The Digestive System Laboratory
The Digestive Tract

The alimentary canal is a continuous tube stretching from the mouth to the anus.

- Parotid, sublingual, and submaxillary salivary glands.
- Buccal cells in cheek which secrete saliva.

- Esophagus
- Liver
- Gallbladder
- Stomach
- Pancreas
- Small intestine
- Colon (large intestine)
- Rectum
- Anus
The Alimentary Canal CS

Fibro-serous covering
Muscularis (externa):
- longitudinal
- transverse (circular)

Submucosa:

Muscularis mucosae: Edge of the mucosa layer.

Mucosa: includes the epithelial lining and lamina propria

Mesentery

Figure 24.6
The alimentary canal consists of four layers. Listed from outside to inside: 1) the fibroserous outer covering; serous in most of GI tract, fibrous in esophagus. 2) the muscularis (externa), smooth muscle (except in upper esophagus) in two or three layers; 3) the submucosa, containing glands, nerves, and blood vessels; 4) the mucosa, the epithelial secretory and absorptive lining, bounded by the muscularis mucosae (mm).
The upper third of the esophagus is marked by skeletal muscle. Notice the outer longitudinal and inner circular muscle layers. The lining is non-keratinized stratified squamous epithelium.
Gastroesophageal Junction

stratified squamous lining of the esophagus

Simple columnar epithelial lining in the stomach.

mucus surface cells.
Gastroesophageal Junction

mucus surface cells (MSC), gastric pits (P), lamina propria (LP)
Gastroesophageal Junction

Which side is the stomach, which is the esophagus?
Gastroesophageal region: a functional but not a structural sphincter.

Muscularis: longitudinal, circular, oblique.

Fundus

Rugae

Body

Pyloric sphincter

Pylorus

The Stomach

Fig. 24.14

Rugae
The Stomach

- Gastroesophageal region
- fundus
- rugae
- pylorus
- Pyloric sphincter
- Body of stomach
Stomach Fundus

The fundus is marked by deep glands and shorter pits. The fundus tends to be thinner than other stomach areas and exhibits less secretion.
Body of the Stomach

Note the deep gastric pits and the numerous mucus-secreting glands. The cells seen in these glands are mucous secreting cells.
Stomach Pylorus

mucosa

Muscularis externa

Gastric pits

Muscularis mucosae
Figure 24.20

- Gallbladder
- Liver produces bile
- Cystic duct
- Common hepatic duct
- Duodenum
- Common bile duct
- Hepatopancreatic ampulla
- Pancreatic duct
- Sphincter of Oddi
- Pancreas

Hepatopancreatic Region
Small Intestine Histology

- Goblet cells
- 2 smooth muscle layers
- Plicae circularis
- Villi
- Microvilli
- Columnar epithelium
- Capillaries
- Lacteals
- Crypt of Lieberkuhn
- Muscularis mucosae
- Brunner’s gland

Figure 24.21
Small Intestine Mucosa

- Villi
- Goblet cells
- Crypts
- Muscularis mucosae
The Duodenum

Goblet cells and villi confirm that this is the small intestine. The small Brunner's glands (BG) under the muscularis mucosa are found only in the duodenum. L = lymph tissue.
Brunner’s Glands

Muscularis mucosae

The highly alkaline secretions from the Brunner's glands serve to change the acidic chyme to an alkaline pH.
Peyer’s Patch

Peyer’s patches are large lymph nodules found mostly in the ileum, visible to the naked eye. Notice the germinal center (C) where B-cells proliferate. These are a major source of antibody production.
The Colon

Transverse colon

Taenia coli

Descending colon

Haustra

Sigmoid colon

Rectum

Ascending colon

Ileoceleal valve

Cecum

Vermiform appendix

(a)

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Goblet Cells in the Colon

Mucus from the numerous goblet cells is used to lubricate the large intestine to ease the passage of its contents.²¹
Abdominal Circulation
Lab Protocol

I. GI Anatomy

A. Materials

1. Models: Torso, stomach, pancreas, duodenum, spleen

2. Cadaver dissection: Both in situ and excised GI tract (see large plastic bucket in the refrigerator) and abdominal blood vessels are prepared.

B. Procedures: Identify the structures and blood vessels of the alimentary canal and related organs and correlate with functions.
II. Histology:

A. Materials:

1. microscope slides
2. Web histology sites

B. Procedures: Identify the histological structures of selected GI organs and relate structure to function.