Name: Harding-Udoh Titania B.

Matric Number: 18/ENG08/007

Department: Biomedical Engineering

Course Code: ANA 226, Human Anatomy II

Assignment Title: digestive system

Question

Miss Egbe Amanda attended a birthday party organized by Mr. Solomon, during the party she was served fried rice, salad, fried chicken and water. Enumerate in details the digestive processes of the above food she ate during the celebration.

Name: Harding-Udoh Titania B. Matric Number: 18/ENG08/007 Dept: Biomedical Engineering

Amanda attended a party and she ate fried rice, salad, fried chicken and water.

We generally have six classes of food, with their various digestive processes.

Fried Rice falls under – Carbohydrate, Minerals, Vitamins, Fats and Oil (Lipids)

Salad- Minerals and Vitamins (May contain dietary fiber; depends on the type of salad)

Fried Chicken- Protein, Fats and Oil (Lipids)…… (+Minerals due to spices)

Water-Water

Carbohydrates

The digestion of carbohydrates begins in the mouth. The salivary enzyme amylase begins the breakdown of food starches into maltose, a disaccharide. As the bolus of food travels through the esophagus to the stomach, no significant digestion of carbohydrates takes place. The esophagus produces no digestive enzymes but does produce mucous for lubrication. The acidic environment in the stomach stops the action of the amylase enzyme.

The next step of carbohydrate digestion takes place in the duodenum. The chyme from the stomach enters the duodenum and mixes with the digestive secretion from the pancreas, liver, and gallbladder. Pancreatic juices also contain amylase, which continues the breakdown of starch and glycogen into maltose, a disaccharide. The disaccharides are broken down into monosaccharides by enzymes called maltases, sucrases, and lactases, which are also present in the brush border of the small intestinal wall. Maltase breaks down maltose into glucose. Other disaccharides, such as sucrose and lactose are broken down by sucrase and lactase, respectively. Sucrase breaks down sucrose (or “table sugar”) into glucose and fructose, and lactase breaks down lactose (or “milk sugar”) into glucose and galactose. The monosaccharides (glucose) thus produced are absorbed and then can be used in metabolic pathways to harness energy. The monosaccharides are transported across the intestinal epithelium into the bloodstream to be transported to the different cells in the body.

Protein

A large part of protein digestion takes place in the stomach. The enzyme pepsin plays an important role in the digestion of proteins by breaking down the intact protein to peptides, which are short chains of four to nine amino acids. In the duodenum, other enzymes— trypsin, elastase, and chymotrypsin—act on the peptides reducing them to smaller peptides. Trypsin elastase, carboxypeptidase, and chymotrypsin are produced by the pancreas and released into the duodenum where they act on the chyme. Further breakdown of peptides to single amino acids is aided by enzymes called peptidases (those that break down peptides). Specifically, carboxypeptidase, dipeptidase, and aminopeptidase play important roles in reducing the peptides to free amino acids. The amino acids are absorbed into the bloodstream through the small intestines.

Fats and Oils (Lipids)

Lipid digestion begins in the stomach with the aid of lingual lipase and gastric lipase. However, the bulk of lipid digestion occurs in the small intestine due to pancreatic lipase. When chyme enters the duodenum, the hormonal responses trigger the release of bile, which is produced in the liver and stored in the gallbladder. Bile aids in the digestion of lipids, primarily triglycerides by emulsification. Emulsification is a process in which large lipid globules are broken down into several small lipid globules. These small globules are more widely distributed in the chyme rather than forming large aggregates. Lipids are hydrophobic substances: in the presence of water, they will aggregate to form globules to minimize exposure to water. Bile contains bile salts, which are amphipathic, meaning they contain hydrophobic and hydrophilic parts. Thus, the bile salts hydrophilic side can interface with water on one side and the hydrophobic side interfaces with lipids on the other. By doing so, bile salts emulsify large lipid globules into small lipid globules.

Emulsification is important for digestion of lipids; Pancreatic juices contain enzymes called lipases (enzymes that break down lipids). If the lipid in the chyme aggregates into large globules, very little surface area of the lipids is available for the lipases to act on, leaving lipid digestion incomplete. By forming an emulsion, bile salts increase the available surface area of the lipids many fold. The pancreatic lipases can then act on the lipids more efficiently and digest them. Lipases break down the lipids into fatty acids and glycerides. These molecules can pass through the plasma membrane of the cell and enter the epithelial cells of the intestinal lining. The bile salts surround long-chain fatty acids and monoglycerides forming tiny spheres called micelles. The micelles move into the brush border of the small intestine absorptive cells where the long-chain fatty acids and monoglycerides diffuse out of the micelles into the absorptive cells leaving the micelles behind in the chyme. The long-chain fatty acids and monoglycerides recombine in the absorptive cells to form triglycerides, which aggregate into globules and become coated with proteins. These large spheres are called chylomicrons. Chylomicrons contain triglycerides, cholesterol, and other lipids and have proteins on their surface. The surface is also composed of the hydrophilic phosphate “heads” of phospholipids. Together, they enable the chylomicron to move in an aqueous environment without exposing the lipids to water. Chylomicrons leave the absorptive cells via exocytosis. Chylomicrons enter the lymphatic vessels, and then enter the blood in the subclavian vein.

