

## Cholesterol & Fats in Our Diet: Part 1

### Good vs. bad

By now you have probably heard that high blood cholesterol is bad for you and that eating a “low-fat, low cholesterol” diet is good for you. High blood cholesterol contributes to some of the nation’s leading killers – coronary heart disease (which leads to heart attack), and stroke.<sup>1</sup>

Did you know, however, that cholesterol is essential to the functioning of your body? Did you know that the *type of fat* in your diet is one of the most important factors in prevention? Did you know that you can substitute *good fats* for *bad fats*? Do you know if your cholesterol

levels are putting you at risk for heart disease, heart attack, or stroke? And if so, do you know how to make changes to get a healthy lipid (fat and cholesterol) profile? This issue of *HealthHints*, along with the November and December issues, will try to answer these questions and give you the latest information on the role of cholesterol and fats in your diet.

### Cholesterol Facts & functions

“It may surprise you that cholesterol itself isn’t bad.”<sup>2</sup> In fact, cholesterol is essential to the normal functioning of the body. It is needed to:

- make vitamin D,
- make some hormones,
- build cell walls, and
- create bile acids that help you digest food.<sup>3</sup>

In fact, cholesterol (a waxy, fat-like substance) is found in **every** cell in the body.<sup>3</sup>

Cholesterol cannot dissolve in the blood, so it has to be carried to and from the cells in protein packages called lipoproteins.<sup>4</sup> There are two main types of cholesterol, known as:

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- Low density lipoproteins (LDL) and
- High density lipoproteins (HDL).

LDL cholesterol is considered *bad* cholesterol (remember L for Lousy) because too much of it in the bloodstream can clog the blood vessels and increase our risk for disease. HDL cholesterol is considered the *good* cholesterol (remember H for Healthy) because it picks up the vessel-clogging cholesterol and carries it away to the liver to be disposed of in the form of bile<sup>5</sup> (see [How the Body Produces & Uses Cholesterol](#)).

Cholesterol comes from two sources: your body and food.<sup>6</sup>

While your body needs some cholesterol to function properly, none of it really needs to come



## Cholesterol Ratio

Because of HDL's important role in the health of blood vessels, doctors often "prefer to talk about the cholesterol ratio – your total cholesterol divided by your HDL cholesterol. For example, if your total cholesterol number is 250 and your HDL is 50, your ratio is 250/50 or 5."<sup>5</sup> Sometimes this is expressed as 5:1.<sup>14</sup> A ratio of 3.5 (or 3.5:1) is considered optimal, and people are urged to aim for a ratio of 5 (or 5:1) or less.<sup>5, 14</sup>

from food (since the body produces its own), and too much cholesterol in your blood



can lead to the build up of **plaque** (a thick, hard deposit).<sup>4</sup> This build up of plaque can narrow the arteries and make them less flexible – a condition known as **atherosclerosis**.<sup>4</sup> Eventually, these deposits of cholesterol and the narrowing of the arteries make it difficult for oxygen- and nutrient-rich blood to flow through the arteries. It may cause **high blood pressure** since the blood has to work harder to pump through the arteries. Additionally, if not enough oxygen-rich blood reaches the heart, chest pain, called **angina**,<sup>7</sup> may result. If blood supply to a portion of the heart is completely cut off by total

blockage of the **coronary artery** (artery that leads directly to the heart), the result is a **heart attack**.<sup>7</sup> If, on the other hand, this decreased blood flow or blockage is in an artery leading to the brain, the result is a **stroke**. Heart attack and stroke often occur due to sudden closure of an artery caused by a **blood clot**, which occurs when plaque ruptures.<sup>8</sup> The "clot" then blocks the entire artery, which may lead to heart attack, stroke, or sudden death.<sup>8</sup>

### Are You at Risk?

#### Knowing your numbers

Because the risks of heart disease and stroke are so great for those with high blood cholesterol, it is critical to be aware of your levels. "You're more likely to have high cholesterol if you're inactive, obese, or eat unhealthy foods. Although high cholesterol can lead to heart disease on its own, other factors compound the risk:

- **Smoking.** Cigarette smoking damages the walls of your blood vessels, making them likely to accumulate fatty

deposits. Smoking may also lower your level of HDL cholesterol.

