



Cholesterol Behind the Whole Life of Humans

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 16 Nov 2023	<p>Cholesterol is a sterol, synthesized by animal cells and vital lipid molecule for human cells (animal) and is also a component of the diet, being present in food of animal origin. Its main function is to maintain the integrity and fluidity of cell membranes and to serve as a precursor for the synthesis of substance that are vital for the organism including steroid hormones, bile acids and vitamin D. animal cells acquire cholesterol from extracellular lipoprotein and form new synthesis of cells. Dietary cholesterol comes exclusively from animal sources, it is naturally present in our diet and tissues. Cholesterol is synthesized in the human body in order to maintain a stable peel when dietary intake is low, given the necessity for cholesterol, very effective intestinal uptake mechanisms bile acid and cholesterol reabsorption cycles exist¹. Conversely carbohydrates are poorly absorbed and indeed rapidly excreted. Dietary cholesterol content does not significantly influence cholesterol value, which are regulated by various nutritional. Factors that influence cholesterol absorption (or) synthesis. Recent study data do not support a link between dietary cholesterol and cardiovascular diseases².</p>
CC License CC-BY-NC-SA 4.0	Keywords: Sterol, Cholesterol, LDL, HDL

1. Introduction

Cholesterol (from the Ancient Greek Chole – (bile) and Stereos(solid) followed by the chemical suffix – for an alcohol) is an organic molecule. It is sterol (or) (modified steroid) a type of lipid. Cholesterol is biosynthesized by all animal cells and is an essential structural component of animal cell membranes. Cholesterol also serves as a precursor for the biosynthesis of steroid hormones, bile acid and vitamin “D”. cholesterol is the principal sterol synthesized by all animals. It is absent among prokaryotes (bacteria and archaea) although there are some exceptions, such as mycoplasma which require cholesterol for growth. Cholesterol also a fundamental element for the normal structural make up and the fluidity of all cell membranes. Cholesterol interacts with phospholipid, bilayers in the cell membrane and increases membrane packing. Cholesterol also takes part in signal transaction intracellular transport, nerve conduction, and signaling pathways through lipid ruffs and caveolae. In vertebrates, hepatic cells typically produce the greatest amount. First identified cholesterol in solid form in gallstones in 1769. FRANCUIS POULLETIER DE LA SALLE, and then rediscovered in 1815 by CHEVREUL who named it “Cholesterine” only later was cholesterol found in blood (Boudet 1833) First invented cholesterol the era of LDL began in 1955 when JOHN GOFMAN, a physician/ physicist at the University of California, Berkeley used the newly invented analytical ultracentrifuge to separate the cholesterol – carrying lipoproteins of plasma according to their density.

What Is Cholesterol

Cholesterol is a waxy substance made in the liver (Produced by the liver) to help build cells and a membrane around the cell to protect it. Cholesterol is vital to human life, and is a kind of sterol. Sterols are a type of fat found in the tissues of both plants and animals, although only animals have varying amount of cholesterol. Your body manufactures much of the cholesterol it needs in the liver, but you can also get it through your diet, animal products such as chicken, meat, eggs, and dairy (dietary) products³.

To fully explain cholesterol, you need to realize that it's also vital to your health and well-being, although they measure cholesterol production in the blood it's found in every cell in the body⁴. In fact, cholesterol production is so important that your liver make about 80% of the cholesterol you need to stay healthy, only about 20% comes from the foods you eat. Cholesterol travels in the blood from of lipoproteins, which are tiny molecules of fat wrapped in protein⁵.

