Digestive System

222 Descriptive Histology

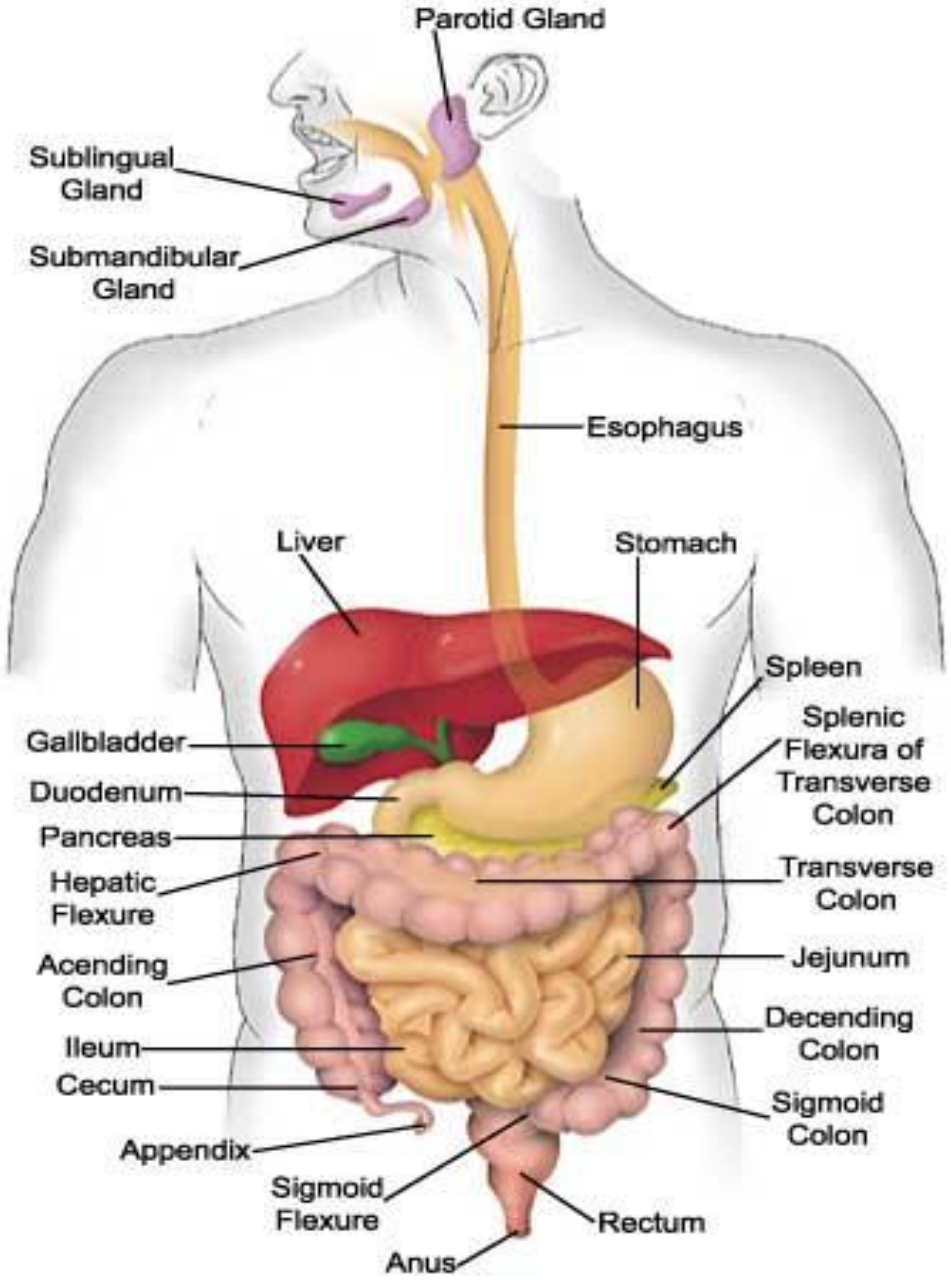
Components of the digestive system

A. Alimentary Canal

- Oral Cavity
- Esophagus
- Stomach
- Small intestine (duodenum, jejunum, ileum)
- Large intestine (cecum and appendix, ascending, transverse, descending, sigmoid colon)
- Rectum
- Anal canal

