The Digestive Apparatus: Overview & Regional Anatomy

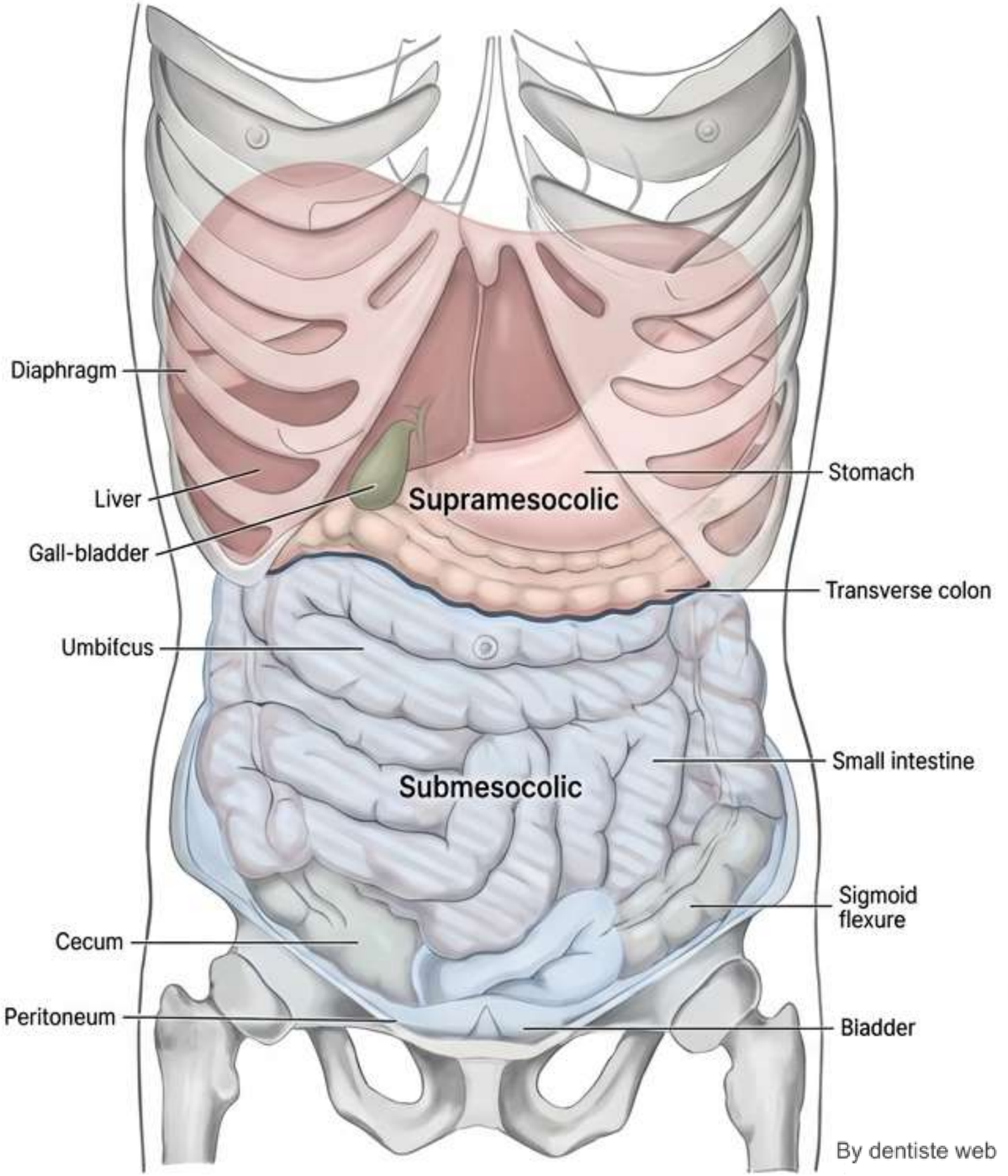
Definition & Composition

- **Definition:** A set of organs responsible for the transformation, digestion, and absorption of ingested food. It is the first system to differentiate in the embryo.
- **Extent:** It extends from the mouth to the anus [Ref: Q03].
- **Composition:**
  - **Oral cavity**, pharynx.
  - **Digestive tract**.
  - **Accessory glands:** Salivary glands, Liver [Ref: Q03], Pancreas [Ref: Q08], Spleen.

Regional Anatomy (Topographical Division)

The abdominal cavity is divided by the transverse colon into two regions:

1. **Supramesocolic Region:**
   - Located **above** the transverse colon [Ref: Q17].
   - **Contents:** Liver, omentum, bile ducts, Stomach [Ref: Q01, Q30], Duodenum, Pancreas, and Spleen.
2. **Submesocolic Region:**
   - Located **below** the transverse colon.
   - **Contents:** Small intestine (with the mesentery), Colon, and Greater Omentum.



The Oral Cavity I: Boundaries & The Vestibule

Descriptive Anatomy

Role: Initial part of the digestive tract containing the organ of taste **[Ref: Q27]**. Responsible for salivation, chewing, swallowing, and phonation phonation **[Ref: Q27]**.

- **Location:** Cephalic region, below nasal cavities and maxillae **[Ref: Q04]**.
- **Communications:**
  - **Anteriorly**: With the outside environment through the oral opening.
  - **Posteriorly**: With the pharynx **[Ref: Q27]**.

Boundaries

Anteriorly: The lips (Labial region) **[Ref: Q27]**.

Posteriorly: The soft palate.

Laterally: The cheeks (Jugal/Genian region).

Below: The floor of the mouth.

Above: The palate.

The Oral Vestibule & Teeth

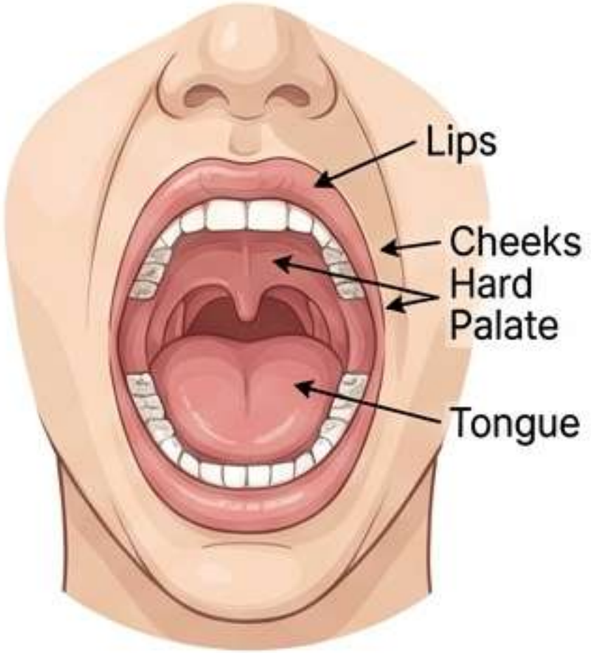
Alveolar Arches: Divide the oral cavity into two parts **[Ref: Q27]**.

