FACULTY OF AGRICULTURE AND VETERINARY MEDICINE

Blood lipoprotein

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What Is Lipoprotein (a)?

□ Lipoproteins are the particles that transport cholesterol and triglycerides **in the blood stream.**

□ Lipoproteins are composed of proteins (apolipoproteins), phospholipids, triglycerides and cholesterol.

□ Lp(a) is a lipoprotein rich in cholesterol. It **differs** from LDL as it contains an additional protein, apolipoprotein (a). **Similar** to LDL, an Lp(a) particle also contains one molecule of apolipoprotein B.

What Is the Normal Range For Blood Levels of Lp(a)?

□ It as assumed that Lp(a) is produced by liver cells.

□ Plasma levels of Lp(a) rise shortly after birth and the levels appear to become consistent within a few months.

□ In adults, plasma levels of Lp(a) vary widely, ranging from 0.2 – 250 mg/dL. The levels are similar in men and women.

- Lp(a) levels less than 30 mg/dL are considered **normal**.
- Here's how Lp(a) levels are looked at in terms of risk:

- Desirable: < 14 mg/dL
- Borderline risk: 14 – 30 mg/dL
- High risk: 31 – 50 mg/dL
- Very high risk: > 50 mg/dL

Lp(a) and Risk for Heart Disease:

- A number of epidemiological evidence indicates that Lp(a) is associated with the risk of CVD.

- **The Copenhagen City Heart** Study found that individuals with plasma Lp(a) levels above (50 mg/L) had (2 to 3) fold increase risk for heart attack (myocardial infarction).

- A **meta-analyses** of prospective studies provided evidence of a link between **Lp(a)** and **coronary artery disease.**

How Is Lp(a) Involved in Atherosclerosis and Heart Disease?

- **Lp(a) and LDL** penetrate the inner layer of the arterial wall and accumulate together at sites for atherosclerotic plaque formation.

- Evidence suggests that **Lp(a)** may be more strongly retained in the arterial wall than LDL. Furthermore, Lp(a) transports oxidized phospholipids whose plasma levels are strongly correlated with the severity of **coronary artery disease.**

Lipids and Lipoproteins:

- Lipids, like cholesterol and triglycerides, are important substances for the human body. They are used by cells for energy utilization, hormone production, bile acid formation and much more.

- Because lipids are insoluble in blood, they are carried by lipoproteins that transport them to various tissues and organs.

☐ Lipoproteins consist of:

☐ (cholesterol, triglycerides,Phospholipids,and protein) .

☐ The lipoproteins act as **carriers transporting** important fats to the organs of the body.

☐ **There are five major types of lipoproteins:**

☐ chylomicrons,

☐ very low-density lipoprotein (VLDL),

☐ intermediate-density lipoprotein (IDL),

☐ low-density lipoprotein (LDL) and

☐ high-density lipoprotein (HDL).

High density lipoprotein cholesterol (HDL cholesterol)

- Is commonly measured to assess the risk of heart disease.

- HDL cholesterol is usually nicknamed **"the good cholesterol"** because high blood levels are associated with less risk of heart disease and low levels are associated with increased risk.

- HDL's act as scavengers, picking up excess cholesterol in the blood and transporting it to the liver where it's broken down, This process is often termed **"reverse cholesterol transport"**.

HDL Cholesterol :

- HDL's may reduce inflammation,
- Protect against oxidation of LDL,
- And positively affect blood clotting (thrombosis).

HDL Cholesterol – Normal Range:

HDL cholesterol (mg/dL) (U.S. and some other countries)	HDL cholesterol (mmol/L (Canada and most of Europe)	
Below 40 mg/dL (men) Below 50 mg/dL (women)	Below 1.0 mmol/L (men) Below 1.3 mmol/L (women)	**Too Low**
40-49 mg/dL (men) 50-59 mg/dL (women)	1-1.3 mmol/L (men) 1.3-1.5 mmol/L (women)	**Acceptable**
60 mg/dL and above	1.6 mmol/L and above	**Very good**

How Can HDL Cholesterol Be Influenced?

- lifestyle modification.

- Smoking reduces HDL cholesterol

- Regular aerobic exercise

- Obesity is associated with low HDL cholesterol levels and high triglyceride levels

- A diet rich in polyunsaturated fatty acids (omega-3)

- Sources include **oils** (olive, canola, soy, flaxseed), **nuts** (almonds, peanuts, walnuts, pecans), **cold-water fish** (salmon, mackerel), and **shellfish** — with limited carbohydrates, such as those found in **ready-to-eat** cereals, potatoes, white bread, and snack foods, is often recommended.

LDL Cholesterol – The "Bad" Cholesterol

- LDL is called **low-density lipoprotein** because LDL particles tend to be less dense than other kinds of cholesterol particles.

- LDL-C is an important marker for the risk of developing heart disease.

- There are special receptors on cell surfaces that bind LDL-C, these are called LDL-receptors. A lack of LDL-receptors may reduce the uptake of cholesterol by the cells, forcing it to remain in the circulation thereby raising blood levels.

How Is LDL Cholesterol Interpreted?

- It is considered important to keep cholesterol levels, especially LDL-C within certain limits. If you have **other risk factors for heart disease**, such as

- high blood pressure,

- Diabetes,

- Or if you smoke

- keeping LDL-C low becomes even more important.

Here you can see how LDL-C levels are looked at in terms of risk:

- above 190 mg/dL is **considered very high**
- 160 – 189 mg/dL is **considered high**
- 130 – 159 mg/dL is **considered borderline high**
- 100 – 129 mg/dL is **considered near ideal**
- below 100 mg/dL is **considered ideal for people at risk of heart disease**
- below 70 mg/dL is **considered ideal for people at very high risk of heart disease**

How Can You Influence Your LDL Cholesterol?

- **Regular exercise** is desirable. Losing weight may be helpful.

- If your LDL-C is high, your doctor will probably suggest **lifestyle changes. Quitting smoking** will be helpful and so may eating whole grain, oatmeal, olive oil, beans, fruit, and vegetables. Most doctors will recommend **eating less fat** from meat and dairy products. **medications** that lower cholesterol. So-called (**statins)** are the most commonly used drugs