

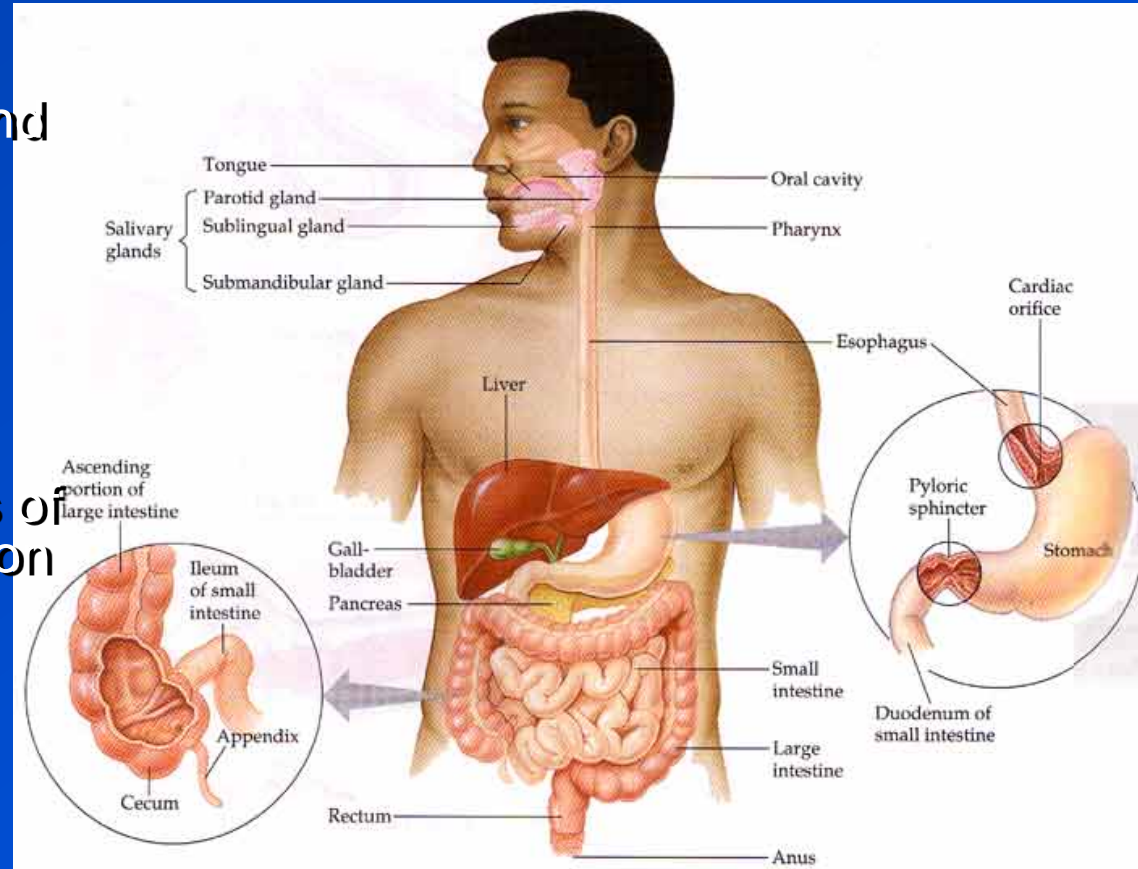
Digestive System, Part 1

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.

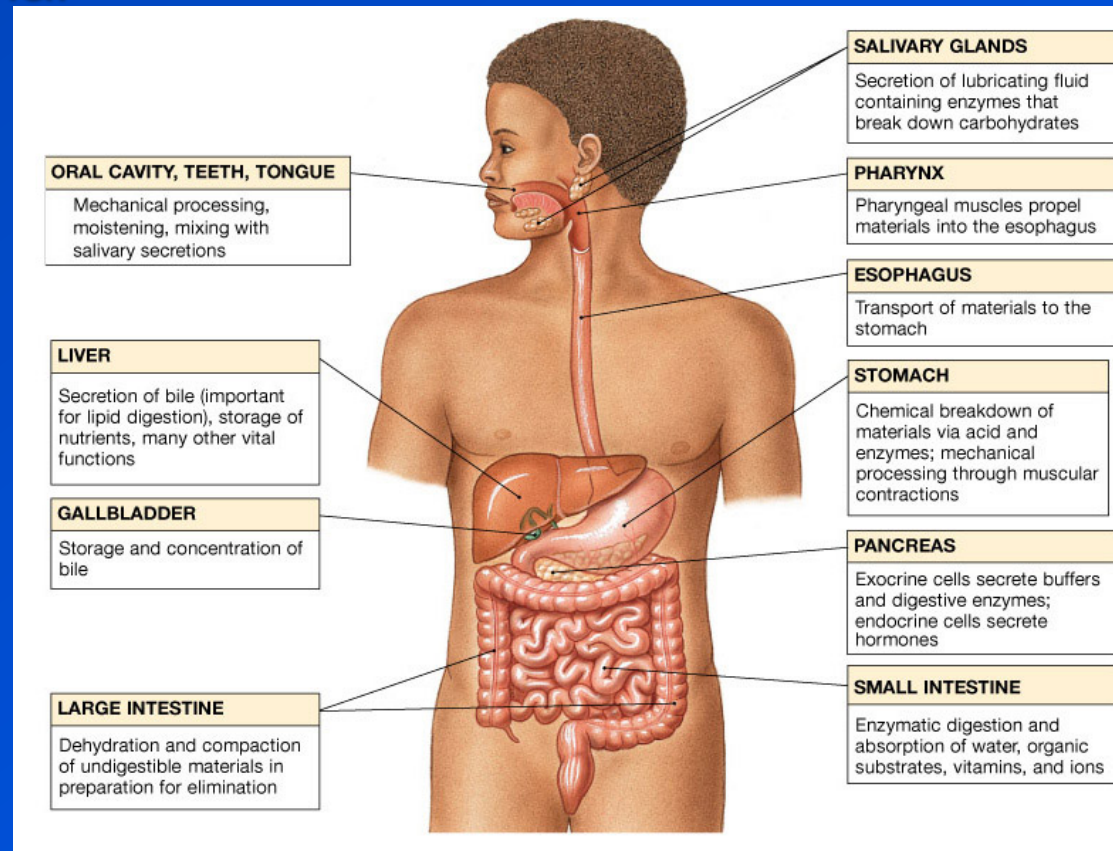
Describe the **individual organs** of the system, including a discussion of the gross and microscopic anatomy.



Digestive System Overview

AKA:
Digestive Tract
Alimentary Tract or Canal
GI tract
Gut

Muscular, hollow tube,
from the lips to the anus
+
Various accessory
organs

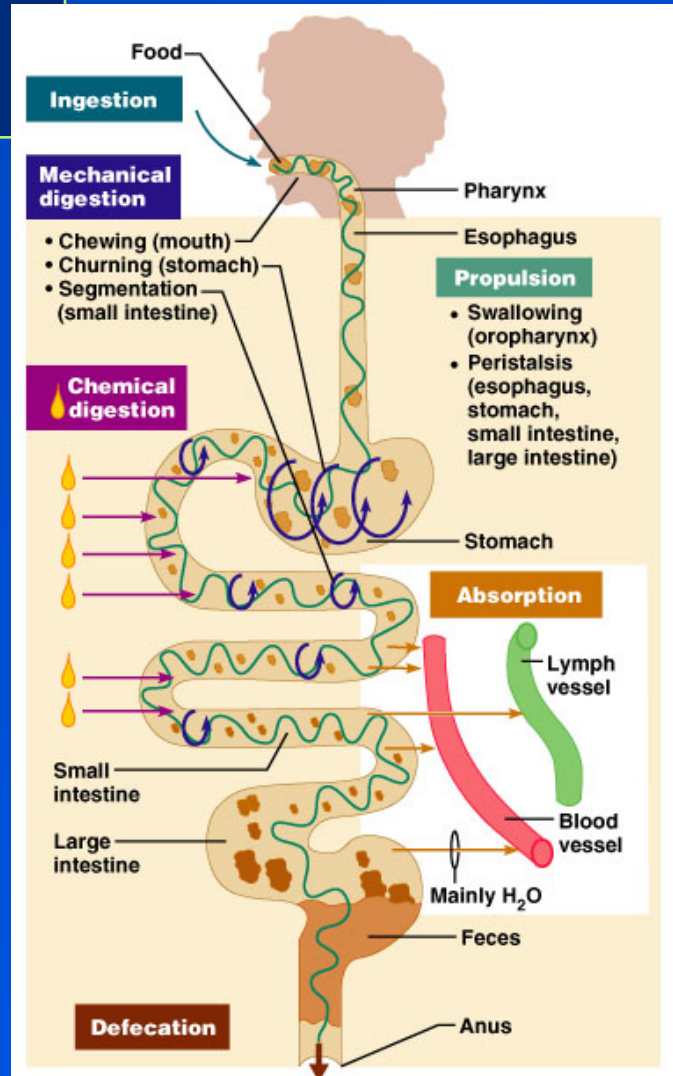


Digestive System Overview

The function of the system as a whole is processing food in such a way that nutrients can be absorbed and residues eliminated.

