I. MAJOR COMPONENTS
   1. Gastrointestinal tract
      - oral cavity
      - pharynx
      - esophagus
      - stomach
      - small intestine
      - large intestine
   2. Accessory digestive organs
      - teeth
      - tongue
      - salivary glands
      - liver
      - gall bladder
      - pancreas

II. MAIN FUNCTIONS
   1.
   2.
   3.
   4.
III. PHASES OF DIGESTION

1.

2.

3.

IV. FEED-FORWARD vs. FEED-BACK CONTROL

Feed-forward =

Feed-back =

Clinical example: Ghrelin Secretion
V. NEURAL REGULATION

1. Extrinsic (autonomic control)
   - parasympathetic effects
   - sympathetic effects

2. Intrinsic
   Enteric nervous system (ENS)

   mechanism:

   role:
VI. MOUTH
1. role in digestive function
   a. mechanical breakdown

   b. **Secretion** in the mouth

   c. **Digestion** in the mouth

       Carbohydrates

       Proteins & Lipids

   d. **Absorption** in the mouth

   e. **Motility** in the mouth

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VII. ESOPHAGUS
Clinical Application: Heartburn (Gastro-esophageal reflux disorder)

Symptoms:

What do you think could cause heartburn?

We have all seen commercials for heartburn treatments, but what do you think these medications actually do to ease heartburn?

VIII. STOMACH
1. distensible pouch between esophagus and small intestine
2. stomach wall

3. role in digestive functions
   a. Secretion in the Stomach
      Mucous
      Pepsinogen
VIII. STOMACH (cont.)
   a. Secretion in the Stomach (cont.)

   HCl

   2 roles: a.

   b.

   Gastrin

   Histamine

b. Digestion in the Stomach

   Carbohydrates

   Proteins

   Lipids

c. Absorption in the Stomach

   d. Motility in the Stomach

   Storage - holds food until digestion proceeds and intestines ready to receive it
   Mixing - waves of contraction churn food with HCl, lingual lipase & pepsin
   Gastric Emptying - squirts liquified food into the small intestine
Clinical Application: Peptic Ulcers

Symptoms:

Causes:

How do you think *Helicobacter pylori* survive in the stomach?

What treatments will most effectively cure peptic ulcers?

IX. SMALL INTESTINE (Part I)
1. several sections: duodenum, jejunum, ileum
2. structure of SI walls

   “brush border enzymes”

3. SI role in digestive functions:
   a. Secretions in the SI

   Cholecystokinin (CCK)

   Secretin

   Gastric inhibitory peptide (GIP)

   PLUS... secretions from the Liver, Gall Bladder and Pancreas...
X. ACCESSORY ORGANS

A. Liver
Serves the Important digestive function of producing and secreting bile.

the role of bile in digestion:

B. Gall Bladder
  1. structure - small, sac-like, under the liver
  2. functions
    a.
    b.

C. Pancreas
  1. structure - glandular organ near stomach and duodenum
  2. digestive function
    Secretions: “pancreatic juice” composed of:
    bicarbonate ions (HCO$_3^-$)
    pancreatic amylase
    trypsin
    pancreatic lipase
XI. SMALL INTESTINE (Part II)

3. role in digestive functions (cont.):
   b. Digestion in SI

   Carbohydrates

   Proteins

   Lipids

3. role in digestive functions (cont.):
   c. Motility in SI

   Peristalsis

   Segmentation

   d. Absorption in SI

   Monosaccharides & Amino Acids

   Lipids
Clinical Application: Lactose Intolerance

Cause:

Symptoms:

Explain the symptoms of lactose intolerance.

How is lactose intolerance different from an allergy to milk?

Why does it bother some people and not others?
XII. **LARGE INTESTINE**

1. several sections: cecum, ascending, transverse, descending, and sigmoid colons

2. structure of walls

3. LI role in digestive functions
   a. **Secretion in LI**
   b. **Digestion in LI**

The role of fiber:
   i. soluble
   ii. insoluble

c. **Absorption in LI**

d. **Motility in LI**
   Peristalsis - wave-like contractions move down length of large intestine
   Mass Movements, Churning and Defecation