

**For  
Your  
Patients**

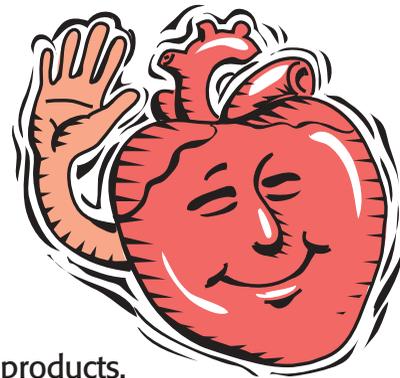
## LIVING A HEALTHIER LIFE

Having diabetes doesn't mean you'll definitely have heart disease. But you do need to manage certain risks. Start by acknowledging the steps you're already taking. Then talk with your healthcare provider about ways to do more. Managing your blood sugar, cholesterol, and blood pressure is key to a healthier life.

### What Steps Are You Taking?

You may already be taking steps that reduce your risk of heart disease or a heart attack. Check the steps you're now taking:

- I exercise on most days.
- I check my blood sugar as directed.
- I take my medications as prescribed.
- I eat low-fat, low-cholesterol foods.
- I watch the amount of food I eat.
- I have my blood pressure and cholesterol levels checked regularly.
- I don't smoke cigarettes or use other tobacco products.



The more boxes you checked, the more you're doing to stay healthy. To further reduce your risk of heart disease, keep working with your healthcare provider to keep your risk factors under control.

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Merck & Co., Inc., is pleased to present  
you with this educational booklet.

# DIABETES AND HEART DISEASE

## UNDERSTANDING THE LINK AND MANAGING THE RISK



If you have type 2 diabetes, there's something you should know. You are 2 to 4 times more likely to have heart disease than someone without diabetes. In fact, heart attack and stroke are the cause of most deaths in people with type 2 diabetes. But there's good news. You can help control your health risks by making some simple changes in the way you live. Reading this booklet can help.

## Your Risk Factors

Some of the main risk factors for heart disease are:

- High **blood sugar**.
- High levels of **cholesterol** and other fat-like substances in the blood.
- High **blood pressure** (blood that pushes too hard against artery walls).

Many people with type 2 diabetes have these risk factors. You can help control these risks by making simple changes in the way you live.

Eating healthier foods and exercising are key. And if you smoke, now's the time to quit. For best results, your doctor might also prescribe medication.



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## Diabetes and Heart Disease

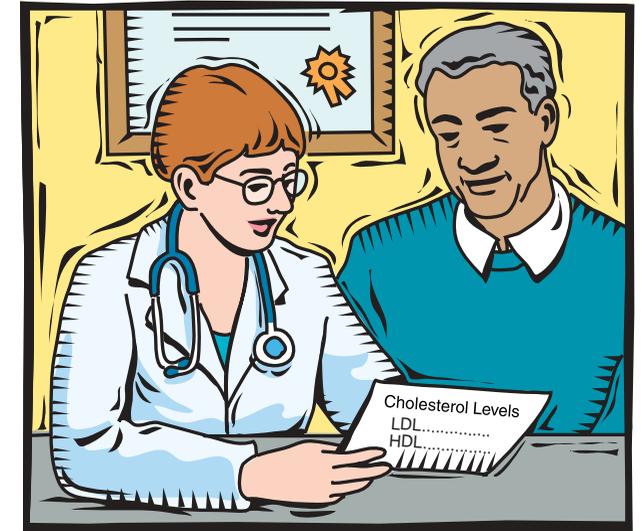
Researchers are still learning why diabetes and heart disease are so closely linked. But they are sure of several things. Abnormal levels of blood sugar, cholesterol, and blood pressure play a critical role in the development of heart disease.

### The Link Between Them

With type 2 diabetes, the body does not respond normally to its own **insulin** (a hormone that controls blood sugar). As a result, too much blood sugar can affect arteries, leading to heart disease.

Arteries also can be affected by cholesterol and blood pressure. Current studies show that abnormal levels of cholesterol and other fat-like substances in the blood, as well as increased blood pressure, increase the risk of heart disease.

