UNIVERSITY STUDENT HEALTH SERVICES • Fact Sheet

HYPERLIPIDEMIA

WHAT IS HYPERLIPIDEMIA & WHY IS IT IMPORTANT?

Hyperlipidemia refers to increased levels of lipids (fats) in the blood, including cholesterol and triglycerides:

- **Cholesterol** is a soft, waxy substance found in every cell of the body. It is crucial for many body functions including strengthening cell membranes, manufacturing hormones, and digesting fats. The liver produces all of the cholesterol that our body needs. The additional cholesterol that we consume through our diet can be unhealthy when in excess.
- **Triglycerides** are a type of fat found in the blood. They come from foods we eat, such as butter and oils. Our bodies convert unused calories into triglycerides, which are then stored in fat cells. Hormones regulate the release of triglycerides for energy between meals.

Hyperlipidemia is a major risk factor for heart disease, which is the number one cause of death in the United States. When lipid levels in the bloodstream become too high, plaques can form on the arterial walls, causing a slowing or blockage of blood flow. This build-up also causes narrowing and hardening of the blood vessels, a process known as arteriosclerosis. Build-up of cholesterol plaques can begin very early in life.

WHAT ARE THE SYMPTOMS?

Typically there are no symptoms until the arteries become so clogged that blood flow is restricted to the heart or other vital organs. At this point, a person can experience chest pain, heart attack, stroke, poor circulation in the limbs, etc. Because of the risk of serious health consequences, treatment is often recommended for people with hyperlipidemia.

WHAT ARE OTHER RISK FACTORS FOR HEART DISEASE?

In addition to abnormal cholesterol and triglyceride levels, other risk factors for cardiovascular disease include the following:

- **Uncontrollable risk factors**
  - Family history of early heart disease (mother or sister affected before age 65; father or brother affected before age 55)
  - Your age (risk increases with age)
- **Controllable risk factors**
  - High blood pressure
  - Diabetes mellitus, types 1 and 2
  - Chronic kidney disease
  - Cigarette smoking, alcohol use
  - Obesity, unhealthy eating habits, lack of physical activity
  - Stress

WHAT ARE THE DIFFERENT LIPID TYPES?

The term “lipids” refers to cholesterol and triglycerides. A “lipid panel” or “lipid profile” is a blood test that measures total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides.

- **Total cholesterol** is the sum of all the different types of cholesterol found in the blood. A high total cholesterol level can increase the risk of heart disease. However, interpretation of high total cholesterol levels is dependent on LDL and HDL levels.

- **Lipoproteins** are the carriers that transport lipids through the bloodstream. These carriers consist of cholesterol, fats, and proteins that are produced by the body. They are not found in food. There are 5 major lipoprotein groups, including LDL, HDL, and VLDL (very low-density lipoprotein).
  - **LDL** is the major cholesterol carrier in the blood. It is often referred to as the “bad“ cholesterol because it leads to the accumulation of plaques on arterial walls. High LDL levels are known to be a major cause of heart disease, making it a primary target of treatment. Goal LDL levels vary from person to person; the more risk factors an individual has, the lower the LDL goal. LDL levels are generally calculated using a formula, which is only valid when triglyceride levels are below 400.
  - **HDL** is known as the “good” cholesterol because it carries cholesterol to the liver, where it is eliminated from the body. High levels of HDL are believed to protect against heart disease, while low levels are associated with an increased risk of heart disease.
  - **VLDL** is the major triglyceride carrier in the blood and is estimated to be 20% of the triglyceride concentration.
  - **Non-HDL** cholesterol is your total cholesterol minus your HDL cholesterol. Non-HDL cholesterol is a better predictor of heart disease than LDL cholesterol in people with diabetes mellitus type 2 and in women. Your non-HDL goal is calculated by adding 30mg/dL to your LDL goal.

- **Triglycerides** are the most common type of fat found in the body. High levels are associated with an increased risk for heart disease and stroke. Very high levels can also lead to acute pancreatitis, a painful inflammatory condition of the pancreas.

LIPID LEVELS		
Total Cholesterol	< 200 mg/dL 200-239 mg/dL ≥ 240 mg/dL	Normal Borderline high High
LDL	< 100 mg/dL 100-129 mg/dL 130-159 mg/dL 160-189 mg/dL ≥ 190 mg/dL	Optimal Near optimal Borderline high High Very High
HDL	< 40 mg/dL ≥ 60 mg/dL	Low High
Triglyceride	< 150 mg/dL 150-499 mg/dL 500-886 mg/dL > 886 mg/dL	Normal Mildly high Moderately high Very high

DO I NEED TO FAST FOR A LIPID CHECK?