Source Of Cholesterol

We have getting cholesterol from two main sources

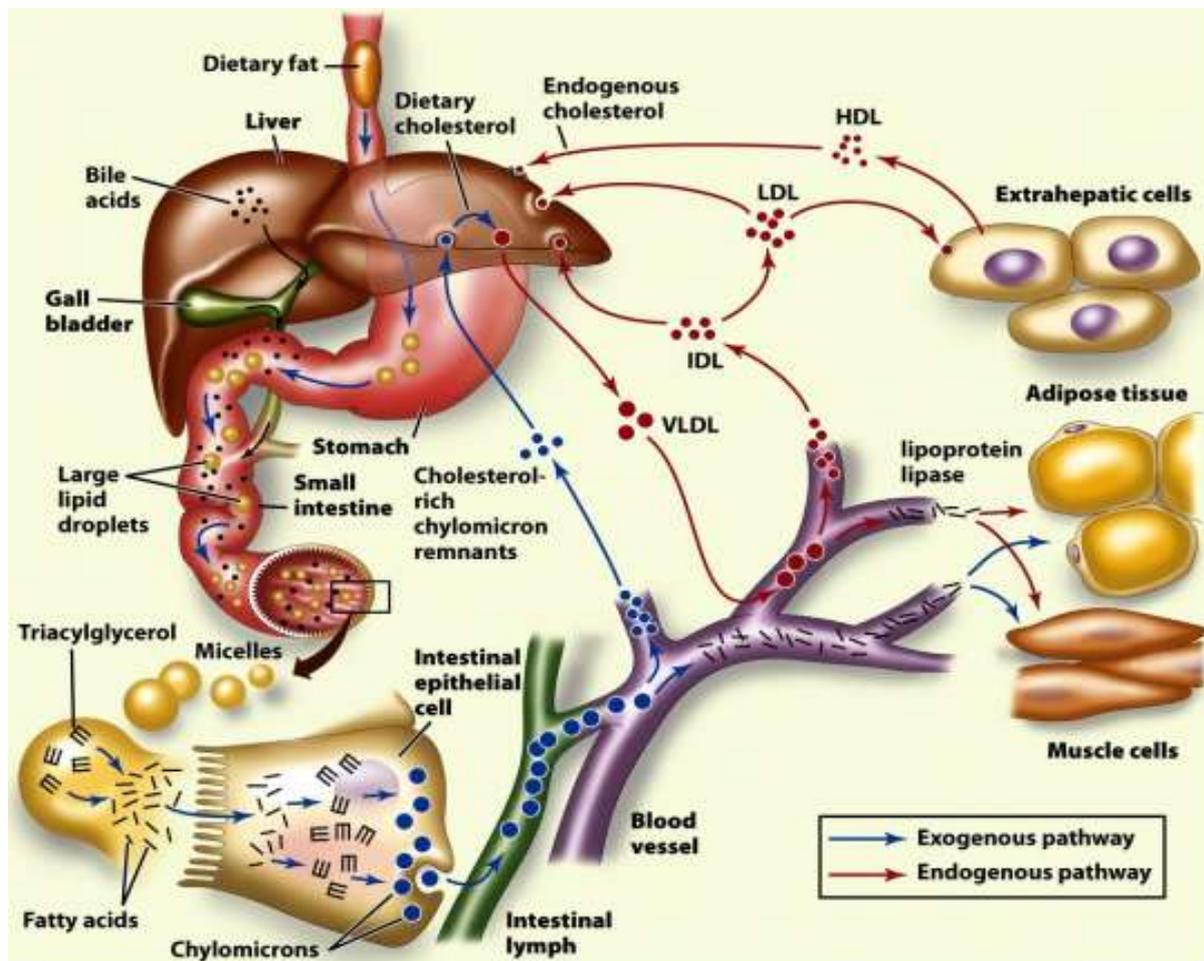
1. Exogenous Cholesterol (Food of animal origin)
2. Endogenous Cholesterol (Synthesized mainly in the liver Acetyl-CoA)⁶

Metabolism And Circulating Blood Cholesterol

Since cholesterol is a fat, it can't travel alone in the blood stream. It would end up as useless globs, (imagine oil floating in a pot of water). To get around this problem, the body packages cholesterol and other lipids into minuscule protein-covered particles that mix easily with blood. These tiny particles called lipoproteins (lipid + protein) move cholesterol and other fats throughout the body.

