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COMMENTARY

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Concept of Lipid Metabolism and Its Disorders

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Description

The synthesis and breakdown of lipids in cells is known as lipid metabolism. It involves the storage or breakdown of fats for energy as well as the creation of structural and functional lipids, such as those necessary for the formation of cell membranes. Animals may consume these fats naturally from food or the liver produces them. This process of synthesizing these fats is known as lipogenesis. Triglycerides and cholesterol make up the majority of lipids that are absorbed from meals and found in the human body. Fatty acids and membrane lipids are two more lipid types that can be found in the body. There are two sources of fats that organisms can use to get energy: from eaten dietary fats and from stored fat. Lipid metabolism is sometimes thought of as the digestion and absorption process of dietary fat, however this is incorrect. Vertebrates generate energy from both types of fat to power vital organs like the heart. Lipids are hydrophobic molecules, thus they must first be solubilized for metabolism to start. Lipid metabolism frequently starts with hydrolysis, which is accomplished with the aid of several digestive system enzymes. Plants also have lipid metabolism, however the processes are somewhat different from those in animals. The absorption of the fatty acids into the intestinal wall's epithelial cells comes next following the hydrolysis. Fatty acids are packed and transferred to other bodily parts in the epithelial cells.

Lipid digestion

The first step in lipid metabolism is digestion, which involves using lipase enzymes to split triglycerides into smaller monoglyceride units. Lingual lipase, a chemical digestion enzyme, starts the chemical breakdown of lipids in the mouth. Lipases do not break down ingested cholesterol; it remains intact until it reaches the small intestine's epithelial cells. The chemical breakdown of lipids is subsequently continued by gastric lipase in the stomach, where mechanical digestion starts. However, after the fats enter the small intestines, the majority of lipid breakdown and absorption takes place. Triglycerides are broken down by the pancreas' chemicals and additional mechanical digestion in the small intestines until they may be absorbed into the epithelial cells of the small intestine as individual fatty acid units. The signal for the hydrolysis of the triglycerides into distinct free fatty acids and glycerol units is sent by the pancreatic lipase.

Lipid absorption

Absorption of fats is the second step in the metabolism of lipids. While the majority of fat absorption happens exclusively in the small intestines, short chain fatty acids can be absorbed in the stomach. The triglycerides will congregate form micelle-like structures after being divided into individual fatty acids, glycerols, and cholesterol. When entering the intestinal epithelial cells, fatty acids and monoglycerides spread across the membrane after leaving the micelles. Fatty acids and monoglycerides are converted back into triglycerides in the cytoplasm of epithelial cells. Triglycerides and cholesterol are bundled into larger particles termed chylomicrons, which are amphipathic structures that transport digested lipids, in the cytoplasm of epithelial cells. Chylomicrons will enter adipose and other bodily tissues through the bloodstream.

Lipid transportation

Membrane lipids, triglycerides, and cholesterols need specialised transport proteins called lipoproteins since they are hydrophobic. Triglycerides and cholesterol can travel through the bloodstream thanks to the amphipathic nature of lipoproteins. One subgroup of lipoproteins called chylomicrons is responsible for transporting digested lipids from the small intestine to the rest of the body

Lipid metabolism disorders

Lipid metabolism disorders are illnesses where there is a problem with the breakdown or synthesis of fats

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(including inborn abnormalities of lipid metabolism) (or fat-like substances). Increased levels of plasma lipids in the blood, such as LDL cholesterol, VLDL cholesterol, and triglycerides, which most frequently cause cardiovascular illnesses, are linked to lipid metabolism disorders. These conditions are frequently inherited, which means that their genetic makeup is transferred from parent to kid when a person develops them. A disturbance of the body's lipid metabolism can occur in patients with Gaucher's disease (types I, II, and III), Niemann-Pick disease, Tay-Sachs disease, and Fabry's disease. Sitosterolemia, Wolman's disease, Refsum's disease, and cerebrotendinous xanthomatosis are rarer disorders with an issue with lipid metabolism.