

# Cholesterol and Fats

Fact Sheet No. 9.319

Food and Nutrition Series | Health

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## Cholesterol

**What is cholesterol?** Cholesterol is a waxy, fat-like substance found in all animals including people. It is an essential part of cells in the body and is used to make certain hormones and digest fats. There are two different types of cholesterol. Blood, or serum, cholesterol circulates in the blood. Dietary cholesterol comes from the food we eat.

**Is all blood cholesterol the same?** The chemical substance is the same. However, it is transported in the blood by different carriers. The relative amounts of cholesterol transported by each carrier can affect the risk of heart disease. The two major blood cholesterol carriers are LDL and HDL (see Table 1).

**Where do we get cholesterol?** Our bodies can make all of our cholesterol, but most people also get it from foods. Different foods vary in the amount of cholesterol they contain. Only animal products have cholesterol; plants do not. See Table 5.

**Is it harmful?** Cholesterol is necessary for a healthy body. By itself, it is not harmful. However, a high blood level of total cholesterol is a major risk factor for heart disease, along with high levels of LDL cholesterol. The higher the level, the greater the risk. In contrast, high levels of HDL cholesterol are protective.

The National Cholesterol Education Program (NCEP) recommends that everyone age 20 and older obtain what is called a “fasting lipoprotein profile” every five years. This is a blood test done after a 9 to 12 hour fast without food, liquids or pills. It reveals information about the total cholesterol, LDL cholesterol, HDL cholesterol, and triglyceride levels in the blood. Table 2 shows how the results from a fasting lipoprotein profile are classified.

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The results of the test, along with other factors, helps determine your overall risk for heart disease. When determining your total risk, consider other risk factors such as age, gender, family history, smoking, hypertension, diabetes, and obesity.

## Fats

**Is eating fat unhealthy?** Eating some fat is necessary. It is an important source of essential fatty acids (linolenic and lionoleic acids) and concentrated energy – it has more than twice as many calories per ounce as sugar, starch or protein. Fats help carry fat-soluble vitamins A, D, E and K. Fats can also make food taste better, aid in cooking, and help keep the hunger pangs away.

Yet, eating too much fat may lead to obesity, which is unhealthy. It also may increase the risk of heart disease and some forms of cancer.

**Are all fats the same?** There is not a single type of fat. Rather, the word “fat” is often used to refer to all of the fatty substances found both in food and in the body.

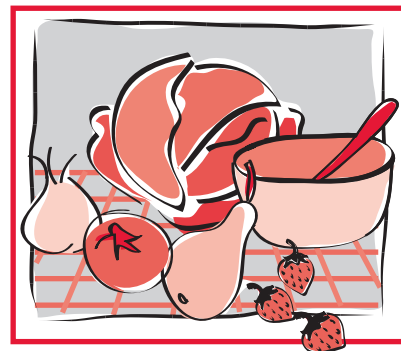
## Types of Fat (See Table 3)

**Essential Fatty Acids:** Types of fat that cannot be made in the body. We must eat foods rich in these as they are the building block for other important fatty acids (e.g., DHA/EPA).

**Lipid:** Scientific term referring to fat, cholesterol and other fat-like substances. A common quality among lipids is that they do not dissolve in water.

**Lipoprotein:** A protein-coated transporter that carries fat and/or cholesterol in the bloodstream.

**Triglycerides:** Scientific name for the main form of fat found in the diet and in the body. Most of the fat in the body is stored as triglycerides.



## Quick Facts

- Fats and cholesterol can help keep our bodies healthy or they can promote disease.
- There are several types of fat.
- Dietary fats and cholesterol can affect blood cholesterol levels.
- An elevated blood cholesterol level is a risk factor for heart disease.
- Most Americans eat too much fat and cholesterol.

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**Table 1. Characteristics of HDL and LDL.**

|                                  | LDL   | HDL   |
|----------------------------------|---|---|
| Full Name:                       | Low Density Lipoprotein.                                  | High Density Lipoprotein.                                   |
| What it does:                    | Takes cholesterol from the liver to the rest of the body. | Primarily takes cholesterol from body tissue back to liver. |
| Effect on risk of heart disease: | Excess amounts <b>increase</b> risk.                      | High amounts <b>reduce</b> risk.                            |
| Nickname:                        | "Bad" cholesterol.  | "Good" cholesterol.   |

**Saturated Fats:** Usually solid at room temperature, saturated fats have all of the hydrogen atoms they can hold (saturated with hydrogen). Saturated fats primarily come from animal products, but are also found in tropical plant oils, such as coconut and palm.

