

Patient Information Sheet

Lipoprotein Risk Factors

Lipoproteins are tiny spherical particles which circulate in the blood. They contain cholesterol, fat, and protein in varying amounts depending on where they are produced in the body and on the jobs they are directed to perform.

Abnormalities of the amounts or kinds of lipoproteins in blood can cause increased risk of atherosclerosis in the coronary arteries (leading to heart attack, angina or coronary pain, or sudden death) and atherosclerosis in many other arteries in the body (leading to stroke, aneurysm, or gangrene). Atherosclerosis is sometimes referred to as hardening or narrowing of the arteries, cholesterol deposition, or arterial blockage. Other risk factors such as smoking, high blood pressure, diabetes, and sedentary lifestyle also contribute to the development of atherosclerosis. The risk from lipoprotein abnormalities can be especially severe, if a very high elevation of one type of lipoprotein is present, or if several lipoprotein abnormalities are found together in one person.

The total cholesterol level measures blood cholesterol in all lipoproteins combined. More specific measurements are LDL and HDL cholesterol. Triglyceride and lipoprotein(a) tests are explained below.

Low density lipoproteins (LDL) perform the task of moving cholesterol from the liver to sites where it is used in other tissues. An increased level of total cholesterol in blood usually indicates high LDL cholesterol, since most of the total cholesterol is normally found in LDL. LDL is sometimes called the "bad" cholesterol, since some of the LDL particles enter the walls of arteries, where they form harmful cholesterol deposits. The higher the level of LDL cholesterol in blood, the more likely a person will develop coronary or other atherosclerotic disease.

High density lipoproteins (HDL) carry approximately one-fourth of the total amount of cholesterol in blood. Studies have shown that persons who have more of their blood cholesterol in HDL, as opposed to other lipoproteins, will have fewer heart attacks and coronary deaths. One of the functions of HDL is reverse cholesterol transport - that is, the transport of cholesterol from body tissues back to the liver. These facts suggest that the HDL cholesterol level can serve as a rough measure of the blood's ability to regulate (and reduce) the cholesterol content of body tissues. Cholesterol in HDL has been called the "good cholesterol".

Body fat is triglyceride. Certain lipoproteins (chylomicrons and very low density lipoproteins) perform the job of transporting fat in the blood. The triglyceride in these lipoproteins comes from both body fat and dietary fat. Triglyceride is eventually broken down into fatty acids, which are the major fuel used by the body to produce movement and heat and to energize other chemical processes. High levels of triglyceride-rich lipoproteins are generally associated with increased coronary risk. However, persons with high triglycerides nearly always have decreased levels of HDL cholesterol. It is not certain whether the rare person with high triglycerides and normal or high HDL has an increased risk for coronary disease. When blood triglycerides are extremely high (above 1000 mg/dl), a person may develop severe inflammation of the pancreas, a digestive organ located in the upper abdomen behind the stomach.

Around 1990, scientific understanding of another lipoprotein, called lipoprotein(a), became clear enough to warrant attention. In many people, lipoprotein(a) circulates in the blood in very small amounts; thus it escaped notice for decades while the other lipoproteins were becoming known. Between 20% and 30% of people in the U.S. have lipoprotein(a) levels high enough to raise coronary risk. Lipoprotein(a) levels are higher among black people than among people of white or Asian race.

In many respects, lipoprotein(a) is similar to LDL. Both are cholesterol-rich lipoproteins, and both carry cholesterol into the walls of arteries. Cholesterol deposits appear to damage the arterial wall, making it prone to the formation of blood clots, which cause heart attacks and strokes. Recent laboratory studies have suggested that lipoprotein(a) may not only carry cholesterol into the arterial wall, but also promote the final event of blood clotting.

Recommended Levels

The table shows desirable and high levels recommended for lipoproteins in blood. The units of measurement are milligrams per deciliter (mg/dl).

Lipoprotein parameter	Desirable	High	Desirable in patient with atherosclerotic disease
Total cholesterol	<200	≥240	<200
Triglycerides	<200	≥400	<200
LDL cholesterol	<130	≥160	≤100

An HDL cholesterol level less than 35 mg/dl is considered to be low. HDL cholesterol levels average 45 mg/dl in men and 55 mg/dl in women. The higher the HDL cholesterol, the less likely a person is to develop atherosclerotic disease. However, in people who have low total cholesterol levels (≤170 mg/dl) and normal triglycerides, both LDL and HDL cholesterol may be low, and this combination generally means low overall risk for atherosclerotic disease.

Lipoprotein(a) levels are largely set by genes (inheritance). Levels above 30-40 mg/dl signify risk for coronary heart disease and stroke.

Treatment

Levels of LDL cholesterol which are greater than desirable can be reduced by eating a diet low in saturated fat and cholesterol. Other measures which are somewhat effective include reducing body weight and increasing the dietary intake of soluble fiber (for example - oatmeal, oat bran, beans, psyllium products such as Metamucil??). Drug treatment is reserved for people with very high LDL cholesterol levels, with multiple risk factors, or with known atherosclerotic disease.

High triglyceride levels respond most effectively to reduction of body weight, to reduction of alcohol intake, or to minimizing the use of estrogen-containing pills. In diabetic patients, improved control of diabetes can help. Medications are used only for high or very high triglyceride levels.

A low HDL cholesterol is difficult to change, but can be raised somewhat by exercising or by quitting smoking. Medications are rarely used to treat low HDL cholesterol by itself.

High lipoprotein(a) levels cannot be treated readily, since they do not respond to diet or to most lipid-lowering medications. Lipoprotein(a) levels can be treated somewhat by giving estrogen to women after menopause or by administering niacin to any patient. When a high level of lipoprotein(a) is found, the best response is to give increased attention to other, more treatable atherosclerotic risk factors (such as LDL or smoking), since all of the risk factors interact to produce atherosclerosis.