Individual parts function in:

- Ingestion
- Propulsion
- Mechanical digestion and segmentation
- Chemical and enzymatic digestion
- Secretion
- Absorption
- Compaction
- Excretion and elimination (defecation)



Membranes

Peritoneum - generic serous membrane in abdominal cavity

Parietal and Visceral Peritoneum

Retroperitoneal vs. (intra)peritoneal

Mesenteries (p 669)- double sheets of peritoneum, surrounding and suspending portions of the digestive organs

- **Greater omentum** - "fatty apron", hangs anteriorly from stomach; double layer encloses fat
- **Lesser omentum** - between stomach and liver
- **Mesentery proper** - suspends and wraps the small intestine
- **Mesocolon** - suspends and wraps the colon, parts are
 - transverse mesocolon
 - sigmoid mesocolon

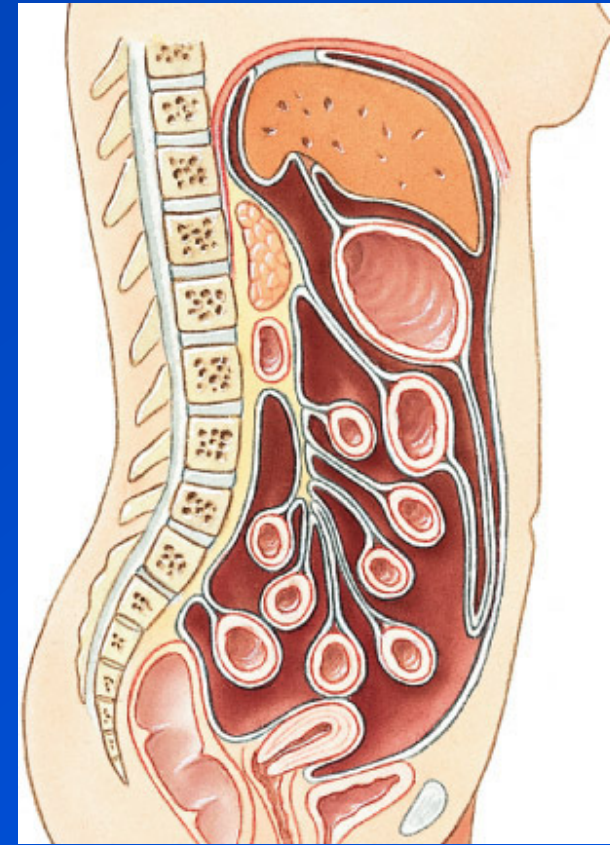
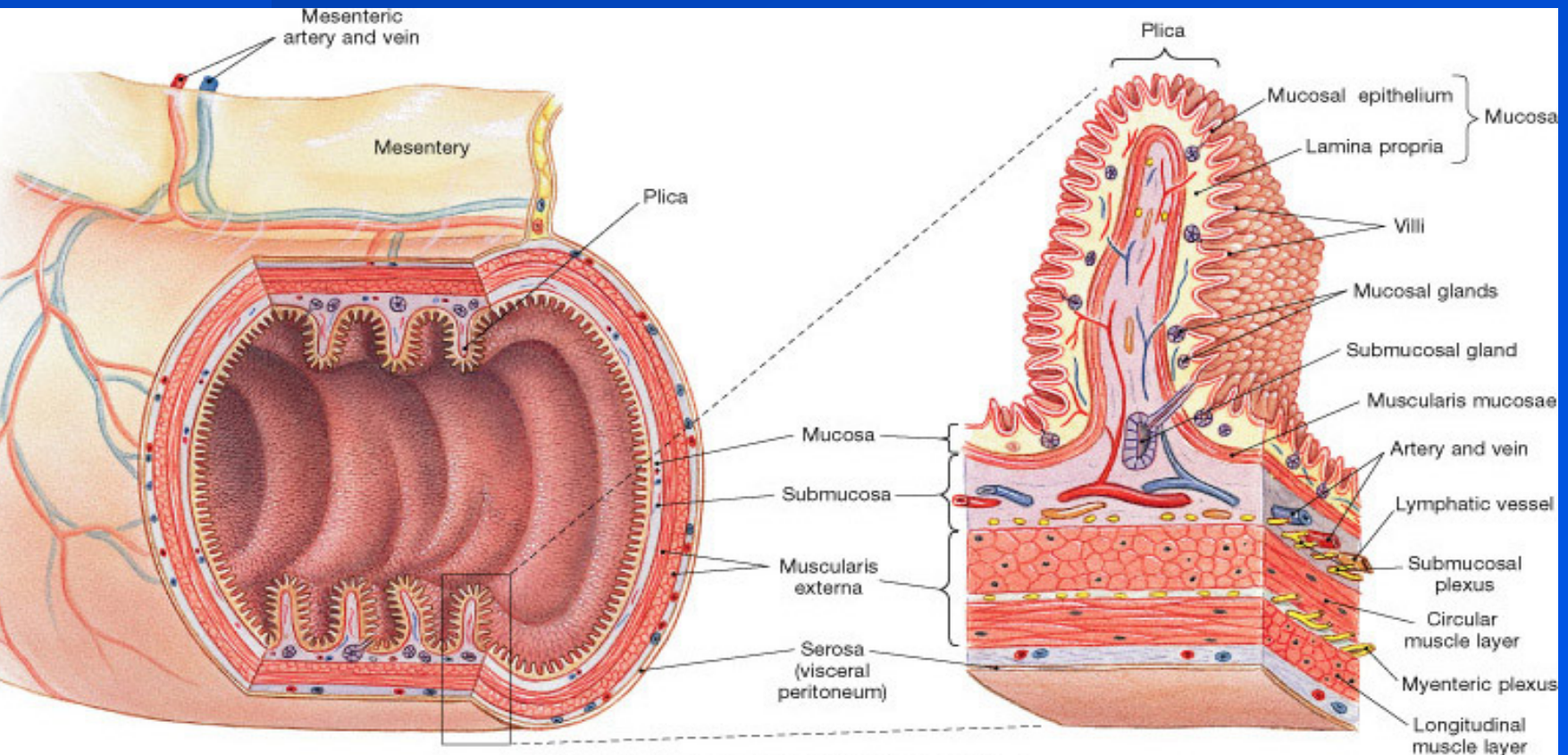
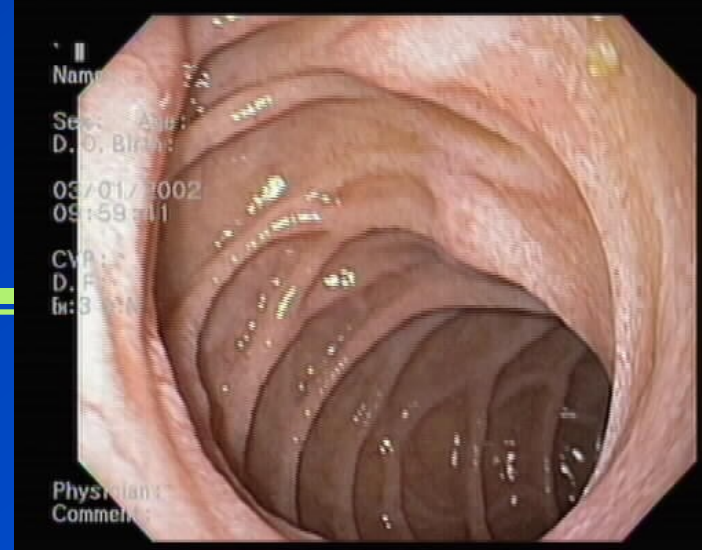


Fig. 22.6

General Organization



(a) Histological organization of the digestive tract

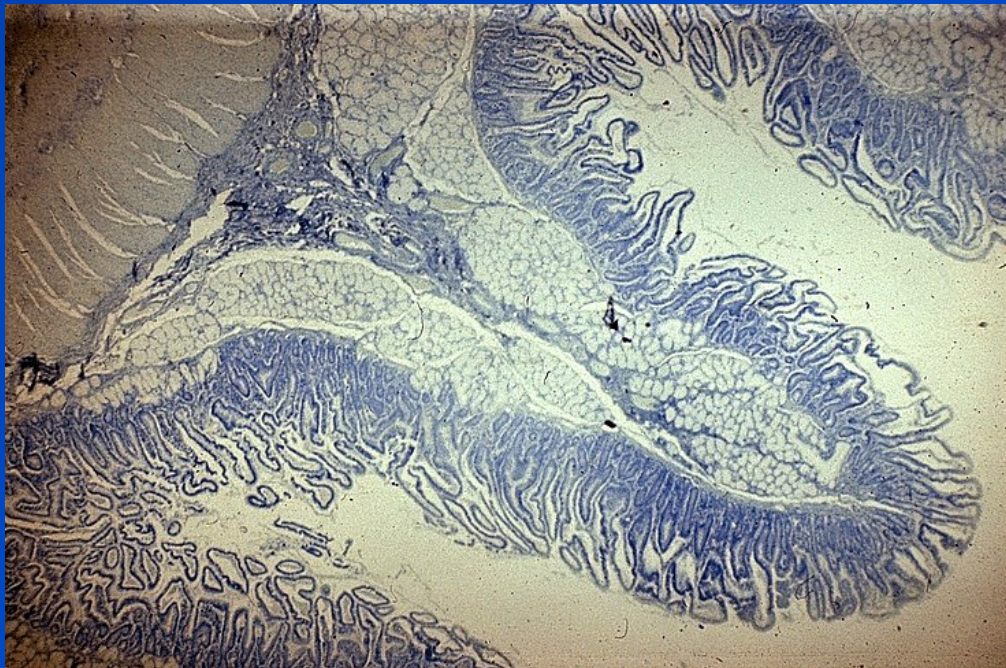
Structure of Small Intestinal Wall

Plicae circulares – circular pleats around the interior of the small intestine

Villi – minute finger-like projections, contain capillaries & lacteals

Microvilli – sub-microscopic size, projections on simple columnar cells

Function of all three?

