PEER Life Science Organ Systems Digestion Notes Outline

**Why It Matters**

* The main purpose of the digestive system is to provide the body with nutrients, including
  + water
  + proteins
  + carbohydrates
  + lipids
  + vitamins
  + minerals
* The two main ways that the stomach breaks down proteins into amino acids are acidic stomach juice and enzymes
* Bile is secreted by the liver and helps separate fats so they can be broken down by enzymes and absorbed.
* Insulin is secreted by the pancreas and is involved in a disease called diabetes.

**What We Know**

* Food first enters the body through the mouth where saliva begins to break down carbohydrates.
* The esophagus pushes food down into the stomach with muscular contractions.
* Bile is produced by the liver and is stored in the gall bladder.
* The pancreas helps digest carbohydrates, proteins, and fats as well as regulates blood sugar.
* The small intestine breaks down and absorbs proteins, carbohydrates, and fats. The large intestine absorbs moisture from what is left of the food.
* The final storage space before waste is removed is the rectum.
* Food stays in the stomach for 4-6 hours, the small intestine for 2-4 hours, and the large intestine for 24-48 hours
* The pharynx has openings that go into the lungs and to the esophagus/stomach.
* The epiglottis is the structure that covers the opening of the trachea and prevents food from entering the lungs.
* The body has a normal pH of 7.2. The stomach has a pH of 2.5 or 2.
* The stomach secretes mucous to protect the lining of the stomach and prevent ulcers.
* The pH of the small intestine is higher than the stomach.
* In addition to making bile, the liver:
  + Processes carbohydrates, fats, and proteins absorbed by the small intestine.
  + Breaks down hormones, drugs, and toxins
  + Makes the proteins in blood responsible for clotting
* The pancreas releases insulin when blood sugar is high and glucagon when blood sugar is low.
* The large intestine removes fluid and salt from solid waste and stores feces.
* The large intestine has many beneficial bacteria that aid in fermentation and produce vitamin K.

**How We Know**

* A cow’s stomach has four (4) compartments.
* Enzymes in your saliva break down carbohydrates.
* Dr. Beaumont noted that proteins were especially degraded by acids in the stomach.
* The liver is a nutrient storage organ that releases stores as needed.
* The gall bladder is not necessary for life
* The pancreas secretes two hormones into blood
  + Insulin - triggers cells to absorb sugar from blood
  + Glucagon - triggers cells to release sugar into blood
* There are two ducts that connect the pancreas and the small intestine.
* The portal vein collects all of the blood leaving the small intestine and has high amounts of carbohydrates and amino acids.
* Fats from the small intestine are absorbed through lymphatic vessels.
* Blood leaving the large intestine has more water and salt than the blood entering the large intestine.
* Bacteria can break down certain foods that humans cannot.
* Vitamin K is needed for normal blood clotting.

**Common Hazards**

* Ulcers
  + A lesion in the mucus lining of the stomach or duodenum is called a peptic ulcer.
  + Causes of ulcers include
    - a bacteria called *Helicobacter pylori*
    - long term use of NSAIDs
    - a disease called Zollinger-Ellison syndrome that causes tumors that release hormones that causes large amounts of acid to be produced.
* Food Poisoning
  + Symptoms of food poisoning are
    - nausea
    - vomiting
    - abdominal cramps
    - fever
    - diarrhea
  + Food poisoning can be avoided by
    - Washing your hands
    - Cleaning kitchen tools
    - Washing fruits and vegetables
    - Cooking food thoroughly
    - Refrigerating leftovers within 2 hours

Fill in the blanks labeling the digestive system. (Source:NIH NIDDK)