

Substrate

[Science](#), [Biology](#)



A1. Role of Enzymes in Processes Enzymes are organic catalysts that help to speed up the breakdown of a molecule, such as fructose. The enzyme helps a chemical reaction take place quickly so that the reaction happens properly. In order for that to happen the enzymes process by the lock and key model, the lock is the substrate and the enzyme is the key. The active sites are specific to a certain substrate of a molecule, so the enzymes only have one job to do. The shape of an enzyme is not changed or consumed during these reactions.

However, without enzymes the reactions would take too long and would not breakdown properly. A2. Deficiency in Aldolase B In hereditary fructose intolerance there is a protein lacking that is needed to breakdown fructose. Aldolase B is the substance needed to breakdown fructose. Without the Aldolase B the body is not able to change glycogen into glucose that the body needs. When this happens an individual's blood sugar can fall and substances will build up in the liver causing more health issues.

With an absence of the enzyme Aldolase B, fructose cannot be broken down causing hereditary fructose intolerance. Symptoms can be severe, " these include severe abdominal pain, vomiting, and hypoglycemia following ingestion of fructose or other sugars metabolized through fructose-1-phosphate. Prolonged fructose ingestion in infants leads ultimately to hepatic and/or renal failure and death. " (Haldeman-Englert, 2011) A4. Substrate The specific substrate acted on by Aldolase B is fructose-1-phosphate (F1P).

This then is converted into DHAP and glyceraldehyde. Once the conversion is finished the product can enter the glycolysis cycle to form ATP or energy used for the body. " In normal cellular conditions, the primary enzymatic <https://assignbuster.com/substrate/>

activity of aldolase B is to cleave fructose diphosphate (FDP). " (Roth, 2012) A5. Role of Aldolase B Aldolase B is the substance needed to breakdown fructose. Its specific role is to speed up the breakdown process of fructose to a more usable form in the body.

Aldolase B is primarily found in the liver, but can also be found in the small intestines and kidneys. B1. Interconversions of Cori Cycle If the Cori Cycle occurred and then remained in a single cell, no useful metabolic work would be complete. The reason for this is that " if the Interconversions of the Cori Cycle were to take place within a single cell it would constitute a " futile cycle" with glucose being consumed and resynthesized at the expense of the ATP and GTP hydrolysis. (Campbell & Farrell, 2008) If this were to happen the cycle would essentially be running in opposite directions, having no effect and wasting energy. Having both the glycolysis portion and the gluconeogenesis portion going at the same time, will result in glucose being converted into pyruvate by glycolysis and then converted back to glucose by gluconeogenesis, all this will cause a use of ATP, not making. The cycle needs to take place in order to produce ATP, an energy source for the body especially during muscle activity. B3.

Defect Preventing Conversion of ADP to ATP Having a deficiency in the Citric Acid cycle can create the entire cycle to halt essentially. Having the citric acid cycle halt can create a build-up of lactic acid, decreasing the amount of oxygen getting to the tissues. Hypothetically the Citric Acid cycle is missing the enzyme malate; " Malic acid acts as a catalyst in the Krebs' cycle to increase energy production from the burning of pyruvic acid. Malic acid also aids in exercise recovery by counteracting the build-up of lactic acid. (Ward,

2011) Missing the malic acid can create chronic fatigue, muscular myalgia, and arthritic-like pains. Any disturbances to the cycle can produce and contribute to neurological and physical problems. B4. Role of Coenzyme Q10
The role of Coenzyme Q10 in ATP synthesis is unique. It can function in every cell of the body to make energy; no other molecule can perform this function. The enzyme is very hydrophobic, so it can move freely within the cell membrane.

Its special function is that it can accept and donate electrons, which plays a big role in the electron transport chain. " It accepts electrons generated during fatty acid and glucose metabolism and then transfers them to electron acceptors. At the same time, Coenzyme Q transfers protons outside the inner mitochondrial membrane, creating a proton gradient across that membrane. The energy released when the protons flow back into the mitochondrial interior is used to form ATP. " (Higdon, 2003)