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Research Article

LIPID METABOLISM AND ITS FLOW IN ECOSYSTEM

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A R T I C L E I N F O

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A B S T R A C T

Lipids play indispensable roles in cell Structure and metabolism, Lipids are substances of biological origin that are soluble in organic solvents such as chloroform and methanol but are only soluble, if at all, in water. Lipid is also flowing continuously in all steps of ecosystem with flowing of energy Lipid is also metabolised with flowing in ecosystem. To maintain the essential requirements it is necessary the maintaining a proper ecosystem in interdependencies among plants, animals and surroundings.

INTRODUCTION

Metabolism is the totality of Chemical reactions occurring within a cell. Catabolic pathways break down substrates to provide energy, largely through oxidative reactions, whereas anabolic pathways synthesize complex bio-molecules from small molecules, often from intermediates in catabolic pathways. Catabolic and anabolic pathways with the same end points are actually different pathways with the same end points are actually different pathways, not simple reversals of each other, so both bath ways can be thermodynamically thermodynamically favourable, Regulation can be imposed only one reactions that are displaced far from equilibrium. Most metabolic energy comes from the oxidation of substrates, with energy release coming in a series of small steps as the electrons released are transferred from carrier to carrier, and ultimately to oxygen. The more highly reduced a substrate, the more energy is released when it is catabolizede.

Flux through metabolic pathways is Controlled by regulating enzyme concentration, enzyme activity compartmentation, and hormonal control. Hormonal regulation may involve the control of enzyme synthesis at a genetic level or the regulation of enzyme activity.

Living (biotic) organisms and their non living (abiotic) environment are inseparably interrelated and interact with a each other. Any unit that and includes all the organism in a given area interacting with the physical environment so that a flow of energy leads to clearly defined biotic structures and cycling of materials between living and nonliving components is an ecological system or ecosystem.

From the stand point of trophic structure, an ecosystem is two-layered: It has (1) an upper autotrophic (self-nourishing) stratum or green belt of chorophyll - containing plants in which the fixation of light energy, the use of simple inorganic substances, and the build up of complex organic substances predominate, and (2) a lower heterotrophic (other - nourished) stratum or "brown belt" of soils and sediments, decaying matter, roots, and so on, in which the use, rearrangement, and the decomposition of complex materials predominate, It is convenient to recognize the following components as constituting the ecosystem (1) inorganic substances (C,N, CO_2, H_2O and others) involved in material cycles, (2) organic compounds (proteins, carbohydrates, lipids, humid substances, and so on) that link biotic and abiotic components; (3) air, water, and substrate environment, including the climate regime and other physical factors (4) producers (autotrophic organisms), mostly green plants that can manufacture food from simple inorganic substances, (5) Phagotroph's (phago = to eat), heterotrophic organisms, chiefly animals that ingest other organisms or particulate organic matter, and (6) Saprotrophs (Sapro = to decompose) or decomposers, *al*so heterotrophic organisms, chiefly bacteria and fungi, that obtain their energy either by breaking down dead tissues or by absorbing dissolved organic matter exuded by or extracted from plants or other organisms. Saprophages are organisms that feed on dead organic matter. The decomposing activities of saprotrophs release inorganic nutrients that are usable by the producers; they also provide food for the macroconsumers and

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often excrete substances that inhibit or stimulate other brotic Components of the ecosystem.

LIPIDS - Lipids are a class of biological molecules defined by low solubility in water and high solubility in non polar solvent. As molecules that are largely hydrocarbon in nature, lipids represent highly reduced form of carbon and upon oxidation in metabolism, yield large amounts of energy. Lipids are thus the molecules of choice for metabolic energy storage. The lipids found in biological systems are either hydrophobic (containing only non polar groups) or amphiphobic (possessing both polar and non-polar groups). The hydrophobic nature of lipid molecules allows membranes to act as effective barriers to more polar molecules, Lipids are substances of biological origin that are soluble in organic solvents such as chloroform and methanol but are only sparingly solvents such as soluble, if at all in water. Fats, oils, certain vitamins and hormones, and most non protein membrane components are lipids.

Biosynthesis of Lipids

Lipids also function as important insulators of delicate internal organs. In addition, nerve a tissue, plasma membrane, and all membranes of subcellular particles such as mitochondria, endoplasmic reticulum, and nuclei have complex lipids as essential components. Moreover, the vital electron transport system in mitochondria and the intricate structures found in chloroplasts, the site of photosynthesis contain complex lipids in their basic architecture.

The liver and adipose tissue are the principal sites of lipid metabolism and the blood serves as a transport system. Other compartments which include cardiac and skeletal muscles are important utilizers of fatty acids are ketone bodies.

Triacylglycerols are the main form for storage of biological energy. In animals dietry triacylglycerols are digested and then resynthesized as they complexes with proteins to form chylomierons, for transport to tissues. Triacylglycerol synthesized in liver are transported to peripheral tissues as very low-density lipo proteins. Low density lipo-proteins represent the major vehicle for transport of cholesterol to peripheral tissues cholesterol level in blood are regulated through control of synthesis of LDL receptors involved in cellular uptake of LDL by endocytosis. Faulty control of LDL levels contributes towards the development of atherosclerotics plaque.

Fat depots are metabolized by enzymatic hydrolysis of triacylglycerols to fatty acids plus glycerol. The process is hormonally controlled via cyclic AMP. Most fatty acid degradation occurs through βoxidation, a mitochondrial processes that involves stepwise oxidation and removal of two carbon fragments as acetyl - CoA. Processing unsaturated fatty acids is a bit more complicated, because of the stereochemistry involved, but the pathways are straight forward. Under conditions in which oxidation of acetyl-CoA through the citric acid cycle is limited acetyl-CoA is used to synthesize ketone bodies excellent or satisfactory energy substrates for some organs.

