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Opinion Article

Lipoprotein: Structure, Types and Function

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DESCRIPTION

Lipoproteins are protein and fat-based molecules that transport cholesterol through the bloodstream. Cholesterol is divided into two types: "Good" cholesterol or High Density Lipoprotein (HDL) and "bad" cholesterol Low Density Lipoprotein (LDL).

Low Density Lipoproteins (LDL)

These particles are made up of Very Low Density Lipoprotein (VLDL) and Intermediate Density Lipoproteins (IDL) particles that have been enriched in cholesterol even more. The bulk of cholesterol in the blood is carried by LDL. B-100 is the most common Apo lipoprotein, and each LDL particle contains one molecule of Apo B-100. LDL is made up of a wide range of particle sizes and densities. Hypertriglyceridemia, low HDL levels, obesity, type 2 diabetes (i.e., people with the metabolic syndrome), and viral and inflammatory conditions are all linked to an abundance of tiny dense LDL particles. For a variety of reasons, small compact LDL particles are thought to be more pro-atherogenic than big LDL particles. Because small compact LDL particles have a lower affinity for the LDL receptor, they spend more time in the circulation.

High Density Lipoproteins (HDL)

High Density Lipoproteins (HDL) may be anti-atherogenic is that these particles play a significant role in reverse cholesterol transport from peripheral tissues to the liver. HDL particles also contain anti-oxidant, anti-inflammatory, anti-thrombotic, and anti-apoptotic capabilities, which may help explain why they can prevent atherosclerosis.

Cholesterol and phospholipids are abundant in HDL particles. These particles are connected with the Apo lipoproteins A-I, A-II, A-IV, C-I, C-II, C-III, and E. The structural protein Apo A-I is the most important, and each HDL particle may include many Apo A-I molecules. The density, size, charge, and Apo lipoprotein composition of HDL particles can all be used to classify them. There are chylomicrons, chylomicron remnants, VLDL, IDL, LDL, HDL, and Lp (a). The basic function of a lipoprotein is to transport hydrophobic lipid (commonly known as fat) molecules in water, such as blood plasma or other extracellular fluids.

They are made up of a triglyceride and cholesterol center surrounded by a phospholipid outer shell, with the hydrophilic portions facing the surrounding water and the lipophilic regions facing the lipid center. The outer shell contains Apo lipoprotein, a type of protein that both stabilizes the complex and gives it a functional identity that dictates its function.

Lipoproteins are special particles that are made up of fat droplets encased in a single layer of phospholipid molecules. Phospholipids are fat molecules with a phosphorus containing group attached. They are unique in that they are amphipathic, meaning they have polar and non-polar ends.

The polar ends of all the phospholipid molecules in a lipoprotein face outwards in order to interact with water, which is a polar molecule. This allows the lipoprotein to be transported through the bloodstream instead of rising to the surface. Despite being insoluble in blood, the non-polar fat balled up inside the phospholipid layer at the center of the lipoprotein is carried to the place where it must be stored or processed through the bloodstream. Lipoproteins are thus molecular trucks that transport fats to where they are needed or stored.

LDLs transport cholesterol from the liver to cell of the body, where the cholesterol is removed from the LDL and utilized by the cells for a variety of functions. Excess or unused cholesterol from the body's tissues is likely transported back to the liver, where it is broken down into bile acids and expelled. LDL particles carry around 70% of all cholesterol in the blood, whereas HDLs carry the majority of the rest. The atherosclerotic development of fatty deposits on the blood vessel walls is predominantly caused by LDL-bound cholesterol, whereas HDL particles may actually minimize or delay such buildups, and hence be beneficial to health.

Cholesterol and triglycerides are water insoluble; they must be supplied in conjunction with proteins. Lipoproteins are complex particles that have a central core carrying cholesterol esters and triglycerides and are surrounded by free cholesterol, phospholipids, and Apo lipoproteins, all of which help lipoprotein synthesis and function.

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