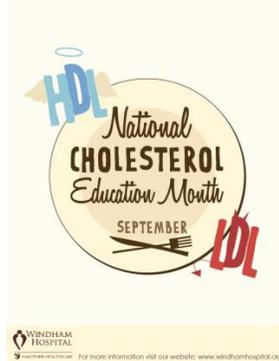


September 2019- National Cholesterol Education Month

September is National Cholesterol Education Month. You may have heard about cholesterol, especially from your doctor. But, do you know exactly what cholesterol is? Did you know that there is good cholesterol and bad cholesterol? Have you heard of the links between cholesterol and serious health conditions? Too much cholesterol in the blood is one of the main risk factors for heart disease and stroke—leading causes of death in the United States. One way to prevent these diseases is to detect cholesterol and treat it when it is found. And yet, most adults with high cholesterol don't have their condition under control. In fact, two out of every three adults have high cholesterol. Help us celebrate this month by reading more about cholesterol below and sharing your knowledge with the ones you love.



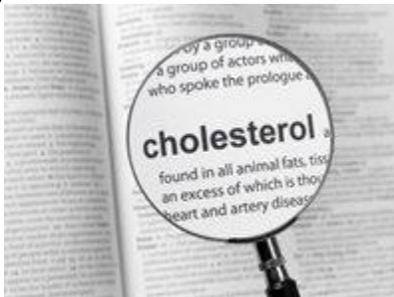
What is the prevalence of high cholesterol in America?

More than 102 million American Adults (20 years or older) have total cholesterol levels at or above 200 mg/dL, which is above healthy levels. More than 35 million of these people have levels of 240 mg/dL or higher, which puts them at high risk for heart disease.

What is cholesterol?

Cholesterol is a waxy, fat-like substance that your body needs. But, when you have too much in your blood, it can build up on the walls of your arteries. This can lead to heart disease and stroke.

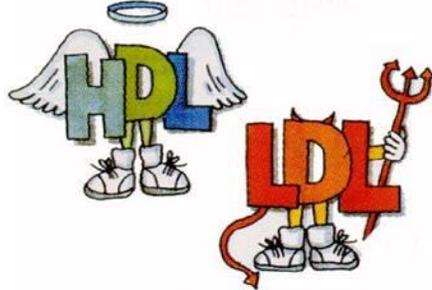
There are two kinds of cholesterol, high density lipoprotein (HDL). It is also called "good" cholesterol. There is also low density lipoprotein (LDL) cholesterol. It is also called "bad" cholesterol. When we talk about high cholesterol, we are talking about "bad" LDL cholesterol.



Cholesterol is a fatty chemical which is an important part of the outer lining (membrane) of cells in the body. Cholesterol is found mainly in foods that come from animals. LDL lipoprotein is the major carrier of cholesterol in the blood. LDL cholesterol is called "bad" cholesterol, because elevated LDL cholesterol is associated with an increased risk of coronary heart disease. LDL lipoprotein deposits cholesterol on the artery walls, causing the formation of a hard, thick substance called cholesterol plaque. Over time, cholesterol plaque causes thickening of the artery walls and narrowing of the arteries, a process called atherosclerosis.

Good cholesterol vs. Bad Cholesterol

As discussed above, there are different types of cholesterol. The three main types of cholesterol discussed by doctors (and that show up on your blood work when you are tested for cholesterol levels), are LDLs, HDLs, and Total cholesterol.



LDL cholesterol is called "bad" cholesterol, because elevated levels of LDL cholesterol are associated with an increased risk of coronary heart disease, stroke, and peripheral artery disease. LDL lipoprotein deposits cholesterol along the inside of artery walls, causing the formation of a hard, thick substance called cholesterol plaque. Over time, cholesterol plaque causes thickening of the artery walls and narrowing of the arteries, a process called atherosclerosis, which decreases blood flow through the narrowed area.

HDL cholesterol is called the "good cholesterol" because HDL cholesterol particles prevent atherosclerosis by extracting cholesterol from the artery walls and disposing of them through the liver. Thus, high levels of LDL cholesterol and low levels of HDL cholesterol (high LDL/HDL ratios) are risk factors for atherosclerosis, while low levels of LDL cholesterol and high levels of HDL cholesterol (low LDL/HDL ratios) are desirable and protect against heart disease and stroke.

