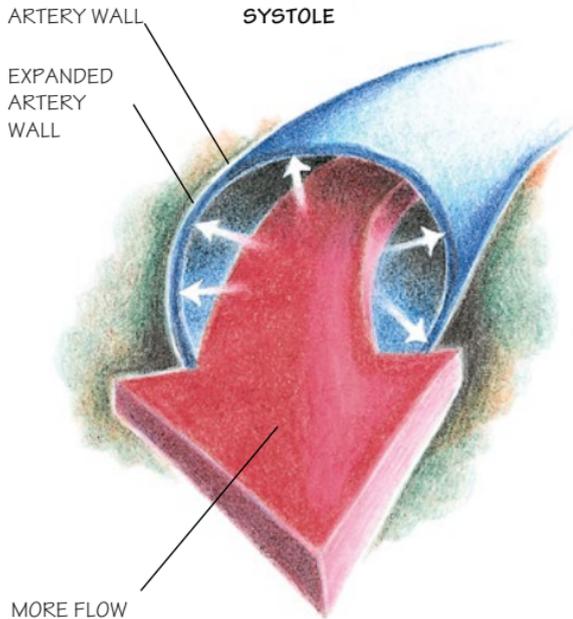


RIGHT  
VENTRICLE

LEFT  
VENTRICLE

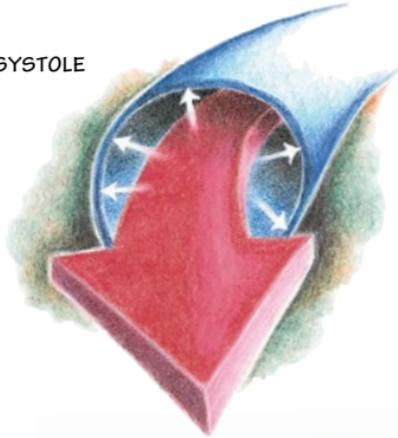
The bottom 2 chambers are called the **ventricles**. The ventricles are larger than the atria, and the left one is more muscular. When the ventricles contract, they propel blood out of the heart to different parts of the body.

# Here's a simple explanation of blood pressure

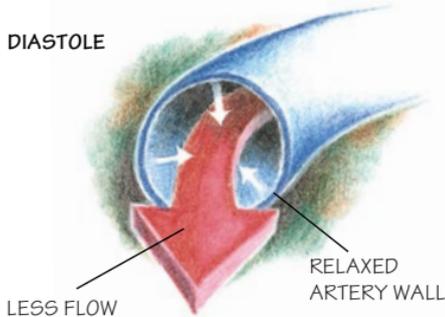


Blood comes out of the heart (**left ventricle**) in 1 big thrust. The artery expands to handle the blood. The amount of pressure put on the expanded artery wall is called **systolic pressure**.

SYSTOLE



DIASTOLE



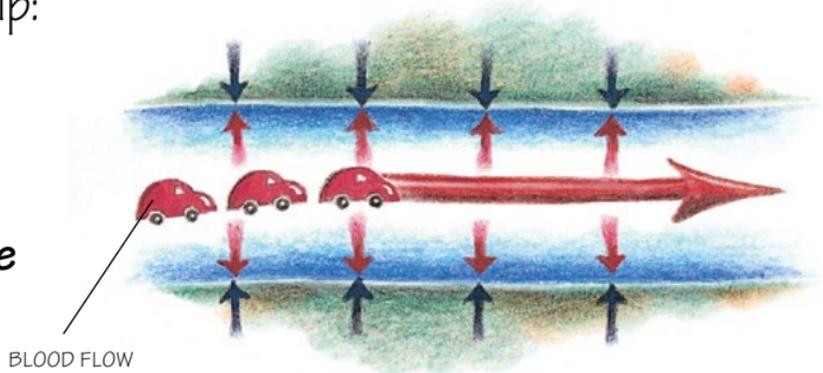
After the artery expands during systole, it relaxes back to its normal size.

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 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 is my blood pressure goal?

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 if their systolic blood pressure is 140 mmHg or higher, or if their diastolic blood pressure is 90 mmHg or higher.

# Managing high blood pressure

Talk to your doctor about your blood pressure goals. Because blood pressure can vary depending on what you are doing, your doctor may ask you to have your blood pressure retested, or he or she may ask you to buy an automatic blood pressure cuff and monitor your blood pressure at home monthly, weekly, or more frequently with changes in blood pressure medication.

SYSTOLIC  
NUMBER

120

---

80

DIASTOLIC  
NUMBER

# What contributes to hypertension?

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

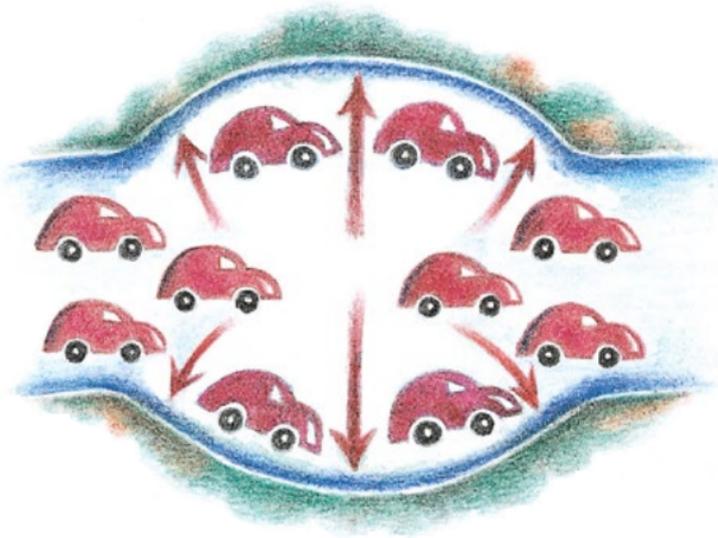
- Excess dietary salt in susceptible individuals
- Excess alcohol intake
- Stress
- Obesity, particularly morbid obesity
- Age
- Genetics and family history
- Physical inactivity
- High saturated fat diet

## Excess dietary salt

Salt helps conserve water in your body.

The American Heart Association Step 2 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.



## Excess alcohol intake

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 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. Drinking alcohol for cardio-protection is not a good idea.

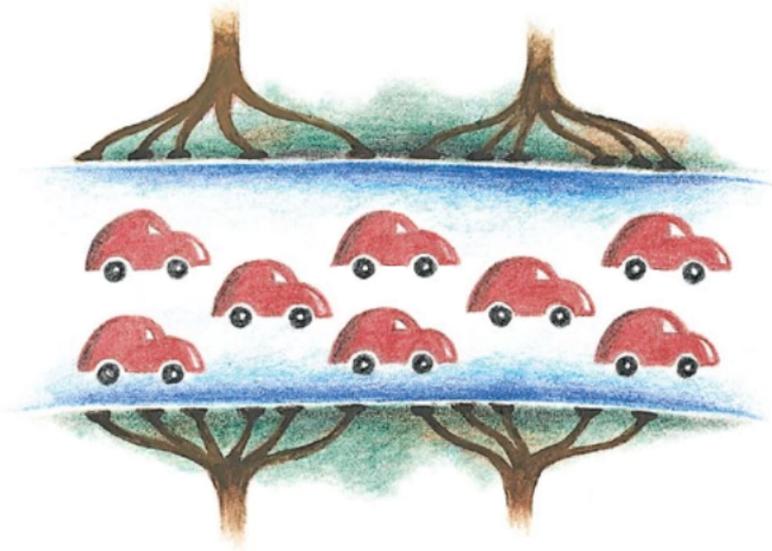
**\*A guide:** One drink is defined as 5 ounces of wine, 12 ounces of beer, or 1-1/2 ounces of 80-proof liquor.

People who should not drink alcohol 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. Because alcohol affects blood pressure, people who have high blood pressure should not have more than 1 drink per day.