B. Accessory Digestive Organs

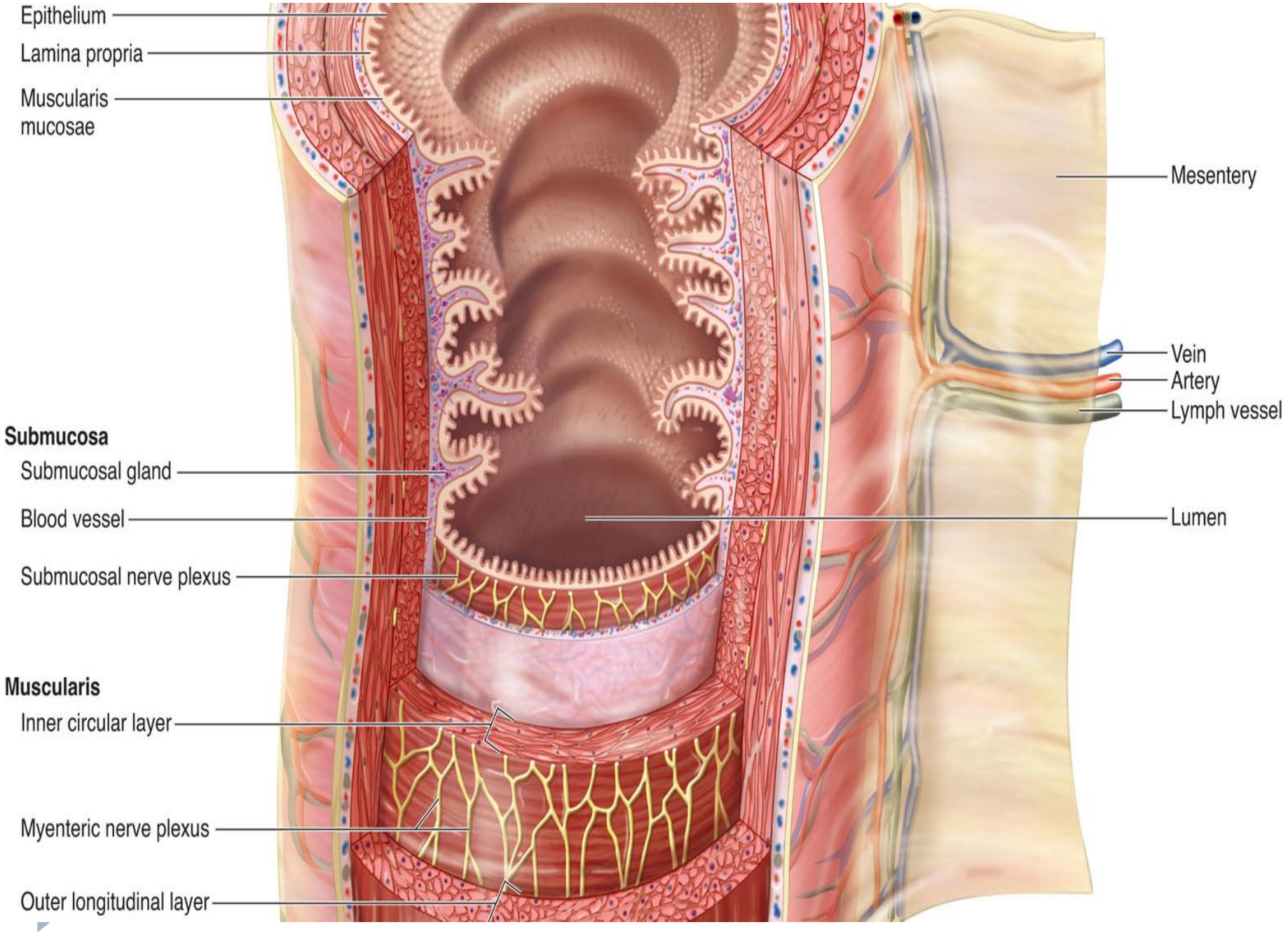
- Teeth
- Tongue
- Salivary Glands
- Liver
- Gall Bladder
- Pancreas

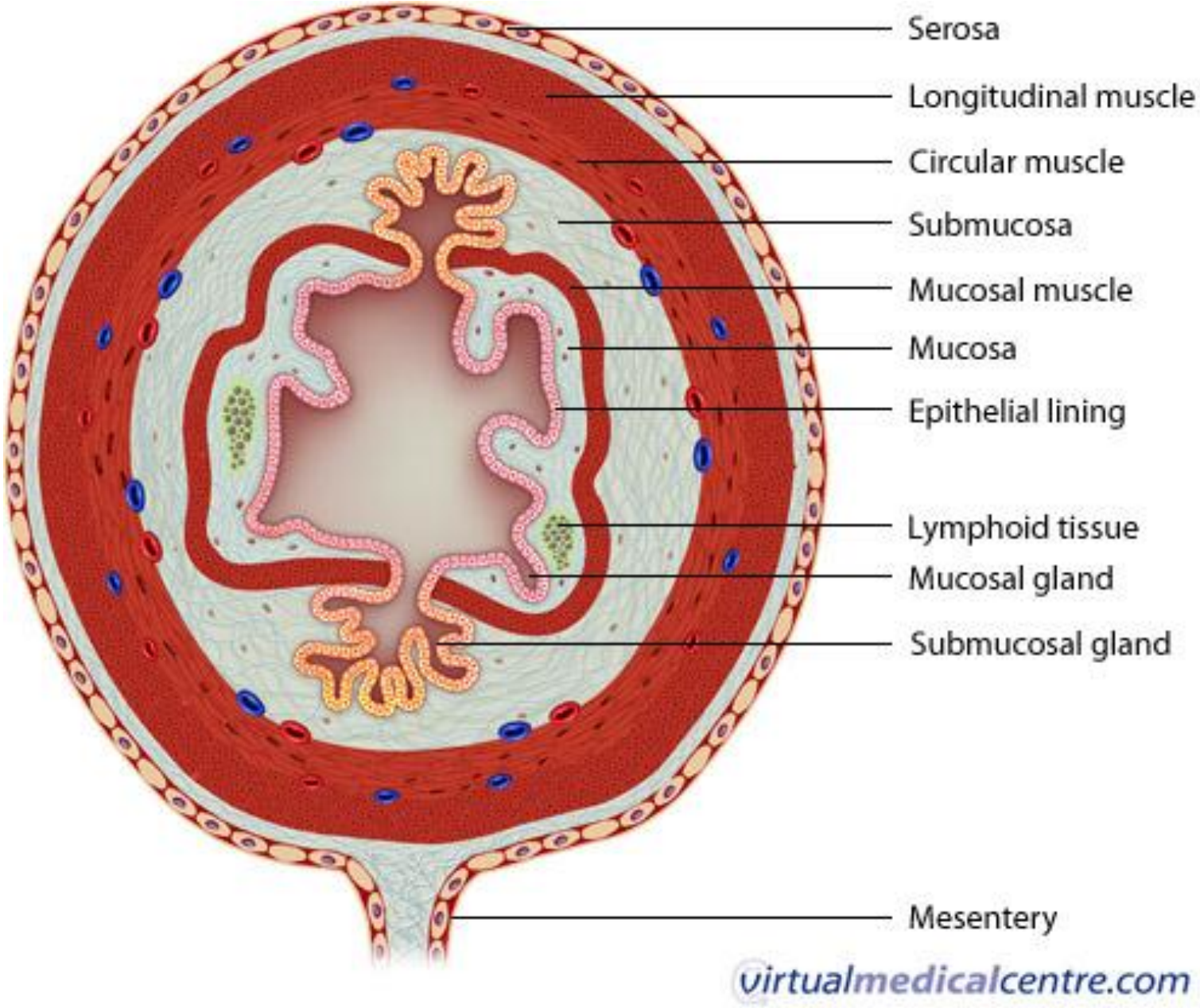

Parotid Gland
Sublingual Gland
Submandibular Gland
Esophagus
Liver
Stomach
Spleen
Splenic Flexura of Transverse Colon
Gallbladder
Duodenum
Pancreas
Hepatic Flexure
Transverse Colon
Acending Colon
Jejunum
Decending Colon
Ileum
Cecum
Sigmoid Colon
Appendix
Sigmoid Flexure
Rectum
Anus

