

What is cholesterol?

Cholesterol is a type of fat in the blood. Everyone needs some cholesterol in their blood for building hormones and cells. What you eat affects the level of cholesterol in our blood. Cholesterol comes from animal products such as meat, eggs, dairy products and certain types of solid and liquid fats. Cholesterol is also produced by the liver.

Cholesterol has several parts: **high-density lipoproteins (HDL)**, **low-density lipoproteins (LDL)**, and **triglycerides**. HDL is called the "good" cholesterol because it carries cholesterol away from the arteries to the liver. The liver helps the body get rid of cholesterol. The LDL is called "bad" cholesterol. If you have too much LDL, cholesterol builds up in the arteries that feed the heart and brain, causing blockages that can lead to heart attacks and strokes. Triglycerides are a form of fat made in the body. Elevated triglycerides can be due to obesity, physical inactivity, cigarette smoking, excessive alcohol intake, and a diet high in simple carbohydrates. The HDL, LDL, and triglycerides together are called "total cholesterol."

Why is having low cholesterol important?

People who have higher-than-normal levels of cholesterol have a higher risk of developing clogged or narrowed blood vessels that carry blood to the heart muscle. Lower cholesterol levels can reduce the risk of heart disease. Reducing children's cholesterol levels with proper diet and exercise is believed to give children a better chance of having low cholesterol when they are adults.

What are normal and abnormal cholesterol levels?

Cholesterol levels for children are as follows:

Total Cholesterol: Normal less than 170, borderline 170-200, elevated >200

LDL Cholesterol: Normal <130

HDL Cholesterol: Normal 40-60 (higher levels actually healthy, often genetic)

Should children have their cholesterol checked?

Children who are at high risk for heart disease should be screened. Heart disease includes heart attack, chest pain, stroke, or bypass surgery. Your child is at higher risk and should be screened if he or she:

- is overweight or obese
- has high blood pressure
- smokes cigarettes
- has diabetes
- has a father or grandfather who had heart disease before the age of 55, or a mother or grandmother who had heart disease before the age of 65
- has a relative with high cholesterol or a lipid disorder
- does not know family health history, for example, because your child is adopted

As screening based on the above risk factors may miss many children at risk, we have elected to universally screen your child at the AAP recommended ages. This will be done at the same time as your child's fingerstick for hemoglobin, at age 4, and before 6th and 10th grades. Our cholesterol screen includes a full cholesterol panel (total cholesterol, HDL, LDL.)

How often should my child's cholesterol be checked?

If your child's total cholesterol level is borderline high (between 171 and 200), your child should start a program that includes a low-saturated fat diet and good levels of exercise. Your child's total cholesterol will probably be rechecked every year.

Children with total cholesterol greater than 200 will be checked again after 2 to 4 months of treatment and have fasting labs including triglycerides. For follow-up the test is done the first thing in the morning, before your child eats or drinks anything except water. This will ensure an accurate triglyceride level.

If your child has very high cholesterol, everyone in your family should have their total cholesterol checked as this may be the result of genetics. It is helpful to start the whole family on a healthier diet and exercise program.

Dietary Recommendations for Healthy Children

The **American Heart Association** has dietary recommendations for infants, children and adolescents to promote cardiovascular health:

Start in Infancy:

- Breast-feeding is ideal nutrition and sufficient to support optimal growth and

development for about the first 4–6 months after birth. Try to maintain breast-feeding for 12 months. Transition to other sources of nutrients should begin at about 4–6 months of age to ensure sufficient micronutrients in the diet.

- Delay introducing 100 percent juice until at least 6 months of age and limit to no more than 4–6 oz/day. Juice should only be fed from a cup.
- Don't overfeed infants and young children — they can usually self-regulate the amount of calories they need each day. Children shouldn't be forced to finish meals if they aren't hungry as they often vary caloric intake from meal to meal.
- Introduce healthy foods and keep offering them if they're initially refused. Don't introduce foods without overall nutritional value simply to provide calories.

