



# DIGESTION

Structures & Functions



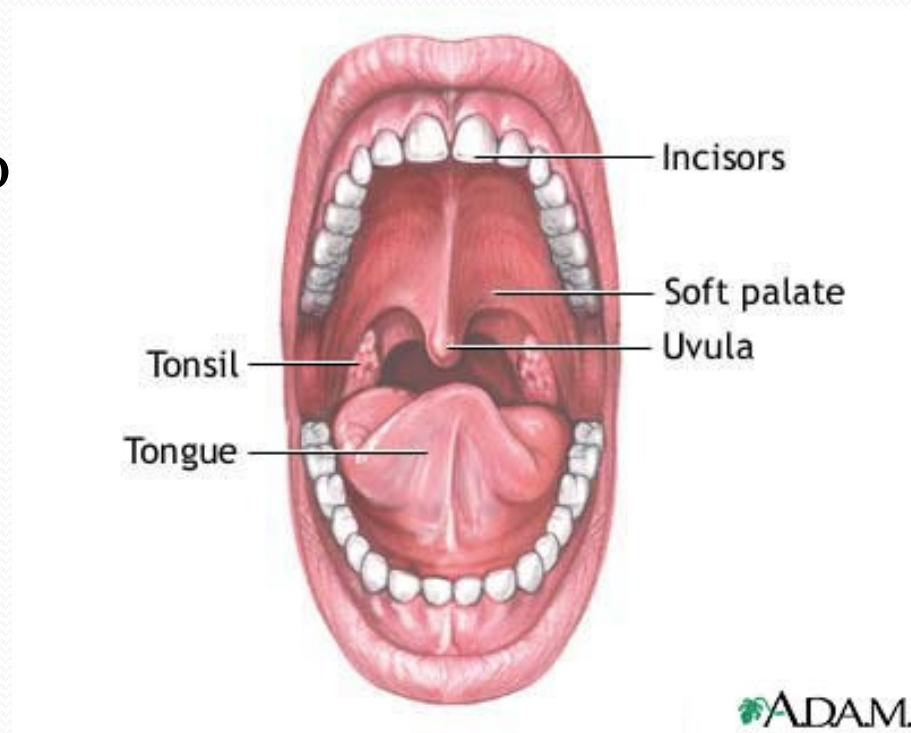
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# Human Digestion

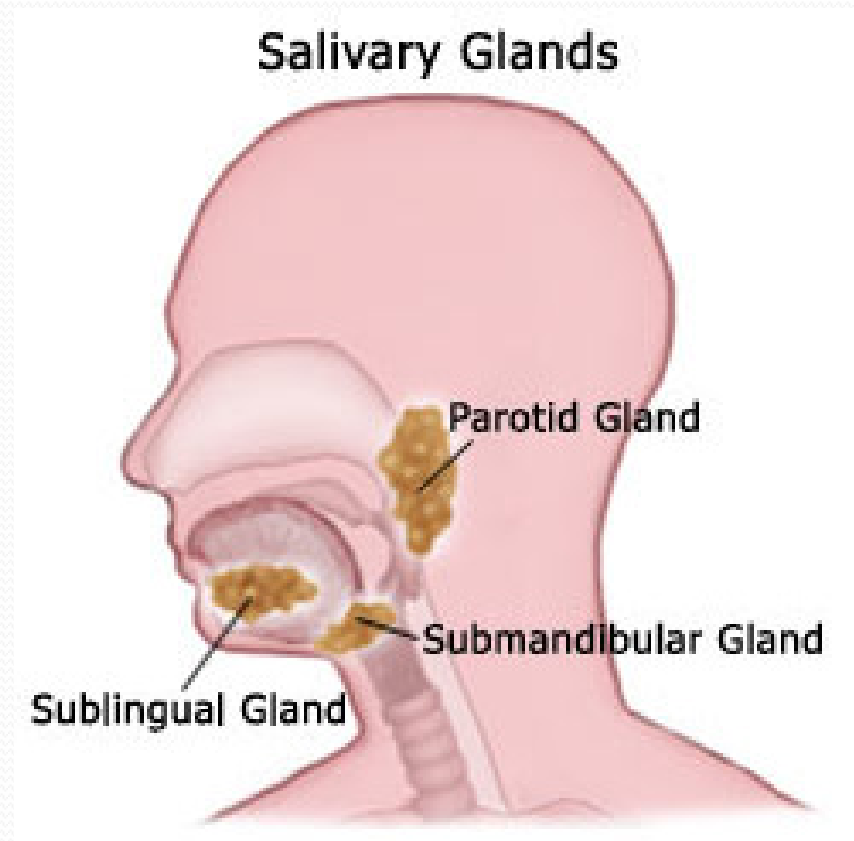
# Mouth

- Mechanical digestion starts here (food is chewed and broken into small pieces by the teeth)
- Salivary amylase (from the salivary glands) starts to break down starch into maltose (by hydrolysis)