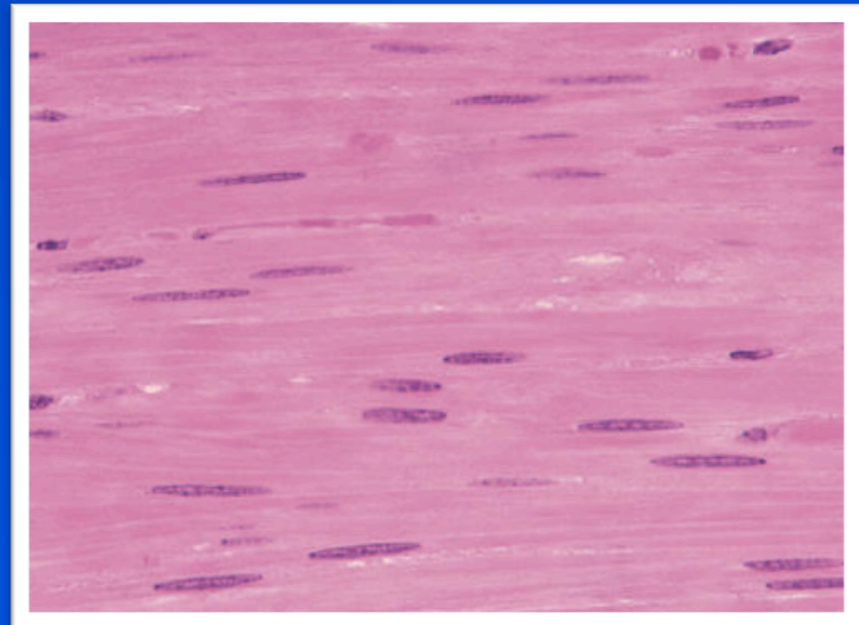
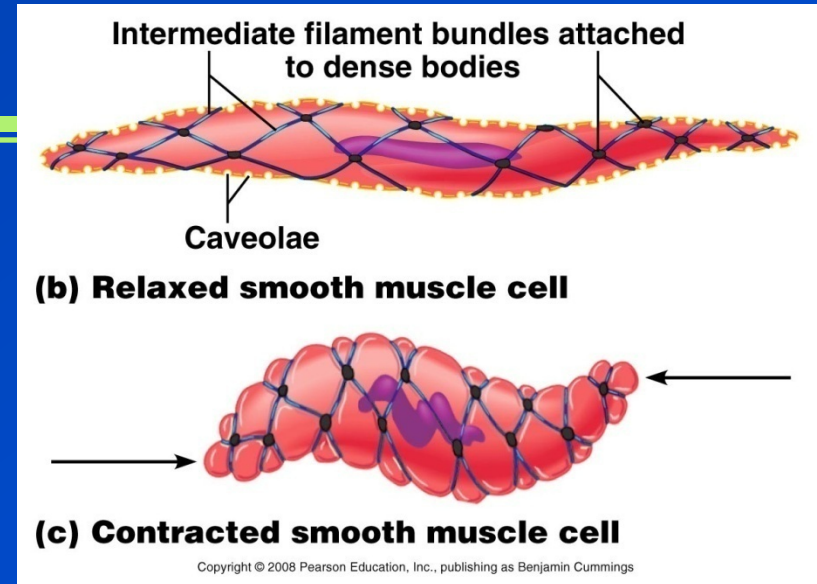


Crypts at bottom of villi – Cell regeneration (mitosis)

Glands – mucus, enzymes

Smooth Muscle, a review

- One nucleus
- Nonstriated
 - Actin and myosin present
- Slow, sustained contraction
- Communication
 - Varicosities
 - Gap junctions

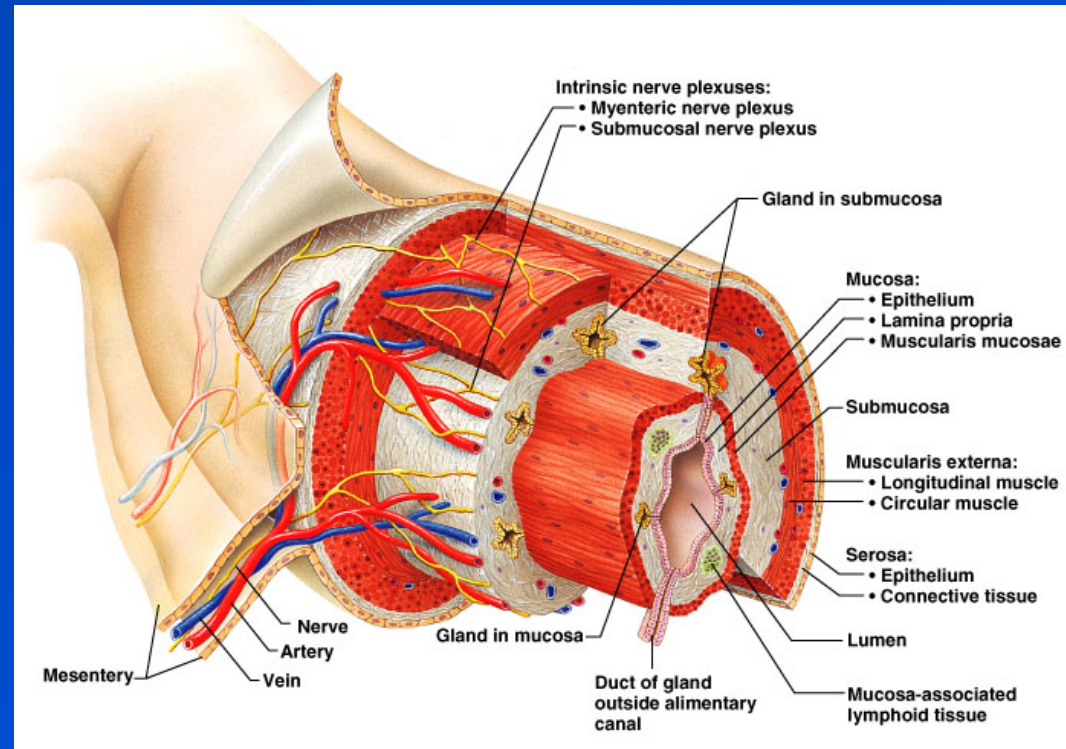


Histological Organization

Tube made up of four layers.

1. Mucosa
2. Submucosa
3. Muscularis externa
4. Serosa = Visceral Peritoneum

Modifications along its length as needed.



The 4 Layers of the Gut

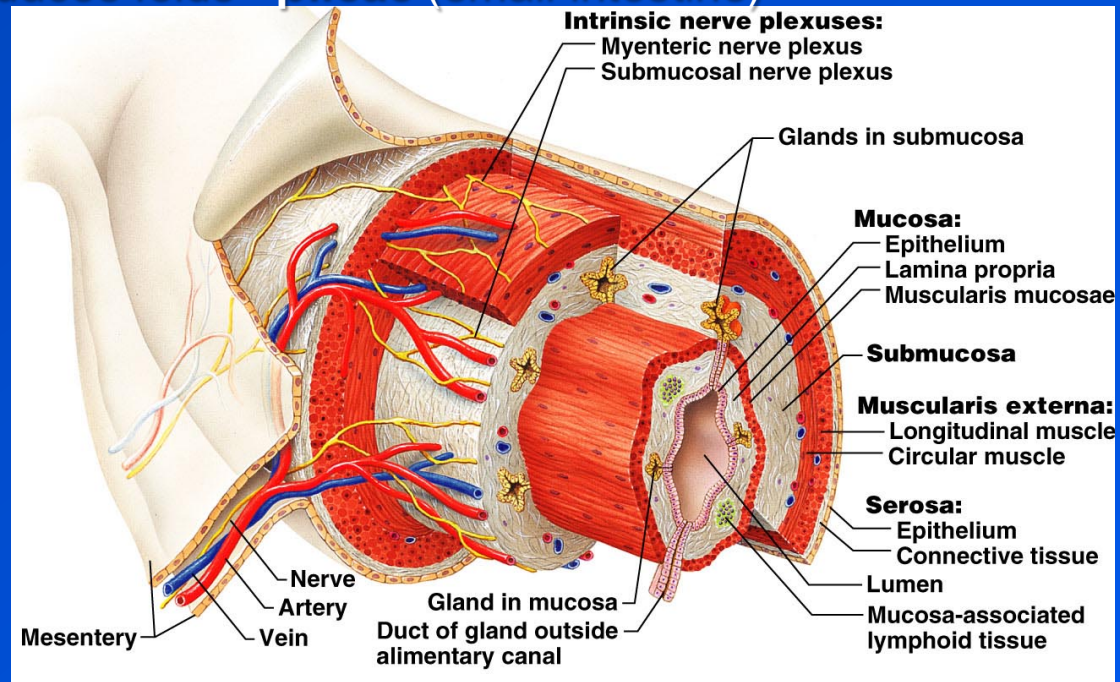
1) Mucosa

Epithelium - usually simple columnar epithelium with goblet cells; may be stratified squamous if protection needed, e.g., esophagus

