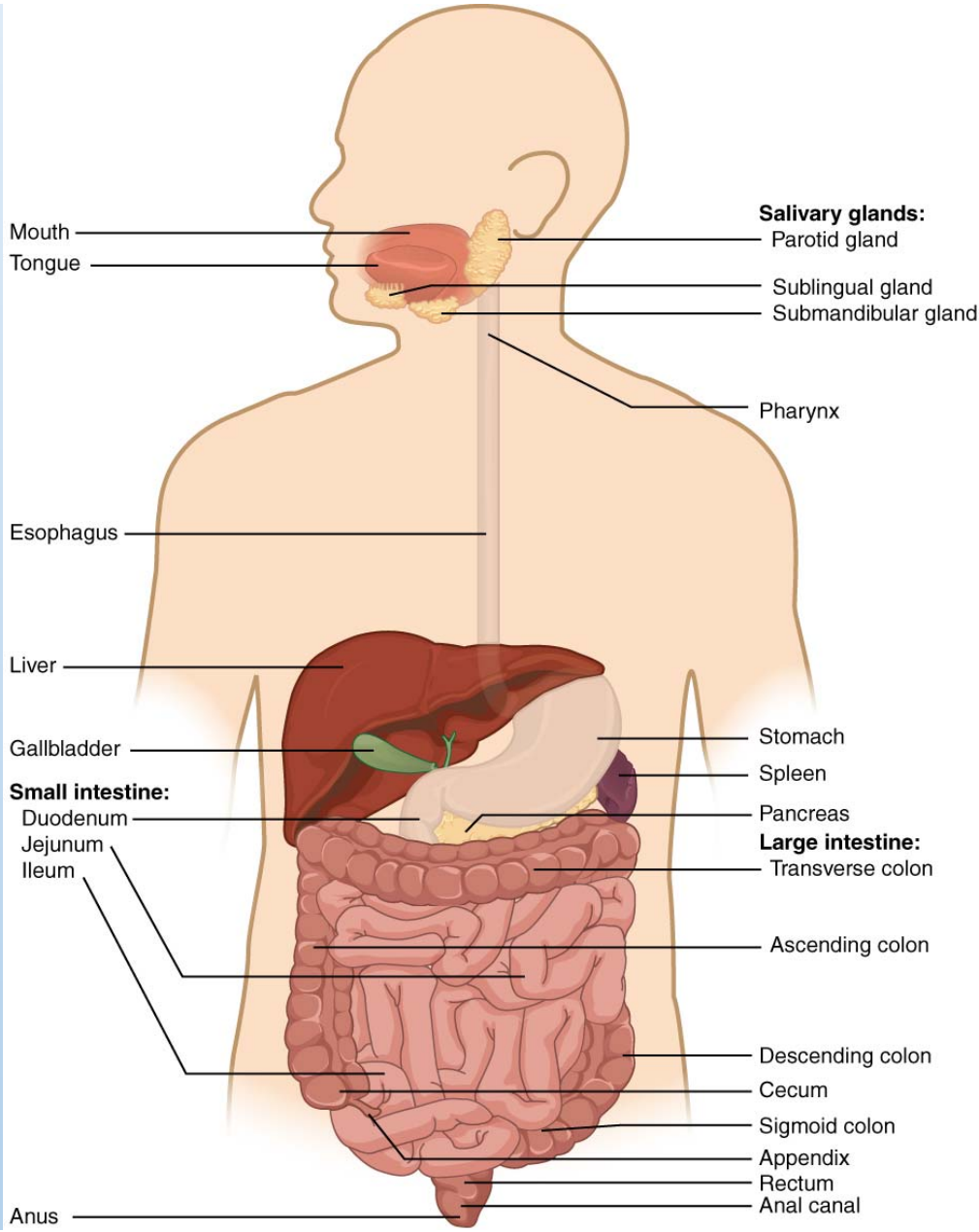
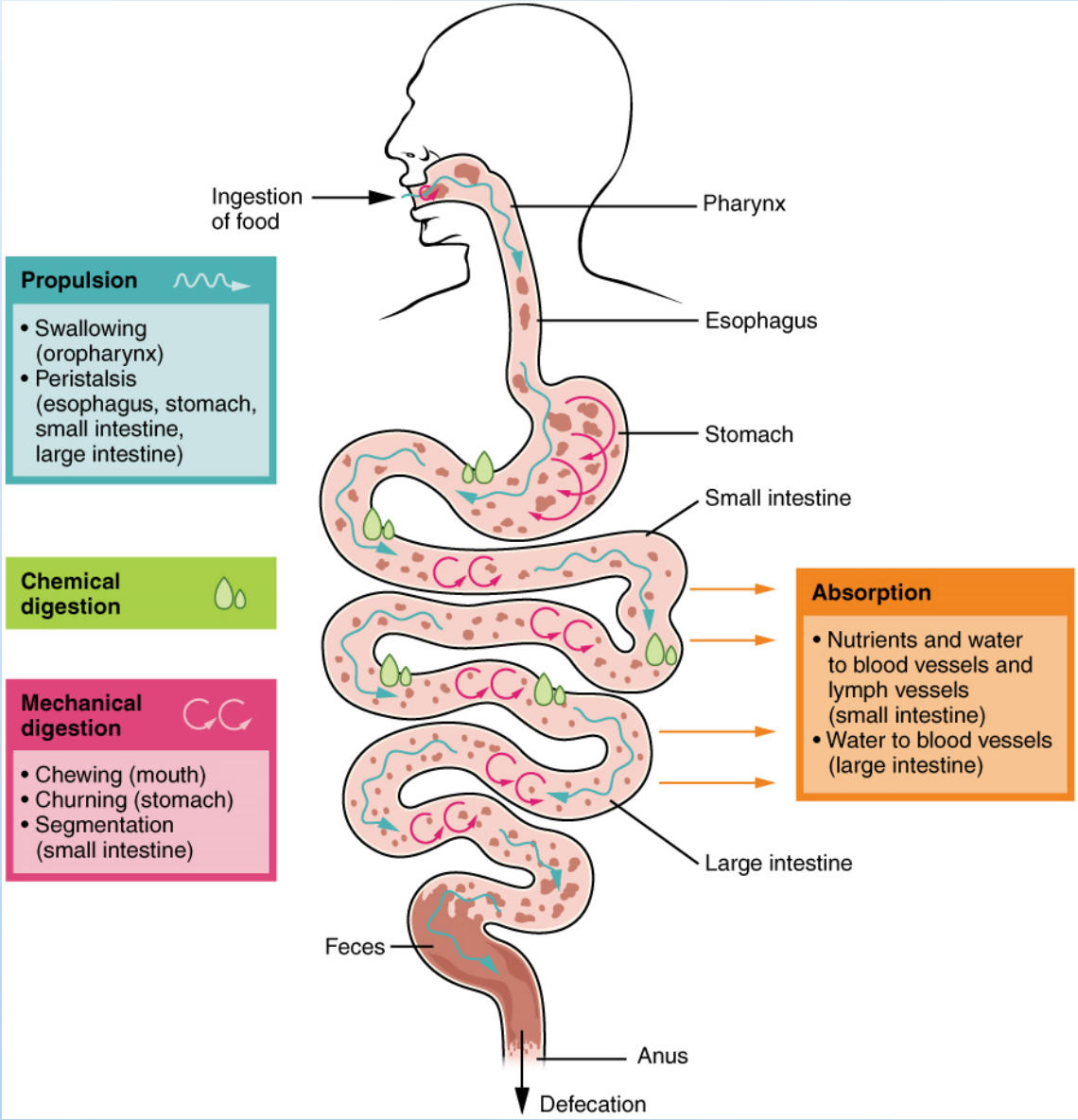

The
Digestive
System

Components of the Digestive System

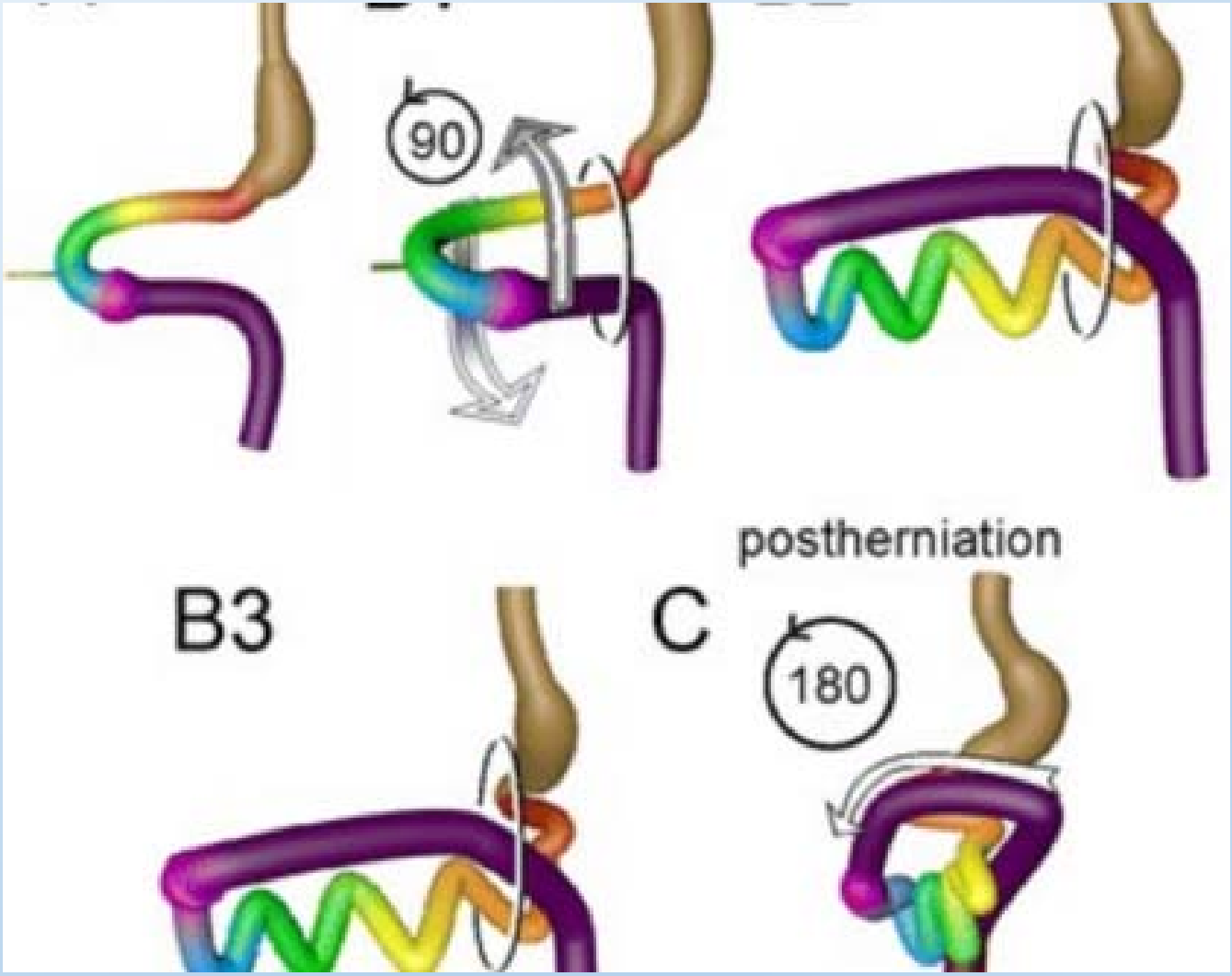


Digestive Processes

The digestive processes are **ingestion**, **propulsion**, **mechanical digestion**, **chemical digestion**, **absorption**, and **defecation**.

