Digestion case essay sample

Let’s follow the path of a delicious ham and cheese sandwich with lettuce and pickles as it is eaten and digested! Start at the beginning and discuss the anatomical parts as well as the biochemical roles that contribute to this sandwich being turned into chemical energy. Be sure to include mechanical and chemical mechanisms, along with how they are metabolized in the body!

Digestion is the chemical breakdown of food molecules into smaller molecules that can be used by various cells within the body. The breakdown is initiated when food is ingested in the mouth and specific enzymes are exposed to components within the food molecules. Digestion begins in the mouth with mastication, or chewing, performed by the teeth. The purpose of chewing is to grant the food more exposure to enzymes, therefore allowing chemical digestion to occur faster. The presence of the food in the mouth stimulates exocrine glands. This causes the mouth to secrete digestive enzymes, namely salivary amylase. These secreted enzymes aid in the breakdown of foods, officially starting the digestion process. Carbohydrates in particular are mostly broken down by salivary amylase. Salivary amylase breaks starch, a popular carb, down to maltose. This means that the bread of the ham and cheese sandwich will notably be chemically altered at this point. It is because of this that bread begins to taste somewhat sweet if it is held in the mouth for some time. Muncins, or mucous, found within saliva help hold the food intact, creating a bolus. This allows the ingested material to be more easily managed as it passes through to the esophagus.

Upon reaching the esophagus, the bolus is propelled by a movement called peristalsis. This wave-like contraction of smooth muscle moves the bolus to the cardiac sphincter, the door to which food enters the stomach. The

stomach itself can store up to about two liters of food. Gastric juice produced by the gastric glands blends with the bolus. Found in gastric juice is primarily hydrochloric acid and pepsinogen. This concoction allows the stomach to maintain a pH of around 2. 0, which enables it to easily dissolve food, along with most microorganisms. The mixture is churned and mixed when muscular walls within the stomach contract.

The mixture eventually turns into chyme, which is simply gastric juice and partially digested food. It is the hormone Gastrin that stimulates the stomach to produce gastric juice; pepsinogen production is stimulated by the presence of Gastrin in the bloodstream. Hydrochloric acid converts pepsinogen to pepsin, a now activated enzyme. It is pepsin that breaks proteins down to peptides. Simply stated, proteins are broken down in the stomach. With all of the chemical commotion in the stomach, this acidic environment would be very capable of self-ingestion if it weren’t for the heavy mucosal presence lining the inner wall of the stomach.

Once the process is complete in the stomach, peristalsis again moves the chyme through the pyloric sphincter as it enters the first ten inches or so of the small intestine, known as the duodenum. The pyloric sphincter releases the chyme into the duodenum in spurts. For a review, at this point most proteins and carbohydrates have been broken down and lipid digestion has not yet begun. The duodenum must also produce large quantities of mucous to protect the intestinal lining from the entering acidic chyme.

Most nutrients for the body is absorbed in the small intestines. Nutrients are able to pass through the walls of the intestines and are absorbed within the

many blood vessels that surround villi in the organ, whose function is to increase surface area for more nutrient absorption. Nutrient rich blood is carried away from the small intestine by the hepatic portal vein and travels to the liver for filtering and the removal of toxins. Moving on to lipid digestion, bile is necessary for fat digestion, known as emulsification. Bile is produced in the liver and stored in the gallbladder until it is needed by enzymes. Lipids are broken down in the small intestine. Pancreatic juice also flows into the small intestine via the pancreatic duct. The juice contains several enzymes, including Lipase that digests fats to glycerol and fatty acids. The pancreas is more commonly known to produce insulin, which regulates blood glucose levels. Pancreatic juice also contains sodium bicarbonate, which is particularly important being that it neutralizes the acidic chyme from the stomach. We all should be very thankful for this during excretion!

With most absorption completed in the small intestines, water and minerals are passed across the intestinal lining into the blood stream for distribution to other cells within the body. The bloodstream also carries simple sugars, amino acids, glycerol, vitamins, and salt. Waste products of digestion pass through to the large intestines, including undigested parts of food. Taking place in the large intestine is the final absorption of any nutrients and water the body may call for at the last minute, such as in dehydration or shock. Vitamins are also reabsorbed here to be reused. The final waste product, now called feces, is moved to and stored in the rectum to be expelled through the anus.

The intricate pathway of the Gastrointestinal (GI) Tract is vital for the expulsion of nutrients from food molecules that cells of all types are able to utilize throughout the body.

Grodner, M., Roth, S. and Walkingshaw, B. (2012). Nutritional Foundations and Clinical Applications:
A Nursing Approach, 5th Edition. St. Louid: Elsevier Health Sciences. VitalBook file.

Your Digestive System and How It Works. (2013, September 1). Retrieved January 6, 2015, from http:/
www. niddk. nih. gov/health-information/health-topics/Anatomy/your-digestive-system/Pages/
anatomy. aspx.