Total cholesterol is the sum of LDL (low density) cholesterol, HDL (high density) cholesterol, VLDL (very low density) cholesterol, and IDL (intermediate density) cholesterol.

Triglycerides and VLDL cholesterol Triglyceride is a fatty substance that is composed of three fatty acids. Like cholesterol, triglyceride in the blood either comes from the diet or the liver. Also, like cholesterol, triglyceride cannot dissolve and circulate in the blood without combining with a lipoprotein. The liver removes triglycerides from the blood, and it synthesizes and packages triglyceride into VLDL (very low-density lipoprotein) particles and releases them back into the blood circulation.

HDL, LDL, Triglycerides ...
What's the difference?

What determines LDL cholesterol levels in the blood?

The liver manufactures and secretes LDL cholesterol into the blood. It also removes LDL cholesterol from the blood by active LDL receptors on the surface of its cells. A decrease number of liver cell LDL receptors is associated with high LDL cholesterol blood levels.

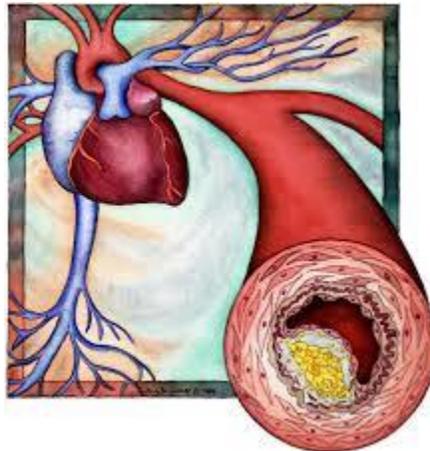
Both heredity and diet have a significant influence on a person's LDL, HDL and total cholesterol levels. For example, familial hypercholesterolemia (hyper= more + cholesterol + emia= in blood) is a common inherited disorder whose victims have a diminished number or nonexistent LDL receptors on the surface of liver cells. People with this disorder also tend to develop atherosclerosis and heart attacks during early adulthood.

Diets that are high in saturated fats and cholesterol raise the levels of LDL cholesterol in the blood. Fats are classified as saturated or unsaturated (according to their chemical structure). Saturated fats are derived primarily from meat and dairy products and can raise blood cholesterol levels. Some vegetable oils made from coconut, palm, and cocoa are also high in saturated fats.

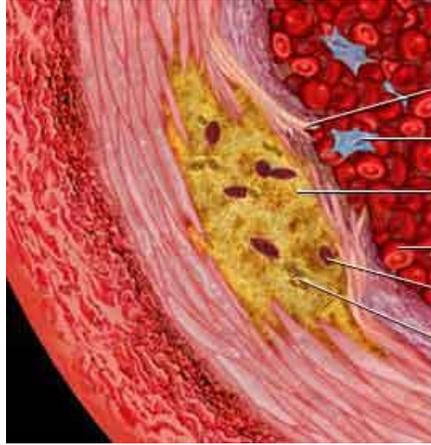


The link between bad cholesterol and heart disease and stroke

As discussed above, cholesterol builds up along the artery walls over time, called plaque. This buildup is called atherosclerosis. Atherosclerotic disease of coronary arteries (the arteries around the heart) is called coronary heart disease. Pieces of the plaque along the walls of coronary arteries can “break off” as a result of a change in environment, such as a sudden blood pressure spike or vasoconstriction, which triggers the body to “clot off” the plaque along the artery wall. This self-protective measure can cause a large blood clot to form over the plaque (in an effort to encapsulate the perceived “foreign body”), which can severely impede, and in some cases completely block off, blood flow through that coronary artery. During this event, a lack of oxygen (carried through the blood) to myocardial tissue (heart muscle) leads to tissue necrosis (tissue death), more commonly known as a heart attack. Coronary heart disease is the most common cause of death in the United States, accounting for about 600,000 deaths annually. In addition to smoking and blood pressure, blood cholesterol is a major controllable risk factor for coronary heart disease.