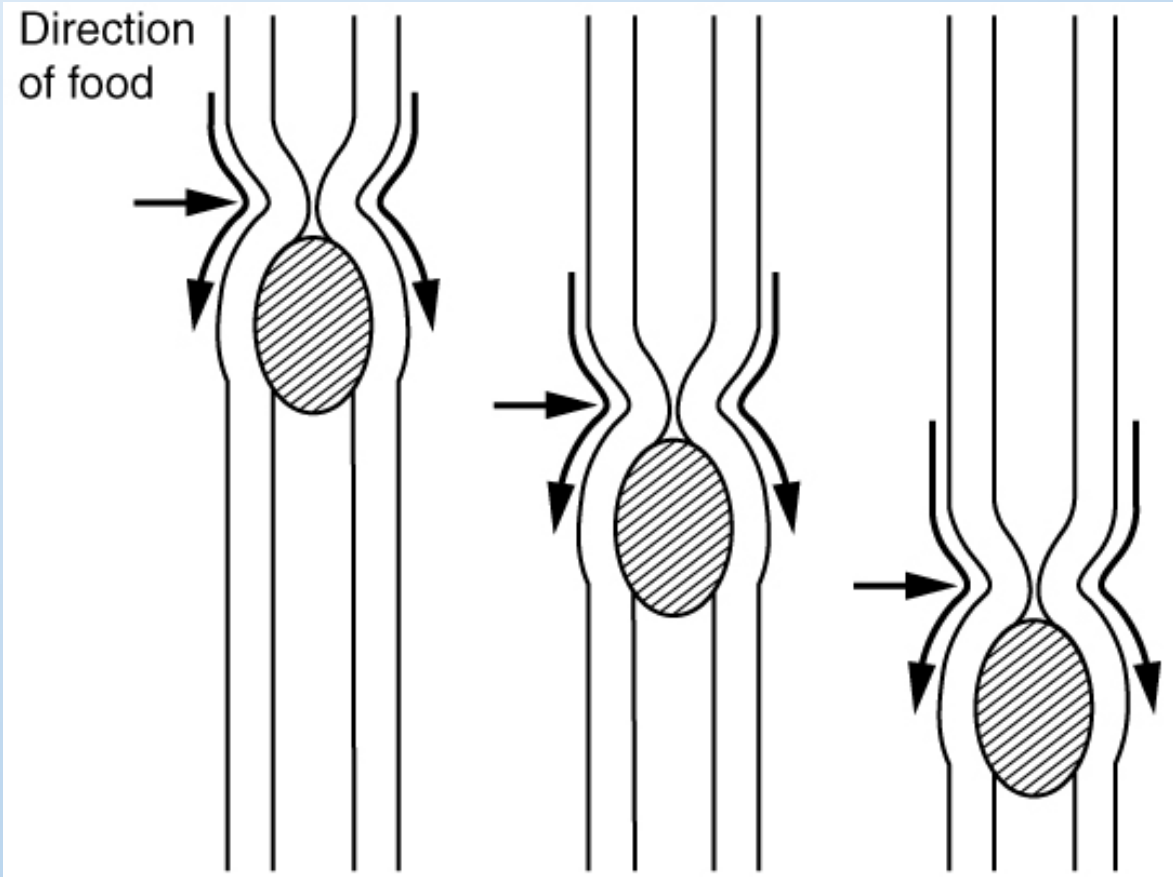


Development



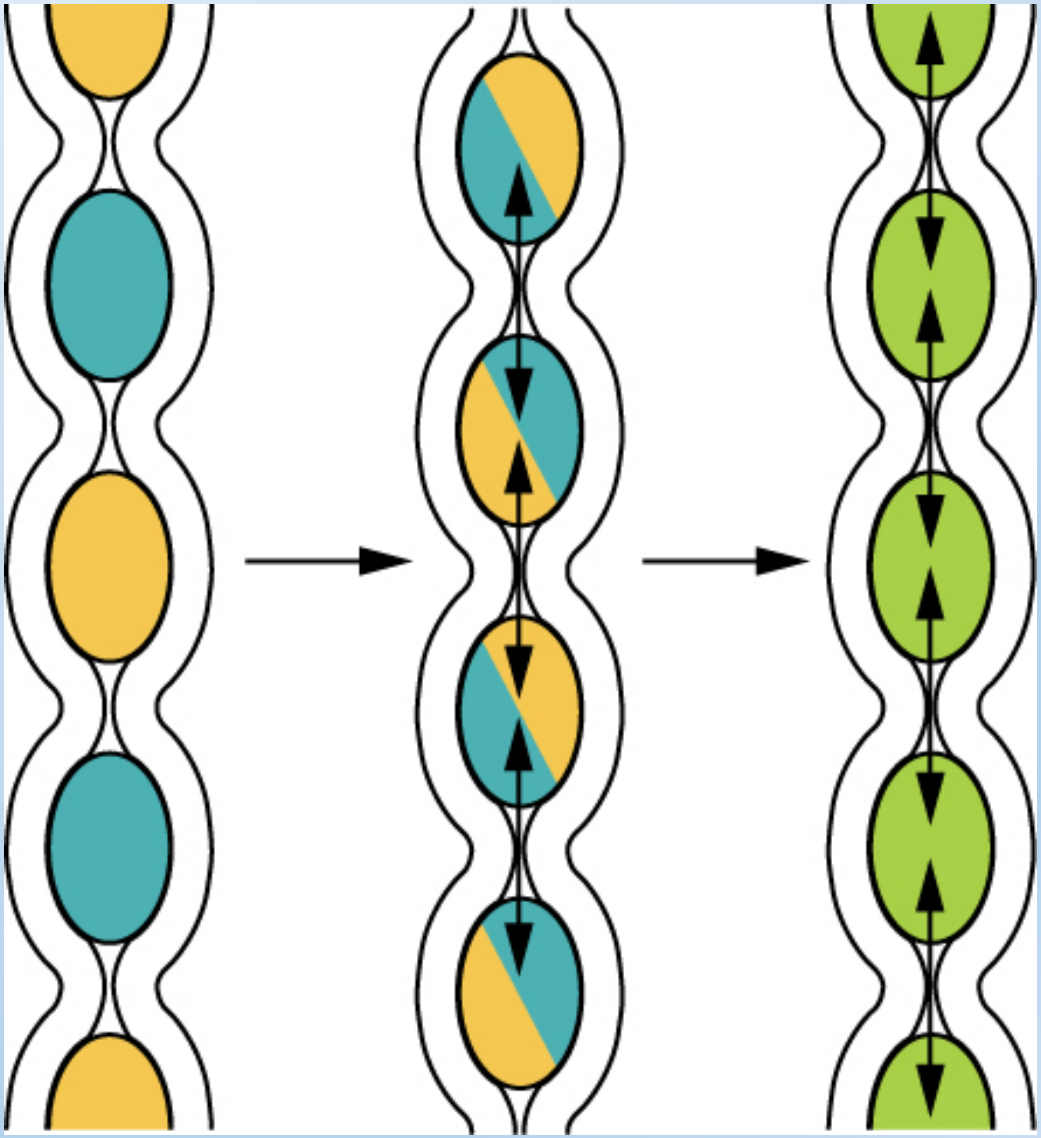
Peristalsis

Propels food through the digestive tract with alternating waves of muscle contraction and relaxation



Segmentation

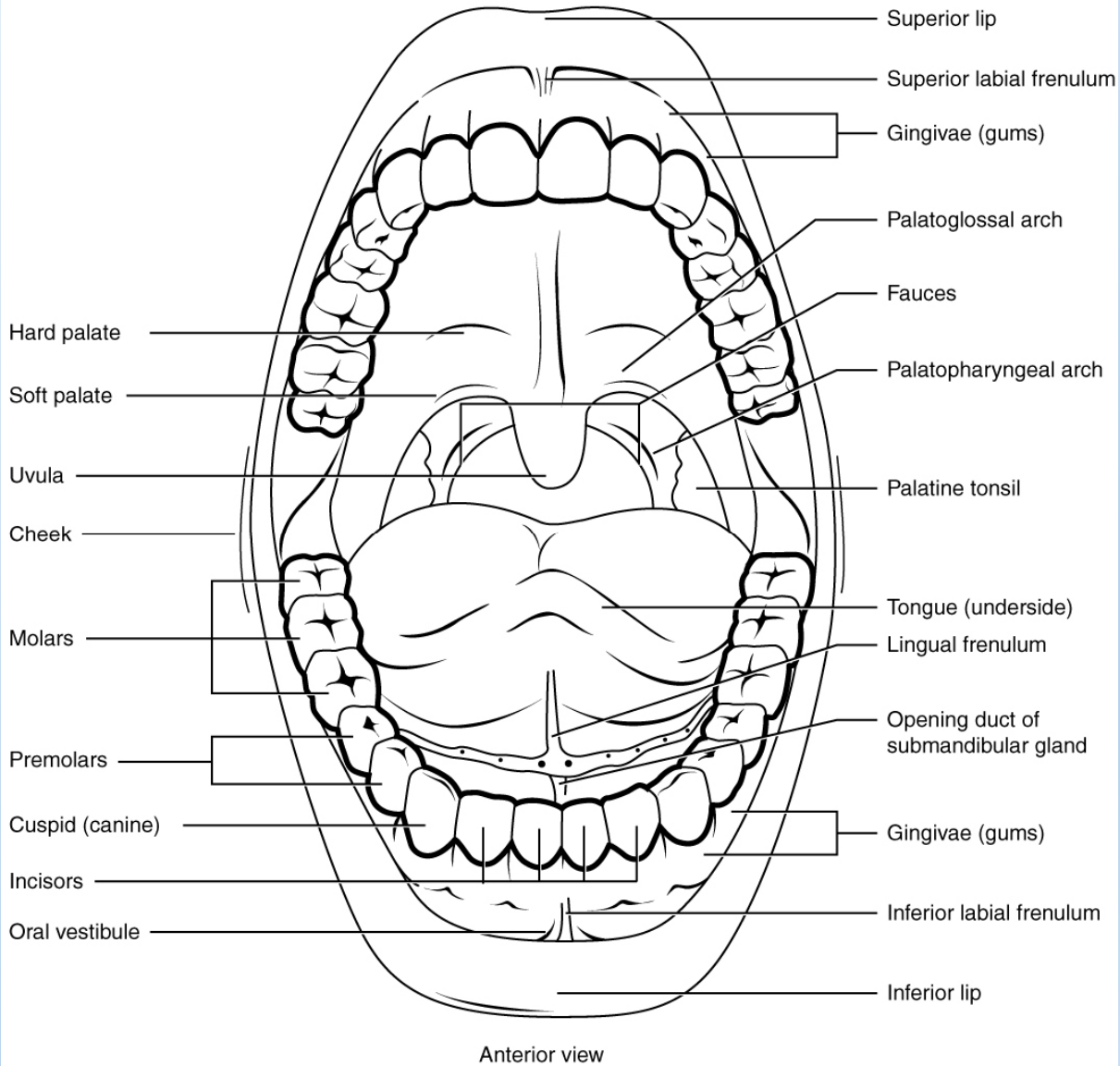
Separates chyme and then pushes it back together, mixing it and providing time for digestion and absorption



Mouth and Larynx

Mouth

Includes the lips or **labia**, tongue, palate, gums, and teeth.

