The Digestive System

N101 - Foot Reflexology Course

Chapter 11
Oral Cavity

The oral cavity or mouth is a hollow chamber where food and air enters. The tongue on the floor of the mouth is made of skeletal muscle and is anchored to bones in the skull and the hyoid bone in the neck. It aids in mechanical manipulation of food into the pharynx during swallowing. The tongue has sensory taste buds called papillae. See Figure 11-2.

Teeth

The teeth provide for mastication of food and the chewing stimulates the salivary glands to produce saliva. An adult has 32 permanent teeth. See Figure 11-3.

Salivary Glands

Three (3) pairs of salivary glands secrete saliva. This contains enzymes which break down starches into simple sugars as well as moisten food to pass through the esophagus. See Figure 11-4.

Pharynx

The pharynx is part of the respiratory and digestive systems. The pharynx allows food to move into the stomach by passing through the esophagus. A safety valve called the epiglottis prevents food from entering the trachea. This is where air would pass through to the lungs.

Esophagus

The esophagus is a mucous lined muscular tube that connects the pharynx with the stomach. It is about 25 cm (10 inches) long. Peristalsis assists the passage of food.

Stomach

The stomach is a pouch-shaped organ about 25 - 30 cm (10 - 12 inches) long. It hangs under the diaphragm (upper left portion of the abdominal cavity). The stomach has the capacity of one litre or more. Its inner lining is marked by thick folds that tend to disappear when the stomach wall is distended. The stomach receives
food from the esophagus and mixes with gastric juices that contain hydrochloric acid and enzymes, by contractions called peristalsis. It initiates the digestion of proteins. It carries on a limited amount of absorption and moves food into the small intestine. See Figure 11-5.

**Small Intestine**

The small intestine’s function is to absorb food and water. It consists of three portions; duodenum, jejunum and the ileum. It is a tubular organ that extends from the pyloric sphincter in the stomach to the beginning of the small intestine. With many loops and coils, it fills much of the abdominal cavity. Circular muscles surround this tube (approx. 7 metres or 20 feet) and move the partially digested food called chyme, through the intestine with a wavelike movement called peristalsis.

The mucous lining of the small intestine contains thousands of microscopic glands that secrete intestinal digestive juice. The wall also contains thousands of “fingers” called villi which absorbs nutrients and water to the blood capillaries inside.

Most of the chemical digestion occurs in the duodenum that is ‘C’ shaped and is approx. 25 cm (10 inches) long. The middle third of the duodenum contains openings from the ducts that empty pancreatic digestive juices from the pancreas and bile from the liver.

The small intestine’s walls secrete the hormone cholecystokinin to stimulate the contraction of the gallbladder and the bile flow into the duodenum. It also stimulates the production of enzymes by the pancreas.

**Liver**

The liver is the largest gland in the body and is classified as an exocrine gland (glands that secrete products into ducts.) It carries on many metabolic activities such as:

1. Stores and releases proteins, minerals, vitamins and sugars (glycogen)
2. Manufactures bile to aid digestion
3. Detoxifies blood by filtration from harmful ingested substances
4. Breaks down fats
5. Processes and distributes nutrients to the body’s cells after receiving them from the GI tract via the hepatic portal system (circulatory)
6. Plays a key role in carbohydrate metabolisms by helping to maintain the normal concentration of blood glucose.
Chapter Summary

Overview:
- The organs of the digestive system are separated into two groups: primary organs and secondary or accessory organs.
- Primary organs include:
  - mouth
  - pharynx
  - esophagus
  - stomach
  - small intestine
  - large intestine
  - rectum
  - anal canal
- Accessory organs include:
  - teeth
  - salivary glands
  - tongue
  - liver
  - gallbladder
  - pancreas
  - appendix
- The primary organs form a tube, open at both ends called the gastrointestinal or GI tract (also called the alimentary canal) which is 9 metres or 29 feet long in adults.
- Food enters the tract and is digested, its nutrients are absorbed and undigested residues are eliminated from the body as feces.
- Accessory organs help in the mechanical or chemical breakdown of food.
- The breakdown of food is both mechanical and chemical in nature.
- Teeth are used to break down food and the stomach churns the food to continue the mechanical breakdown process.
- Chemical breakdown results from the digestive enzymes and other chemicals acting on food as it passes through the GI tract.
- In chemical digestion, large food molecules are reduced to smaller molecules that can be absorbed through the intestinal wall lining and distributed to the body cells.
- The process of altering the chemical and physical composition of food is called digestion.
- The digestive system also functions as an organ of elimination, eliminating waste or feces.
- Foods undergo three (3) kinds of processes: digestion, absorption, and metabolism.
- The appendix is physically attached to the digestive tube and classified as an accessory organ. It is not functionally important in the digestive process.
- Table 11-1, page 2 - Organs of the Digestive System.