Lamina propria – areolar connective tissue deep to epithelium

Muscularis mucosae -produces folds - **plicae** (small intestine) or **rugae** (stomach)

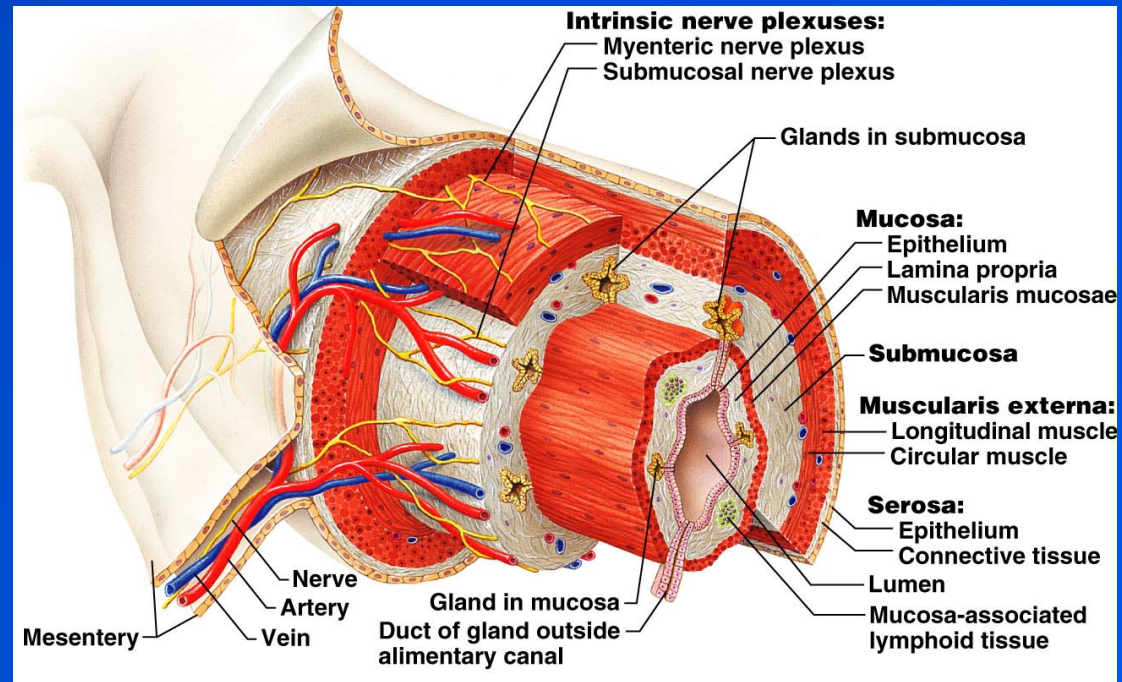
Fig 23.7



The 4 Layers of the Gut

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

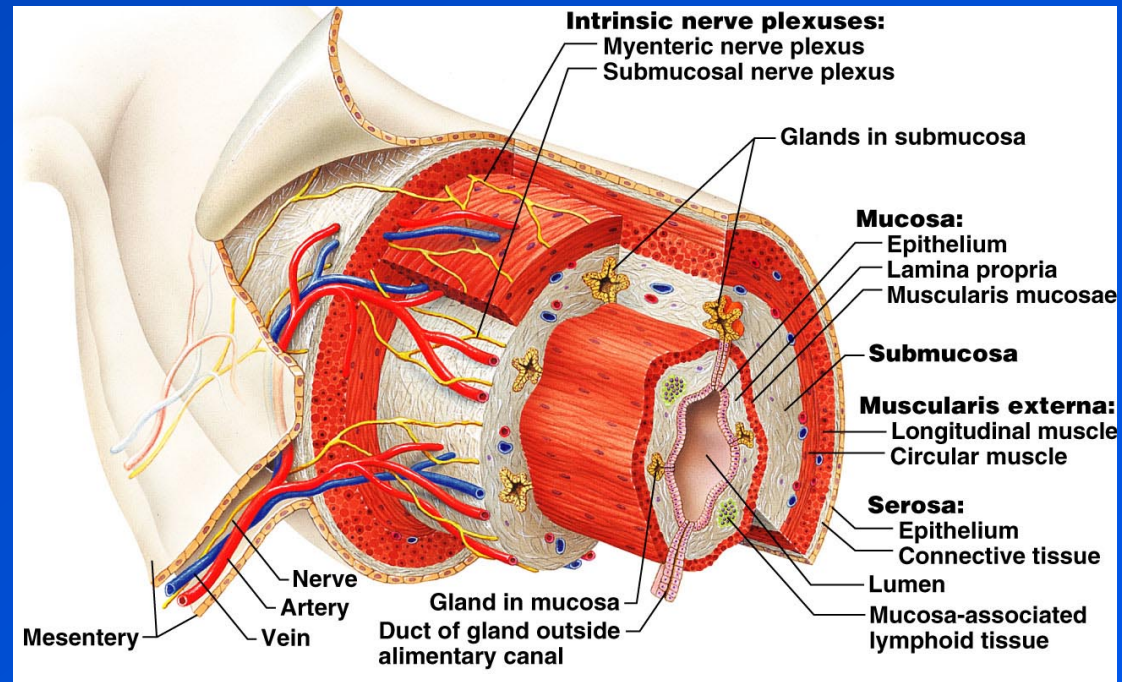
Fig 23.7



The 4 Layers of the Gut

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

Fig 23.7

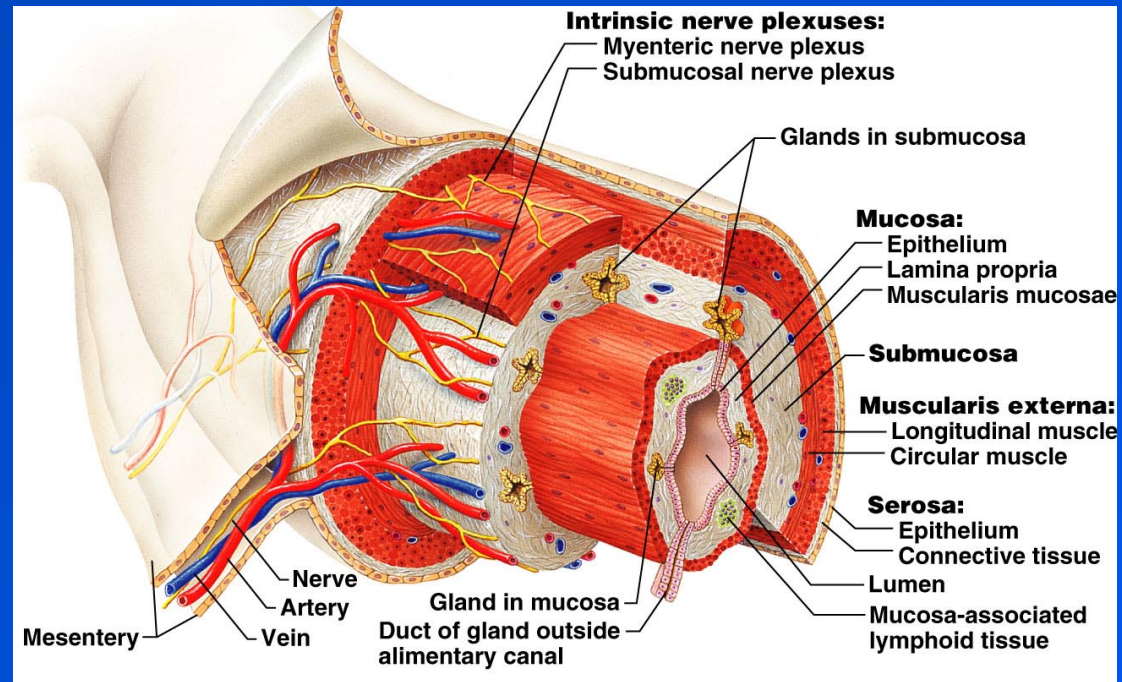


The 4 Layers of the Gut

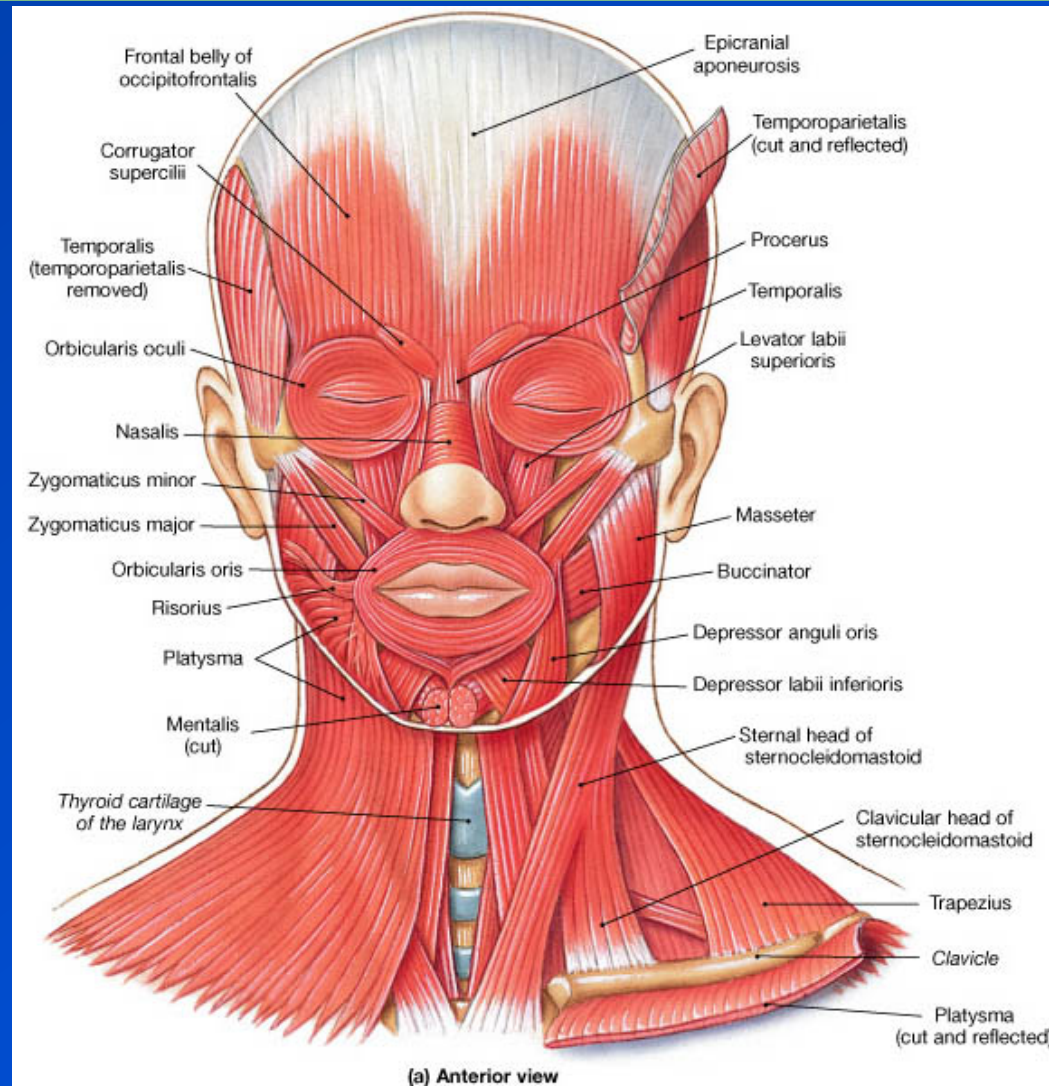
