

**For
Your
Patients**



Type 2 Diabetes & Cardiovascular Disease

Increase Your Understanding, Lower Your Risks

Provided as a service to healthcare professionals by Merck & Co., Inc.

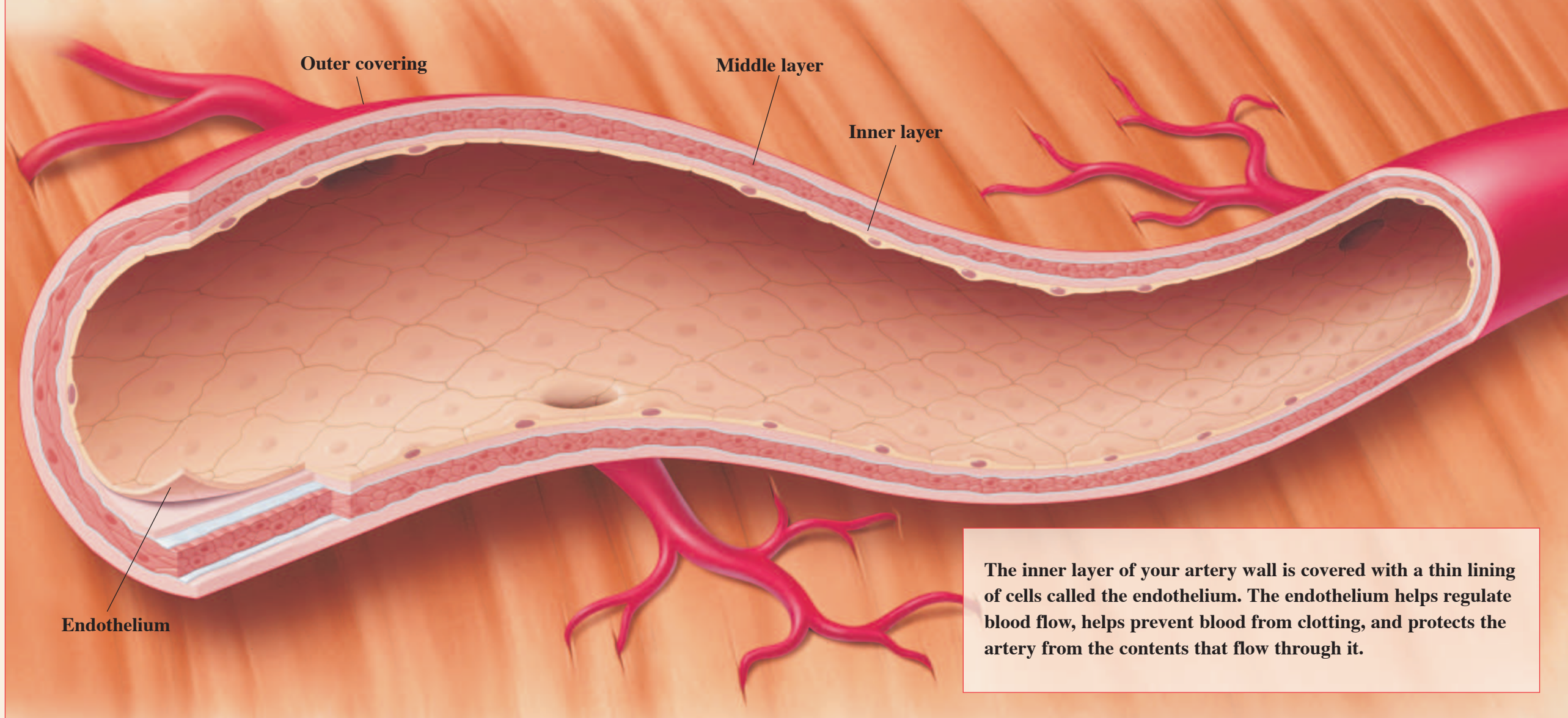


Normal Artery

Your heart pumps oxygen-rich blood through a series of arteries to all parts of your body. Normal arteries are smooth and elastic. This allows blood to flow through easily.



Arterial System



The inner layer of your artery wall is covered with a thin lining of cells called the endothelium. The endothelium helps regulate blood flow, helps prevent blood from clotting, and protects the artery from the contents that flow through it.