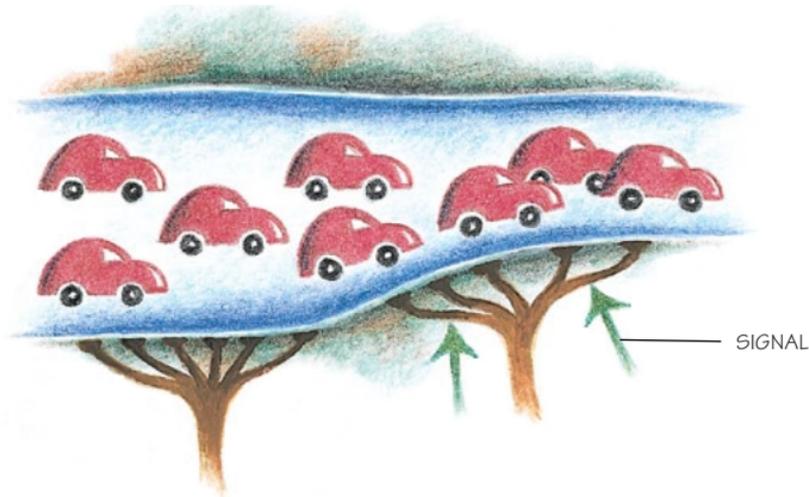
# What about stress?

When you are under stress, your brain releases signals to the body through the nerves and hormones. These signals allow your body to respond to various situations. Whether chronic stress or reactions to stress raise blood pressure is hard to define and even harder to treat because stressors are usually related to the environment and lifestyle.

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. The same number of cars (blood) need to move through a smaller space (artery). This increases the pressure inside the artery.



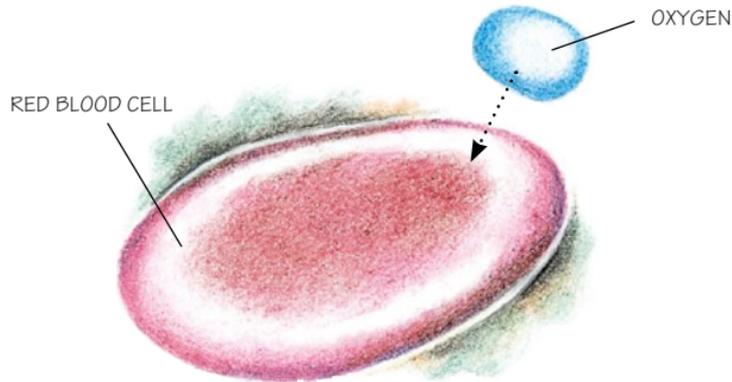
### 3. Tobacco abuse

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

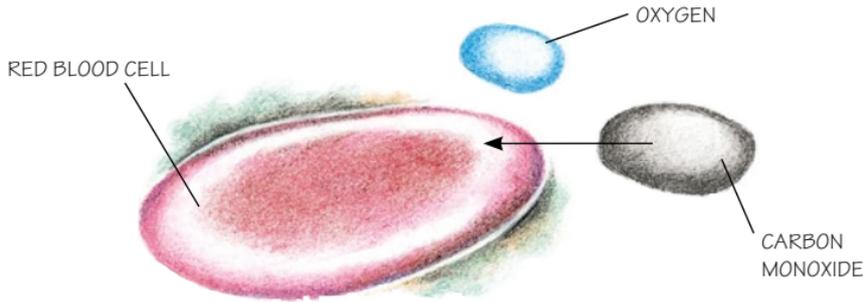
- Introduces carbon monoxide into the body
- Directly harms the blood vessels
- Increases blood pressure and heart rate
- Increases the risk of a heart attack

# Carbon monoxide

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

Smoking has harmful effects, especially for anyone who has already had a heart attack or bypass surgery. More importantly, there is an increased risk of a second heart attack or need for stent placement or 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).

# Lower HDL-cholesterol

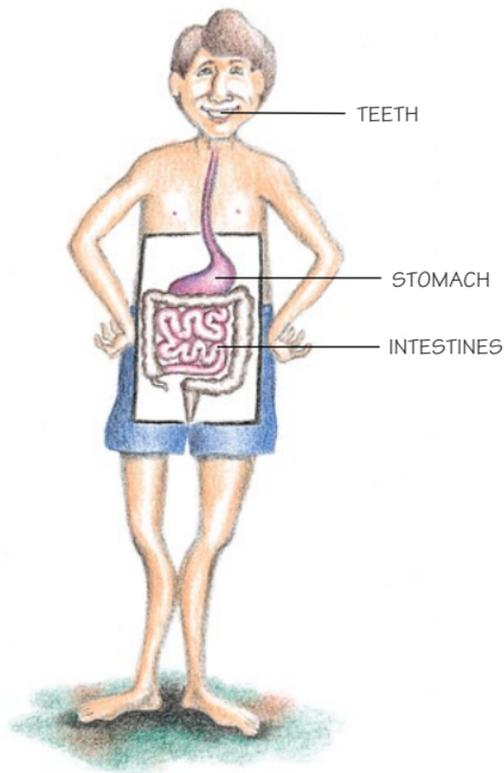
Three more reasons for not smoking are: (1) it reduces the amount of HDL-cholesterol or “good cholesterol” in your bloodstream, (2) it makes your blood clot more easily, increasing the potential for an arterial blockage (heart attack or stroke), and (3) it may also cause damage to the lining of the arteries, making them more susceptible to cholesterol deposits and constriction or narrowing.



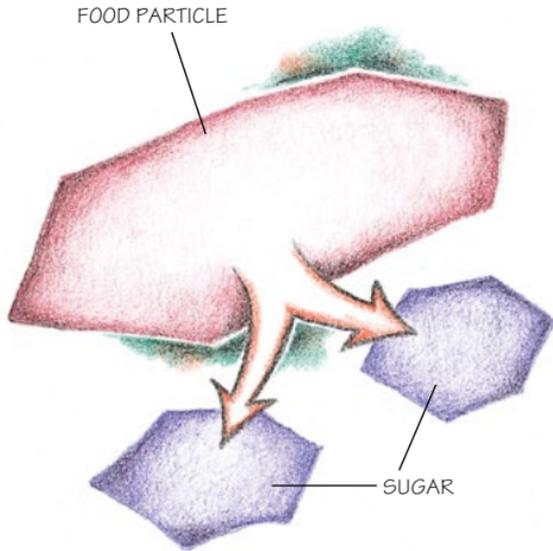
SMOKING REDUCES  
HDL-CHOLESTEROL

## 4. 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 ...

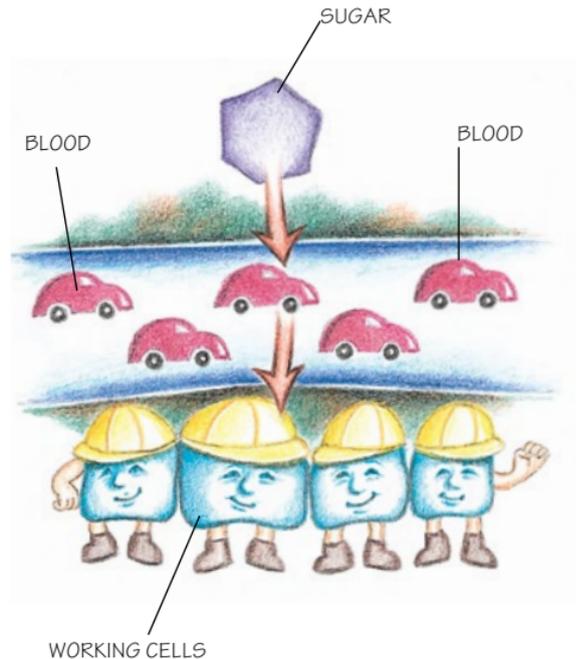


While you eat, the digestive system (teeth, stomach, and intestines) breaks your food down into smaller particles that are used by your body.



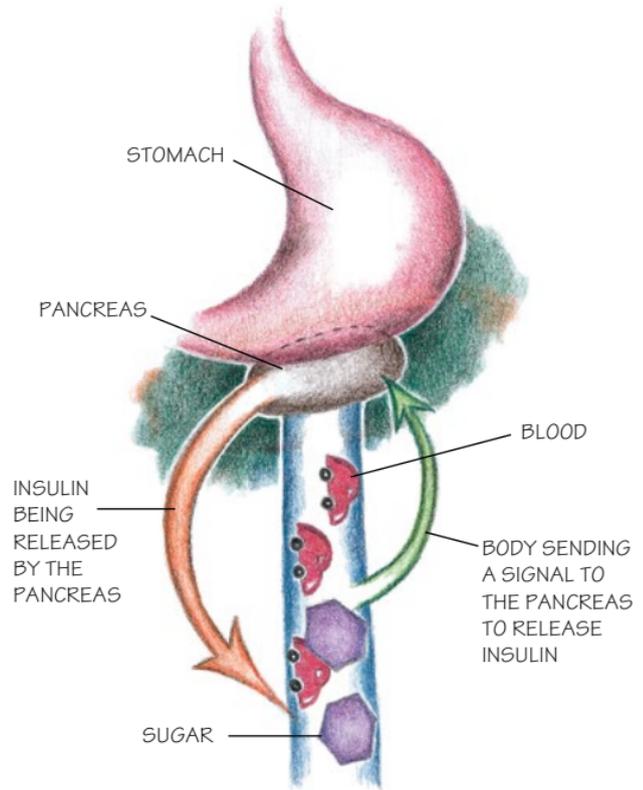
Some food is broken down into particles of **sugar**. Sometimes this sugar is referred to as **carbohydrates** or **glucose**.