4) Serosa

visceral layer of mesentery
(contiguous with the peritoneum) or
adventitia depending on location

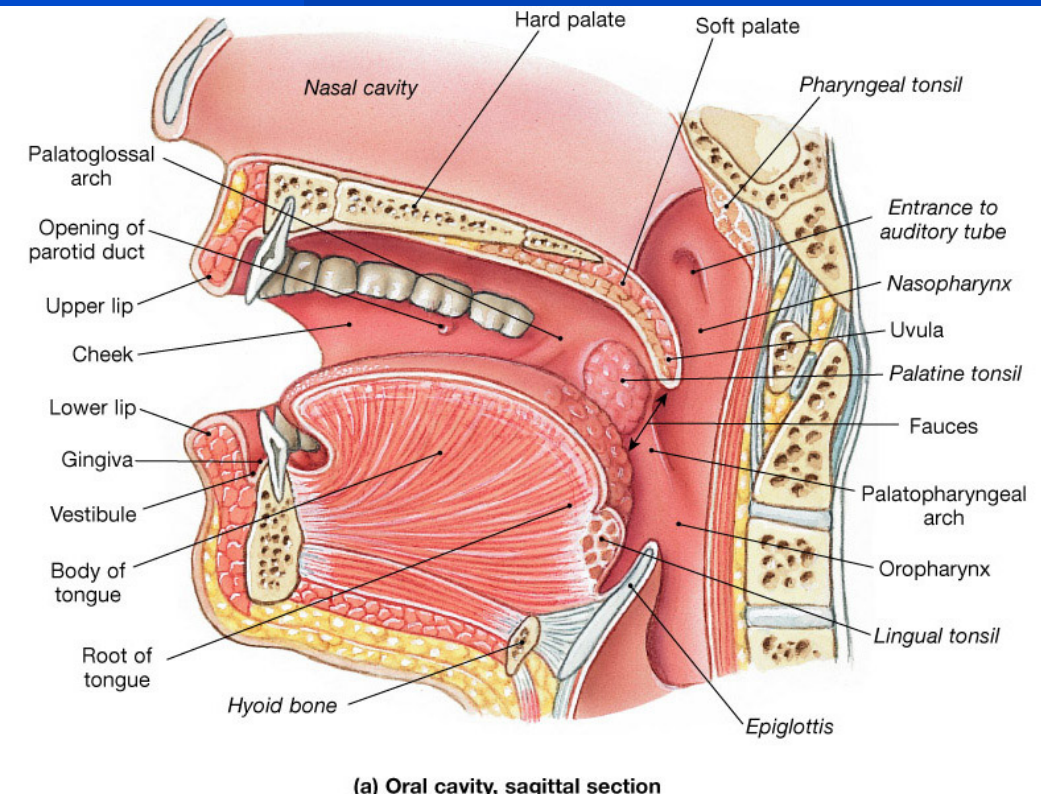
Fig 23.7



Repetitio est mater studiorum

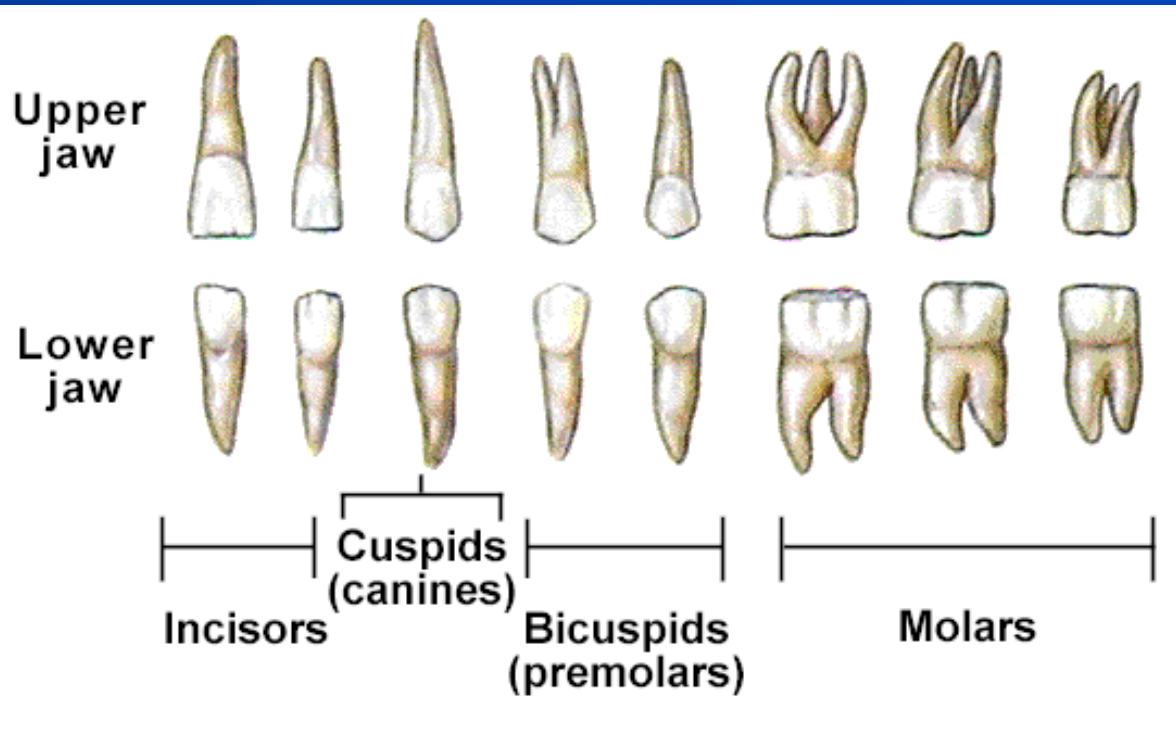


Oral Cavity



- AKA **buccal cavity** or mouth - lined with oral mucosa (type of epithelium ?)
- Lips = labia
 - Labial frenulum
- Hard and soft palates - form roof of mouth
- Tongue - skeletal muscle
 - Lingual frenulum
- Salivary glands - three pairs
- Teeth
- Fauces = opening to pharynx