The American Heart Association recommends this eating pattern for families:.

- Eat foods low in saturated fat, trans fat, cholesterol, salt (sodium), and added sugars.
- Keep total fat intake between 30 to 35 percent of calories for children 2 to 3 years of age and between 25 to 35 percent of calories for children and adolescents 4 to 18 years of age, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts and vegetable oils.
- Eat only enough calories to maintain a healthy weight for your height and build. Be physically active for at least 60 minutes a day.
 - Don't overfeed. Estimated calories needed by children range from 900/day for a 1-year-old to 1,800 for a 14–18-year-old girl and 2,200 for a 14–18-year-old boy.

Table 32-3: Characteristics of the American Heart Association Step 1 and Step 2 Diet

Nutrient	Step 1	Step 2
Calories	Adequate for normal growth	Same
Total fat	≤30% of calories	Same
Saturated fat	<10% of calories	≤7%
Polyunsaturated fat	Up to 10% of calories	Same
Monounsaturated fat	Remainder of fat calories	Same

Carbohydrates	Approx 55% of calories	Same
Protein	Approx 15-20% of calories	Same
Cholesterol (mg/day)	<300	<200

*Data from National Cholesterol Education Program. Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents. *Pediatrics*. 1992;89:525

Where do you start?

- **Avoid/restrict foods high in saturated fat:** fatty animal meats, eggs, cream, chocolate, peanut butter, coconut, lard, palm oil, stick margarine, and hydrogenated oils.
- **Avoid foods containing trans fats:** stick margarine, shortening, deep fat fried foods, commercial pastries/snacks/crackers/chips, hydrogenated and partially hydrogenated fats.
- Cook with healthy oils such as **olive, canola, flax, soy, peanut** and **high oleic safflower** or **sunflower oil**.
- Allow foods with naturally containing **monounsaturated oils:** cashews, avocados, almonds, peanuts, poultry; and **omega 3 oils:** shellfish, fish.
- Focus on lean proteins such as **skinless poultry** and **fish**, as well as non-meat proteins such as **tofu, beans, and lentils**. Avoid commercially fried meats and fish.
- Learn, and teach your children, how to read labels for saturated fat content. Start with snacks, choosing those with less than 2 gm saturated fat per serving and no more than 10 gms of sugar per 1 serving. See the end of this handout for a link to learn how to read a label.
- Focus on **dairy** intake, lowering the saturated fat by choosing the lowest acceptable alternative (ideally skim or 1% milk, and reduced or non-fat cheeses and yogurts.)
- **Reduce simple carbohydrates:** Simple carbohydrates common in our diets are:

- alcoholic and sugar-sweetened beverages (soda, juice, sports drinks, and sweet teas)
 - snack foods (sweets, chips, fries)
 - white foods (white bread, white rice, white potatoes, white pasta).
 - Focus a little on each category a week at a time, trying to reduce foods are most prevalent in the diet and which can be most easily replaced with a healthier version.
- Use **whole grain/high fiber carbohydrates** wherever possible (whole grain breads, pastas, brown rice.) Look for whole grain to be the first item on the ingredient list.
 - Include a **fruit or vegetable in every meal and snack**. Limit juice however.
 - Shop the perimeter of the supermarket (where the fresh fruits, vegetables, meats, fish and dairy are sold.)
 - Invest some time **reading labels** of basic food items you purchase repeatedly (breads, granola bars, cereals, peanut butter.) Once you identify your preferred brands, keep a **list** to help with future shopping trips.
 - Stop ordering off the kids menu at restaurants, or ask to substitute a fruit/vegetable for the fries.
 - **Make gradual changes-** i.e. start by cutting out sweetened beverages one week, change to whole grain products the next.
 - **Avoid drastic statements-** don't ban pizza, French fries, and baked goods. Teach moderation and appropriate portion size.
 - Limit television and computer time and **encourage physical activity**. Daily aerobic activity helps elevate HDL levels.
 - Involve the whole family, not just a single child or parent with elevated cholesterol. A healthier diet and lifestyle is beneficial for all.