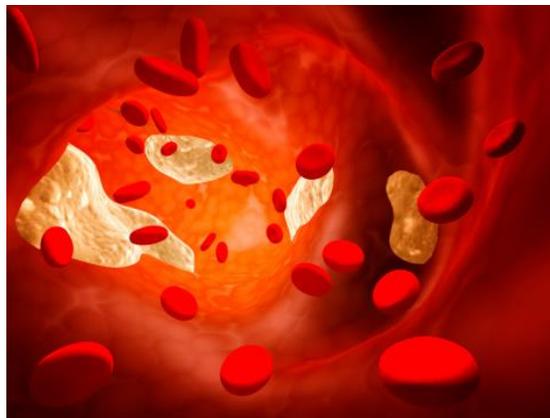


Atherosclerosis can also lead to brain damage from stroke. Similar to the event described above in the coronary arteries, a buildup of cholesterol in the carotid arteries (that carry blood to the brain), can impede blood flow to the brain. When this blood flow is severely impeded or, in some cases, completely obstructed, brain tissue is starved of oxygen (and blood flow), causing one type of stroke. Knowing that stroke and heart disease have such a strong correlation to high cholesterol levels, it is of vital importance to keep control over your cholesterol levels.



Is there a link between triglyceride levels and heart disease and stroke?

Whether elevated triglyceride levels in the blood lead to atherosclerosis and heart attacks is controversial. While abnormally high triglyceride levels may be a risk factor for atherosclerosis, it is difficult to conclusively prove that elevated triglyceride by itself can cause atherosclerosis. Elevated triglyceride levels are often associated with other conditions that increase the risk of atherosclerosis, including obesity, low levels of HDL- cholesterol, insulin resistance and poorly controlled diabetes mellitus, and small, dense LDL cholesterol particles.



What affects cholesterol levels?

Your blood cholesterol level is affected not only by what you eat but also by how quickly your body makes LDL ("bad") cholesterol and disposes of it. In fact, your body makes all the cholesterol it needs, and it is not necessary to take in any additional cholesterol from the foods you eat.

Many factors help determine whether your LDL-cholesterol level is high or low. The following factors are the most important:

Heredity- Your genes influence how high your LDL ("bad") cholesterol is by affecting how fast LDL is made and removed from the blood. One specific form of inherited high cholesterol that affects 1 in 500 people is familial hypercholesterolemia, which often leads to early heart disease. But even if you do not have a specific genetic form of high cholesterol, genes play a role in influencing your LDL-cholesterol level.

What you eat- Two main nutrients in the foods you eat make your LDL ("bad") cholesterol level go up: saturated fat, a type of fat found mostly in foods that come from animals; and cholesterol, which comes only from animal products. Saturated fat raises your LDL-cholesterol level more than anything else in the diet. Eating too much saturated fat and cholesterol is the main reason for high levels of cholesterol and a high rate of heart attacks in the United States. Reducing the amount of saturated fat and cholesterol you eat is a very important step in reducing your blood cholesterol levels.



Weight- Excess weight tends to increase your LDL ("bad") cholesterol level. If you are overweight and have a high LDL-cholesterol level, losing weight may help you lower it. Weight loss also helps to lower triglycerides and raise HDL ("good") cholesterol levels.

Physical activity/exercise- Regular physical activity may lower LDL ("bad") cholesterol and raise HDL ("good") cholesterol levels.

Age and sex- Before the age of menopause, women usually have total cholesterol levels that are lower than those of men the same age. As women and men get older, their blood cholesterol levels rise until about 60 to 65 years of age. After the age of about 50, women often have higher total cholesterol levels than men of the same age.

Alcohol- Alcohol intake increases HDL ("good") cholesterol but does not lower LDL ("bad") cholesterol. Doctors don't know for certain whether alcohol also reduces the risk of heart disease. Drinking too much alcohol can damage the liver and heart muscle, lead to high blood pressure, and raise

triglycerides. Because of the risks, alcoholic beverages should not be used as a way to prevent heart disease.

Stress- Stress over the long term has been shown in several studies to raise blood cholesterol levels. One way that stress may do this is by affecting your habits. For example, when some people are under stress, they console themselves by eating fatty foods. The saturated fat and cholesterol in these foods contribute to higher levels of blood cholesterol.

What causes high triglyceride levels?

High triglyceride levels may be genetic or they may be acquired. Examples of inherited hypertriglyceridemia (hyper=high + triglyceride + emia= in blood) disorders include mixed hypertriglyceridemia, familial hypertriglyceridemia, and familial dysbetalipoproteinemia.

