

Difference Between Chylomicrons and VLDL

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Key Difference - Chylomicrons vs VLDL

In the context of transportation of lipids within the body system, lipoproteins are important molecules found in the body. A lipoprotein is considered as a biochemical aggregation which is made up of lipids and proteins. Structure of lipoproteins consists of a monolayer of phospholipids and cholesterol, and proteins are embedded within it. In the outer cholesterol layer, the hydrophilic regions are aligned to the outside, and the hydrophobic regions (lipophilic) are to the inside. There are four major types of lipoproteins; chylomicrons, very low-density lipoprotein (VLDL), low-density lipoprotein (LDL) and high-density lipoprotein (HDL). Chylomicron is the largest lipoprotein out of the four types. VLDL has the ability to transfer its structure into different types of lipoproteins. **Chylomicrons are synthesized in the small intestine, and transport exogenous dietary products whilst VLDL synthesizes in the liver and transport endogenous dietary products.** This is the **key difference** between chylomicrons and VLDL.

What are Chylomicrons?

Chylomicrons are considered as particles of lipoproteins which are composed of a high proportion of triglycerides and least proportion of proteins. Phospholipids and cholesterol are present in average amounts. The main function of the chylomicrons is the transportation of dietary lipids which is absorbed from the small intestines into different locations such as fat cells of the adipose tissue, cardiac muscle, and skeletal muscle. At the different locations, the triglyceride component is removed from the chylomicrons due to the activity of lipoprotein lipase and makes the free fatty acids to be absorbed by the tissues.

Chylomicrons are originated in the endoplasmic reticulum of the enterocytes present in the lining of the small intestine. The structure of the intestine is developed for greater absorption due to the high surface area provided by the presence of villi and microvilli. The newly originated chylomicrons get released from the basolateral membranes into the lacteals. Lacteal is a capillary of lymphatic tissue which absorbs dietary fats of the villi of the small intestine. Since they are secreted into the lacteals, they get combined with the lymph and develop into chyle which is a fluid structure that is composed of emulsified fats and lymph. The formed chyle is transported into the venous return of systemic circulation by the lymphatic vessels where the chylomicrons are then supplied into the tissues with the absorbed fat from the diet.

