Gastrointestinal Tract

- Tongue
- Esophagus
- Stomach
- Small Intestine
- Large intestine
- Appendix
- Anorectic junction
- Associated glands
- Gall bladder

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Tongue (Gross Anatomy)

Structure

• Dorsal surface
• Mucus membrane
  - Papillae
  Vallate papillae
  Foliate papillae
  Fungiform papillae
• Ventral surface
Tongue (Histology)

- **Mucosa**
- **Epithelium**
  - Stratified squamous
  - Papilla-Taste buds
- **Linguall corium** – connective tissue
- **Muscles**
  - Intrinsic
  - Extrinsic
  - Salivary glands
    - (Van Ebner glands)
  - Lymphoid tissue
  - Vessels
Slide 63 Tongue

Filiform papillae
Taste Buds - van Gieson

- circumvallate papilla
- taste buds
- connective tissue core
- stratified squamous epithelium
Taste Bud

- Gustatory pore
- Gustatory hair
- Supportive cell
- Sensory cells
General plan of Gastrointestinal Tract

1. Mucus membrane
   - Epithelium
   - Lamina propria
   - Muscularis mucosae

2. Submucosa

3. Musculalis layer
   - Inner circular
   - Outer longitudinal

4. Adventitia or Serosa
Esophagus

Mucosa
- Epithelium - stratified squamous
- Lamina propria
- Muscularis mucosae

Sub mucosa - Esophageal glands

Muscularis layer
- Upper1/3 - skeletal muscles
- Middle1/3 - smooth & skeletal
- Lower1/3 - smooth muscle

Adventitia

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Musculais mucosae

fammina propria
Stomach

1. Mucus membrane
   - epithelium - Simple columnar
     - Gastric pits
     - lamina propria
     - Gastric glands
     - muscularis mucosae

2. Submucosa

3. Musculalis layer
   - inner oblique
   - middle circular
   - outer longitudinal

4. Serosa
Stomach

Gastric glands
(a) pyloric (2) cardiac (3) fundic gland
- Cells in gastric glands
- Mucus neck cells
- Parietal cell (oxyntic cells)
- Chief (zymogenic cells)
- Enteroendocrine cells
Gastric glands

- Pit
- Junction of gland and base of pit
- Lamina propria
- Glands
- Muscularis mucosae

Cardia

- Esophagus
- Cardia

- Pyloric canal
- Pylorus

Duodenum

- Pit
- Neck
- Gland
- Lamina propria

Pylorus

- Lymph nodule
- Muscularis mucosae
- Submucosa

Body
At the mere thought of manufacturing two million red blood cells every second, each carrying a billion O2's, and pumpin' out cardiac output of over five thousand ml's a minute, the anatomy student is overcome by sheer exhaustion...
Lower G.I.T

- Intestine
- Small Intestine
  - Duodenum
  - Jejunum
  - ileum
- Large intestine (Colon)
  - Appendix
  - Rectum
  - Anal canal
Gross features of intestine

- **Small Intestine**
  - Villi
  - Valve of kerckring
  - crypts of lieberkuhn

- **Large intestine**
  - No Villi
  - Sacculation +nt
  - Teania coli +nt
villi

crypts

lamina propria

muscularis mucosae
Small intestine - duodenum

1. Mucus membrane
   - epithelium
     - Simple columnar
     - intestinal villi
   - lamina propria
     intestinal glands (crypts of lieberkuhn)
   - muscularis mucosae

2. Submucosa
   Brunner's gland

3. Musculalis layer
   - inner circular
   - outer longitudinal

4. Serosa
Duodenum H&E

- mucosa
- submucosa
- submucosal glands
- muscularis externa
Duodenum
Small intestine -jejunum

1. Mucus membrane
   - epithelium - Simple columnar
     - intestinal villi
   - lamina propria
     intestinal glands (crypts of lieberkuhn)
   - solitary Lymphoid nodule
   - muscularis mucosae

2. Submucosa
   - NO gland

3. Musculalis layer
   - inner circular
   - outer longitudinal

4. Serosa
Jejunum H&E
muscularis externa
villi
plicae circulares
Jejunum H&E

- villus
- crypts
- submucosa
- muscularis externa
Small intestine - jejunum

- lamina propria
- tall cylindrical villi
- submucosa
- muscularis: inner circular layer
- muscularis: outer longitudinal layer
- crypts
- adventitia
Intestinal glands

- Paneth cells
- Goblet cells
- Absorptive cells
- Endocrine cells
Small intestine - ileum