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.

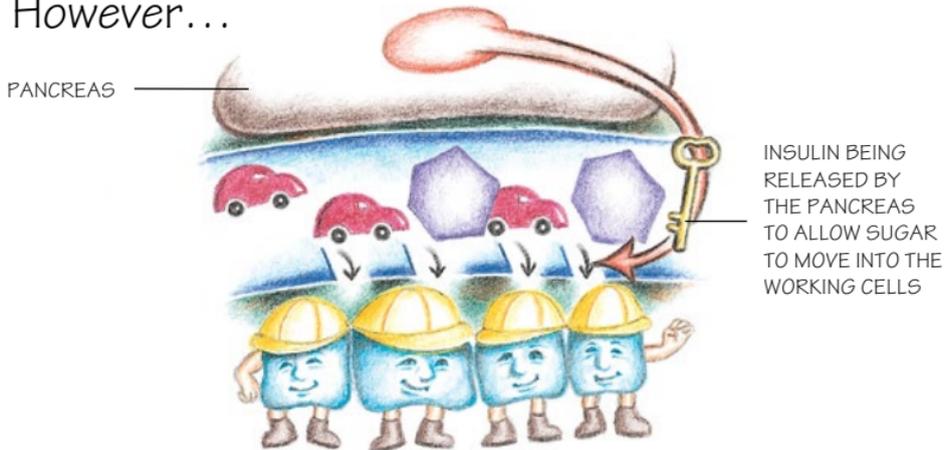


At the same time the sugar moves into the blood, the body sends a signal to the **pancreas** telling it to release **insulin** into the bloodstream.

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.

The cells in the body may, particularly in obese individuals, make it harder for insulin to move sugar into the cells, a process known as **insulin resistance**. The pancreas reacts by producing even more insulin and pushing sugar into the cells. Eventually, the pancreas reaches its limit for producing insulin, and although much of the sugar gets into the cells, some does not, resulting in the development of **type 2 diabetes**.

## 5. Metabolic syndrome (pre-diabetes)

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:

- Large waistline
- Elevated triglyceride levels
- Low HDL-cholesterol
- High blood pressure
- Elevated fasting blood glucose levels

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

## 6. Overweight or obesity

The American Heart Association describes 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:

- raise triglycerides (the “bad” blood fat)
- lower HDL-cholesterol (the “good” cholesterol)
- raise LDL-cholesterol (the “bad” cholesterol)
- raise blood pressure
- increase the risk of developing diabetes, and
- increase the risk of metabolic syndrome and insulin resistance

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

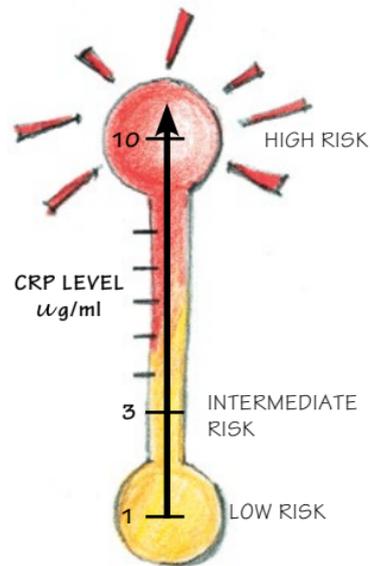
youth and adult lives. A *sedentary* lifestyle could be the real culprit.

Recently, a dramatic increase in obesity has been observed in children and adolescents. According to the Centers for Disease Control, obesity rates in adolescents ages 2–19 is about 17% or 12.7 million children in the United States alone. 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. Vascular injury and inflammation

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 chest pain or heart attack.

Your doctor may order a simple blood test to check your **C-reactive protein** (CRP) levels, which reflect the degree of vascular inflammation. A lower CRP score is preferred. You can reduce your CRP levels by losing weight, closely controlling diabetes, exercising regularly, and quitting smoking. Certain medications — such as aspirin, statins, and ACE inhibitors — are also effective in lowering CRP levels.



## 8. 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.

## 9. Genetics and family history

A **family history** of cardiovascular disease is a risk factor for men younger than 40 and women younger than 50. It 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 healthy lifestyle but there is still a high incidence of cardiovascular disease, then it is likely that genetics is playing a role. In either case, by practicing a healthy lifestyle, you can help reduce your risk rather than giving up and thinking you have no control over your destiny.

If you have a strong family history of heart disease, you should talk to your doctor about how to monitor your child's cholesterol at an earlier age.



# Why children?

Compared with the rest of the industrialized world, the United States has a much greater proportion of children with high cholesterol.



UNITED STATES



OTHER COUNTRIES

## When should my child's total cholesterol be tested?

If both parents have high cholesterol, or if one parent has had a cardiac event (heart attack or bypass surgery at a very early age — before age 40), then their child should have his or her total cholesterol tested at age 2. Your doctor will help you to determine the frequency of testing.

## What are some treatment options for lowering my child's cholesterol?

Generally speaking, the first sensible option for parents is to modify their child's diet. A registered dietitian can provide suggestions for making your child's diet healthier. However, in families where one parent has inherited high LDL-cholesterol, their children have a 50% chance of inheriting the high LDL-cholesterol, which will not normalize with diet.

*Statin therapy should be considered after a healthy diet has been tried, particularly if there is a family history of heart attack or stroke before age 40.*

# Are there any other treatment options that may help improve my child's cholesterol?

Encourage your child to get plenty of exercise. Exercise does not necessarily change the total cholesterol, but it can increase the HDL-cholesterol or “good” cholesterol. This habit will be helpful throughout your child's life. Statin drugs are safe and effective in children and have not been shown to adversely affect growth and development.



Children are not the only ones  
to benefit from exercise.  
Lack of exercise is a risk factor  
for adults, too ...

# 10. Physical inactivity

Lack of exercise is a major contributor to obesity, diabetes, and hypertension. Beginning an exercise program may help you feel better, have more energy, lose weight, lower your cholesterol, lower your blood pressure, and improve your muscle tone. Also, starting an exercise routine can increase your HDL-cholesterol or “good cholesterol” — especially if exercise is associated with weight loss. Exercise can also reduce vascular inflammation such as C-reactive protein levels.

Having a high **HDL-cholesterol** level is a “positive” factor. An HDL-cholesterol level greater than 60 mg/dL helps to reduce your risk of having cardiovascular disease.

For most people, the best way to naturally increase HDL-cholesterol is through **aerobic exercise** and **losing excess fat**. Always follow your doctor’s recommendation when starting an exercise program.



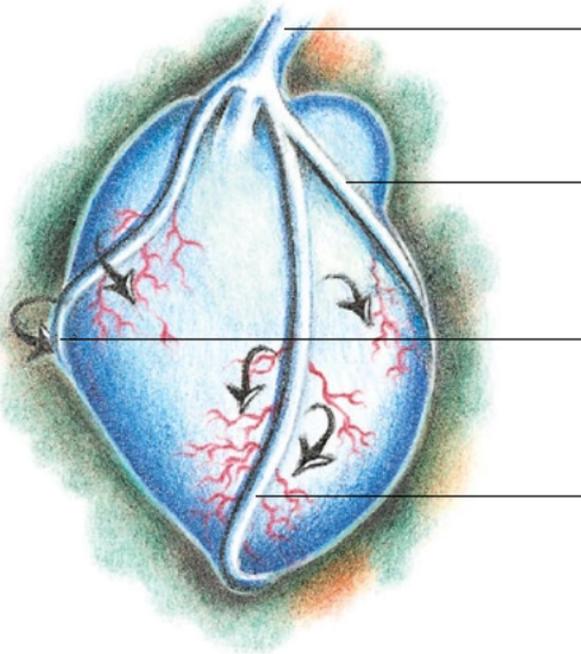
INCREASE  
HDL-CHOLESTEROL  
WITH EXERCISE  
AND FAT LOSS

# How Does Cholesterol Damage an Artery?



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.

