

9.2: Digestion of food

Learning Objectives

- Understand what happens in stage 1 of food catabolism.

Food digestion, stage 1 of food catabolism, happens in the digestive system shown in the figure on the right (*Copyright: public domain, via Wikimedia Common*). It is primarily the hydrolysis of biopolymers or larger molecules in food into smaller molecules that can transfer from the digestive system to the bloodstream and transport to cells. Carbohydrates are hydrolyzed into monosaccharides, fats into fatty acids and mono- or di-glycerides, proteins into amino acids, and DNA and RNA into mononucleotides by different enzymes.

Digestion of carbohydrates

The carbohydrates in human food are starch, sucrose, and lactose. Their digestion begins in the mouth through enzymes in the saliva and continues in the small intestine by pancreatic amylase. The enzymes degrade the starch into smaller and smaller fragments that ultimately result in glucose and maltose, which the small intestine can absorb.

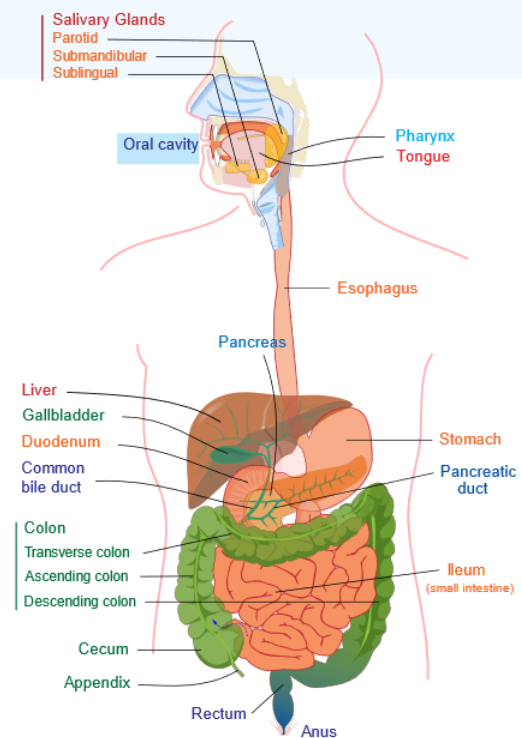
Sucrose (table sugar) is hydrolyzed into glucose and fructose by the enzyme sucrase. Lactose found in milk is hydrolyzed into glucose and galactose by the enzyme lactase. The majority of the adult population have problems digesting unfermented dairy because they can not produce sufficient amounts of the enzyme lactase -a condition called lactose intolerance.

Digestion of fats

Digestion of fats begins in the mouth through lingual lipase, but it mainly happens in the small intestine. Bile acids emulsify the fats, and the pancreatic enzyme lipase hydrolysis them into free fatty acids and mono- and diacyl-glycerides.

Digestion of proteins

Digestion of proteins happens in the stomach and the duodenum, i.e., the first portion of the small intestine. Three enzymes: pepsin, secreted by the stomach, and trypsin and chymotrypsin, secreted by the pancreas, hydrolyze proteins into smaller peptides which are then hydrolyzed into amino acids by various exopeptidases and dipeptidases.



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