Hypertriglyceridemia can often be caused by non-genetic factors such as obesity, excessive alcohol intake, diabetes mellitus, kidney disease, and estrogen- containing medications such as birth control pills.



Can children and adolescents have high cholesterol?

Yes. High cholesterol can develop in early childhood and adolescence, and your risk increases as your weight increases. In the United States, more than one-fifth (20%) of youth aged 12–19 years have at least one abnormal lipid level. It is important for children over 2 years of age to have their cholesterol checked, if they are overweight/obese, have a family history of high cholesterol, a family history of heart disease, diabetes, high blood pressure, or certain chronic condition (chronic kidney disease, chronic inflammatory diseases, congenital heart disease, and childhood cancer survivorship).

The National Cholesterol Education Program has developed specific recommendations about cholesterol treatment for people at increased risk, such as those with a family history of high cholesterol or heart disease.

Childhood Obesity Give Children a Healthier Start



How can you lower your LDL levels?

Make therapeutic lifestyle changes (TLC) by eating a low-fat, high-fiber diet and being physically active most days of the week:

-Eat a healthy diet that is low in salt; low in total fat, saturated fat, and cholesterol; and rich in fresh fruits and vegetables.

-Take at least 1 brisk 10-minute walk, 3 times a day, 5 days a week.

-Maintain a healthy weight.

-Don't smoke. If you smoke, quit as soon as possible

Have your cholesterol levels checked every 5 years and be sure to follow your doctor's instructions and stay on your medications, if prescribed, to control your cholesterol.



Medications to lower cholesterol

Medications are prescribed when lifestyle changes cannot reduce the LDL cholesterol to desired levels. The most effective and widely used medications to lower LDL cholesterol are called statins. Most of the large controlled trials

that demonstrated the heart attack and stroke prevention benefits of lowering LDL cholesterol used one of the statins. Other medications used in lowering LDL cholesterol and in altering cholesterol profiles include, fibrates such as gemfibrozil (Lopid), resins such as cholestyramine (Questran), and ezetimibe (Zetia).

How can you lower triglyceride levels?

Diet is the first step in treating hypertriglyceridemia. A low fat diet, regular aerobic exercise, loss of excess weight, reduction of alcohol consumption, and stopping cigarette smoking may be enough to control triglyceride levels in the blood. In patients with diabetes mellitus, meticulous control of elevated blood glucose is also important.

When medications are necessary, fibrates (such as Lopid), nicotinic acid, and statin medications can be used. Lopid not only decreases triglyceride levels but also increases HDL cholesterol levels and LDL cholesterol particle size. Nicotinic acid lowers triglyceride levels, increases HDL cholesterol levels and the size of LDL cholesterol particles.

The statin drugs have been found effective in decreasing triglyceride as well as LDL cholesterol levels and, to a lesser extent, in elevating HDL cholesterol levels.

What are the benefits of lowering your LDL cholesterol levels?

Lowering LDL cholesterol is currently one of the primary public health initiatives preventing atherosclerosis and heart attacks. The benefits of lowering LDL cholesterol include:

- Reducing or stopping the formation of new cholesterol plaques on the artery walls
- Reducing existing cholesterol plaques on the artery walls and widening the arteries
- Preventing the rupture of cholesterol plaques, which initiates blood clot formation and blocks blood vessels
- Decreasing the risk of heart attacks
- Decreasing the risk of strokes
- Decreasing the risk of peripheral artery disease

The same measures that decrease narrowing in coronary arteries also may benefit the carotid and cerebral arteries (arteries that deliver blood to the brain) as well as the femoral arteries that supplies blood to the legs.

Why screen?

Screening is the key to detecting high cholesterol. High cholesterol does not have symptoms. As a result, many people do not know that their cholesterol is too high. Doctors can do a simple blood test to check patients' levels. The National Cholesterol Education Program (NCEP) recommends that adults aged 20 years or older have their cholesterol checked every 5 years. In national surveys done from 2005–2009, the number of people who said they were screened for cholesterol within 5 years increased from 73% to 76%. However, only a handful of states met the 80% *Healthy People 2020* objective, and disparities persist among sociodemographic groups.



Is it time to get your cholesterol level checked?

