Chewing (mastication)

Voluntary, but has more of reflex behavior

Mixing of food with saliva and grinding
Nasal passages
Hard palate
Soft palate
Uvula
Pharynx
Epiglottis
Esophagus
Trachea

Bolus
Tongue

Glottis at entrance of larynx

Swallowing center inhibits respiratory center in brain
Elevation of uvula prevents food from entering nasal passages
Position of tongue prevents food from reentering mouth
Epiglottis is pressed down over closed glottis as auxiliary mechanism to prevent food from entering airways
Step 1

1. Tongue pushes bolus against soft palate and back of mouth, triggering swallowing reflex.
Gastrointestinal Motilities
Swallowing (deglutition)
- initiated voluntarily
- Continuing as involuntary reflex
- **Voluntary stage**: in which tongue is pressing food by upward and backward movement against soft palate, which results in squeezing food bolus into pharynx.
2. Upper esophageal sphincter relaxes while epiglottis closes to keep swallowed material out of the airways.
Involuntary stages
Reflexes initiated by introducing food into pharynx.

- Pharyngeal phase:

- Esophageal phase:
  - Primary persistaltic contractions
  - Secondary persistaltic contractions
3. Food moves downward into the esophagus, propelled by peristaltic waves and aided by gravity.
Anterior view of frontal sections peristalsis in esophagus
Gastric Motilities

- Receptive relaxation

- Gastric Peristaltic movements
  - Retropulsion
  - Gastric emptying

- Hunger contractions
Gastric Emptying and Mixing as a Result of Antral Peristaltic Contractions

- Esophagus
- Stomach
- Gastroesophageal sphincter
- Pyloric sphincter
- Duodenum
- Direction of movement of peristaltic contraction
- Movement of chyme
- Peristaltic contraction
Gastric Motilities

- Receptive relaxation

- Gastric Peristaltic movements
  - Retropulsion
  - Gastric emptying

- Hunger contractions
Control of Gastric Motility
Motility in Small Intestine

Site of most digestion and absorption: duodenum and jejunum

types of movement

Segmentation (mixing) - digestive state

Peristalsis (propulsive) - inter-digestive

Migrating motor complex

Peristaltic rush (power propulsion)
Peristaltic contractions are responsible for forward movement.

Time zero

- Contraction
- Bolus
- Receiving segment

Seconds later

- Bolus moves forward

Direction of movement
Migrating motor complex

cycle of quiescence and intense motor activity that begins in antrum and continues along the small intestine

Function: Sweeps the stomach and intestine between meals.
Other movements

- Peristaltic rush:
  Remove harmful agents

- Movements caused by the activity of muscularis mucosa:
  Spreading chyme over the mucosa
Control of Intestinal movements

- Electrical activity of muscle

- Neural control: ENS, ANS

- Hormonal control
  - Gastrin, CCK, Serotonin enhance intestinal motility.
  - Secretin and Glucagon inhibit intestinal motility.
Summary of Motilities of Small intestine

Segmentation contraction: characterize the digestive or fed state and have mixing effects

Peristaltic contractions: mainly Propulsive effect

Migrating motor complex characterizes the inter-digestive state, ended with ingestion of food

Peristaltic rush is a response to harmful agents
Motilities of the Colon

- Haustration contractions:
  effect: propulsive

- Mass contractions:
  - facilitated by: gastrocolic and duodenocolic reflexes
  effect: propulsive
(a) Anterior view of large intestine showing major regions

(b) Frontal section of anal canal
Defecation

- Intrinsic reflexes

- Extrinsic reflexes