

The Digestive System

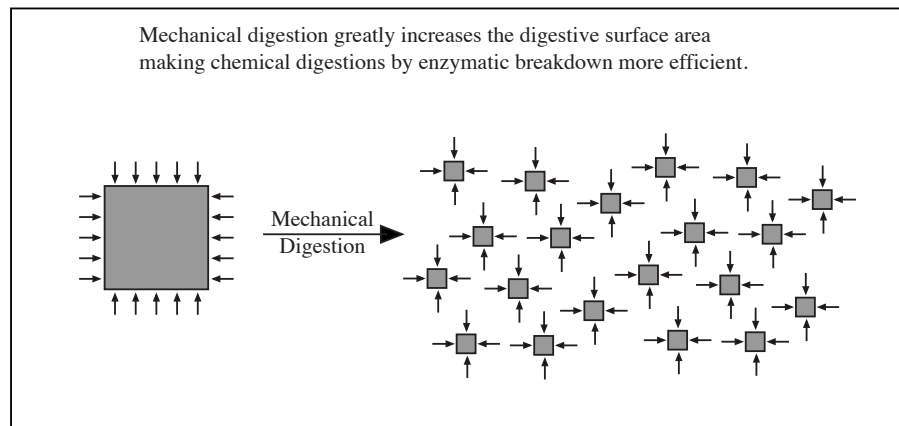
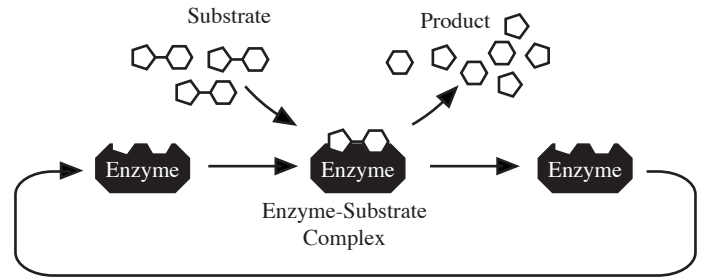
1. Introduction