If you have type 2 diabetes, your cholesterol and blood pressure levels should be lower than those in people who do not have diabetes in order to reduce your risk of heart disease.



### How to Control Them

Strong evidence indicates that good blood sugar control limits problems affecting *small* blood vessels, such as those in the eyes and kidneys. New evidence suggests that controlling cholesterol and blood pressure levels can reduce the risk to *larger* blood vessels, specifically those of the heart.

# THE LINK: DIABETES CAN LEAD TO HEART DISEASE

Major risk factors for heart disease include high blood sugar, abnormal lipid levels, and high blood pressure. These risk factors increase everyone's chances of developing heart disease. But in people with type 2 diabetes, the overall effect of each risk factor is even greater. In fact, damage to arteries is often under way by the time type 2 diabetes is diagnosed. That's why, even without a prior heart attack, people with type 2 diabetes generally have the same risk of a cardiovascular event as those without diabetes who have already had a heart attack.

## High Blood Sugar

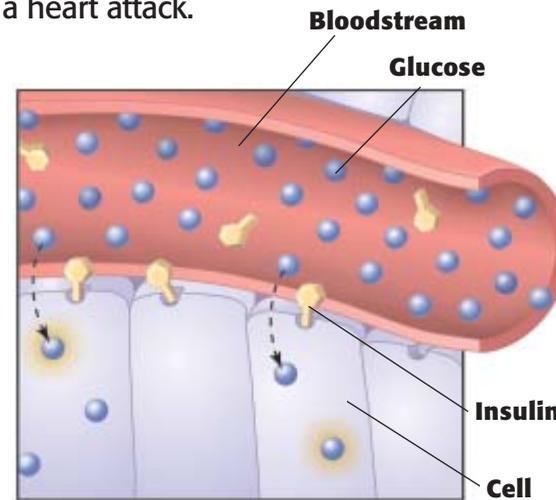
With type 2 diabetes, the body has problems making insulin and using the insulin it does produce (**insulin resistance**). This makes it harder to control blood sugar (**glucose**) levels and may set the stage for artery problems.

- High blood sugar can cause damage to the arteries by affecting proteins in the artery walls.
- Over time, insulin resistance can lead to high blood pressure and increased cholesterol levels through a complex metabolic process.

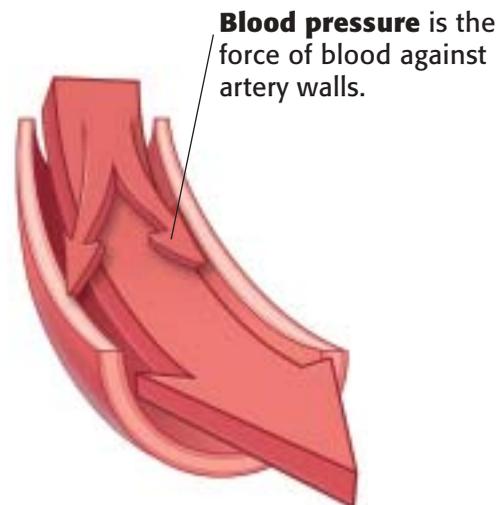
## High Blood Pressure

Blood pressure is the measurement of the force of blood pressing against artery walls. Walking uphill, playing sports, or feeling stress can raise blood pressure temporarily. After the exercise or stress is over, blood pressure should return to normal.

*But diabetes can cause arteries to become less elastic, which makes ongoing high blood pressure more likely. Over time, ongoing high blood pressure causes artery walls to thicken and roughen, making it easier for **plaque** (deposits of fat, cholesterol, and other materials) to collect.*



**Insulin** allows glucose to enter cells. When cells are resistant to insulin, or not enough insulin is made, more glucose stays in the blood instead of entering the cells.



**Blood pressure** is the force of blood against artery walls.

## Abnormal Lipid Levels

Lipids are fat-like substances in the blood. Cholesterol and triglycerides are 2 types of lipids. The body needs some lipids in the blood to stay healthy, but lipid levels that are too high can damage artery walls. Current studies show that certain abnormal lipid levels are common among many people with type 2 diabetes.

