

Digestion usable
particles and
absorbed along the



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Digestion is a form of catabolism: process of breaking food into its various nutrients and then the nutrients are used by the body for growth, energy and repair of cellular structures (Jerry, 2016). Jerry (2016) mentioned that this process occur in the gastrointestinal tract (GI tract), a long, connected, tubular structure that starts with the mouth and ends with the anus.

Digestion, the chemical and mechanical break down of food, happen mainly in the lumen of the gut (Seeley, Stephens, & Tate, 2006). The food is propelled forward within the system, change by enzymes and hormones into usable particles and absorbed along the way (Seeley et al., 2006).

Seeley et al. (2006) concluded that the undigested part of the food is moved through the digestive tract and eliminated through the anus. There are six types of processes which are ingestion, propulsion, chemical digestion, segmentation, absorption and defecation (refer to Figure 1 in Appendix 1). Ingestion is simply taking food into the digestive tract, usually via the mouth (Marieb & Hoehn, 2014). Food cannot pass through the cell membranes because it consists of the large molecules, therefore, the teeth, saliva, and tongue play a main roles in mastication, in order to break the food into small pieces (Avissar, Choi, DeSaix, Jurukovski, Wise, & Rye, n. d.).

Tortora and Derrickson (2010) stated that chewing or mastication breaks up food into small particles to increase the surface area for digestion and absorption. Saliva is necessary to soften food for swallowing (Scanlon & Sanders, 2007). Scanlon and Sanders (2007) reported that starch molecules can be broken down by digestive enzyme in saliva, which is salivary amylase, into glucose molecules. According to Kong and Singh (2008), the food particles is then mixed with saliva containing amylase to form a

swallow-able bolus for transport through esophagus. The second process in digestive system is propulsion.

According to Seeley, Stephens, & Tate (2004), “propulsion is the movement of food from one end of the digestive tract to the other” (p. 860). In other words, it helps to propels food through the alimentary canal, includes swallowing, and peristalsis (Marieb & Hoehn, 2014).

Seeley et al. (2006) mentioned that peristalsis is in charge for moving material via most of the digestive tract. Scanlon & Sanders (2007) claimed that peristalsis of the esophagus make sure the food move in one direction and gets to the stomach no matter the body is in what positions. As Seeley et al. (2006) explained, muscular contractions occur in peristaltic waves, consisting of a wave of relaxation of the circular muscles, which forms a leading wave of distention in front of the bolus, followed by a wave of strong contraction of the circular muscles behind the bolus, which forces the bolus along the digestive tube (pp. 860-861). Chemical digestion is the enzyme-mediated, hydrolysis process that breaks down large macro-nutrients into smaller molecules (Martinez, 2017).

According to Seeley, Stephens, and Tate (2006), digestive enzymes are secreted either by exocrine glands in the stomach and small intestine. Enzymes are proteins that catalyze or speed up chemical reactions but are not alter in the process (Martinez, 2017). Chandler (2017) explained that chemical digestion begins in the mouth with salivary amylase in saliva splitting complex carbohydrates into simple carbohydrates. Besides, Chandler (2017) stated that the enzymes and acid in the stomach continue

chemical digestion, but the bulk of chemical digestion takes place in the small intestine. The pancreas secretes an incredibly strong digestive cocktail known as pancreatic juice, which is capable of digesting lipids, carbohydrates, proteins and nucleic acids (Chandler, 2017). Seeley et al.

(2006) concluded that by the time food has left the duodenum, it has been reduced to its chemical building blocks—fatty acids, amino acids, monosaccharides, and nucleotides. Segmentation is an involuntary process that helps the digestion and absorption in small intestine (Diagram Group, 2005). Seeley, Stephens and Tate (2006) states that short segments of intestine contract and relax alternately along the intestine in segmental contractions.

The stomach act as the food storage through expanding rugae to hold the undigested food. (Seeley et al., 2006). According to Kong and Singh (2008), the secretion of gastric juice and stomach contraction promotes the mixing and homogenizing function which grind and crush foods particle in the stomach. The ingested food in the stomach is .

mixed with the secretions of the stomach glands to form chyme by gentle mixing waves which starts a few minutes after the food enters the stomach, repeating gradually in every 15 to 25 seconds (Chamley et al., 2005). The mixing waves are peristaltic-like contractions mixing the ingested food with the secretions of the stomach from the body towards the pyloric sphincter (Chamley et al., 2005).