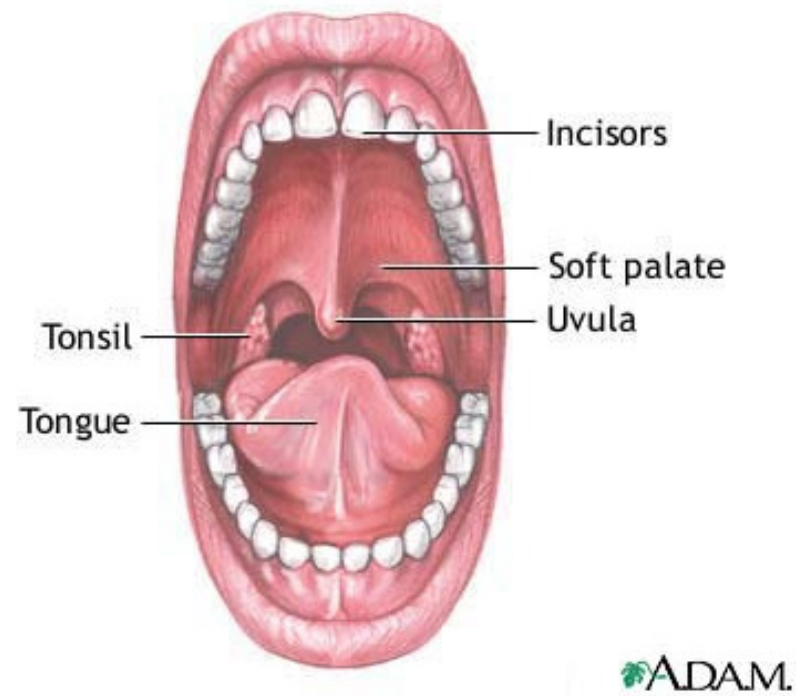
# Salivary Glands

- Produce saliva containing the enzyme salivary amylase
- Saliva helps to moisten and lubricate food in preparation for swallowing
- Salivary amylase catalyzes the breakdown of starch into maltose



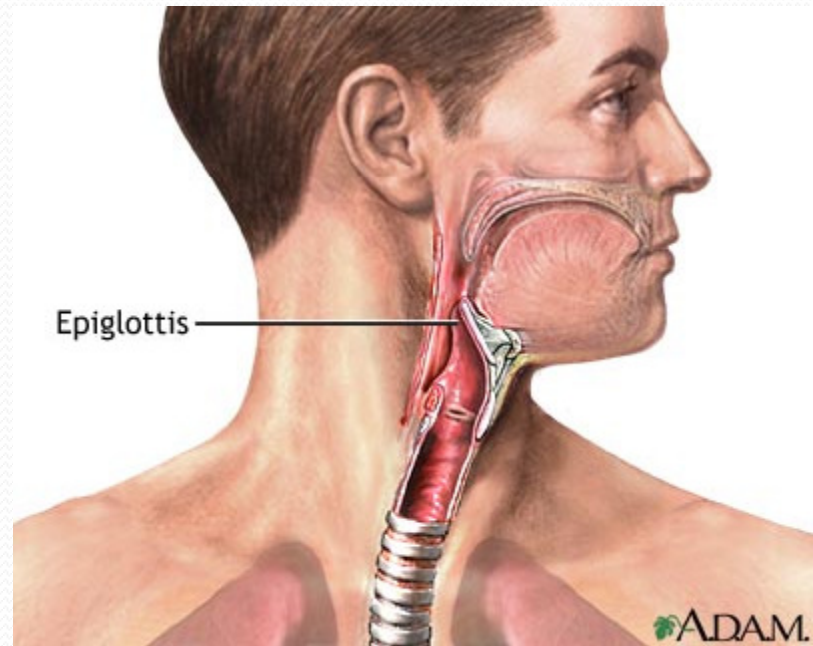
# Tongue

- Mixes the chewed food with saliva
- Forms chewed food into a 'bolus' in preparation for swallowing