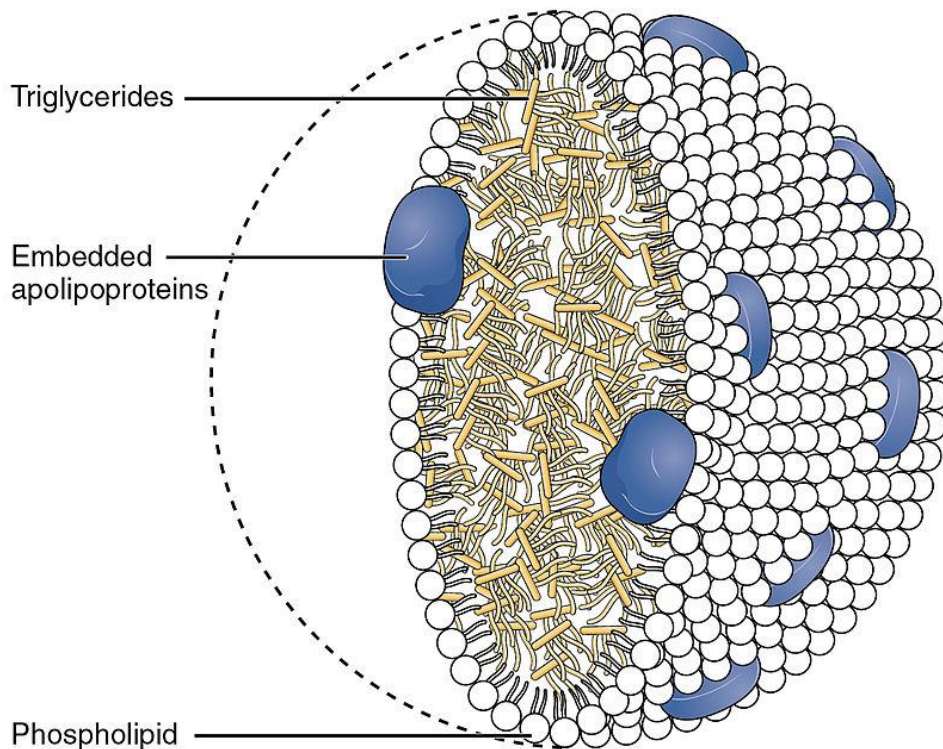


Figure 01: Chylomicron

The life cycle of the chylomicrons can be of three different stages; nascent chylomicrons, mature chylomicrons, chylomicron remnant. In the first stage, bile which is secreted by the gallbladder and the enzyme lipase, emulsify and hydrolyze the triglycerides respectively into a mixture of monoglycerides and fatty acids. This mixture is then passed into the enterocytes of the lining of the small intestine. Here the mixture is re-esterified which results in the formation of triacylglycerol. This formed triacylglycerol is then combined with different compounds such as phospholipids, cholesterol and apolipoprotein B 48 in the formation of nascent chylomicrons.

A mature chylomicron is formed during the circulation of blood where the nascent chylomicrons exchange components with high density lipoproteins (HDL) such as apolipoprotein C 2 (APOC2) and apolipoprotein E. A chylomicron remnant is developed with the returning of APOC2 to HDL when the triglyceride stores are completely distributed.

What is VLDL?

In the context of lipoproteins, VLDL (Very Low Density Lipoprotein) is one of the four types. The name suggests the meaning; density which is relative to the content of extracellular water. VLDL is synthesized by the liver through the assembling of triglycerides, apolipoproteins, and cholesterol. In the bloodstream, VLDL get converted into different types of lipoproteins such as LDL (Low Density Lipoprotein) and IDL (Intermediate Density Lipoprotein). VLDL is considered as the major lipid transport mechanism present internally. Their main function is to transport endogenous triglycerides, cholesterol, phospholipids and cholesteryl esters. Other than that, they involve in the long distance transportation of different proteins which are hydrophobic intercellular messengers.