What happens if that part does not function? For example, what happens to digestion if the person is missing many teeth but can’t afford dentures, or perhaps has a digestive disorder?

The above explanation of digestion occurs in a ‘ normal’ functioning body. There are several dilemmas involving digestion that the human body may encounter with progressed age, disease, or improper mechanics, such as lack of teeth. A major threat involving a decrease in digestion ability is malnutrition. Malnutrition does not simply refer to not eating, but also encompasses insufficient absorbance of nutrients once food has been eaten.

There is a wide array of factors that may lead to malnutrition in an individual. Mechanically, the lack of teeth is a simple but yet common reason of

decreased nutrition intake. Though salivary glands are stimulated upon the introduction of food to the mouth, a person with no teeth tends to avoid the more strenuous foods to chew, such as meats, carrots, lettuce, and nuts, and become partial to a lot of soft foods like potatoes and eggs, which may not necessarily be the most nutritious or balanced. Individuals with gum disease may have all their teeth, but it can become sore for them to chew their meals and, as a result, the eating dwindles. Jaw injuries or surgeries can cause discomfort and may temporarily hinder proper ingestion. This makes the digestion process more strenuous and time consuming on other organs.

Digestive disorders cause certain components of digestion to not function optimally. Celiac disease, Crohn’s disease, and ulcers are a few common disorders that many suffer from. Internally, the same structural components are still present such as GI organs, blood vessels, smooth muscle, villi, etc in most individuals with these diseases. An exception is Celiac disease. This inherited autoimmune disease occurs in the small intestines. It is characterized by damaged or irritated villi in the small intestine. Villi either disintegrate or fall off completely, which severely hinder the amount of nutrients that are absorbed through the bloodstream.

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A Nursing Approach, 5th Edition. St. Louid: Elsevier Health Sciences. VitalBook file.

What stress factors may cause issues in the digestive tract for some people?

The enteric nervous system, composed of millions of nerves, controls digestion. It communicated with the central nervous system. Stress has the ability to activate our ‘ fight or flight’ response. In this mode, digestion can be slowed or shut down completely as blood flow is cut off by the central nervous system to focus energy on the perceived threat. In more nervous situations that are not threats, the body slows down digestion, which may cause abdominal cramps, grumbling, and gas. Stress factors include substance abuse, such as drugs and alcohol, work, school, and simply puberty. Also, the constant intake of pesticides and growth hormones from processed foods take a big toll on the digestive tract; the body does not receive the proper balanced nutrition. Constant stress can cause inflammation in the GI tract, and vice versa, constant GI tract problems cause increased levels of hormonal stress.

Iliades, C. (n. d.). How Stress Affects Digestion. Retrieved January 6, 2015, from http://www. everydayhealth. com/health-report/better-digestion/how-stress-affects-digestion. aspx

Stress and The Sensitive Gut. (2010, August 1). Retrieved January 6, 2015, from http:/
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edu/newsletters/Harvard_Mental_Health_Letter/2010/August/stress-and-the-sensitive-gut

How can a regular exercise program aid in the development of a healthy digestive tract?

Exercise improves blood circulation throughout the entire body, including in our digestive systems. This motion aids in peristalsis and keeps food moving easily moving through the entire tract. This repels constipation, which also deters the possible chance of hemorrhoids, gas, bloating and cramps, even those sometimes associated with the menstrual cycle.

Melone, S. (n. d.). How Does Exercise Improve Digestion? Retrieved January 7, 2015, from http://
healthyliving. azcentral. com/exercise-improve-digestion-4714. html

How might digestion and metabolism be different over the lifespan?

Aging is a factor in many digestive disorders; older adults are more prone to get digestive tract disorders because of medicines, antibiotics, and sometimes simply genetics. In the esophagus, the elderly tend to have impaired esophageal contractions. The movement of food is not impaired by this though, and the bolus can still easily reach the stomach. In the stomach, damage to the lining increases from the constant acidic environment, especially in adults who take aspirin. The risk for peptic ulcers increases. Also the stomach loses its elasticity over time and is not able to accommodate as much food. This is one of the reasons elderly people do not eat nearly as much, but still feel satisfied after meals. Not many changes occur regarding absorption in the small intestine. The commonly noted change is that lactase levels decrease, leading to lactose intolerance. Lastly, the rectum does somewhat enlarge in circumference, but the large intestine does not change much. Constipation can occur more frequently, mainly

because prescription drugs and antibiotics are used more frequently in older adults and elders.

It must also be noted that physical activity does usually decrease with age. This is a direct link with a slowed metabolism. Also, the decreased caloric intake in older adults slows metabolism as well. The key to maintaining a healthy GI tract over a lifetime is exercise and physical activity, and to do it often; it is all around beneficial.

Ruiz, A. (2014, December 1). Effects of Aging on the Digestive System. Retrieved January 6, 2015, from http://
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effects_of_aging_on_the_digestive_system. html