Digestive system

Science, Anatomy

Our digestive systems contain glands. These glands produce enzymes. Enzymes are catalysts. Catalysts make chemical reactions happen quicker and easier. Digestive enzymes help us to break downfoodeasier. Our bodies make lots of different digestive enzymes. Each enzyme breaks down a particular food. When an enzyme has broken down one food molecule, it can then break down another molecule of the same kind. It can do this over and over again. It makes the reaction happen without being used up.

In the digestive system, enzymes are produced to break down carbohydrates, proteins and fats into smaller soluble molecules from large food molecules. These spread through the tube of the small intestine and into the blood plasma (carbohydrates and proteins) or lymph (fats) and pass to the cells. The stomach makes hydrochloric acid to help the enzyme called pepsin work. Fats are difficult to digest and absorb because they are not soluble in water. To help with fat digestion the gall bladder produces bile this makes the fats smaller. This increases their surface area for enzymes to act on.

In the mouth is saliva and they containing amylase produced by the salivary glands. This enzyme is used to break down starch/carbohydrates into glucose molecules. In the stomach is found Pepsin which breaks down proteins into amino acids. In the small intestine, parts of a large molecule of fat are broken down into smaller fatty acid and glycerol molecules. Below is how the different foods are digested by using enzymes: 1. Carbohydrates - Foods rich in carbohydrates include bread, potatoes, dried peas and beans, rice, pasta, fruits, and vegetables.

Many of these foods contain both starch and fibre. The digestible carbohydrates such as starch and sugar are broken into simpler molecules by enzymes in the saliva, in juice produced by the pancreas, and in the lining of the small intestine. Starch is digested in two steps. First, an enzyme in the saliva and pancreatic juice breaks the starch into molecules called maltose. Then an enzyme in the lining of the small intestine splits the maltose into glucose molecules that can be absorbed into the blood. Glucose is carried through he bloodstream to the liver, where it is stored or used to provide energy for the work of the body. Sugars are digested in one step. An enzyme in the lining of the small intestine digests sucrose, also known as table sugar, into glucose and fructose, which are absorbed through the intestine into the blood. Milk contains another type of sugar, lactose, which is changed into absorbable molecules by another enzyme in the intestinal lining. 2. Protein - Foods such as meat, eggs, and beans consist of giant molecules of protein that must be digested by enzymes before they can be used to build and repair body tissues.

An enzyme in the juice of the stomach starts the digestion of swallowed protein. Then in the small intestine, several enzymes from the pancreatic juice and the lining of the intestine complete the breakdown of huge protein molecules into small molecules called amino acids. These small molecules can be absorbed through the small intestine into the blood and then be carried to all parts of the body to build the walls and other parts of cells. 3. Fats - Fat molecules are a rich source of energy for the body.

The first step in digestion of a fat such as butter is to dissolve it into the watery content of the intestine. The bile acids produced by the liver dissolve fat into tiny droplets and allow pancreatic and intestinal enzymes to break the large fat molecules into smaller ones. Some of these small molecules are fatty acids and cholesterol. The bile acids combine with the fatty acids and cholesterol and help these molecules move into the cells of the mucosa. In these cells the small molecules are formed back into large ones, most of which pass into vessels near the intestine.

These small vessels carry the reformed fat to the veins of the chest, and the blood carries the fat to storage depots in different parts of the body. There are two theories on the process of chemical digestion, and they are the ‘ induced fit’ and the ‘ lock and key’ theory. Enzymes are specific to reactants (known as substrates). That is, enzymes only catalyze one type of reaction. Induced fit is where an enzyme almost closes around the substrate like a baseball glove around the ball. And the induced fit model says that when a substrate binds to an enzyme, the enzyme temporarily changes shape to accommodate the substrate.

While the enzyme is still specific to substrates, it is not as if the substrate is a perfect fit on the active site of the enzyme. After the reaction is complete, the enzyme returns back to its original shape, ready to be reused. Lock and key is simply that the theory states that an enzymes’ active site is the exact shape of the substrate, and that the substrate neatly fits in. Also another way to look at it is that the enzyme is like a lock, and the substrate is like a

key. Only specific substrate works with an enzyme, just like a specific key is required for a lock.

The lock represents the active site on the enzyme, where the substrate binds. So both are substrates specific, just one model states that the enzyme moulds to fit the substrate whereas the other says that the site is already shaped around the substrate. In recent research however, the lock and key model is disputed, with the induced fit being more likely. While the induced fit model is more likely to be correct from current evidence, the lock and key model is still used because it allows a simple diagrammatic way to understand the specificity of enzymes.