**Monounsaturated Fats:** Liquid at room temperature, monounsaturated fats are missing one pair of hydrogen atoms. Monounsaturated fats primarily come from

**Table 2. Classifications of a Fasting Lipoprotein Profile.**

|                          |                 |
|--------------------------|-----------------|
| <b>Total Cholesterol</b> |                 |
| Desirable                | < 200 mg/dL     |
| Borderline high          | 200 – 239 mg/dL |
| High                     | ≥ 240 mg/dL     |
| <b>LDL Cholesterol</b>   |                 |
| Optimal                  | < 100 mg/dL     |
| Near Optimal/Above       |                 |
| Optimal                  | 100 – 129 mg/dL |
| Borderline High          | 130 – 159 mg/dL |
| High                     | 160 – 189 mg/dL |
| Very High                | ≥ 190 mg/dL     |
| <b>HDL Cholesterol</b>   |                 |
| Low                      | < 40 mg/dL      |
| High <sup>1</sup>        | ≥ 60 mg/dL      |
| <b>Triglycerides</b>     |                 |
| Normal                   | < 150 mg/dL     |
| Borderline High          | 150 – 199 mg/dL |
| High                     | 200 – 499 mg/dL |
| Very High                | ≥ 500 mg/dL     |

<sup>1</sup>An HDL of 60 mg/dL and above is considered protective against heart disease.

plants and include olive oil, canola oil and peanut oil.

**Polyunsaturated Fats:** Liquid at room temperature, polyunsaturated fats are missing two or more pairs of hydrogen atoms. Many common vegetable oils, such as corn, soybean, safflower and sunflower oil, are high in polyunsaturated fats.

**Hydrogenated Fats:** Polyunsaturated fats and monounsaturated fats are sometimes processed to make them solid at room temperature and to protect against rancidity. Hydrogen atoms are added through a process called hydrogenation.

**Trans Fatty Acids:** A type of fat formed during the process of hydrogenation. Trans fatty acids have been shown to increase LDL cholesterol and lower HDL cholesterol, which may increase the risk for heart disease.

**Omega-3 Fatty Acids:** A type of fatty acid that is highly polyunsaturated. Omega-3 fatty acids are mainly found in higher-fat, cold-water fish, such as salmon, mackerel and herring, as well as omega-3 fortified eggs. Diets high in omega-3 fatty acids may help lower levels of LDL cholesterol and triglycerides.

## Fats and Cholesterol

**How are fats related to blood cholesterol?** Scientific evidence indicates that the amount and type of dietary fat can affect blood cholesterol. Eating less fat, especially saturated fats, has been found to lower blood cholesterol levels. Replacing some saturated fats with polyunsaturated and monounsaturated fats (especially olive and canola oil) also can help lower blood cholesterol. Dietary cholesterol can raise blood cholesterol but generally is not as important as saturated fat and total fat in the diet. Remember, high total blood cholesterol levels and LDL cholesterol levels increase risk of heart disease while lower levels reduce risk. Higher levels of HDL cholesterol help lower the risk for heart disease.

**How much fat and cholesterol is too much?** Frequently, recommendations for fat are given in percentage of calories from fat or fat calories. (Currently, the average American gets about 33 percent of total calories from fat.) Most medical experts think this is too much. The *U.S. Dietary Guidelines* advise a general reduction in fat (especially saturated fat) and cholesterol. Dietary recommendations by the American Heart Association and the National Cholesterol Education Program for fat and cholesterol intakes for both the general public and for people with high LDL cholesterol, heart disease and/or diabetes are presented in Table 4.

Diet therapy may not be enough for some people with high risk. Most people, however, continue diet therapy at least six months before deciding whether to add drug treatment.

