Objectives:

Discuss the general functions and anatomy of the digestive tract, including accessory structures.

First, an overview of the tubular nature of the digestive system.

Describe the individual organs of the system, including a discussion of the gross and microscopic anatomy.
General Organization of a Tubular Organ (Repetio est....)
The 4 Layers of the Gut (review)

1) **Mucosa**
   - Epithelium - usually simple columnar with goblet cells; may be stratified squamous if protection needed
   - Lamina propria – areolar connective tissue deep to epithelium
   - Muscularis mucosae - produces folds - plicae (small intestine) or rugae (stomach)

2) **Submucosa** – made up of loose connective tissue contains submucosal plexus and blood vessels

3) **Muscularis externa** – smooth muscle, usually two layers (controlled by the myenteric plexus; source of peristalsis) -
   - inner layer: circular
   - outer layer: longitudinal

4) **Serosa**
   - visceral layer of mesentery (contiguous with the peritoneum) or adventitia depending on location

*Fig 23.7*
Regions of Small Intestine

SI is longest part of alimentary canal. Almost all absorption of nutrients is in SI, with a few important exceptions.

1. **Duodenum**
2. **Jejunum**
3. **Ileum**
1. **Duodenum** (short, ~30 cm)
   - Mostly retroperitoneal
     - fixed shape & position
   - Mixing bowl for chyme & ?
   - Entry of bile duct at the duodenal papilla
Regions of Small Intestine

2. **Jejunum** (2.5 m long)
   - Most of digestion
   - Mostly superior to the ileum
3. **Ileum** (longest at 3.5 m)
   - Most of absorption, ends in **ileocecal valve** – slit valve into large intestine (colon)
Comparative Histology

- Note Bile and Pancreatic Ducts in Duodenum, Duodenal papilla
- Glands in Duodenum
  - Mucus
  - pH increase (buffer)
- Similar histology
- Peyer’s Patches
  - AKA MALT
Comparative Histology, cont’d

- Specialized Cells
  - Absorptive cells
    - Very active
  - Goblet cells
  - Enteroendocrine cells
  - Local communication

- N.B. hepatopancreatic sphincter

Diagram:
- DUODENUM
- JEJUNUM
- Duodenal glands
- Plica
- Serosa
- Muscularis externa
- Muscularis mucosae
- Aggregate lymphoid nodules (Peyer’s patches)
- ILEUM
Large Intestine = Large Bowel = Colon = 1.5 meters

- **Cecum**
  - pocket at proximal end with **Vermiform Appendix in LRQ**
  - Appendicitis p 669

- **Ileocecal Valve**
  - Opens when stomach is filling
  - Prevents fecal reflux into ileum
Large Intestine = Large Bowel = Colon = 1.5 meters

**Ascending colon** - on right, between cecum and right colic flexure

**Transverse colon** - horizontal portion

**Descending colon** - left side, between left colic flexure and

**Sigmoid colon** - S bend near terminal end

Some functions;

Absorption of water, vit. B₁₂ and electrolytes

Compaction and storage of feces
1. Mucosa - simple columnar epith with abundant goblet cells; stratified squamous epithelium near anal canal

2. No villi

3. Longitudinal muscle layer incomplete, forms three bands or *taenia coli*

4. Circular muscle - forms pockets or *haustra* between bands

5. Anal Sphincter
Rectum and Anus

- **Rectum** – terminal end is anal canal - ending at the anus -
  - which has internal involuntary sphincter and external voluntary sphincter
  - Retroperitoneal
  - Mucus glands
  - Rectal and Anal valves

Normal colonoscopy
Colorectal Polyps

Generally benign
Asymptomatic
May bleed
May be precancerous
Blood Supply

**Celiac trunk** - 3 branches – to liver, gallbladder, esophagus, stomach, duodenum, pancreas, and spleen

**Superior mesenteric** – to pancreas and duodenum, small intestine and part of colon

**Inferior mesenteric** – to descending colon
Located in RUQ, adjacent to the diaphragm, largest organ made up of 4 lobes (left and right, caudate, and quadrate)

Falciform ligament (remnant of fetal blood supply)

Hilus (porta hepatis) – "entry" point on the visceral surface
Extremely versatile: Know a few functions?

Gall bladder—storage of bile

Blood supply: hepatic artery (1/3) and portal vein (2/3); Return via Central V. to vena cava
Microscopic anatomy: Liver lobules and portal triads

- 100,000 Lobules (the basic functional unit)
- Hepatocytes are arranged like spokes in a hexagonal wheel
- Bathed in blood of hepatic sinusoids
  - From Portal V. and Hepatic A.
  - Triads at each corner
- Kupffer Cells are phagocytic
Gall Bladder

- Fundus, body, neck
- Hepatic Duct and Cystic duct connect to form the Common Bile Duct
- Duodenal papilla in the proximal duodenum
- Storage and Concentration of Bile
Pancreas

- Retroperitoneal
- Endocrine or exocrine gland? Both!
  - Only 1% is endocrine
    - Insulin, et al.
- Simple Cuboidal Epith arranged in Acini
- Digestive enzymes excreted into the pancreatic duct
- Common bile duct and pancreatic duct lead to duodenal ampulla and papilla
  - Controlled by hepatopancreatic sphincter
Pancreas, cont’d

- **Exocrine part**
  - Acinar cells
  - Several types of digestive enzymes e.g., trypsin
  - Used as diagnostic tools for pancreatitis

- **Endocrine part (Chapt 25)**
  - Pancreatic islets
  - Insulin, other hormones