General Digestive functions
Peristalsis

Segmentation
General Digestive functions
GI tract X-section

Intrinsic nerve plexuses:
- Myenteric nerve plexus
- Submucosal nerve plexus

Gland in submucosa

Mucosa:
- Epithelium
- Lamina propria
- Muscularis mucosae

Submucosa

Muscularis externa:
- Longitudinal muscle
- Circular muscle

Serosa:
- Epithelium
- Connective tissue

Lumen

Mesentery

Nerve
Artery
Vein

Gland in mucosa

Duct of gland outside alimentary canal

Mucosa-associated lymphoid tissue

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Peritoneum

(a) Transverse section of abdominal cavity

(b) Some organs become retroperitoneal

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Oral Cavity

(a) Uvula
   Soft palate
   Palatoglossal arch
   Palatine tonsil
   Hard palate
   Oral cavity
   Tongue
   Lingual tonsil
   Oropharynx
   Epiglottis
   Laryngopharynx
   Hyoid bone
   Esophagus
   Trachea

Opening of pharyngotympanic (auditory) tube in nasopharynx

(b) Superior lip
    Superior labial frenulum
    Palatine raphe
    Hard palate
    Palatoglossal arch
    Soft palate
    Uvula
    Palatine tonsil
    Posterior wall of oropharynx
    Tongue
    Lingual frenulum
    Gingivae (gums)
    Duct of submandibular gland
    Vestibule
    Inferior labial frenulum
    Inferior lip

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Salivary glands

(a) Tongue
(b) Serous cells
Serous demilunes
Mucous cells

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Esophagus

- Mucosa (contains a stratified squamous epithelium)
- Submucosa (areolar connective tissue)
- Lumen
- Muscularis externa
  - Circular layer
  - Longitudinal layer
- Adventitia (fibrous connective tissue)
Deglutination

(a) Upper esophageal sphincter contracted

(b) Upper esophageal sphincter relaxed

(c) Upper esophageal sphincter contracted

(d) Relaxed muscles

Circular muscles contract, constricting passageway and pushing bolus down

Longitudinal muscles contract, shortening passageway ahead of bolus

Gastroesophageal sphincter closed

Stomach

(e) Relaxed muscles

Gastroesophageal sphincter open

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Stomach – X-section
Stomach peristalsis
Microscopic Stomach

- Mucosa
  - Surface epithelium
  - Lamina propria
  - Muscularis mucosae
- Submucosa
  - (contains submucosal plexus)
- Muscularis externa
  - (contains myenteric plexus)
- Serosa
- Gastric pits
  - Surface epithelium
  - Mucous neck cells
  - Parietal cell
  - Gastric glands
  - Chief cell
- Enteroendocrine cell
- Pepsinogen
  - HCl
  - Pepsin
- Mitochondria in parietal cell
- Parietal cell
- Chief cell
- Enteroendocrine cell

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Small Intestine - folds
SI - Microvilli

(a) Villi
(b) Desquamating cells

Microvilli
Absorptive cell

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Small Intestine-Brush Border Enzymes
Large Intestine - Outside

- Right colic (hepatic) flexure
- Transverse colon
- Superior mesenteric artery
- Haustrum
- Ascending colon
- Ileum
- Ileocecal valve
- Cecum
- Vermiform appendix
- Rectum
- Anal canal
- External anal sphincter
- Left colic (splenic) flexure
- Transverse mesocolon
- Epiploic appendages
- Descending colon
- Cut edge of mesentery
- Teniae coli
- Sigmoid colon
Large Intestine - Microscope
Pancreas Enzymes
Liver Lobule Microscope
Enzymes

Carbohydrate digestion

Foodstuff: Starch and disaccharides
- Salivary amylase
- Pancreatic amylase

Enzyme(s) and source: Oligosaccharides and disaccharides
- Lactose
- Maltose
- Sucrose
- Brush border enzymes in small intestine (dextrinase, glucoamylase, lactase, maltase, and sucrase)

Site of action: Mouth
Path of absorption: The monosaccharides glucose and galactose are absorbed via cotransport with sodium ions; fructose passes via facilitated diffusion. All monosaccharides enter the capillary blood in the villi and are transported to the liver via the hepatic portal vein.

Protein digestion

Foodstuff: Protein
- Pepsin (stomach glands) in the presence of HCl
- Pancreatic enzymes (trypsin, chymotrypsin, carboxypeptidase)
- Brush border enzymes (aminopeptidase, carboxypeptidase, and dipeptidase)

Site of action: Stomach, Small intestine
Path of absorption: Amino acids are absorbed via cotransport with sodium ions; they enter the capillary blood in the villi and are transported to the liver via the hepatic portal vein.