Fasting prior to your lab draw provides the most accurate lipid profile results. Triglycerides require 12-14 hours of fasting. At least 9 hours of fasting is preferred, though not required, for LDL testing.

- **A fasting lipid profile is the preferred screening test** in most individuals, especially those with cardiovascular risk factors. If you are advised to fast, it is always a good idea to drink plenty of water, and it is usually ok to take any prescribed medications (talk to your provider first).
- **Fasting is not necessary if you are only getting a total cholesterol and/or HDL checked.** In patients without risk factors, the initial screen can be a simple non-fasting total cholesterol level. If total cholesterol is over 250, then a fasting lipid profile should be checked.

HOW OFTEN SHOULD I HAVE MY LIPIDS CHECKED?

Expert recommendations for lipid screening vary. Most guidelines recommend a full fasting lipid profile.

- **Initial screening:** The recommended age to begin screening also varies among guidelines. Many experts recommend baseline screening at age 20.
- **Follow-up testing:** The optimal interval between screenings is also uncertain. Some guidelines recommend repeating labs:
  - Every 5 years if results are low or normal.
  - Every 3 years or less if results are high-normal.

WHAT CAN I DO TO IMPROVE MY LIPIDS?

A healthy diet, regular exercise, and weight loss (if you are overweight) are important first steps in improving lipid levels. Lifestyle changes alone may lower lipid levels by up to 20%.

Medications are typically recommended in patients who are at high risk for developing heart attack or stroke. Statins, the most commonly prescribed class of cholesterol medications, can decrease LDL by 50% and increase HDL by up to 15%.

HEALTHY EATING HABITS

The best medicine for many health conditions, including high cholesterol, is a healthy diet. The following guidelines can help improve your cholesterol & overall health:

- **Eat your fruits and veggies!** Cholesterol is found primarily in foods from animals (eg. egg yolks, poultry, meat, shellfish, and dairy products). Foods from plants do not contain cholesterol. Research shows that fruits and vegetables decrease the risk of heart disease and possibly cancer.
  - Aim for at least 5 servings of fruits/vegetables per day. Eat them with each meal and for snacks. Keep a bowl of fruit out for easy access.
  - Frozen or canned produce can replace fresh produce if necessary.
- **Know your fats.** Choose healthy fats (polyunsaturated & monounsaturated fats) over unhealthy fats (trans fats & saturated fats). The following guidelines can help:
  - Limit red meat and cheese (choose chicken, fish, & beans instead).
  - Cook with olive, canola, or peanut oil (instead of butter or margarine).
  - Limit processed foods, like store-made baked goods (eg. crackers, cookies, cupcakes, etc). Choose ones labeled as "zero trans fat".
  - Avoid replacing unhealthy fats with refined carbohydrates (eg. white bread, white rice, most sweets, etc).
  - Read Nutrition Fact labels on foods, and choose ones with a "% Daily Value" of 5% or less for cholesterol & fat. Aim for an average daily cholesterol intake of less than 200mg.
  - Limit eating out, & choose healthier menu options.

HEALTHY FATS (PUFAs & MUFAs)

- Most of your fat intake should come from poly-unsaturated fats (PUFAs). PUFAs are required for normal body functions because they contain essential fatty acids that are not made by your body. The 2 main types are omega-3 fatty acids and omega-6 fatty acids. A diet high in PUFAs can decrease LDL & triglyceride levels. Omega-3 fatty acids can also raise HDL levels.
  - Omega-3 fatty acids are found in fatty fish (eg. salmon, mackerel, sardines, lake trout), flax seeds, and walnuts.
  - Omega-6 fatty acids are found in vegetable oils, such as safflower, sunflower, soybean, and corn oils.
- Include monounsaturated fats (MUFAs) in your diet. Like other good fats, they tend to be liquid at room temperature. Examples include olive oil, canola oil, peanut oil, avocados, and most nuts.

HARMFUL FATS (TRANS FATS)

Avoid trans fats, which are the worst type of dietary fat. They raise LDL levels, lower HDL levels, and have no known health benefits.

- Trans fats are solid at room temperature. Small quantities are found naturally in meat & dairy products.
- Partially hydrogenated oils (PHOs) are the main source of artificial trans fats & have long been a staple in fast foods and commercially baked goods & snack foods.
- In 2018, the FDA banned the use of PHOs in food products because of their negative health effects. However, the new fat substitutes are only slightly healthier & will not turn junk foods into health foods.