Oral Cavity - Figure 11-2
- Oral cavity or mouth is a hollow chamber where food and air enter.
- The tongue is made of skeletal muscle and is anchored to bones in the skull and the hyoid bone in the neck. It aids in mechanical manipulation of food into the pharynx during swallowing.
- The tongue has sensory taste buds called papillae.

Teeth - Figure 11-3
- Teeth provide for mastication of food.
- Chewing stimulates the salivary glands.
- An adult has 32 permanent teeth.

Salivary Glands - Figure 11-4
- Contains enzymes which break down starches into simple sugars.
- Moists food to pass through the esophagus.

Pharynx
- The pharynx is part of the respiratory and digestive systems.
- It allows food to move into the stomach by passing through the esophagus.
- A safety valve called the epiglottis prevents food from entering the trachea. This is where air would pass through into the lungs.

Esophagus
- It is a mucus lined muscular tube that connects the pharynx with the stomach.
- It is approx. 25 cm (10 inches) long.
- Peristalsis assists the passage of food.

Stomach - Figure 11-5
- It is a pouch-shaped organ about 25 - 30 cm (10-12 inches) long.
- It hangs under the diaphragm and has the capacity of 1 litre or more with thick folds that disappear when distended.
- Stomach receives food from the esophagus. The food mixes with gastric juices that contain hydrochloric acid and enzymes by contractions called peristalsis.

Small Intestine
- Function is to absorb food and water.
- Consists of three (3) portions:
  - duodenum
  - jejunum
  - ileum
- It connects the stomach from the pyloric sphincter to the small intestine.
- Fills most of the abdominal cavity and the tube has circular muscles that move partially digested food called chyme through the intestine by a wavelike movement called peristalsis.
- It is approx. 7 metres or 20 feet long.
The mucous lining contains thousands of microscopic glands that secrete intestinal digestive juice and also contains thousands of “fingers” called villi that absorb nutrients and water that are transferred to the capillaries.

The duodenum is approx. 25 cm (10 inches) long and most of the chemical digestion occurs here.

The middle third of the duodenum has duct openings that empty pancreatic digestive juice from the pancreas and bile from the liver.

Small intestines’ walls secrete the hormone cholecystokinin to stimulate the contraction of the gallbladder to empty bile into the duodenum and to stimulate the pancreas for pancreatic digestive enzymes (juice).

Liver - Figure 11-6
- Largest gland in the body.
- An exocrine gland that secretes bile into ducts.
- Store and release proteins, minerals, vitamins and glycogen (sugar).
- Manufactures bile to aid digestion.
- Blood is detoxified from harmful ingested substances by filtration and fat is broken down.
- Processes and distributes nutrients to the cells via the circulatory hepatic portal system.
- Plays a key role in carbohydrate metabolisms by maintaining the normal concentration of blood glucose.

Gallbladder - Figure 11-7
- Function is to concentrate and store bile produced by the liver.
- A pear-shaped sac on the undersurface of the liver with a capacity of 30 to 50 ml. (1-2 oz.) to store bile between meals.
- Bile is concentrated by reabsorbing water and is released into the duodenum when stimulated by the hormone cholecystokinin from the small intestine via the common bile duct.
- The function of bile is to emulsify fats into smaller particles for easier digestion of the food particles.
- Jaundice is a condition caused by excessive bile absorbed into the blood due to a blockage such as gallstones which produces a yellowish skin discolouration.

Pancreas - Figure 11-8
- Lies behind the stomach in the concavity of the ‘C’ -shape of the duodenum.
- It is an exocrine gland that secretes pancreatic juice into ducts and an endocrine gland that secretes hormones into the blood.
- Pancreatic juice contains enzymes that digest food and also contains sodium bicarbonate to neutralize hydrochloric acid in the gastric juice.
- Pancreatic juice empties into the duodenum of the small intestine.
- The pancreas also contains cells that have no contact with ducts, called islets (of Langerhans) which secretes the hormone insulin (to regulate blood sugar) which is an endocrine function (see Endocrine System.)
- The pancreas provides both digestive and endocrine functions.

Large Intestines - Figure 11-9
- It is about 1.5 metres (5 feet) in length and consists of:
  - cecum
  - ascending colon
  - transverse colon
  - descending colon
  - sigmoid colon
  - rectum
  - anal canal
- Partially digested and unabsorbed food material is called chyme and it enters the large intestine from the small intestine after passing through a sphincter called the ileocecal valve.
- Chyme becomes feces as water and salts are reabsorbed due to bacterial action.
- The ileocecal valve prevents the contents of the cecum of the large intestine from backing up into the ileum of the small intestine.
- After a meal, peristalsis in the ileum is increased and forces some content of the small intestine into the cecum.
- The appendix or vermiform appendix is directly attached to the cecum but does not serve an important digestive function.
- The appendix contains lymphatic tissue and is part of the immune system.