Children can eat a diet consistent with adult guidelines to maintain

Here is a sample nutrition label seen on foods:

## Spinach Souffle Nutrition Facts

|                              |                      |
|------------------------------|----------------------|
| Serving Size ½ cup           |                      |
| Servings Per Container 3     |                      |
| Amount Per Serving           |                      |
| <b>Calories 150</b>          | Calories from Fat 90 |
| <b>% Daily Value*</b>        |                      |
| <b>Total Fat</b> 10g         | <b>15%</b>           |
| <b>Saturated Fat</b> 2g      | <b>10%</b>           |
| <b>Cholesterol</b> 120mg     | <b>38%</b>           |
| <b>Sodium</b> 480mg          | <b>19%</b>           |
| <b>Total Carbohydrate</b> 9g | <b>3%</b>            |
| <b>Dietary Fiber</b> 0g      | <b>12%</b>           |
| <b>Sugars</b> 4g             |                      |
| <b>Protein</b> 6g            |                      |
| Vitamin A 35%                | • Vitamin C 2%       |
| Calcium 10%                  | • Iron 4%            |

\* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

|                                    | Calories: | 2,000   | 2,500   |
|------------------------------------|-----------|---------|---------|
| Total Fat                          | Less than | 65g     | 80g     |
| Sat Fat                            | Less than | 20g     | 25g     |
| Cholesterol                        | Less than | 300mg   | 300mg   |
| Sodium                             | Less than | 2,400mg | 2,400mg |
| Total Carbohydrates                |           |         |         |
| Dietary Fiber                      |           | 25g     | 30g     |
| Calories per gram:                 |           |         |         |
| Fat 9 • Carbohydrate 4 • Protein 4 |           |         |         |

This label tells you that this spinach souffle provides 10 g total fat in a half cup serving. This is 15% of the Daily Value for total fat, based on a 2,000-calorie diet: 10 grams fat / 65 g total fat in a 2,000-calorie diet = 15%. (See fact sheet 9.365, Understanding the Food Label).

Evaluate your diet as a whole. The percent of calories from fat for the entire diet is more important than the percentage of fat from an individual food.

appropriate growth while lowering risk for future cardiovascular disease. Adoption of a healthy diet and lifestyle in youth is recommended because it tracks into adulthood.

**In what foods are fats and cholesterol found?** In some foods, fats are obvious, such as in noticeably greasy, fried or oily foods. In other foods, they are more

**Table 3. Polyunsaturated, monounsaturated and saturated fats.**

|                             | <b>Polyunsaturated (fats, oils)</b>  | <b>Monounsaturated (fats, oils)</b>                   | <b>Saturated (fats)</b>  |
|-----------------------------|--|---|--|
| Amounts of hydrogen:        | Missing many hydrogen atoms.   | Missing some hydrogen atoms.                          | Filled up with hydrogen.   |
| How they affect our health: | Can lower blood cholesterol, may lower HDL.  | Lowers blood cholesterol but not HDL.                 | Can raise blood cholesterol.   |
| At room temperature:        | Polyunsaturated and monounsaturated fats are liquid (so we call them oils).          |   | Saturated fats are usually solid or firm.  |
| Where they come from:       | Mostly from plants: safflower oil, corn oil, soybean oil, cottonseed oil, sesame oil | Mostly from plants: olive oil, peanut oil, canola oil | Mostly from animals: fat in meat, butter, lard, cheese, whole milk, cream. Some from plants: coconut oil, palm oil, cocoa butter (in chocolate), hydrogenated vegetable oil. |

**Table 4. Recommendations for Calories, Fat and Cholesterol Intakes\***

| <b>Nutrient</b>       | <b>People without Heart Disease or High LDL Cholesterol</b>                                | <b>People with Heart Disease, Diabetes, or High LDL Cholesterol</b> |
|-----------------------|--|---|
| <b>Total Calories</b> | Balance calorie intake and physical activity to achieve or maintain a healthy body weight. |   |
| <b>Total Fat</b>      | Less than 30% of total calories  | 25 – 35% of total calories <sup>1</sup>                             |
| Saturated Fat         | Less than 10% of total calories  | Less than 7% of total calories                                      |
| Polyunsaturated Fat   | Up to 10% of total calories  | Up to 10% of total calories   |
| Monounsaturated Fat   | Up to 20% of total calories  | Up to 20% of total calories   |
| <b>Cholesterol</b>    | Less than 300 mg/day   | Less than 200 mg/day  |

\*By the American Heart Association and the National Cholesterol Education Program

<sup>1</sup>A higher fat intake is allowed, provided most of it is unsaturated fat, and may be needed to prevent low HDL levels from worsening.

invisible. Cholesterol comes from animal products but has no tell-tale signs. It is not found in food products made from plants. A food can be high in fat and cholesterol (fried egg), high in fat but low in cholesterol (peanut butter), low in fat and high in cholesterol (shrimp) or low in both (fruit). Table 5 shows the fat and cholesterol contents of several foods.