Types and Numbers of Teeth

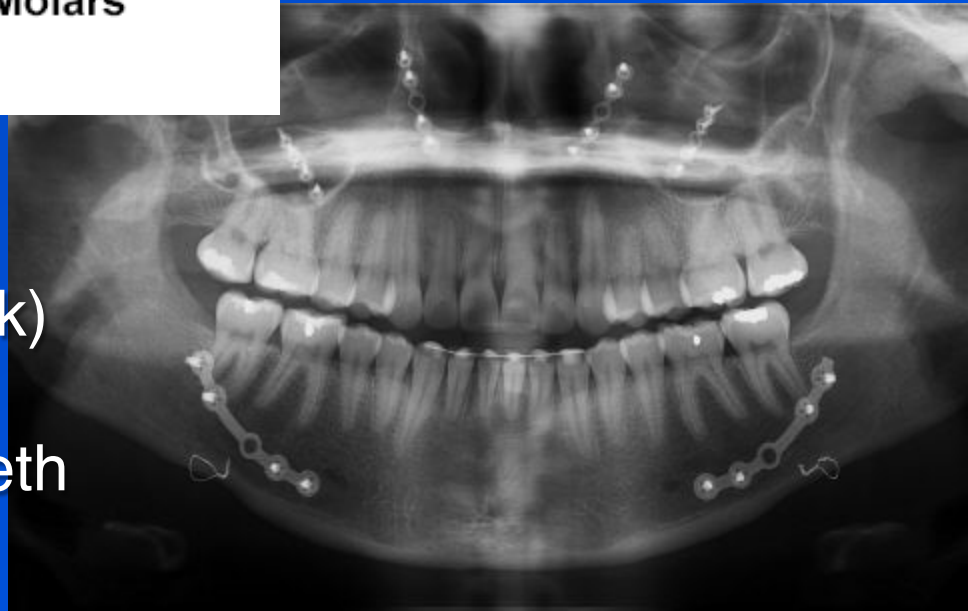


Dental succession

Deciduous (1^o, baby, milk)

teeth - 20, replaced by

Permanent teeth - 32 teeth



Structure of Teeth

Fig 23.14

Crown - exposed surface of tooth

Neck - boundary between **root** and crown

Enamel - outer surface

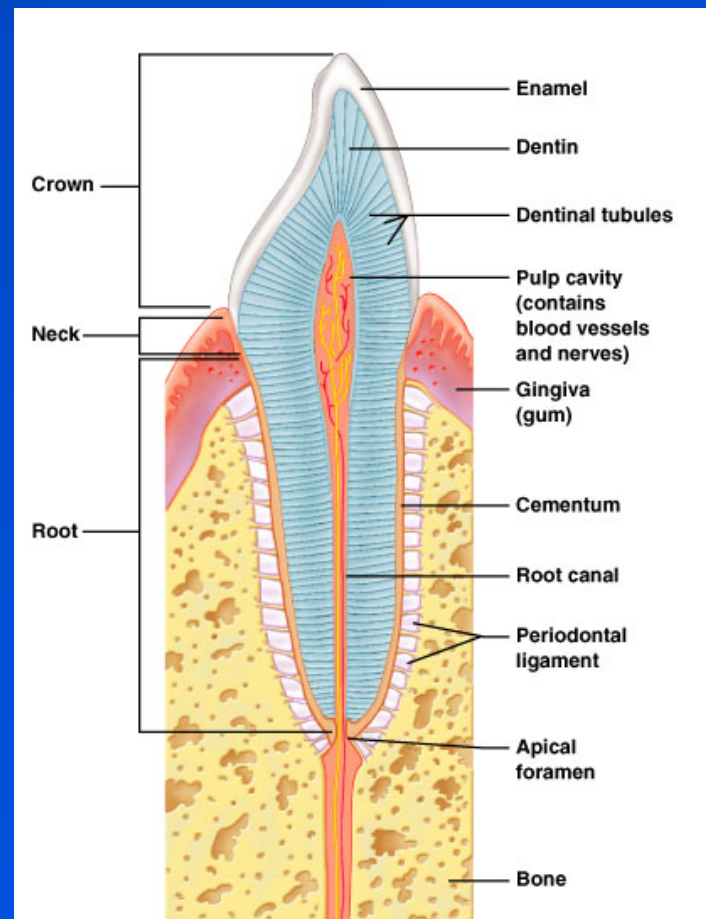
Dentin - bone-like, but noncellular

Pulp cavity - hollow with blood vessels and nerves

Root canal - canal length of root

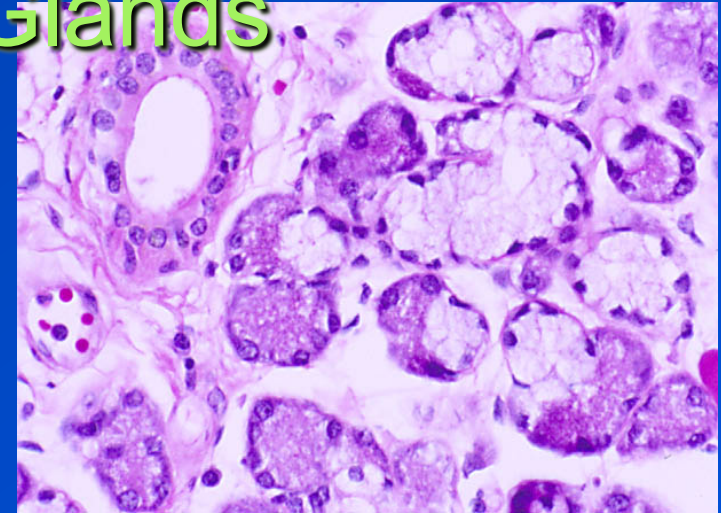
Gingival sulcus - where gum and tooth meet

Periodontal Ligament

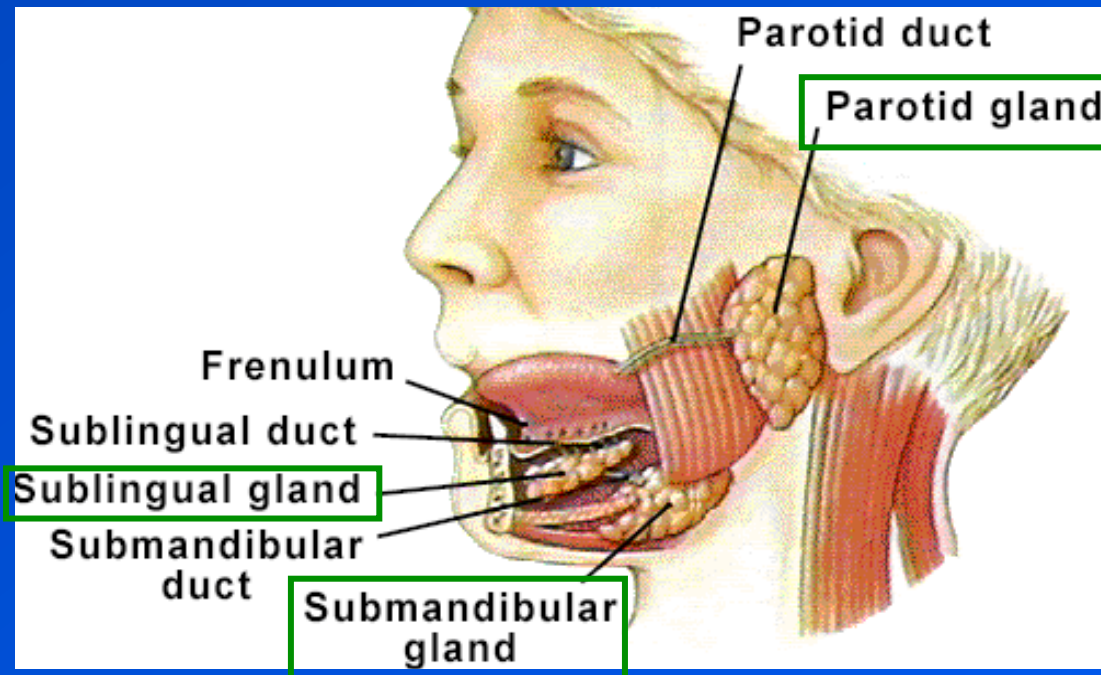


Three pairs of Salivary Glands

1-1.5 L / day for
digestion (?)
lubrication (swallowing) moistening
(tasting)



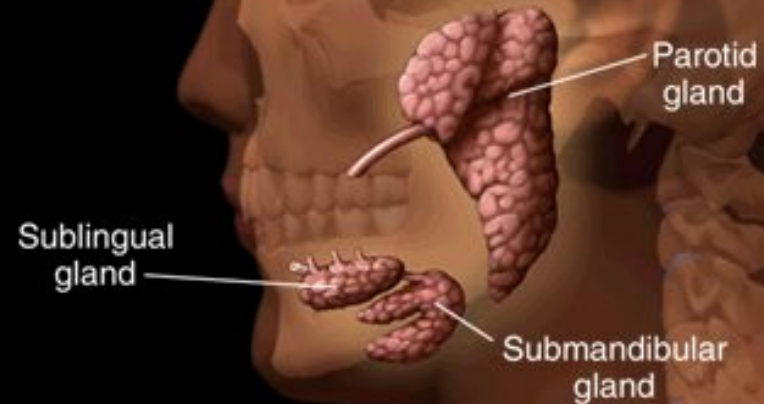
- **Parotid** – lateral side of face, anterior to ear, drain by parotid duct to vestibule near 2nd upper molar
- **Submandibular** – medial surface of mandible – drain near lingual frenulum drain posterior to lower molars
- **Sublingual** – in floor of mouth - drain near lingual frenulum



