Nutrient Uptake & Digestion

**Topics for today:**
- Overview of energy uptake & digestion
- Amylase digestive action in mouth
- Action of pepsin in stomach
- Role of pancreas in digestion
- Role of duodenum in digestion

**Phases of the uptake of energy**
- **Ingestion** - mechanical disaggregation & swallowing of food
- **Digestion** - chemical breakdown of complex to simple nutrients
- **Absorption** - uptake of simple nutrients into blood and lymph
Salivary glands

Sublingual gland
Parotid gland

These glands secrete Salivary amylase which initiates the digestion of carbohydrates.

Action of amylase*
(salivary and pancreatic amylases)

\[
\text{amylose (starch)} \quad \downarrow \quad \text{maltose} \quad \text{oligosaccharide}
\]

* Breaks down carbohydrates to disaccharides

Sequence of swallowing

soft palate
food bolus
tongue
pharynx
epiglottis open
trachea open
epiglottis closed
esophagus open
trachea closed
Peristaltic action of esophagus

Peristalsis is a traveling wave of contraction of multiunit smooth muscle initiated voluntarily and under involuntary coordination.

Structure of stomach

Protein digestion initiated by action of enzyme pepsin

Glands of gastric mucosa

Gastric pit
Mucous neck cells
Parietal cells - HCl
Chief cells - secrete pepsinogen*
G cells - secrete gastrin

*Precursor of pepsin, a proteolytic enzyme
**Pepsin** - an endopeptidase enzyme

 breaks interior peptide bonds

 Breaks interior peptide bonds

 Duodenum and Pancreas

 primary site of digestion

 Source of enzymes for digestion of proteins, carbohydrates and lipids

 Pancreatic tissue

 secretes $\text{HCO}_3^-$

 Source of pancreatic enzymes
Pancreatic fluid components

**Ductule secretion**
- Bicarbonate-rich fluid

**Acinar cell secretion**
- Trypsinogen (trypsin precursor)
- Carboxypeptidase
- Amylase
- Lipase

Action of peptidases (proteolytic enzymes)

Endopeptidases
- Pepsin
- Trypsin

Exopeptidases
- Aminopeptidase
- Carboxypeptidase

Action of Lipase

Lipase hydrolyzes triglycerides into fatty acids and glycerol.
Intestinal tract

Small intestine
- Duodenum
- Jejunum
- Ileum

Large intestine

Intestinal villi

Secretions into Small Intestine

Duodenal mucosal secretions
- Aminopeptidase
- Maltase
- Sucrase
- Lactase

Liver secretions
- Bile salts (not enzymes)