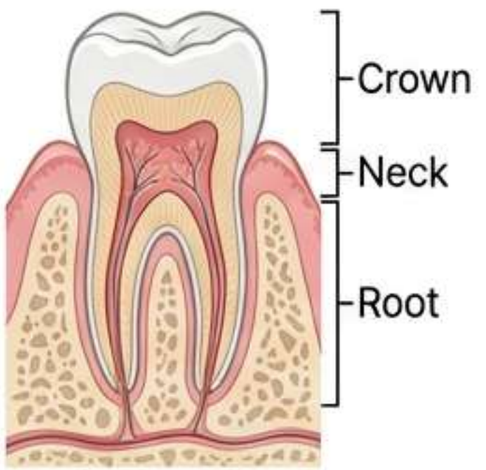
- **Composed of**: Bone, gum, and teeth.

Teeth: **32 teeth in an adult** (16 per jaw).

Distribution: 4 incisors, 2 canines, 4 premolars, 6 molars.

Parts: **Crown** (visible), **Root** (invisible), joined by the **neck**.





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The Oral Cavity II: The Tongue & Palate

The Tongue

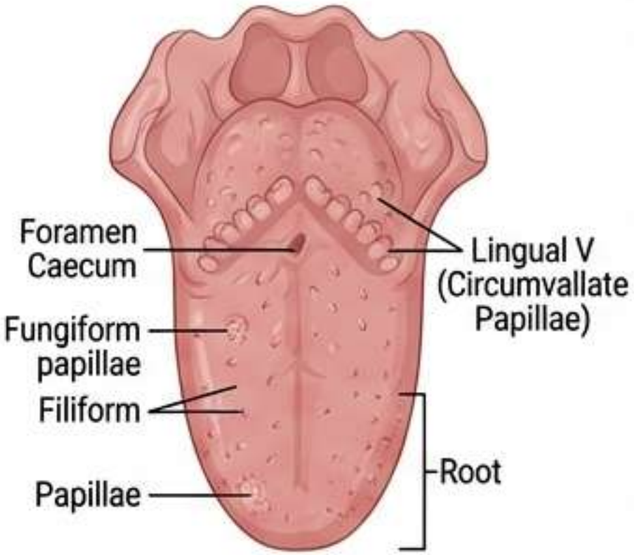
- **Role:** Organ of taste involved in swallowing, chewing, and articulation **[Ref: Q21]**.
- **Structure:**
  - **Skeleton:** Osteofibrous (hyo-glossal membrane and lingual septum) **[Ref: Q21]**.
  - **Muscles:** Seventeen **(17)** in number (intrinsic and extrinsic) **[Ref: Q21]**.
- **Morphology:**
  - **Root (Base):** Attached to hyoid bone and mandible **[Ref: Q21]**.
  - **Body:** Mobile. Dorsal surface contains taste buds forming the **lingual V** (circumvallate papillae) **[Ref: Q26]**.
  - **Inferior Surface:** Joined to floor of mouth by the **lingual frenulum** **[Ref: Q21]**.

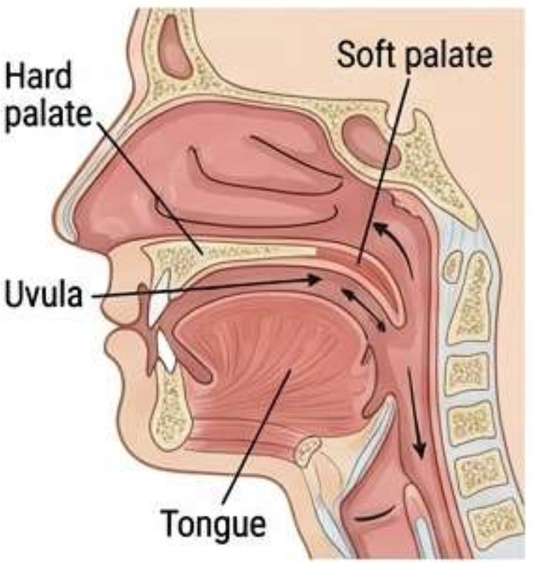
The Palate

- **Hard Palate:** Bony, formed by upper jawbone and palatine bone **[Ref: Q28]**.
- **Soft Palate (Velum):** Fibro-muscular.
  - Separates nasopharynx from oropharynx **[Ref: Q28]**.
  - Continues downwards to the **uvula** **[Ref: Q28]**.

Isthmus of the Throat

- Bounded laterally by the **tonsillar fossa** (contains palatine tonsil) **[Ref: Q28]**.





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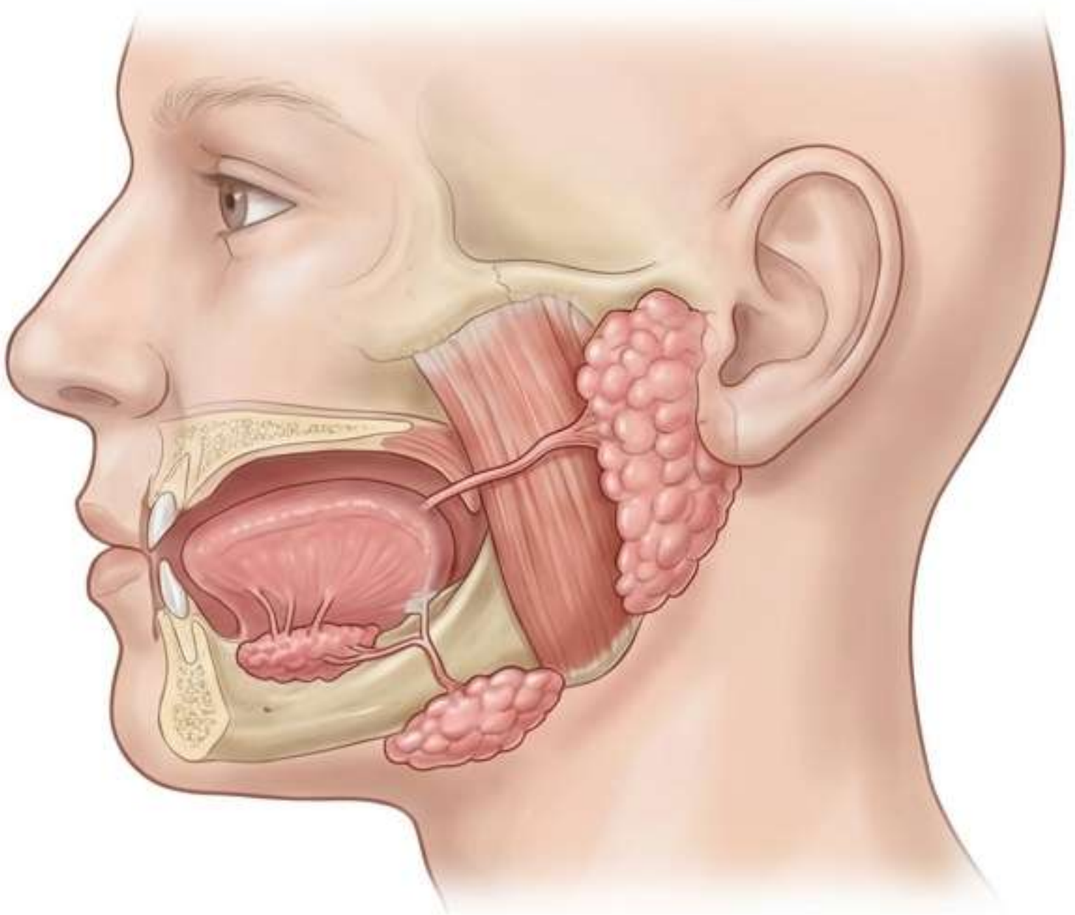
The Salivary Glands

Overview

- There are three pairs of salivary glands [Ref: Q08].
- They are connected to the oral cavity by their own excretory ducts [Ref: Q29].



