12.3: Metabolic Syndrome

Metabolic syndrome is the name for a group of risk factors that raises your risk for heart disease and other health problems, such as diabetes and stroke.

The term “metabolic” refers to the biochemical processes involved in the body's normal functioning. Risk factors are traits, conditions, or habits that increase your chance of developing a disease.

In this article, “heart disease” refers to coronary heart disease (CHD). CHD (also called coronary artery disease, abbreviated CAD) is a condition in which a waxy substance called plaque builds up inside the coronary (heart) arteries. Plaque hardens and narrows the arteries, reducing blood flow to your heart muscle. This can lead to chest pain, a heart attack, heart damage, or even death.

Metabolic Risk Factors

The five conditions described below are metabolic risk factors. You can have any one of these risk factors by itself, but they tend to occur together. You must have at least three metabolic risk factors to be diagnosed with metabolic syndrome.

A Large Waistline

Having a large waistline means that you carry excess weight around your waist (abdominal obesity). This is also called having an “apple-shaped” figure. Your doctor will measure your waist to find out whether you have a large waistline.

A waist measurement of 35 inches or more for women or 40 inches or more for men is a metabolic risk factor. A large waistline means you're at increased risk for heart disease and other health problems.
A High Triglyceride Level

Triglycerides are a type of fat found in the blood. A \textit{triglyceride level of 150 mg/dL or higher} (or being on medicine to treat high triglycerides) is a metabolic risk factor. (The mg/dL is milligrams per deciliter—the units used to measure triglycerides, cholesterol, and blood sugar.)

A Low HDL Cholesterol Level

HDL cholesterol sometimes is called "good" cholesterol. This is because it helps remove cholesterol from your arteries.

An \textit{HDL cholesterol level of less than 50 mg/dL for women and less than 40 mg/dL for men} (or being on medicine to treat low HDL cholesterol) is a metabolic risk factor.

High Blood Pressure

A \textit{blood pressure of 130/85 mmHg or higher} (or being on medicine to treat high blood pressure) is a metabolic risk factor. (The mmHg is millimeters of mercury—the units used to measure blood pressure.)

If only one of your two blood pressure numbers is high, you’re still at risk for metabolic syndrome.

High Fasting Blood Sugar

A normal fasting blood sugar level is less than 100 mg/dL. A fasting blood sugar level between 100–125 mg/dL is considered prediabetes. A fasting blood sugar level of 126 mg/dL or higher is considered diabetes.

A \textit{fasting blood sugar level of 100 mg/dL or higher} (or being on medicine to treat high blood sugar) is a metabolic risk factor.

About 85 percent of people who have type 2 diabetes—the most common type of diabetes—also have metabolic syndrome. These people have a much higher risk for heart disease than the 15 percent of people who have type 2 diabetes without metabolic syndrome.

Cholesterol Management

What Is Cholesterol? To understand high blood cholesterol, it helps to learn about cholesterol. Cholesterol is a waxy, fat-like substance that’s found in all cells of the body. Your body needs some cholesterol to make hormones, vitamin D, and substances that help you digest foods. Your body makes all the cholesterol it needs. However, cholesterol also is found in some of the foods you eat. Cholesterol travels through your bloodstream in small packages called lipoproteins. These packages are made of fat (lipid) on the inside and proteins on the outside.

Two kinds of lipoproteins carry cholesterol throughout your body: low-density lipoproteins (LDL) and high-density lipoproteins (HDL). Having healthy levels of both types of lipoproteins is important.

LDL cholesterol sometimes is called “bad” cholesterol. A high LDL level leads to a buildup of cholesterol in your arteries. (Arteries are blood vessels that carry blood from your heart to your body.)
HDL cholesterol sometimes is called “good” cholesterol. This is because it carries cholesterol from other parts of your body back to your liver. Your liver removes the cholesterol from your body.

What Is High Blood Cholesterol?

High blood cholesterol is a condition in which you have too much cholesterol in your blood. By itself, the condition usually has no signs or symptoms. Thus, many people don’t know that their cholesterol levels are too high.

People who have high blood cholesterol have a greater chance of getting coronary heart disease, also called coronary artery disease. (In this article, the term “heart disease” refers to coronary heart disease.) The higher the level of LDL cholesterol in your blood, the GREATER your chance is of getting heart disease. The higher the level of HDL cholesterol in your blood, the LOWER your chance is of getting heart disease.

Coronary heart disease is a condition in which plaque builds up inside the coronary (heart) arteries. Plaque is made up of cholesterol, fat, calcium, and other substances found in the blood. When plaque builds up in the arteries, the condition is called atherosclerosis.

What Causes High Blood Cholesterol?

Many factors can affect the cholesterol levels in your blood. You can control some factors, but not others.