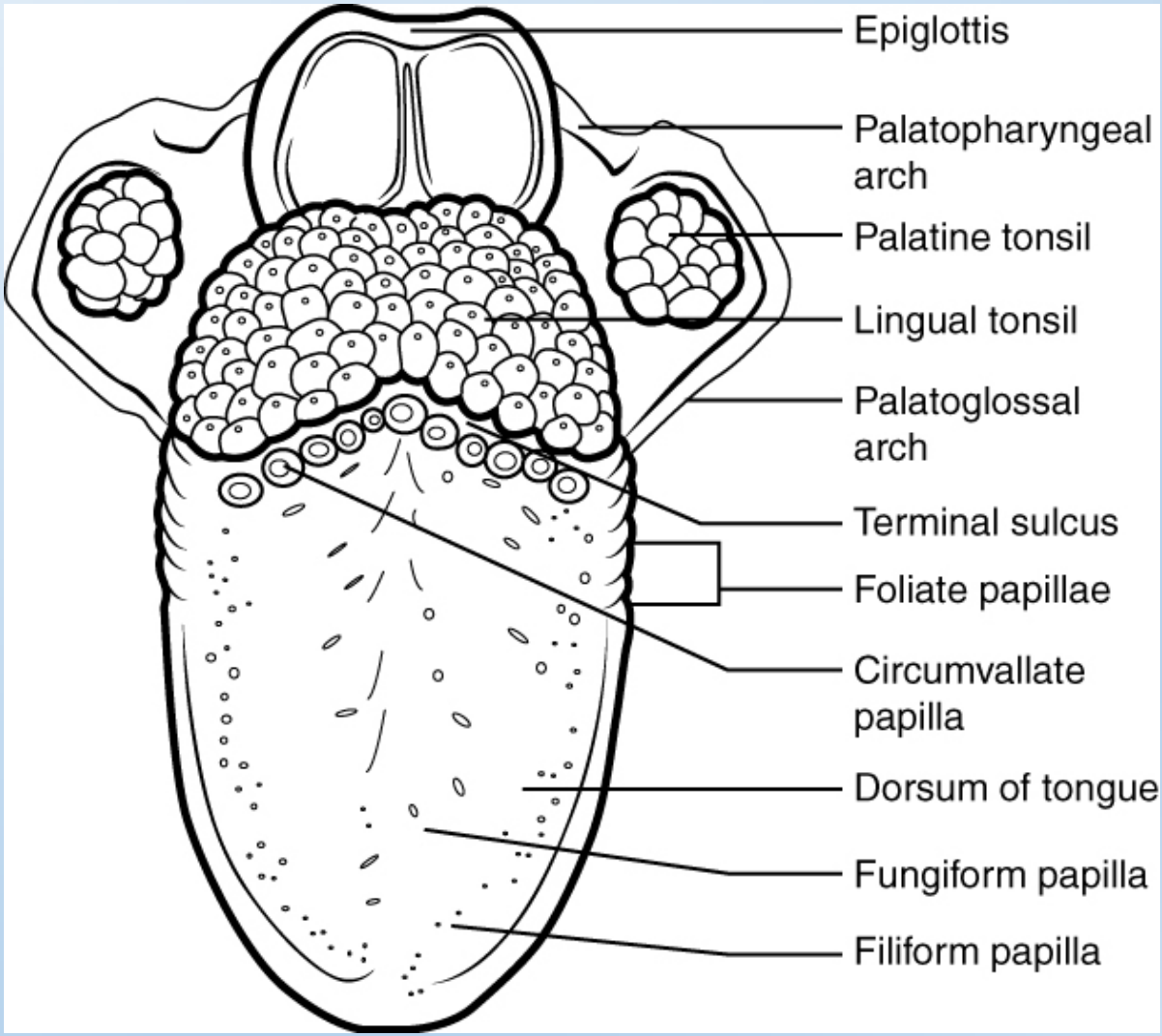


Tongue

Skeletal muscle covered by stratified squamous epithelia

Studded with papillae

- Foliate, fungiform, and circumvallate with tastebuds
- Filiform for friction



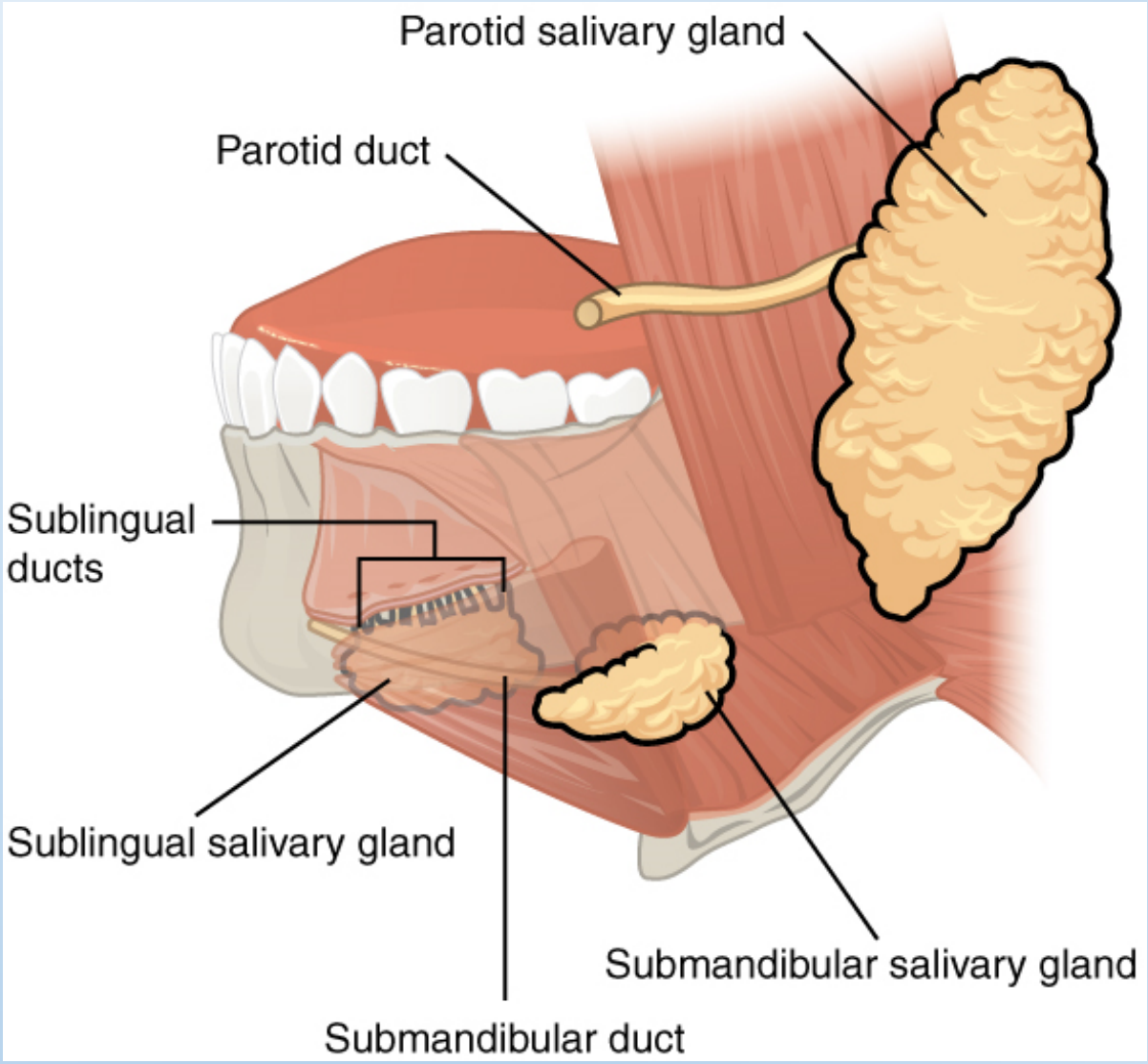
Salivary Glands

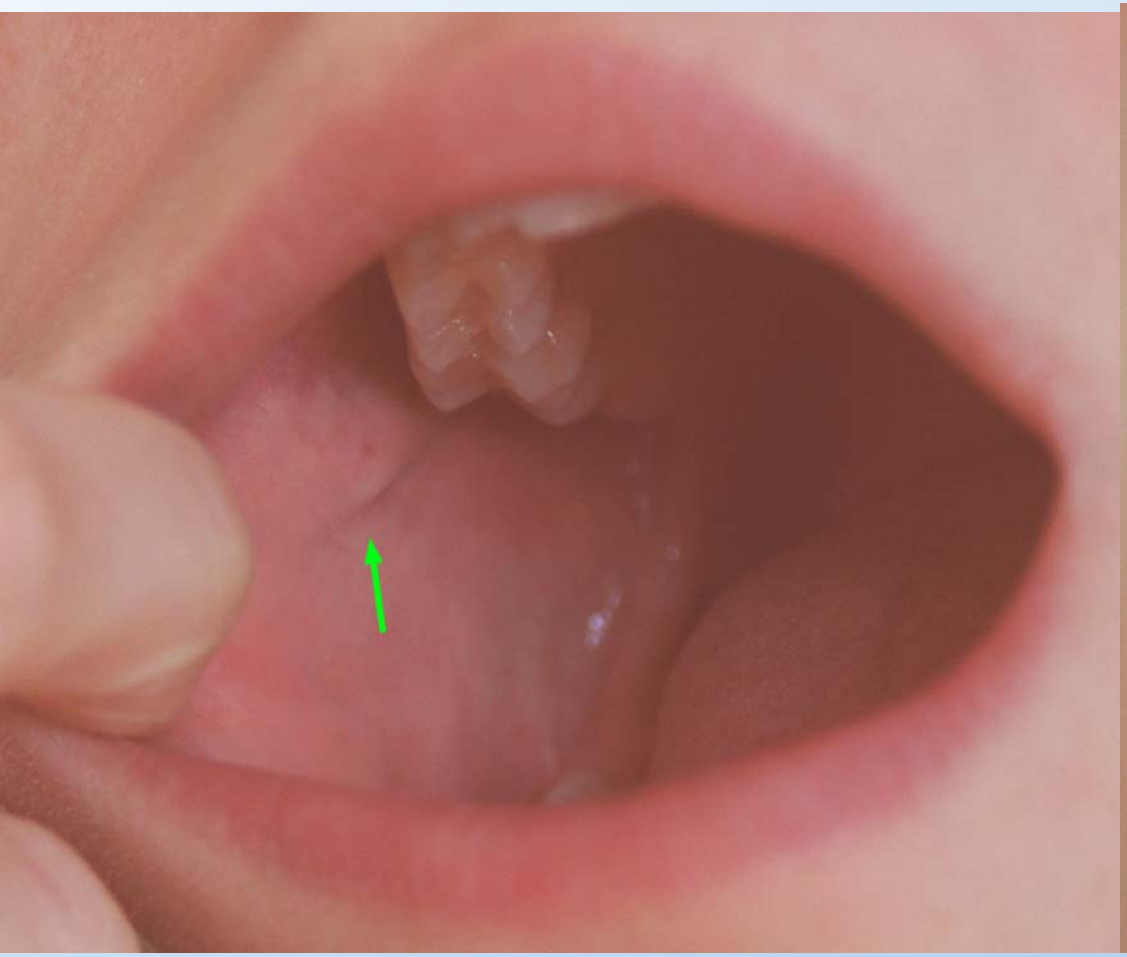
3 major glands located outside the oral mucosa