## Cholesterol

The body needs cholesterol to function properly. Cholesterol helps the body build new cells, produce hormones, and digest food. LDL (low-density lipoprotein) and HDL (high-density lipoprotein) are the most well-known types of cholesterol.

- **LDL** ("bad") cholesterol can damage arteries. In people with type 2 diabetes, LDL is often smaller and more dense than normal. This form of LDL cholesterol may be especially dangerous to artery walls and often cannot be fully corrected through glucose control.
- **HDL** ("good") cholesterol works to clear LDL cholesterol from the blood, helping to keep arteries healthy. With type 2 diabetes, HDL cholesterol levels are often lower than normal. This means that less LDL cholesterol can be cleared from the blood, increasing the risk of artery damage.

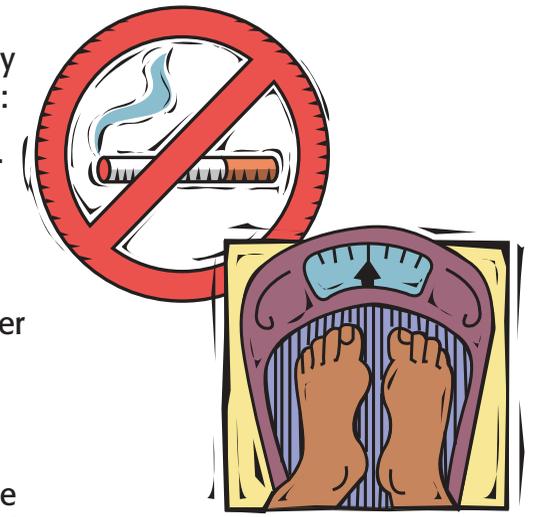
## Triglycerides

Having type 2 diabetes (and insulin resistance) can lead to elevated levels of triglycerides. HDL is programmed to remove these lipids as well as LDL cholesterol. Elevated levels of triglycerides prevent HDL from removing normal amounts of LDL cholesterol from the blood. This sets the stage for **plaque** (deposits of fat, cholesterol, and other materials) to form.

## Lifestyle Can Increase Risks

Certain lifestyle factors can directly or indirectly increase your risk for heart disease and stroke:

- **Smoking** damages the lining of the arteries. This allows plaque to build up in the artery walls, which can raise blood pressure and reduce blood flow to the heart.
- **Inactivity** and being overweight make it harder for the heart to do its work. This can cause plaque to build up in the arteries and lead to high blood pressure.
- **Being overweight** and not being active make it harder for the body to use insulin. It also makes your heart work harder.