Histology of Alimentary canal wall

Same four layers from esophagus to anal canal

1. Mucosa
2. Submucosa
3. Muscularis externa
4. Serosa or adventitia


Epithelium
Lamina propria
Muscularis mucosae
Mesentery
Vein
Artery
Lymph vessel
Submucosa
Submucosal gland
Blood vessel
Lumen
Submucosal nerve plexus
Muscularis
Inner circular layer
Myenteric nerve plexus
Outer longitudinal layer


Serosa
Longitudinal muscle
Circular muscle
Submucosa
Mucosal muscle
Mucosa
Epithelial lining
Lymphoid tissue
Mucosal gland
Submucosal gland
Mesentery
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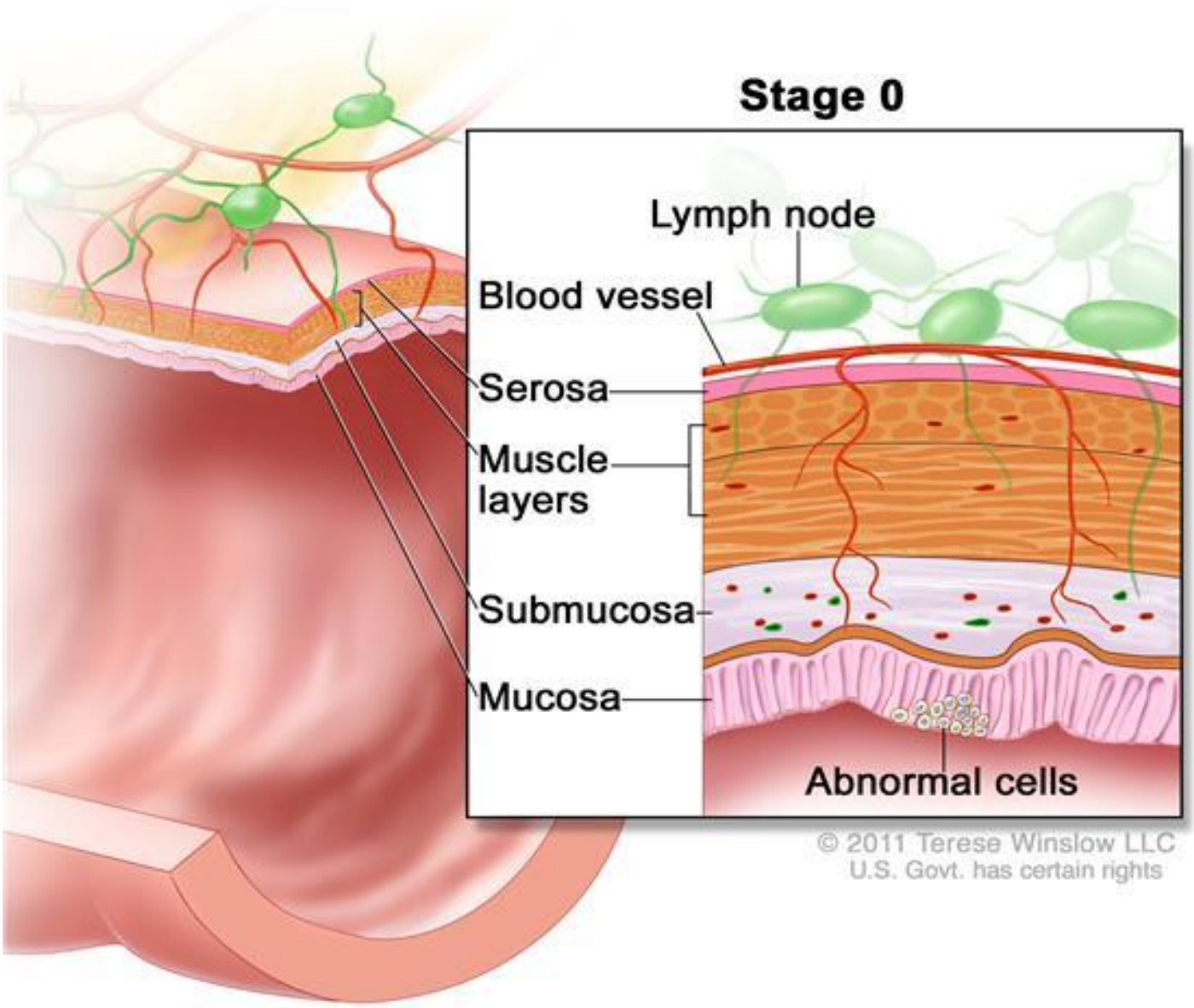
1. Mucosa (Inner Layer)

Three sub-layers

1. Lining epithelium
2. Lamina propria
3. Muscularis mucosae

Mucosa con.

- Epithelium: absorbs nutrients, secretes mucus
  - Continuous with ducts and secretory cells of intrinsic digestive glands (those within the wall)
  - Extrinsic (accessory) glands: the larger ones such as liver and pancreas
- Lamina propria
  - Loose connective tissue with nourishing and absorbing capillaries
  - Contains most of mucosa-associated lymphoid tissue (MALT)
- Muscularis mucosae
  - Thin layer of muscle producing only local movements


Stage 0
Lymph node
Blood vessel
Serosa
Muscle layers
Submucosa
Mucosa
Abnormal cells
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2. Submucosa

- Dense Connective tissue containing major blood and lymphatic vessels
- Submucosal nerves plexus
- Contain Glands and lymphoid tissue
- Contain many elastic fibers so gut can regain shape after food passes