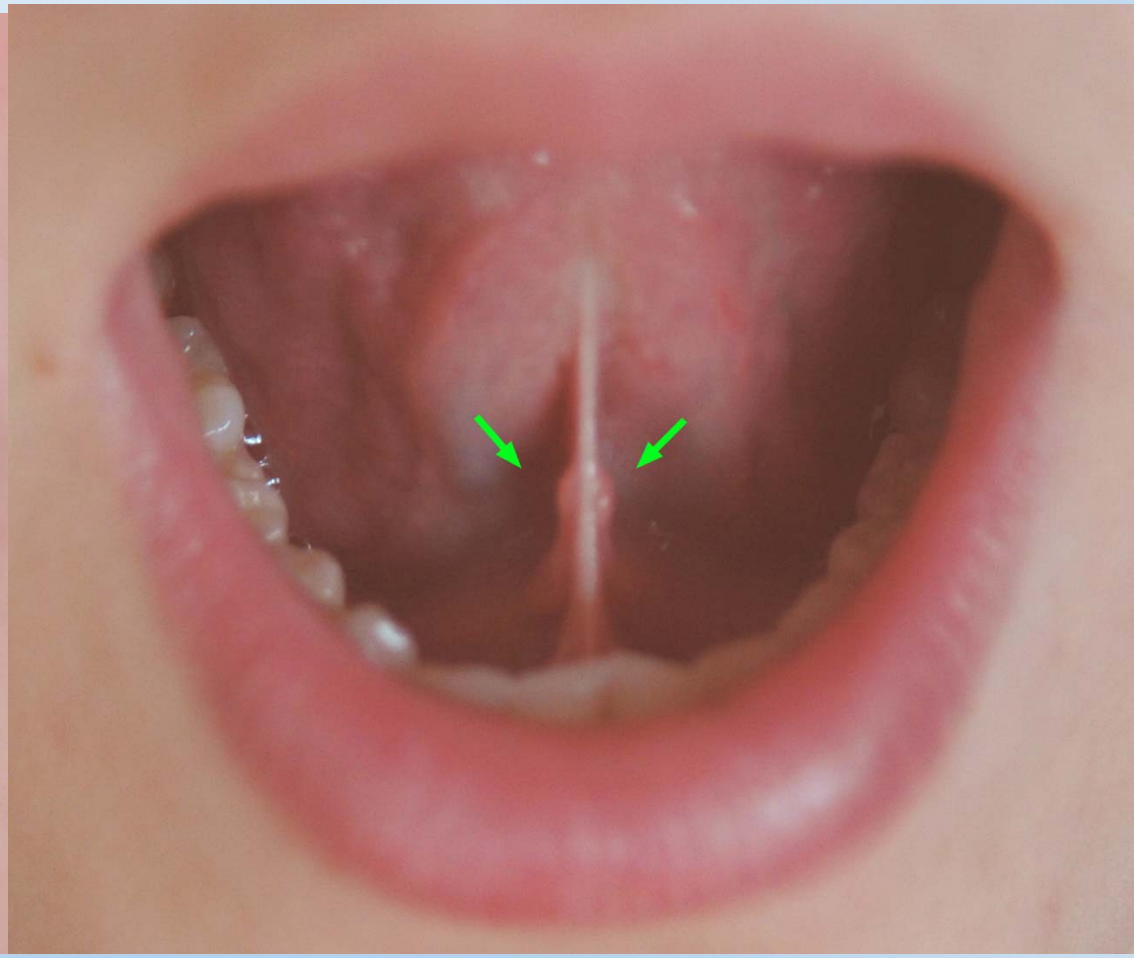
- **Submandibular glands**
- **Sublingual glands**
- **Parotid glands**

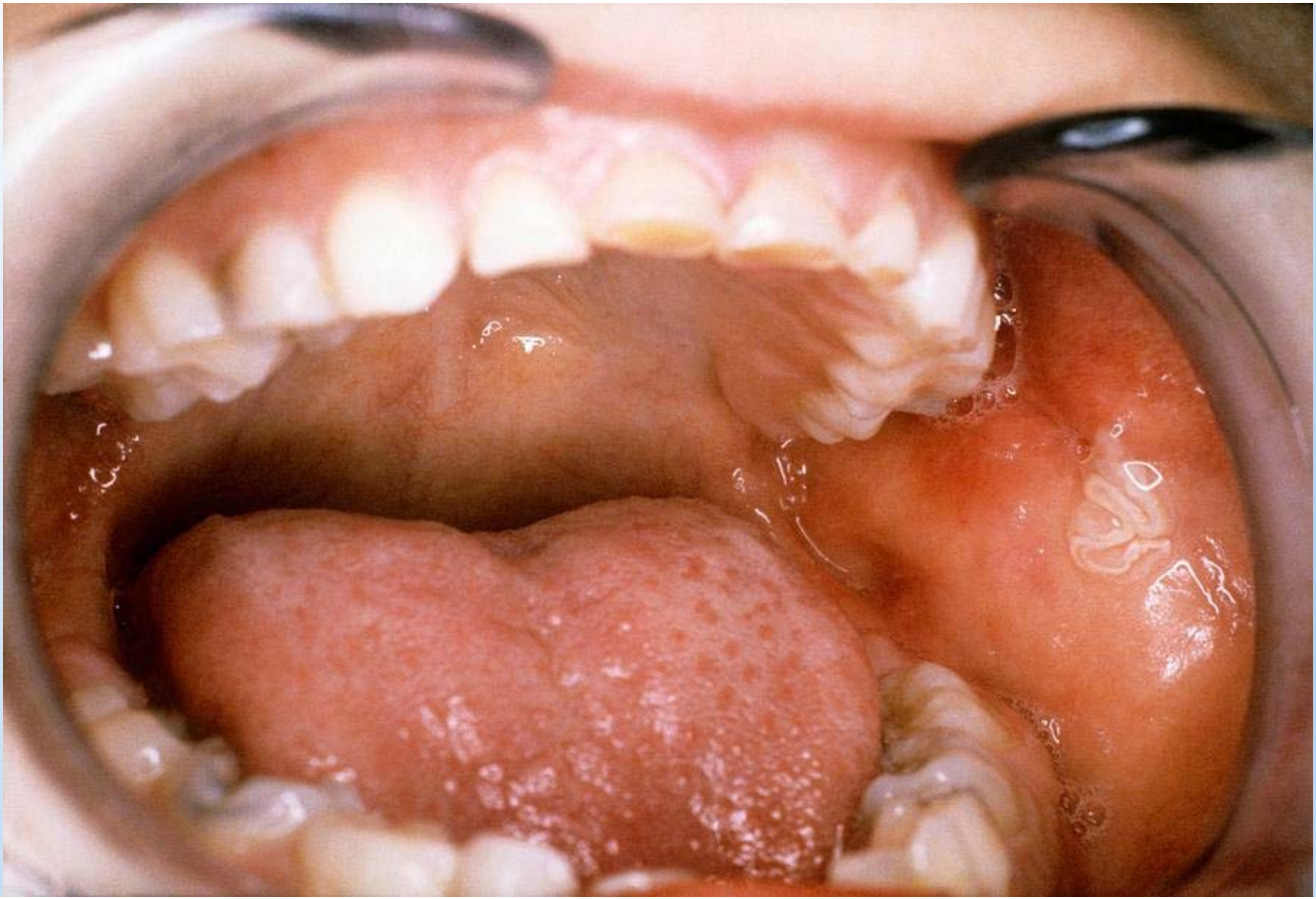
Secrete **saliva** via ducts

Regulated by autonomic nervous system







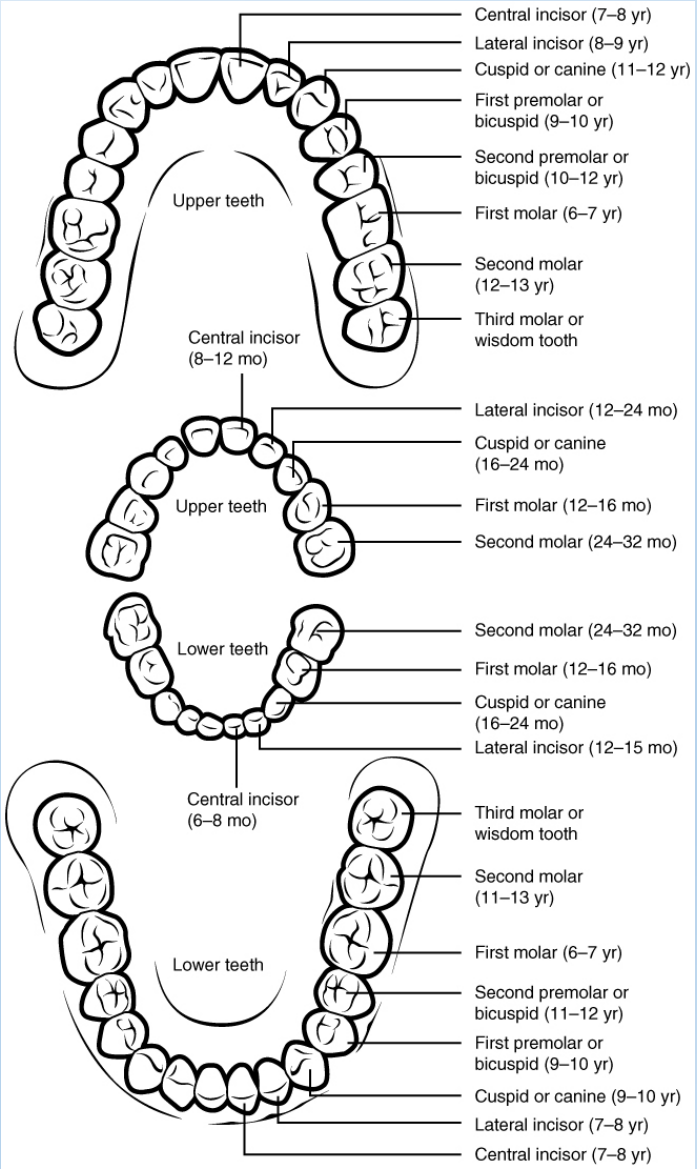


Teeth

Arranged in the maxilla and mandible

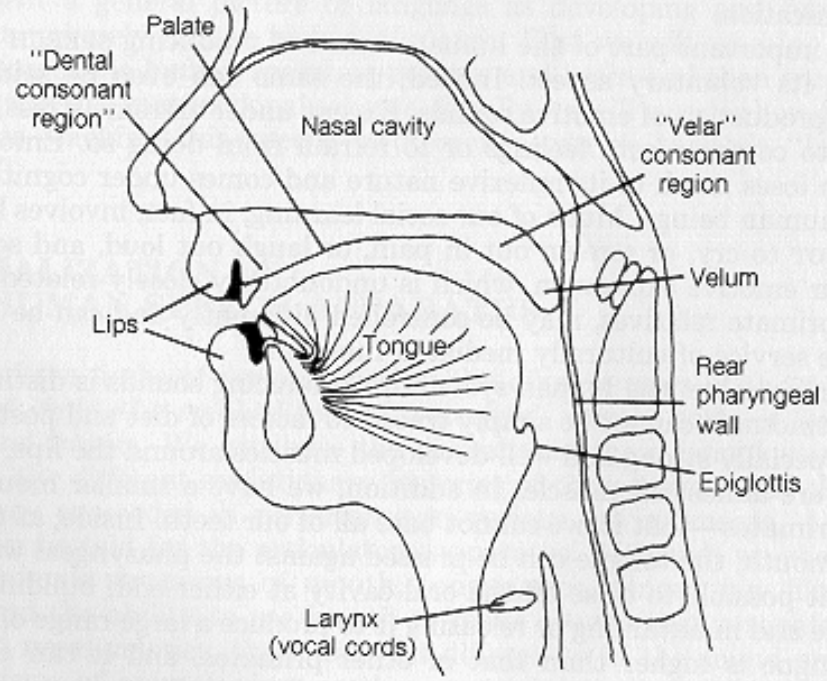
Humans have two dentition patterns

- 20 **deciduous** or baby teeth
- 32 **permanent** or adult teeth include
  - **Incisors**
  - **Cuspids**/canines
  - **Premolars**/bicuspids
  - **Molars**



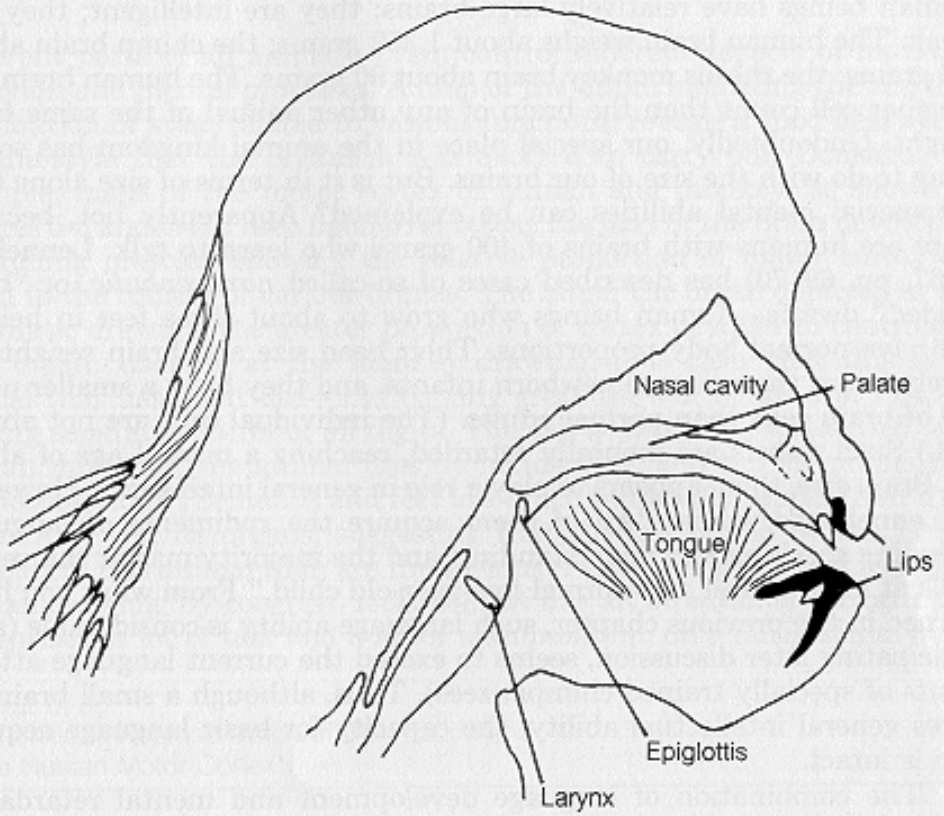
Larynx

FIGURE 5-1
The Adult Human Vocal Tract[1]



[1]Figure from Lieberman (1975, p. 60).