- **High blood pressure.** Increased pressure on your artery walls damages your arteries, which can speed the accumulation of fatty deposits.
- **Diabetes.** High blood sugar contributes to high LDL cholesterol and low HDL cholesterol. High blood sugar also damages the lining of your arteries.
- **Family history of heart disease.** If a parent or sibling developed heart disease before age 55, high cholesterol levels place you at a greater than average risk of developing heart disease."<sup>9</sup>

High cholesterol has no symptoms; therefore, the only way to know your levels is through a blood test. Everyone age 20 and older should have their cholesterol measured at least every 5 years.<sup>10</sup> Ask your doctor to perform a blood test known as a lipid profile. The



term lipid profile or lipid panel is used to describe a group of tests that are often ordered together to determine the risk of coronary heart disease. These tests have been shown to be good indicators of whether someone is likely to have a heart attack or stroke caused by the blockage of blood vessels.<sup>11</sup> The tests in the lipid profile include:

- total cholesterol,
- HDL cholesterol,
- LDL cholesterol, and
- triglycerides.<sup>11</sup>

The table, “What Your Cholesterol Numbers Mean,” contains the standard for what the numbers in the lipid profile mean.

### HDL

HDL (healthy) cholesterol is especially important to the health of your blood vessels. It is like “nature’s plaque vacuum cleaner – it picks up the vessel-clogging cholesterol and carries it away to the liver, where it is disposed of in the form of bile. The higher your HDL levels, the cleaner your blood vessels will be.”<sup>5</sup> You can think of HDL as a garbage truck. Most Americans eat a diet that’s relatively high in saturated fat, trans fat, and cholesterol—i.e., a lot of “garbage.”<sup>13</sup> “Those people who have a lot of garbage trucks—in other words, who have high HDL levels—are more efficient at getting rid of extra fat and cholesterol in their diet. As a result, they have a lower risk of a heart attack or stroke than those who eat a high-fat, high-cholesterol diet who have lower HDL levels.”<sup>13</sup>

### LDL

“Because LDL cholesterol is closely associated with heart disease, it’s the main focus of cholesterol-lowering treatment. But it’s not as simple as the chart may appear. Your target LDL number can vary, depending on your underlying risk of heart disease.

Most people should aim for an LDL level below 130 mg/dL. If you have other risk factors for heart disease, your target LDL may be below 100 mg/dL. If

you’re at very high risk of heart disease, you may need to aim for an LDL level below 70 mg/dL.

So who’s considered very high risk? You might be if you’ve had a heart attack or if you have diabetes. In addition, two or more of the following risk factors might also place you in the very high risk group:

- Smoking
- High blood pressure
- Low HDL cholesterol

What Your Cholesterol Numbers Mean	
<b>Total Cholesterol:</b>	
Less than 200 mg/dL	Desirable
200-239 mg/dL	Borderline high
240+ mg/dL	High
<b>HDL (good/healthy) Cholesterol:</b>	
Less than 40 mg/dL (men)	Bad
Less than 50 mg/dL (women)	Bad
40-59 mg/dL	Better
60+ mg/dL	Best
<b>LDL (bad/lousy) Cholesterol:</b>	
Less than 70 mg/dl	Optimal for people at very high risk for heart disease
Less than 100 mg/dL	Optimal for people at risk of heart disease
100-129 mg/dL	Near optimal
130-159 mg/dL	Borderline high
160-189 mg/dL	High
190+ mg/dL	Very high
<b>Triglycerides:</b>	
Less than 150 mg/dL	Desirable
150-199 mg/dL	Borderline high
200-499 mg/dL	High
500+ mg/dL	Very high. <sup>9</sup>

- Family history of early heart disease
- Age older than 45 if you're a man, or older than 55 if you're a woman."<sup>9</sup>

## Triglycerides

Triglycerides and cholesterol are separate types of fat that circulate in the blood. Triglycerides provide your body with energy between meals, while cholesterol is used to build cells and certain hormones. Foods that tend to increase triglycerides the most are carbohydrates and alcohol consumption. Foods that contain high saturated and trans fat also have an effect on increasing triglycerides. When you eat, your body converts any calories it doesn't need to use right away into triglycerides and stores it in the form of fat in the body.

If you regularly eat more calories than you burn, you may have high triglycerides. High levels of triglycerides can contribute to heart disease, stroke, and other disease risk (see *Triglycerides*). The same recommendations for



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change in diet and exercise patterns that help reduce cholesterol can help reduce triglycerides as well.<sup>12</sup> (See the November issue of *HealthHints* for more information on diet and exercise.)

Take a closer look at what makes up your lipid profile in the article *LDL and HDL Cholesterol: What's Bad and What's Good?* from the American Heart Association.

