

Animal Nutrition and Digestive System

Evolution of the Digestive System

As animals became larger, a more efficient digestive system was needed to meet nutritional needs. Teeth used to be on the outer surface of jawless fish, but over the last 500,000 years they have moved into the mouth to aid in digestion. Some animals, such as canines and rodents, have stopped growing some teeth because they were not being utilized. Powerful jaw muscles in humans allow for higher levels of usage for caloric energy used for more movement. Diet has a direct correlation with tooth formation.

Importance

- Animals need the proper nutrition for growth and maintenance to provide energy for works and vital functions
- Proper nutrition is also needed to maintain body temperature, produce milk, reproduce and develop proper bone structures
- Digestion is important for breaking down food into nutrients which the body can use for numerous sources

Development

- The nutritional requirements in most animals are relatively complex compared with simple requirements from plants. Nutrients used by animals include carbohydrates, lipids, nucleic acids, proteins, minerals and vitamins.
 - Carbs - main source of energy
 - Lipids - used to form cellular and organelle membranes
 - Nucleic Acids - used for the construction of DNA
 - Proteins - form the framework of the body
 - Minerals - phosphorus, sulfur, potassium, magnesium and zinc are all required by animals and obtain them when they consume plants
 - Vitamins - organic compounds in trace amounts to the health

Homeostasis

- Mammals maintain homeostasis through both structural protections and the control of various systems through the nervous and endocrine systems
- Homeostasis is the maintenance of a constant internal environment
- Multiple factors, including chemical and physical factors, are all maintained by all animals in order for their body systems to operate with maximum efficiency
- The digestive systems role in helping with homeostasis in animals is to break down the food animals take in into usable nutrients such as carbohydrates, lipids, and nucleic acids. By breaking food into smaller macromolecules, cells throughout the body gather necessary nutrients to make energy, new organelles, and divide into new cells.

Hollow Structures

Mouth

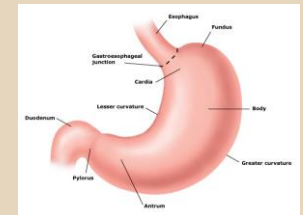
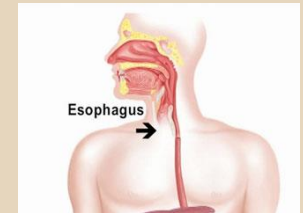
- Food is broken down here by the teeth and saliva, beginning the of digestion by breaking food into smaller more manageable parts.

Esophagus

- Here the digestive process is continued. In the esophagus, food is pushed down by the contractions of a group of muscles towards the stomach. At the bottom of the esophagus, there is the lower esophageal sphincter which keeps contents from the stomach from coming back up.

Stomach

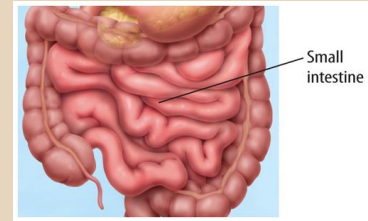
- From the esophagus, food enters the stomach. In the stomach, food is broke down by acid and enzymes in the stomach. Periodically, the pyloric sphincter opens and stomach contents go into the small intestine.



Hollow Structures(Cont.)

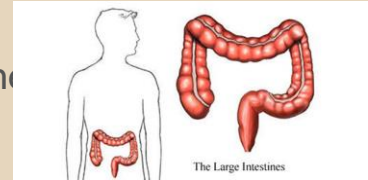
Small Intestine

- After going through the stomach, food continues to the small intestine. it is here where most of the nutrients from food are absorbed into the body



Large Intestine

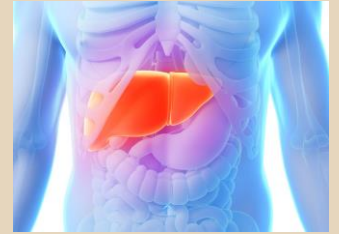
- After most of the nutrients are absorbed in the small intestine, food nears the end of its' journey in the large intestine. The large intestine removes most of the water from food which could not be digested. After going through the large intestine, food enters the rectum and anus, where it leaves the body