Head and Neck of a Young Adult Male Chimpanzee
Sectioned in the Midsaggital Plane[1]



[1]Figure from Lieberman (1975, p. 105).

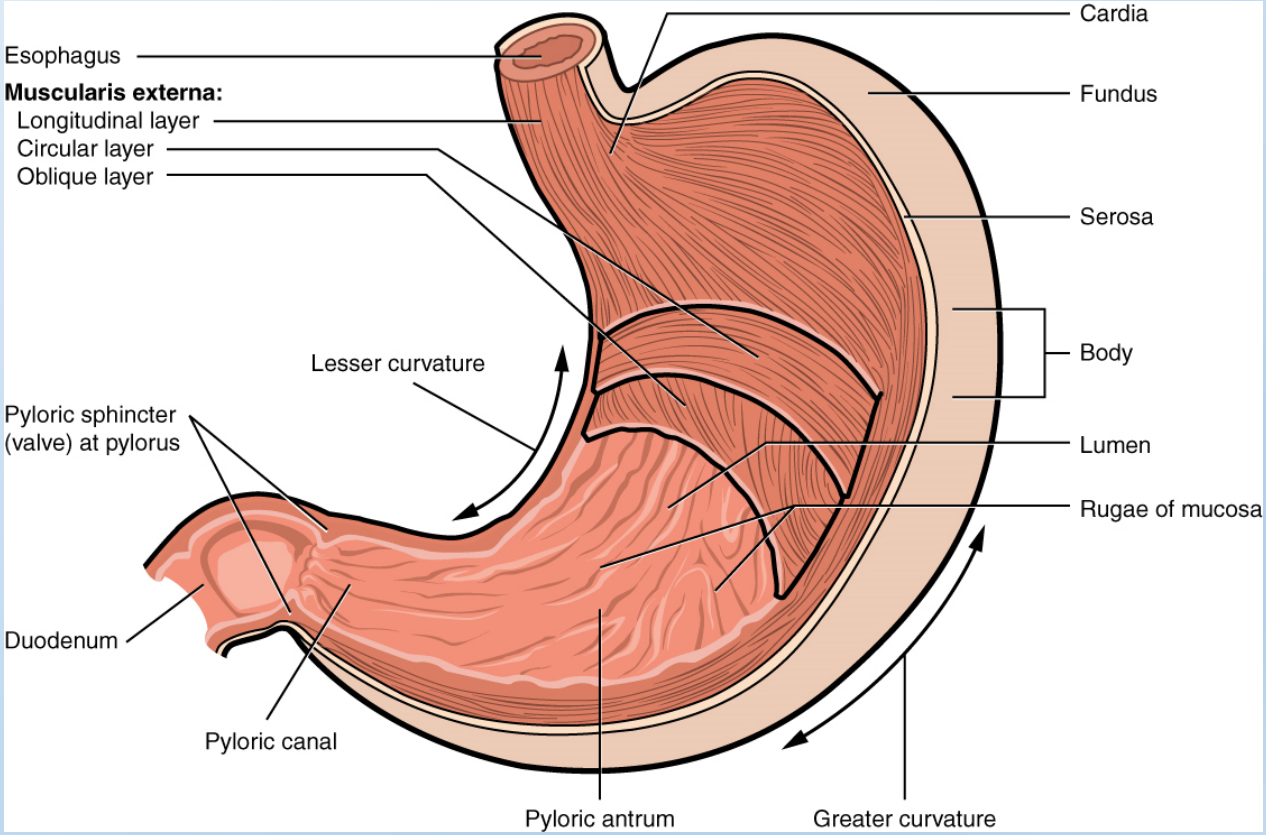
Stomach

Four major regions:

- **Cardia**
- **Fundus**
- **Body**
- **Pylorus**

Additional inner oblique muscle in the muscularis layer

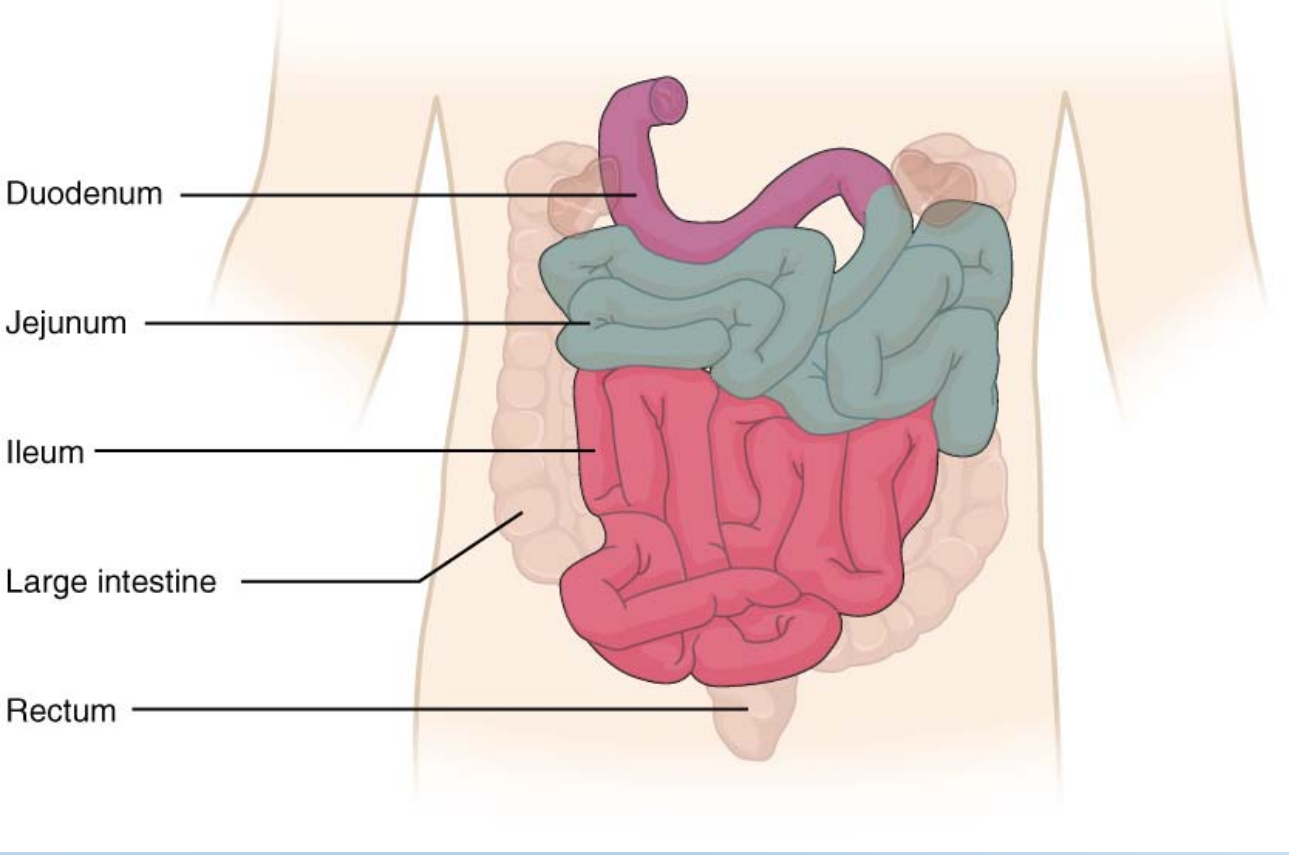
[Stomach overview (5:58)]



Small Intestine

Regions include the **duodenum**, **jejunum**, and **ileum**

Several accessory organs enter via **hepatopancreatic sphincter**

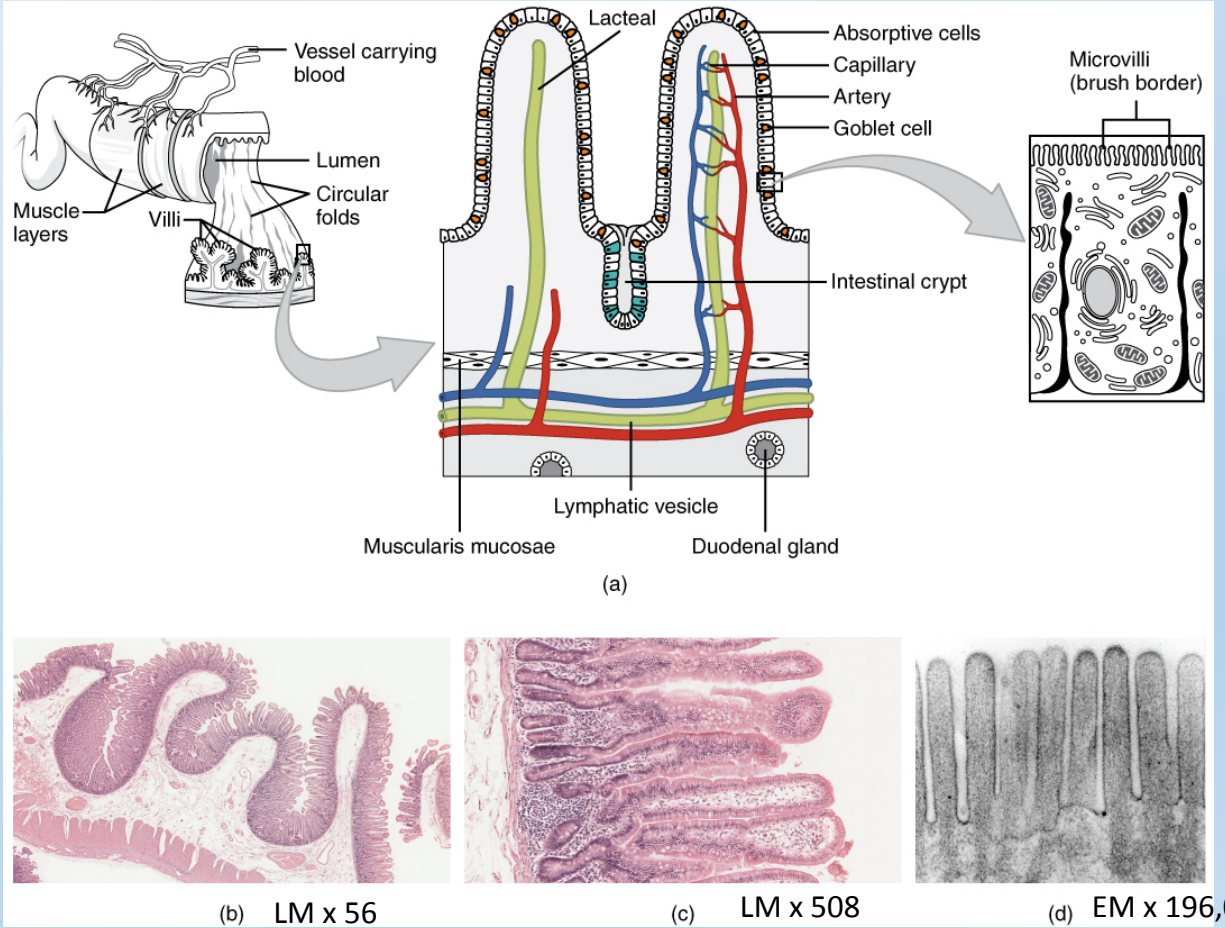


Small Intestine Histology

Circular folds, **villi**, and **microvilli** maximize surface area for minimized volume (a L to R)