What Is Cholesterol?

● Cholesterol is a type of fat, or lipid, found in the bloodstream. Your body needs some cholesterol to function normally. However, high levels of LDL cholesterol can lead to long-term problems. Your doctor can measure the amount of cholesterol and other lipids in your blood through a simple blood test. This measurement includes the following lipid types:



LDL Cholesterol (Bad): Low-Density Lipoprotein carries the largest amount of cholesterol through the bloodstream. LDL cholesterol is called “bad cholesterol” because it can build up in the artery walls, forming plaque. High levels of LDL increase your risk of heart attack and stroke.



HDL Cholesterol (Good): High-Density Lipoprotein is called “good cholesterol” because it carries the excess cholesterol out of the arteries. High levels of HDL help prevent plaque buildup in your arteries and may lower your risk of heart attack and stroke.



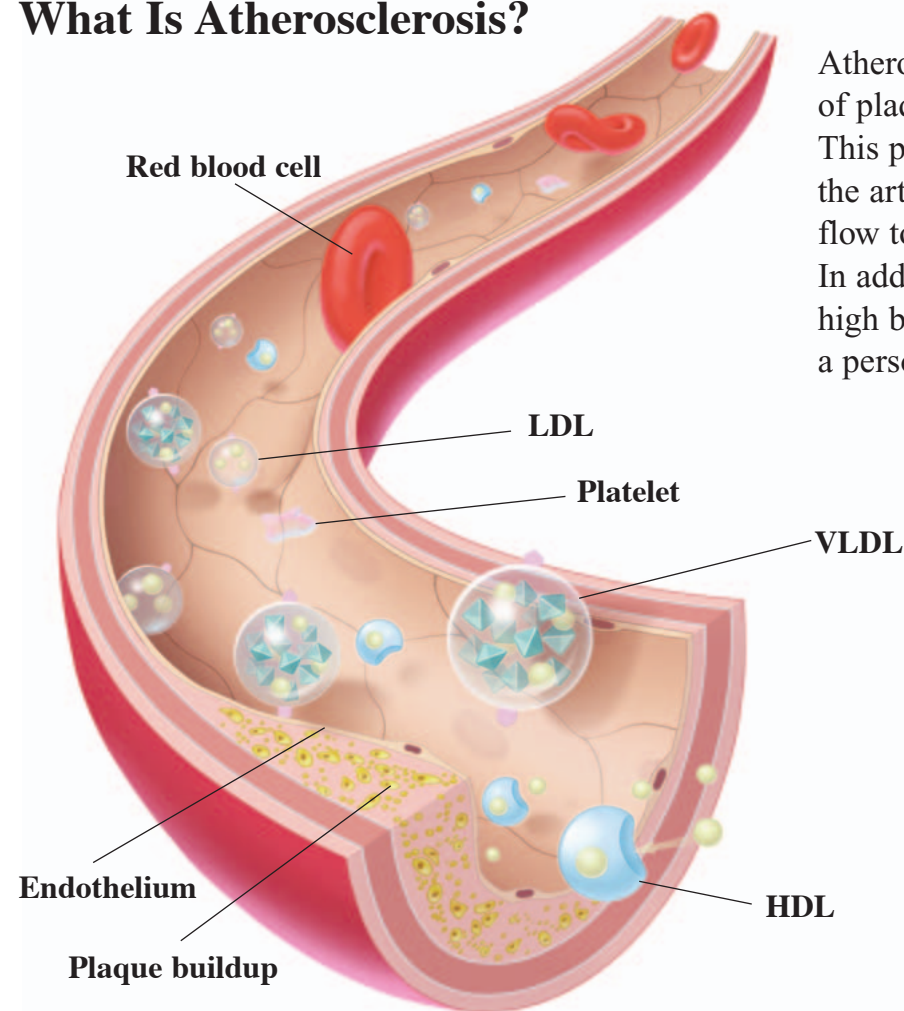
Triglycerides: These are other fatlike substances carried through the bloodstream. Triglycerides are stored in the body’s tissues as fat for use as energy as needed. Triglycerides not used can lead to excess fat buildup in the body.



