The anatomy of human digestive system

Science, Biology

The Anatomy of Human Digestive System Introduction Digestion is the process wherein food is mechanically and chemically breaks down into smaller pieces small enough to be utilized and absorb by the body. The human digestive system beginsfrom the mouth, passed through the esophagus, stomach, and the intestinesup to the anus for elimination. Digestion starts with the processing of food mechanically in the mouth. Food is crashed and grounded by teeth, the process is called mastication. This increases the surface area that makes it easier for enzymes to break it down further. Enzymes from the saliva also help to soften the food and breaks down carbohydrates molecules. Partially digested food is then transferred to the pharynx or throat. Pharynx is a common path for air and food. The two leading tubes are the esophagus that leads to the stomach and trachea or windpipe that leads to lungs. The epiglottis is a cartilage tissue that regulates the passage of either food or air. This prevents entrance of solid particles to the lungs. Food is transferred to the stomach through peristalsis. Peristalsis is a series of involuntary wave-like muscle contractions which food move along the digestive tract. The stomach serves as a mixer and grinder of the food. It is the main digestion organ that releases powerful enzymes and strong acids that further break down particulates to compounds the body can able to assimilate. Carbohydrates are converted to simple sugars, proteins are broken down into its component amino acids and lipids are degraded to monoglycerides and fatty acids. Digested food is then transferred to the small intestine that breaks down food using enzymes secreted by the liver and pancreas. While in here, nutrients are absorb through the walls and into the bloodstream. Next stage is the large intestine

or colon thatextracts water to form feces. It is then deposited into the rectum to be eliminated in the anus. The Human Digestive System Food travels from the mouth, passing the esophagus and into the stomach. This would take 5 to 10 minutes. Food is then stored in 2 to 6 hours inside the stomach for partial digestion. Final digestion and nutrient absorption occur in the small intestine over a period of 5 to 6 hours. In 12 to 24 hours, any undigested material passes through the large intestine, and feces are expelled through the anus. Digestive System Organization Gastrointestinal tract (Alimentary Canal) Gastrointestinal tract is 5 to 10 meters of tube like structure that extends from the mouth up to the anus. It is divided into upper and lower portion. The upper gastrointestinal tract includes esophagus, stomach, and duodenum. Lower gastrointestinal tract is composed primarily of small and large intestines. Intestine is also subdivided into parts, depending on its role in the digestive system. The Small intestine is divided into three parts: duodenum, jejunum and ileum. Duodenum is the portion directly after the stomach. Here, enzymes from the pancreas and gall bladder mix together. The digestive enzymes from the pancreas degrade proteins and bile (from gall bladder) serves as fat emulsifier. Jejunum is the middle portion of the small intestine. It contains plicae circulates and villi that increases the surface area of digested food. Ileum is the last part the serves as absorption potion. With the aid of villi and microvilli, it absorbs nutrient directly to the blood stream. The large intestine also has three parts: cecum, colon and rectum. Cecum is a pouch like structure that connects the ileum to the colon. Absorption of water is the main function of colon. Bacteria lives inside the colon that produces vitamins like vitamin K. Last part is the rectum that

serves as repository of feces that is later eliminated in the anus. Accessory structures Accessory structures consist of parts that are not connected in the tube path of gastro intestinal tract. It is composed of digestive organs like the teeth, tongue, salivary glands, liver, gall bladder and pancreas. Most of these organs secrete enzymes and substances that aids in the digestion process. The Digestion Process Ingestion Ingestion is the start of digestion process. It involves mechanical and chemical digestion. Mechanical digestion involves the mechanical break down with mastication (chewing). Chemical digestion uses enzymes and substances secreted by the salivary glands. The saliva contains amylase that digests starch and mucin that lubricates food for easy swallowing. It also has buffer system that balances the pH and antibacterial chemicals that kill bacteria from the food. Deglutination Deglutination constists of sequence of three stages: voluntary stage , pharyngeal stage and esophageal stage. The voluntary stage push back the food back to the mouth before swallowing. The pharyngeal stage raises the soft palate and the esophageal stage contracts the pharyngeal muscles, open the esophagus and start peristalsis. The Esophagus The esophagus is a hollow tube with three constrictions; the aortic arch, left primary bronchus and diaphragm. It is surrounded by SNS plexus and blood vessels. It’s main purpose is to transport food and secrete mucous for lubrication. The Stomach Stomach is a J-shaped organ located at left side of the abdomen, posterior to the spleen. It is composed of vascular muscle divided into four regions: cardiac sphincter, fundus, antrum (pylorus) and pyloric sphincter. The stomach walls has three layers: oblique, circular and longitudinal. The inner surface is thrown into folds called rugae. The lining of stomach wall is