Micrographs

- Circular folds (b)
- Villi (c)
- Microvilli (d)

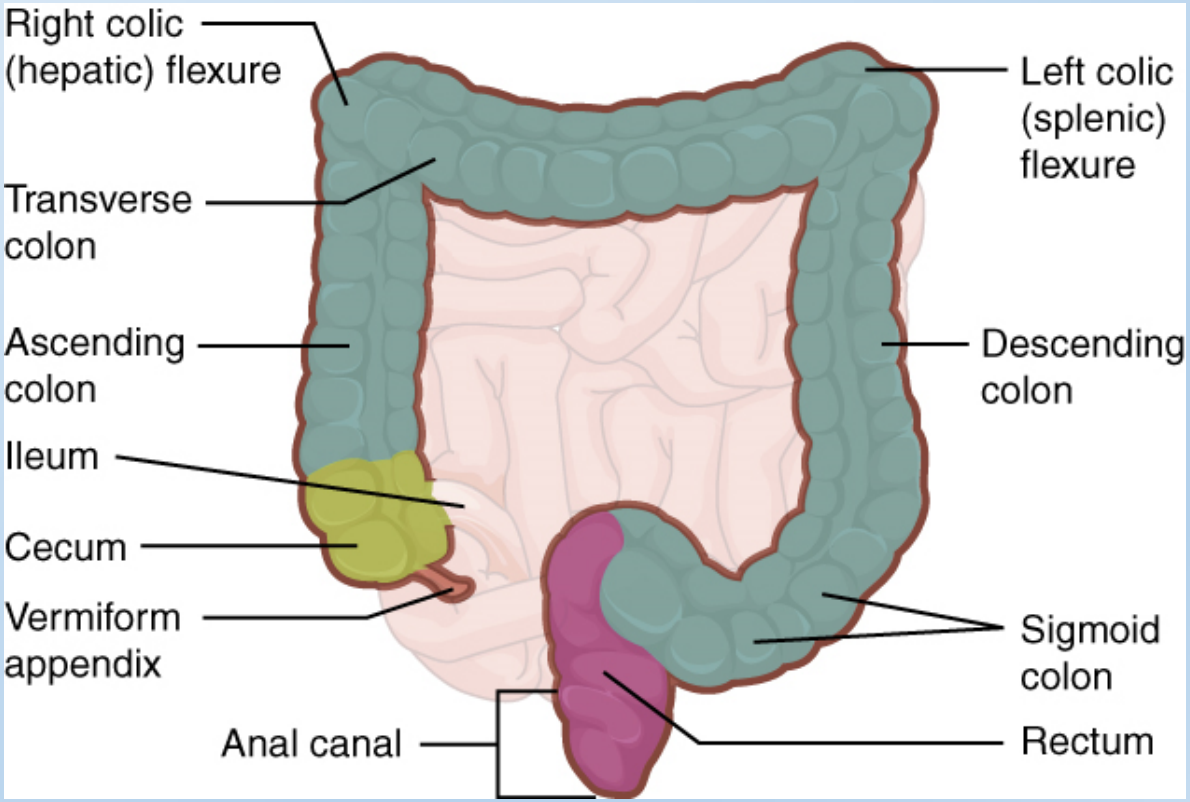


(credit b-d: Micrograph provided by the Regents of University of Michigan Medical School © 2012)

Large Intestine

Regions include the **cecum** with **appendix**, **colon**, **rectum**, and **anal canal**

Intestinal absorption (13:30)

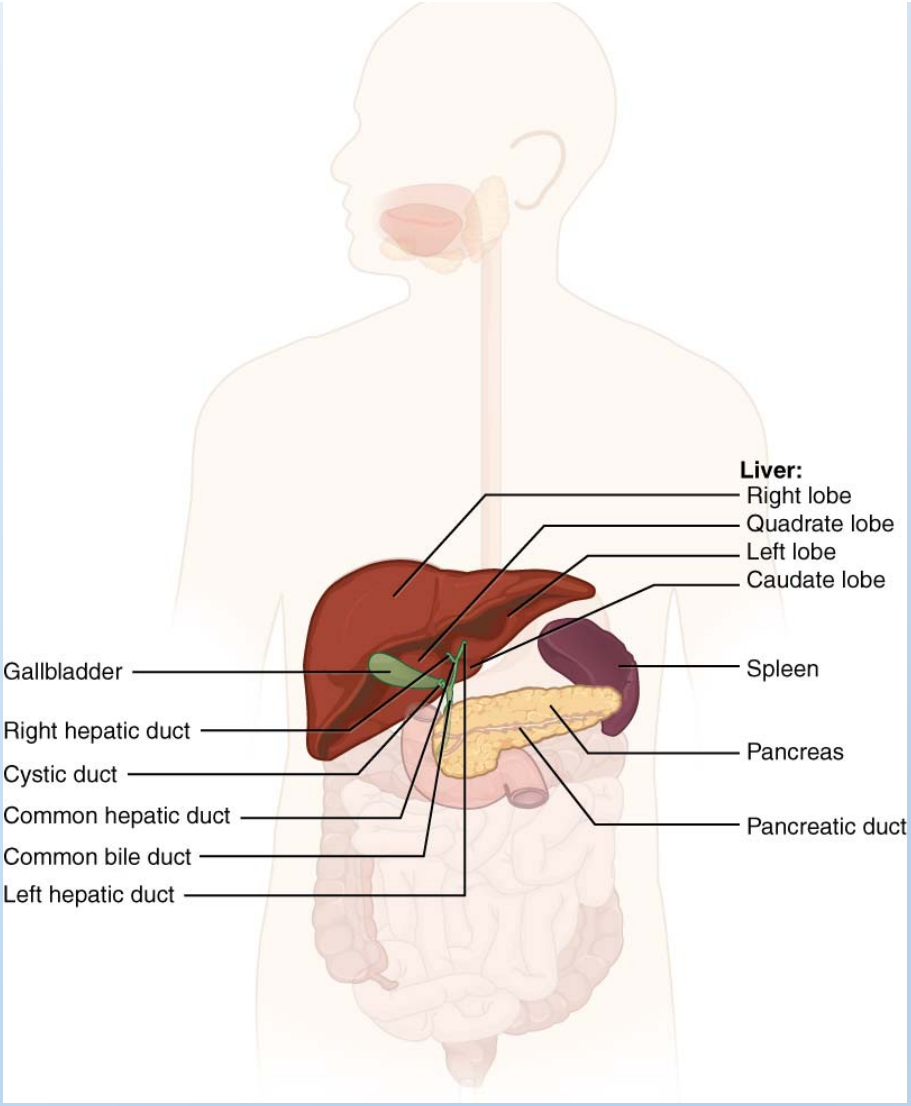


Accessory Organs

considered accessory digestive organs, but their roles are vital

- Liver
- Pancreas
- Gallbladder

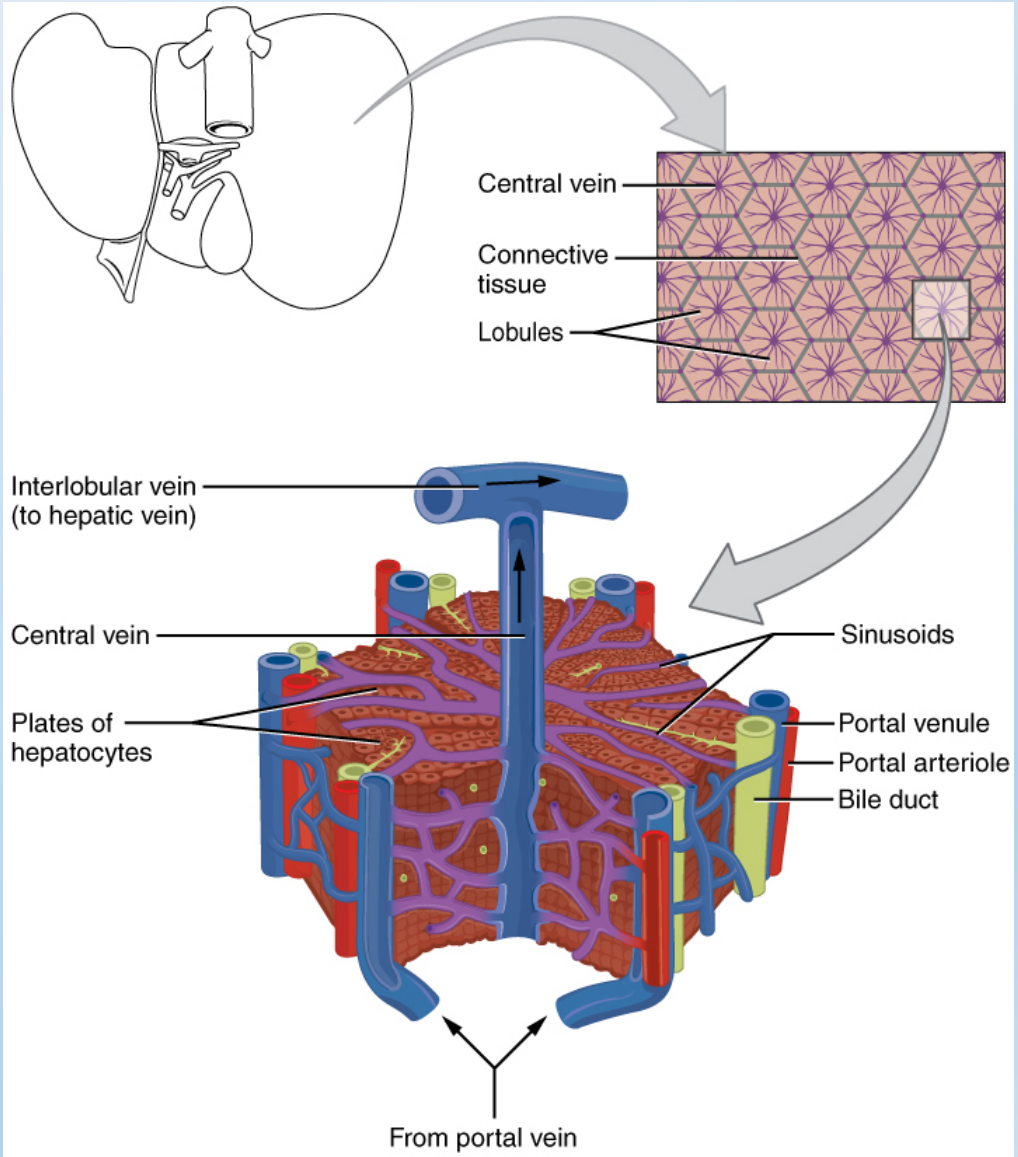
Salivary glands (discussed earlier) too



Liver

receives oxygenated blood from the **hepatic artery** and nutrient-rich deoxygenated blood from the **hepatic portal vein**