Solid Structures

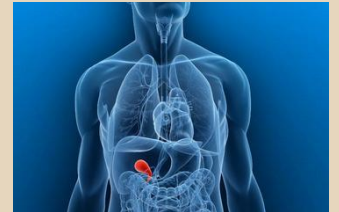
Liver

- While food does not pass directly through the liver while being, as with the other solid structures of the digestive system, it does help out indirectly in two ways. The first way is by filtering the blood coming out of the digestive system, and detoxifying it from toxins such as alcohol. Second, the liver produces bile which enters the small intestine to help with digestion there.



Gallbladder

- The gallbladder is a small structure that is used to store bile produced by liver in between meals. While helpful, it is not vital to human digestion.

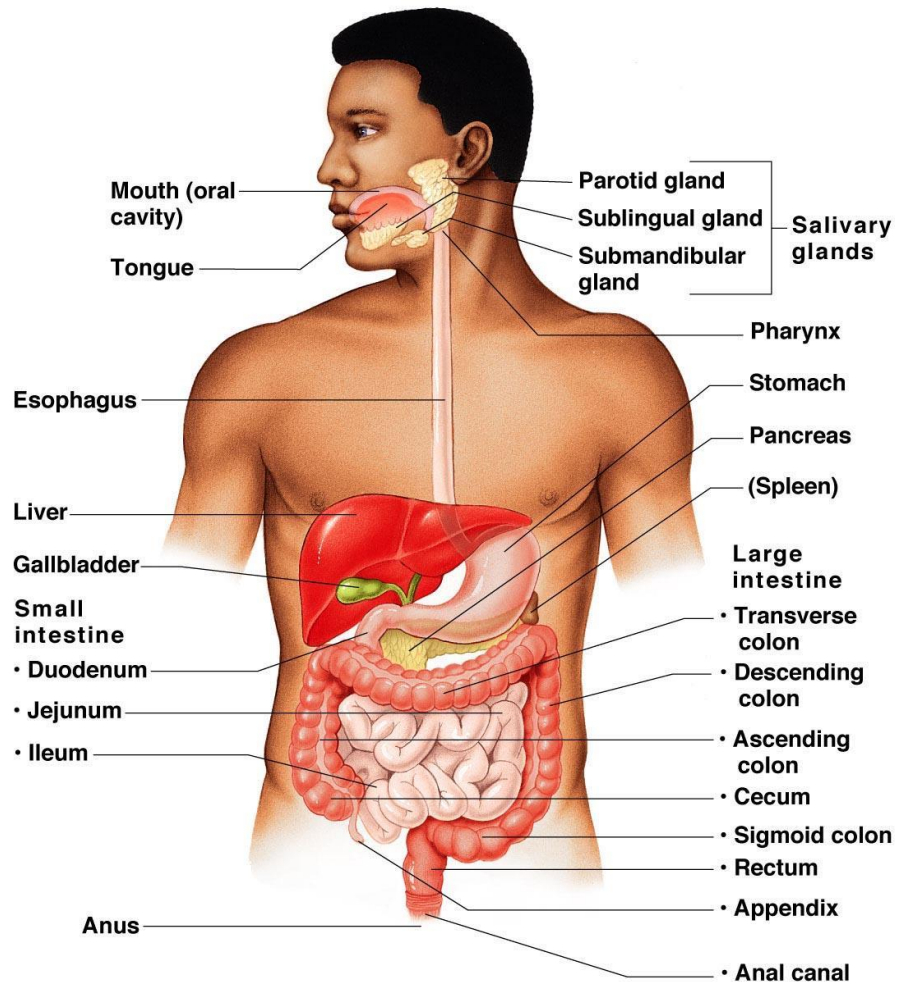


Solid Structures(Cont.)

Pancreas

- In addition to helping to regulate blood sugar, the pancreas also plays a role in digestion. The pancreas produces enzymes that are important in digestion. Like bile from the liver, excretions from the pancreas enter the digestive system through the small intestine.