## When Your Numbers Are High Taking action for your health

"High cholesterol can be caused by several factors — some you can change, and some you can't. Heredity can play a big part. Some people can have a perfect heart-healthy lifestyle and still have skyrocketing cholesterol because their bodies naturally make too much of it (see *How the Body Produces & Uses Cholesterol*) — our bodies' production of cholesterol is independent from what we eat. Also, LDL cholesterol increases naturally with age, so even if you put up all-star numbers when you were younger, each passing year has made you that much more likely to have problems."<sup>5</sup>

If your numbers are bad, borderline high to very high, undesirable, or not optimal — it



is time to take some action (see *High Blood Cholesterol: What You Need to Know* and *Measuring Your Blood Cholesterol*). Although cholesterol sometimes must be controlled with medication, the first steps to controlling cholesterol involve lifestyle changes, including a healthy diet and physical activity. See the next issue of *HealthHints* for the latest on lifestyle change steps you can take to improve your cholesterol levels and reduce your risk for disease, as well as information for when cholesterol-controlling medications are necessary.

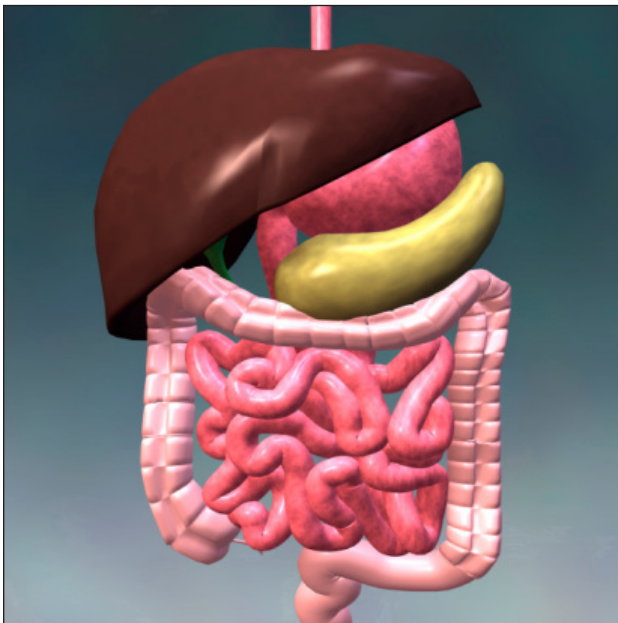
To view the references used in this newsletter, go to:

<http://fcs.tamu.edu/health/healthhints/2007oct/ref.php>

## How the Body Produces & Uses Cholesterol

Cholesterol in the blood is controlled in two important places:

- Liver – where cholesterol is produced
- Intestines – where cholesterol is absorbed.



Dietary lipids (cholesterol and triglycerides) are absorbed through the **intestines** and then are delivered through the bloodstream to the **liver**, where they are processed.<sup>1</sup>

The **liver** produces cholesterol (using it to make digestive acids, which are also called bile) and also removes cholesterol from the blood. The **intestines** absorb cholesterol, which comes from food and from bile.<sup>2</sup>

“One of the main jobs of the **liver** is to make sure all the tissues of the body receive the cholesterol and triglycerides they need to function.

Whenever possible (i.e., for about 8 hours after a meal), the liver takes up dietary cholesterol and triglycerides from the bloodstream. During times when dietary lipids are not available, the liver produces cholesterol and triglycerides itself.”<sup>1</sup> The liver then packages the cholesterol and triglycerides, along with special proteins, into tiny spheres called **lipoproteins** (HDL and LDL). “Cholesterol can’t dissolve in the blood. It has to be transported to and from the cells by carriers called lipoproteins.”<sup>3</sup> “The lipoproteins are released into the circulation and are delivered to the cells of the body. The cells remove the needed cholesterol and triglycerides from the lipoproteins as they are needed.”<sup>4</sup>

If the **liver** produces more cholesterol than the **intestines** absorb, there will be excess cholesterol in the blood.<sup>2</sup>

Sources:

1. Fogoros, R.N. (2003). Cholesterol and triglycerides [on-line]. Retrieved August 16, 2007. From <http://heartdisease.about.com/cs/cholesterol/a/choltri.htm>.
2. American Heart Association (2007). Common misconceptions about cholesterol [on-line]. Retrieved June 21, 2007. From <http://www.americanheart.org/presenter.jhtml?identifier=3006030>.
3. American Heart Association (2007). LDL and HDL cholesterol: What’s bad and what’s good? [on-line]. Retrieved August 20, 2007. From <http://www.americanheart.org/presenter.jhtml?identifier=180>.