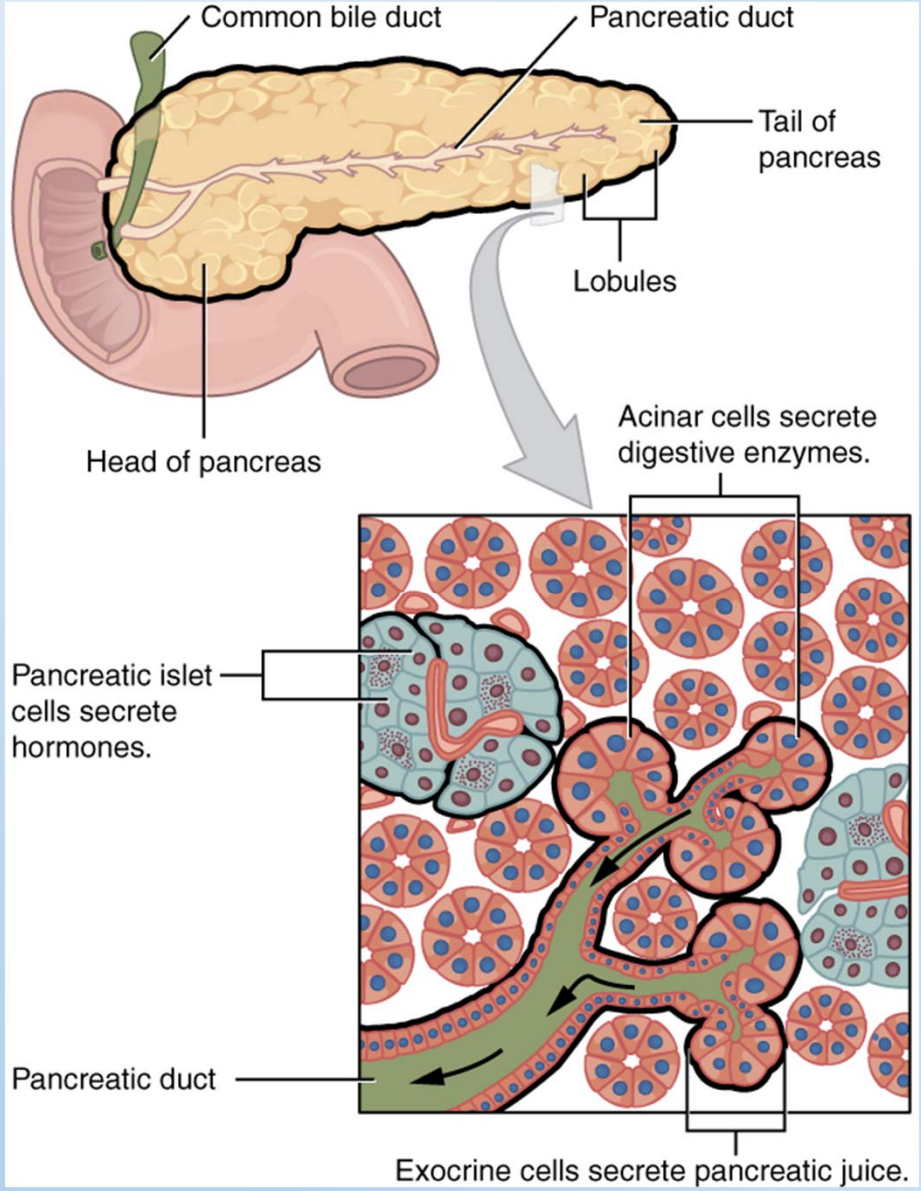
- Filters blood and processes nutrients
- Synthesizes **bile** to emulsify lipids



Pancreas

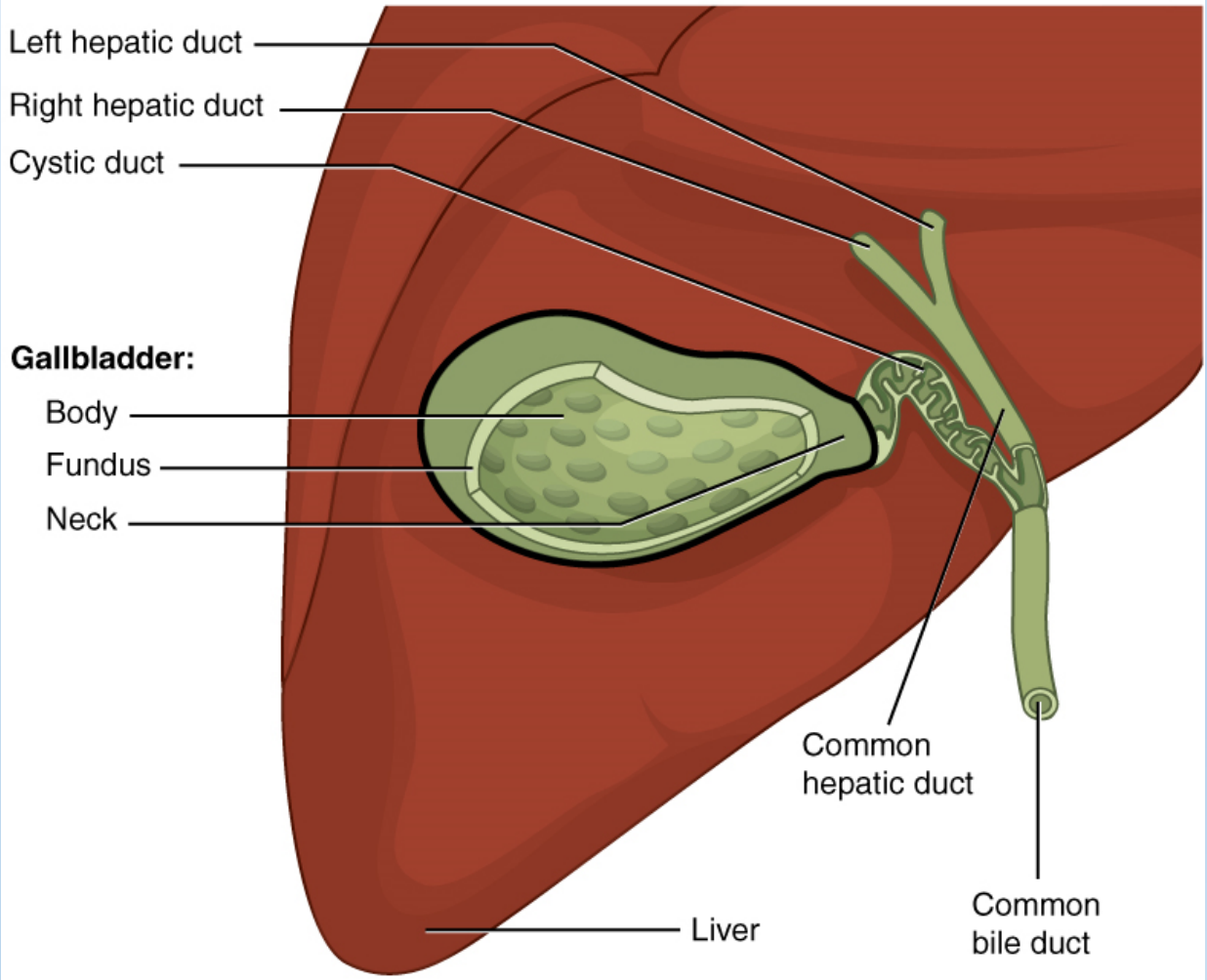
Acinar cells deliver **pancreatic juice** to the duodenum through the pancreatic duct

Pancreatic islets secrete insulin and glucagon



Gallbladder

stores and concentrates bile for release to the small intestine on demand via the **cystic duct**



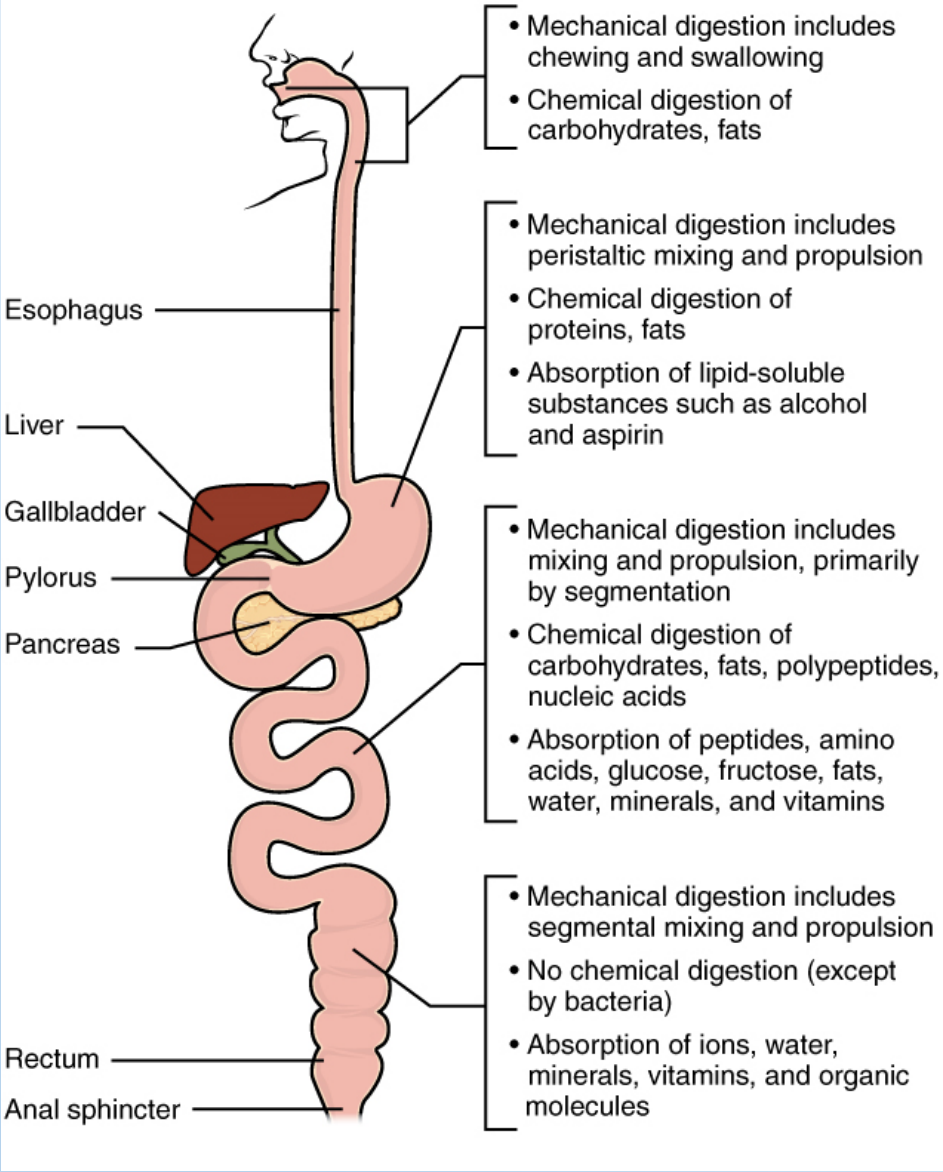
Viral Hepatitis
Differential Features

Features	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis D	Hepatitis E
Genome type	Ss RNA	Ds DNA	Ss RNA	Ss RNA	Ss RNA
Genome size	7.5 kB	3.2 kB	9.4 kB	1.7 kB	7.5 kB
Incubation period, days (mean)	15-49 (30)	28-160 (70-80)	15-160 (50)	21-140 (35)	15-65 (42)
Fecal-oral transmission	yes	no	no	no	yes
Parenteral transmission	rare	yes	yes	yes	no
Sexual transmission	no	yes, common	yes, uncommon	yes, uncommon	no
Fulminant hepatitis	<1%	<1%	rare	2-7.5%	~1%, 30% in pregnancy
Chronic hepatitis	no	10%	85%	90% with superinfection	no

Digestion and Absorption

Carbohydrates, proteins, lipids, and nucleic acids with unique locations, enzymes, and mechanisms