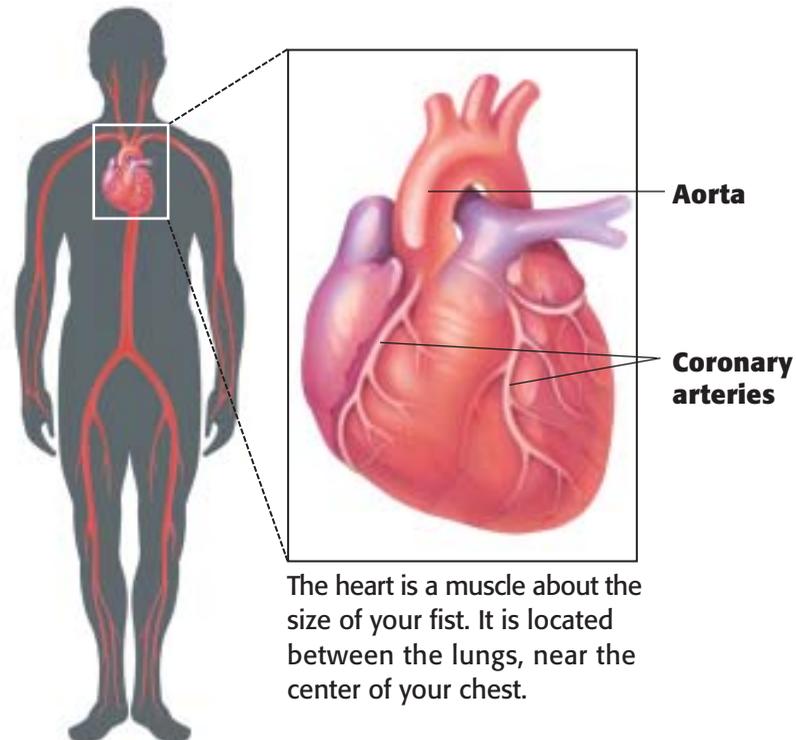


## THE LINK: UNDERSTANDING HEART DISEASE

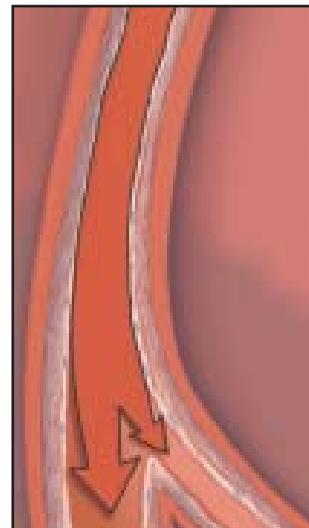
Diabetes puts your heart at risk. But before you can truly understand the link, you must first learn how your heart works. The heart is a muscle that pumps to move blood. The heart muscle pumps blood to the lungs, where the blood collects oxygen. Oxygen-rich blood travels back to the heart and is pumped to the rest of the body. To stay healthy, the heart muscle needs a steady supply of oxygen-rich blood. This blood reaches the heart muscle through the **coronary arteries**. Heart disease occurs when the coronary arteries are damaged.

### Coronary Arteries Nourish the Heart Muscle

A large vessel called the **aorta** carries oxygen-rich blood from your heart to the rest of your body. The coronary arteries branch off from the aorta. Smaller arteries branch off from the coronary arteries. These smaller arteries run over and through the heart muscle. They nourish every part of the heart with blood.

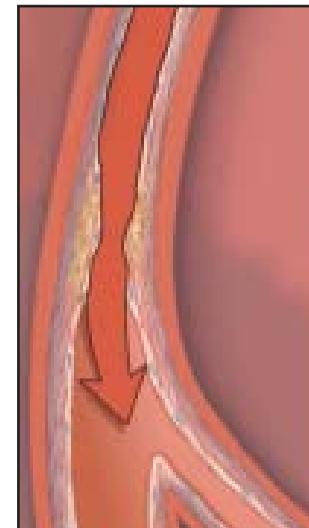


The heart is a muscle about the size of your fist. It is located between the lungs, near the center of your chest.



#### Healthy Artery

A normal coronary artery wall is smooth. The artery is unblocked. Oxygen-rich blood flows easily to the heart muscle.



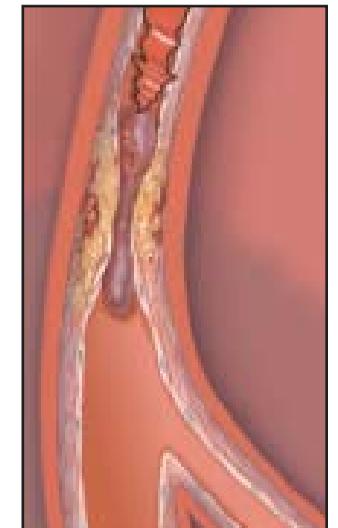
#### Damaged Artery

Plaque collects in the artery wall. This can cause the wall to become stiffer and less elastic. Symptoms are rare at this early stage.



#### Narrowed Artery

As plaque builds up, the artery narrows. Blood flow to the heart is reduced. When the heart needs more blood, such as during exercise or emotional stress, you may feel symptoms of **angina** (chest tightness or pain).



#### Blocked Artery

Plaque may rupture, leading to a **blood clot** (mass of blood cells) and blocked flow of blood. If an artery is fully blocked and blood cannot reach the heart, a heart attack results.

