Chapter 3: Digestion, Absorption and Transport

Digestion

- The breakdown of foods
- This process requires:
    - enzymes
        - mouth (salivary glands)
        - stomach (gastric glands)
        - small intestines (intestinal glands)
    - pancreas
    - acid
        - HCl (hydrochloric acid) in the stomach

The Human Digestive System: See Figure 3-1 in text

- There is a good bit of detail here, some of which you will not be held responsible for. You should be able to describe these organs associated with the digestive system:
    - mouth
    - salivary glands
    - esophagus
    - stomach
    - liver
    - gallbladder
    - bile duct
    - small intestine
    - pancreas
    - large intestive (colon)
    - rectum
    - anus

Special Features of the GI tract

- Peristalsis: wavelike muscular contractions of the GI tract that move food and fluid along
- Sphincter muscles: circular muscles that separate parts of the GI tract and allow for flow of food and fluids in one direction only
    - this is the norm -- what is an example of the fluid coming back up the wrong direction?
- Secretions of digestion: enzymes, water, and other components

pH of the digestive fluids: See illustration in text (Figure 3-6)

- Stomach (gastric juice) -- very acidic because of the presence of hydrochloric acid
- Saliva -- neutral
- Pancreatic juice and bile -- basic
    - the basic quality of the pancreatic juice plays a critical role in neutralizing the digestive fluids as they come from the stomach; the stomach can handle the acidity of gastric juice because of the mucus that lines its walls, but the rest of the digestive tract does not possess this quality, so the fluids must be neutralized as they enter the small intestines (look again at your anatomical illustration of the GI

tract and see how the pancreatic duct enters the upper section of the small intestines just for this purpose).

The small intestines: See illustration in text (Figure 3-9)

- This illustration is very important as it shows some of the unique qualities of the small intestines. We will look again at the role of these qualities in absorption below.

Go to this **MEDtropolis link** (http://medtropolis.com/virtual-body/) for an interactive view of the digestive system. It, like your textbook, has some detail of anatomy that you will not be responsible for, but it gives you a good picture of what happens during digestion. Click first on "Digestive Tract" and then investigate what the link has to offer. Be sure to take the "Guided Tour" (click on the blue arrows where is says "more" to get the entire tour).

Absorption: See illustration in text (Figure 3-9)

- The process of absorption means that digested nutrients (see "end products of digestion" below) pass through the intestinal walls into the bloodstream; now the nutrients are actually available for use in the body.
    - As you read the narrative (pp.77-79) and look at the illustration, ask yourself these questions:
        - What is the significance of the folds in the intestinal walls?
        - What is the name of the finger-like projections that cover the folds?
        - What are the vessels within each villus? There are blood vessels - and lymph vessels as well - within each villus; nutrients are absorbed by passing through the wall of the villus and then moving into one of these vessels (most commonly through the process of diffusion)
        - What is the function of the crypts between the villi?
        - As the intestinal wall is magnified further, you see that each villus is covered with tiny hairs called microvilli; how do the microvilli assist in the process of absorption?

End products of digestion:

- Carbohydrate: the monosaccharides
    - glucose
    - fructose
    - galactose
- Triglyceride
    - glycerol
    - fatty acids
- Protein
    - amino acids
- Absorbed without alteration:
    - water
    - minerals
    - vitamins
    - cholesterol

From your glossaries in Chapter 3:

- Page 70
  - mouth
  - esophagus
  - sphincter
  - stomach
  - small intestine
  - gallbladder
  - pancreas
  - large intestine (colon)
  - rectum
  - anus

- Page 74
  - digestive enzymes

- Also on Page 74
  - salivary glands
  - saliva
  - gastric glands
  - gastric juice
  - hydrochloric acid
  - mucus
  - bile
  - pancreatic juice
  - bicarbonate

- Figure 3-7 on page 76 is more detail than you need right now
  - It will be a good study guide when you prepare for your midterm test, however, as it includes details we will get from chapters 4-6.

The Circulatory Systems

- Now individual nutrients have entered the body's circulation and are available to the body cells.
  - Note the general make-up of the vascular system
  - Nutrients absorbed into the bloodstream are taken first to the liver
  - Study the placement of the liver anatomically in relation to the other digestive organs
- Note the general make-up of the lymphatic system
  - Nutrients absorbed into the lymphatic system do not go to the liver first

Study the Health and Regulation of the GI tract

- Required reading: Highlight 3