Since cholesterol is mostly a lipophile molecule, it does not dissolve well in blood. For this reason, it is packed into lipoproteins that are composed of a lipid core (which can contain cholesterol esters and triglycerides) and a hydrophilic outer membrane comprising phospholipids, apolipoprotein and free cholesterol. This allows for the transport of the nonpolar lipid molecules such as cholesterol and triglycerides around the body through the blood to cells that require them. Plasma lipoprotein are separated into five major classes.

1. Chylomicrons
2. VLDL
3. IDL
4. LDL
5. HDL



Cholesterol can enter the blood through the digestion of dietary fat via chylomicrons. However, since cholesterol has an important role in cellular function. It can also be dietary synthesized by each cell in

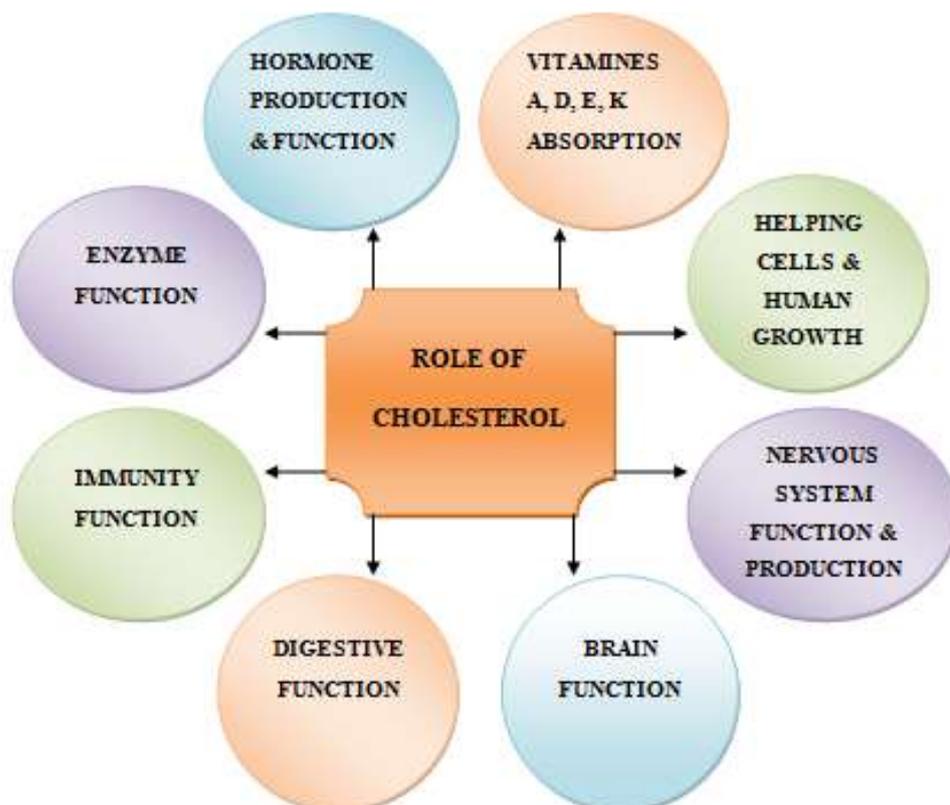
the body. Notably LDL particles are through to act as a major transporter of cholesterol to the peripheral tissues as at least two-third of circulating cholesterol resides in LDL. Conversely, HDL molecules are thought to do the opposite. They take excess cholesterol and return it to the liver for excretion⁷.

Biological Functions of Cholesterol

- Cholesterol fulfills a number of biological functions and is necessary for successful cellular homeostasis. It not only acts as a precursor to bile acids, but it also assists in steroid and vitamin D synthesis as well as playing a central role in maintaining cellular membrane rigidity and fluidity.
- Cholesterol is also a constituent of bile salt, which is used in digestion to facilitate absorption of fat-soluble vitamin A, D, E, K⁸.