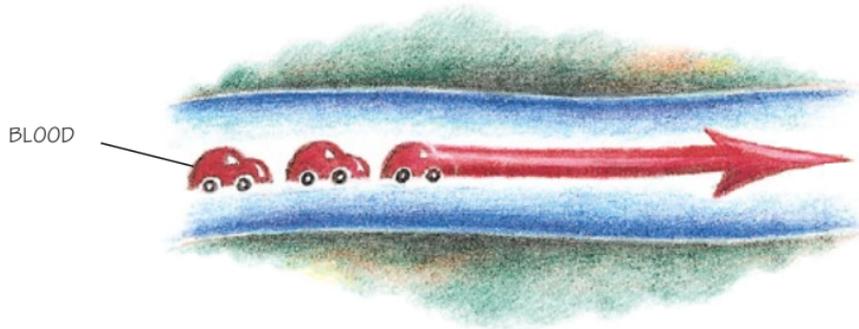
The **right coronary artery** provides blood to the back or underside of the heart.

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.

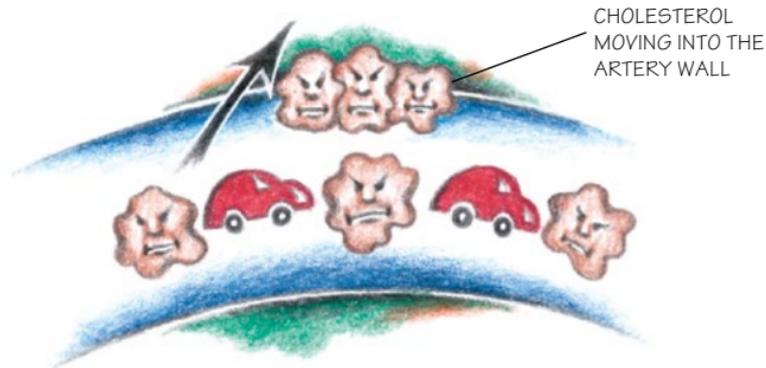


At birth, the inside of the arteries, including the coronary arteries, is slippery — similar to a nonstick pan. The blood cells (represented by the small cars) flow smoothly through the arteries.

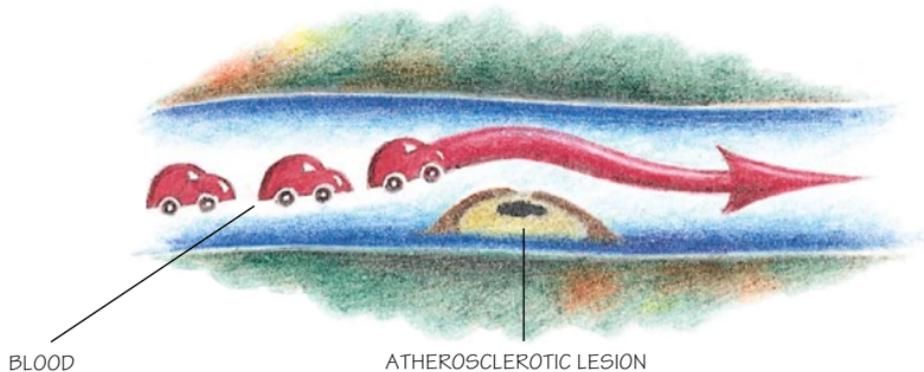


*What happens to an artery  
during a person's lifetime?*

Over time, the inside of the artery may become damaged due to high blood pressure, smoking, and LDL or bad cholesterol. Fatty streaks begin to develop along the insides of the damaged areas as cholesterol (lipids) moves into the artery walls.



When people smoke or they have risk factors such as diabetes, high blood pressure, obesity, high cholesterol, and physical inactivity, these fatty streaks may become more advanced **atherosclerotic lesions**.

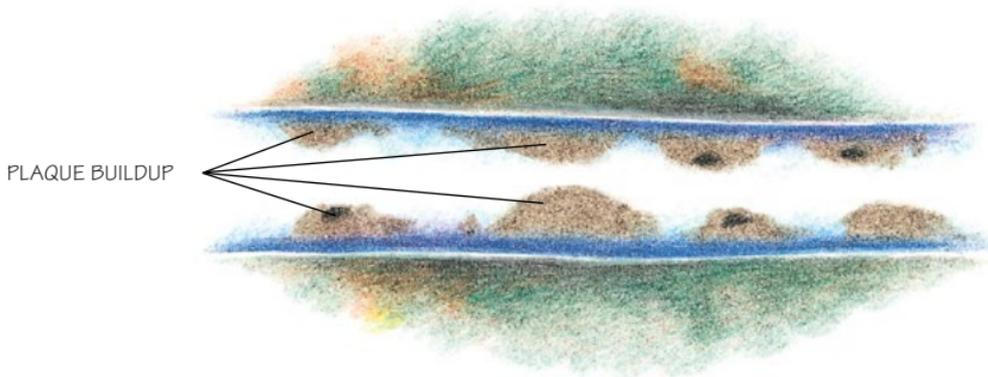


The body views these fatty streaks as “infection.”  
It tries to fight the “infection” by producing inflammation.  
Fatty streaks may eventually progress to **plaque**  
(atheromas or fibroatheromas).

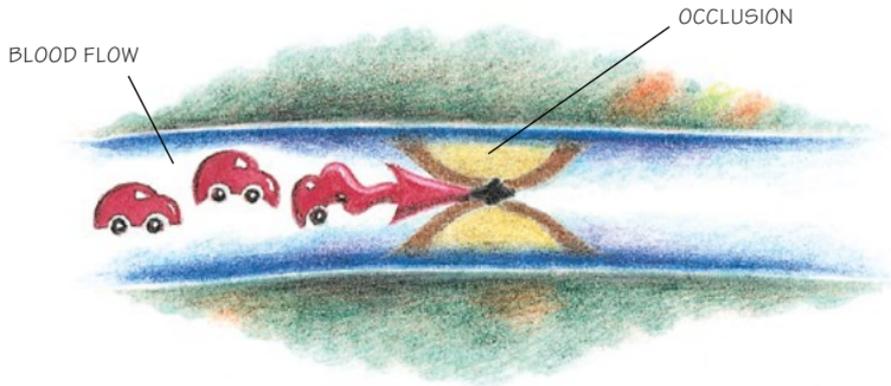
Simply, the progression of cholesterol inside the artery  
wall is:

**Damaged Artery → Fatty Streaks → Inflammation → Plaque**

Buildups of plaque may occur at multiple points along the length of the artery, often starting where the artery divides into branch points or forks in the road. Plaque buildups are not limited to the arteries of the heart. They can occur and restrict blood flow in arteries throughout your entire body, including the brain (**stroke**) and legs (**claudication**).



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**.



# Why is HDL-cholesterol so useful?

**HDL-cholesterol** circulating through the bloodstream has many positive effects. HDL-cholesterol acts like a **scavenger** by helping to remove cholesterol from other lipoproteins in the bloodstream and from the artery wall. HDL-cholesterol takes the excess cholesterol back to the liver to be removed from the body. This process is called reverse cholesterol transport.



HDL-CHOLESTEROL  
REMOVING LDL-CHOLESTEROL  
FROM THE BLOODSTREAM

# What should my cholesterol levels be?

The American Heart Association (AHA) and the American College of Cardiology (ACC) create the guidelines for managing blood cholesterol. High cholesterol has a long-term, cumulative effect on damaging a person's entire cardiovascular system, so the guidelines stress the importance of lifestyle modifications such as:

(1) adhering to a heart-healthy diet, (2) exercising regularly based on your doctor's recommendations, and (3) avoiding tobacco products.

For individuals who cannot lower their cholesterol with diet and exercise, the AHA/ACC guidelines provide recommendations for managing cholesterol with medications to avoid developing atherosclerotic cardiovascular disease (ASCVD). Your primary care doctor will determine whether or not you should begin a cholesterol-lowering medication such as a statin.

Individuals who have had multiple ASCVD events (such as stents) or 1 major ASCVD event (such as a heart attack) and who have multiple high-risk conditions such as high cholesterol, diabetes, or smoking, should talk to a doctor about adding a cholesterol-lowering medication called a

PCSK9 inhibitor if they cannot achieve the recommended cholesterol targets (LDL cholesterol less than 70 mg/dL) with statin medications.