1. The Parotid Gland

- **Size:** The largest gland.
- **Location:** Behind ascending branch of mandible, below external auditory canal.
- **Key Relations:** Formed by two lobes; the facial nerve circulates between them [Ref: Q29].
- **Duct:** Stenon's duct (excretory duct).

2. The Submandibular Gland

- **Location:** Lateral side of the suprahyoid region.
- **Duct:** Wharton's duct [Ref: Q29].

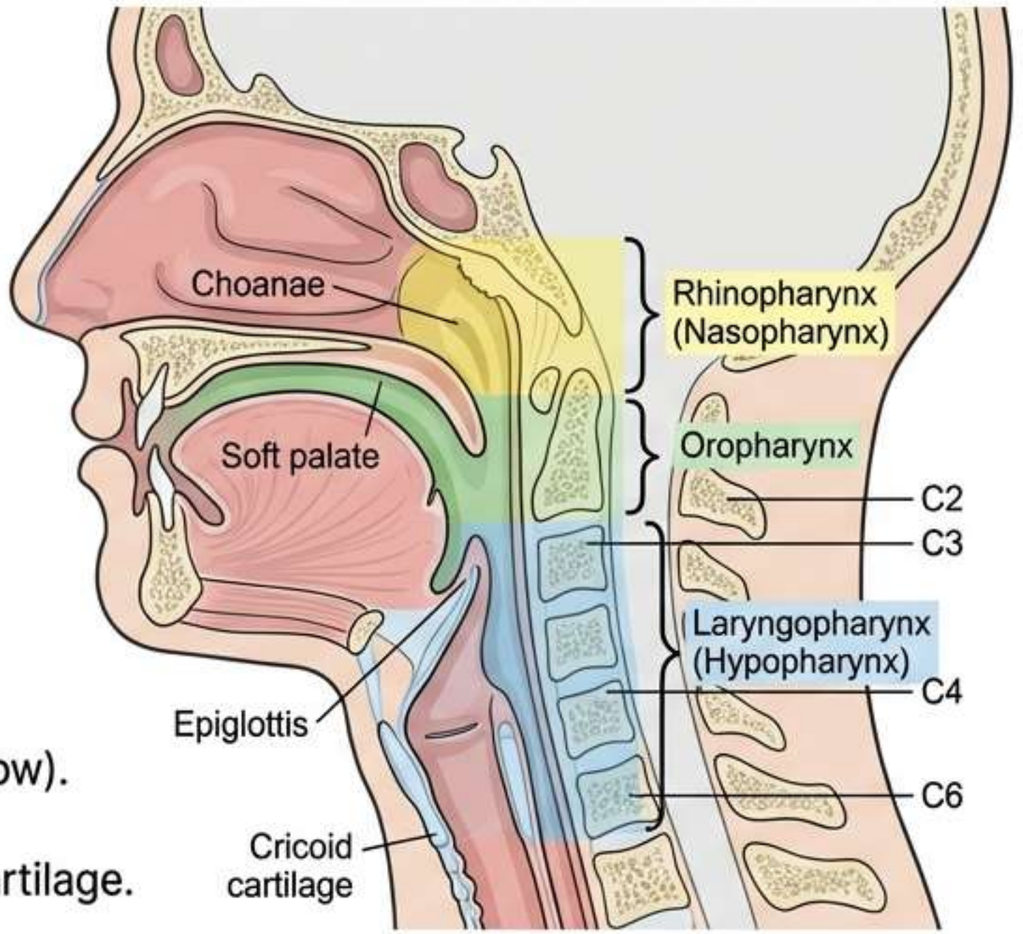
3. The Sublingual Gland

- **Location:** In the floor of the mouth [Ref: Q29].
- **Structure:** A group of small glands with several excretory ducts.

The Pharynx: The Aerodigestive Junction

Definition & Location

- **Type:** Muscular-mucous passageway; an aerodigestive junction [Ref: Q09].
- **Extent:** Base of skull to lower edge of cricoid cartilage (C6) [Ref: Q07, Q12].



Divisions (3 Floors)

1. **Rhinopharynx (Nasopharynx):**
   - Base of skull to soft palate.
   - Communicates with nasal cavities via choanae [Ref: Q06].
2. **Oropharynx:**
   - Crossroads where air and food meet.
   - Between soft palate (above) and upper edge of epiglottis (below).
3. **Laryngopharynx (Hypopharynx):**
   - Between upper edge of epiglottis and lower edge of cricoid cartilage.
   - Projects posteriorly on vertebrae C2, C3, C4 [Ref: Q12].
   - Connects to the esophagus [Ref: Q12].

Clinical Swiss Atlas

The Esophagus: Path & Narrowings

General Features

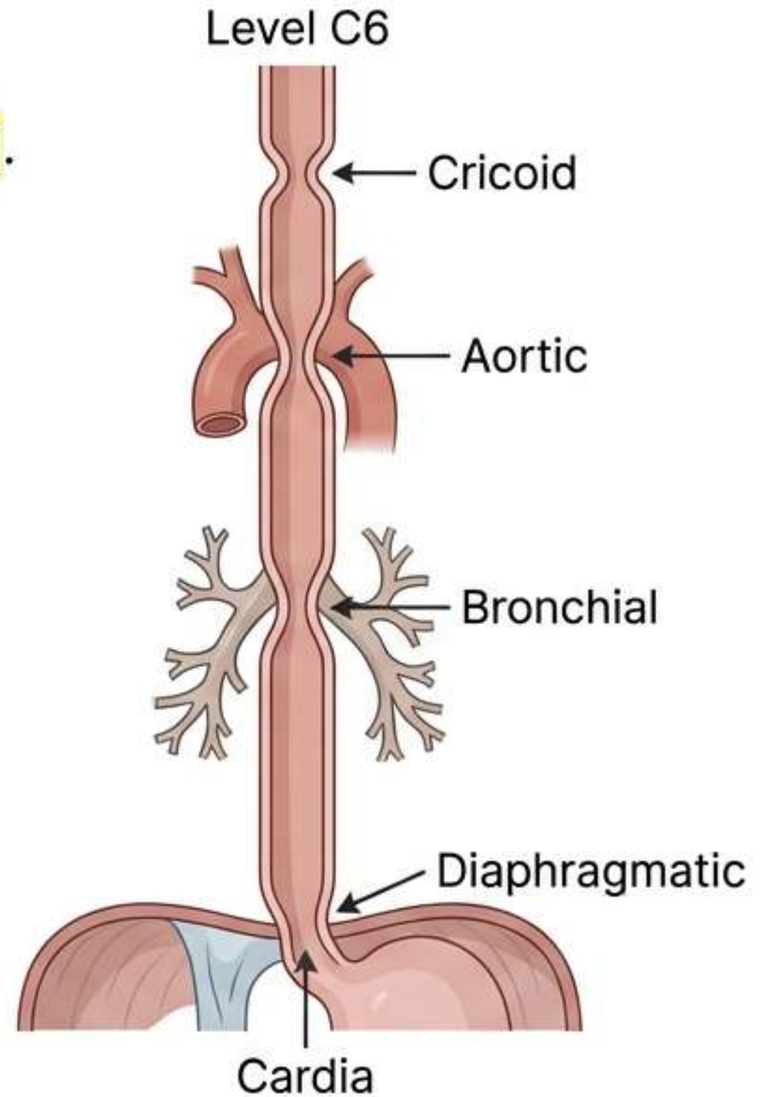
- **Definition**: Muscular duct ensuring descent of food bolus **[Ref: Q16]**.
- **Origin**: Lower edge of cricoid cartilage (**Level C6**) **[Ref: Q07]**.
- **Termination**: Opens into stomach at the **Cardia** **[Ref: Q16]**.