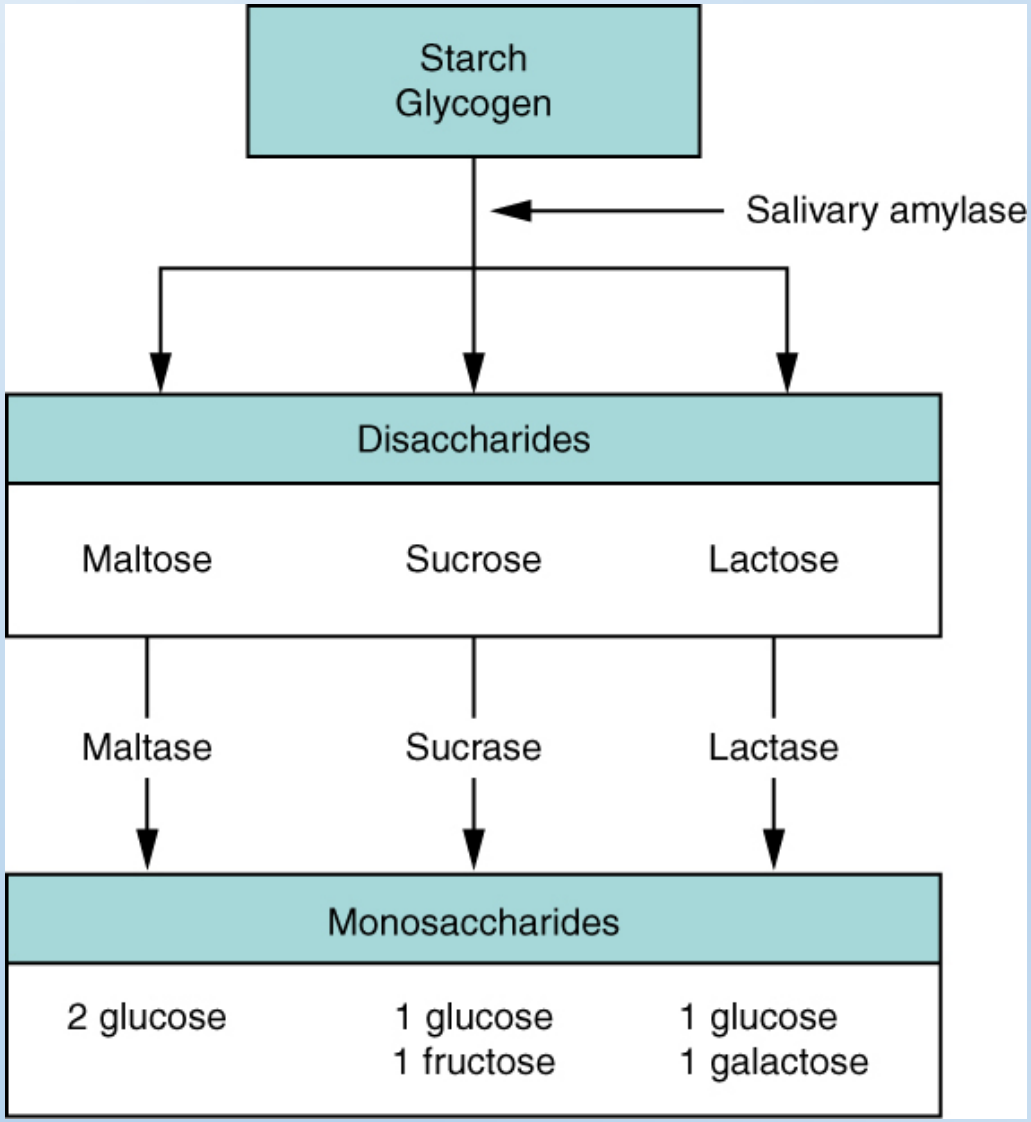
- Digestion enzymes table 23.8
- Absorption mechanisms table 23.10



Carbohydrate Digestion

Begins in mouth, stops in stomach, and finishes in small intestine

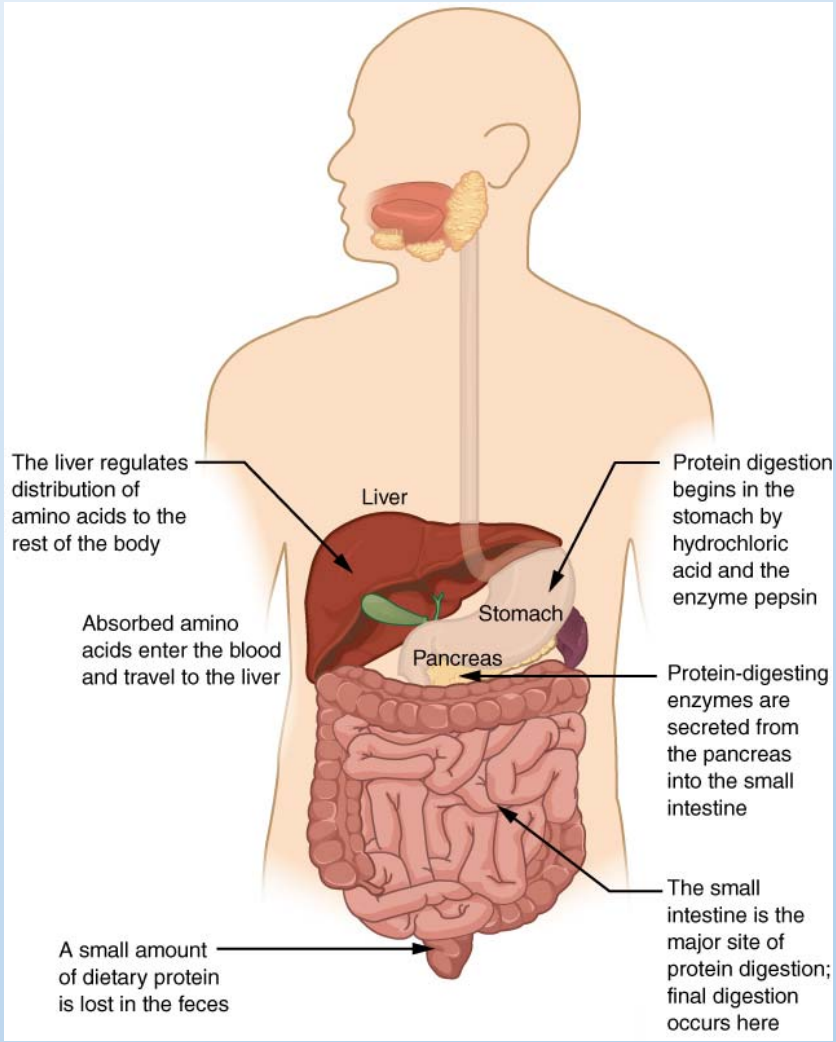
Broken down into monomers in a series of steps

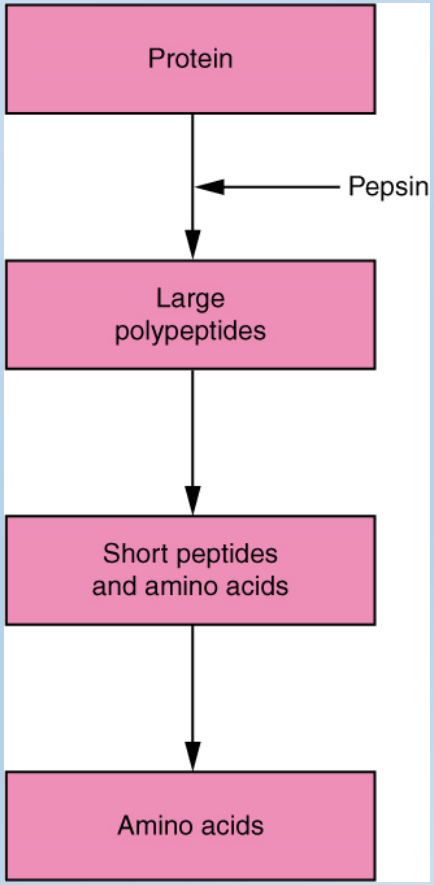


Protein Digestion

Begins in the stomach and is completed in the small intestine

Broken down into monomers in a series of steps

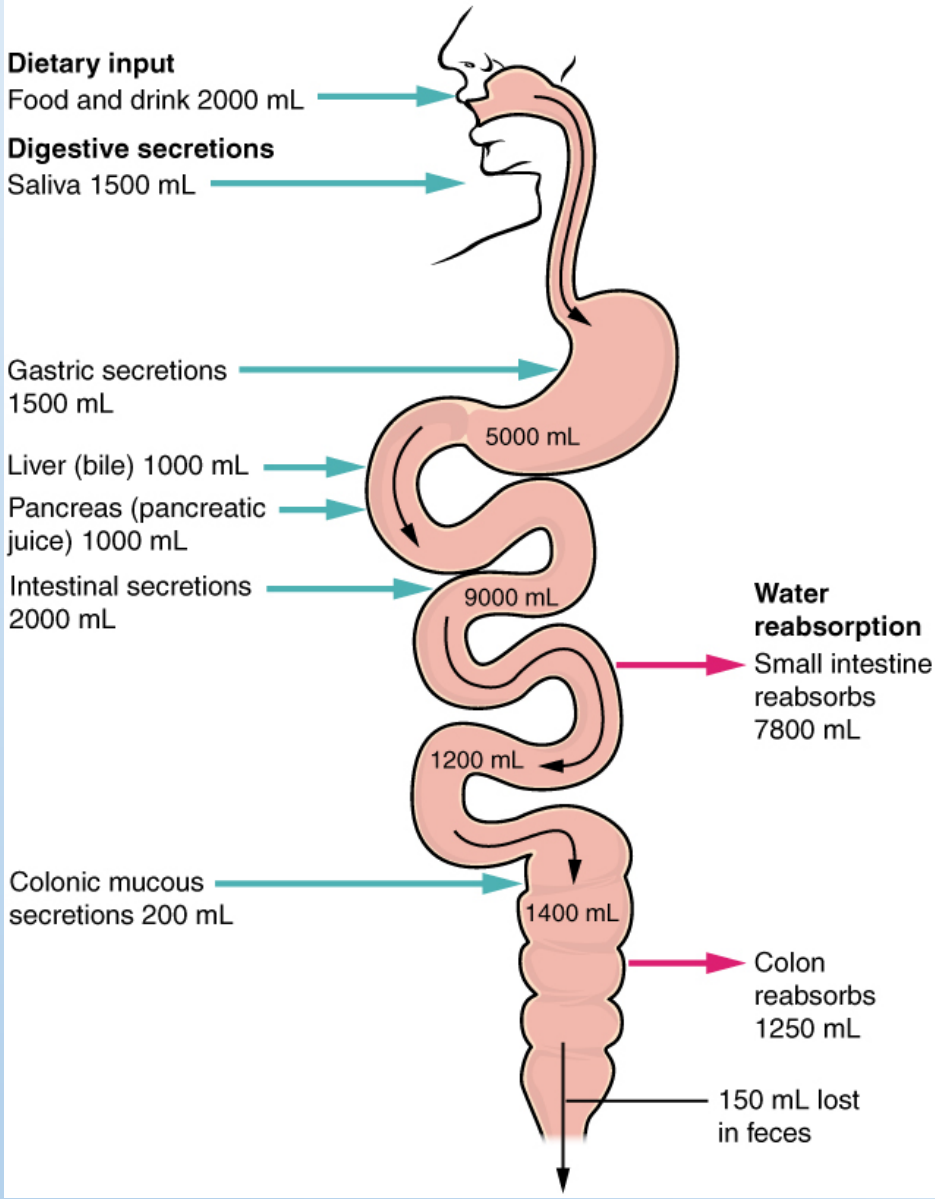




Water Absorption

Most occurs in the large intestine

Minerals and water soluble vitamins in tandem



Lipid Absorption

Transformed into **micelles** and **chylocmicrons**

Lacteals transport