Basically; Lipids are digested and absorbed in the small intestine.

Vitamins

Vitamins can be either water-soluble or lipid-soluble. Fat soluble vitamins are absorbed in the same manner as lipids. It is important to consume some amount of dietary lipid to aid the absorption of lipid-soluble vitamins. Water-soluble vitamins can be directly absorbed into the bloodstream from the intestine. Rather than slipping easily into the bloodstream like most water-soluble vitamins, fat-soluble vitamins gain entry to the blood via lymph channels in the intestinal wall. Many fat-soluble vitamins travel through the body only under escort by proteins that act as carriers. When food containing fat-soluble vitamins is ingested, the food is digested by stomach acid and then travels to the small intestine, where it is digested further. Bile is needed for the absorption of fat-soluble vitamins. This substance, which is produced in the liver, flows into the small intestine, where it breaks down fats. Nutrients are then absorbed through the wall of the small intestine. Upon absorption, the fat-soluble vitamins enter the lymph vessels before making their way into the bloodstream. In most cases, fat-soluble vitamins must be coupled with a protein in order to travel through the body. These vitamins are used throughout the body, but excesses are stored in the liver and fat tissues. As additional amounts of these vitamins are needed, your body taps into the reserves, releasing them into the bloodstream from the liver.

Minerals

The body needs, and stores, fairly large amounts of the major minerals. These minerals are no more important to your health than the trace minerals; they're just present in your body in greater amounts.

Major minerals travel through the body in various ways. Potassium, for example, is quickly absorbed into the bloodstream, where it circulates freely and is excreted by the kidneys, much like a water-soluble vitamin. Calcium is more like a fat-soluble vitamin because it requires a carrier for absorption and transport.

Minerals in a food source are locked within a matrix composed primarily of proteins, complex carbohydrates and fats. The purpose of digestion is to render large composite molecules into smaller manageable units, minerals are liberated during this process.

Water

One of the main differences between eating food and drinking water is that when food is consumed, it's digested, whereas water is absorbed into the body's system.

The first big step the body takes with water is registering hydration through your mouth. After a few gulps of water, the brain will convince the body– that the body has had enough to drink. This is an important hydration mechanism because it takes a long time for the water that was drunk to reach cells and provide them with sufficient hydration. If the brain registered hydration only after cells received water, people would be drinking way more than the body really needs.

The water travels through the esophagus, a small pipe connected to the mouth and lands in the stomach. This is where the process of water absorption to the bloodstream begins. The amount of water absorbed in the stomach and how quickly water is absorbed depends, in part, on how much has been eaten. If someone is drinking water on an empty stomach, they are more likely to experience a faster rate of water absorption. Whereas, if a person has eaten a lot of food before they drink water, the speed of absorption will slow down accordingly, and absorption could take up to a few hours.(Which Amanda has done)

The small intestine absorbs water into the cell membrane and bloodstream. From here, water will travel to cells across the body, providing them with the hydration to perform daily functions efficiently. Once absorbed into the body, water aids some vital functions.

The large intestine is the key center for water reabsorption rather than the stomach and the small intestine because of the following reasons:

- It prevents most of the par cellular flow of water and electrolytes because of tight junctions, unlike in the small intestine. This prevents the backflow of electrolytes and water from the Chile to the blood.
- It is mainly involved in concentrating the fecal matter, so reabsorption of water and electrolytes becomes its main function.

The primarily job of your kidneys is to filter toxins efficiently, kidneys require a large amount of water. If the kidney does not receive enough water, it could lead to health concerns including kidney stones and other kidney-related diseases.one way the kidneys inform someone of whether they're providing their body with enough water is by concentrating the amount of water expelled through urine – thus changing the color of urine to bright yellow.

Water is also sent to the brain where it provides hydration to brain cells. Here, water is used to maintain certain cerebral functions. Without the appropriate level of hydration, studies have shown that people experience impaired short-term memory function and visual motor skills.

Once the human body uses up all the water it needs to function efficiently, it begins the process of removing excess water. Water leaves the body in four main ways: through the kidneys, skin, large intestine, and mouth.

1. The most high-profile exit strategy of water is through the kidneys via urine.
2. Another exit point for water is through stools.
3. When someone exercises or heats, small droplets of water, your sweat.
4. Small droplets of water also exit the body via the breath.