Mumps



Salivary Glands



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Swollen, painful parotid salivary glands (parotitis) on one or both sides of the face

Etiology: Mumps virus (Myxovirus)

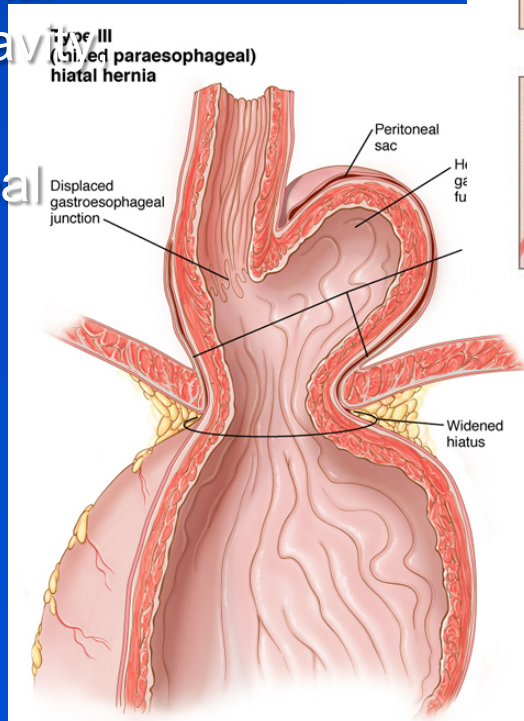
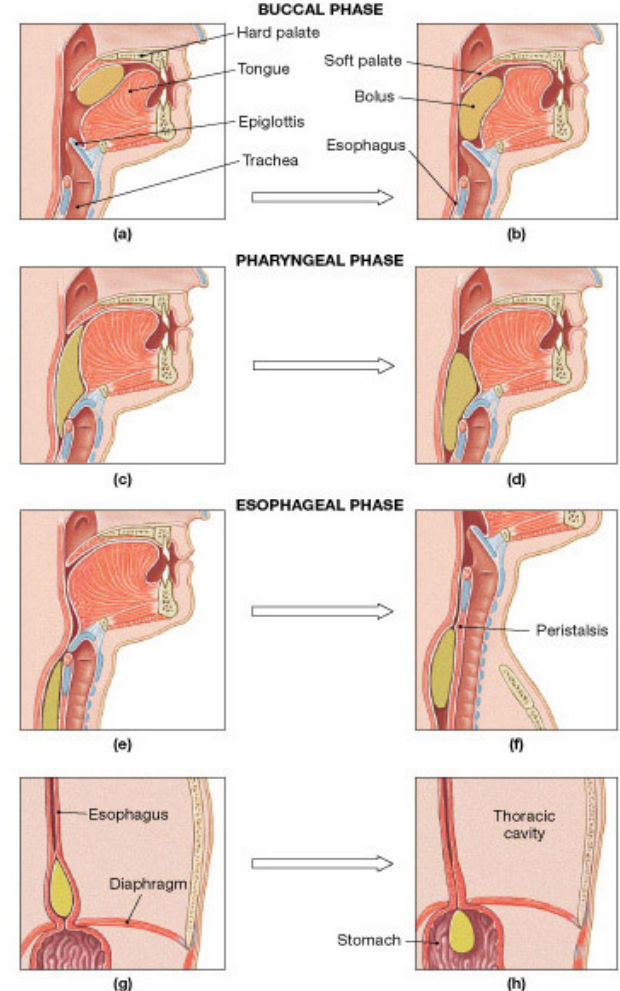
Fever and sometimes orchitis, pancreatitis etc.

About 1/3 of infected people do not show symptoms

Effective vaccine (MMR) since 1967

Esophagus

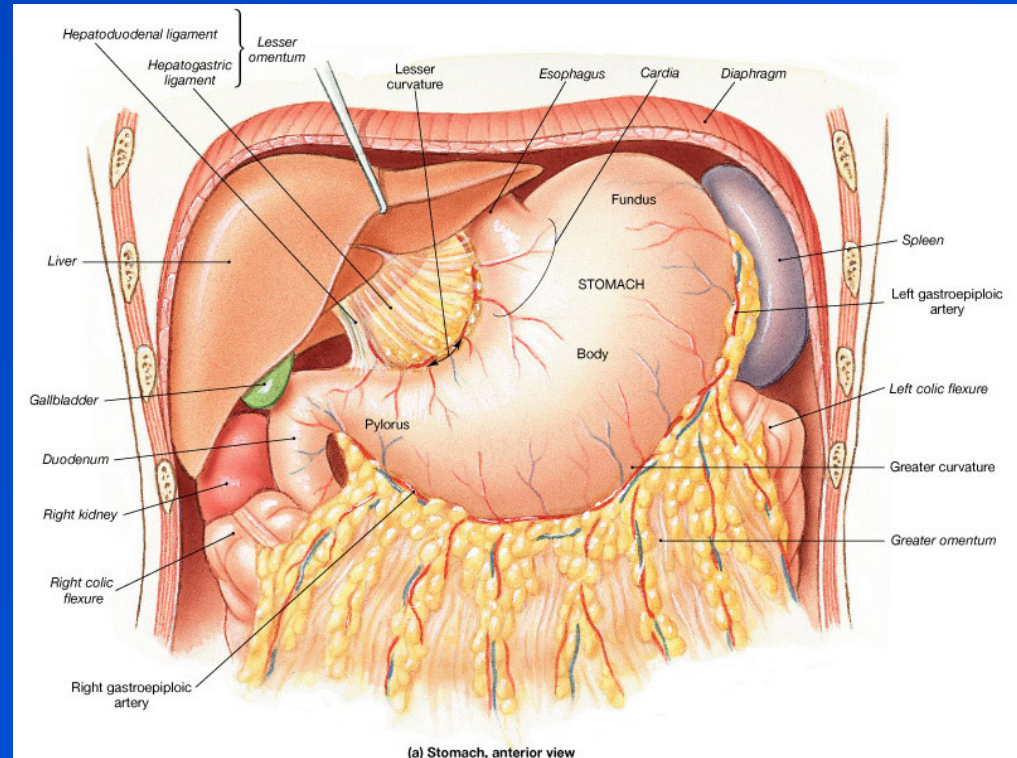
- Lined with noncornified stratified squamous epithelium
- Food boluses propelled by peristalsis of both skeletal and smooth muscle (gravity too)
- Hiatus; lower esophageal sphincter
- GERD



Hiatal hernia

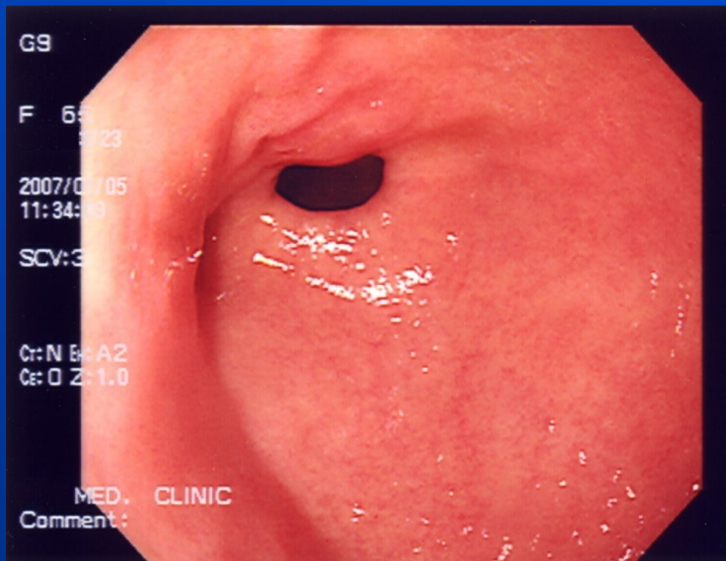
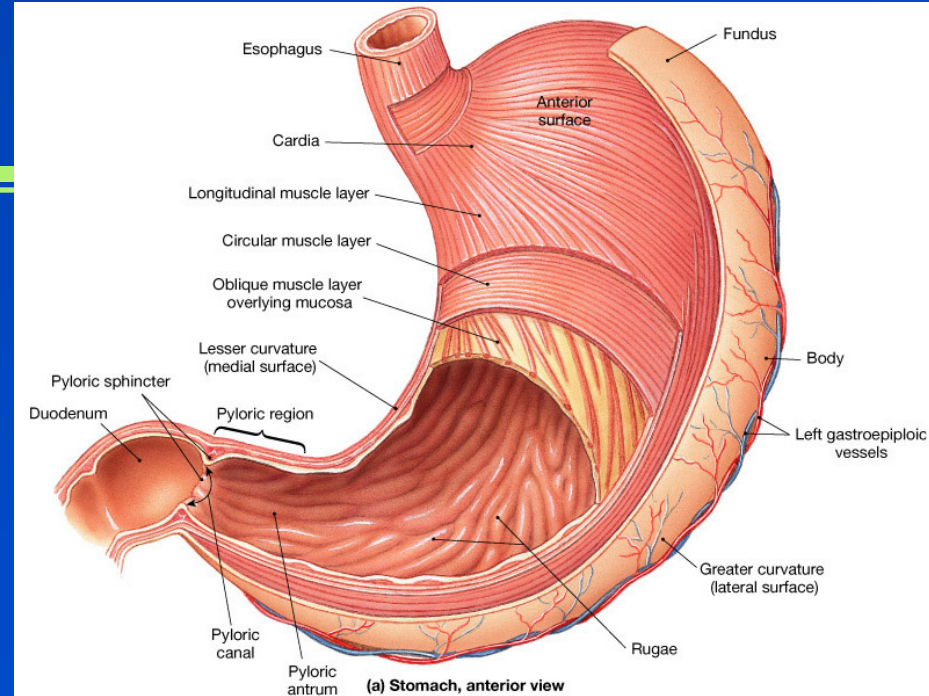
Stomach