3. Muscularis externa

Two layers of smooth muscle responsible for peristalsis and segmentation

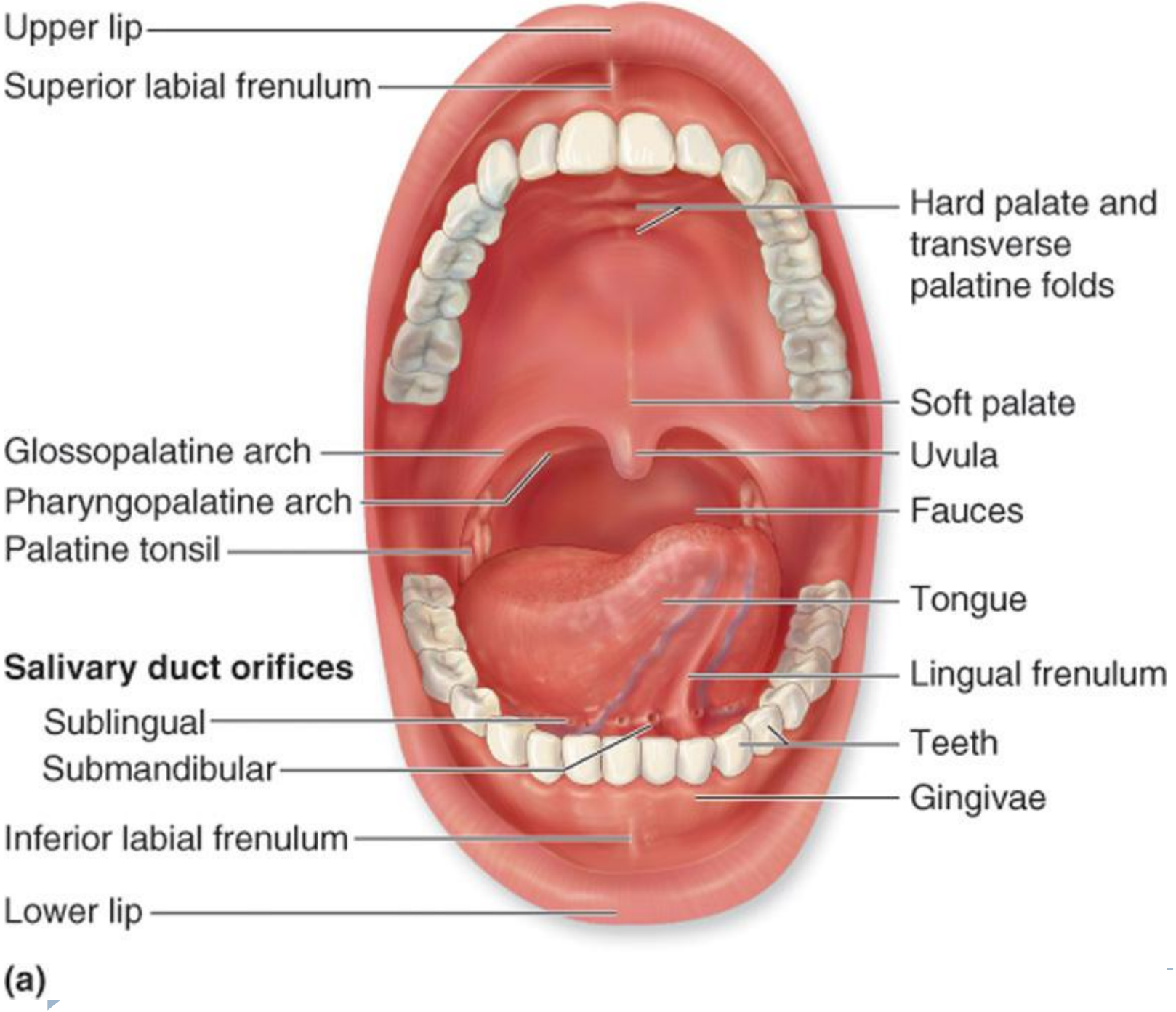
- Inner circular layer (circumferential)
  - Squeezes
  - In some places forms sphincters (act as valves)
- Outer longitudinal layer: shortens gut
- In between lies Myenteric nerve plexus, blood and lymph vessels

4. Serosa

- Simple squamous epithelium (mesothelium)
  - Thin layer of loose connective tissue underneath rich in blood and lymph vessels and adipose tissue.
- Exceptions:
  - Parts not in peritoneal cavity have thick adventitia, lack serosa
  - Some have both, e.g. retroperitoneal organs

Oral Cavity

- Stratified Squamous epithelium
  - Keratinized layer (gingiva)
  - Nonkeratinized layer (soft palate, lips, cheeks and the floor of the mouth)


Upper lip
Superior labial frenulum
Hard palate and transverse palatine folds
Soft palate
Glossopalatine arch
Uvula
Pharyngopalatine arch
Fauces
Palatine tonsil
Tongue
Salivary duct orifices
Lingual frenulum
Sublingual
Teeth
Submandibular
Gingivae
Inferior labial frenulum
Lower lip

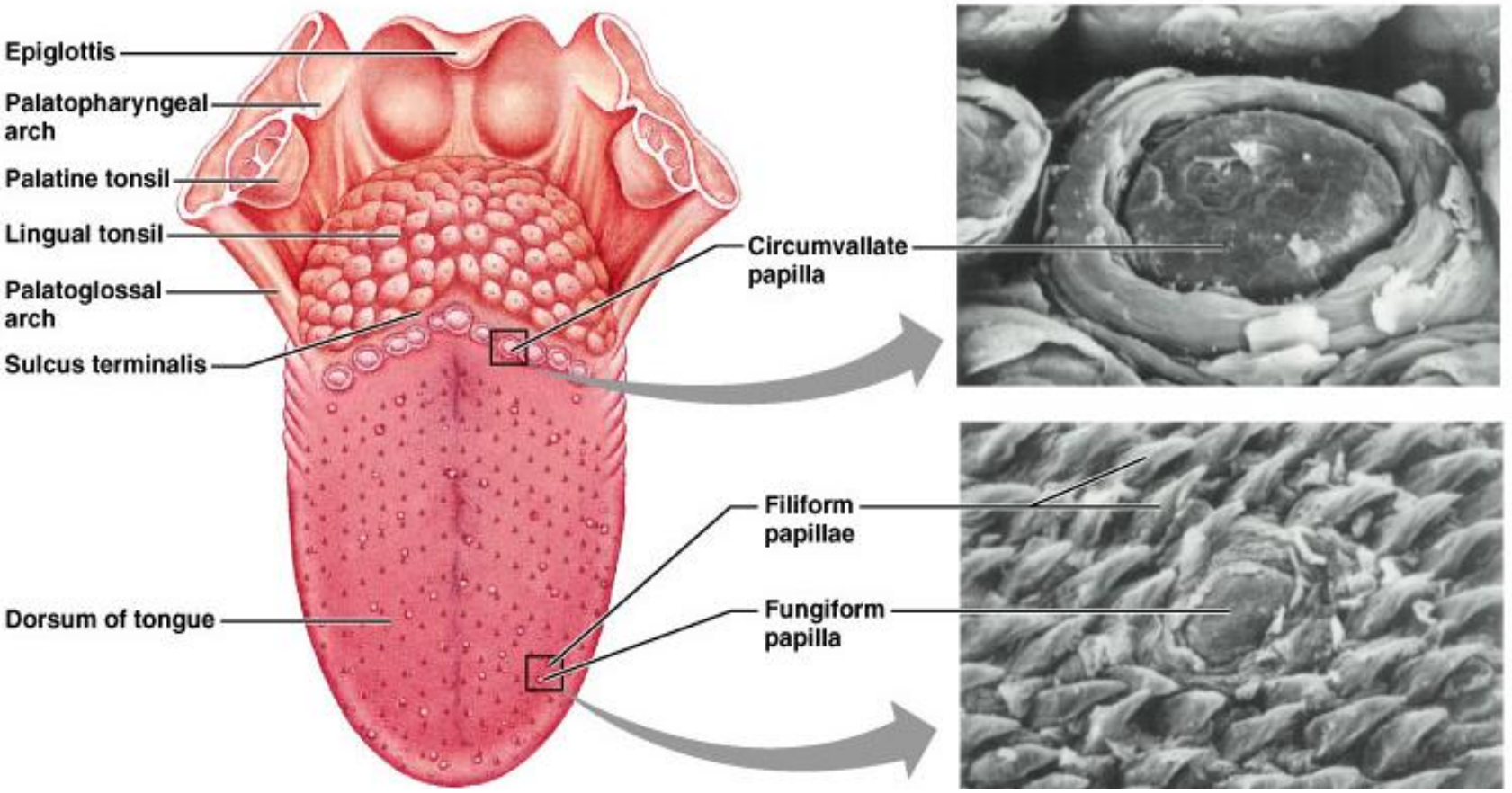
(a)

