Digestive System:

“Gastrointestinal System”
- Consists of: Digestive Tract & Accessory Organs
  1. **Digestive Tract:** Muscular tube
     - “From the mouth to the anus”
     - Food passes through the tract

**Components:** Oral Cavity (Mouth), Pharynx, Esophagus, Stomach, Small, & Large Intestine (Colon/Rectum)
2. Accessory Organs:
   - Helping in digestion
   - Food does **NOT** pass through accessory organs

   **Components**
   - Teeth,
   - Tongue,
   - Salivary Glands,
   - Liver,
   - Gall bladder &
   - Pancreas

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Digestive Tract: Overview

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Digestive Tract Functions:
1. **Ingestion**: Intake of foods and liquids
2. **Mechanical Processing**: Physical reduction in *size*
3. **Secretion:** Glandular Release
   a. **Exocrine:** Digestive enzymes & chemicals
   b. **Endocrine:** Regulatory hormones

4. **Digestion:** Molecular breakdown
   - GOAL: Break down into absorbable units
   - Monosaccharides, amino acids, fatty acids

   ✓ Absorbed **through** the epithelium

- Monosaccharides
- Amino Acids
- Fat: Triglycerides
5. **Absorption**: Transport monomers through epithelial cells
   - GOAL: Transfer to Blood & Lymph

6. **Excretion**: Secretion of additional waste
   - Primarily LIVER – Bile

7. **Compaction**: Progressive dehydration and collecting of indigestible components
   - Readying for defecation/reclaiming water

• **Overall Function**: Reduce large molecules into small absorbable molecules
**Histological Organization: GI Tract**

- Layering of GI tract: Lumen space to surface
  1. **Mucous Membranes**: Line inside of internal organs, indirectly exposed to outside
  2. **Connective Tissue**: Binding and supportive
  3. **Smooth Muscle**: Involuntary
  4. **Serous Membrane**: Cover internal organs surface exposed to cavity space

**Naming of 4 LAYERS (tunics)**

1. **Mucosa**: Most VARIABLE
2. **Submucosa**
3. **Muscularis Externa**
4. **Serosa** (Serous Membrane – Visceral Peritoneum)

![Diagram showing the layers of the GI tract](image)
Variations in 4 LAYERS reflect specializations

Specialization = GI Tract ORGANS

Stomach versus Esophagus

4 Layers of Structure:
- Mucosa, Submucosa, Muscularis Externa, Serosa

1. Mucous Membrane: Mucosa
   - Lines interior of GI Tract
   - “In contact w/ to food”

- Composed of 3 Layers:
  a. Epithelium,
  b. Lamina Propria
  c. Muscularis Mucosae
a. **Epithelium**: Contacts passing food

- Stratified or Simple
- Glandular or non-glandular

**Esophagus**: Stratified
Squamous – non glandular

**Stomach**: Simple Columnar - glandular
b. **Lamina Propria**: Underlying Areolar CT

- **Contains**:
  1. **Blood & Nerve Tissue**:
      - Supplying epithelial tissue
  2. **Lymphoid Tissue**: “Immune”
      - White blood cell aggregations
      - **MALT**: Mucosae Associated Lymphoid Tissue
  3. **Glands**: Mucosal Glands
c. **Muscularis Mucosae:**
   
   *Border of Mucous Membrane*

   - **Smooth muscle band**
     
     ⇒ PULLS Mucosa into macroscopic folds
   - a. **Rugae:** Mucosal folds of stomach
   - b. **Plicae:** Mucosal folds of intestine

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2. **Submucosa**: Dense irregular Connective Tissue

- Surrounds: Mucosa
- Contains:
  a. Large **blood vessels**
  b. **Lymph tissue**: Especially in lower GI tract
  c. **Large Glands**: Submucosal Glands
  d. **Nerves**: Control glandular secretions

  * **Submucosal Plexus**: "Meissner’s Plexus"

3. **Muscularis Externa**: Muscle Wall

- Surrounds: Submucosa
- Contains:
  a. 2 – 3 Smooth Muscle Layers
    1. Inner Circular Layer
    2. Outer Longitudinal Layer
    3. **Oblique Layer - Stomach**
Function: **Peristalsis**
- Waves of contractions moving ingested contents

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**Peristalsis: Stomach Antrum**

**Endoscopy videoclip:**
Peristaltic Wave in the Gastric Antrum

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**b. Myenteric Plexus**: Nerve network controlling peristalsis
* Exception: Entrance & Exit
  - Skeletal / Voluntary muscle
  - Oral cavity and anus

4. **Serous Membrane**: Serosa
   - Surrounds: **Muscularis Externa**
   - Function:
     a. **Attaches & stabilizes digestive tract**
     b. **Secretes Serous Fluid**
     c. **Supports blood vessels & nerves**