CONTROVERSIAL FATS (SATURATED FATS)
Saturated fats have typically been considered a bad fat because they increase total cholesterol and LDL levels. Newer research suggests that saturated fat may not increase the risk of heart disease; however, studies show that replacing saturated fat with PUFAs can decrease the risk of heart disease. Therefore, we recommend continuing to limit your intake of saturated fats.

- Saturated fats are mainly found in animal products, such as cheese, butter, and red meat.
- They are also found in coconut and palm oils, which are used widely in commercial food preparation.

- **Choose whole grains** (eg. 100% whole wheat bread, whole grain cereal, brown rice) over refined grains (eg. white bread, refined or sweetened cereals, white rice). Regular intake of refined grains and sugars can decrease HDL levels and increase the risk of diabetes.
- **Increase your fiber intake.** A high-fiber diet can improve LDL levels and decrease the risk of heart disease. Females should aim for 25gm/day, and males should aim for 38 grams/day. Examples include fruits, vegetables, legumes, and whole grains. Oats, barley, fruits, & legumes are high in soluble fiber, which has the most beneficial effects on cholesterol and glucose levels.
- **Avoid sugary drinks**, like soda, juice, and most sports drinks.

OTHER LIFESTYLE CHANGES

- **Increase your physical activity.** Work your way up to least 30 minutes of moderate-intensity exercise, 5 or more days per week. Aerobic physical activity conditions your heart and lungs by raising your heart and breathing rates. Examples include brisk walking, jogging, biking, swimming, dancing, gardening, etc. Regular exercise can improve triglycerides and HDL levels.
- **Lose weight.** If you're overweight, losing 5-10% of your body weight can help lower cholesterol levels.
- **Stop smoking.** In addition to being the cause of lung disease and a variety of cancers, smoking is another major risk factor for heart disease.
- **Limit alcohol use.** General expert recommendations are to limit alcohol intake to no more than 1 drink/day for females & 2 drinks/day for males. A "drink" is defined as:
  - 1.5oz of 80-proof liquor or 1oz of 100-proof liquor
  - 5oz of wine
  - 12oz of beer (regular or light)

  Moderate alcohol use may reduce the risk of heart disease. However, chronic or excessive alcohol use can lead to weight gain, diseases of the pancreas and liver, as well as increased risks of certain cancers. Therefore, we recommend against increasing your alcohol intake or starting to drink if you don't do so already.

WHEN IS MEDICATION TREATMENT NECESSARY?

The decision to start medication to improve lipid levels is based on an individual's risk for developing heart disease. Calculators based on a person's lipid levels and risk factors are used to estimate their 10-year risk for heart attack or stroke. In general, these risk calculators are only validated for people 40-79 years old. If the 10-year risk estimate is:

- Over 10% → Medication treatment is generally recommended.
- 7.5-10% → Medication treatment may be considered.

Guidelines also recommend medication treatment in individuals who have:

- LDL ≥ 190 mg/dL.
- Diabetes (Type 1 or 2) and LDL ≥ 70 mg/dL.

WHAT MEDICATIONS ARE AVAILABLE?

Several classes of lipid-lowering medications exist. The choice of medication is based on which type of lipid is abnormal. Statins are the most commonly prescribed class of lipid-lowering agents.

- **High LDL levels** are the main target of medication treatment. When the decision is made to initiate medication therapy, the first choice is usually a statin (eg. Lipitor, Zocor, Crestor, etc).
  - Statins are among the most powerful drugs for lowering LDL and preventing heart disease. Statin therapy can reduce the risk of cardiovascular events (like heart attack and stroke) by up to 36% in patients without a prior history of them.
  - Statins can also decrease triglyceride levels.
  - Side effects may include muscle aches, liver dysfunction, and an increased risk of diabetes. However, most people tolerate statins well, and the benefits often outweigh potential risks.
- **Low HDL levels & high triglyceride levels** are both associated with an increased risk for heart disease. Unlike statins, however, medication classes that specifically target HDL and triglycerides have not been shown to improve cardiovascular outcomes. Therefore, lifestyle changes are the primary means to improve heart health in those with isolated abnormalities in HDL and/or triglycerides.
  - To improve HDL levels, substitute MUFAs for saturated fats.
  - To improve triglycerides, increase PUFAs, and limit foods high in sugar and carbohydrates, as well as alcohol.
  - Taking 3-4 grams of fish oil (EPA+DHA) daily can improve triglyceride levels. Fish oil can also increase HDL.

RECOMMENDED RESOURCES

- familydoctor.org
- www.health.harvard.edu
- www.heart.org
- www.nhlbi.nih.gov