Tongue

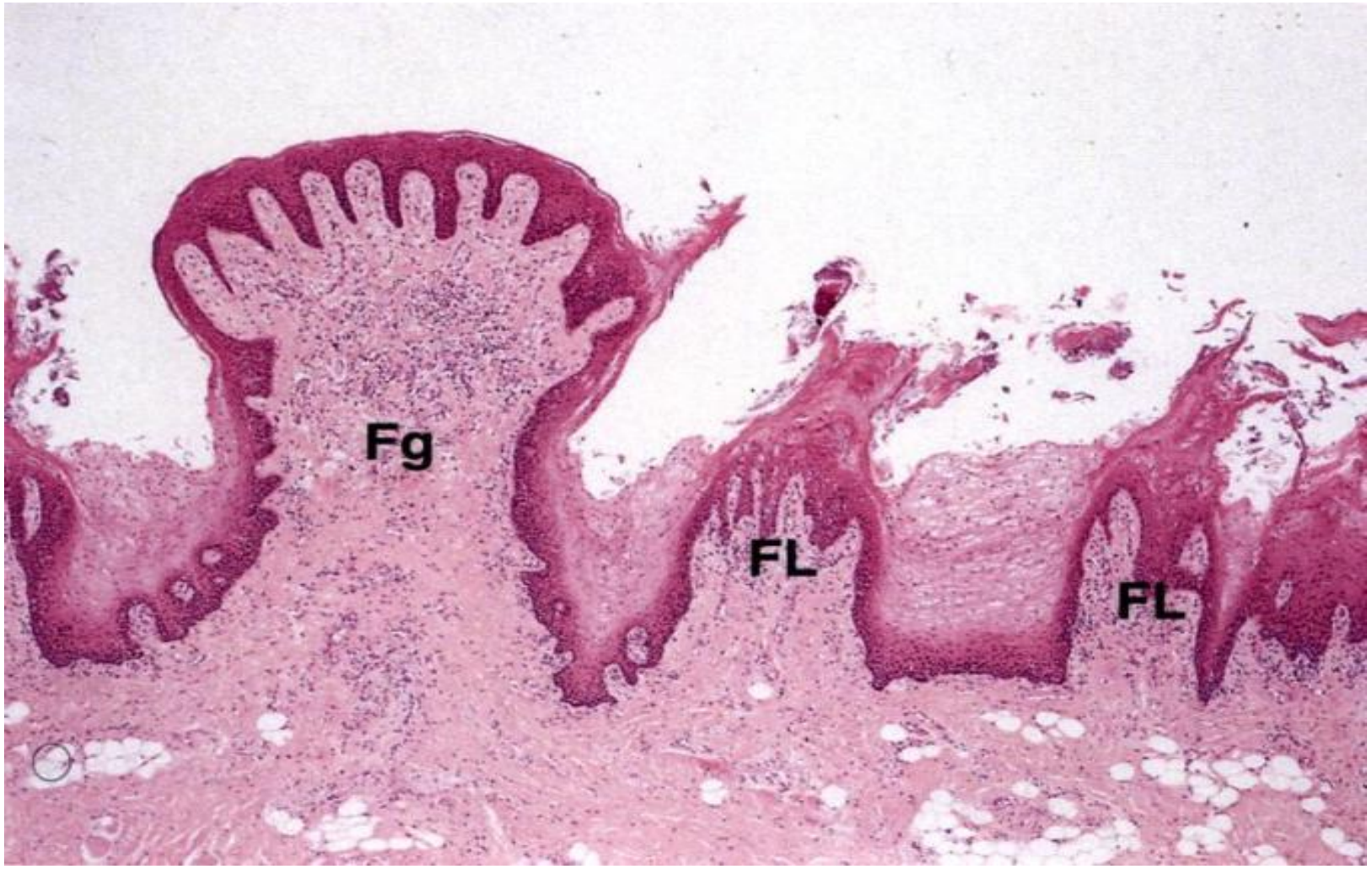
- Striated muscles covered by mucous membrane
  - Grip and reposition food
  - Forms "bolus" of food (lump)
  - Help in swallowing
  - Speech – help form some consonants
- Taste buds contained by circumvallate and fungiform papillae
- Lingual tonsil – back of tongue

