

Digestion!!!!!! Chpt 45, topic 5

The Pathway of food---

- Mouth—pharynx—larynx—esophagus—stomach—small intestine—large intestine—anus

Layers of the GI tract—

- Inner—closest to food—
 - **Mucosa**—epithelial and collective tissue—lots of folds for surface area
- **Submucosa**—collective tissue—contains the capillaries (where nutrients are absorbed)
- **Smooth Muscle**—allows for **Peristalsis**—the muscle movement that propels food thorough out the tract
- **Periteriom**—the outside layer used for protection

Mouth

Mechanical Digestion—

- Mastication
- Through the teeth in the mouth

Chemical Digestion—

- Through salivary glands
 - Sublingular
 - Submandibular
 - Paratoid

Esophagus

- Tube
- Moves food through peristalsis
- Esophageal Sphincter
 - Closing at the end of the tube
 - Regulates food going into the stomach
 - Stops stomach acid from coming back up

Stomach

- Contains---
 - HCl
 - Pepsin—denatures proteins—kills pathogens
- **Rugae**—folds in the stomach that can expand to create more surface area
- Mechanical breakdown—peristalsis and stomach churning
- Chemical breakdown—HCl and Pepsin break down proteins

Small Intestine

- Nutrient absorption
- Duodenum—
 - Most chemical digest occurs here
 - Bile and enzymes help
 - Lipids and nucleic acids digested
- Jejunum and Ileum—
 - Used for absorption of nutrients
 - Contain microvilli

Large Intestine

- Absorb Water

- Compact left over into fecal matter
- Parts: Ascending, Transverse, Descending, Sigmoid

Liver

- Functions
 - Secretes bile—emulsifies fats
 - Controls nutrient distribution
 - Stores vitamins and minerals
 - Iron
 - Detoxification (drugs and poisons)

Pancreas

- Gland
 - Regulates level of glucose in blood
 - **Pancreatic amylase**—breaks down carbohydrates
 - **Ribonuclease**—breaks down RNA
 - **Deoxyribonuclease**—breaks down DNA
 - **Pancreatic Lipase**—degrades fats (lipids)

Nutrition—

- Eight essential things to life...
 - Proteins
 - Found in eggs, meat—take enzymes to break them apart and rebuild them according to our structure
 - Carbohydrates
 - Starch (grains...)—provide energy
 - Lipids
 - Fats (butter)—long term energy source—break down for phospholipid bilayer
 - Vitamins
 - Jump start normal metabolism
 - Minerals
 - (calcium, sodium...)—comes part of cell tissue
 - Water
 - Helps liquidate cells and keeps organs moist....
 - Antioxidants
 - (green tea, blue berries)—Kills off oxidants (bad)
 - Oxidants—latches on to things and prevents them from functioning
 - Phytochemical
 - (teas)—not essential—helps fight cancer

Topic Questions:

5.1.1 Explain why digestion of large food molecules is essential.

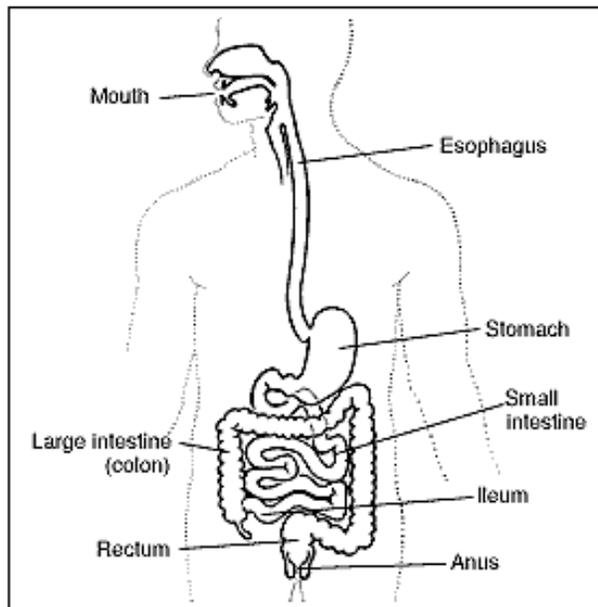
- The foods that we eat are not necessarily usable in their current form by our tissue. They have to be broken down and changed into another form.
- Food molecules are simply too large to be absorbed by the villi in the small intestine, once again they have to be broken down into small forms.

5.1.2 Explain the need for enzymes in digestion. If we didn't have enzymes- digestion still would happen, but it would happen at a very slow rate. Enzymes serve as a catalyst for this process.

5.1.3 State the sources, substrate, products and optimum pH conditions for one amylase, one protease, and one lipase.

- **Enzyme:** Salivary Amylase | Pepsin | Pancreatic lipase
- **Source:** Salivary glands | Wall of Stomach | Pancreas
- **Substrate:** Starch | Proteins | Triglycerides (fats or oils)
- **Products:** Maltose | Small polypeptides | Fatty Acids and Glycerol
- **Optimum pH:** pH 7 | pH 1.5 | pH 7

5.1.4 Draw a diagram of the digestive system. (Ileum not required)



5.1.5 Outline the function of the stomach, small intestine and large intestine.

- Digestion of proteins begins in the stomach, where the process is catalyzed by the enzyme pepsin where possible harmful bacteria are killed by the stomach's acidic condition which is also the optimum conditions for the enzyme pepsin.
- In the small intestine, enzymes complete the process where the end matter is absorbed by villi.
- The large intestine absorbs water and passes the un-absorbable rest off as feces.

5.1.6 Distinguish between absorption and assimilation.

- Absorption is when food molecules pass through a layer of cells such as passing through the villi.
- Assimilation is when food actually becomes part of the body's tissue.

5.1.7 Explain how the structure of the villus is related to its role in absorption of the end products of digestion.

- It increases the surface area of the small intestine
- The epithelium has a surface of only a thin layer of cells.
- Protein channels in the microvilli allow for quick absorption of foods via facilitated diffusion and active transport.
- Blood capillaries close to epithelium making it only a small distance for diffusion to occur.