Keeping your cholesterol levels healthy is a great way to keep your heart healthy – and lower your chances of getting heart disease or having a stroke. Cholesterol can be tricky to understand, though, because not all is bad for you. Some is actually good for you. The most important thing you can do as a first step is to know your cholesterol numbers by getting your cholesterol tested. Here are some easy ways for you to understand what the testing involves, how it can help you and ways to improve your health by improving your cholesterol.

The American Heart Association endorses the National Cholesterol Education Program (NCEP) guidelines for detection of high cholesterol: All adults age

20 or older should have a fasting lipoprotein profile — which measures total cholesterol, LDL (bad) cholesterol, HDL (good) cholesterol and triglycerides — once every five years.

This test is done after a nine- to 12-hour fast without food, liquids or pills. It gives information about total cholesterol, LDL (bad) cholesterol, HDL (good) cholesterol and triglycerides.

Your test report will show your cholesterol levels in milligrams per deciliter of blood (mg/dL). To determine how your cholesterol levels affect your risk of heart disease, your doctor will also take into account other risk factors such as age, family history, smoking and high blood pressure.



What are "normal" cholesterol levels?

The National Cholesterol Education Program (NCEP) recommends that adults aged 20 years or older have their cholesterol checked every 5 years. Preventive guidelines for cholesterol screening among young adults differ, but experts agree on the need to screen young adults who have other risk factors for coronary heart disease: obesity, smoking, high blood pressure, diabetes, and family history. Less than half of young adults who have these risk factors don't get cholesterol screening even though up to a quarter of them have elevated cholesterol.

A simple blood test called a lipoprotein profile can measure your total cholesterol levels, including LDL (low-density lipoprotein, or "bad" cholesterol), HDL (high-density lipoprotein, or "good" cholesterol), and triglycerides.

The following chart shows optimal lipid levels for adults:

Desirable Cholesterol Levels	
Total cholesterol	Less than 170 mg/dL
Low LDL ("bad") cholesterol	Less than 110 mg/dL
High HDL ("good") cholesterol	35 mg/dL or higher
Triglycerides	Less than 150 mg/dL



What do my cholesterol levels mean?

Your cholesterol levels may or may not fall within the above listed parameters of "good cholesterol levels." In either case, it is important to understand what your cholesterol levels mean. Below are the various types of cholesterol tested by the lab during your screening and a description of what the numbers in each category mean.

Total Cholesterol Level

Less than 200 mg/dL	Desirable level that puts you at lower risk for coronary heart disease. A cholesterol level of 200 mg/dL or higher raises your risk.
200 to 239 mg/dL	Borderline high
240 mg/dL and above	High blood cholesterol. A person with this level has more than twice the risk of coronary heart disease as someone whose cholesterol is below 200 mg/dL.

*Your total cholesterol score is calculated by the following: HDL + LDL + 20% of your triglyceride level.

HDL Cholesterol Level

**Less than 40 mg/dL (for men)
Less than 50 mg/dL (for women)

Low HDL cholesterol. A major risk factor for heart disease.

60 mg/dL and above

High HDL cholesterol. An HDL of 60 mg/dL and above is considered protective against heart disease.

With HDL (good) cholesterol, higher levels are better. Low HDL cholesterol (less than 40 mg/dL for men, less than 50 mg/dL for women) puts you at higher risk for heart disease. In the average man, HDL cholesterol levels range from 40 to 50 mg/dL. In the average woman, they range from 50 to 60 mg/dL. An HDL cholesterol of 60 mg/dL or higher gives some protection against heart disease. The mean level of HDL cholesterol for American adults age 20 and older is 54.3 mg/dL.

Smoking, being overweight and being sedentary can all result in lower HDL cholesterol. To raise your HDL level, avoid tobacco smoke, maintain a healthy weight and get at least 30-60 minutes of physical activity more days than not.

People with high blood triglycerides usually also have lower HDL cholesterol and a higher risk of heart attack and stroke. Progesterone, anabolic steroids and male sex hormones (testosterone) also lower HDL cholesterol levels. Female sex hormones raise HDL cholesterol levels.



LDL Cholesterol Level

Less than 100 mg/dL	Optimal
100 to 129 mg/dL	Near or above optimal
130 to 159 mg/dL	Borderline high
160 to 189 mg/dL	High
190 mg/dL and above	Very high

Your other risk factors for heart disease and stroke help determine what your LDL level should be, as well as the appropriate treatment for you. A healthy level for you may not be healthy for your friend or neighbor. Discuss your levels and your treatment options with your doctor to get the plan that works for you. The mean level of LDL cholesterol for American adults age 20 and older is 115.0 mg/dL.