- **Model** the behaviors you want in your children- start eating YOUR vegetables!
- Visit a **registered dietician** if you are struggling enacting change or understanding the diet.

Take Control of Portion Sizes

Size matters. Portion size has a lot to do with why our kids are getting chubbier. Because there's too much of everything on their plates, our kids are getting far more calories than they need daily. You may be surprised to learn these are serving sizes:

- 1 slice of bread
- ½ cup rice or pasta (cooked)
- 1 small piece of fruit (super-large apples are 2+ servings)
- 1 wedge of melon
- ¾ cup fruit juice
- 1 cup milk or yogurt
- 2 oz. cheese (about the size of a domino)
- 2-3 oz. meat, poultry or fish (this is about the size of a deck of cards)

Daily Estimated Calories and Recommended Servings for Grains, Fruits, Vegetables, and Milk/Dairy by Age and Gender

	1 Year	2-3 Years	4-8 Years	9-13 Years	14-18 Years
Calories†	900 kcal	1000 kcal			
Female			1200 kcal	1600 kcal	1800 kcal
Male			1400 kcal	1800 kcal	2200 kcal
Fat	30-40% kcal	30-35% kcal	25-35% kcal	25-35% kcal	25-35% kcal

Milk/Dairy‡	2 cups¶	2 cups	2 cups	3 cups	3 cups
Lean Meat/Beans	1.5 oz	2 oz		5 oz	
Female			3 oz		5 oz
Male			4 oz		6 oz
Fruits§	1 cup	1 cup	1.5 cups	1.5 cups	
Female					1.5 cups
Male					2 cups
Vegetables§	3/4 cup	1 cup			
Female			1 cup	2 cups	2.5 cups
Male			1.5 cup	2.5 cups	3 cups
Grains_	2 oz	3 oz			
Female			4 oz	5 oz	6 oz
Male			5 oz	6 oz	7 oz

*Calorie estimates are based on a sedentary lifestyle. Increased physical activity will require additional calories: by 0-200 kcal/d if moderately physically active; and by 200–400 kcal/d if very physically active.

†For youth 2 years and older; adopted from Table 2, Table 3, and Appendix A-2 of the *Dietary Guidelines for Americans* (2005)¹⁴; <http://www.healthierus.gov/dietaryguidelines>. Nutrient and energy contributions from each group are calculated according to the nutrient-dense forms of food in each group (eg, lean meats and fat-free milk).

‡Milk listed is fat-free (except for children under the age of 2 years). If 1%, 2%, or whole-fat milk is substituted, this will utilize, for each cup, 19, 39, or 63 kcal of discretionary calories and add 2.6, 5.1, or 9.0 g of total fat, of which 1.3, 2.6, or 4.6 g are saturated fat.

§Serving sizes are 1/4 cup for 1 year of age, 1/3 cup for 2 to 3 years of age, and 1/2 cup for _4 years of age.

A variety of vegetables should be selected from each subgroup over the week. Half of all grains should be whole grains.

¶For 1-year-old children, calculations are based on 2% fat milk. If 2 cups of whole

milk are substituted, 48 kcal of discretionary calories will be utilized. The American Academy of Pediatrics recommends that low-fat/reduced fat milk not be started before 2 years of age.

What is a “low-fat” food?

