

# What is Hypercholesterolemia? A Guide for Families

## What is hypercholesterolemia?

*Hypercholesterolemia* in a child means elevated blood cholesterol levels. *Hyperlipidemia* is a more general term that refers to elevation of cholesterol or triglyceride level. Total cholesterol is made up of non-high-density lipoprotein (HDL) cholesterol (non-HDL-C) and HDL cholesterol (HDL-C). Non-HDL-C is made up of low-density lipoprotein (LDL) cholesterol (LDL-C) and very low-density lipoprotein (VLDL) cholesterol (VLDL-C). If triglyceride levels are equal to or greater than 400 mg/dL, the calculated LDL-C is not accurate and a direct measurement must be ordered.

Low-density lipoprotein cholesterol is referred to as the *bad cholesterol* that gets deposited in blood vessel walls. High-density lipoprotein cholesterol is referred to as the *good cholesterol* that removes excess LDL-C from blood vessel walls. Even though elevated LDL-C and HDL-C levels can cause hypercholesterolemia, an elevated LDL-C level traditionally carries more risk.

An acceptable LDL-C level in otherwise healthy children is less than 110 mg/dL; borderline high is 110 to 129 mg/dL; and high is 130 mg/dL or greater, according to National Heart, Lung, and Blood Institute guidelines. Other cardiovascular risk factors and whether a child has diabetes should be taken into consideration when deciding whether to treat an LDL-C level above 130 mg/dL.

## What causes hypercholesterolemia?

Low-density lipoprotein cholesterol is mainly made by the liver; some LDL-C comes from the diet. The blood level of LDL-C is also influenced by hereditary factors. Mild to moderate LDL-C level elevation can be the result of bad diet and lifestyle. Mild to moderate LDL-C level elevation can also be seen in obesity. In children with obesity, triglyceride levels are often elevated more than cholesterol, and HDL-C level is often low.

*Familial hypercholesterolemia* is a common inherited condition. Children with this condition often have an LDL-C level that is greater than 190 mg/dL. In this condition, the liver keeps making LDL-C even though the blood level of LDL-C is already high. Uncontrolled diabetes, hypothyroidism, and kidney diseases can also cause elevated LDL-C and triglyceride levels.

## What problems result from having high cholesterol levels?

Extra cholesterol, especially LDL-C, is deposited in blood vessel walls, the buildup of which causes an inflammatory reaction. Over time, this can narrow the arteries, block blood flow, and cause heart attacks. Such problems usually do not occur before 40 years of age in men and 50 years of age in women. Patients with LDL-C levels above 190 mg/dL are at risk for having these problems at an earlier age.

## What are the measures to control high cholesterol?

Dietary cholesterol mainly comes from foods of animal origin, but it does not play a large role in determining cholesterol levels. Increasing physical activity in children with elevated cholesterol levels can be beneficial to improve cholesterol levels. The American Academy of Pediatrics recommends that children get at least 1 hour of moderate to vigorous activity daily. A diet restricting fat can decrease LDL-C levels by 8% to 10%.

Total fat restriction is not as important as restricting saturated and trans fats while favoring healthy monounsaturated and polyunsaturated fats.

Saturated fats can increase blood cholesterol levels. Foods high in saturated fat mostly include animal products, such as meat (eg, beef, sausage, bacon, hot dogs, lunch meats like bologna, salami, and poultry with skin), and dairy products (eg, whole milk, cheese, butter, ice cream). Choose lean protein foods, like fish, lean cuts of meat, white meat without skin, and lean cuts of red meat, to reduce saturated fat. Low-fat (2%) milk can be used starting at 1 to 2 years of age in those with risk factors for hypercholesterolemia. Fat-free or 1% milk can be used after 2 years of age. Remember to look at total fat and saturated fat contents on nutrition labels.

In children with hypercholesterolemia, saturated fat intake should be less than 7% of calories and dietary cholesterol intake should be less than 200 mg per day. Plant oils that are high in saturated fats include coconut and palm oils. Eating trans fats found in highly processed foods can also increase LDL-C levels; hence avoid trans fat as much as possible. Some examples of foods that contain trans fatty acids are microwave popcorn, frozen pizza, and coffee creamer. Cooking should be done using vegetable oils (eg, canola, corn, olive, safflower) that are high in monounsaturated and polyunsaturated fats. Try to increase your child's intake of nuts, such as walnuts and almonds, which are another source of monounsaturated fats. Cold-water fish, especially tuna, swordfish, salmon, mackerel, sardines, and herring, are healthy, and eating them at least 2 times a week is recommended as a source of omega-3 polyunsaturated fats.

Cholesterol is never found in plant sources. In fact, plant sterols (cholesterol equivalent of plants) can decrease LDL-C levels. Whole grains, beans, high-fiber cereals, fruits, vegetables, water-soluble fiber (eg, psyllium), soy protein, and oat bran can reduce LDL-C levels by decreasing absorption of cholesterol. It is recommended that children with obesity, elevated LDL-C levels, and elevated triglyceride levels work on weight loss and reduce their intake of sugars and starchy foods (see *Hypertriglyceridemia: A Guide for Families* handout).

**Medications:** When LDL-C levels are persistently higher than 130 to 190 mg/dL, depending on the presence or absence of specific risk factors and/or conditions, even after dietary and lifestyle changes, your child's doctor may recommend a lipid-lowering medication, such as a statin. Thus, children with medical conditions, such as diabetes or kidney disease, may need to start cholesterol-lowering medications at lower levels of LDL-C than otherwise healthy children.

## When should your child's cholesterol levels be checked?

Cholesterol screening is recommended for all children between ages 9 and 11 years and again between 17 and 21 years. If there is positive family history of heart disease and elevated cholesterol in immediate relatives, cholesterol screening is recommended earlier, between 2 and 10 years of age.

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