Patients with LDL cholesterol greater than 190 mg/dL should talk to a doctor about starting high-intensity statin therapy.

Patients between the ages of 40 and 75 with diabetes and LDL cholesterol of 70 mg/dL or higher should talk to a doctor about starting moderate-intensity statin therapy.

For patients between the ages of 40 and 75 without diabetes and with LDL cholesterol of 70 mg/dL or higher, the doctor may use a “risk calculator” or coronary artery calcium score to determine whether or not to begin statin therapy.

# What are the first steps to reduce my risk factors for cardiovascular disease?

Without a doubt, quit smoking. Consult with your doctor about programs that are available to help you stop smoking. Two other steps that may help you to reduce your risk of cardiovascular disease are to **begin exercising** and to **modify your diet**. Here are some basic steps ...

# 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.



**30  
minutes  
a day,  
5 days  
a week**

## 2. Amount and regularity of exercise

The U.S. Surgeon  
General recommends  
that healthy adults  
exercise 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.



BLOOD MOVING  
THROUGH  
THE BODY



### 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.

# Getting started

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.



To begin your exercise program, it may be best 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.

# How hard and how often should I exercise?

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

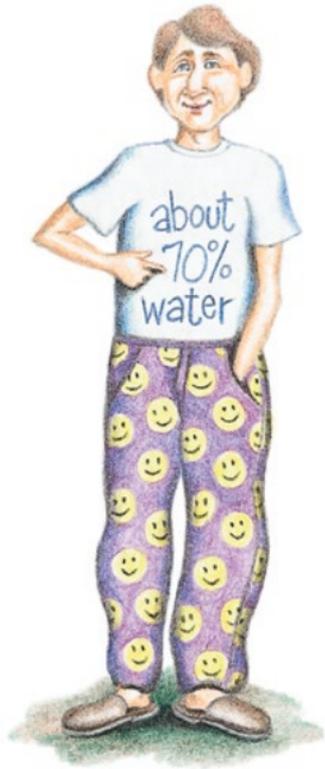
- 1) Try to exercise so that you are breathing noticeably but are not out of breath. Remember this simple rule: you should be able to carry on a conversation while you are exercising.
- 2) Sweating is a good thing. This means that your body is working hard enough and receiving the necessary stimulus 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. **If you feel any chest discomfort, lightheadedness, or other concerning symptom, stop your exercise.**

# VERY, VERY important

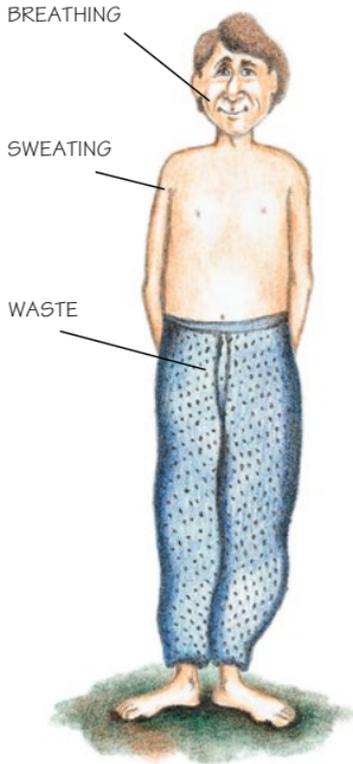
**Cool down.** As important as the warm-up and the aerobic exercise are to improving your fitness, you must also include a cooldown as part of your exercise routine.

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.

You should drink 6 to 10 (8-ounce) 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.

In addition to exercise, the National Cholesterol Education Program recommends diet modification as another important factor in helping to manage your cholesterol and blood pressure levels.

# Nutrition

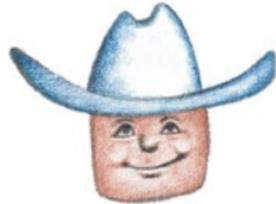
As mentioned earlier, your body receives cholesterol 2 ways: the cholesterol made by your body in the liver and the cholesterol you obtain from animal sources in the diet.

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 how each can affect your blood cholesterol.

# Fats

Not all fats are bad. **Monounsaturated** fats are “good” fats. Examples include olive and canola oils, peanut butter, and nuts.



MONOUNSATURATED FAT



POLYUNSATURATED FAT

**Polyunsaturated** fats are “acceptable” fats. Examples include margarine made with corn or safflower oils and some nuts. The fats found in marine fish oils like salmon are protective against coronary disease and actually lower triglycerides.



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 and Fish

Limit the amount of fatty meats, particularly those that are very high in saturated fat (bacon, sausage, and prime rib), to 1 or 2 servings per week. Cook meat 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 meat, and remove the skin before cooking chicken. It is a good idea to eat at least 1 helping of ocean fish per week. Shrimp, previously banned from low-cholesterol diets, is now considered okay to eat.

TRIM FAT OFF  
RED MEAT

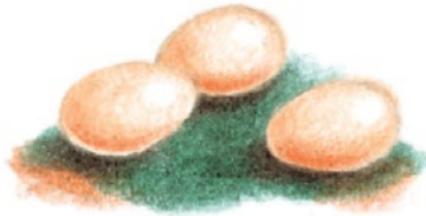


REMOVE SKIN FROM  
CHICKEN



# Eggs

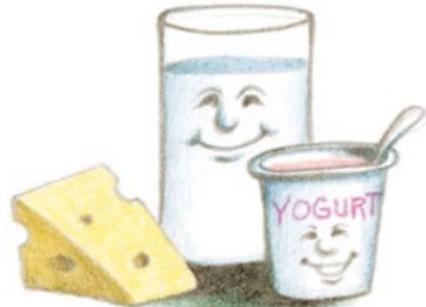
If you have elevated cholesterol or a history of heart disease, you should limit egg yolks to no more than 3 or 4 per week. Egg whites or “egg substitutes” have no cholesterol and do not need to be limited.



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

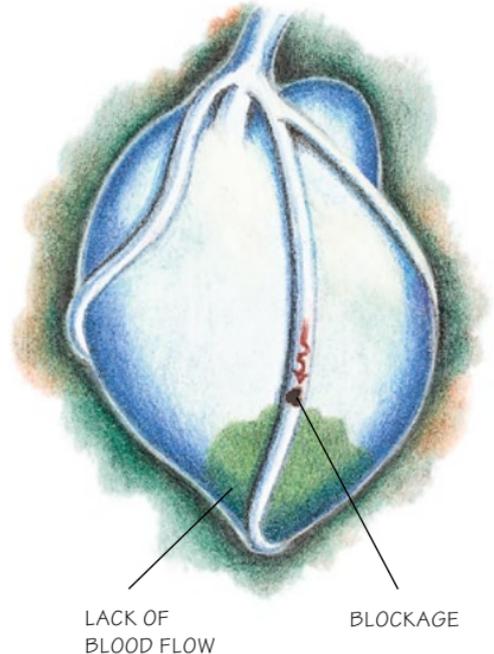
# What else can be done to reduce your chances of developing heart disease?

Despite the changes you may make in your diet and exercise routine, it may still be necessary for you to consider medication. Your doctor will closely monitor your progress with the dietitian. Then you and your doctor will be able to decide on the type of medical therapy that is best for you.

# Medications, Angioplasty, and Bypass Surgery

# Treating blocked arteries

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. It experiences **ischemia**. This may may result in heart pain (**angina**). 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** behind the breastbone and left chest and often extending to the neck, jaw, shoulders, or down the arm (usually the left arm)
- **Nausea**
- **Shortness of breath and/or sweating**

**NOTE:** People who have **diabetes** may not “feel” angina in the same way, often have atypical symptoms like shortness of breath, 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.”

**If you experience any of these symptoms, call 911 and seek immediate medical attention!**



# Statins

Several years ago, a class of medications was introduced to help reduce the amount of cholesterol in the bloodstream.



This class of medications is collectively known as **statins**. Studies have shown that this group of medications is very effective for most people in helping to **reduce** their total cholesterol, LDL-cholesterol, and triglycerides and — in some instances — **increase** the HDL-cholesterol.



This is particularly important for individuals who have already been diagnosed with coronary heart disease or who have already had a cardiac event.

Patients who are not candidates for therapy with statins include those individuals who have liver damage or have allergies to these medications. As with all medications, be sure to consult with your doctor about the recommended dosage.