It is often easy to choose low-fat foods, many clues are on the food label including nutrition claims that the food is:

- **fat free** (less than 0.5g of fat per serving)
- **low fat** (less than 3g of fat per serving)
- **lean** (less than 10g of fat per serving and 4.5g of saturated fat)
- **extra lean** (less than 5g of fat per serving and 2g of saturated fat)
- **Trans Fat Free** (Less than 0.5g of trans fats per serving)
- **Low Cholesterol** (20mg or less per serving and 2g or less saturated fat per serving)
- **Cholesterol Free** (Less than 2mg per serving and 2g or less saturated fat per serving)
- **Low Saturated Fat** (1g or less and 15% or less of calories from saturated fat)
- **Low calorie** (40 calories or less per serving)

Nutrition claims that are less helpful when choosing low-fat foods include the terms reduced, less, and light, since they only mean that the food has fewer calories or grams of fat than the regular version of the food:

- **Reduced Fat** (25% less fat than food it is being compared to)
- **Light/Lite** (50% less fat or one-third fewer calories than the regular product)
- **Less Cholesterol** (25% or less than the food it is being compared to, and 2g or less saturated fat per serving)

Example, **tortilla chips**:

- DORITOS Nacho Cheese Flavored Tortilla Chips = 8g of fat and 140 calories per serving
- DORITOS **Reduced Fat** Nacho Cheese Flavored Tortilla Chips = 5g of fat and 120 calories per
- DORITOS **Light** Nacho Cheese Flavored Tortilla Chips = 2g of fat and 100 calories

per serving

- If you thought that the reduced fat chips were low fat, you would have been mistaken. They are not a bad choice, since they are not high in fat, but you can find "potato chips" with even less fat. These include BAKED! LAY'S Original Potato Crisps, with only 1.5g of fat, and TOSTITOS Light Restaurant Style Tortilla Chips, which as only 1g of fat per serving.

Example, **“reduced fat muffins”**:

- If its original fat content per muffin was 20g, and the fat has been reduced to 15g, it is still five times higher than the 3g per serving that officially qualifies as low fat.

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Example, **“light mayonnaise”**:

- “half the calories and fat of regular mayonnaise”
- the regular mayo has 11g of fat and 100 calories per serving; the light mayo has 5g of fat and 50 calories per serving
- fat calories in the light mayonnaise still account for 45 (or 90%) of those 50 calories.

So if you’re looking for low fat items, make sure it says exactly that on the label. A final note of caution: watch out for those packages of fat-free snacks. If you eat more than the single serving size, they cease to be a fat-free snack. All those fractions of a gram add up and count towards your daily fat intake.

Beware of excess sugar and calories in “low-fat” foods

Unfortunately, just because something is low in fat doesn't meant that it is low in calories. So while you want to avoid high-fat foods, **you also want to avoid foods that are high in sugar and calories**. For example, most of the foods that rank at the top of the list for being low in fat in the United States Department of Agriculture National Nutrient Database for Standard Reference include candy, soda, and fruit drinks!

Healthy low-fat foods, in addition to those that are labeled low fat or fat free, include:

- Fruits and vegetables (except olives and avocados- these contain healthy fats)
 - Egg whites
 - Angel food cake*
 - Oatmeal cookies*
 - Breakfast cereals (most brands)
 - Air-popped popcorn (without added butter)*
 - Light tuna fish (canned in water)
 - Wheat bread
 - Pancakes
 - Beans
 - Rice
 - Pretzels*
 - Vegetable soup
 - Chicken soup with rice
 - Milk - 1% reduced fat and skim milk
- *These are a few examples of low-fat snacks and most should be eaten in moderation only.

Hidden Fats

Many low-fat foods become high fat foods when they contain added high fat or hidden fat ingredients to them, including:

- oils, which are 100% fat and should only be used in limited amounts, with an emphasis on monounsaturated and polyunsaturated oils
- butter and margarine
- cheese
- mayonnaise (1 tablespoon = 10g of fat and 90 calories)
- ranch dressing (2 tablespoons = 15g of fat and 140 calories)
- nuts

Other foods made with hydrogenated vegetable oils, palm kernel oil, or coconut oil, are likely also high in fat.

Other options for lowering cholesterol levels:

Fiber

There are 2 kinds of fiber: soluble and insoluble. While our bodies need both, it is *soluble fiber* that helps to lower our cholesterol. Eating 5 to 10 grams of soluble fiber each day can decrease LDL (“bad”) cholesterol by 5% to 10%. It is best to get

soluble fiber from foods rather than supplements. Increase your fiber content gradually and drink lots of water (fiber without water can be constipating).