- Cardiac Sphincter (?)
- Cardia
- Fundus
- Body
- Pyloric antrum
- Pylorus
- Pyloric sphincter
- Greater and Lesser Curvatures
- Greater Omentum

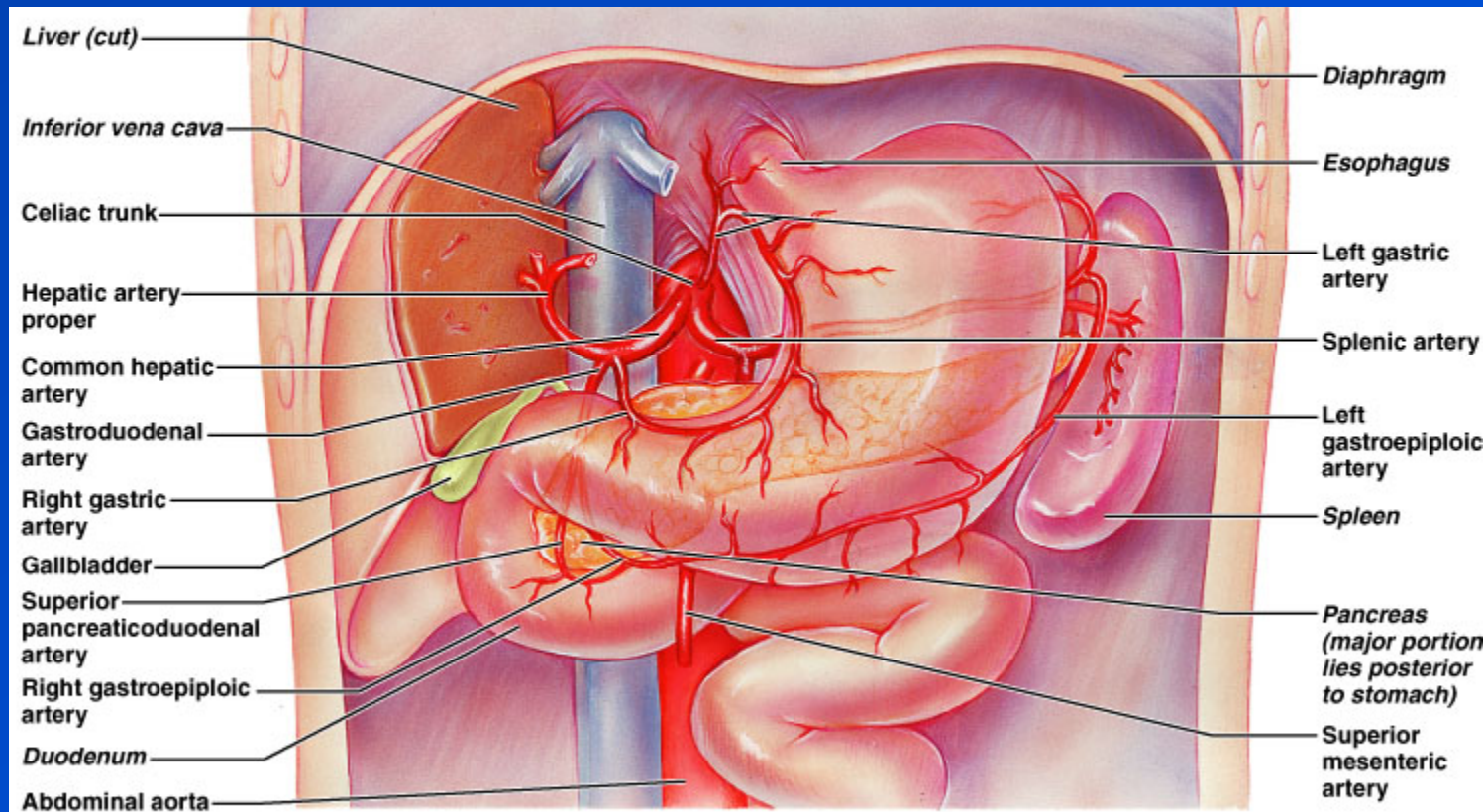


Stomach

- Rugae or Rugal Folds
- Pylorus
- Pyloric sphincter



Circulation



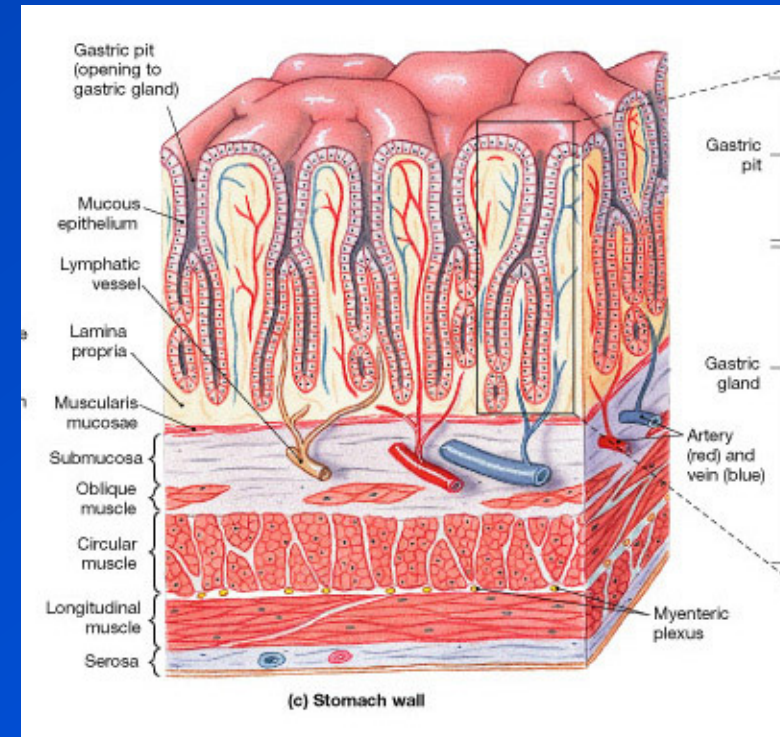
Histology of Stomach

Type of epithelium lining stomach?

Gastric pits – shallow pits, external half rapidly reproduces for replacement

Gastric glands – deep in lamina propria, 3 types of cells

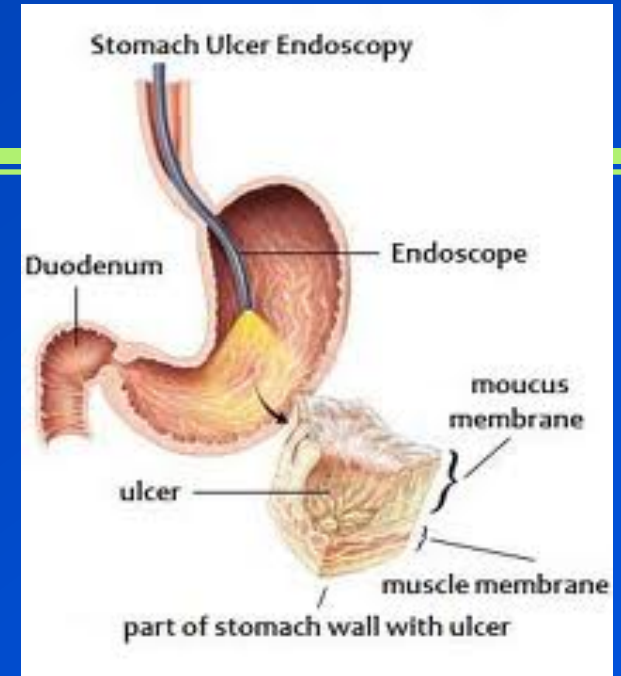
1. **Parietal cells** (produce **HCl** and intrinsic factor B_{12})
2. **Chief cells** (produce **pepsinogen**)
3. **Enteroendocrine cells – G cells** (several hormones including gastrin which stimulates both parietal and chief cells)



Ulcers

- Mucosal erosion of stomach or duodenum
- GERD
- NSAIDs
- *Helicobacter pylori*
- Stress??
- Dx by esophagogastroduodenoscopy

Endoscopy
video



Review:

