

# Human Digestion

# Digestion

- **Digestion:** a series of enzyme-catalyzed reactions by which large molecules are hydrolyzed to molecules small enough to be absorbed through the intestinal membranes
  - Carbohydrates
  - Fats
  - Proteins

# DIGESTIVE TRACK

Mouth -> Esophagus-> Stomach -> Small  
Intestine-> Large Intestine

# Digestive Juices

## Five Principal Digestive Juices      Location of Entrance of Digestive Juices

- |                     |  |
|---------------------|--|
| 1. Saliva           | 1. Three pairs of salivary glands in mouth             |
| 2. Gastric Juice    | 2. Glands in the walls of the stomach                  |
| 3. Pancreatic Juice | 3. Enters duodenum through the pancreatic duct         |
| 4. Bile             | 4. Enters duodenum through a duct from the gallbladder |
| 5. Intestinal Juice | 5. Intestinal mucosal cells                            |

# Salivary Digestion

- Hydrolysis of starch begins
- Contents of saliva
- pH ranges from slightly acidic to slightly basic
- Optimal pH 6.6 to 6.8
- Salivary amylase catalyzes the hydrolysis of starch to maltose
- Starch + water  $\xrightarrow{\text{Salivary amylase}}$  Maltose

## Cont.

- Salivary amylase inactive at pH of 4.0
- Saliva secreted continuously
  - Rate of secretion increases by the sight, odor, or thought of many foods

# Gastric Digestion

- Food particles reduced in size, mixed with gastric juices, liquid consistency called chyme
- Gastric juices are clear, pale yellow
- Acidic pH of 1.5-2.5
- Contents of gastric juices
- Secretion of hormone, gastrin, triggered by food entering stomach
- Hormone produced by gastric glands

# Cont.

- Main digestive function of the stomach is partial digestion of proteins
- Pepsin
- Protein + water  $\xrightarrow{\text{pepsin}}$  Proteoses + peptones
- Gastric lipase
- Pyloric valve to duodenum



# Intestinal Digestion

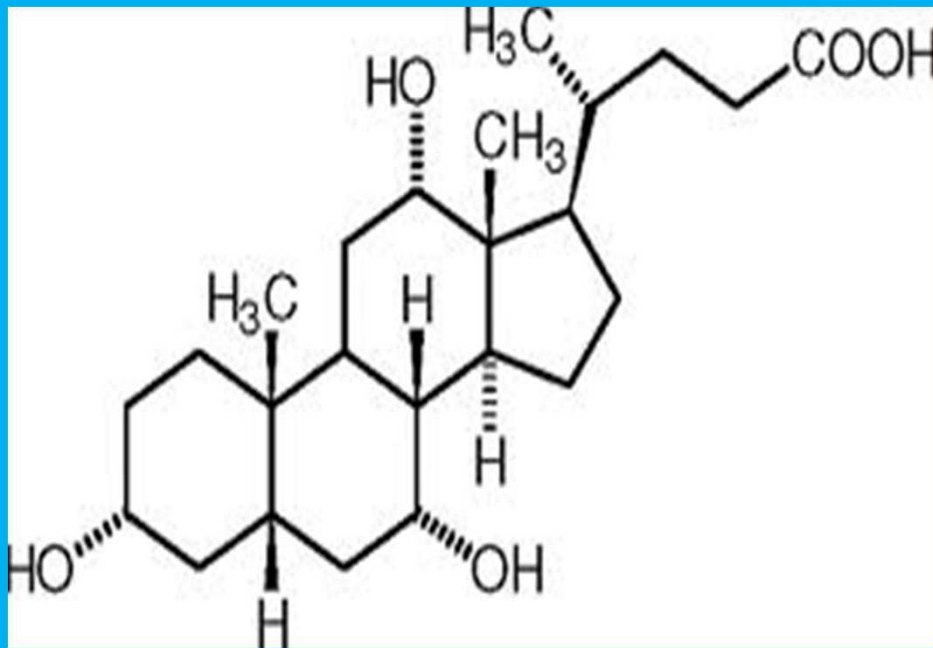
- Small intestine is where most the digestion takes place
- All stomach contents made alkaline
- pH of pancreatic juice 7.5-8.0
- pH of bile is 7.1-7.7
- Pancreatic secretion stimulated hormones
- Four enzymes occurring in small intestine

# Cont.

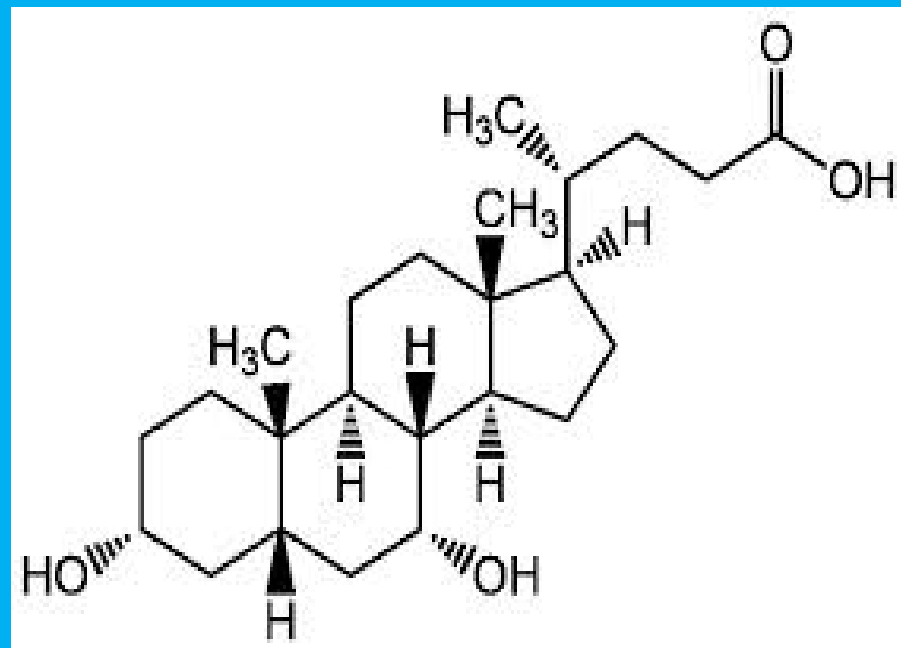
- Bile produced in liver
  - Stored in gallbladder
- Food enters duodenum, gallbladder contracts, bile enters duodenum through duct used by pancreatic juice
- Major contents of bile
  - Bile acids (as salts)
  - Bile pigments
  - Inorganic salts
  - Cholesterol

# Cont.

Bile acids are steroid monocarboxylic acids two examples below



Cholic acid



Chenodeoxycholic acid

# Cont.

- Importance of presence of bile in intestine
- Bile acids emulsify fats
- Bile salts reabsorbed in lower small intestine
- Most of the digested food absorbed in small intestine

# Large Intestine

- Undigested or indigestible materials pass from small to large intestine
- Additional chemical breakdown
- Nutrients not absorbed in the large intestine
- All water absorbed in large intestine

# Questions

1. What are the five digestive juices?
2. What is digestion?
3. What are the three salivary glands?
4. Where is all of the water absorbed?
5. What are the four that occur in the small intestine?