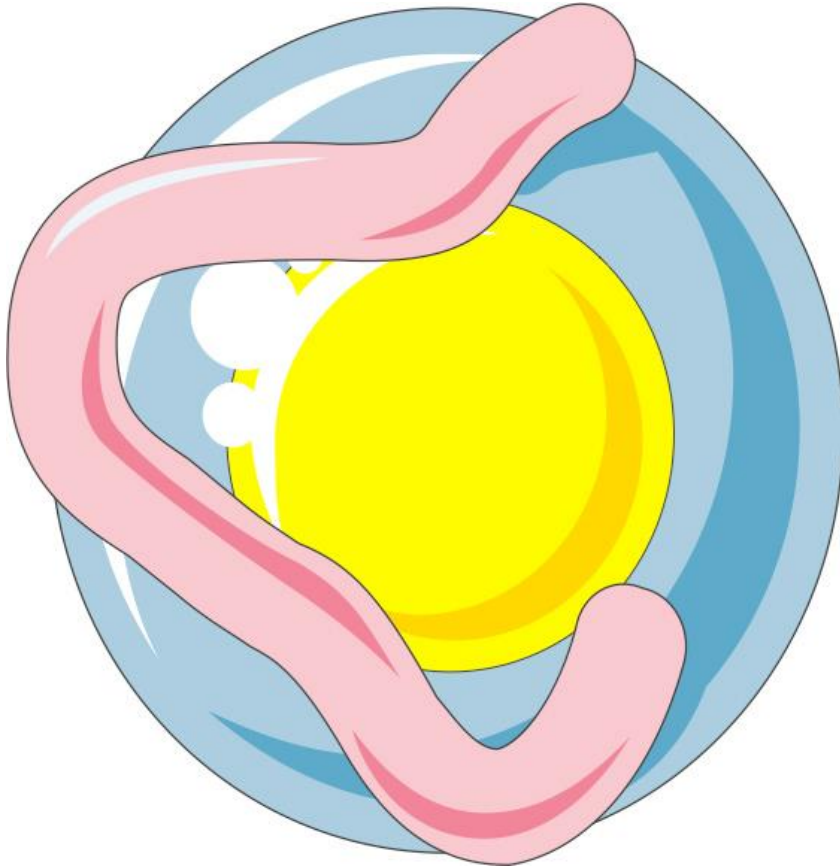


Figure 02: VLDL

The metabolism of VLDL is similar to that of chylomicrons. Triacylglycerol is the main lipid found in VLDL. The type of VLDL released from the liver is known as Nascent VLDL which consist of apolipoprotein C1, apolipoprotein E and apolipoprotein B100 along with cholesterol, phospholipids and cholesteryl esters. During blood circulation, nascent VLDL will acquire apolipoprotein C2 and apolipoprotein E. These two compounds are donated by HDL. Once acquired, nascent VLDL is converted to mature VLDL. Mature VLDL in the muscle and adipose tissue comes in contact with lipoprotein lipase (LPL) which emulsifies and remove triglycerides from VLDL to address storage purposes or utilize as an energy source.

Once mature VLDL come in contact with HDL where apolipoprotein C2 is transferred back to HDL. HDL, along with the cholesteryl ester transfer protein (CETP) HDL transfers cholesteryl esters to VLDL in exchange of phospholipids and triglycerides. Due to these mechanisms which include the activity of LPL and CETP, the molecular composition of VLDL alters which converts the molecule into another type of lipoprotein; IDL.

What are the Similarities Between Chylomicrons and VLDL?

- Both involve in the transportation of lipids within the body system.
- Both metabolism mechanisms are similar with the interaction of HDL (apolipoprotein C2 and apolipoprotein E).
- Major lipid component of both types is triacylglycerol.

What is the Difference Between Chylomicrons and VLDL?

Chylomicrons vs VLDL	
Chylomicron is the largest lipoprotein which is synthesized in the small intestine and transport exogenous dietary product.	VLDL are very low-density lipoproteins synthesized in the liver and transport endogenous dietary products.
Transportation	
Chylomicrons transport exogenous dietary products.	VLDL transport endogenous dietary products.
Source of synthesis	
Chylomicrons are synthesized by intestine	VLDL is synthesized by the liver.

Summary - Chylomicrons vs VLDL

Lipoproteins are of 04 different types. They involve in the transportation of lipids within the body system with the assembling of proteins. Chylomicrons are synthesized in the small intestine, and transport exogenous dietary products whilst VLDL synthesizes in the liver and transport endogenous dietary products. VLDL has the ability to convert into other types of lipoproteins such as IDL. Both metabolism mechanisms are similar to the interaction of HDL (apolipoprotein C2 and apolipoprotein E). Major lipid component of both chylomicrons and VLDL is triacylglycerol. This is the difference between Chylomicrons and VLDL.

Reference:

- 1.Hindawi. "Very-Low-Density Lipoprotein: Complex Particles in Cardiac Energy Metabolism."Journal of Lipids, Hindawi, 3 July 2011. [Available here](#)
- 2."Chylomicron." [Wikipedia](#), Wikimedia Foundation, 5 Oct. 2017.

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- 1.'Chylomicrons Contain Triglycerides Cholesterol Molecules and Other Lipids'By OpenStax College - [Anatomy & Physiology Connexions Web site.\(CC BY 3.0\)](#) via [Commons Wikimedia](#)
- 2.'VLDL 2'by Servier Medical Art [\(CC BY 2.0\)](#)

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APA: Difference Between Chylomicrons and VLDL. (2017, October 16). Retrieved (date), from <http://differencebetween.com/difference-between-chylomicrons-and-vs-vldl/>

MLA: " Difference Between Chylomicrons and VLDL" Difference Between.Com. 16 October 2017. Web.

Chicago: "Difference Between Chylomicrons and VLDL." Difference Between.Com.
<http://differencebetween.com/difference-between-chylomicrons-and-vs-vldl/> accessed
(accessed [date]).



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