### When Coronary Arteries Are Damaged

One type of **heart disease** is called coronary artery disease (**CAD**). Coronary artery disease happens when the heart's arteries become narrowed or blocked. This is caused by **atherosclerosis** (also called hardening of the arteries). This condition occurs when plaque collects in the artery walls. As plaque builds up, the arteries narrow, and blood flow is reduced. If the heart can't get enough oxygen-rich blood to stay healthy, a **heart attack** (death of part of the heart muscle) may occur.

### Other Artery Damage

Artery damage isn't limited to the arteries in the heart. Two other dangers are **stroke** (damage to arteries leading to the brain) and **peripheral artery disease** (damage to arteries leading to the legs and feet). Taking steps to reduce your risk of heart disease also can help reduce your risk of other artery damage.

## HEART DISEASE: SPECIAL CONCERNS

Controlling your risk factors helps reduce your chances of having a heart attack. But you should still know and watch for the warning signs. Recognizing a problem helps you get medical attention sooner, when treatment can be more effective.

### Understanding Heart Problems

Even if your risk factors are under control, you should always be on the lookout for heart problems. These include:

- **Heart attack**, which usually causes pain and pressure in the chest. Pain in the back, neck, jaw, or arm also may occur.
- **Angina**, chest pain that signals a lowered amount of blood flow to the heart (**ischemia**).

### Recognizing Silent Heart Problems

Normally, your body warns you of a problem by making you feel pain. If you have diabetes, you are more likely to have no symptoms or unusual symptoms.

Over time, high blood sugar damages nerves in your body. This damage may keep you from feeling pain caused by a heart problem.

A heart attack with little or no pain is called a **silent heart attack**. Angina that you're not able to feel is called **silent ischemia**. (Women have an even higher risk of silent problems than men.)



### When to Call Emergency Services (911)

If you have a sudden heart problem, prompt treatment could save your life. You may be having a heart attack or angina if you have 1 or more of the following symptoms:

- Shortness of breath or trouble breathing
- Heavy sweating
- Tiredness, weakness, or faintness
- Nausea or vomiting
- Dizziness
- Pain or pressure in your chest, back, neck, jaw, or arm

## MONITORING RISKS: YOU AND YOUR HCP

The only way to know if risk factors are under control is to monitor them. This means visiting your healthcare provider (**HCP**) regularly. At these visits, your HCP will check your blood pressure and weight. He or she also may do laboratory tests to measure blood sugar and cholesterol levels.

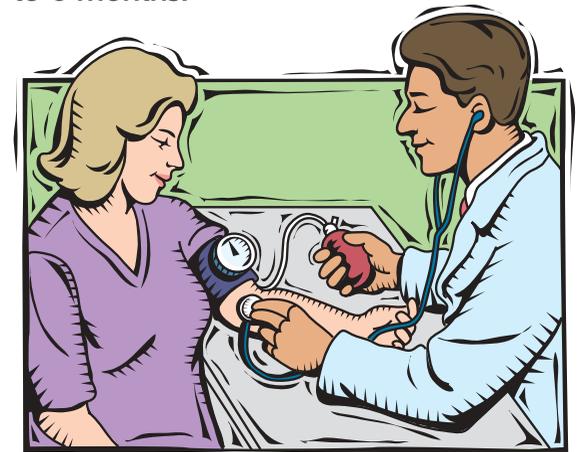
### Monitoring Blood Sugar

An A1C blood test measures your average blood sugar level over the past 2 to 3 months. You should have this test every 3 to 6 months.

### Monitoring Blood Pressure

A blood pressure test measures how hard blood pushes against artery walls. A blood pressure reading contains 2 numbers. The top (**systolic**) number shows how hard the blood is pressing against the artery when the heart is pumping. The bottom (**diastolic**) number measures the force of blood against the artery between heartbeats.

Blood pressure often increases as people age, so be sure to have your blood pressure tested at each doctor visit.



