

Heart&Stroke

Living with Cholesterol

Cholesterol and healthy living



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STROKE
FOUNDATION**

heartandstroke.ca

Cholesterol and Healthy Living

What is cholesterol?

The word “cholesterol” can refer either to the cholesterol found in the body (blood cholesterol) OR the cholesterol found in food (dietary cholesterol). In this booklet, for the sake of easy reading, we’ll use the word “cholesterol” to talk about “blood cholesterol” or, specifically, high blood cholesterol. As for cholesterol in food, we’ll use the term “dietary cholesterol.”

Cholesterol is a soft waxy substance made by our bodies. It is one of the lipids (fats) normally found in the blood and every cell of the body. We often associate cholesterol with health problems. In fact, cholesterol is a vital building block of cell membranes, hormones and vitamin D. Without it, our bodies couldn’t function.

Cholesterol is transported in the blood in lipoproteins. Excess cholesterol carried in LDL (low density lipoproteins) is a major risk factor for atherosclerosis, also known as narrowing of the arteries.

In atherosclerosis, a sticky substance called plaque builds up on the insides of arteries (blood vessels that carry blood from the heart to different parts of the body). This build-up slowly clogs the arteries and damages their lining. The major component of plaque is cholesterol. As the arteries narrow and become damaged, the risk of circulation problems, angina, heart attacks and strokes increases.

Almost 40% of Canadian adults are classified as having high blood cholesterol levels.

Where does cholesterol come from?

The liver makes about 80 percent of the cholesterol in your body. The other 20 percent comes from the foods you eat. The foods that raise your blood cholesterol the most are saturated fat and trans fat in such foods as fatty meat and whole-fat dairy products, snack foods and ready-prepared foods. Foods that have high levels of dietary cholesterol

include egg yolks, organ meats, shrimp, squid and fatty meats. Dietary cholesterol only has an effect in some people.

From a nutrition perspective, the best way for controlling blood cholesterol is to eat a healthy diet that is lower in fat, especially saturated and trans fat. Your doctor will advise you on how much food containing dietary cholesterol you should eat. We’ll discuss the different kinds of dietary fats and their role in your diet a little later on in this booklet.

Lifestyle and cholesterol levels

Adopting a healthy lifestyle is an important first step toward achieving and maintaining healthy cholesterol levels. In this booklet, we’ll outline lifestyle changes that can help you manage your cholesterol levels and lower your risk of cardiovascular disease. The basics of cholesterol management include:

- Eating a diet that is lower in saturated and trans fats, and includes plenty of fruit, vegetables and whole grains;
- Being physically active, and accumulating 150 minutes of moderate- to vigorous-intensity physical activity per week in bouts of 10 minutes or more;
- Achieving and maintaining a healthy weight;
- Limiting excess alcohol intake;
- Being smoke-free.

Understanding lipoproteins

Cholesterol is carried through the body by the blood, in tiny cholesterol-protein packets called lipoproteins. The major lipoproteins are:

1. **Low-density lipoproteins or LDL cholesterol;**
2. **High-density lipoproteins or HDL cholesterol.**

To understand the results of cholesterol testing, we need to understand the difference between these two.

The first, LDL cholesterol, is known as “bad” cholesterol. While our bodies need normal amounts of LDL cholesterol for cell growth and repair, high levels of LDL cholesterol are responsible for the buildup of plaque in the arteries.

The second, HDL cholesterol, is known as “good” cholesterol because it helps move “bad” cholesterol out of the cells that line the arteries to the bloodstream and back to the liver for excretion.

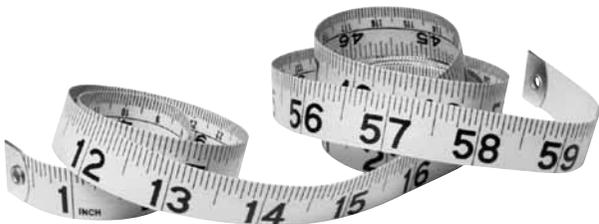
Triglyceride – the most common fat in the body

Another type of fat called triglyceride is usually measured when your cholesterol is tested. Triglyceride is not cholesterol. However, it is the most common form of fat in our bodies. It appears to be associated with increased heart disease risk, although the exact relationship is not yet clear. High blood triglycerides may increase the tendency of the blood to clot. The greater the tendency to clot, the greater the risk of a heart attack or stroke.

High triglyceride levels are associated with excess intake of simple sugars, refined carbohydrates, saturated fats, trans fats and alcohol. They are closely linked to excess body weight, a sedentary lifestyle and poorly controlled diabetes.

A question of balance

All blood lipids (fats) have a role within the body. The key to good health is maintaining a proper balance between them. In the next several pages, we’ll see how blood lipids are measured and what levels of each are considered healthy.



How do I know if I have high cholesterol?

In most cases, high cholesterol does not produce symptoms. The only way to know if you have high cholesterol levels is to have your blood tested. Not sure if you should be concerned about your cholesterol levels? Ask your doctor.

Canadian guidelines recommend having your cholesterol tested if you:

- are male and over 40 years of age;
- are female and over 50 years of age and/or post-menopausal;
- have heart disease, diabetes or high blood pressure;
- have a waist measurement greater than 102 cm (40 inches) for men or 88 cm (35 inches) for women;
- smoke or have smoked within the last year;
- have erectile dysfunction.
- have a family history of heart disease or stroke.

A simple blood test is all it takes

Cholesterol levels can be measured by a simple test involving a blood sample taken from the arm. This test can analyze the four types of fats in the blood and total cholesterol levels.

When cholesterol is tested, you will usually receive five categories of results:

1. Total cholesterol;
2. LDL cholesterol;
3. HDL cholesterol;
4. Triglycerides;
5. Total cholesterol/HDL cholesterol ratio.

Measuring the levels of these different lipids (fats) helps doctors assess your risk for heart disease. To manage your health, you should know your cholesterol numbers and what they mean.

Total cholesterol

Total cholesterol means the total amount of cholesterol in your blood. This includes LDL cholesterol and HDL cholesterol.

LDL cholesterol

High levels of LDL cholesterol can cause a buildup of plaque (cholesterol deposits) inside your arteries. This can lead to narrowing of the arteries and increased risk of heart attack or stroke.

HDL cholesterol

Research suggests HDL cholesterol may help protect us from atherosclerosis (the gradual “clogging up” of arteries by plaque), heart disease and stroke. Higher levels of HDL cholesterol are generally associated with a reduced risk of heart disease and stroke. Generally, your HDL cholesterol level should be higher than 1.0 mmol/L for men and higher than 1.3 mmol/L for women.

Triglycerides

High triglyceride levels are linked to low levels of HDL “good” cholesterol, excess body weight and poorly controlled diabetes. Generally, your triglyceride level should be less than 1.7 mmol/L.

Total cholesterol/HDL cholesterol ratio

This ratio shows how high your HDL “good” cholesterol is relative to your overall cholesterol levels.

Your total cholesterol/HDL cholesterol ratio, which will be given in your cholesterol test results, is calculated by dividing your total cholesterol number by your HDL cholesterol number. A lower number is associated with a lower risk of heart disease.

Understanding your test results

When looking at your cholesterol test results, it's important to remember there is no “ideal” level for any type of cholesterol. Test results should be considered together with your risk factors, medical history and present health. For example, test results that are normal for a healthy young adult might indicate a health risk for an older adult with diabetes. Your doctor is the best person to interpret your test results and advise you if you need to take action.

In Canada, the results of cholesterol tests are given in millimoles per litre (mmol/L).* As we've seen, four types of blood lipids (fats) are tested. Refer to the table on page 19 to keep track of your cholesterol test results and the target levels recommended by your health care provider.

* NOTE:

In the United States, results are reported in milligrams per decilitre (mg/dL). To convert American cholesterol readings to an approximate Canadian equivalent, divide the American number by 40; for triglycerides, divide the American number by 90.



“Research on cholesterol metabolism is one of the keys to preventing heart disease and stroke. Although we know a lot about the effects of abnormal cholesterol levels, there is still much to be learned about the causes and the Heart and Stroke Foundation is a leading funder in this area. Understanding the causes will help us devise better ways to prevent heart disease and stroke.”

