

Two thick salmon fillets are shown against a light blue background. The fillets are cut into a curved shape, revealing the characteristic orange-pink color of the flesh and the darker skin on the outer edge. The top fillet is slightly behind and to the right of the bottom one.

Lipid Chemistry

A detailed image of a fish head, likely a salmon, is positioned in the lower half of the slide. The fish has a silvery, metallic sheen on its scales and a prominent eye. The head is angled towards the left, with the snout pointing downwards.

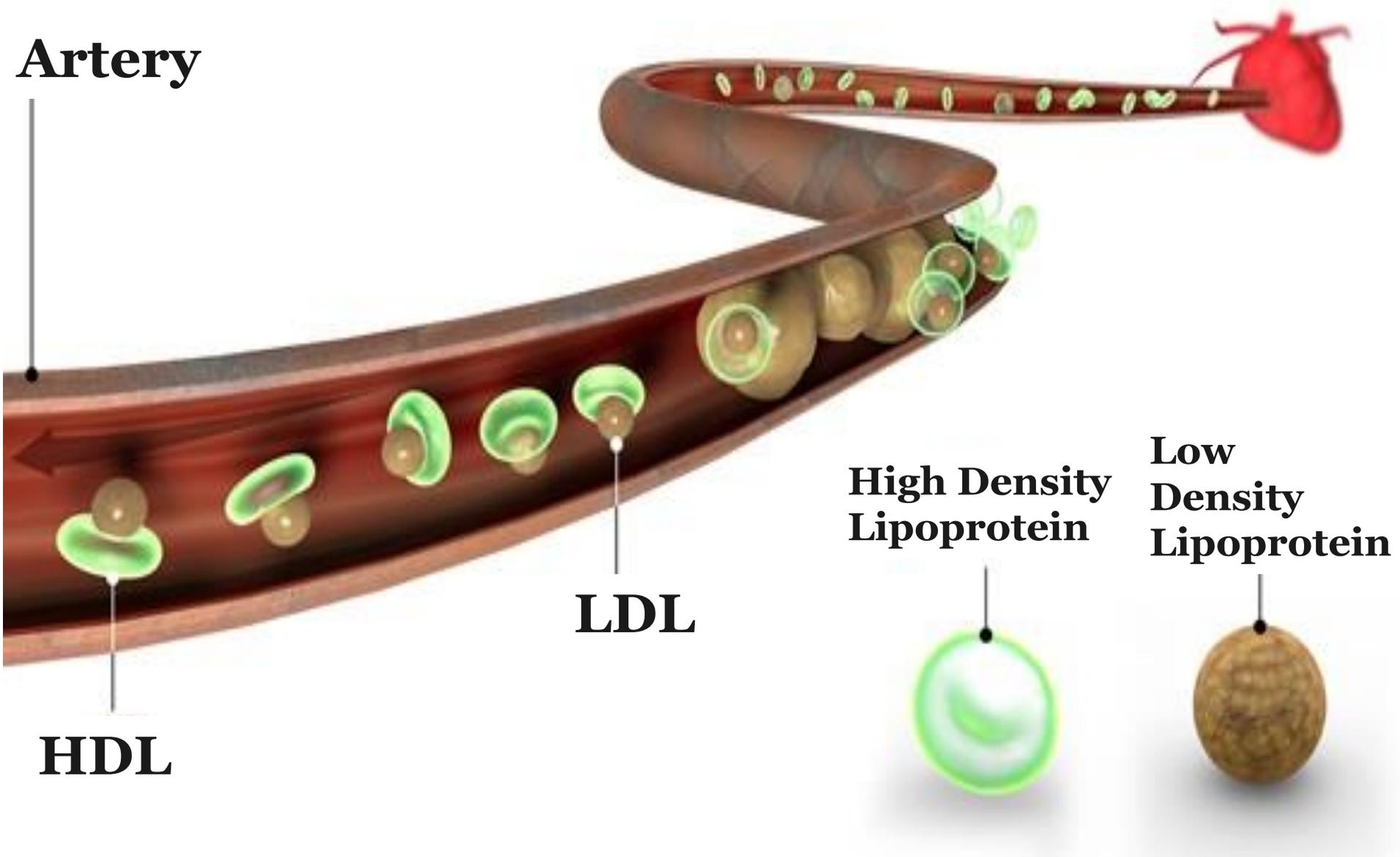
Ph.D & Msc Students

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CHOLESTEROL LIPOPROTEINS

Artery



HDL

LDL

High Density Lipoprotein

Low Density Lipoprotein

Lipoprotein, Any member of a group of substances containing both [lipid](#) (fat) and [protein](#). They occur in both soluble complexes—as in [egg yolk](#) and mammalian [blood plasma](#)—and insoluble ones, as in [cell](#) membranes. Lipoproteins in blood plasma have been intensively studied because they are the mode of transport for [cholesterol](#) through the bloodstream and lymphatic fluid.

Types of lipoproteins

Lipoproteins are classified based on their density, electrophoretic mobility, and nature of apoprotein content. Based on their density, lipoproteins can be classified into

Chylomicrons, very low-density lipoproteins (VLDL), intermediate density lipoproteins (IDL), low-density lipoproteins (LDL), and high-density lipoproteins (HDL).

Types of lipoproteins

- 1) **Chylomicrons** – these are the largest and least dense of the lipoproteins, with the highest triglyceride content.
- 2) **VLDL**, very low density lipoprotein – this is composed of protein, fats and cholesterol synthesized in the liver. It is associated with 5 different apo-proteins, They are second only to chylomicrons in the percentage triglyceride content.
- 3) **IDL** – intermediate density lipoprotein, is created by the metabolism of VLDL.

Types of lipoproteins

4) **LDL**, low density lipoprotein – this is the last VLDL remnant, and contains chiefly cholesterol. The only apoprotein associated with it is apoB-100.

5) **HDL**, high density lipoprotein – this has the highest protein: lipid ratio, and so is the densest, also called ‘good cholesterol’, because it carries cholesterol away from the tissues to the liver, lowering blood cholesterol levels. High HDL levels are associated with lowered risk of cardiovascular disease. HDL levels are higher with exercise, higher estrogen levels, with alcohol consumption, and weight loss.