The papillae of tongue

- ***FILIFORM*** (sharp, often partyl keratinized conical projections; most numerous; lacks taste buds
- ***FUNGIFORM*** (resemble mushrooms; occur singly and scattered; each papilla with taste buds)
- ***FOLIATE*** (poorly-developed in humans; occur in rows separated by furrows into which serous glands drain; many taste buds)
- ***CIRCUMVALLATE*** (largest and least numerous (7-12 only; each papilla surrounded by a ringlike ridge of mucosa separated by a circular furrow; furrow wall with many tastebuds; also with serous (von Ebner's gland)

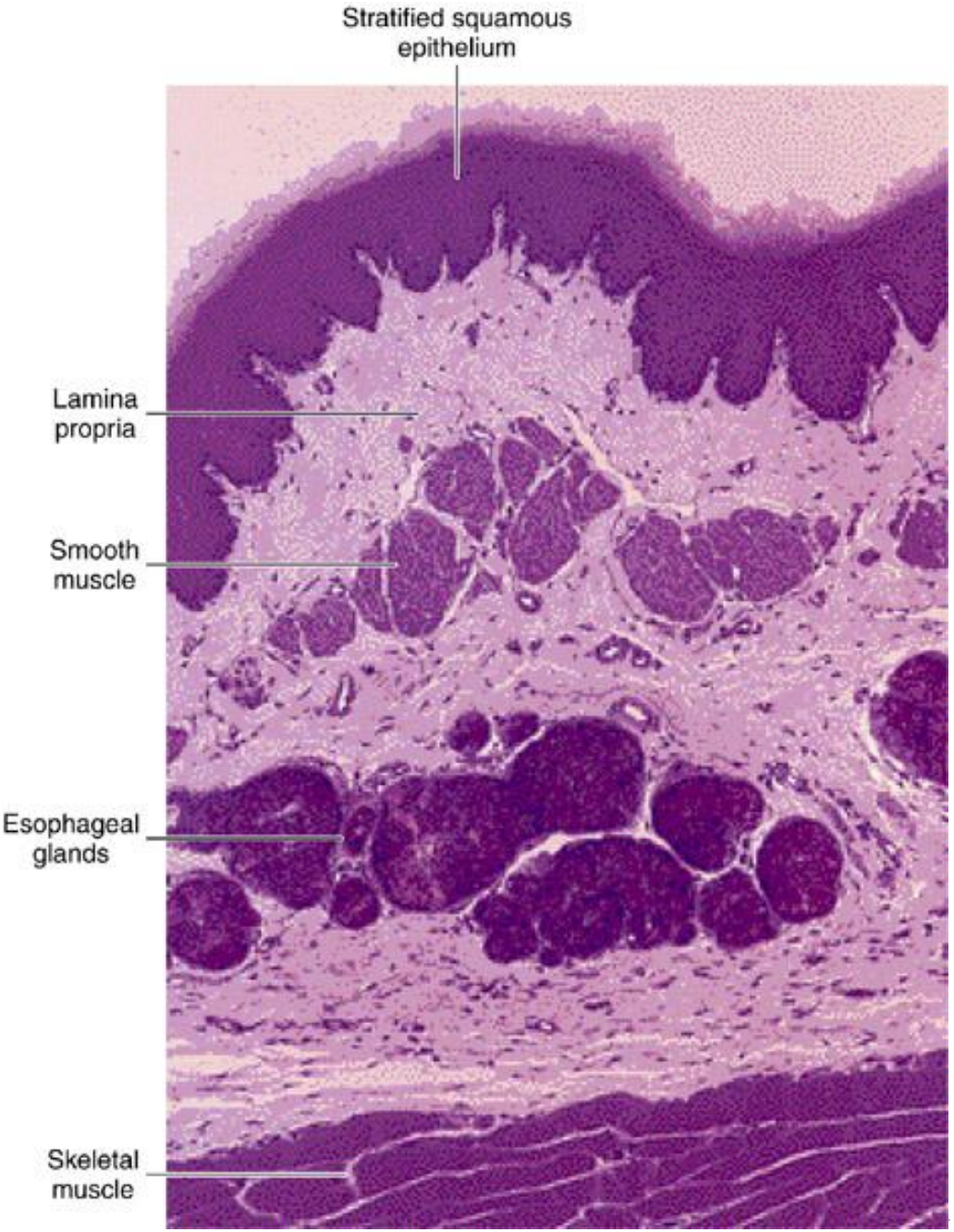

Epiglottis
Palatopharyngeal arch
Palatine tonsil
Lingual tonsil
Palatoglossal arch
Sulcus terminalis
Dorsum of tongue
Circumvallate papilla
Filiform papillae
Fungiform papilla

Filiform and Fungiform Papillae



Esophagus

- Muscular tube that transports food from mouth to stomach.
- Lining same as in much of the oral cavity - nonkeratinized stratified squamous epithelium.
- Layers same as general digestive tract as outlined above.