Jacques Genest, MD

Heart and Stroke Foundation Researcher

Professor, Department of Medicine –
Division of Experimental Medicine
McGill University, Montreal, Quebec

Cholesterol levels and other risk factors

When deciding your target cholesterol ranges, your doctor will take into account your cardiovascular risk factors (i.e. things that increase your risk of heart disease and stroke). These include:

- Age and gender.
 - Males, over the age of 55 years, and females, after menopause, are at increased risk for heart disease.
 - Stroke can occur at any age. As you age, your risk increases. Until menopause, women have a lower risk of stroke than men.
- Ethnicity – people of First Nations, African or South Asian descent are at a greater risk of heart disease.
- High blood pressure (hypertension).
- Family history. You are at higher risk if a close family member (parent, brother or sister) had a heart attack or a stroke before age 55 for a male relative or before age 65 for a female relative.
- Diabetes.
- Smoking.
- Physical inactivity.
- Being overweight (for men – having a waist circumference greater than 102 cm or 40 inches; for women – having a waist measurement greater than 88 cm or 35 inches).

The more risk factors you have, the more important it is to keep cholesterol levels within their target range. If any of your cholesterol levels are significantly outside of their ranges, ask your doctor about lifestyle changes you can make to positively impact those levels. Your doctor may also prescribe medication to help keep your cholesterol in check.

Cholesterol control through food and activity

Unhealthy blood cholesterol levels can increase your risk for stroke and heart disease, as well as conditions such as atherosclerosis (narrowing of the arteries). If you have been diagnosed with high cholesterol, you can get your numbers back on track by:

- making healthy dietary changes;
- being active 150 minutes per week in bouts of 10 minutes or more;
- achieving and maintaining a healthy body weight; and
- becoming smoke-free.

Eat healthier

Simple dietary changes can help keep cholesterol at healthy levels. The key is to eat nutritious, balanced meals, choosing foods from each of the four major food groups recommended by *Canada's Food Guide*. In addition:

- Follow a lower-fat diet with between 20% to 35% of calories from fat. That's equal to 45 to 75 grams of fat per day for women and 60 to 100 grams per day for men.
- Avoid trans fat, which is found in foods made with shortening or partially hydrogenated vegetable oil, such as fast and many packaged foods. Trans fats raise "bad" LDL cholesterol and lower "good" HDL cholesterol levels.
- Reduce your intake of foods that are high in saturated fat, such as fatty meats, and dairy products such as butter, cheese, cream or homogenized milk.
- Choose healthy unsaturated fat found in oils, nuts and fish.
- Include more vegetables and fruits, whole grains, legumes and nuts in your diet.

Increase fibre

Fibre is a vital part of a healthy diet, but most of us are getting less than half the recommended amount. A healthy adult needs 21 to 38 grams a day, but surveys show that the average daily Canadian intake is about 14 grams. A heart-healthy diet includes foods that are higher in fibre. Good sources of fibre can be found in two of *Canada's Food Guide* Food Groups containing complex carbohydrates: whole-grain products such as wild and brown rice and oatmeal; and vegetables and fruit.

There are two kinds of fibre: soluble and insoluble. Soluble fibre may help lower cholesterol and control blood sugar. The best sources are oatmeal and oat bran, legumes such as dried beans, peas and lentils, and pectin-rich foods such as apples, strawberries and citrus fruit. You will also see cereals and over-the-counter products that contain psyllium, a soluble fibre.

When shopping, check food product labels carefully. Look for 100% whole grain or 100% whole wheat with the germ at the beginning of the ingredient list, and check the fibre content in the Nutrition Facts table. Products with 2 grams of fibre or more are a healthy choice.

What are plant sterols?

Health Canada has approved the addition of plant sterols to certain foods. Research has shown that plant sterols (also known as phytosterols and plant stanols) can help lower LDL ("bad") cholesterol. In order to achieve a sustained drop in unhealthy cholesterol, consumers need to eat 2 to 2.5 g of plant sterols a day and must continue to use them to maintain the benefit.