VLDL: Very-Low-Density Lipoprotein carries both cholesterol and triglycerides through the bloodstream. When triglycerides are shed from VLDL, the VLDL becomes LDL cholesterol, or “bad cholesterol.”

Over time, high LDL-cholesterol levels can lead to atherosclerosis (“hardening of the arteries”).

What Is Atherosclerosis?



Atherosclerosis is the buildup of plaque in the artery walls. This plaque buildup can narrow the artery opening and reduce blood flow to the heart and other organs. In addition to high LDL cholesterol, high blood pressure also increases a person’s risk of atherosclerosis.

Turn the page to understand how type 2 diabetes can lead to atherosclerosis and speed up its progression.

What Are Glucose and Insulin?

Your body breaks down the food you eat and turns it into a simple blood sugar called glucose. When glucose enters your bloodstream, your pancreas releases a hormone called insulin.



Glucose:

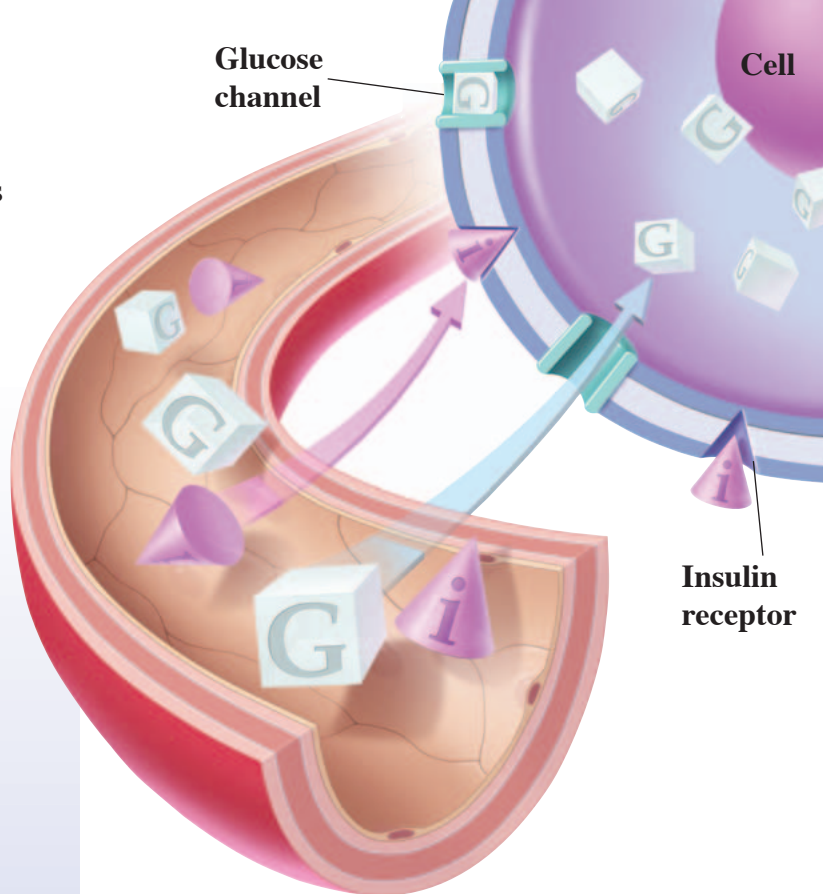
Your body's cells use glucose (blood sugar) as energy to perform daily activities.



Insulin:

Insulin is the “key” that “unlocks” your body's cells and allows glucose to enter.

A steady balance of glucose (blood sugar) and insulin is needed to maintain normal blood sugar levels.



What Is Type 2 Diabetes?