Factors You Can Control

1. Diet:

Cholesterol is found in foods that come from animal sources, such as egg yolks, meat, and cheese. Some foods have fats that raise your cholesterol level.

For example, saturated fat raises your low-density lipoprotein (LDL) cholesterol level more than anything else in your diet. Saturated fat is found in some meats, dairy products, chocolate, baked goods, and deep-fried and processed foods.

Trans fatty acids (trans fats) raise your LDL cholesterol and lower your high-density lipoprotein (HDL) cholesterol. Trans fats are made when hydrogen is added to vegetable oil to harden it. Trans fats are found in some fried and processed foods.

Limiting foods with cholesterol, saturated fat, and trans fats can help you control your cholesterol levels.

2. Physical Activity and Weight

Lack of physical activity can lead to weight gain. Being overweight tends to raise your LDL level, lower your HDL level, and increase your total cholesterol level. (Total cholesterol is a measure of the total amount of cholesterol in your blood, including LDL and HDL.) Routine physical activity can help you lose weight and lower your LDL cholesterol. Being physically active also can help you raise your HDL cholesterol level.

Factors You Can't Control

1. Heredity
High blood cholesterol can run in families. An inherited condition called familial hypercholesterolemia causes very high LDL cholesterol. ("Inherited" means the condition is passed from parents to children through genes.) This condition begins at birth, and it may cause a heart attack at an early age.

2. Age and Sex

Starting at puberty, men often have lower levels of HDL cholesterol than women. As women and men age, their LDL cholesterol levels often rise. Before age 55, women usually have lower LDL cholesterol levels than men. However, after age 55, women can have higher LDL levels than men.

How Is High Blood Cholesterol Diagnosed?

Your doctor will diagnose high blood cholesterol by checking the cholesterol levels in your blood. A blood test called a lipoprotein panel can measure your cholesterol levels. Before the test, you’ll need to fast (not eat or drink anything but water) for 9 to 12 hours.

The lipoprotein panel will give your doctor information about your:

- Total cholesterol. Total cholesterol is a measure of the total amount of cholesterol in your blood, including low-density lipoprotein (LDL) cholesterol and high-density lipoprotein (HDL) cholesterol.
- LDL cholesterol. LDL, or “bad,” cholesterol is the main source of cholesterol buildup and blockages in the arteries.
- HDL cholesterol. HDL, or “good,” cholesterol helps remove cholesterol from your arteries.
- Triglycerides (tri-GLIH-se-rides). Triglycerides are a type of fat found in your blood. Some studies suggest that a high level of triglycerides in the blood may raise the risk of coronary heart disease, especially in women.

If it’s not possible to have a lipoprotein panel, knowing your total cholesterol and HDL cholesterol can give you a general idea about your cholesterol levels.

Testing for total and HDL cholesterol does not require fasting. If your total cholesterol is 200 mg/dL or more, or if your HDL cholesterol is less than 40 mg/dL, your doctor will likely recommend that you have a lipoprotein panel. (Cholesterol is measured as milligrams (mg) of cholesterol per deciliter (dL) of blood.)

The tables below show total, LDL, and HDL cholesterol levels and their corresponding categories. See how your cholesterol numbers compare to the numbers in the tables below.

Table 1. Cholesterol Levels

<table>
<thead>
<tr>
<th>Total Cholesterol Level</th>
<th>Total Cholesterol Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 200 mg/dL</td>
<td>Desirable</td>
</tr>
<tr>
<td>200-239 mg/dL</td>
<td>Borderline high</td>
</tr>
<tr>
<td>240 mg/dL and higher</td>
<td>High</td>
</tr>
<tr>
<td>LDL Cholesterol Level</td>
<td>LDL Cholesterol</td>
</tr>
</tbody>
</table>
Less than 100 mg/dL  Optimal
100-129 mg/dL  Near optimal/above optimal
130-159 mg/dL  Borderline high
160-189 mg/dL  High
190 mg/dL and higher  Very high

**HDL Cholesterol Level**  **HDL Cholesterol Category**
Less than 40 mg/dL  A major risk for heart disease
40-59 mg/dL  The higher, the better
60 mg/dL and higher  Considered protective against heart disease

Triglycerides also can raise your risk for heart disease. If your triglyceride level is borderline high (150–199 mg/dL) or high (200 mg/dL or higher), you may need treatment.

**How Is High Blood Cholesterol Treated?**

High blood cholesterol is treated with lifestyle changes and medicines. The main goal of treatment is to lower your low-density lipoprotein (LDL) cholesterol level enough to reduce your risk for coronary heart disease, heart attack, and other related health problems.

Your risk for heart disease and heart attack goes up as your LDL cholesterol level rises and your number of heart disease risk factors increases.

Some people are at high risk for heart attacks because they already have heart disease. Other people are at high risk for heart disease because they have diabetes or more than one heart disease risk factor.