A. Gastrointestinal (GI) Tract or Alimentary Canal

B. Digestive Processes

i. Mechanical Digestion

ii. Chemical Digestion by Enzymatic Breakdown



C. Tissue Structure (Know the illustration below well)

i. Mucosa

- Membrane

a. Epithelia

b. Lamina Propria

c. Aggregated Lymphatic Nodules

ii. Submucosa

a. Accessory Glands

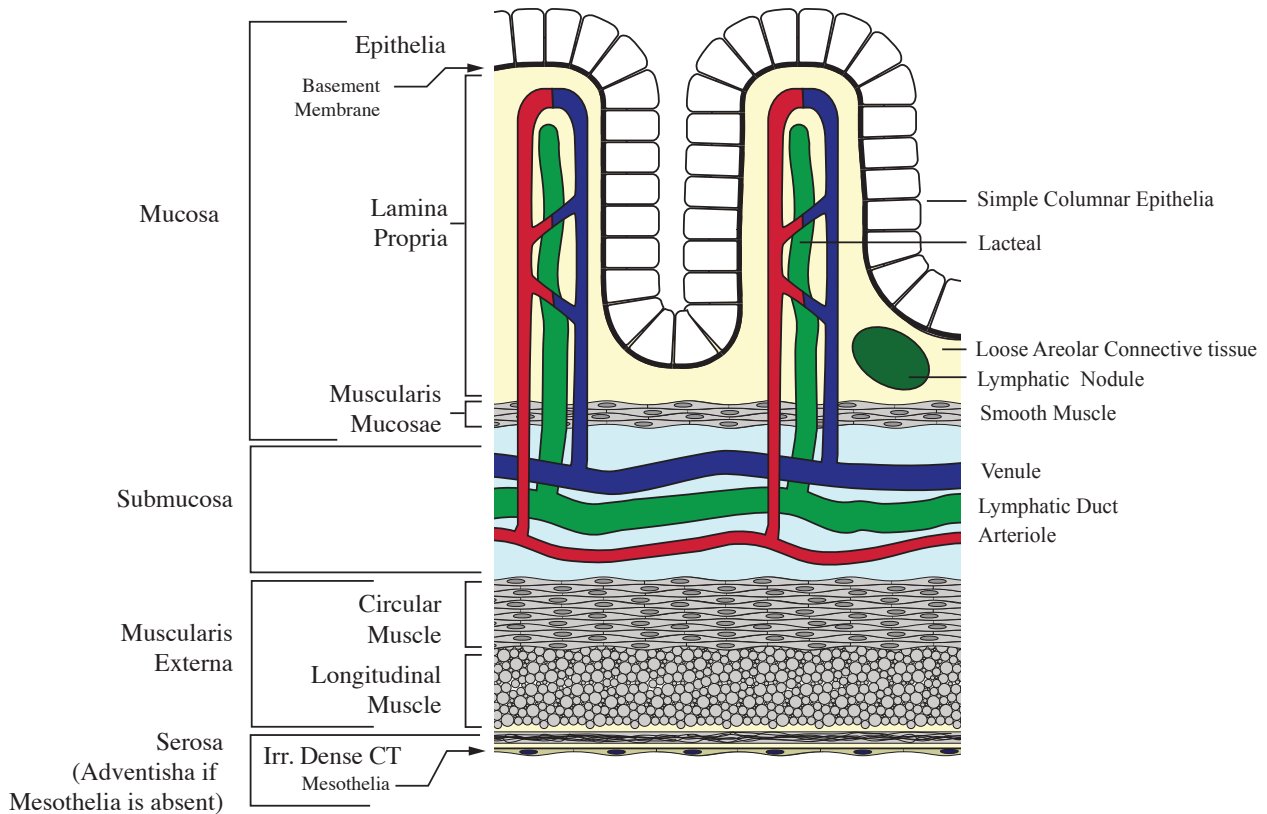
iii. Muscularis Externa

a. Circular Muscle

b. Longitudinal Muscle

iv. Serosa or Adventitia

Know the name and functions of all layers, tissues identified on the illustration below.



2. Mouth

- A. Buccal Cavity
- B. Oral Cavity Proper
- C. Mastication (“Chewing”)
- D. Lips and Cheeks
 - Trigeminal Nerve
 - i. Lingual Frenulum
 - ii. Tissue of Cheeks
 - a. Mucous Membrane:

Stratified Squamous Epithelium

E. Teeth and Gums

i. Types of Teeth

- a. Incisors
- b. Canines
- c. Premolars
- d. Molars
 - Wisdom Teeth

ii. Deciduous Teeth (4-2-4)

iii. Permanent teeth (4-2-4-6)

iv. Dentition

	Deciduous Teeth	Permanent Teeth
Incisors	4	4
Canines	2	2
Premolars	0	4
Molars	4	6

v. Periodontal Ligaments

vi. Tooth Anatomy

- | | |
|-------------------|------------|
| a. Root | g. Enamel |
| b. Crown | h. Dentine |
| c. Neck | i. Cement |
| d. Apical Foramen | j. Pulp |
| f. Root Cavity | |

vii. Mastication

viii. Gums or Gingivae

- Firm Connective Tissue
- Mucous Membrane
- Stratified Squamous Epithelium

F. Tongue

- Mucous Membrane
- i. Function
- ii. Anatomy of Oral Part
 - a. Body
 - Taste Buds
 - b. Pharyngeal Part or Root of Tongue
 - Lingual Tonsil
- iii. Skeletal Muscle and Fine Motor Control

G. Palate

- i. Hard Palate
- ii. Soft Palate
 - a. Uvula

H. Salivary Glands

- i. Glands
 - a. Parotid Glands
 - b. Submandibular Glands
 - c. Sublingual glands
- ii. Saliva
 - a. Composition
 - Mucin
 - b. Salivary Amylase
 - c. Bicarbonate

iii. Control of Salivary Secretion

a. Autonomic Nervous System

- Parasympathetic Stimulation
 - * ATP Active Transport Pumps Stimulated
 - * Watery Secretion
- Sympathetic stimulation
 - * ATP Active Transport Pumps Inhibited
 - * Thick Mucus

3. Pharynx

A. Nasopharynx

B. Oropharynx

i. Fauces

- Deglutition or Gag Reflex

C. Laryngopharynx

4. Esophagus

A. Sphincter

i. Lower Esophageal Sphincter

B. Histology

i. Mucosa

iii. Muscularis Externa

ii. Submucosa

iv. Adventitia

5. Swallowing or Deglutition

- Bolus

A. Voluntary Oral Phase

B. Pharyngeal Phase

- Peristalsis
- Epiglottis

C. Involuntary Esophageal Phase

i. Peristalsis (See Handout)

- Circular and Longitudinal Muscle Coordination

6. Abdominal Cavity and Peritoneum

A. Abdominal Cavity

i. Abdominal Viscera

ii. Peritoneum

- a. Parietal peritoneum
- b. Visceral peritoneum
- c. Peritoneal cavity
- d. Serous fluid
- e. Mesenteries

- Intraperitoneal and Retroperitoneal Organs

B. Abdominopelvic Cavity

i. Pelvic Viscera

7. Stomach

A. Anatomy

- i. Greater Curvature
- ii. Lesser Curvature
- iii. Lower Esophageal Orifice
- iv. Pyloric Orifice

B. Regions

- i. Cardiac Region
- ii. Body
- iii. Pyloric Canal
- vi. Fundis

C. Histology of Stomach

- i. Muscularis Externa
 - a. Longitudinal Layer
 - b. Circular Layer
 - c. Oblique
- ii. Rugae
- iii. Epithelia and Gastric Pits (*See handout on Chyme Production*)

Note: On the video, parietal cells and chief cells were mistakenly switched. The outline below is correct!

- a. Mucous Cells → Mucous
- b. Parietal Cells → HCl
- c. Chief Cells → Pepsinogen
- d. Enteroendocrine Cells → Gastrin

- D. Functions of Stomach (*See handout on Protein Digestion*)
 - i. Storage
 - ii. Make Chyme
- E. Digestive Movements
 - i. Peristaltic Mixing Waves (Stomach Churning)
 - ii. Pyloric Pump
- F. Regulation and Secretion of Gastric Juices (*Pull out handout on Digestive Regulation*)
 - i. Means of Control:
 - a. Neural Control
 - b. Hormonal Control
 - Secretin
 - Cholecystokinin
 - ii. Phases
 - a. Cephalic Phase
 - b. Gastric Phase (and feedback mechanisms)
 - c. Intestinal phase (and feedback mechanisms)
- 8. Small Intestine
 - A. Anatomy
 - i. Duodenum
 - ii. Jejunum
 - iii. Ileum

B. Small Intestine: Adaptations to Increase Absorptive Surface Area

i. Plicae circulares

ii. Villi

- Intestinal Glands (Crypts of Lieberkühn)
- Lacteal

iii. Microvilli

C. Aggregated Lymph Nodules

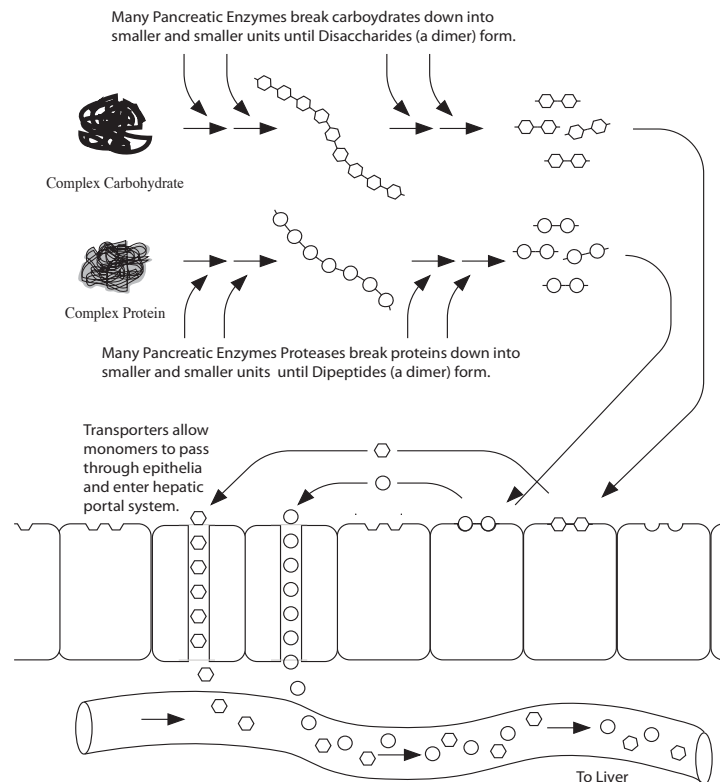
D. Digestive movements of the small intestine