### Monitoring Cholesterol

Cholesterol testing measures the levels of LDL and HDL cholesterol as well as total cholesterol. If your LDL cholesterol level is too high, your doctor may prescribe medication to help lower it. Some medications also help to increase the level of HDL cholesterol. Cholesterol should be tested every 6 months.

### Guide for Adults With Diabetes

Adapted from 2003 American Diabetes Association Guidelines.

#### Blood Sugar Control

A1C	Less than 7.0%
Blood sugar before meals	90–130 milligrams per deciliter (mg/dL)
Peak blood sugar after meals	Less than 180 mg/dL

#### Blood Pressure

Less than 130/80 millimeters of mercury (mmHg)

#### Lipids

LDL (Bad) Cholesterol	Less than 100 mg/dL
Triglycerides	Less than 150 mg/dL
HDL (Good) Cholesterol	Greater than 40 mg/dL

## MANAGING BLOOD SUGAR

Keeping blood sugar within your target range helps you feel your best. It also reduces chances of damage to artery walls. And managing blood sugar helps keep blood pressure and cholesterol levels low. Check your blood sugar as directed and track your results.

### Checking Blood Sugar

Your healthcare team will show you how and when to check your blood sugar. Be sure to follow all the steps, and check as directed. Call your healthcare team if you have questions.

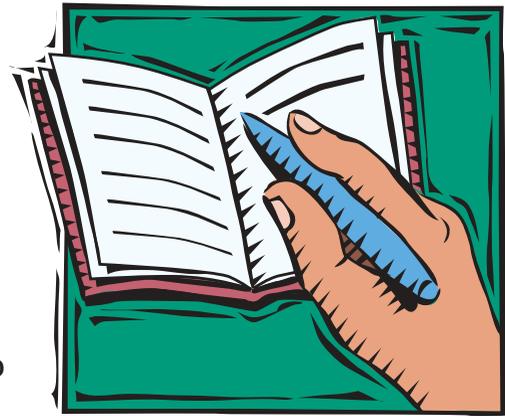
### Keeping a Log

Each time you check your blood sugar, write the results in a log or notebook. Take your log with you whenever you meet with your healthcare team.

The results will tell them whether you need to make any changes in your diet, exercise plan, or medications.

When checking your blood sugar, be sure to write down:

- The date and the time.
- The reading on your blood sugar (glucose) meter.



- Anything that might affect the reading, such as a large meal, above-normal exercise, stress, or sickness.

**My Checklist** Ask your healthcare provider to fill in the spaces below. Remember to always take your medications as directed.

### Blood Sugar

My blood sugar should be within this range: \_\_\_\_\_.

My target level before meals: Less than \_\_\_\_\_.

My target level after meals: Less than \_\_\_\_\_.

My A1C target should be: \_\_\_\_\_.

### Cholesterol

My target LDL level should be: Less than \_\_\_\_\_.

My target HDL level should be: Greater than \_\_\_\_\_.

### Blood Pressure

My target blood pressure should be: Less than \_\_\_\_\_.

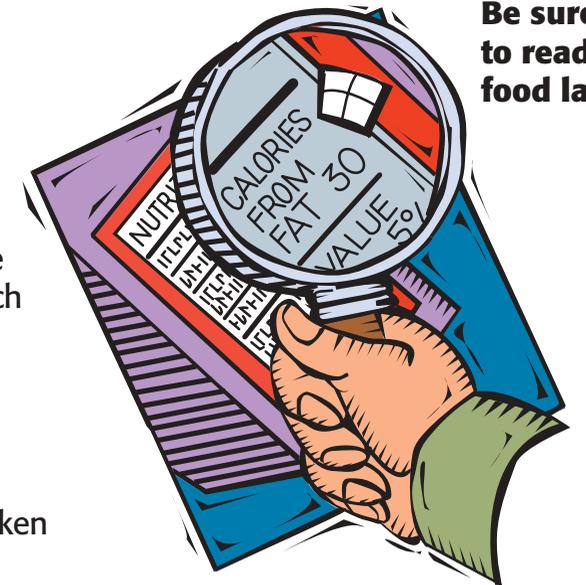
## MANAGING CHOLESTEROL

The foods you eat and how you plan your meals affect your blood sugar. But diet also plays a role in managing blood pressure, cholesterol levels, and weight. A dietitian or diabetes educator can help you plan meals that are healthy for you and that taste good, too.