Plant sterols occur naturally in small amounts in vegetable oils, nuts, whole grains, vegetables and fruit. For example, to get 2 g of naturally occurring plant sterols per day, you would need to eat approximately 210 carrots, 83 oranges or 20 tbsps of sesame seeds. Foods in Canada are now allowed to have up to 1 g of added plant sterols per serving.

You may see plant sterols being added to such foods as mayonnaise, margarine, salad dressing, yogurt and yogurt drinks, vegetable and fruit juices.

Plant sterols can reduce LDL cholesterol levels up to approximately 10%, but have no impact on HDL ("good") cholesterol or triglycerides. So it is important to follow a healthy diet and physical activity routine to attain a healthy overall cholesterol profile.

Consult your healthcare provider before including daily consumption of foods with added plant sterols, especially if you are currently taking any medications to manage your cholesterol. Health Canada has assessed plant sterols to be safe up to 3 g per day for adults. Plant sterol enriched foods are not recommended for children, breast-feeding or pregnant women as these individuals have specific nutritional and dietary needs and lowering blood cholesterol is not normally a priority for them. These products are intended for persons diagnosed with high cholesterol.

For more information on plant sterols visit Health Canada's website (hc-sc.gc.ca) and do a search on "plant sterols".

Be active

Physical activity plays a very important role in improving your cholesterol levels and overall heart health. It is important to be active 150 minutes per week, in bouts of 10 minutes or more. Read more about physical activity at heartandstroke.ca/healthyliving.

Achieve and maintain a healthy body weight

Being overweight or obese increases your triglycerides and lowers your HDL cholesterol level. It also increase your risk of diabetes, heart disease and stroke. By achieving a healthy weight you can reduce those risk factors. Visit heartandstroke.ca for healthy weight information.

Be smoke-free

Studies have shown smokers have lower levels of HDL ‘good’ cholesterol than non-smokers. However, a few weeks after becoming smoke-free, levels of HDL in former tobacco users increases to the same levels as those of non-smokers.

Cholesterol and dietary fat

As we’ve already mentioned, cholesterol levels are closely linked to intake of dietary fat, especially saturated fats and trans fats. A lower-fat eating pattern means that you get about 20-35 percent of your day’s calories from fat

- For a woman this means about 45-75 grams of fat a day
- For a man this means about 60-105 grams of fat a day

Use these numbers as a guideline to compare how much fat is in a food or recipe with how much fat you should eat each day.

All fats are not created equal. Some are bad for health while others, in moderate amounts, are actually healthy. The goal is to reduce bad fats, especially trans and saturated, and replace some of these with unsaturated fats and foods high in fibre and nutrient content. We are also aiming to lower our fat and calorie intake.

Work towards limiting saturated and trans fats from your diet. Saturated fats raise LDL cholesterol “bad” cholesterol, and are found in fatty meats, full-fat milk products, butter, lard, coconut, palm and palm kernel oils, fast foods, snack foods, many ready-prepared foods and those made with hydrogenated vegetable oil. Trans fats not only raise LDL cholesterol, they lower HDL “good” cholesterol, and are found in all foods with shortening or partially hydrogenated vegetable oil, snack foods, fast foods and many ready-prepared foods.

Food manufacturers are required to state the amount of trans fat in a product on the product’s Nutrition Facts table. Look for the words “partially hydrogenated” or “vegetable oil shortening” in the ingredients list on food packages. These items contain trans fats.

Include monounsaturated fats in your diet such as olive, canola and peanut oils, non-hydrogenated margarines, nuts, seeds and avocados. Include polyunsaturated fats as well. These lower blood levels of LDL-cholesterol and are found in many liquid vegetable oils such as sunflower, corn oil as well as in walnuts and almonds.

Include omega-3 fats in your diet. Omega-3 fats are polyunsaturated fats which can help to improve your blood cholesterol level (see chart below). Omega-3 fats are found in ground flaxseed, flaxseed oil, and walnuts. Enjoy fish like salmon, tuna, sardines and mackerel twice per week. Add ground flaxseeds to your cereals. Snack on a handful of nuts* instead of potato chips.

*While nuts and seeds provide a healthy type of fat, they are also high in calories and should be used in moderation. For more information on portion sizes, go to heartandstroke.ca/healthyliving.