Cholesterol is insoluble in the blood, and so it must be bound to lipoproteins in order to be transported. Two types of lipoprotein are involved in this function: low-density lipoproteins (LDLs) and high-density lipoproteins (HDLs). LDLs transport cholesterol from its site of synthesis in the [liver](#) to the body's cells, where the cholesterol is separated from the LDL and is then used by the cells for various purposes.

HDLs probably transport excess or unused cholesterol from the body's tissues back to the liver, where the cholesterol is broken down to [bile](#) acids and is then excreted. About 70 percent of all cholesterol in the blood is carried by LDL particles, and most of the remainder is carried by HDLs. LDL-bound cholesterol is primarily responsible for the atherosclerotic buildup of fatty deposits on the [blood vessel](#) walls, while HDL particles may actually reduce or retard such atherosclerotic buildups and are thus [beneficial](#) to [health](#).

Body cells extract cholesterol from the blood by means of tiny coated pits (receptors) on their surfaces; these receptors bind with the LDL particles (and their attached cholesterol) and draw them from the blood into the cell. There are limits to how much cholesterol a body cell can take in, however, and a cell's capture of LDL particles inhibits the making of more LDL receptors on that cell's surface, thus lowering its future intake of cholesterol.

Fewer receptors on the body cells means that less cholesterol is ingested by the cells and that more remains in the bloodstream, thus increasing the risk of cholesterol accumulating in the interior walls of blood vessels.

Different lipoproteins are differentiated based on specific proteins attached to the phospholipid outer layer, called the apo-lipoprotein. This also helps to make the fatty molecule more stable, and also binds to cell surface receptors in some cases, to enable the cell to take up the lipoprotein by receptor-mediated endocytosis.

Physical properties and lipid compositions of lipoprotein classes.

Parameters	CM	VLDL	LDL	HDL
Density (g/ml)	< 0.94	0.94-1.006	1.006-1.063	1.063-1.210
Total lipid (wt%)	99	91	80	44
Triacylglycerols	85	55	10	6
Cholesterol	2	7	11	7
Phospholipids	8	20	29	46