protected by a mucuos membrane. The G-cells make gastrin, a hormone that stimnulates the secretion of (HCl) by the parietal cells. The goblet cells secrets mucin that dissolves in water for lubrication. The stomach also contains enzymes that work best at pH 1-2. The main function of the stomach is to mix food and start the digestion of proteins, nucleis acids and fats. It also serves as a reservoir that can store up to 2 L of food, activates some enzymes, destroy some bacteria, makes intrinsic factor and absorb alcohol, water , lipophilic acid and B12. Anatomy of the Stomach The Small Intestine The small intestine is the part of gastro intestinal tract after the stomach. It varies in length from 15 feet (4. 6 m)to as long as 32 feet (9. 8m). Diameter is approximately 2. 5 – 3 cm. Inside the small intestines take place the most chemical part of the digestion process. The main function of the small intestine is the absorption of nutrients, minerals, vitamins and electrolytes of chyme from the stomach. Almost 90% of daily fluid intake is absorbed in the small intestine. Small intestine is segmented into three parts: duodenum, jejunum and ileum. Duodenum is where most digestion occurs. The jejunum and ileum absorbs nutrient and water. The small intestine also secretes important enzymes necessary for digestion. It releases peptidases that degrade proteins to amino acids, sucrases, maltase, lactase for sugars to simple monosaccharaides, lipases and nucleases. The Large Intestines The large intestine or colon is a 5 – 7 ft. long muscular tube that connects the small intestine to the rectum. The large intestine is divided into four primary sections: cecum, colon, rectum and anal canal. It extends from ileocecal valve to anus. The primary function of the large intestine is to reabsorb water from the liquid material sent by the small intestine. Unlike

the small intestine, the colon doesn’t have villi and no permanent circular folds. It is composed of smooth muscles like taeniae coli and haustra. It also does mechanical digestion by means of haustral churning. Large intestine also uses peristalsis to transport digested food from one haustra to the next. The large intestine houses millions of beneficial bacteria that also aid in chemical digestion. These are called bacterial flora that produces several vitamins like vitamin K and biotin. Inside the large intestines, chyme is dehydrated to form solid feces. Feces are mainly composed of water, inorganic salts, epithelial cells, bacteria and byproducts of digestion. Defecation occurs when feces leaves the body through the anus. Peristalsis pushes feces to the rectum while rectal walls stretch to accommodate free flow. Control can be voluntary and parasympathetic. Anatomy of the Large Intestine The Liver The liver is a vital organ. It is located at the right hypochondrium of the epigastric region. It is divided into four lobes: left, quadrate, caudate and right. Each lobe has lobules that contain hepatocytes. It serves many functions for human to survive. Its role in digestion is its ability to produce bile. Bile is a bitter, greenish-yellow alkaline fluid, stored in the gallbladder. Between meals and upon eating, bile is discharged into the duodenum where it aids the process of digestion. Bile is an enzyme that emulsifies fats to form triglycerides and fatty acids. The liver itself contains water, bile salts, bile pigments, electrolytes, cholesterol, and lecithin. The liver also detoxifies and removes harmful toxins from excessive use of drugs and alcoholic beverages. It also stores glycogen, vitamins (A, D, E, K), minerals and cholesterol. It also activates vitamin D and has a large role in fetal production of red blood cells. The Pancreas Pancreas is located at the

left side of the hypogastrium of the epigastric region beside the liver. Pancreas is part of the endocrine system as well as the digestive system. It is an organ which secretes both digestive enzymes (exocrine) and hormones (endocrine). Its role in digestion is its ability to produce pancreatic juice that digests major nutrients. Specific enzymes are trypsin and chymotrypsin that digest proteins and amylase that digest starch. Pancreatic juice also acts as buffer that neutralizes acid from the stomach. Bile and pancreatic juice are transmitted to the duodenum via the pancreatic duct and bile duct. Works Cited Books: Tortora, Gerard J., and Bryan H. Derrickson. Principles of Anatomy and Physiology, Atlas and Registration Card. 11th ed. John Wiley and Sons, 2005. Print. Marieb, Elaine N. Human Anatomy & Physiology. 6th ed. New York: Benjamin-Cummings Pub Co., 2004. Print. Netter, Frank H. Atlas of Human Anatomy. 3rd ed. Teterboro, N. J.: Saunders, 2003. Print. Websites: “ National Digestive Diseases Information Clearing House.” http://digestive. niddk. nih. gov/ddiseases/pubs/yrdd/. 2011. Web. 15 Oct. 2011. “ The Digestive System.” www. bokarius. com/pathology/digestivesystem. ppt. 2011. Web. 17 Oct. 2011. “ Human Digestive System” http://www. enchantedlearning. com/subjects/anatomy/digestive/. 2011. Web. 16 Oct. 2011. “ The Digestive System.” http://www. medicinenet. com/the_digestive_system/article. htm. 2011. Web. 18 Oct. 2011. “ Digestion.” http://www. sparknotes. com/health/digestion/summary. html. 2011. Web. 20 Oct. 2011.