### Eating Less Fat and Cholesterol

Excess fat and cholesterol in your diet can increase lipid levels and lead to high blood pressure. Eating foods high in fat also can make you gain weight. To cut down on the amount of fat and cholesterol you eat:

- Bake, broil, steam, or microwave foods. Avoid frying them.
- Season with fresh herbs, lemon juice, or flavored vinegar instead of butter or margarine.
- Choose only low-calorie, fat-free, low-fat, or reduced-fat dairy products, including milk and cheese.
- Select lean cuts of meat. Trim off all the fat you can see. Avoid organ meats, such as liver. Also avoid bacon, sausage, and fatty luncheon meats.
- Eat fish and other seafood as a source of protein.
- Remove and discard the skin from chicken and turkey before eating.
- Use vegetable oil, canola oil, or olive oil instead of butter or lard. Avoid hydrogenated vegetable oil and palm oil, often found in baked and fried foods.
- Choose fresh vegetables or plain frozen vegetables. Avoid cream, cheese, or butter sauces, which add fat and cholesterol.
- Buy fat-free or reduced-fat salad dressing.
- Use half or less of the fat called for in recipes.
- Check food labels for fat content. Try to pick fat-free, low-fat, or reduced-fat products. But be aware that these foods may be high in sugar.



**Be sure to read food labels**

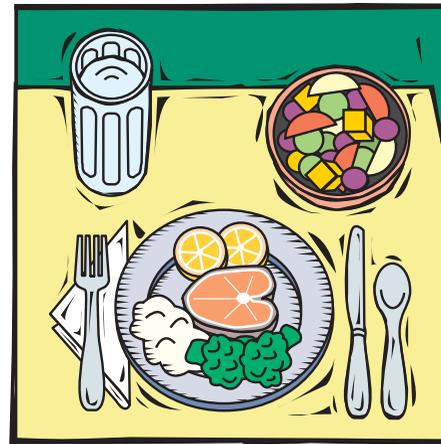
## MANAGING HIGH BLOOD PRESSURE

For many people, controlling high blood pressure is as simple as eating healthy foods and exercising often. But even if you practice healthy habits, you may still need medication. Remember, when blood pressure is controlled, your eyes and kidneys benefit, as well as your heart.

### Eat Healthier

To help control blood pressure, eat less fat and salt. Start with these tips.

- Grill or broil meats. Be sure to trim fat and skin. Eat chicken and fish that are not breaded.
- Choose tomato sauce instead of cream sauce.
- Fill up on fiber. Eat 5 servings of fruits and vegetables daily.
- Eat fresh vegetables instead of canned.
- Use half the salt a recipe calls for.



### Improve Your Fitness

Being fit helps reduce stress as well as blood pressure. Your goal should be 30 minutes or more of exercise on most days of the week. Walk the dog. Cut the lawn. Hike or bike. The choices are plenty. Check with your doctor about the best ways to get fit. Exercise also helps you lose weight. Losing even 10 pounds can help lower blood pressure.

### Don't Smoke

If you smoke, now is the time to quit. This may be the single most important thing you can do for your health. Ask your healthcare provider about programs and prescriptions to help. You don't have to tough it out alone. Support is just a phone call away.

### If You Need Medication

Your doctor may prescribe medication to help blood flow more easily through your vessels. Take this medication as directed by your doctor.

### Foot Care Tips

Together, diabetes and heart disease can reduce blood flow to feet. This means you can't afford to take your feet for granted.

- Inspect your feet daily for cracks, blisters, scratches, or dry skin. Don't treat or trim corns, calluses, or nails yourself.
- Use moisturizing cream, lotion, or powder to moisten dry or scaly feet (but don't use these products between your toes).
- Check your feet after exercise, or have someone check them for you. Look for redness, blisters, sores, or swelling. Call your doctor if a foot problem persists.

