**Enzymes definition, examples, functions and structure**

Student's Name

Institution

Course

Instructor

Due Date

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**introduction**

living organisms’ body is composed of different types of cells, tissues, and other complex organs. For efficient functioning the body release chemical substances to accelerate biological processes such as digestion, respiration, excretion and several other metabolic activities in order to sustain a healthy life. Hence enzyme are essential in all living organism which govern all biological process

**Definition**

As explained in enzymology; Enzyme is a substance that act as a catalyst in living organism, they help in regulating the rate at which chemical reaction take place without being affected in the process. they are proteins that helps to increase the speed of metabolism or the chemical reactions in the body. They can also perform multiple reaction simultaneously with the final distribution of reactant and products maintained at equilibrium properties. All living organisms have enzymes within their bodies. Our bodies naturally produce enzymes, but enzymes are also found in manufactured products and food

**Example of enzymes and their function**

Lipases: This group of enzymes helps digest fats in the gastrointestinal tract.

Amylase: they help in digestion of starch into sugars. These are found in the saliva

Maltase: They facilitate the breakdown of the sugar maltose into glucose, They are found in the saliva.

Trypsin: These enzymes break down proteins into amino acids in the small intestine.

Lactase: they facilitate complete digestion of whole milk, they breakdown lactose in the sugar in milk into glucose and galactose.

In medical field they are use to treat lactose intolerance in patients, it is achieved when used as supplements

Acetylcholinesterase: These enzymes are found at postsynaptic neuromuscular junction, they break down the neurotransmitter acetylcholine in nerves and muscles int acetic acid and choline. (Nelson, 2012)

Helicase: These are motor proteins that move along the nucleic acid, they help to unpack the genetic material of an organism. They form an essential part during DNA replication as the they separate the double strand DNA into single strand DNA. (Nelson, 2012)

DNA polymerase: These enzymes help to catalyze the synthesizes of DNA during replication. They duplicate the DNA content of the cell during cell division.

DNA ligase: This enzyme plays a crucial role in DNA replication by joining the Okazaki fragments on the lagging strand.

Proteases: Proteases are enzymes responsible for breaking down proteins in our food into amino acids during digestion. This process is known as proteolysis. They are found in stomach, pancreas and small intestines.

Ribonuclease: This enzyme is involved in the breakdown of RNA molecules into nucleotides

Catalase: Catalase is an enzyme that helps convert hydrogen peroxide into water and oxygen, protecting cells from oxidative damage. They are mainly found in peroxisome of mammalian cells. Catalase protect cellular organelles against damage from peroxides which in continuously produced by metabolic reactions

Phosphorylase: Phosphorylase enzymes are essential for glycogen breakdown into glucose units in the liver and muscles. They catalyze the transfer of phosphate group from a donor molecule to a receptor molecule.

Lysozyme: Lysozyme is an enzyme that destroys bacterial cell walls, contributing to the body's immune defense.

ATP synthase: ATP synthase is an enzyme responsible for producing ATP, the energy currency of cells, during cellular respiration.

Carbonic anhydrase: This enzyme catalyzes the conversion of carbon dioxide and water into bicarbonate ions, crucial for maintaining acid-base balance in the body.

**Enzymes structure**

Enzymes are a linear chain of amino acids that give rise to a "three - dimensional structure". They have a specific active site and potentially an allosteric site. The active site is the Part of the enzyme where the substrate molecule bind and a chemical reaction take place. The sequence of amino acids specifies the structure, which in turn identifies the catalytic activity of the enzyme. Upon heating, the enzyme's structure denatures, resulting in a loss of enzyme activity, which in turn is associated with temperature. (begley, 1997)

Compared to its substrates, enzymes are typically large with varying sizes, ranging from 62 amino acids to an average of 2500 residues found in fatty acids synthase. Only a small section of the structure is involved in catalysis and is situated next to the binding sites. The catalytic sites and the binding site together constitute the enzyme's active site. A small number of ribozymes exist which serve as an RNA - based biological catalyst. It reacts in complex with the protein.

References

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