Know Your Fats

Choose healthy fats more often (such as monounsaturated & polyunsaturated fats)

Types of Fat	Major Food Sources	Good Choice or Poor Choice
Healthy fats		
Monounsaturated Fat/ Monounsaturates	Olive, canola and peanut oils, non-hydrogenated margarines, nuts, seeds and avocados	Good Choice
Polyunsaturated Fat/ Polyunsaturates Omega-6 Fat	Safflower, sunflower and corn oils, non-hydrogenated margarines, nuts and seeds	Good Choice
Omega-3 Fat	Fattier fish such as mackerel, herring, trout, salmon, swordfish, cod and bluefish, canola, soybean oils, flaxseeds, omega-3 eggs, walnuts, pecans and pine nuts	Good Choice
Unhealthy fats		
Saturated Fat/ Saturates	Fatty meats, full-fat milk products, butter, lard, coconut, palm and palm kernel oils, fast foods, snack foods, many ready prepared foods and those made with hydrogenated vegetable oil	Poor Choice
Trans Fat	All foods made with shortening or partially hydrogenated vegetable oil, snack foods, fast foods and many ready-prepared foods	Poor Choice

For more information on how these fats affect your blood cholesterol, log on to heartandstroke.ca/healthyliving

Best way to eat healthy is to be prepared

Planning is the first step to healthy eating. It is possible to have healthy meals and snacks all week long if you plan in advance. Plan the recipes you want to cook for the week, check your fridge and pantry to see what you need and make a shopping list. Plan your meals around the four Food Groups in *Canada's Food Guide* to ensure you are eating balanced meals.

At the store, read the Nutrition Fact table and choose foods that are lower in fat and sodium. Load up on vegetables and fruit. Also, look for the Health Check logo. The Health Check logo ensures that the food product has been reviewed by the Heart and Stroke Foundation's registered dietitians and is part of healthy eating. For more information on Health Check, visit healthcheck.org

When preparing your meals, plan for leftovers. Cook more than you need for dinner and use the leftovers to make another meal or school lunches for the next day.

Eating out can be another challenge. Always ask if nutrient information is available so that you can make educated choices. Also look for the Health Check logo on menu items which will assist you in making healthy choices and guarantee that the nutrient information is available.



Nutrition Facts

Per 125 mL (87 g)			
Amount	% Daily Value		
Calories 80			
Fat 0.5 g			1 %
Saturated 0 g			0 %
+ Trans 0 g			
Cholesterol 0 mg			
Sodium 0 mg			0 %
Carbohydrate 18 g			6 %
Fibre 2 g			8 %
Sugars 2 g			
Protein 3 g			
Vitamin A	2 %	Vitamin C	10 %
Calcium	0 %	Iron	2 %

Taking medication to lower cholesterol

Sometimes diet and exercise are not enough to bring your cholesterol to healthy levels. Some people have inherited a tendency towards high cholesterol levels. This makes it more difficult to achieve healthy cholesterol levels. If this is the case, your doctor will prescribe medication.

Several types of drugs are available to lower your cholesterol. Your doctor will help you decide which one is best for you. Keep in mind that these medications do not cure high cholesterol. Nor do they replace a healthy lifestyle.

Medication type: Statins

These drugs block an enzyme in your liver that is required to make cholesterol. As a result, your liver makes less cholesterol and picks up LDL “bad” cholesterol from your bloodstream. These drugs are very effective and lower LDL-cholesterol by up to 55%. They are the most widely prescribed cholesterol lowering medication.

While the frequency of side effects with these medications is generally very low, headache, muscle pain and weakness, and high liver enzymes may occur. Your doctor may do a simple blood test after starting statin therapy to rule out any serious side-effects.

Medication Type: Cholesterol absorption inhibitors

There is currently only one cholesterol absorption inhibitor available in Canada. It works by preventing your body from absorbing and storing cholesterol in your liver and improving the way cholesterol is cleared from your blood. This drug helps lower the levels of total and LDL-cholesterol in your blood. It is only prescribed when your cholesterol cannot be controlled with proper diet and physical activity. It should always be used as part of a healthy living plan, which includes eating a lower-fat, low-cholesterol diet and engaging in regular physical activity.