Dimensions

- **Total Length**: **25 cm**. (Cervical: 6cm, Thoracic: 16cm, Diaphragmatic: 1cm, Abdominal: 2cm).

Narrowings

1. **Cricoid:** Caused by cricoid cartilage **[Ref: Q16]**.
2. **Aortic:** Caused by aortic arch.
3. **Bronchial:** Caused by left bronchus **[Ref: Q05]**.
4. **Diaphragmatic:** Passing through diaphragm.



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The Stomach I: Morphology & Segments

Definition & Location

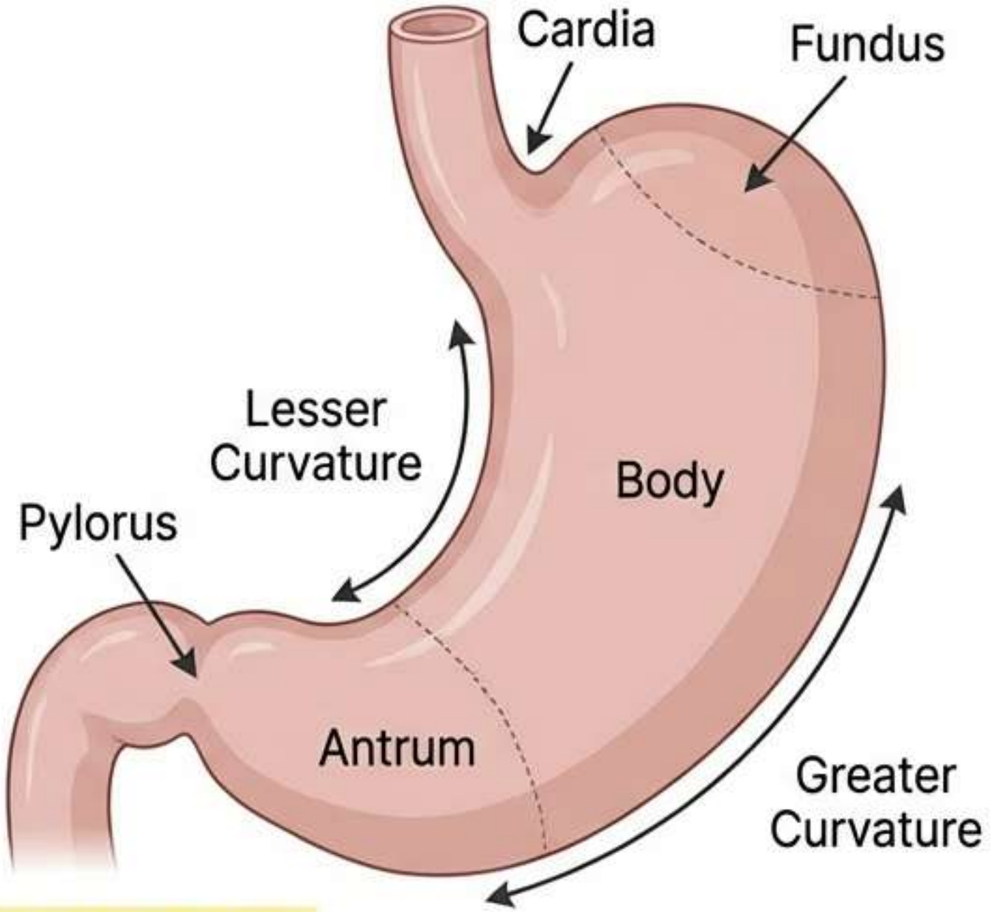
- **Region:** Supramesocolic region **[Ref: Q01, Q17, Q30]**.
- **Nature:** Thoraco-abdominal organ **[Ref: Q10, Q30]**.

External Morphology

- **Shape:** Elongated, J-shaped.
- **Curvatures:** Lesser curvature (right edge) and Greater curvature (left edge).

Segments

1. **Fundus:** Convex part (Greater curvature).
2. **Body:** Elongated part.
3. **Antrum:** Horizontal (antral-pyloric) part **[Ref: Q30]**.



Orifices

1. **Cardia**: Superior orifice connecting to esophagus **[Ref: Q01, Q05, Q16, Q30]**.
2. **Pylorus**: Inferior orifice connecting to duodenum **[Ref: Q10, Q17, Q30]**.

Clinical Swiss Atlas
The Stomach II: Structure & Vascularization

Internal Morphology

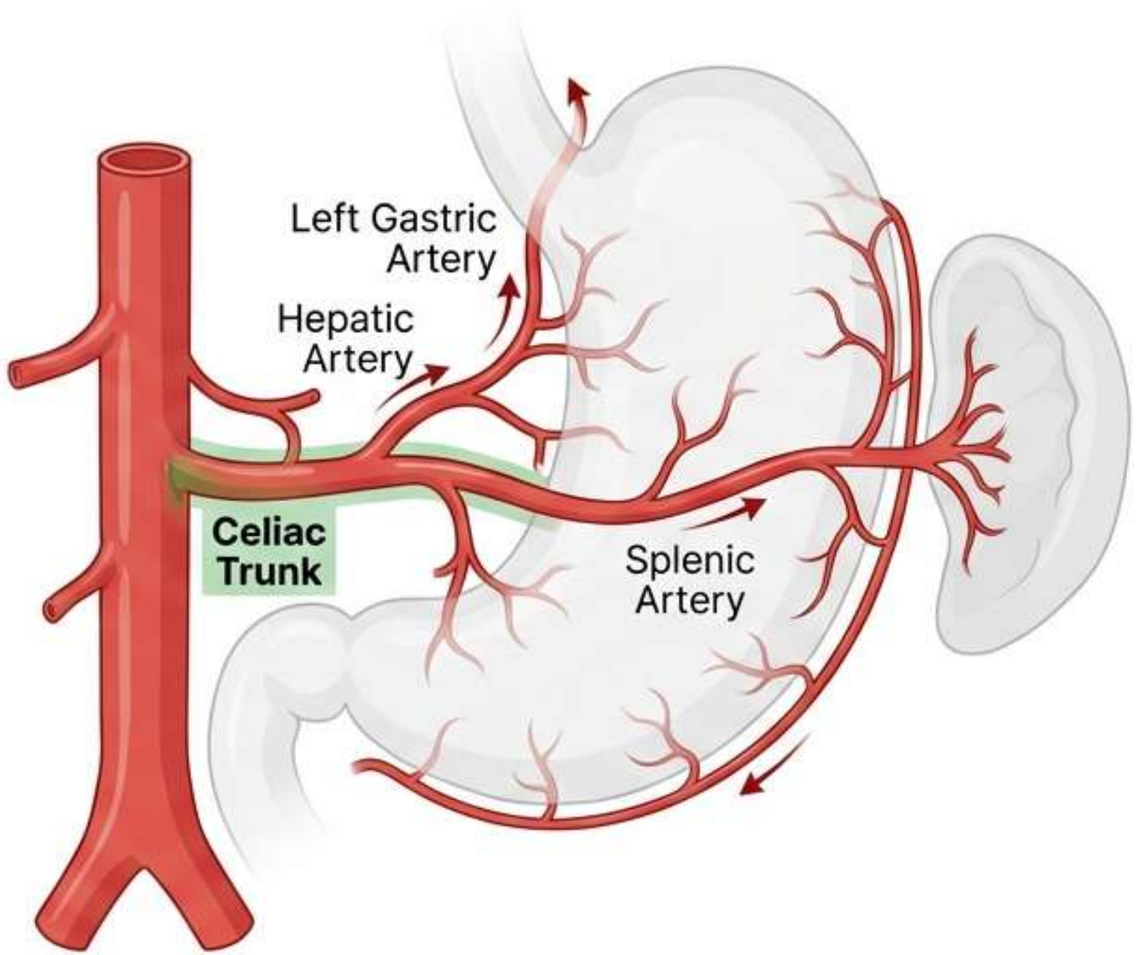
- **Mucosa:** Features numerous **longitudinal folds**.
- **Wall Layers (External to Internal):** Serosa, Muscularis, Submucosa, Mucosa.

Vascularization

- **Arterial Supply:** Depends mainly on the **Celiac Trunk** [Ref: Q11, Q17].
- **Origin:** Celiac trunk originates from the anterior surface of the abdominal aorta.

Branches of Celiac Trunk [Ref: Q11]

1. **Left Gastric Artery**.
2. **Hepatic Artery**.
3. **Splenic Artery**.



Clinical Swiss Atlas

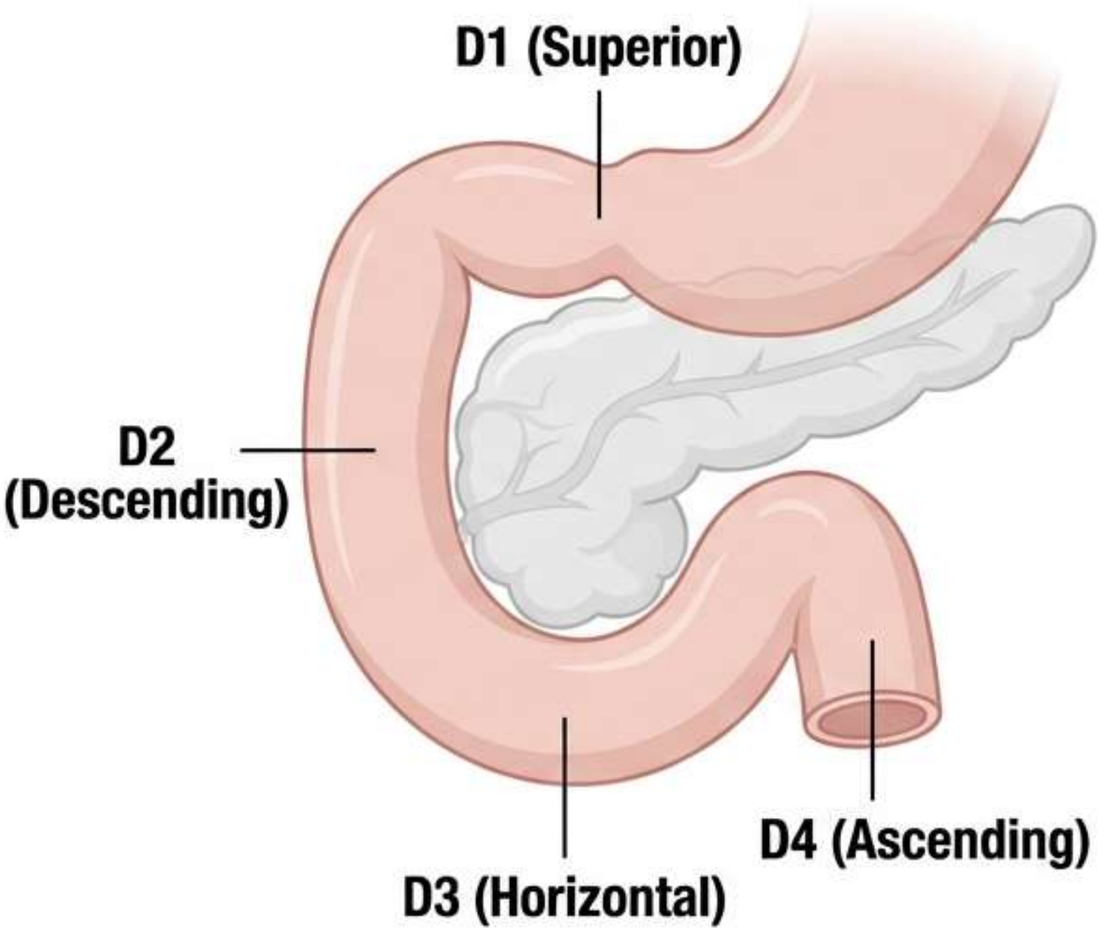
The Small Intestine I: The Duodenum

Overview

- **Definition**: Segment following the stomach and ending at the jejunum **[Ref: Q02]**.
- **Shape**: Frame open to the left (surrounds pancreas head).
- **Dimensions**: Length 30 cm; Diameter 3–4 cm.

Sections (D1–D4)

1. **D1 (Superior):**
   - Follows the pylorus and extends to the right.
   - Consists of a **mobile initial segment (bulb)** and a fixed segment.
2. **D2 (Descending):** Vertical section.
3. **D3 (Horizontal):** Horizontal section.
4. **D4 (Ascending):** Ascending section.



