Patient education: High cholesterol and lipids (Beyond the Basics)

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INTRODUCTION

High levels of lipids (fats) in the blood, including cholesterol and triglycerides, is also called "hyperlipidemia." Hyperlipidemia can significantly increase a person's risk of heart attacks, strokes, and other serious problems due to vessel wall narrowing or obstruction. To lower these risks, doctors often recommend that people with hyperlipidemia try to lower their cholesterol levels through a combination of dietary changes, exercise, and medication. Most cholesterol-lowering therapies are aimed at reducing low-density lipoprotein (LDL) or "bad" cholesterol. High levels of LDL can cause atherosclerosis (buildup of fatty deposits in the blood vessels), which is the major cause of cardiovascular events (heart attacks, strokes, and lower extremity or peripheral artery disease).

This article will discuss the relationship between hyperlipidemia and cardiovascular disease, the different types of lipids, and expert recommendations for lipid screening. Treatment options for high cholesterol are discussed separately. (See "Patient education: High cholesterol and lipid treatment options (Beyond the Basics)".)

HYPERLIPIDEMIA AND CARDIOVASCULAR DISEASE

Hyperlipidemia can significantly increase a person's risk of developing cardiovascular disease, including disease of blood vessels supplying the heart (coronary artery disease), brain (cerebrovascular disease), and limbs (peripheral artery disease). These conditions happen when the blood vessels get clogged with fatty deposits, restricting blood flow. When this happens, it can lead to heart attacks, strokes, and other serious problems such as narrowing of the arteries that deliver blood to most organs.

Other risk factors for cardiovascular disease — In addition to hyperlipidemia, there are a number of other factors that increase a person's risk of cardiovascular disease:

- Diabetes mellitus (see "Patient education: Type 1 diabetes: Overview (Beyond the Basics)" and "Patient education: Type 2 diabetes: Overview (Beyond the Basics)")
- High blood pressure (hypertension) (see "Patient education: High blood pressure in adults (Beyond the Basics)")
- Chronic kidney disease (see "Patient education: Chronic kidney disease (Beyond the Basics)")
- Cigarette smoking
- Having a parent or sibling who developed cardiovascular disease at a young age (<55 years for men or <65 years for women)

Regardless of whether any of these factors are present, a person's risk for developing cardiovascular disease increases with age. Men have a higher risk than women at any age.

Calculating your risk of cardiovascular disease — There are various online calculators that allow you to input information about yourself in order to estimate your risk of developing cardiovascular disease. Different calculators can give different scores depending on the variables they use in calculating a person's risk. Examples include:

- Framingham 2008 data for men (calculator 1)

- Framingham 2008 data for women (calculator 2)
- American College of Cardiology/American Heart Association 2013 data for men and women (calculator 3).

Your health care provider can help you understand how to use the available calculators to better understand your risk and interpret the results.

TYPES OF LIPIDS

The term "lipids" includes cholesterol and triglycerides, although there are other types of lipids, too. Standard lipid blood tests include a measurement of total cholesterol, low-density lipoprotein (LDL) and high-density lipoprotein (HDL) cholesterol, and triglycerides.

Total cholesterol — A high total cholesterol level can increase your risk of cardiovascular disease. However, decisions about when to treat high cholesterol are usually based upon the level of LDL or HDL cholesterol rather than the level of total cholesterol (see 'LDL cholesterol' below and 'HDL cholesterol' below). In general:

- A total cholesterol level of less than 200 mg/dL (5.17 mmol/L) is **normal**.
- A total cholesterol level of 200 to 239 mg/dL (5.17 to 6.18 mmol/L) is **borderline high**.
- A total cholesterol level of 240 mg/dL (6.21 mmol/L) or greater is **high**.

The total cholesterol level can be measured any time of day. It is not necessary to fast (ie, avoid eating) before testing.

LDL cholesterol — This is sometimes called "bad" cholesterol, as high LDL levels raise your risk of cardiovascular disease. Some health care providers make decisions about how to treat hyperlipidemia based on the LDL cholesterol level. Your goal LDL cholesterol depends on your overall risk for a cardiovascular event (heart attack or stroke). Several factors affect your personal risk, including whether you have a history of cardiovascular disease and your risk of developing cardiovascular disease in the future (based on your age, sex, and other major risk factors) (see 'Calculating your risk of cardiovascular disease' above). People at higher risk are often given a lower LDL cholesterol goal.

If your health care provider plans to measure your LDL cholesterol level, he or she may ask you to fast (avoid eating) for nine hours or longer in order to obtain an accurate result. A fasting test is more important if you have elevated triglycerides (>200 mg/dL) (see 'Triglycerides' below) or when your health care provider plans to measure your fasting blood sugar (glucose). However, in many cases, your LDL cholesterol can be measured even after you have eaten recently.

HDL cholesterol — Not all cholesterol is bad. High levels of HDL ("good") cholesterol is often an indicator of a lower risk of cardiovascular disease. A level of 60 mg/dL (1.55 mmol/L) or higher is excellent, while levels of HDL cholesterol less than 40 mg/dL (1.03 mmol/L) are considered lower than desirable. There is no treatment that lowers your risk for a cardiovascular event by raising HDL cholesterol.

As with total cholesterol, the HDL cholesterol can be measured with a blood test at any time, regardless of whether you have been fasting.

Non-HDL cholesterol — "Non-HDL" cholesterol includes LDL cholesterol as well as other types of plaque-forming lipids that do not fall into these categories. Non-HDL cholesterol accounts for the cholesterol carried by very low density lipoproteins (VLDL), intermediate density lipoproteins (IDL), and lipoprotein (a). It can be calculated by subtracting HDL cholesterol from total cholesterol. Since total cholesterol and HDL cholesterol can be measured accurately without fasting, so can non-HDL cholesterol. Non-HDL cholesterol is generally considered a better predictor of cardiovascular risk than LDL cholesterol.