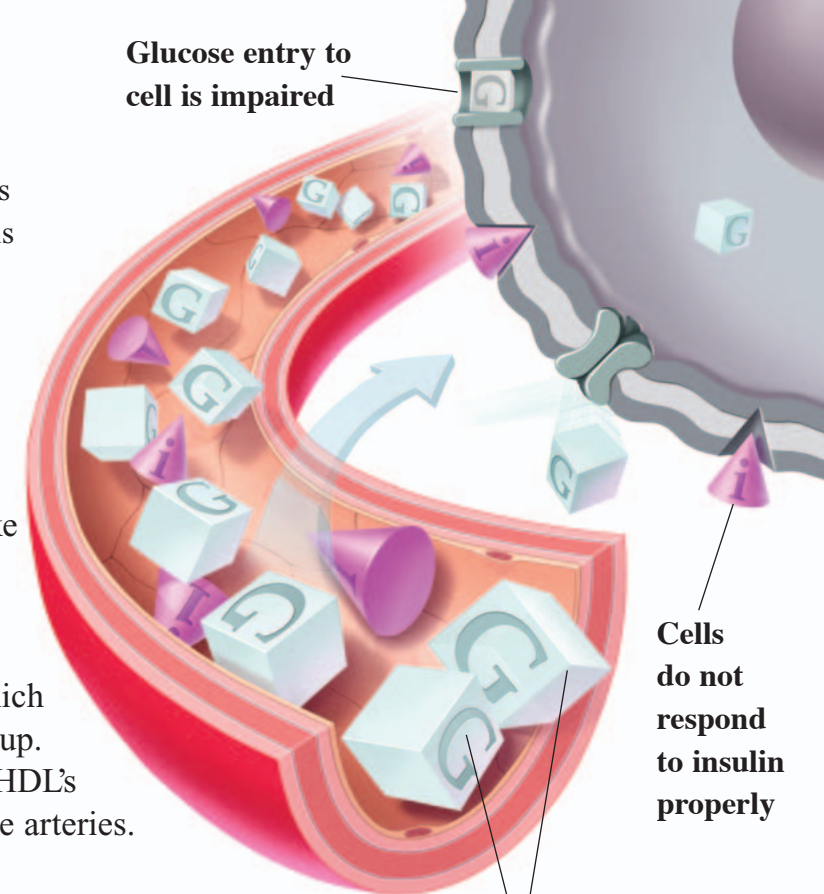
When you have diabetes, your blood sugar levels are too high. In type 2 diabetes, your body's cells do not use insulin properly. As a result, glucose entry into cells is impaired. This is called “insulin resistance.”

Diabetes: The Atherosclerosis Link

Metabolic changes caused by diabetes can:

- Harm the lining of the artery wall and make it more prone to plaque buildup.
- Reduce elasticity of the artery.
- Increase triglyceride levels.
- Increase the level of small, dense LDL, which is more likely to contribute to plaque buildup.
- Lower HDL (good cholesterol) levels and HDL's ability to carry excess cholesterol out of the arteries.

