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CHOLESTEROL, STRUCTURE AND IMPORTANCE. CHOLESTEROL BIOSYNTHESIS AND TRANSPORT

Annotation: This article provides information on the structure and importance of cholesterol, as well as the biosynthesis and transport of cholesterol.

Keywords:. Cholesterol, fatty acids, LP, fatty acids, vitamin D3, steroid hormones, mevalon, squalene, lanosterin

The importance of cholesterol in the body is due to the fact that cholesterol is part of the biomembranes; Bile acids are synthesized; steroid hormones are synthesized; vitamin D is synthesized.

Cholesterol balance is maintained in the healthy body. It contains: 0.3-0.5 g of cholesterol per meal, about 1 g of the body is synthesized per day. The healthy body contains about 140 g of cholesterol, 93% of which are in the cells and 7-10% in the blood. The concentration of flour in the blood was 150-250 mg / dL, in women 150-200 mg / dl, in men 200-250 mg / dl. Cholesterol is involved in many metabolic processes. Including: cell membranes, congenital LP, fatty acids, vitamin D3, steroid hormone synthesis, excretion and skin orcas. The adult human body releases about 1.3 grams of cholesterol every night. The higher the amount of cholesterol in the diet, the lower the synthesis of cholesterol in the tissues (which is ruled out by OMG-reductase).

About 80% of cholesterol is synthesized in the liver, 10% in the small intestinal cells and about 5% in the skin cells. The enzymes necessary for the synthesis of cholesterol are present in many cells of the body. The main substrate that provides cholesterol synthesis is acetyl glucose in acetyl-CoA. This process consists of three stages, which involve more than 35 enzymatic reactions:

1. Formation of fruit acid from acetyl-CoA.
2. Formation of squalene from mevalonic acid (Szo);
3. The formation of lanosterin from squalene, then cholesterol.

The first stage of biosynthesis takes place in the cytoplasm and consists of a series of reactions. In the initial stage of mevalonic acid synthesis, two molecules of acetyl-CoA from acetyl-CoAacetyl transferase in the presence of acetoacetyl-CoA, followed by condensation with a third molecule of acetyl-CoA, ез-oxylate, β-oxyl. β-oxy-β-methylglutaryl-CoA is reversed by the allosteric enzyme OMG-reductase to form mevalonic acid.

