NOTES:
The Digestive System
(Ch 14, part 2)
Structure of the pancreas:

- The pancreas produces **PANCREATIC JUICE** that is then secreted into a pancreatic duct.
- The **PANCREATIC DUCT** leads to the **DUODENUM** (first portion of the small intestine)
Pancreatic juice contains enzymes that split or break down:

- carbohydrates
- proteins
- fats/lipids
- nucleic acids

*pancreatic juice also has a high bicarbonate ion concentration that helps neutralize chyme and causes intestinal contents to be alkaline (basic).*
Hormones regulate / control pancreatic secretion:

- as chyme enters the duodenum, the duodenal mucous membrane secretes the hormone **SECRETIN**
  - stimulates secretion of pancreatic juice that has a high conc. of bicarbonate ions
- proteins and fats in the chyme within the duodenum cause the duodenal membrane to release the hormone **CHOLECYSTOKININ**
  - stimulates secretion of pancreatic juice that has a high conc. of digestive enzymes
LIVER

Structure of the liver:

- The liver is located in the upper right quadrant of the abdominal cavity – just below the diaphragm.
- The liver is divided into a large **RIGHT LOBE** and a smaller **LEFT LOBE**.
Structure of the liver:

- Each lobe consists of **HEPATIC LOBULES**, the functional units of the gland.

- Within the lobules are many small **BILE CANALS** which receive bile from the hepatic cells.

- These bile canals unite to form larger ducts and then converge to become the **HEPATIC DUCTS**.
Cholecystectomy with Injury to the Common Bile and Hepatic Ducts

Correct Post-operative Condition

- Right hepatic duct
- Left hepatic duct
- Common hepatic duct
- Cystic duct
- Cystic artery
- Common bile duct

Normal (Pre-operative) Anatomy

- Right hepatic duct
- Left hepatic duct
- Common hepatic duct
- Cystic artery
- Cystic duct
- Triangle of Calot

Actual Post-operative Condition

- Large slip across left hepatic duct
- Three (3) clips on right cut and clipped
- GALL BLADDER REMOVED
- Cystic duct and a portion of the common bile duct removed
Liver functions include:

- metabolizing carbohydrates, lipids, and proteins;
- storage of some substances;
- filtering the blood;
- destroying toxins;
- secreting bile.

**Bile is the only liver secretion that directly affects digestion!!**
Composition of BILE:

- BILE contains:
  - bile salts
  - *bile pigments
  - cholesterol
  - electrolytes

*only the BILE SALTS have digestive functions!
**GALLBLADDER**

- The gallbladder stores bile between meals and releases bile into the small intestine via the **CYSTIC DUCT** and **COMMON HEPATIC DUCT**

- Cholesterol in the bile may form solid, may form **GALLSTONES** which could block the ducts
Functions of Bile Salts:

- Emulsify fats (surround and break them down into small droplets)
- Aid in the absorption of fatty acids, cholesterol, and certain vitamins
SMALL INTESTINE

*the small intestine receives secretions from the pancreas and liver, completes nutrient digestion, absorbs the products of digestion, and transports the residues to the large intestine.
SMALL INTESTINE

- the small intestine consists of the:
  DUODENUM (first 25 cm)
  JEJUNUM
  ILEUM
Structure of the small intestine wall:

- the wall is lined with **villi** that increase the surface area and aid in mixing and absorption
  (these, in turn, are covered with smaller extensions called **microvilli**)
- intestinal glands are located between the villi
Secretions of the small intestine:

- secretions include: **MUCUS** and **DIGESTIVE ENZYMES**
- digestive enzymes split molecules of **SUGARS**, **PROTEINS**, and **FATS** into simpler forms

*these secretions are released when stimulated by gastric juice, chyme, and stretching of the small intestine’s wall*
Absorption in the small intestine:

- the intestinal villi absorb the products of carbohydrate, protein, and fat digestion
- the villi also absorb electrolytes and water
**if food is rushed through the small intestine, not enough absorption of these things takes place and the result is DIARRHEA.**
LARGE INTESTINE

*the large intestine reabsorbs water and electrolytes, and forms and stores FECES*
LARGE INTESTINE

- the large intestine consists of the:
  - CECUM
  - COLON
    (divided into the ASCENDING, TRANSVERSE, DESCENDING, and SIGMOID COLON)
  - RECTUM
  - ANAL CANAL
Functions of the Large Intestine:

- has little or no digestive function
- secretes mucus
- absorbs water and electrolytes
- forms and stores **FECES**
FECES consist of:
- Water
- Electrolytes
- Bacteria
- Undigested material
- Mucus