## PCSK9 inhibitors

PCSK9 inhibitors sharply reduce LDL-cholesterol beyond the limits achieved by statins alone and are very useful in those who cannot tolerate any statin, usually due to muscle cramps and aches. Typically, beyond the very best LDL-cholesterol lowering by a statin, the PCSK9 inhibitors lower LDL-cholesterol by 30% or more. These drugs are self-injected once every 2 to 4 weeks, and to date, with more than 5 years of follow-up, have proven to be safe.

# 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 can save heart muscle.

# Genetic testing and genetic counseling

What is genetic testing and why is it important to me?

To understand genetic testing, it is first important to understand what a gene is and how genes impact the body's development.

Think of it this way. When building a house, a builder uses an architectural blueprint to lay out the exact position of the foundation, walls, roof, wiring, plumbing, etc. The architect's blueprint provides the dimensions and location for each item so the house fits together seamlessly.

Genes are the blueprint of our bodies. Each person receives his or her specific genes from each parent at conception. As bodies grow and develop, genes send “messages” to the rest of the body to lay out the design of bones, organs, skin pigment, eye color, etc.

On rare occasions, unfavorable genetic traits are passed down from our parents, or there is an error (mutation) in a gene. Unfavorable genetic traits may be present when we are born, or the genetic traits may not appear until later in life (example: increased risk for breast cancer).

Genetic testing is becoming more prevalent in the treatment of cardiovascular disease. Specifically, genetic tests are being ordered (1) to make sure individuals are on medications that are effective and/or (2) to help individuals avoid medications that may cause adverse effects. For example, those with a history of cardiovascular disease (heart attack, bypass, or angioplasty) who carry the CYP2C19 gene might not benefit from being on the medication clopidogrel bisulfate. Because each person's genetic makeup is unique, be sure to talk to your primary care doctor or cardiologist about whether you should consider genetic testing prior to starting your cardiac medications.

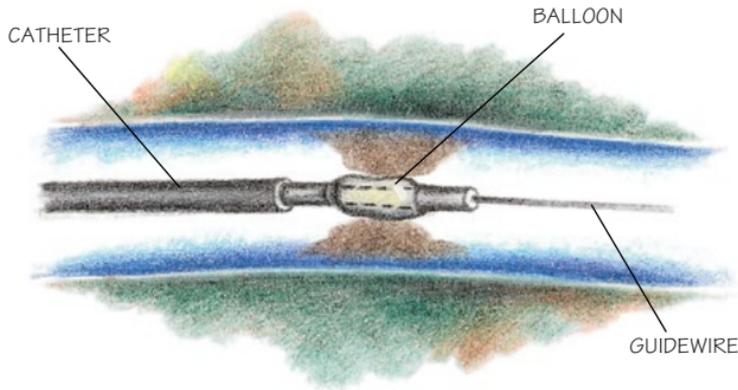
Before agreeing to a genetic test, you should ask your doctor the following questions:

- 1) Will the cost of the genetic test be covered by my health insurance plan?
- 2) Will I be able to meet with a genetic counselor to discuss the results of testing?
- 3) Where is my genetic information going to be stored, and who will have access to the data?
- 4) Will the results of the genetic testing be reported to my primary care doctor?

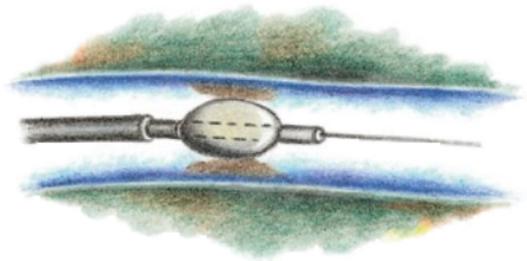
5) Does the health care provider offer long-term follow-up? If a solution to my genetic issue is not found for several years, will the provider follow up with me if a treatment or clinical research study becomes available?

# Angioplasty

Coronary angioplasty is currently the preferred treatment for a heart attack. Angioplasty is a procedure by which the cardiologist inserts a balloon catheter over a thin wire across a blockage of a coronary artery.



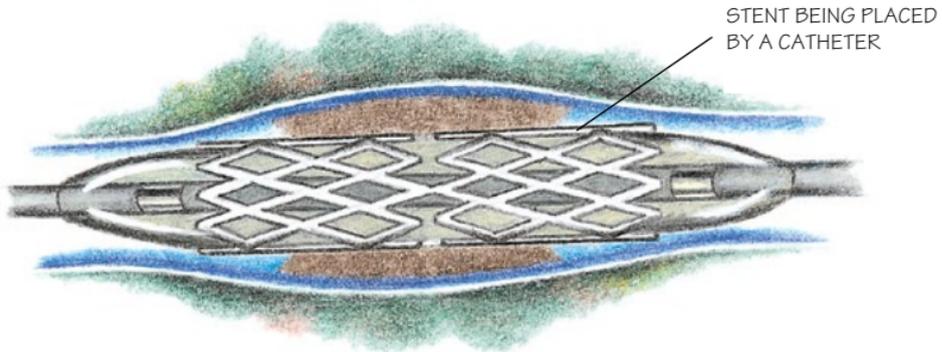
The balloon is inflated to compress the plaque. This is repeated as necessary to restore blood flow.



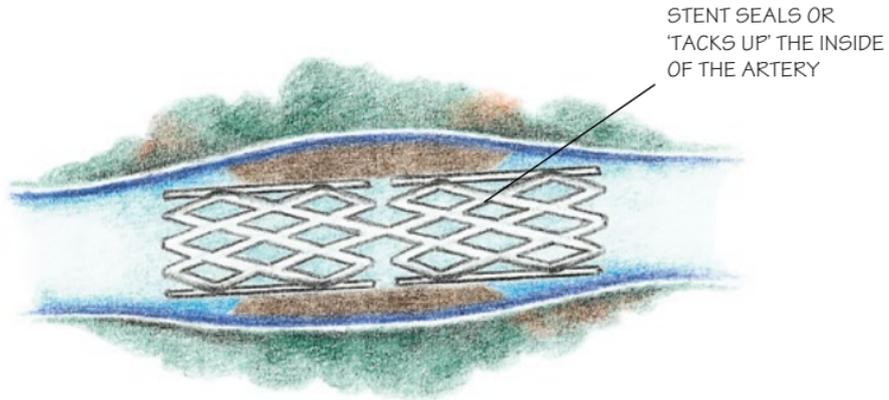
Inflating the balloon catheter compresses and disrupts the plaque, allowing blood flow to the starved heart muscle.

# Stents

The cardiologist may decide to insert a stent inside the coronary artery. Usually made of stainless steel or other metal alloys, the stent functions as a scaffold to hold open the inside of the coronary artery.



Stents can seal and “tack up” tissue flaps within the artery that are created when a balloon catheter injures the artery.

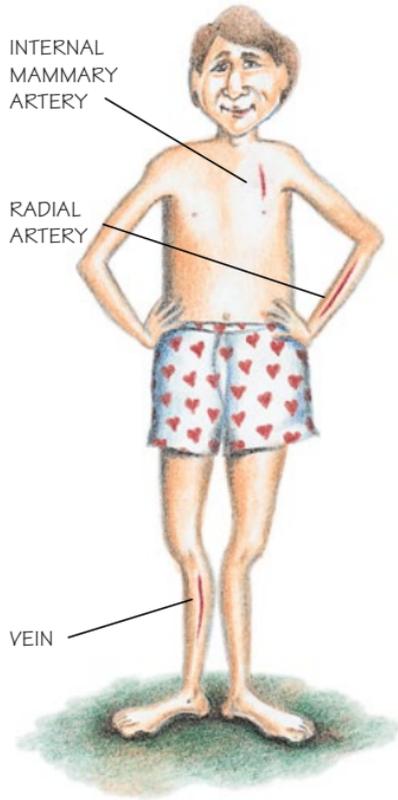


Today's stents are treated with medicines that reduce inflammation and minimize scar tissue, which could narrow the stent. These devices significantly reduce the risk of repeated blockages and the need to have another angioplasty or coronary bypass procedure.

