Digestion, absorption and utilization of nutrients
Introduction

• Our body is synthesized by what we eat

• Body is made up of cells, tissues and organs which occurs due to changes in food eaten to body structure.

• The changes that occur in foods eaten, its utilization and elimination of waste products from the body is called metabolism

• Each nutrient has its own metabolism but it occurs as a correlated systematic manner.
Uses of food in the body

- The use of food in the body involves three processes – digestion, absorption and utilization of nutrients in the body.

- Digestion – is the process which releases many nutrients in the forms in which the body can use by breaking up food in the intestinal tract.

- Absorption – is the process which carries these nutrients into the circulation system and delivers them to the cells.
• Utilization – cell is the important unit of life. Hence a large number of chemical reactions in the cell utilize the nutrients absorbed to produce materials needed for our existence.

• Mechanical processes involved in digestion include chewing food, swallowing food, churning action in the stomach and rhythmic contraction of the intestinal tract.

• Further the rhythmic contractions of the intestines, help to break the food into smaller particles and move the food mass forward through the digestive tract.
Uses of food in the body:

- Chewing of food reduces the food particles in size, mixes these with saliva and dilutes it with water, so that is easy to swallow.

- The food swallowed is mixed with enzymes and acid by the churning action in stomach.
Taste and Smell - the Chemosenses

1. Olfactory Cells:
   • Stimulated by odors around us
   • Found high inside the nose, connect directly to the brain

2. Gustatory Cells:
   • React to food and beverages
   • Clustered into taste buds
   • TASTE: salty, sweet, bitter, sour, and umami
3. Common Chemical Sense

- Thousands of nerve endings on the moist surfaces of the eyes, nose, mouth, and throat accent our sense of smell and taste

- Flavor - texture, temperature, common chemical sense, taste, and odor
Cephalic (preabsorptive) phase response

• In response to sensory stimulation, the body primes its resources to better absorb and use anticipated nutrients

• EXAMPLE:

  Sound (Hearing a description of food) can cause the salivary glands to increase the flow of saliva
A. Salivary glands
B. Oesophagus
C. Stomach
D. Pancreas
E. Large intestine
F. Appendix
G. Small intestine
H. Gall bladder
I. Liver

Organs of GI tract
Salivary glands

Parotid gland
Submandibular gland
Sublingual gland
Physical processes

- Chewing
- Peristalsis – the wavelike, rhythmic muscular contractions of the GI tract that move chyme down its tract
- Segmentation – periodic squeezing and partitioning of the SI which mixes the chyme and promotes close contact with digestive juices and absorbing cells
- Sphincters – regulate the flow of food particles
PERISTALSIS

Ringlike peristaltic contractions sweep food along the GI tract

SEGMENTATION

Circular muscles contract, breaking chyme into ever smaller pieces...

... until chyme is thoroughly mixed with digestive juices
Chemical processes

- Enzymes: protein compounds that facilitate chemical reactions but are not altered in the process
Chemical processes

- Acid in the stomach (hydrochloric acid)
- Base in the small intestine (bicarbonate)
- Bile
- Mucus
Mouth

- Saliva
- Amylase – breaks down starches into small sugar molecules (only about 5%)
- Lingual Lipase – breaks down fats, but only in a miniscule amount
- Epiglottis – guards entrance to the trachea
Swallowing

As you swallow, the epiglottis closes off the air passage and prevents choking.
Stomach

GASTRIC JUICE:

- Water
- Hydrochloric Acid \( (pH = 2) \)
- Mucus
- Enzymes
- Hormones
- Intrinsic Factor
Nutrient absorption in the stomach

Only:

- Some lipid-soluble compounds
- Weak acids, such as alcohol and aspirin
- Vitamin B12