An appropriate non-HDL cholesterol goal can be calculated by adding 30 mg/dL (0.78 mmol/L) to your LDL cholesterol goal. As discussed, the LDL cholesterol goal depends on a number of factors. (See 'LDL cholesterol' above.)

Triglycerides — High triglyceride levels are also associated with an increased risk of cardiovascular disease. Triglyceride levels are divided as follows:

- **Normal** – Less than 150 mg/dL (1.7 mmol/L)
- **Mildly increased** – 150 to 499 mg/dL (1.7 to 5.6 mmol/L)
- **Moderately increased** – 500 to 886 mg/dL (5.6 to 10.0 mmol/L)
- **Very high** – Greater than 886 mg/dL (10.0 mmol/L)

Triglycerides should be measured after fasting for at least nine hours. Some people with increased triglyceride levels may need treatment with medication.

WHEN SHOULD I START LIPID SCREENING?

Many expert groups have guidelines for lipid screening, which typically involves a "lipid profile" that includes blood tests to measure cholesterol and triglyceride levels. The guidelines differ in their recommendations about when to start screening, how frequently you should be screened, and when to stop.

Your health care provider can talk with you about your situation and whether and when you should be screened. An initial screening profile is often measured by the pediatrician during childhood, and should be measured again at age 18 years. Below are some commonly used guidelines.

For **men**:

- Regular lipid screening should start at age 35 years if there are no other risk factors for cardiovascular disease. (See 'Other risk factors for cardiovascular disease' above.)
- Screening should start at age 25 to 30 years if there are other risk factors, such as obesity, diabetes, high blood pressure, smoking, or family history of cardiovascular disease at a young age.

For **women**:

- Regular lipid screening should start at age 45 years if there are no other risk factors for cardiovascular disease. (See 'Other risk factors for cardiovascular disease' above.)
- Screening should start at age 30 to 35 years if there are other risk factors, such as obesity, diabetes, high blood pressure, smoking, or family history of cardiovascular disease at a young age.

The optimal time interval between screenings is uncertain. A reasonable approach is to repeat the lipid profile every five years for people who are unlikely to be candidates for treatment based on past results, and more frequently (eg, every three years) for people who are near or above the threshold for treatment.

There is no specific recommendation to stop screening at a particular age. However, once a person has had a lipid profile with normal results, it is probably of less value to continue screening beyond the age of 65, as lipid levels are less likely to increase after this point.

HIGH CHOLESTEROL TREATMENT

Information about how to decide on treatment for hyperlipidemia, and the available treatment options, is available separately. (See "Patient education: High cholesterol and lipid treatment options (Beyond the Basics)".)

WHERE TO GET MORE INFORMATION

Your health care practitioner is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for health care professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

Patient education: High cholesterol (The Basics)
Patient education: Atherosclerosis (The Basics)
Patient education: Coronary artery disease (The Basics)
Patient education: Diabetes and diet (The Basics)
Patient education: Metabolic dysfunction-associated steatotic liver disease (The Basics)
Patient education: The ABCs of diabetes (The Basics)
Patient education: Medicines after an ischemic stroke (The Basics)

Patient education: Heart attack recovery (The Basics)
Patient education: Medicines after a heart attack (The Basics)
Patient education: Recovery after coronary artery bypass graft surgery (The Basics)
Patient education: Lowering the risk of having a stroke (The Basics)
Patient education: Coronary artery disease in women (The Basics)
Patient education: Can foods or supplements lower cholesterol? (The Basics)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

Patient education: High cholesterol and lipid treatment options (Beyond the Basics)
Patient education: Type 1 diabetes: Overview (Beyond the Basics)
Patient education: Type 2 diabetes: Overview (Beyond the Basics)
Patient education: Transient ischemic attack (Beyond the Basics)
Patient education: Stroke symptoms and diagnosis (Beyond the Basics)
Patient education: Peripheral artery disease and claudication (Beyond the Basics)
Patient education: Abdominal aortic aneurysm (Beyond the Basics)
Patient education: High blood pressure in adults (Beyond the Basics)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

Hypertriglyceridemia in adults: Management
HDL cholesterol: Clinical aspects of abnormal values
Lipid management with diet or dietary supplements
Low-density lipoprotein cholesterol lowering with drugs other than statins and PCSK9 inhibitors
Lipoprotein(a)
Inherited disorders of LDL-cholesterol metabolism other than familial hypercholesterolemia
Screening for lipid disorders in adults
Secondary causes of dyslipidemia
Statins: Actions, side effects, and administration
Treatment of drug-resistant hypercholesterolemia
Low-density lipoprotein cholesterol-lowering therapy in the primary prevention of cardiovascular disease
Management of low density lipoprotein cholesterol (LDL-C) in the secondary prevention of cardiovascular disease

The following organizations also provide reliable health information.

- National Library of Medicine

  (www.nlm.nih.gov/medlineplus/healthtopics.html)

- National Cholesterol Education Program of the National Heart, Lung, and Blood Institute of the NIH

  (www.nhlbi.nih.gov/health/health-topics/topics/hbc)

- American Heart Association

  (www.americanheart.org)

- The Hormone Health Network

  (https://www.hormone.org/diseases-and-conditions/hyperlipidemia, available in English and Spanish)

- The Framingham Heart Study

  (https://www.framinghamheartstudy.org/)

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Contributor Disclosures

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