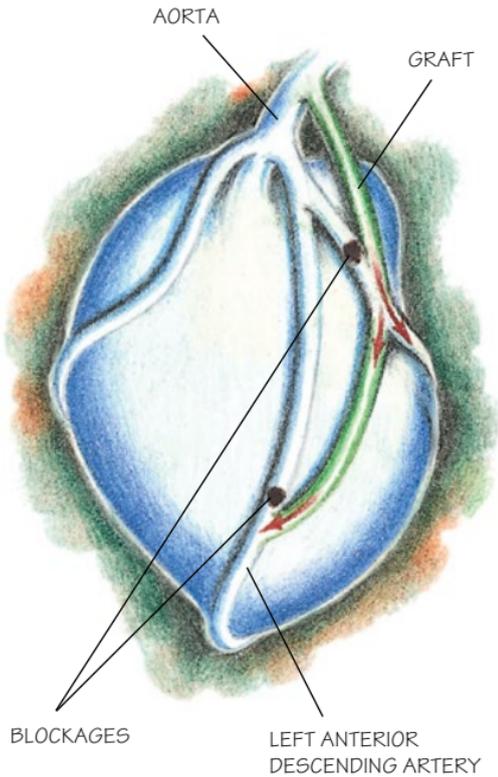
Unfortunately, stents do not eliminate clot formation or the risk of heart attack following the procedure.

# 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.

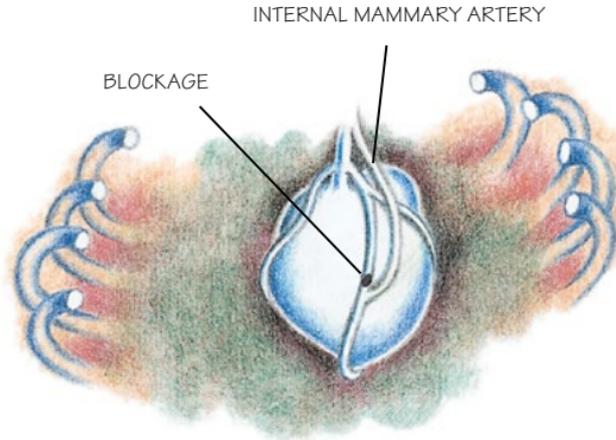


The surgeon may use a vein from the leg, and/or the internal mammary artery found in the chest, and/or the radial artery of the forearm.



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 from 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 1 or 2 bypasses, these surgery techniques are not appropriate for many patients.

What Should I Do After  
My Heart Attack, Bypass  
Surgery, or Angioplasty?

**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)
- lower your blood pressure to 130/80 mmHg or lower
- discuss a cholesterol treatment plan with your doctor
- take a daily enteric-coated aspirin (81 mg or greater) unless you have other medical complications
- keep strict control of diabetes and lower your A1C below 7%
- follow a heart-healthy diet and begin a basic exercise program, mainly walking.

**Your doctor will prescribe medications designed to improve your overall health. Be sure to follow these medication guidelines:**

- Refill your prescriptions unless otherwise instructed by your doctor or physician's assistant.
- Take the medication as instructed.
- Take the medication at the prescribed time of day.
- Try not to miss taking the medication. Similarly, don't take extra doses.

**Contact your doctor before discontinuing any medication.**

## **Talk to your doctor or cardiologist about:**

- How often you should have an office visit with your primary care doctor and cardiologist (generally once a year with each doctor)
- How often you should have a cholesterol test
- How often you should have a glucose and hemoglobin A1C test
- When you should get a flu vaccine
- How often you should check your blood pressure

**In addition to talking to your doctor about heart disease, be sure to discuss the following:**

- If you are over age 50, discuss when you should have your next colorectal exam
- If you are a male over age 50, discuss whether you should have a PSA test
- If you are a female between 21 and 65, discuss when you should have your next Pap smear
- If you are a female over age 40, discuss when you should have your next mammography exam

## **Additional questions for your doctor:**

- *What are my medications? What is each one for?*
- *What time of day should I take each one?*
- *Do I have any exercise limitations? What are they?*
- *Should I have a treadmill test before I start to exercise?  
What is my target heart rate?*
- *Are there any concerns that I should be aware of before having/resuming sexual activity?*
- *Based on my weight, blood pressure, and blood cholesterol level, should I talk to someone about changing my diet?*

And now for some  
heartfelt thoughts...

For more than 50% of the individuals who have cardiovascular disease, the first sign is a **fatal heart attack**. 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 to review and improve your current eating habits. 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.

The Christ Hospital hopes that you have found the information in this book to be helpful. For additional information about cholesterol and blood pressure management programs offered within The Christ Hospital, please click on The Christ Hospital logos below:



**High Cholesterol**



**High Blood Pressure**

# Bibliography

American College of Sports Medicine position stand. "The Recommended Quality and Quantity of Exercise for Developing and Maintaining Cardiorespiratory and Muscular Fitness in Healthy Adults." *Medicine and Science in Sports and Exercise* April 1990.

American Diabetes Association (2014). Living with diabetes. Retrieved October 19, 2014, from <http://www.diabetes.org>.

American Heart Association Consensus Panel Statement. "Preventing Heart Attack and Death in Patients With Coronary Disease." *Circulation* 1995; 2-4.

Angell, M. "Caring for women's health – What is the problem?" *New England Journal of Medicine* 1993: 271.

Burke, A.P., and A. Farb, G.T. Malcom, Y. Liang, J. Smialek, R. Virmani. "Coronary Risk Factors and Plaque Morphology in Men with Coronary Disease Who Died Suddenly." *New England Journal of Medicine* 1 May 1997: 1276-1282.

Centers for Disease Control and Prevention (2014). Childhood Obesity Facts. Retrieved March 4, 2018, from <https://www.cdc.gov/obesity/data/childhood.html>.

Centers for Disease Control and Prevention. Health, United States, 2005. Retrieved March 4, 2018, from <https://www.cdc.gov/nchs/data/hus/hus05.pdf>.

Chan, A. W., and D.J. Moliterno, P.B. Berger, et al. "Triple antiplatelet therapy during percutaneous coronary intervention is associated with improved outcomes including one-year survival: results from the Do Tirofiban and ReoPro Give Similar Efficacy Outcome Trial (TARGET)." *Journal of American College of Cardiology* 2003; 42:1188-1195.

Cogswell, M.E. "Nicotine Withdrawal Symptoms." *North Carolina Medical Journal* 1 Jan. 1995: 40-45.

Collins, R., and R. Peto, C. Baigent, P. Sleight. "Aspirin, Heparin, and Fibrinolytic Therapy in Suspected Acute Myocardial Infarction." *New England Journal of Medicine* 20 March 1997: 847-860.

Da Costa, F.D., et al. "Myocardial Revascularization with the Radial Artery: A Clinical and Angiographic Study." *Annals of Thoracic Surgery* Aug. 1996: 475-480.

Danesh, J., and J.G. Wheeler, G. Hirschfeld, et al. "C-reactive protein and other circulation markers of inflammation in the prediction of coronary heart disease." *New England Journal of Medicine* 2004; 350:1387-1397.

Eckel, R.H. "Obesity in Heart Disease." *Circulation* 1997: 3248-3250.

Ervin, R.B. (2009). Prevalence of Metabolic Syndrome Among Adults 20 Years of Age and Over, by Sex, Age, Race and Ethnicity, and Body Mass Index; United States, 2003-2006. Retrieved October 19, 2014, from <http://www.cdc.gov/nchs/data/nhsr/nhsr013.pdf>.

Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA*, May 16, 2001, Vol. 285, No. 19: 2486-2497.

Friedman, G.D., and A.L. Klatsky. "Is Alcohol Good for Your Health?" *New England Journal of Medicine* 16 Dec. 1993: 1882-1883.

Gellar, A. "Common Addictions." *Clinical Symposia*. Ciba-Geigy Corporation 1996.

Grossman, E., and F.H. Messerli. "Diabetic and Hypertensive Heart Disease." *Annals of Internal Medicine* 15 Aug. 1996: 304-310.

Grundy, S.M., and J.I. Cleeman, C.N.B. Merz et al. "Implications of recent clinical trials for the national cholesterol education program adult treatment panel III guidelines." *Circulation* 2004; 110:227-239.

Grundy, S.M., and N.J. Stone, A.L. Bailey et al. "2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines." *Circulation* 2018; DOI10.1161/CIR.0000000000000625.

Henningfield, J.D., and R.M. Keenan. "The Anatomy of Nicotine Addiction." *Health Values* March/April 1993: 12-19.

