Enzymes Characterization in Diabetes mellitus

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The characterization of the enzyme in patients and healthy individuals or an animal model of disease is studied in a whole investigation of biomarkers of the disease.

Diabetes Mellitus

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by complete or partial deficiencies in insulin production and/or insulin action coupled with chronic hyperglycemia and disruption in carbohydrate, lipid and protein metabolism. In addition, an alterations in enzymatic antioxidant defenses in DM was detected. The reactive oxygen species (ROS) overproduction induces lysosomal membrane permeabilization.

Experimental Diabetes

Streptozotocin (STZ) is an antibiotic with antineoplastic and diabetogenic properties that has been isolated from a bacterium of the genus *Streptomyces*.

The research interest is focusing on the investigation of enzymatic variation and some signaling pathways in some diseases such as Diabetes mellitus. The target enzyme of our study are the lysosomal enzymes such as arylsulfatses and some glycosidases.

Lysosomal enzymes

Lysosomal enzymes are digestive enzymes located in the lysosome and responsible for the degradation of biomolecules in the cell. They include many types which hydrolyze carbohydrates, lipids, proteins, nucleic acids and **glycoconjugates**.

Arylsufatases

- **Arylsulfatase A (ASA):** is a lysosomal enzyme known as cerebroside-3-sulfohydrolase. It desulfates the galactose-3-sulfate residues in cerebroside sulfate and other sulfated galactolipids.

- **Arylsulfatase B (ASB):** is a lysosomal hydrolase that desulfates the non reducing terminal N-acetylgalactosamine-4-sulfate residue present in glycosaminoglycans (GAGS).

Glycosidases

Glycosidases are glycoprotein enzymes that hydrolyze glycosidic bond during the digestion process of carbohydrates. There are two classes of glycosidases. The first class includes exoglycosidases which are α-glucosidase, β-glucosidase and β-glucuronidase. The second class includes endoglycosidases such as α-amylase.

α-glucosidase (EC.3.2.1.20) is an exoglycosidase enzyme that plays role in the breakdown of glycogen in the liver and muscles into glucose. This enzyme posses both maltase/glycoamylase and succrase/isomaltase activity. α-Amylases (E.C. 3.2.1.1) are endoglyconases that catalyze the hydrolysis of α-(1→4) glycosidic linkage in starch and related polysaccharides.

On the other hand, β-glucuroniadse (EC 3.2.1.31), which is another vital exoglycosidase enzyme, plays role in the cleavage of β-glucuronide linkage at the non reducing termini of glycosaminglycans such as chondroitin sulfate and hyaluronic acid.

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