The Role of Cholesterol

- Although cholesterol tends to get a bad rap, it also performs several important functions in the human body.
- It plays a role in forming and maintaining cell membranes and structures cholesterol can insert between fat molecules making up the cell, making the membrane more fluid. Cells also need cholesterol to help them adjust to changes in temperature. For example, without cholesterol, T-cells (a type of white blood cell) would not maintain their cell membranes, leading to rupturing of the cells.
- Cholesterol is essential for making a number of critical hormones, and manufacture of steroid – based hormones particularly sex hormones like testosterone and progesterone (estrogen), other hormones produced mainly by the adrenal gland, also require cholesterol for production. For example, 1. Aldosterone –Kinden’s retain water,2. Cortisol - The hormone that is important suppressing inflammation in the body. Cholesterol must also be present for the skin to manufacture “Vitamin D” which plays a role in how the body handles calcium and assists in maintaining bone density.
- Cholesterol also enables the body to form bile acids, which are help breakdown fats in the digestive tract so that they can be absorbed into the body. In addition, triglycerides are an important source of energy for the body, particularly when glucose is deficient⁹.



Regulation Of Cholesterol Synthesis

Biosynthesis of cholesterol is directly regulated by the cholesterol levels present, through the homeostatic mechanisms involved are only partly understood. A higher intake from food leads to a net decrease in endogenous production. Whereas lower intake from food has the opposite effect¹⁰.

How Cholesterol Is Integrated into Cell

Most of the people heard about “Cholesterol levels” and the dangers of high blood cholesterol, is one of the main causes of cardiovascular disease. But behind the harmful side effects of high cholesterol, cholesterol is an essential component of all cells and fundamental to a host of important actions of the body. Hormones like estrogen and testosterone are made from cholesterol. Cholesterol is transported around the body in the blood as small particles consisting of fat and protein. In the body’s cells these particles are broken down and cholesterol is released and integrated as part of the cell. Although this process is essential, not just for humans, for all animals incorporated into the cells after the breakdown of these particles¹¹.

What are The Dangers of Low Cholesterol

While the exact effect of low cholesterol on health are still being studied researchers are concerned about how low cholesterol appears to negatively affect mental health. A 1999 “DUKE UNIVERSITY STUDY” of health young women found that those with low cholesterol were more likely to have symptoms of depression and anxiety. Researchers suggest that because cholesterol is involved in making hormones and vitamin D, low levels may affect the health of your brain. Vitamin D is important for cell growth. A 2012 study presented at the American College of Cardiology Scientific Sessions found a possible relationship between low cholesterol and cancer risk. The process that affects cholesterol levels could affect cancer, but more research is needed on this topic. One other concern about low cholesterol involves women who may become pregnant. If you’re pregnant and you have low cholesterol you face a higher risk of delivering your baby prematurely (or) a baby has a low birth weight¹².

We Need Cholesterol

According to literature reviews published in the proceeding of the nutrition society in 2014 “Current option in nutrition and medical care” in 2012. If you consume no cholesterol, your body will make what it needs. If you eat a lot of food high in cholesterol your body, make less. Most cholesterol is produced in the liver. It is used to synthesized bile salts used for fat digestion, vitamin D and steroid hormones, such as testosterone and estrogen. It is a component of the cell membrane, the waxy substance that protects your nervous system. Healthy cholesterol does not cause cardio vascular diseases at any age group. What we found in detailed systematic review was that people with high cholesterol lived longer and had less heart diseases. Newer research shows that healthy fats are necessary and beneficial for health¹³.

4. Conclusion

Cholesterol isn’t entirely the healthy villain it’s made out to be, its name darkly linked to heart attack, stroke and other types of cardiovascular disease. Cholesterol produced by our own liver for our own good, our body consist of 100 Trillion cells, every day died billions of cells, every single cell having cell membrane made up of cholesterol, so for replacing that cells we need cholesterol. Our bodies need cholesterol not only to make cell membranes, important key hormones like testosterone and estrogen, the bile acids needed to digest and absorb fats and vitamin “D”. cholesterol is so important to the body that the liver and intestines make it from scratch. What found in detailed systematic review was that people with high cholesterol lived longer and had less heart diseases.

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