

## The Digestive System

### **Introduction**

Digestion starts in the mouth. The teeth begin the process by breaking up the food into small portions (mastication) to increase the surface area on which the enzymes act. Saliva is produced by the salivary glands which coats the food and makes it easier to be swallowed. The enzyme salivary amylase starts the breakdown of starch into maltose. The food is rolled into a ball (bolus) before swallowing. It enters the oesophagus.



The food moves down the oesophagus by the process of peristalsis. It is a wave-like contraction of the walls to move the food down toward the stomach.

The stomach has an acidic environment (pH 1-2). It produces gastric juice which contains pepsin, rennin and hydrochloric acid. The acid stops the action of the salivary amylase and creates a suitable environment in which the enzymes of the stomach work best. Any invading organism that might have entered the digestive system would be destroyed by the stomach acid. Pepsin is a protease begins the digestion of protein breaking it down into the polypeptides and then into peptones. Renin separates the fats in milk from the proteins. The pyloric sphincter relaxes to allow the liquid food (chyme) to enter the first part of the small intestine called the duodenum.

The chyme coming from the stomach is acidic; however, the enzymes in the small intestine works best in alkaline conditions, the chyme must be neutralized. This neutralization is carried out by the pancreatic juice which is secreted by the pancreas. This juice also contains amylase which continues the breakdown of starch into maltose. It also contains lipase which digests emulsified fat converting it to fatty acids and glycerol. Trypsin splits the peptones into smaller peptides after it is activated by enterokinase. Bile is manufactured in the liver and stored in the gall bladder and is also secreted into the duodenum to emulsify fats into tiny droplets. Bile also contains sodium bicarbonate to neutralize the acid from the stomach.

### **The stomach and Intestines**



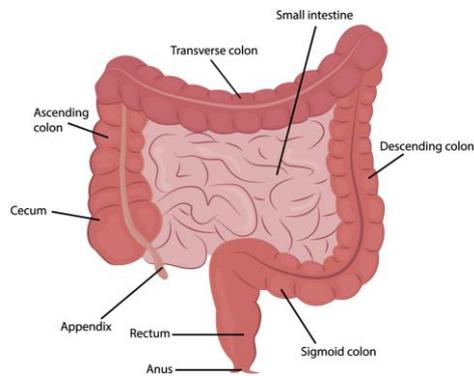
The intestinal glands in the walls of the small intestine secrete intestinal juice. It has several enzymes which break down food into their simplest forms:

- 1.** Maltase works on converting maltose to glucose
- 2.** Peptidase works on peptides converting it to amino acids
- 3.** Sucrase works on sucrose converting it to glucose and fructose
- 4.** Lactase works on lactose converting it to glucose and galactose

The second part of the small intestine is for absorption. It is also called the ileum. This is well-suited for its function:

- 1.** It is approximately 6m long hence it provides a large surface area for absorption.
- 2.** The inner walls of the ileum have many finger-like projections called villi. On these villi are even smaller projections called microvilli. This further increases the surface area for absorption
- 3.** Each villus is highly supplied with blood. This means that amino acid and glucose can be diffuse easily into these capillaries and then it can be transported to the hepatic portal vein.
- 4.** Each villus contains a lacteal which absorbs fatty acids and glycerol. Lacteals

are part of the lymphatic system which will allow fatty acid and glycerol to pass into the blood at the neck.



The large intestine joins the small intestine near the caecum and appendix. Colon absorbs water and mineral salts from the food remains. This leaves the undigested parts called faeces that is stored for a short time. The rectum stores the faeces which not only contains undigested cellulose but dead bacteria and intestinal cells scraped from the wall of the alimentary canal.

The anus is controlled by a sphincter muscle, which when relaxed cause the egestion of the faeces.