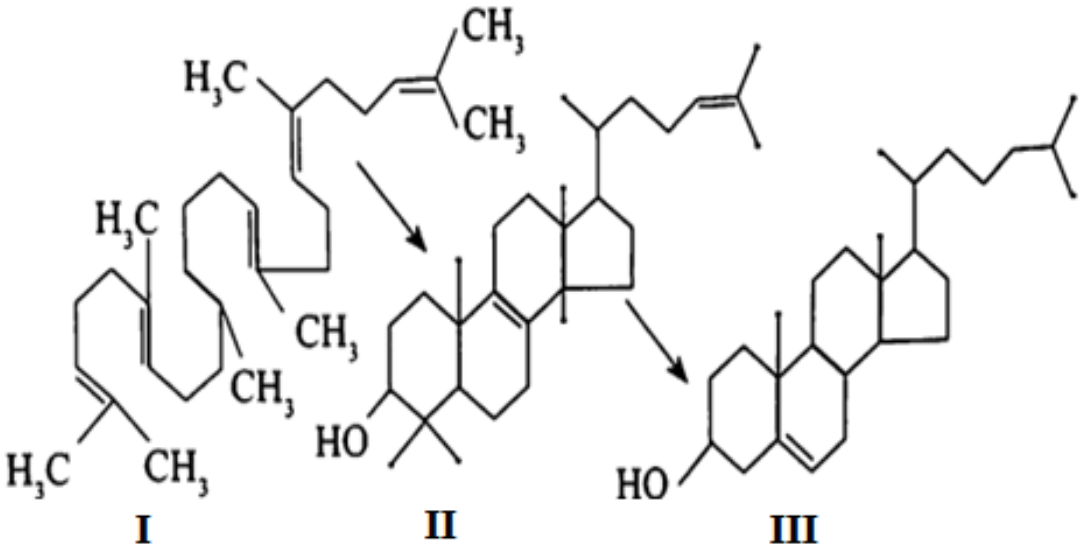

Figure 1. I-Skvalein; II-Lanosterin; III-Chemical structure of cholesterol

Mevalonic acid undergoes a number of changes, and its non-carbonaceous parts condense to form squalene, which is composed of six isoprene units. It, in turn, produces lanosterin, a tetracyclic group. After a few steps, cholesterol is formed from lanosterin. Cholesterol biosynthesis is controlled by the enzyme HMG-CoA reductase. The increase in cholesterol in the blood and tissues inhibits the synthesis of the enzyme HMG-reductase at the transcriptional level, and enzyme synthesis is facilitated. However, 2 forms of the enzyme HMG-reductase have been identified. In particular, its phosphorylated form is inactive and its phosphorylated form is active. Daily synthesis of its synthesis is observed. Midnight is synthesized more than the morning hours. HMG-CoA reductase activity increases under the influence of insulin and thyroid hormones. HMG-CoA

reductase activity decreases with starvation, thyroidectomy, and administration of glucagon and glucocorticoids.

Cholesterol transportation.

Cholesterol is high in lipoproteins, which are synthesized in liver and intestinal cells. Lipoproteins contain free cholesterol and essential oils. Free cholesterol esters are excreted in the nucleus accumbens of essential lipoprotein. When the lipoprotein particles collide with each other, cholesterol is diffused from one particle to another. Such an exchange can be made in two volumes, but from all other lipoproteins, more cholesterol is transferred to ZULP. This is because cholesterol esterification is actively active under the influence of lecithin-cholesterol-acyltransferase (LHAT), which is present in ZULP. This enzyme catalyzes the binding of free acetylcholine in the lecithin molecule to free cholesterol.

LHAT ZYULP's surface is located in the surface layer, and the cholesterol esters formed under its influence are immersed in the particles. As a result, the cholesterol concentration in the surface layer decreases and the cholesterol levels drop from other lipoproteins and tissues to ZUL. ZPLP is transmitted to the cells of various organs by endocytosis, providing them with cholesterol; ZULP, in turn, removes excess cholesterol from their membranes, preventing them from accumulating. ZULPs, which are composed of mainly cholesterol-containing compounds, pass into the liver and intestinal tract by endocytosis and break down.

There are two ways in which cholesterol is excreted from the body: in the liver, cholesterol is converted to bile acids and excreted through the intestines, and unchanged cholesterol is excreted in the bile in the intestines and excreted in the feces. Disruption of the balance between these mechanisms leads to changes in the amount of cholesterol in the blood and tissues. One of the most serious consequences of this is hypercholesterolemia, which in turn can lead to atherosclerosis or gallstones.

Types of hypercholesterolemia:

• Primary - idiopathic or familial

• Secondary - acquired or exogenous

There are several types of hyperlipoproteinemia:

Round 1 (hereditary) Lipoprotein lipase and apoC-2 deficiency. There is no risk of hyperthyroidism, hypertriglyceridemia, atherosclerosis

Round 2 (familial) hypercholesterolemia. Defects in ZPLP receptors are due to mutations in the avoV-100 gene. Hypercholesterolemia and hypertension, early atherosclerosis, xanthomatosis

Round 3 (family mixed). The defect of apoE and its isoforms is due to the violation of its binding to receptors. Blood XM, ZHPLP, ZPLPni increase, hypercholesterolemia, hypertriglyceridemia, early atherosclerosis, xanthomatosis

Rounds 4 and 5 (familial hypertriglyceridemia). Multiple synthesis of ZZhPLP due to genetic heterogeneous diseases, hyperinsulinemia. Increased ZHPLP and ZPLP in the blood, hypertriglyceridemia, normal hypercholesterolemia, atherosclerosis, xanthomatosis, hyperglycemia

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