**What about fish and fish oil supplements?** Diets high in fish, especially cold-water fish like salmon, herring, mackerel, and whitefish, have been linked to reduced risk of heart disease. People who eat large amounts of fish tend to have lower blood cholesterol and triglyceride levels. The high amounts of omega-3 fatty acids found in fish are believed to be the reason. The current recommendation is to consume a variety of fish (preferably oily)

at least two times per week. The use of fish oil supplements could be considered with consultation with your doctor, especially in individuals with cardiovascular disease and elevated triglycerides.

## Reducing Fat and Cholesterol

**Read labels and shop carefully.** The Nutrition Facts panel on the food label provides the necessary information to help consumers meet the American Heart Association's and the USDA/Health and Human Services' Dietary Guidelines. The Nutrition Facts panel lists the Daily Reference Values (DRV) for specific nutrients, including fat, saturated fat and cholesterol. DRVs are set by the Food and Drug Administration and are intended to help consumers evaluate their food choices to determine how their intake of certain nutrients compares to desirable intakes. The DRV for fat is 65 g, for saturated fat 20 g, and for cholesterol 300 mg.

Specific health claims can be made for food products that meet certain requirements. For example, "While many factors affect heart disease, diets low in saturated fat and cholesterol may reduce the risk of this disease." In order to make a health claim about heart disease and fats, the food must be low in fat, saturated fat and cholesterol. Terms "lean" and "extra lean" can be used to describe the fat content of meat, poultry, seafood and game meats if certain standards are met.

Products that have "percent fat free" claims must accurately reflect the amount

### When shopping, buy foods: with less fat:

- Hamburger with deep color or labeled "lean"
- Least fatty grades of meat
- Nonfat, 1%, or 2% milk
- Nonfat dry milk
- Tuna packed in water

### instead of those with more fat:

- Hamburger with light pink color or labeled "regular"
- Heavily marbled beef
- Whole milk
- Nondairy coffee creamer
- Tuna packed in oil

of fat present in 100 grams of the food. "Percent fat free" products must meet the low fat or fat free product definitions. For example, if a product contains 2.5 grams of fat per 50 grams, the claim must be "95 percent fat free."

**Learn the heart-healthy facts.** It is true that fat and cholesterol often are found in meats, but meats can provide many important nutrients. Many people think chicken and fish are healthier than red meat. However, with careful selection and preparation, red meats can be low in fat and included in a heart-healthy diet.

Remember, chicken and fish, which often are low-fat choices, can be prepared so they are higher in fat than lean beef or pork. Dark meat poultry has more fat than white meat. Keeping the skin on chicken or frying it adds more fat. What you buy at

### Eat more:

- Vegetables
- Fruits
- Lean meats, fish, poultry
- Vegetable protein – peas, lentils, beans, grains, nuts, seeds, soy
- Whole grains in breads, cereals, pasta and white grains
- Fruit for dessert and snacks

### Eat less:

- Fried foods
- Fatty and processed meats – lunch meats, bacon, hot dogs, sausage
- Desserts high in fat – ice cream, pastries, pies, cheesecake

**Table 5. Spotting hard to see fats and cholesterol in foods.**

| Category, food                         | Serving size | Grams fat per serving | Cholesterol (mg/dl) |
|--|--------------|-----------------------|---------------------|
| <b>Dairy</b>                           |              |                       |                     |
| ice cream                              | 1 cup        | 14                    | 59                  |
| egg, cooked                            | 1            | 6                     | 213                 |
| cheddar cheese                         | 1 oz.        | 9                     | 30                  |
| <b>Meat</b>                            |              |                       |                     |
| regular ground beef, cooked (70% lean) | 1 patty      | 12                    | 60                  |
| hot dogs                               | 1            | 16                    | 30                  |
| chicken leg w/skin                     | 1            | 20                    | 139                 |
| <b>Nuts and seeds</b>                  |              |                       |                     |
| peanut butter                          | 1 Tbsp.      | 8                     | 0                   |
| <b>Baked goods</b>                     |              |                       |                     |
| doughnut, glazed (3 1/4" diameter)     | 1            | 14                    | 4                   |
| brownies (2 3/4" x 7/8")               | 1 square     | 9                     | 10                  |
| <b>Candy</b>                           |              |                       |                     |
| chocolate                              | 1 oz.        | 9                     | 7                   |
| <b>Other</b>                           |              |                       |                     |
| olives, giant size                     | 5            | 3                     | 0                   |

\*Fats do not always come in teaspoons, but all fat must be counted in what you eat each day. For example, the fat in a hot dog cannot be measured with a teaspoon, but it may be a big source of fat, contributing 3 teaspoons per 2 ounces of hot dog.

References: National Heart, Lung and Blood Institute. Executive Summary of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *Journal of the American Medical Association*, 285(19): 2486-97, 2001.

American Heart Association. Diet and lifestyle recommendations revision 2006: A scientific statement from the American Heart Association nutrition committee. *Circulation*, 114:82-96, 2006. U.S. Department of Agriculture. Agricultural Research Service.

Nutrient intakes from food: Mean amounts and percentages of calories from protein, carbohydrate, fat, and alcohol, One day, 2003 - 2004. 2007. Or [www.ars.usda.gov/ba/bhnrc/fsrg](http://www.ars.usda.gov/ba/bhnrc/fsrg).

the store and how you cook the food makes the difference.

**To reduce meat fats:**

- Cut off all visible fat.
- Thoroughly drain fat off all cooked meats.
- Cook stew and other meats a day ahead of time. Remove the hardened fat from the top before reheating or making chili, stew or soups.
- Baste with wine, tomato juice or bouillon instead of drippings.
- Broil rather than pan-fry meats, such as hamburger, chops and steak.
- Remove skin from chicken.
- Buy lean or extra lean meats.

**Examples of lean meat choices:**

**Beef** – round steak, rump roast, top ground steak and roast, tip steak and roast, lean cubed steak, top loin steak, tenderloin steak, flank, sirloin, ground beef, lean or extra lean.

**Pork** – leg roast (fresh ham), leg steak, lean pork cutlets, center rib chop and roast, butterfly chop, sirloin roast, tenderloin, tenderloin roast, ground pork, lean or extra lean, lean shoulder cubes, lamb-leg, loin chops.

**Change recipes to reduce fats.** Many favorite recipes can still be used in a reduced-fat diet.

- Try cutting oil or fat in half. You usually can't tell the difference.
- Use lean meats in recipes.
- In casseroles, use more vegetables and less meat and be careful with the sauces.
- Use low-fat alternatives for sour cream, mayonnaise and whipping cream, such as nonfat yogurt or whipped topping made from skim milk.
- Use two egg whites instead of one yolk.

**Watch portion sizes.** Moderation is the key. For example, a lean 3-ounce meat portion provides you with the nutrients you need. A piece of meat the size of a deck of cards is about a 3-ounce portion. Don't eliminate – just cut down. Eat high-fat food less often and in small portions.

**Increase fiber intake.** Research has shown eating foods rich in soluble fiber may decrease LDL cholesterol levels. Foods high in soluble fiber include cereal grains, beans, peas, legumes and many fruits and vegetables. For more information see fact sheet no. 9.333 *Dietary Fiber*.

There are several things you can do to reduce the amount of fat and cholesterol you eat.

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**The following terms describe products that help reduce intake of fat:**

- Low fat: 3 grams or less per serving.
- Low saturated fat: 1 gram or less and less than 0.5 grams trans fat per serving.
- Low cholesterol: Less than 20 mg cholesterol and 2 grams or less of both saturated fat and trans fat per serving.
- Low calorie: 40 calories or less per serving. Synonyms for low include "little," "few" and "low source of."
- Reduced: At least 25 percent fewer calories, fat, saturated fat, or cholesterol per serving than the original product.
- Lean: Less than 10 grams fat, less than 4.5 grams saturated fat and trans fat, and less than 95 mg cholesterol per serving and per 100 grams.
- Extra lean: Less than 5 grams fat, less than 2 grams saturated fat and trans fat, and less than 95 mg cholesterol per serving and per 100 grams.
- Light: 1/3 fewer calories, 1/2 the fat, or 1/2 the sodium of reference food.