Examples of Soluble fiber:

- Cereal grains (barley, regular oatmeal, oat bran, whole-grain breads)
- Fruits: (prunes, citrus, strawberries, apples, pears)
- Beans and peas (dried and canned beans, peas and lentils)
- Vegetables (broccoli, brussels sprouts, carrots)

Soy Protein

Although it is not clear that soy protein alone reduces cholesterol, it may have that effect when used as a replacement for animal protein in milk or meat because animal-based foods naturally contain more cholesterol.

Between 2 and 4 servings of soy each day (25 grams or more) is about right. Several healthy brands of soy milk are on the market; these have less than 2 grams of saturated fat and less than 10 grams of sugar. Tofu is a refrigerated soy product. Many meat-substitute soy products can be found in the freezer case.

Examples of Soy Protein:

- soy milk
- soy/veggie burgers
- tofu

Omega-3 Fatty Acids

Omega-3 fatty acids reduce certain fats the bloodstream. Some fish and shellfish are rich sources of omega-3s, although anyone who could become pregnant and young children should limit those with high mercury content.

Omega-3 fatty acids

Seafood with high mercury content is to be avoided in pregnancy and in young children.

- **good:** shrimp, cod, catfish, clams, grouper, red snapper
- **better:** pollock, crab, lobster, whitefish

- **best:** salmon, herring, oysters, halibut, canned light tuna

Nuts

Replacing snacks high in saturated fats with nuts — especially almonds — can help reduce LDL and increase HDL (“good”) cholesterol. Nuts contain healthy fats, but they are also high in calories; choose those without added oils and salt and limit to a small handful a day.

Examples of healthy nuts:

- almonds
- hazelnuts
- pecans
- pistachios
- English walnuts

Whole Grains

Replacing refined carbohydrates with whole grains also helps lower cholesterol levels. Whole grain is the cereal grain left fully intact after it is harvested. A whole grain is called “whole” because it contains the bran, germ, and endosperm (refined grains contain only endosperm.) When wheat is harvested, the result is a small kernel called a wheat berry. Wheat berries are ground into whole wheat flour, which contains many more minerals, micro-nutrients and healthy fats than the endosperm alone. Whole grains also take longer to digest, and minimize spikes in blood sugar and insulin levels, which in turn help regulate fat metabolism. Look for “**whole grain**” on ingredient lists (as the first ingredient)- “whole flour” or “wheat flour” does NOT indicate a whole grain.

Examples of whole grains:

- Wheat berries, whole wheat flour
- Millet
- Rolled oats or oat groats
- Brown rice
- Hulled barley
- Popcorn

How to Make Fast Food Friendlier

Feeding your children nutritious meals between all your daily activities can be a challenge. If you must eat on the go, here are some tips to make fast food healthier for you and your family members:

- Pass on the “value-size.” When you supersize, the size of your fries isn’t the only thing that gets bigger.
- Skip the sides. Eating a burger or sandwich by itself is often filling enough. If you do want a side, consider ordering a fruit cup or side salad.
- Avoid double meat and bacon. A serving size of meat is 2-3 ounces — about the size of a deck of cards. You’re probably getting well over that with a single meat patty. Bacon is high in calories and fat with little nutrient content.
- Try the grilled chicken sandwich. Poultry without skin is significantly leaner than the meats most fast-food companies use in their burgers.
- Eat your sandwich open-faced. By eating only half the bun, you can eliminate unnecessary calories.
- Try asking for a wheat bun. Some places offer a wheat alternative, some don’t. It never hurts to ask.
- Skip the mayo and other calorie-laden dressings and sauces.
- Drink water, diet soda or low-fat milk. Sodas are loaded with sugars, which have calories you don’t need.

HOW TO READ FOOD LABELS:

http://pediatrics.about.com/od/nutrition/ss/food_labels.htm