Fatty acid biosynthesis occurs via the stepwise addition of two carbon fragments, in a process that superficially resembles a reversal of ß-oxidation. Metabolic activation involves acyl carrier proteins, and the reductive power comes from NADPH. In eukaryotic cells the seven enzyme activities are linked covalently on multifunctional enzymes or multienzyme complexes. Fatty acid one famed elongation beyond the stage is mechanistically similar, but CoA derivatives are involved instead of acyl carrier proteins. Unsaturated fatty acids are formed primarily by an ER associated desaturating system, Triacylglycerols are synthesized by straight forward pathways in which acyl groups in fatty acyl - CoAs are transferred to the hydroxyl groups of glycerol-3-phosphate and diacylglycerol. Faulty, hormones con control of triacylglycerol deposition along with excess dietary intake, can be responsible tor obesity.

Glycerophospholipids, the predominant membrane lipids, are synthesized by routes that start from phosphatidic acid and intermediates activated by reaction with cytidine triphosphate. Retailoring of fatty acid side chain in phospholipids, exchange of polar head groups, and the actions of phospholipids exchange to proteins, which insert phospholipids into membranes, all play roles in shaping the lipid composition of specific membranes. s-Adenosylmethionine is the methyl group donor for phosphaticlycholine synthesis.

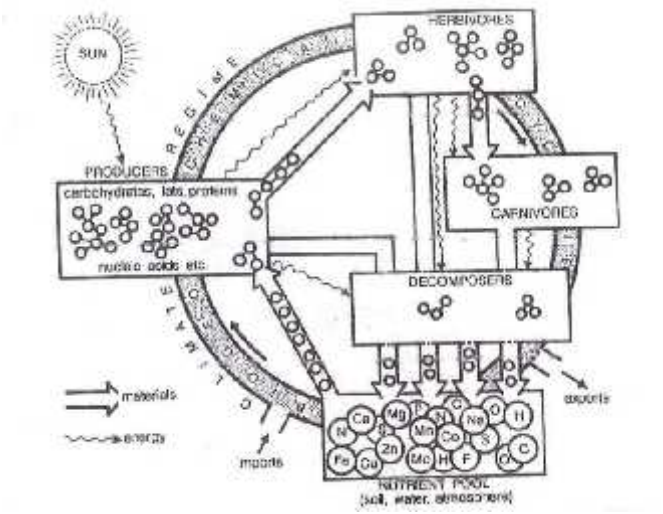
Glycosphingolipids are assembled from ceramide and successive sugar additions involving glycosyltransferases and nucleotide linked sugars. The pathway for turnover of these compounds in nervous tissue was elucidated from analysis of products that accumulated in cells of individuals with enzymatic defects in the pathway.

All steroid compounds - and indeed all isoprenoid compounds are synthesized from acetate, by a pathway that proceeds through the six- carbon mevalonic acid and involves C_5, C_{10} and C_{15} intermediates. Cyclization of the C_{30} hydrocarbon squalene leads to cholesterol, the precursor for all bile acids and steroid hormones that include prostaglandins, thromboxanes, and leukotrienes. Although actions of these biological regulators are not yet understood at the molecular level, metabolism of these eicosanoid presents therapeutic targets for drug used to control inflamation, blood clotting, and gastric secretion and to manipulate reproductive processes in various ways.

Food Chain

The transfer of food energy from the producers, through a series of organisms (herbivores to Carnivores to decomposers) with respected eating and being eaten, is known as food chain. Producers utilise the radiant energy of sun which is transformed to Chemical form, ATP during photosynthesis. Thus, in any food chain, green plants occupy the first trophic (nutritional) level - the producer level, and are called the primary producers. The energy, as stored in food matter no manufactured by green plants, is then utilised by the plant eaters - the herbivores which constitute the second trophic - level and are called the primary consumers (herbivores). Herbivores in turn are eaten by the carnivores, which constitute the third trophic level - the secondary consumers level, and are called the secondary consumers (carnivores). These in turn may still be eaten by other carnivores at tertiary consumer level i.e. by the tertiary consumers (carnivores). Some organisms are omnivorous eating the producers as well as the the carnivorous at their lower food chain. Such

organisms thus may occupy more than one trophic level in the food chain



A generalised model of an ecosystem to show its structure and function. (Sharma, P. D. 2013)

CONCLUSION AND RECOMMENDATIONS

It is concluded that the lipid and its metabolism is also continuing of flowing in the food chain from producer to herbivores to carnivores & to decomposers. In good chain, the lipid & its metabolism is also flowing with energy from producers to primary consumers (herbivores), from primary consumers to secondary consumers (Carnivores), and from secondary consumers to tertiary consumers carnivores/ omnivores and so on. The metabolism of an organism (or of a cell) may be defined as the sum total of all the enzyme - catalyzed reactions that occur in an organism (or in a cell).

The rapid advances and technology have but the scientists and technologists on their heads to cope up with the simultaneous changes that have occurred during the past decades. Various types of revisions, rectifications as well as modifications and sometimes even together innovated ideas that developed in numerous fields of specializations have required to be incorporated with the advanced to the concerning field of the study. The innovative techniques have put the researches on consistent "think and rethink" level on the entertain high concepts related to the life science. The study of such concept as lipid is to be considered with metabolism of biosynthesis of lipid and its flow in ecosystem of land, aquatic, mountains, desert and air etc. and interrelationship in between plants, animals and biosphere.

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