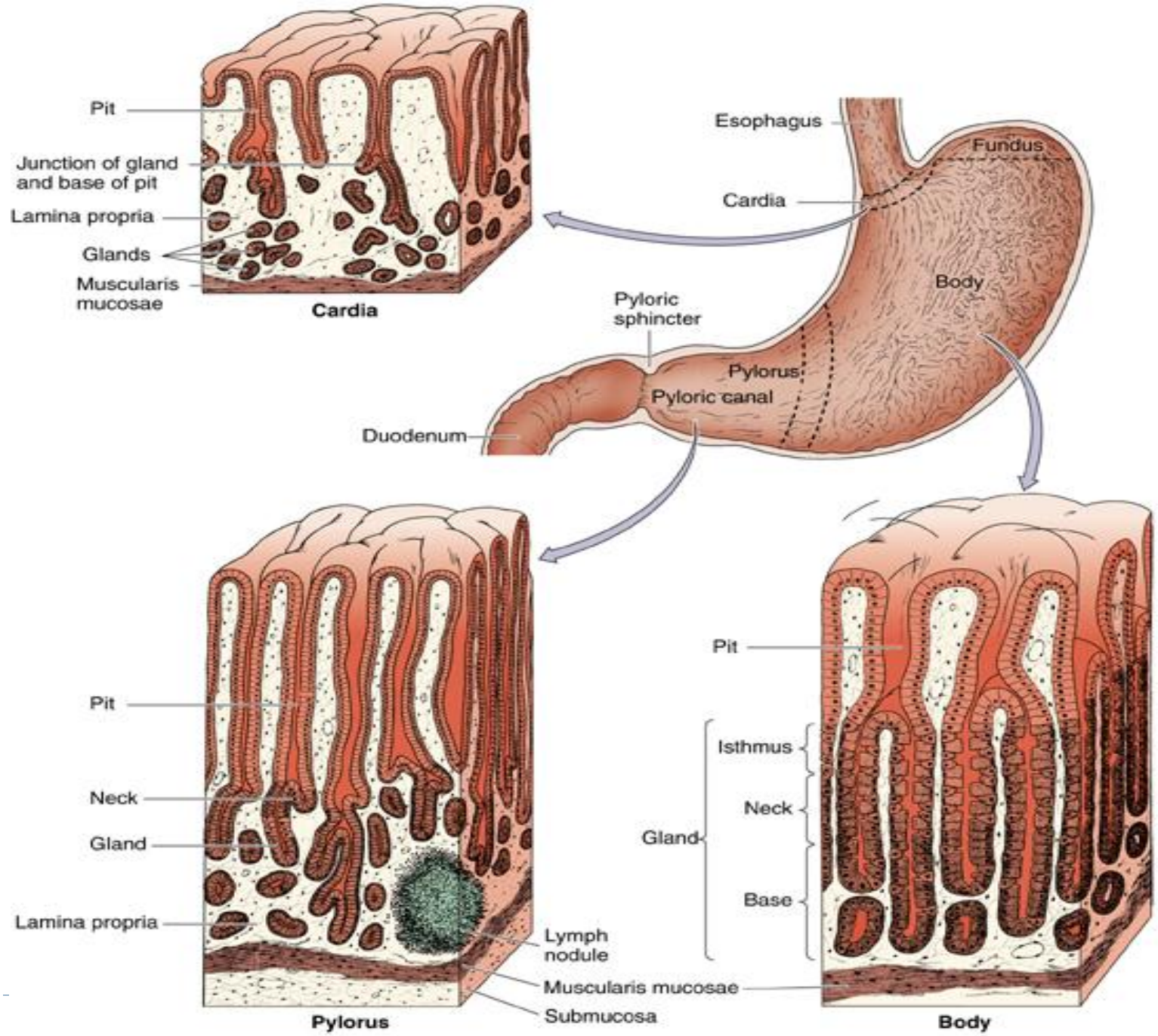


Section of the upper region of the esophagus. Mucous esophageal glands are in the submucosa; striated skeletal muscle is in the muscularis. PAS and PT stain. Low magnification.

Stomach

There are 3 major regions of the stomach, each with a different histological structure.

1. The cardia - cardiac stomach
2. The body (corpus) and fundus
3. The pylorus - pyloric stomach


Pit
Junction of gland and base of pit
Lamina propria
Glands
Muscularis mucosae
Cardia
Esophagus
Fundus
Cardia
Body
Pyloric sphincter
Pylorus
Pyloric canal
Duodenum
Pit
Neck
Gland
Lamina propria
Lymph nodule
Muscularis mucosae
Submucosa
Pylorus
Pit
Isthmus
Neck
Gland
Base
Body

Stomach

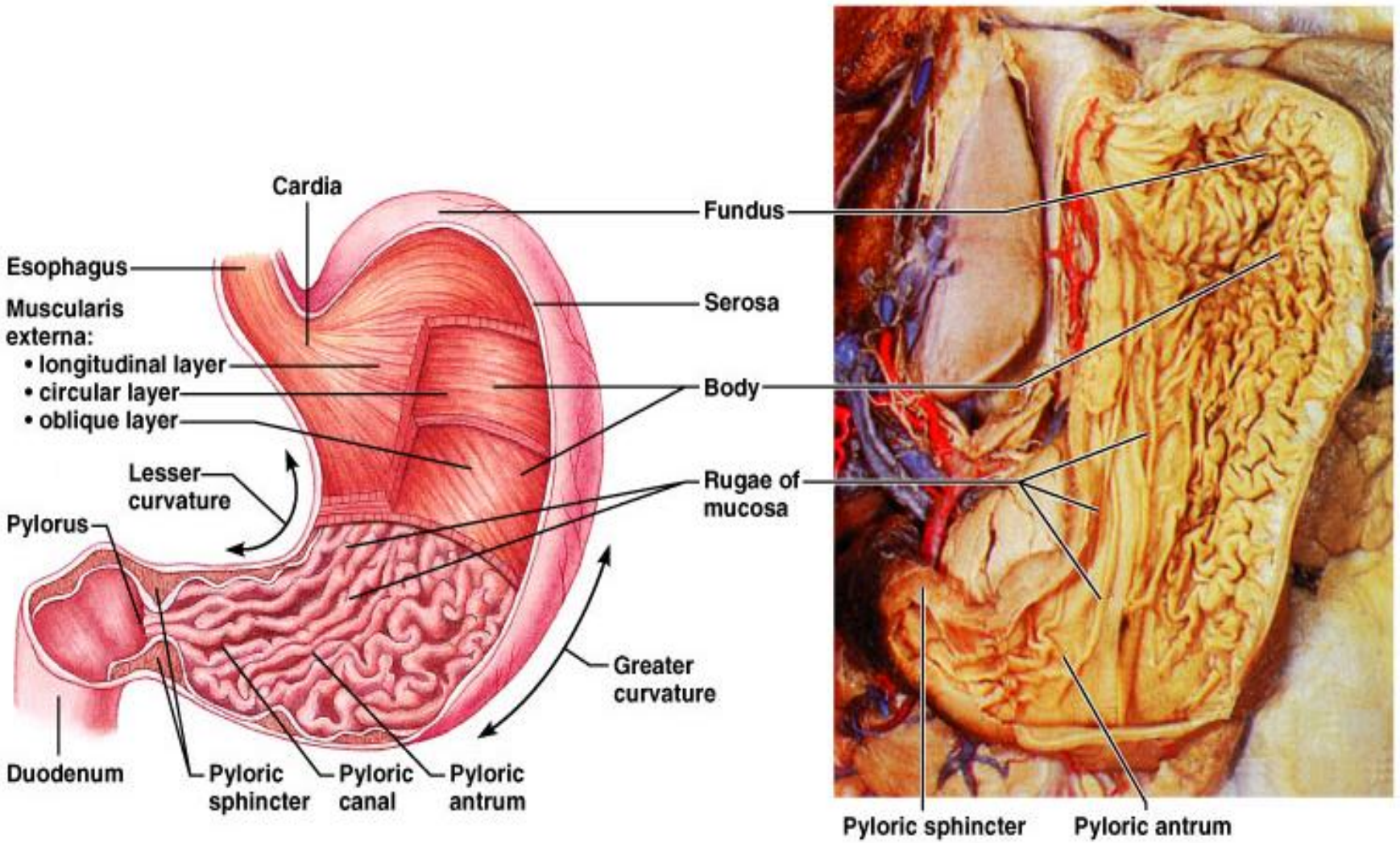
The inner surface of the stomach is thrown into folds called rugae that include both mucosa and submucosa. (see next slide)