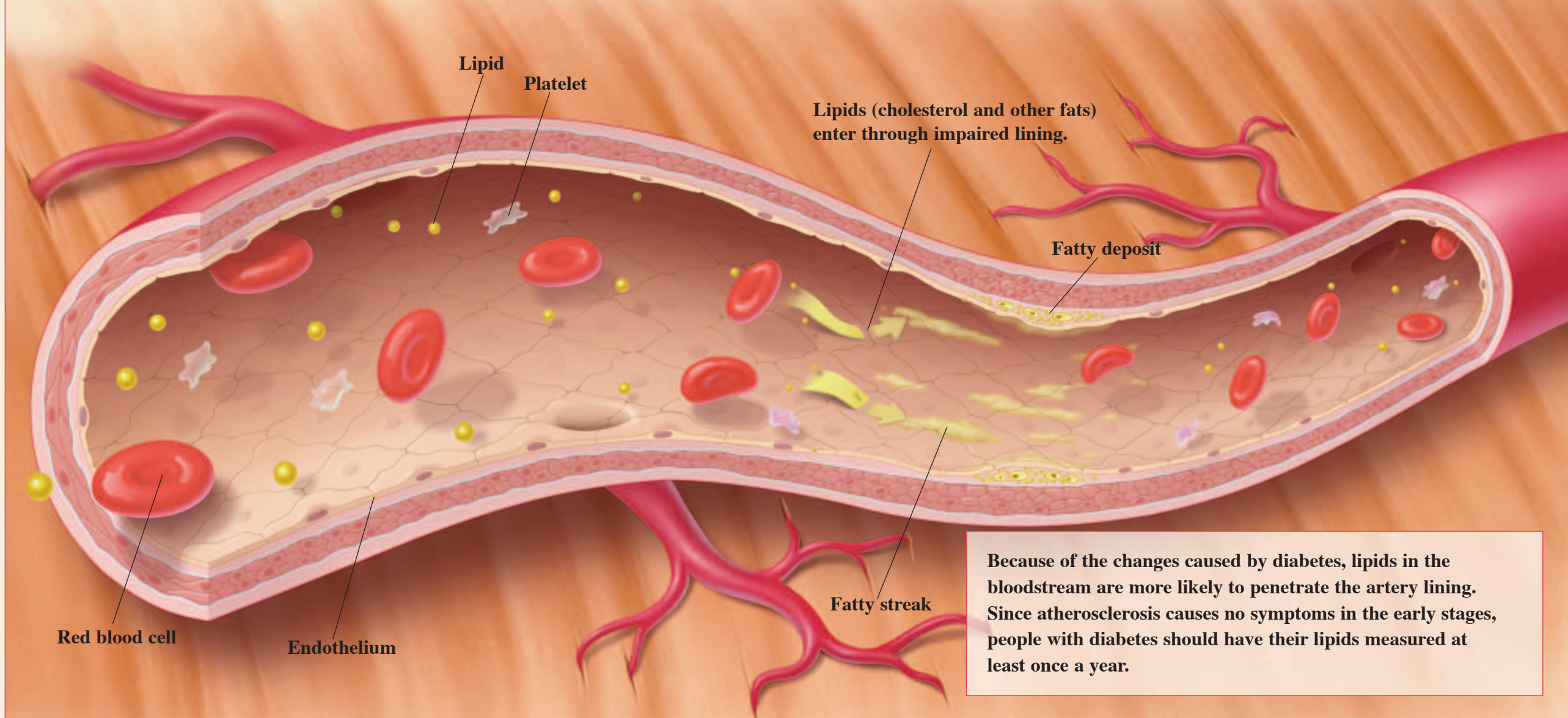
These changes can contribute to atherosclerosis and speed up the progression of plaque buildup. A person with type 2 diabetes and no prior history of heart disease has the same risk of a heart attack as someone without diabetes who has already suffered a heart attack.



How Do Lipids Enter the Artery Lining?