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Clinical Swiss Atlas

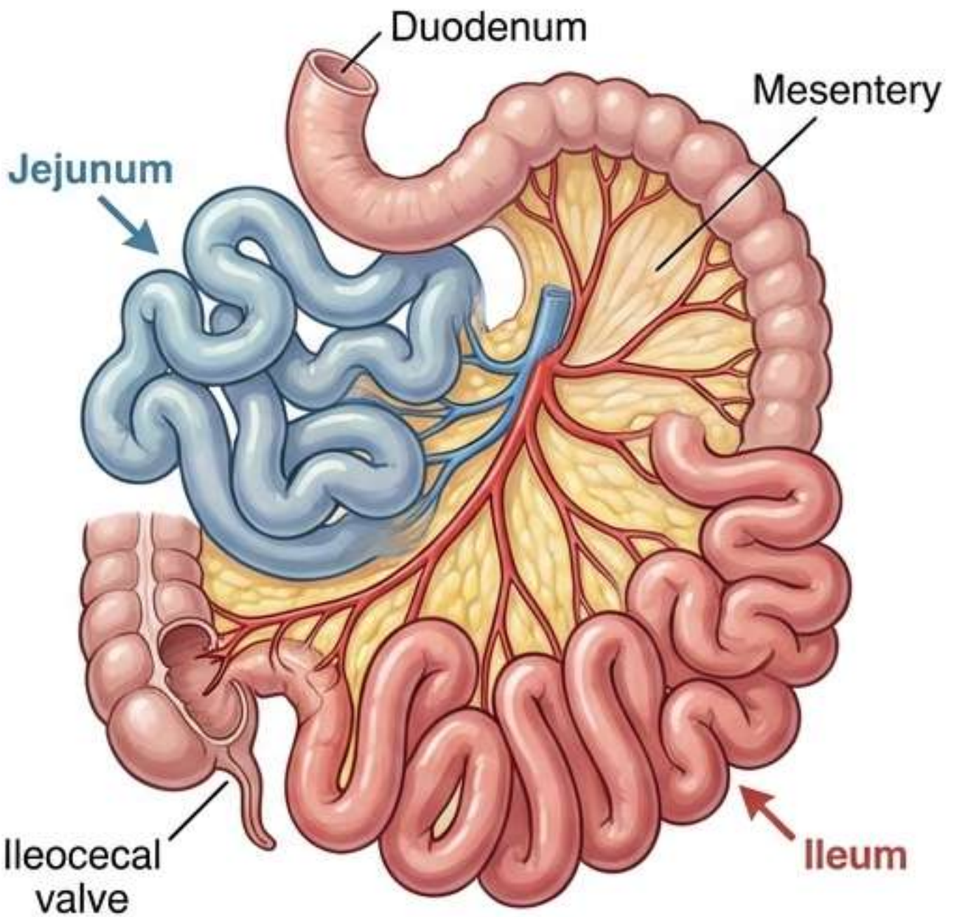
The Small Intestine II: The Jejunoileum

Anatomy

- Extent: Follows duodenum, ends at ascending colon at the ileocecal valve.
- Composition: Jejunum and Ileum [Ref: Q19].
- Dimensions: Length 6 meters.
- Location: Submesocolic layer [Ref: Q19].

Intestinal Loops

- Composed of about 15 U-shaped loops.
- Jejunum (Left): Transversely elongated loops.
- Ileum (Right): Vertically elongated loops.
- Fixation: Connected to the posterior wall by the mesentery [Ref: Q19].



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Clinical Swiss Atlas

The Large Intestine (Colon)

General Features

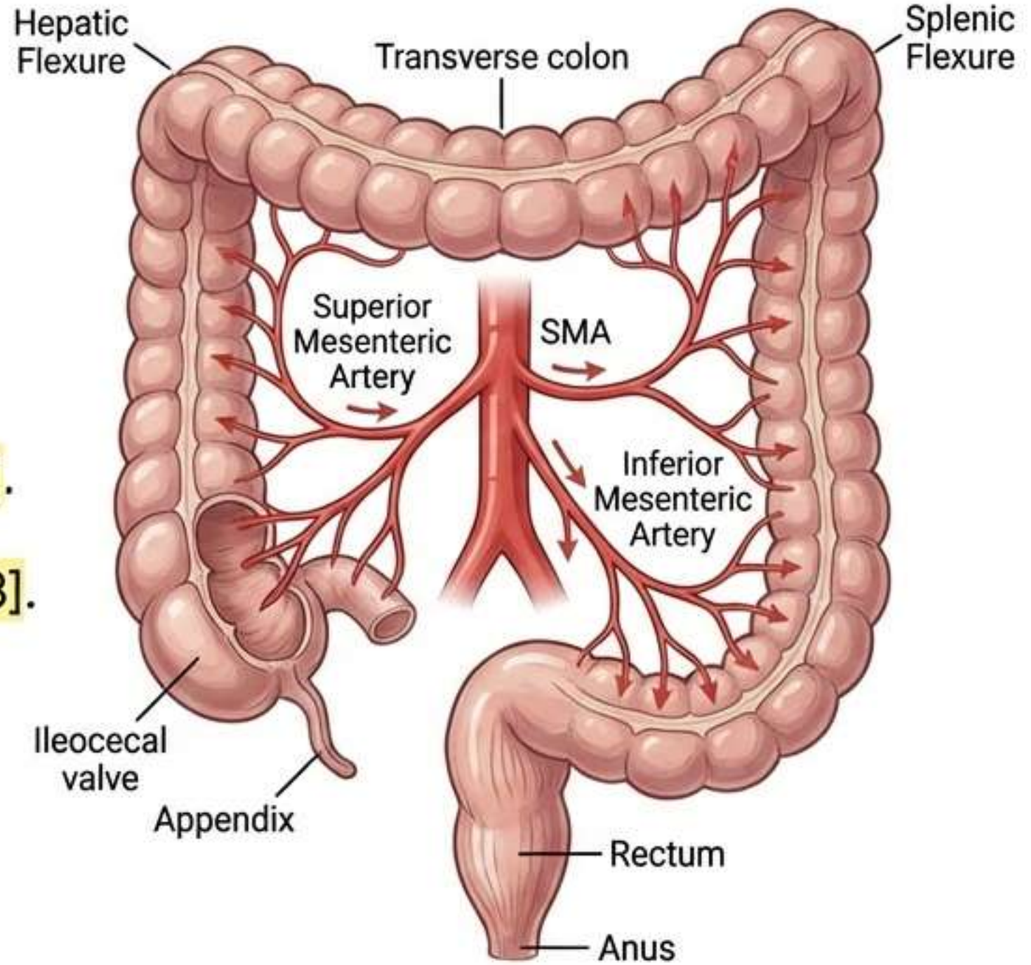
- **Extent:** From jejunoileum to anus.
- **Length: 1.5 meters.**

Segments & Angles [Ref: Q14]

1. **Caecum & Appendix.**
2. **Ascending Colon.**
3. **Right Colonic Angle (Hepatic):** Related to liver [Ref: Q14].
4. **Transverse Colon.**
5. **Left Colonic Angle (Splenic):** Related to spleen [Ref: Q23].
6. **Descending Colon.**
7. **Sigmoid (Pelvic) Colon.**

Vascularization

- **Superior Mesenteric Artery:** Right half [Ref: Q23].
- **Inferior Mesenteric Artery:** Left half [Ref: Q23].