Interdependence

- During digestion, the digestive system and the muscular system work together
- Muscles work together to move food and nutrients throughout the body
- The circulatory system also work together with the digestive systems
- the circulatory system distributes nutrients obtained during digestion throughout the body

Major Concepts

- The main stages of food processing are ingestion, digestion, absorption and egestion
 - Ingestion: when food is consumed and broken down by teeth and saliva
 - Digestion: acids break down large foods into small molecules
 - Absorption: nutrients are absorbed into bloodstream
 - Egestion: unused nutrients are excreted

Diseases and Disorders

Crohn's Disease

- Crohn's Disease is an autoimmune disorder where healthy cells are attacked in the digestive system, causing inflammation of the walls in the digestive system.
- Causes- The exact causes of Crohn's Disease are unknown, but some influencing factors include genetics, the environment, and smoking. Most common in teens and adolescents.
- Symptoms- Vary with the part of the digestive system being impacted, most common are crampy feelings in the abdomen, fever, fatigue, and loss of appetite.
- Treatments- While there are no cures to Crohn's disease, there are a few treatments that can help ease the symptoms. These treatments can range from medication to help with diarrhea and pain, to surgery in the most extreme cases.

Diseases and Disorders(Cont.)

Gastroesophageal Reflux Disease(GERD)

- A condition where contents from the stomach are released back into the esophagus.
- Causes- GERD occurs when the muscles in the lower esophageal sphincter do not close completely, allowing flow of stomach contents back into the esophagus. Common causes of this are pregnancy, obesity, and smoking.
- Symptoms- Heartburn or a burning sensation in the chest, nausea after eating
- Treatments- GERD has no cure, but there are many things that can lessen the impact of the symptoms. These include, but are not limited to losing weight if overweight or obese, taking plenty of water with medications, taking antacids, or taking more specialized drugs prescribed by a doctor, such as proton pump inhibitors that decrease stomach acid.

Diseases and Disorder(Cont.)

Cirrhosis

- Cirrhosis is a condition where the liver deteriorates and may become nonfunctional. Commonly it takes place because of the buildup of scar tissue on the liver that causes the liver to stop functioning or stop repairing injured cells in the liver. It is the 12th leading cause of death
- Causes- Cirrhosis has many causes, the most common of which are chronic hepatitis B and C and alcohol consumption. Prolonged heavy consumption of alcohol can cause damage to the liver, varying from mild to severe, and fat build up. If diagnosed with cirrhosis, one should not drink any alcohol. Hepatitis damages the liver over a long period of time, possibly causing cirrhosis if not caught early.
- Symptoms- Early on in cirrhosis, there may be no present symptoms, but as the disease progress, some symptoms that appear are: Fatigue, weakness, loss of appetite, weight loss, jaundice(Yellowing of the eyes and skin), and nausea.
- Treatment- Some treatments for include taking medications that replace bile or taking antiviral medication for hepatitis B and C. In the latest stages for cirrhosis, patients can be given a transplant.

Pop Quiz

What directly correlates with tooth formation?

- A. type of animal
- B. diet
- C. vertebrate/invertebrate
- D. age
- E. all of the above

Digestion is the

- A. absorption of nutrients suspended in water
- B. conversion of glycogen to glucose
- C. chemical and mechanical breakdown of food for absorption into the body
- D. churning of food in the stomach and intestine
- E. flow through the trachea

Which of the following does not occur in the mouth?

- A. lubrication of the food
- B. beginning of the protein digestion
- C. breaking the food into small fragments
- D. all of the above
- E. none of the above

The mammalian trachea and esophagus connect to the

- A. large intestine
- B. stomach
- C. pharynx
- D. rectum
- E. epiglottis

The main stages of food processing are

- A. ingestion, digestion, absorption, egestion
- B. undernourishment, malnourishment, digestion, ingestion
- C. bile production, egestion, absorption, enzyme production
- D. egestion, stomach adaptation, ingestion, secretion
- E. none of the above

Digestion Song

<https://www.youtube.com/watch?v=fiRKW0W51Pg>

Works Cited

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