i. Segmenting Contractions

ii. Peristaltic Contractions

E. Digestive Enzymes in the Small Intestine

- Disaccharidases
- Proteases



- F. Absorption from the Small Intestine
 - i. Carbohydrates
 - ii. Proteins
 - iii. Lipids – to be dealt with shortly

- 9. Pancreas as a Digestive Organ
 - A. Gross Anatomy
 - i. Head
 - ii. Body
 - iii. Tail
 - B. Ducts and Valves
 - Main Pancreatic Duct
 - Hepatopancreatic Sphincter
 - Accessory Pancreatic Duct
 - C. Select Pancreatic Enzymes
 - i. Pancreatic Lipases
 - ii. Pancreatic Amylase
 - iii. Pancreatic Proteolytic Enzymes
 - D. Endocrine Controls
 - i. Cholecystokinin
 - ii. Secretin

- 10. Gallbladder and Biliary System
 - A. Biliary System and Enterohepatic Circulation

11. The Liver as a Digestive Organ

A. Anatomy

- i. Falciform Ligament
- ii. Right lobe
 - a. Quadrate Lobe
 - b. Caudate Lobe
- iii. Left Lobe

B. Vessels of the Liver

- i. Hepatic Artery
- ii. Hepatic Portal Vein
- iii. Hepatic Vein
- iv. Bile Ducts
 - a. Right and Left Hepatic Ducts
 - b. Cystic Duct
 - c. Common Hepatic Duct
 - d. Bile Canaliculi

C. Microscopic anatomy

- i. Lobules
- ii. Hepatocytes
- iii. Portal Area
- iv. Sinusoids

D. Functions of the Liver

- i. Review of Metabolic Pathways Basics
- ii. Metabolic Functions, Part #1
 - a. Conversion of fructose to glucose
 - b. Glucose as glycogen
 - c. Synthesis of fatty acids and triglycerides
 - d. Beta Oxidation
 - e. Gluconeogenesis from Fatty Acid catabolism
 - f. Deamination of Amino Acids
 - g. Detoxification of Ammonia and Urea formation
 - h. Gluconeogenesis from Amino Acid catabolism
 - i. Synthesis of nonessential amino acids
- iii. Metabolic Functions, Part #2
 - a. plasma protein production such as albumin
 - b. Form fetal erythrocytes
 - c. bilirubin removal
 - d. lipoprotein, cholesterol and phospholipid formation
 - e. metabolism (primarily detoxification) of drugs, pesticides, herbicides, environmental pollutants, and poisons.
 - f. vitamin A synthesis from carotene
 - g. heat production due to many chemical reactions
- iv. Storage Functions
 - a. Also fat-soluble vitamins (A, D, E, and K)
 - b. minerals (ie., iron),
 - c. vitamin B₁₂.
- v. Bile Secretion

12. Lipid Digestion and Transport Essay

(Pull out your handout on Lipid Digestion and Transport)

13. Large Intestine

A. Gross Anatomy

- | | |
|-----------------------|----------------------|
| i. Cecum | iv. Descending Colon |
| ii. Ascending Colon | v. Sigmoid Colon |
| iii. Transverse Colon | vi. Haustra |

B. Functions of the Large Intestine

- i. Bacterial Activity
- ii. Composition of Feces
- iii. Movements of the Large intestine

14. Rectum

A. Anal Canal

B. Internal Anal Sphincter

C. External Anal Sphincter

D. Defecation Reflex