The Rectum & Anal Canal

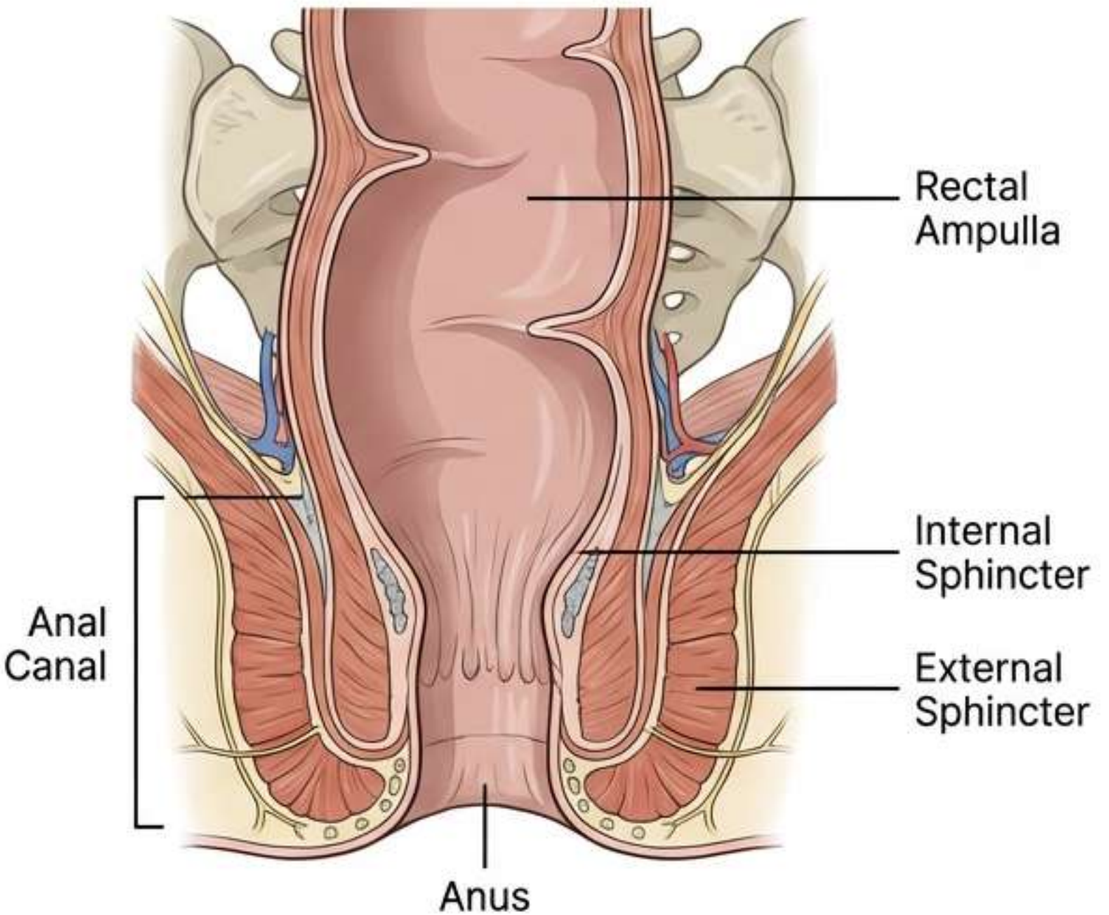
Anatomy

- Role: Storage of faecal matter.
- Location: Small pelvis, in front of sacrum/coccyx.
- Segments:
  1. Rectal Ampulla (Pelvic): 15 cm.
  2. Anal Canal: 3 cm.

  Total Length: 18 cm.

Sphincter Apparatus

- Internal Sphincter:
  - Smooth muscle (involuntary).
  - Thickening of circular layer.
- External Sphincter:
  - Striated muscle (voluntary).
  - 3 layers (deep, superficial, subcutaneous).

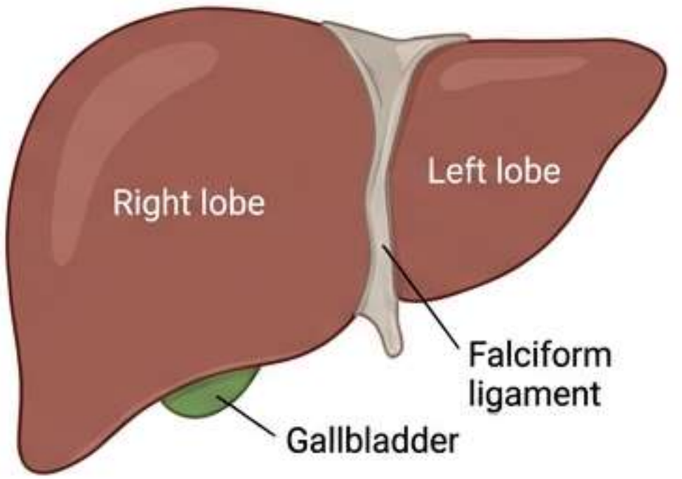


Clinical Swiss Atlas with Neue Haas Grotesk Display

The Liver I: Anatomy & Segmentation

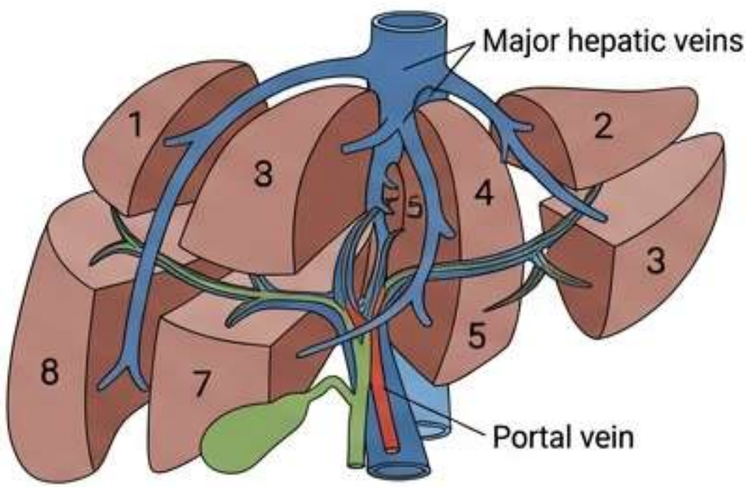
Descriptive Anatomy

- **Location:** Right hypochondrium, extending to epigastrium [Ref: Q15].
- **Size:** Weight 1.5 to 2 kg. Length 30 cm.
- **Capsule:** Surrounded by Glisson's capsule.



Morphology

- **Lobes:** Right and Left, separated by falciform ligament.
- **Inferior (Visceral) Surface:** Contains H-shaped groove (Hepatic hilum) and Gallbladder bed [Ref: Q15].



Segmentation

- 8 Segments (Couinaud’s segmentation) based on vascular distribution.