## IMPROVING HEALTH WITH ACTIVITY

You can improve your overall health by being active. Activity can help reduce your weight, lower your blood sugar, strengthen your heart, and increase your HDL ("good") cholesterol. Begin slowly. Then increase your activity safely over time.

### Starting Out

Becoming active starts with moving more. Try these simple ways to make your day more active:

- Light gardening or housework.
- Walking to a coworker's office instead of using the phone.
- Using the stairs instead of the elevator.
- When you go to the store, parking your car farther away and walking.



### Moving On to Brisk Exercise

Next, add brisk exercise to your day. This works your heart muscle, which can make it stronger. To get started:

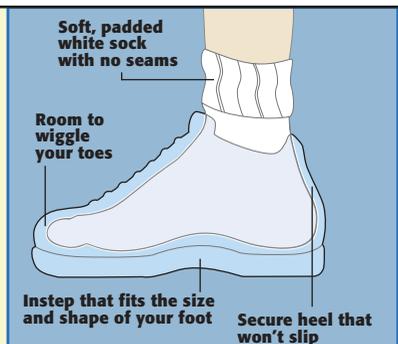


- Talk with your healthcare provider before starting an exercise program. Ask which activities are safe for you. Choices may include walking, swimming, dancing, biking, or aerobics.
- Start with 5 to 10 minutes of exercise a day, at least 3 days a week.
- Keep in mind that exercise lowers blood sugar. Have glucose tablets or a snack if you feel symptoms of low blood sugar.

### Make Sure Shoes and Socks Fit

To keep your feet healthy, protect them with shoes and socks that fit well. Keep these tips in mind:

- Buy shoes at the end of the day, when your feet are larger. Make sure you can wiggle all of your toes, and that the heel fits without slipping. The instep should conform to your foot.
- Avoid open-toed or open-heeled shoes and shoes that need to be "broken in."



# TREATING DIABETES AND HEART DISEASE

Watching your diet and being active may help control your risk factors for heart disease. Your healthcare provider also may prescribe medications to help control your blood sugar, blood pressure, and cholesterol levels. Take these as directed.

## Glucose Control Medications

Some diabetes medications help lower your blood sugar. This can help protect artery walls. Your healthcare provider may prescribe pills, injections, or both.

### Pills

There are several types of pills for treating type 2 diabetes. They help control blood sugar in different ways. Certain pills:

- Help your body make more insulin.
- Make your body's insulin work better.
- Regulate the amount of glucose in your blood.



### Insulin Injections

Sometimes insulin is prescribed. Insulin won't work if it's taken by mouth, so it must be injected under the skin.

## Guidelines for Taking Medications

Here are some tips that will help you take your medications safely:

- Keep a list of all your medications, dosages, and the reason you take them. Bring this list to all doctor and dentist appointments.
- Talk to your healthcare provider or pharmacist about each medication. Make sure you know when to take it, how to take it, and how much to take.
- Tell your healthcare provider and pharmacist about all prescription and over-the-counter medications you take. Mention any allergies you have to any foods or medications, and tell them if you're pregnant or breastfeeding.
- Do not stop taking any medications unless your healthcare provider tells you to. Stopping could make your condition worse.

## Cholesterol-lowering Medications

These medications improve cholesterol levels and may improve triglyceride levels. This helps prevent plaque from building up on artery walls.

## Blood Pressure Medications

These medications are also called **antihypertensives**. Most of them work by relaxing blood vessels. This allows the heart to pump blood more easily.

## Aspirin

Aspirin reduces the risk of heart attack and stroke by preventing blood platelets from clumping together to form blood clots.



## Other Medications

Other medications may be prescribed to:

- Make your heart pump with more strength.
- Help prevent blood clots.
- Control an irregular heartbeat.
- Prevent or relieve angina.
- Rid your body of excess water, which helps to lower blood pressure.

## My Medications

Work with your healthcare team to fill in the spaces below.

Name of medication	Dosage	Why I take it	When to take it