In the early stages of atherosclerosis, excess cholesterol and other fats are carried beneath the artery lining. These fatty deposits form yellow ridges called fatty streaks.

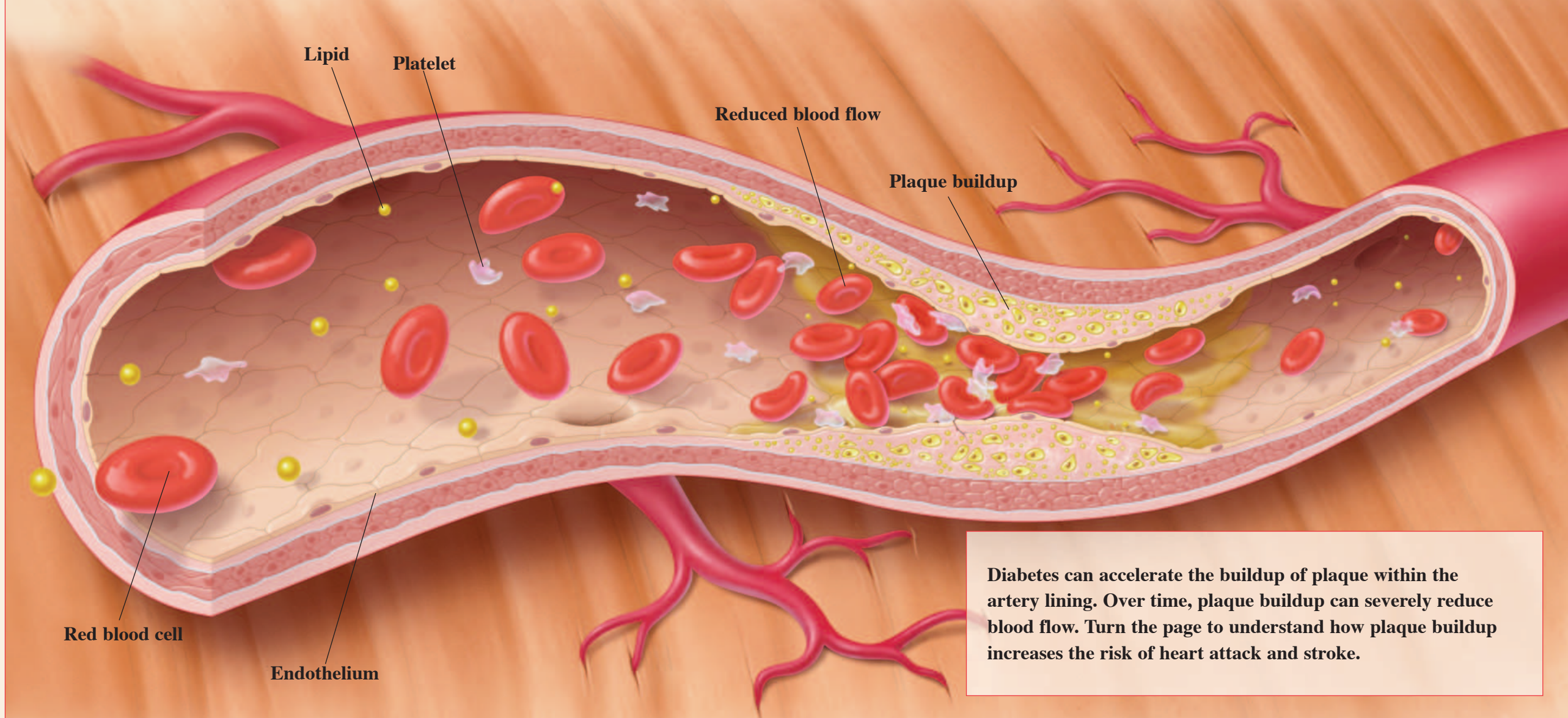
A **fatty streak** is the earliest sign of atherosclerosis, and it may start to develop early in life (even in childhood). Although a fatty streak does not reduce blood flow, it can lead to plaque buildup.



