WHAT IS CHOLESTEROL & WHY IS IT IMPORTANT?
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.

When the cholesterol in our blood stream becomes too high, it can build up as plaques 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.

Typically there are no symptoms until the arteries become so narrow 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, etc. High cholesterol is one of the major risk factors for heart disease.

WHO GETS HIGH CHOLESTEROL?
Genetic factors affect your blood cholesterol level and influence the degree to which you can lower your level with dietary changes. In the United States, blood cholesterol levels begin to rise after age 20. Total cholesterol increases more than 2 mg/dL per year during early adulthood and continues to increase at a lesser rate until age 65.

Men have higher total cholesterol levels than women until age 50. Women lose the protective effect of estrogen after menopause, at which point their cholesterol starts to increase more.

WHAT ARE THE DIFFERENT TYPES OF CHOLESTEROL?
■ Total cholesterol is the sum of all the different types of cholesterol found in the blood. It serves as a general indicator of someone’s overall risk for developing heart disease.

■ Lipoproteins are the carriers that transport cholesterol throughout the body. These carriers consist of cholesterol, fats, and proteins that are manufactured by the body. They are not found in food. The 2 most important lipoproteins are low density lipoprotein (LDL) and high density lipoprotein (HDL).

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 plaque on the walls of arteries. Therefore, decreasing LDL levels is a crucial part of lowering the risk of heart disease.

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 (especially over 60) are believed to protect against heart disease, while low levels (less than 40) increase the risk of heart disease and possibly the risk of stroke.

WHAT ARE TRIGLYCERIDES?
Triglycerides are a type of fat found in the blood. They are usually checked along with cholesterol levels in a blood test known as a “lipid panel” or “lipid profile”.

■ Your body converts unused calories into triglycerides, which are then stored in fat cells. Hormones regulate the release of triglycerides for energy between meals.

■ High triglyceride levels may contribute to arteriosclerosis and be an independent risk factor for heart disease.

HOW OFTEN SHOULD I HAVE MY CHOLESTEROL CHECKED?
According to the National Cholesterol Education Program (NCEP), adults age 20 and over should have a complete lipid profile (total cholesterol, LDL, HDL, and triglycerides) drawn every 5 years. Levels should be checked more often if they are abnormal. You need to be fasting for 8-12 hours prior to having this blood test done.

LDL cholesterol is the primary target of treatment because elevated levels are known to be a major cause of heart disease. Abnormal LDL levels requiring treatment vary from person to person. The more risk factors a person has, the lower their LDL cholesterol goal.

50% of adults in the U.S. have a total cholesterol > 200.

20% of adults over the age of 20 have a total cholesterol > 240.
WHAT ARE OTHER RISK FACTORS FOR HEART DISEASE?
In addition to abnormal cholesterol and triglyceride levels, other risk factors for heart 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 (45 years or older for males; 55 years or older for females)

**Controllable risk factors:**
- High blood pressure
- Cigarette smoking
- Diabetes
- Obesity
- Unhealthy eating habits
- Alcohol use
- Lack of physical activity
- Stress

A risk assessment tool to determine your short-term risk of developing heart disease is available at hp2010.nhlbihin.net/atpiii/calculator.asp?

WHAT CAN I DO TO IMPROVE MY CHOLESTEROL?
Altering or eliminating the controllable risk factors listed above can help lower your blood cholesterol. However, if your cholesterol level is high and/or you have multiple risk factors, you will need closer monitoring, nutritional counseling, and/or medications to lower your cholesterol.

**THERAPEUTIC LIFESTYLE CHANGES**
Lifestyle changes, including a healthy diet and regular exercise, are important first steps to improving your cholesterol.

- **Develop healthy eating habits.** The NCEP recommends a diet lower in cholesterol, saturated fats, and trans fats and higher in complex carbohydrates and fiber. Cholesterol levels should begin to drop 2-3 weeks after a change in diet. Over time, the average reduction in cholesterol levels will reach 10-15%.
  - Learn to read Nutrition Facts labels! Choose foods that have a “% Daily Value” of 5% or less for nutrients like cholesterol and fat. Refer to our nutrition label handout for a quick primer on how to read and understand food labels.
  - Cholesterol is found primarily in foods from animals (especially egg yolks, poultry, meat, shellfish, and milk and dairy products). Foods from plants do not contain cholesterol. Therefore, increasing complex carbohydrates (such as whole grains, fruits, and vegetables) in your diet will help lower cholesterol levels. The NCEP recommends limiting your average daily cholesterol intake to less than 200 milligrams.
  - “Healthy plant fats”, like monounsaturated and polyunsaturated fats, appear to promote heart health. Most of your fat intake should come from these “good fats”. Examples include olive oil, canola oil, nuts, seeds, fish, avocados, etc.
  - Avoid “bad fats”, like saturated and trans fats. Both raise LDL levels, while trans fats may also decrease HDL levels.

- **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. Reduce your intake by substituting skim or 1% milk for whole milk and replacing animal products with plant-based foods.
- **Trans fats** are those that are solid at room temperature. They are found in foods made with shortening, margarines, and “partially hydrogenated” oils. Major sources include fast foods and commercially baked goods & snack foods.
- Increasing soluble fiber intake to 10-25 grams/day can also improve LDL levels. Examples include oats/oat bran, barley, flax seed, nuts, beans, peas, potatoes, broccoli, carrots, apples, bananas, oranges, and pears.
- **Increase your physical activity.** Get at least 30 minutes of moderate-intensity exercise on 5 or more days a week. Aerobic physical activity conditions your heart and lungs by raising your heart and breathing rates. Examples include brisk walking, jogging, and swimming. Regular exercise also increases HDL in some people.
- **Lose weight.** If you’re overweight, losing 5-10 pounds 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.** The general recommendation by advisory boards is not to drink more than one drink per day. A “drink” is defined as:
  - 1.5 oz of 80-proof liquor or 1 oz of 100-proof liquor
  - 5 oz of wine
  - 12 oz of beer (regular or light)

There is some information to suggest that moderate alcohol use may prevent the build-up of plaques in the arteries. 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.

**DRUG THERAPY**
Depending on your cholesterol levels, risk factors, and response to lifestyle changes, your medical provider may recommend treatment with medications. Several classes of medications exist. Some can have serious side effects and interact with other medications. Therefore, it is important to take your pills as prescribed and to keep your appointments for regular follow-up and blood tests.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Daily Calorie Recommendation</th>
<th>For a 2000 Calorie Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Fat</td>
<td>&lt; 7% of calories</td>
<td>≤ 16 grams</td>
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<tr>
<td>Polysaturated Fat</td>
<td>≤ 10% of calories</td>
<td>≤ 22 grams</td>
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<tr>
<td>Monounsaturated Fat</td>
<td>≤ 20% of calories</td>
<td>≤ 44 grams</td>
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<tr>
<td>Total Fat</td>
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<tr>
<td>Carbohydrate</td>
<td>50-60% of calories</td>
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<tr>
<td>Fiber</td>
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<td>20-30 grams</td>
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<tr>
<td>Protein</td>
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<tr>
<td>Cholesterol</td>
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<td>&lt; 200 mg</td>
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</table>

For more information on dietary suggestions, visit www.nhlbi.nih.gov/chd.