Medication type: Bile acid sequestrants (resins)

Your body uses cholesterol to make bile – an acid used in digestion. Bile acid sequestrants bind to bile – preventing it from being used during digestion. In response, your liver makes more bile and the more it makes, the more LDL “bad” cholesterol it needs – which means there is less LDL-cholesterol circulating through your blood. These drugs can reduce total cholesterol by 20%.

Medication type: Fibric acids (fibrates)

These medications break down triglycerides and are used to treat very high triglyceride. These drugs may cause muscle discomfort or fatigue. They are occasionally used in combination with other cholesterol lowering drugs.

Medication type: Niacin

Niacin works by slowing the liver’s production of the chemicals that help make LDL “bad” cholesterol. It significantly raises HDL “good” cholesterol. It is a form of vitamin B which should only be taken as a cholesterol lowering medication when prescribed by your doctor. Side effects may include flushing in the upper body and face.



“Keeping blood cholesterol under control is a key factor in reducing the risk of heart disease and stroke. Studies have shown that a 1 mmol/L reduction in plasma total cholesterol can reduce coronary heart disease risk by 25%.”

Ruth McPherson, MD, PhD, FRCPC Heart and Stroke Foundation Researcher

Director, Lipid Clinic,
Lipid Research Laboratory
University of Ottawa Heart Institute
Professor, Medicine & Biochemistry
University Of Ottawa

Reducing the risk of heart disease and stroke

The Heart and Stroke Foundation can help you identify and control your risk factors for heart disease and stroke. Look for the *Heart&Stroke Risk Assessment™* icon on our website at heartandstroke.ca and get your personalized risk profile. It's quick, free and confidential. When you're finished, you'll better understand your risk of heart disease and stroke.

You can also receive a customized action plan for healthy living that includes practical online tips, tools, recipes and other resources to help you reduce your risk of heart disease and stroke.

Be sure to talk to your healthcare professional about any heart health concerns you may have, and use this booklet to help guide you towards a healthier life.

As a Heart and Stroke Foundation volunteer you make all the difference!

The support of Heart and Stroke Foundation volunteers is critical to ensure improved health for our families and communities and end heart disease and stroke. For more information on how you can help, visit our website at heartandstroke.ca, call 1-888-HSF-INFO, or contact your local area office.

We Need Your Support. Your gift is important! We rely on public donations to fund vital heart and stroke research; help us continue our mission to stop the devastating impact of heart disease and stroke. By Phone: Call 1-888-HSF-INFO, 24 hours a day, seven days a week and we will assist you in making your donation. Or visit our website at heartandstroke.ca and click on "Make a Donation".

Know and control your cholesterol levels

Keep track of your cholesterol levels using this chart as your guide. Work with your doctor to keep an accurate record of your results.

Cholesterol Levels Data Table

Type of lipid	Total cholesterol	LDL cholesterol	HDL cholesterol	Total cholesterol/HDL-cholesterol ratio	Triglycerides
Target level set by your doctor based on your risk factors*					
Your test results					
Year	Total cholesterol	LDL cholesterol	HDL cholesterol	Total cholesterol/HDL-cholesterol ratio	Triglycerides

* Your doctor will help establish a target level for you based on your personal risk factors, taking into account your age, total cholesterol level, smoking status, HDL-C level and systolic blood pressure.

Thanks to the millions of Canadians who put their hearts into supporting our vital work.

Because of you, the Foundation has helped reduce the mortality rate by 75% over the past 50 years. Sadly, one in three Canadians will develop heart disease and stroke over their lifetime – and some at a much too early age.

More answers are needed to facilitate further medical advancements, public and professional health education and effective social change programs that save lives – today and for generations to come.



Go to the Heart and Stroke Foundation website to find

- Delicious heart-healthy recipes
- Tips to get active for life
- Current heart disease and stroke patient information
- Breaking news on Foundation funded research
- Free newsletters, He@lthline and He@lthline for Parents
- Information on volunteering for the Heart and Stroke Foundation in your community

heartandstroke.ca

or call

1-888-HSF-INFO (473-4636)

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