Because of the changes caused by diabetes, lipids in the bloodstream are more likely to penetrate the artery lining. Since atherosclerosis causes no symptoms in the early stages, people with diabetes should have their lipids measured at least once a year.

How Does Plaque Reduce Blood Flow?

The buildup of lipids also stimulates other cells to grow and multiply within the artery lining. As these fats and cells increase in number, fatty plaques form. Plaque buildup narrows the artery opening and may reduce blood flow.

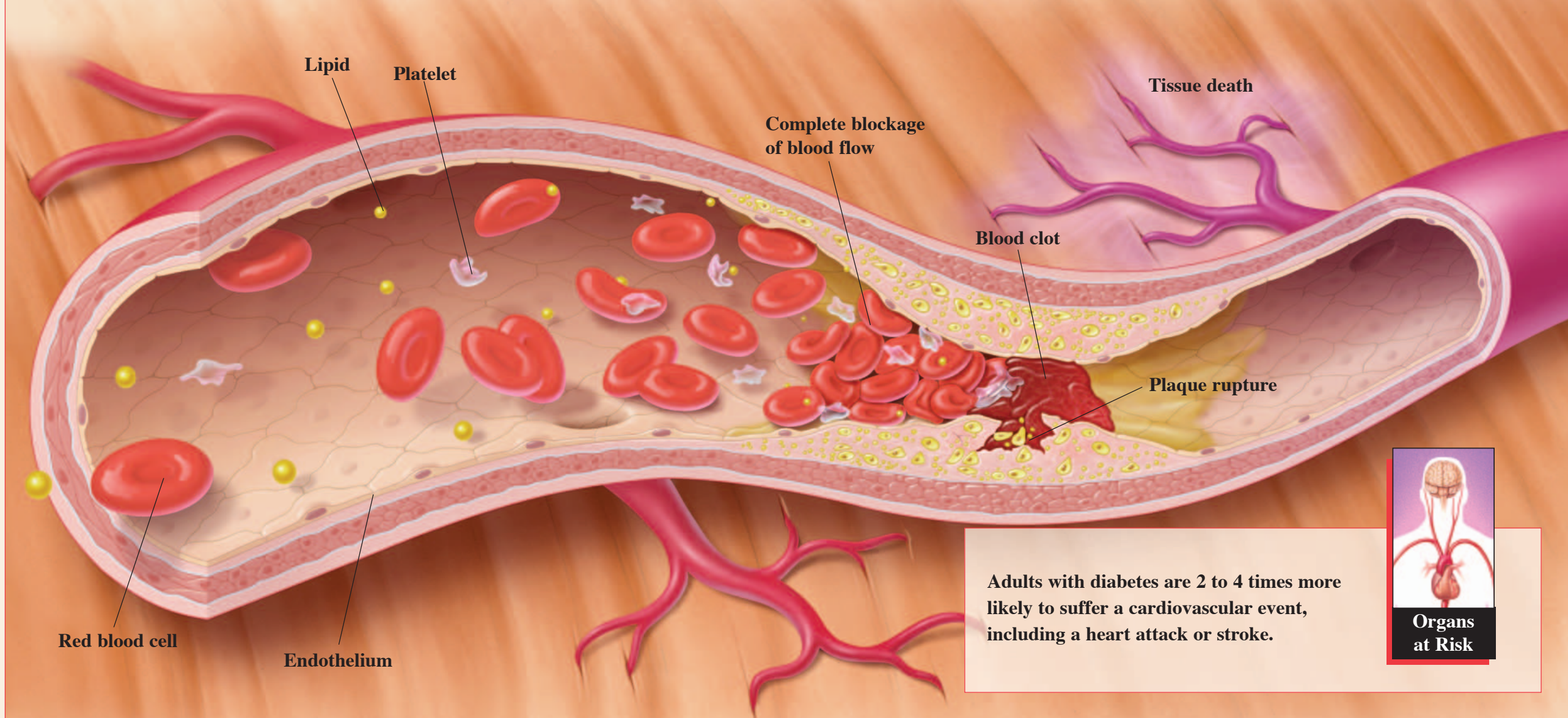


Diabetes can accelerate the buildup of plaque within the artery lining. Over time, plaque buildup can severely reduce blood flow. Turn the page to understand how plaque buildup increases the risk of heart attack and stroke.

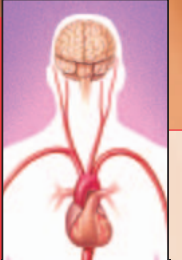
What Causes a Heart Attack or Stroke?

A blood clot can form at any time in an artery narrowed by plaque buildup. A blood clot usually forms when the surface of the plaque tears or ruptures, causing platelets in the blood to clump together. This blocks the artery and starves the organ it supplies of oxygen-rich blood.

A **heart attack** is tissue death usually caused by a blood clot in an artery supplying the heart. A **stroke** is tissue death usually caused by a blood clot in an artery supplying the brain.



Adults with diabetes are 2 to 4 times more likely to suffer a cardiovascular event, including a heart attack or stroke.



**Organs
at Risk**

The American Diabetes Association (ADA) recommends that people with diabetes have their blood pressure checked at every doctor's visit and their lipid levels measured at least once a year. Use this chart to track your results.

Test	Goal	Date of Visit			
Blood Pressure					
Lipids					
LDL “Bad” Cholesterol					
HDL “Good” Cholesterol					
Triglycerides					
Total Cholesterol					
Other:					

My Medication Chart

The following chart can be used to help you keep track of the medications you take regularly.

[illegible]

Do You Know Your Numbers? Because high cholesterol is a silent process, the American Diabetes Association (ADA) recommends that people with diabetes have their lipid levels measured at least once a year. Work with your doctor to reach the following goals:

Lipid Level	ADA Recommended Goal
LDL “Bad” Cholesterol.....	Less than 100 mg/dL
HDL “Good” Cholesterol.....	More than 40 mg/dL
Triglycerides.....	Less than 150 mg/dL

Are You at Risk for Heart Disease and Stroke?

If you have diabetes, you may think that controlling your blood sugar is all you need to do to manage your health risks. Unfortunately, blood sugar control alone may not be enough to lower your risk of heart disease and stroke.

Talk to your healthcare professional about a plan to help you reduce your risk of heart attack and stroke, regardless of your cholesterol level.

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In consultation with:

Silvio E. Inzucchi, MD
Robert Gabbay, MD, PhD
Nicholas R. Ricculli, DO, FACC
Steven H. Schneider, MD
Matthew Leinung, MD