1. The mucosa of the rugae is also folded. These folds form invaginatoins, such that the basal areas of the invaginations penetrate into mucosal lamina propria.

2. The upper portion of these invaginations in the mucosa are called the gastric pits - foveolae gastricae.

The epithelial lining of the the pits and general surface area of the stomach consists of simple columnar epithelium of mucous secreting cells in all parts of the stomach.

3. The gastric glands of the stomach connect to the bottoms of the gastric pits. The cellular structure of these glands is different in the different parts of the stomach.

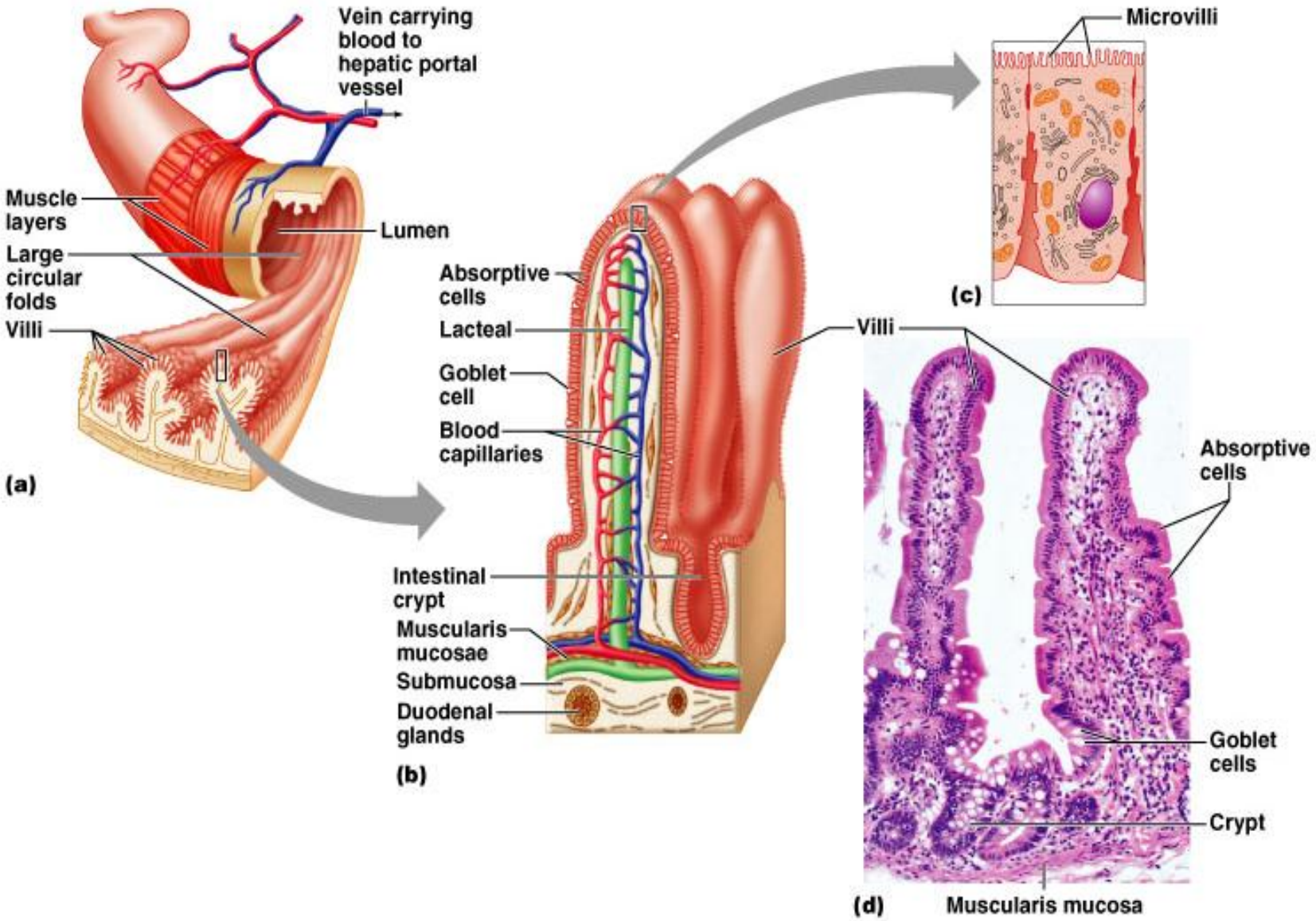

Cardia
Fundus
Esophagus
Serosa
Muscularis externa:
• longitudinal layer
• circular layer
• oblique layer
Body
Lesser curvature
Rugae of mucosa
Pylorus
Greater curvature
Duodenum
Pyloric sphincter
Pyloric canal
Pyloric antrum
Pyloric sphincter
Pyloric antrum

Small Intestine

- Consists of 3 segments

1. Duodenum
2. Jejunum
3. Ileum

- Receives chyme from the stomach, bile from the liver, and digestive enzymes from……...
- Site of complete digestion and absorption.
- Undigested fraction is channeled to large intestine


Vein carrying blood to hepatic portal vessel
Muscle layers
Lumen
Large circular folds
Villi
(a)
Absorptive cells
Lacteal
Goblet cell
Blood capillaries
Intestinal crypt
Muscularis mucosae
Submucosa
Duodenal glands
(b)
Microvilli
(c)
Villi
Absorptive cells
Goblet cells
Crypt
(d)
Muscularis mucosa