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The Biliary System & Liver Functions

Vascularization

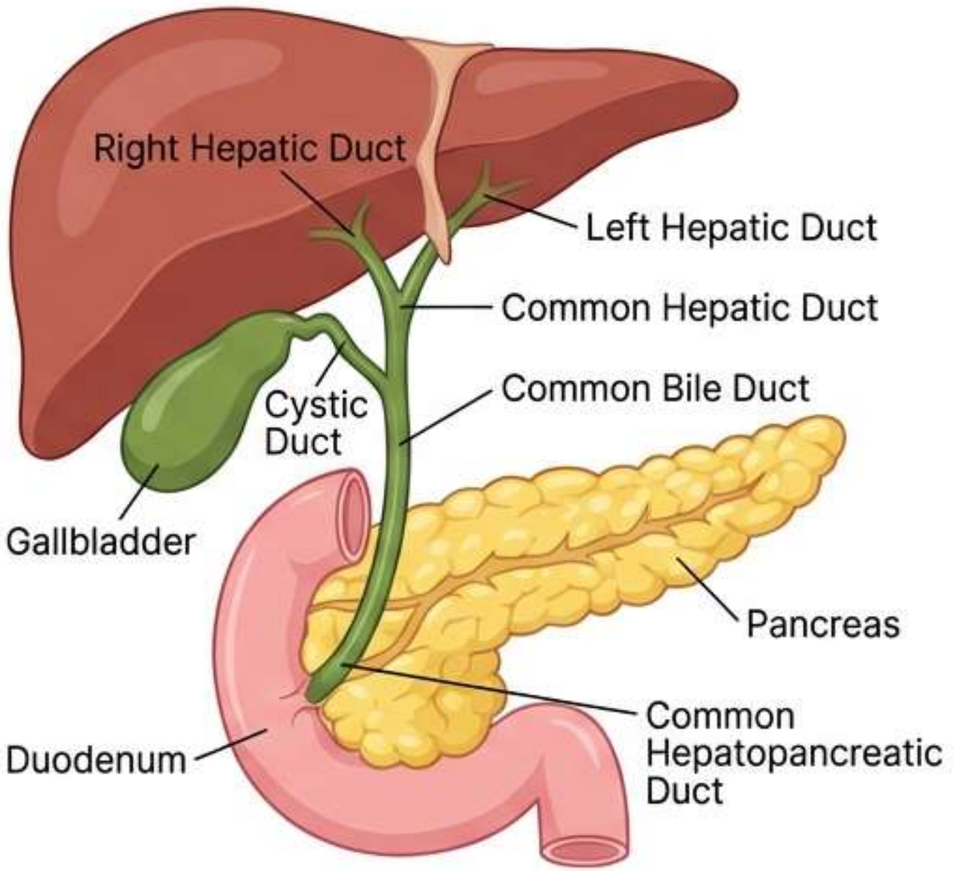
* **Double Supply**: Hepatic Artery & Portal Vein.
* **Portal Vein**: Supplies *more* blood; carries venous blood from digestive tract [Ref: Q15].

Biliary System

* **Gallbladder**: Bile reservoir located on underside of liver [Ref: Q15].
* **Common Bile Duct**: Formed by convergence of Hepatic and Cystic ducts. Opens into duodenum.

Functions

* **Exocrine**: Secretes **bile**.
* **Metabolic**: Metabolism of **proteins and carbohydrates** [Ref: Q24].
* **Storage**: Iron, Vitamin K.



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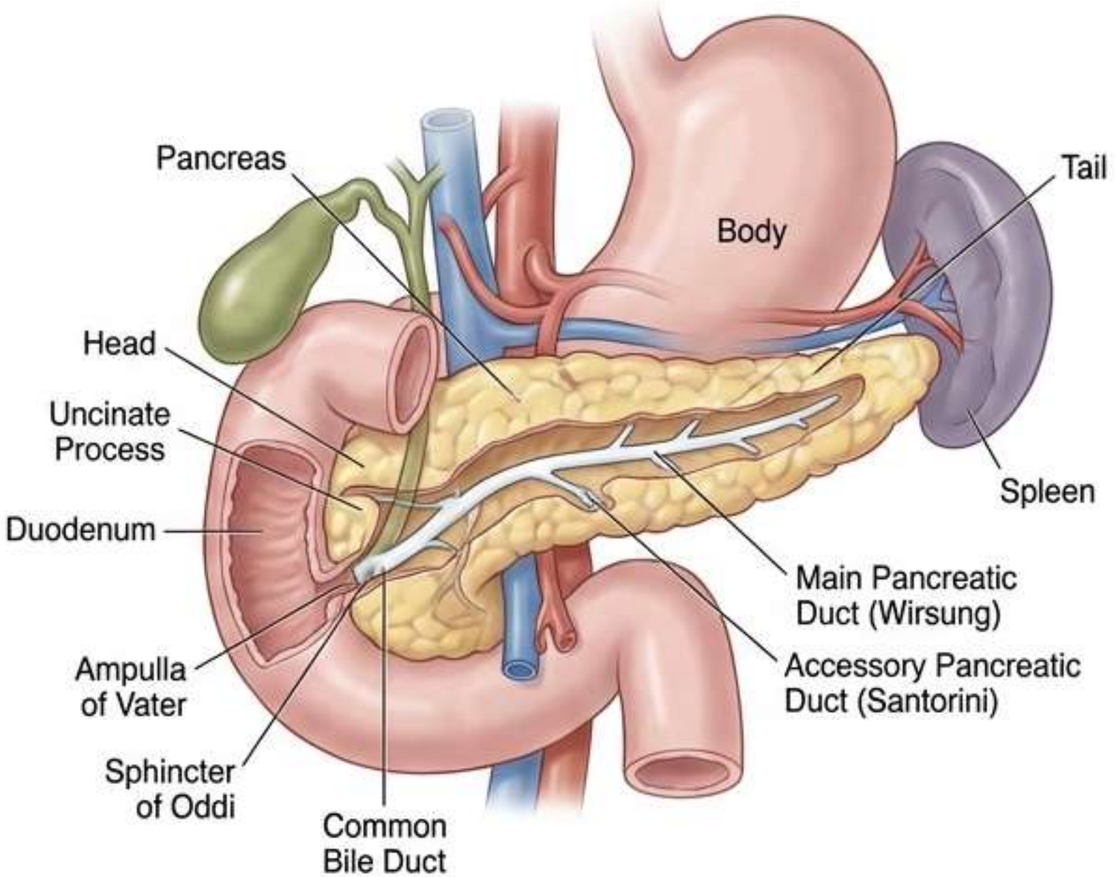
The Pancreas

Anatomy

- **Type:** Mixed **Exocrine and Endocrine** gland [Ref: Q20, Q25].
- **Location:** Abdominal cavity, behind stomach. Forms **duodenopancreatic block.**
- **Parts:** Head (with **uncinate process**), Body, Tail.

Ducts

- **Main (Wirsung):** Runs length of pancreas. Opens at **Ampulla of Vater**. Surrounded by **Sphincter of Oddi**.
- **Accessory (Santorini):** Branches off main duct.



Pathologies

Acute/Chronic pancreatitis, Cancer, Diabetes.