** The lower your LDL cholesterol, the lower your risk of heart attack and stroke. In fact, it's a better gauge of risk than total blood cholesterol.



Triglyceride Level	Category
Less than 100 mg/dL	Optimal
Less than 150 mg/dL	Normal
150–199 mg/dL	Borderline high
200–499 mg/dL	High
500 mg/dL and above	Very high

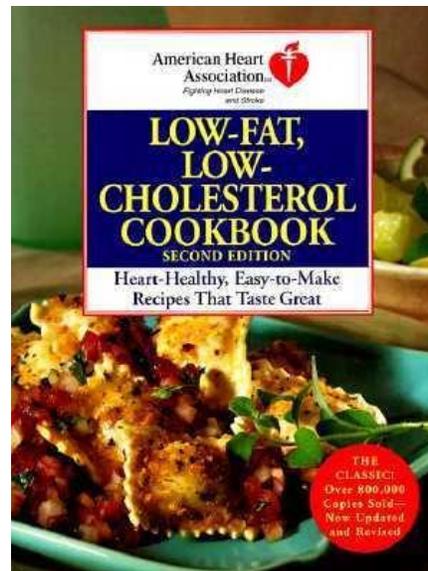
Triglyceride is the most common type of fat in the body. Many people who have heart disease or diabetes have high triglyceride levels. Normal triglyceride levels vary by age and sex. A high triglyceride level combined with low HDL cholesterol or high LDL cholesterol seems to speed up atherosclerosis (the buildup of fatty deposits in artery walls). Atherosclerosis increases the risk for heart attack and stroke.

Many people have high triglyceride levels due to being overweight/obese, physical inactivity, cigarette smoking, excess alcohol consumption and/or a diet very high in carbohydrates (60 percent or more of calories). High triglycerides are a lifestyle-related risk factor; however, underlying diseases or genetic disorders can be the cause. The mean level of triglycerides for American adults age 20 and older is 144.2 mg/dl. People with high triglycerides should substitute monounsaturated and polyunsaturated fats — such as those found in canola oil, olive oil or liquid margarine — for saturated fats, limit added sugars, eat complex carbohydrates and reduce fructose intake.

The main therapy to reduce triglyceride levels is to change your lifestyle. This means control your weight, eat a heart-healthy diet, get regular physical activity, avoid tobacco smoke, limit alcohol to one drink per day for

women or two drinks per day for men and limit beverages and foods with added sugars. Visit your healthcare provider to create an action plan that will incorporate all these lifestyle changes. Sometimes, medication is needed in addition to a healthy diet and lifestyle.

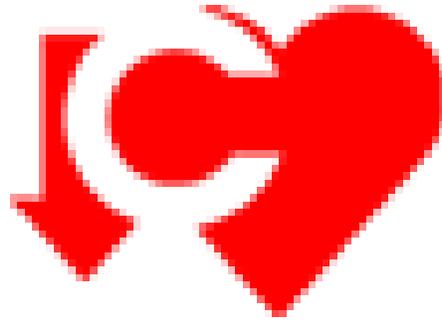
A triglyceride level of 150 mg/dL or higher is one of the risk factors of metabolic syndrome. Metabolic syndrome increases the risk for heart disease and other disorders, including diabetes.



Are there clinical and community programs to help address cholesterol?

Eating a healthy diet, being physically active, and achieving and maintaining a healthy body weight can help decrease your risk of developing serious health conditions such as high cholesterol. There are also a variety of community and clinical activities that address cholesterol screening and treatment:

- CDC's National Heart Disease and Stroke Prevention programs support states implementing evidence based practices in community and clinical settings, specifically highlighting cholesterol control within communities.
- The National Cholesterol Education Program [\[link\]](#) provides evidenced-based resources and recommendations to health care providers, and new guidelines for cholesterol are currently in development.⁵
- The Million Hearts™ [\[link\]](#) initiative, a public/private partnership, is an innovative alignment and coordination of clinical and community activities targeting leading causes of cardiovascular disease morbidity and mortality—including the improvement of cholesterol control.



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