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These Enzyme Catalyzed Reactions allow Organisms to grow and Reproduce

Daniel Wright

Department of Endocrinology Diabetes Care Specialist at Novo Nordisk, Western Kentucky University, USA

***Corresponding author:** Daniel Wright, Department of Endocrinology Diabetes Care Specialist at Novo Nordisk, Western Kentucky University USA

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Description

Metabolism is the set of life-sustaining chemical reactions in organisms. The three main purposes of metabolism are: the conversion of the energy in food to energy available to run cellular processes; the conversion of food to building blocks for proteins, lipids, nucleic acids, and some carbohydrates; and the elimination of metabolic wastes. These enzyme-catalyzed reactions allow organisms to grow and reproduce, maintain their structures, and respond to their environments. The word metabolism can also refer to the sum of all chemical reactions that occur in living organisms, including digestion and the transportation of substances into and between different cells, in which case the above described set of reactions within the cells is called intermediary (or intermediate) metabolism. Metabolic reactions may be categorized as catabolic the breaking down of compounds (for example, of glucose to pyruvate by cellular respiration); or anabolic – the building up (synthesis) of compounds (such as proteins, carbohydrates, lipids, and nucleic acids). Usually, catabolism releases energy, and anabolism consumes energy.

The chemical reactions of metabolism are organized into metabolic pathways, in which one chemical is transformed through a series of steps into another chemical, each step being facilitated by a specific enzyme. Enzymes are crucial to metabolism because they allow organisms to drive desirable reactions that require energy and will not occur by themselves, by coupling them to spontaneous reactions that release energy. Enzymes act as catalysts they allow a reaction to precede more rapidly and they also allow the regulation of the rate of a metabolic reaction, for example in response to changes in the cell's environment or to signals from other cells. The metabolic system of a particular organism determines which substances it will find nutritious and which poisonous. For example, some prokaryotes use hydrogen sulfide as a nutrient, yet this gas is poisonous to animals. The basal metabolic rate of an organism is the measure of the amount of energy consumed by all of these chemical reactions.

Amino acids and proteins

Proteins are made of amino acids arranged in a linear chain joined by peptide bonds. Many proteins are enzymes that catalyze the chemical reactions in metabolism. Other proteins have structural or mechanical functions, such as those that form the cytoskeleton, a system of scaffolding that maintains the cell shape.

Proteins are also important in cell signaling, immune responses, cell adhesion, active transport across membranes, and the cell cycle. Amino acids also contribute to cellular energy metabolism by providing a carbon source for entry into the citric acid cycle (tricarboxylic acid cycle), especially when a primary source of energy, such as glucose, is scarce, or when cells undergo metabolic stress.

Lipids

Lipids are the most diverse group of biochemicals. Their main structural uses are as part of biological membranes both internal and external, such as the cell membrane, or to unlock the chemical energy of oxygen. Lipids are the polymers of fatty acids that contain a long, non-polar hydrocarbon chain with a small polar region containing oxygen. Lipids are usually defined as hydrophobic or amphipathic biological molecules but will dissolve in organic solvents such as alcohol, benzene or chloroform. The fats are a large group of compounds that contain fatty acids and glycerol; a glycerol molecule attached to three fatty acids by ester linkages is called a triacylglyceride. Several variations on this basic structure exist, including backbones such as sphingosine in sphingomyelin, and hydrophilic groups such as phosphate as in phospholipids. Steroids such as sterol are another major class of lipids.

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