1. Mucus membrane
   - epithelium - Simple columnar
     - intestinal villi
   - lamina propria
   intestinal glands (crypts of lieberkuhn)
   - muscularis mucosae

2. Submucosa
   - aggregated Lymphoid nodule (peyers patches)
   - microfold cells ("M" Cell)

3. Musculalis layer
   - inner circular
   - outer longitudinal

4. Serosa
Small intestine - ileum

- lumen
- villus
- mucosal glands
- submucosa
- lymphoid cells in mucosa
- muscularis interna
- muscularis externa
lamina propria

villus

columnar absorptive cells

goblet cell

muscularis

crypt

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Large intestine

1. Mucus membrane
   - epithelium - Simple columnar
   - villi are absent
   - lamina propria
     intestinal glands (crypts of lieberkuhn)
   - muscularis mucosae

2. Submucosa

3. Musculalis layer
   - inner circular
   - outer longitudinal

4. Serosa or adventitia
Large intestine

- crypts
- lumen
- muscularis mucosae
- mucosa
- submucosa
Large intestine

- crypts
- submucosa
- muscularis mucosa

[Image of a histological section of the large intestine with labeled structures]
Large intestine
Appendix

1. Mucus membrane
   - epithelium - Simple columnar
   - villi are absent
   - lamina propria
     intestinal glands (crypts of lieberkuhn), lymphoid tissue
   - muscularis mucosae

2. Submucosa
   Lymphoid nodule

3. Musculalis layer
   - inner circular
   - outer longitudinal

4. Serosa
crypts

mucosa

submucosa

lymph nodule
THE SEMICOLON
Anorectal junction

columnar

stratified squamous

Anorectal Junction
Organ associated with G.I.T.

- **Salivary glands**
  - parotid gland
  - sub mandibular gland
  - sub lingual gland
- **Pancreas**
- **Liver**
- **Gall bladder**
Salivary glands

Serous salivary gland
- Serous acini- round nucleus,
- small lumen
- darkly stained
- Watery secretion

Mucus salivary gland
- Mucus acini- flat nucleus
- Large lumen
- Lightly stained
- Viscous secretion

Mixed salivary gland
- Both mucus and serous acini
- demilunes
Salivary gland - Demilune and Ducts

**Demilunes** - mucus acinus covered with serous cells

**Ducts**
- Acinus (alveolus) opens in
  - intercalated ducts
    - cuboidal cells
- striated ducts
  - columnar cells with striations

**Excretory duct**
- columnar cells
Salivary gland

- Parotid salivary gland
- Mostly serous acini
- Many ducts
- Adipocytes and plasma cells
Parotid salivary gland
Sublingual salivary gland

- predominantly mucus acini
- Demilunes may present
- Few ducts
Sub mandibular gland
Pancreas

Exocrine and endocrine parts

**Exocrine glands**-
- Serous acini present
- Acini are compact, less lumen
- Acini secrete digestive enzyme
- Centroacinar cells continue as intercalated ducts, secrete alkaline fluid

**Endocrine glands**-
- Island of langerhans
- Branching cords like pattern of pale staining cells
Pancreas

- **Endocrine cells**
  1. **Alpha cells** - 20%, mainly at periphery, large cells secrete glucagon
  2. **Beta cells** - 70%, at centre, small cells, secrete insulin
  3. **Delta cells** - 5%, secrete somatostatin
  4. **F cells** - secrete polypeptides
Pancreas

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Liver

Glisson capsule - trabeculae

Portal tract - portal triad
- 1. Portal venule, 2. bile ductule, 3. hepatic arteriole

- Space of mall

Hepatic lobule -
- hexagonal shaped
- Central vein
- Hepatocytes
- Hepatic plates
- Liver sinusoids
- Kuffer cells
- Space of Disse
- Bile canaliculi
Portal lobule and Hepatic acini

- **Portal lobule** - blood supply area
- **Hepatic acinus** - area drain by bile duct (functional)
Portal lobule

Hepatic acinus
Liver

central vein
liver lobule
portal area

central vein
sinusoids
sheets of hepatocytes

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Liver

- Sinusoid
- Fenestrated endothelium
- Bile canaliculi
- Cord

Right image: Liver H&E with labeled structures:
- Branch of the bile duct
- Branch of the portal vein
- Branch of the hepatic artery
Liver

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Gall bladder

1. Mucosa-
   - Epithelium-simple columnar with micro villi
   - Lamina propria
   - Mucosal folds
   - Muscularis mucosae and sub mucosa absent

2. Fibro muscular layer

3. Serosa/Adventitia
Gall bladder
Gall bladder

Mucosal folds

smooth muscle