Hermiller, J.B., and M. W. Jrucoff, D. J. Kereiakes, et al. on behalf of the DAPT study investigators. "Benefits and risks of extended dual antiplatelet therapy after everolimus-eluting stents." *JACC Cl.* 2016; 9:138-147.

Inflammation and Heart Disease. Retrieved December 29, 2017 from <http://www.heart.org>.

James, P.A., and S. Oparil, B. Carter, Evidence-Based Guideline for the Management of High Blood Pressure in Adults. Retrieved October 19, 2014, from <http://jama.jamanetwork.com/article.aspx?articleid=1791497>.

Joint National Committee. *The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure*. Bethesda (MD): National Institutes of Health, National Heart, Lung, and Blood Institute; 1993. NIH publication No. 93-1008.

Kannel, W.B., and R.B. D'Agostino, J.L. Cobb. "Effects of Weight on Cardiovascular Disease." *American Journal of Clinical Nutrition* March 1996: 419S-422S.

Kenney, W.L. et al. *American College of Sports Medicine Guidelines for Exercise Testing and Prescription*. 5th ed. Media, Pa.: Williams & Wilkins, 1995.

Kereiakes, D.J., and R.W. Yeh, J.M. Massaro, et al. on behalf of the DAPT study investigators. "Antiplatelet Therapy Duration Follow Bare Metal or Drug-Eluting Coronary Stents: the Dual Antiplatelet Therapy Randomized Clinical Trial." *Journal of the American Medical Association* 2015; 313(11):1113-1121.

Koenig, W., and H. Lowel, J. Baumert, and C. Mesisinger. "C-reactive protein modulates risk prediction based on the Framingham score. Implications for future risk assessment: results from a large cohort study in Southern Germany." *Circulation* 2004; 109:1349-1353.

Kong, D.F., and V. Hasselblad, and R.A. Harrington et al. "Meta-analysis of survival with platelet glycoprotein IIb/IIIa antagonists for percutaneous coronary interventions." *American Journal of Cardiology* 2003; 92:651-655.

Lincoff, A.M., and I.A. Bittle, R.A. Harrington et al. "Bivalirudin and provisional glycoprotein IIb/IIIa blockade compared with heparin and planned glycoprotein IIb/IIIa blockade during percutaneous coronary intervention: REPLACE-2 randomized trial." *Journal of the American Medical Association* 2003; 289:853-863.

Margolis, S., and P.J. Goldschmidt-Clermont. *The Johns-Hopkins White Papers*. Baltimore: The Johns-Hopkins Medical Institutions, 1996.

Mauri, L., and D.J. Kereiakes, R.W. Yeh, et al. for the DAPT study investigators (2014). *Dual Antiplatelet Therapy Beyond One Year After Drug-eluting Coronary Stent Procedures*. Manuscript submitted for publication.

McCarron, D.A., and M.E. Reusser. "Body Weight and Blood Pressure Regulation." *American Journal of Clinical Nutrition* March 1996: 423S-425S.

Meeker, M.H., and J.C. Rothrock. *Alexander's Care of the Patient in Surgery*, 10th ed. St. Louis: Mosby, 1995.

Mehta, S.R., S. Yusuf, and R. J. Peters et al. "Effects of pretreatment with clopidogrel and aspirin followed by long-term therapy in patients undergoing percutaneous coronary intervention: the PCI-CURE study." *Lancet* 2001; 358: 527-533.

Office of the Surgeon General (2010). *The Surgeon General's Vision for a Healthy and Fit Nation*. Rockville, MD: U.S. Department of Health and Human Services.

Pearson, T.A., and G.A. Mensah, R.W. Alexander, et al. "Markers of inflammation and cardiovascular disease. Application to clinical and public health practice. *Circulation* 2003; 107:499-511.

Peterson, J.A., and C.X. Bryant, *The Fitness Handbook; 2nd edition*, St. Louis: Wellness Bookshelf, 1995.

Peterson, T.A., and G.A. Mensah, R.W. Alexander et al. "Markers of inflammation and cardiovascular disease. Application to clinical and public health practice." *Circulation* 2003; 107:499-511.

Ridker, P.M. "Clinical application of C-reactive protein for cardiovascular disease detection and prevention." *Circulation* 2003; 107: 363-369.

Ridker, P.M., and J.E. Buring, N.R. Cook, N. Rifai. "C-reactive protein, the metabolic syndrome and risk of incident cardiovascular events: an 8-year follow-up of 14,719 initially healthy American women." *Circulation* 2003; 107:391-397.

Ridker, P.M., and N. Rifai, L. Rose, et al. "Comparison of C-reactive protein and low-density lipoprotein cholesterol levels in the prediction of first cardiovascular events." *New England Journal of Medicine* 2002; 347:1557-1565.

Ridker, P.M., and B. M. Everett, T. Thuren, et al. CANTOS Study group. "Antiinflammatory Therapy with Canakinumab for Atherosclerotic Disease." *New England Journal of Medicine* 2017; 377(12):1119-1131.

Ryan, T.J., and J.L. Anderson, E.M. Autman, et al. "ACC/AHA Guidelines for the Management of Patients with Acute Myocardial Infarction: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Acute Myocardial Infarction)." *Journal of the American College of Cardiology* 1 Nov. 1996: 1328-1428.

St. Jeor, S.T., and K.D. Brownell, R.L. Atkinson, C. Bouchard, et al. "Obesity Workshop III." *Circulation* 1996: 1391-1396.

Schlant, R.C., and R.W. Alexander. *The Heart*, 8th ed. New York: McGraw-Hill, 1994.

Steinhubl, S.R., and P.B. Berger, and J.T. Mann, et al. "Early and sustained dual oral antiplatelet therapy following percutaneous coronary intervention: randomized controlled trial." *Journal of the American Medical Association* 2002; 288:2411-2420.

Superko, H.R. "The Most Common Cause of Coronary Heart Disease can be Successfully Treated by the Least Expensive Therapy — Exercise." *Certified News* 1998: 1-5.

United States Surgeon General. Department of Health and Human Services. *The Health Consequences of Smoking. Nicotine Addiction*. Washington, D.C.: U.S. Department of Health and Human Services, 1988.

United States Surgeon General on his priorities at <https://www.surgeongeneral.gov/priorities/prevention/strategy/active-living.html> accessed March 4, 2018.

Voors, A.A., et al. "Smoking and Cardiac Events After Venous Coronary Bypass Surgery." *Circulation* Jan 1, 1995: 42-47.

Voutilainen, S., et al. "Angiographic 5-Year Follow-up Study of Right Gastroepiploic Artery Grafts." *Annals of Thoracic Surgery* Aug. 1996: 501-505.

White H.D., and J.J. Van de Werf. "Thrombolysis for Acute Myocardial Infarction." *Circulation* 28 April 1998: 1632-1646.

Yeh, E.T.H., and J.T. Willerson. "Coming of age of C-reactive protein: using inflammation markers in cardiology." *Circulation* 2003; 107:370-372.

Yufuf S., and F. Zhao, S.R. Mehta, et al. "Effects of clopidogrel in addition to aspirin in patients with acute coronary syndromes without ST-segment elevation." *New England Journal of Medicine* 2001; 345:494-502.

Zelasko, C.J. "Exercise for Weight Loss: What are the Facts?" *Journal of the American Dietetic Association*

## About the Authors

**Dr. Charles J. Glueck** is an internationally recognized lipidologist, former Professor of Medicine and Director of the General Clinical Research Center at the University of Cincinnati School of Medicine, and for 30 years Director of the Cholesterol, Metabolism, and Thrombosis Center of the Jewish Hospital of Cincinnati. He has published more than 500 scientific articles and papers.

**Dr. Dean J. Kereiakes** is one of the country's preeminent cardiologists. Dr. Kereiakes is Medical Director for The Christ Hospital Heart and Vascular Center and The Carl and Edyth Lindner Center for Research and Education, as well as Clinical Professor of Medicine at The Ohio State University. He frequently lectures worldwide and has published more than 900 scientific articles and papers.

## ***Your Health: What You Should Know™***

Current titles in the *Your Health: What You Should Know series™*:

*Congestive Heart Failure: What You Should Know™*

*Diabetes: What You Should Know™*

*Heart Disease: What You Should Know™*

*High Cholesterol: What You Should Know™*

*Women's Health Over 40: What You Should Know™*

*Women's Health Under 40: What You Should Know™*

Click on the logo below to go to purchase additional titles:



Amazon's trademark is used under license from Amazon.com, Inc. or its affiliates.