Talk with your doctor about lowering your cholesterol and your risk for heart disease. Also, check the list to find out whether you have risk factors that affect your LDL cholesterol goal:

- Cigarette smoking
- High blood pressure (140/90 mmHg or higher), or you’re on medicine to treat high blood pressure
- Low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL)
- Family history of early heart disease (heart disease in father or brother before age 55; heart disease in mother or sister before age 65)
- Age (men 45 years or older; women 55 years or older)
Lowering Cholesterol Using Therapeutic Lifestyle Changes (TLC)

TLC is a set of lifestyle changes that can help you lower your LDL cholesterol. The main parts of the TLC program are a healthy diet, weight management, and physical activity.

The TLC Diet

With the TLC diet, less than 7 percent of your daily calories should come from saturated fat. This kind of fat is found in some meats, dairy products, chocolate, baked goods, and deep-fried and processed foods.

No more than 25 to 35 percent of your daily calories should come from all fats, including saturated, trans, monounsaturated, and polyunsaturated fats.

You also should have less than 200 mg a day of cholesterol. The amounts of cholesterol and the types of fat in prepared foods can be found on the foods’ Nutrition Facts labels.

Foods high in soluble fiber also are part of the TLC diet. They help prevent the digestive tract from absorbing cholesterol. These foods include:

- Whole-grain cereals such as oatmeal and oat bran
- Fruits such as apples, bananas, oranges, pears, and prunes
- Legumes such as kidney beans, lentils, chick peas, black-eyed peas, and lima beans

A diet rich in fruits and vegetables can increase important cholesterol-lowering compounds in your diet. These compounds, called plant stanols or sterols, work like soluble fiber.

A healthy diet also includes some types of fish, such as salmon, tuna (canned or fresh), and mackerel. These fish are a good source of omega-3 fatty acids. These acids may help protect the heart from blood clots and inflammation and reduce the risk of heart attack. Try to have about two fish meals every week.

You also should try to limit the amount of sodium (salt) that you eat. This means choosing low-salt and “no added salt” foods and seasonings at the table or while cooking. The Nutrition Facts label on food packaging shows the amount of sodium in the item.

Try to limit drinks with alcohol. Too much alcohol will raise your blood pressure and triglyceride level. (Triglycerides are a type of fat found in the blood.) Alcohol also adds extra calories, which will cause weight gain.

Men should have no more than two drinks containing alcohol a day. Women should have no more than one drink containing alcohol a day. One drink is a glass of wine, beer, or a small amount of hard liquor.

Weight Management

If you’re overweight or obese, losing weight can help lower LDL cholesterol. Maintaining a healthy weight is especially important if you have a condition called metabolic syndrome.

Metabolic syndrome is the name for a group of risk factors that raise your risk for heart disease and other health
problems, such as diabetes and stroke.

The five metabolic risk factors are a large waistline (abdominal obesity), a high triglyceride level, a low HDL cholesterol level, high blood pressure, and high blood sugar. Metabolic syndrome is diagnosed if you have at least three of these metabolic risk factors.

Physical Activity

Routine physical activity can lower LDL cholesterol and triglycerides and raise your HDL cholesterol level. People gain health benefits from as little as 60 minutes of moderate-intensity aerobic activity per week (however, 150 minutes per week is the recommendation). The more active you are, the more you will benefit.

Cholesterol-Lowering Medicines

In addition to lifestyle changes, your doctor may prescribe medicines to help lower your cholesterol. Even with medicines, you should continue the TLC program.

Medicines can help control high blood cholesterol, but they don’t cure it.

List of Treatments for Cardiovascular Disease

- Drugs: There are a number of drugs on the market that aid in the prevention and management of all of the aforementioned conditions. They cannot replace the benefits of diet, exercise, and stress management, but should be used in conjunction.
- Angiogram: One of many diagnostic tests used to determine location and extent of coronary artery disease.
- Angioplasty: A procedure where a balloon is fed through a catheter into a coronary artery and a blockage is opened when the balloon is inflated.
- Stent: A "prop" that keeps the artery open following angioplasty.
- Coronary Artery Bypass Graft: A surgical procedure in which blockages in coronary arteries are bypassed via grafting of vessels (vein & arterial tissues can be used) around the blockage. This used to be done only "open chest" or "open heart"; modern surgical practice allows for some blockages to be bypassed via small opening in between the ribs (rather than sawing open the breast bone).
- Endarterectomy: When the carotid artery (feeds the brain) is opened via a procedure (angioplasty &/or stent, usually).
- Valve replacements: valves separate the chambers of the heart. Sometimes those valves become compromised either mechanically or via infection and have to be replaced. Porcine of mechanical valves can be used.
- Heart transplant: When a heart has been damaged beyond repair a patient may become a candidate for a transplant; a large percentage of patients awaiting transplants never receive one.