# Pharynx & Epiglottis

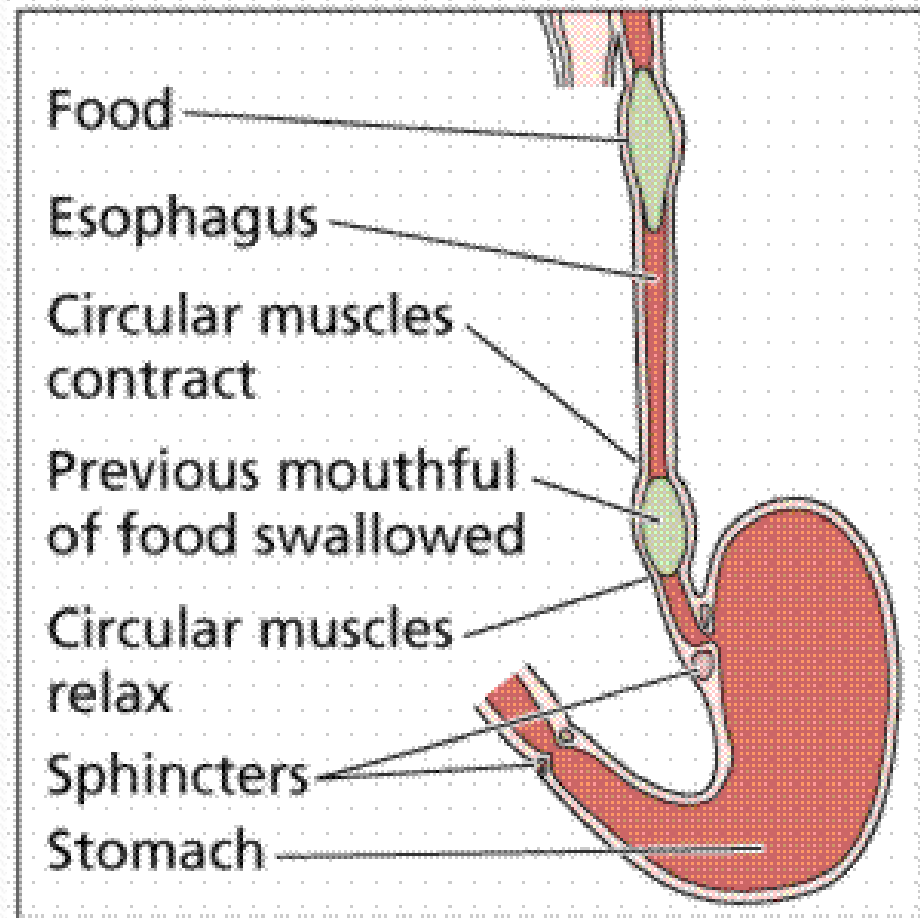
- Located between the mouth & the esophagus
- Where swallowing occurs
- Epiglottis prevents food from entering the trachea



# Esophagus

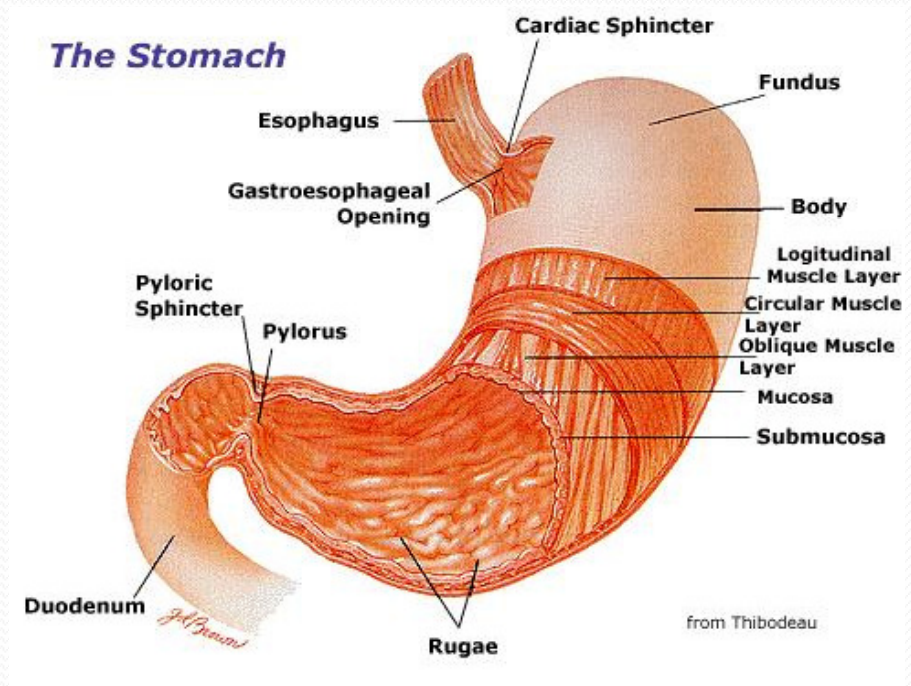
- The tube that leads to the stomach
- Food is pushed through the esophagus by rhythmic contractions called peristalsis

## Peristalsis



# Stomach – cardiac sphincter

- The entrance to the stomach is called the cardiac sphincter (near the heart)
- When it relaxes food is able to enter the stomach
- Prevents food from moving ‘backwards’



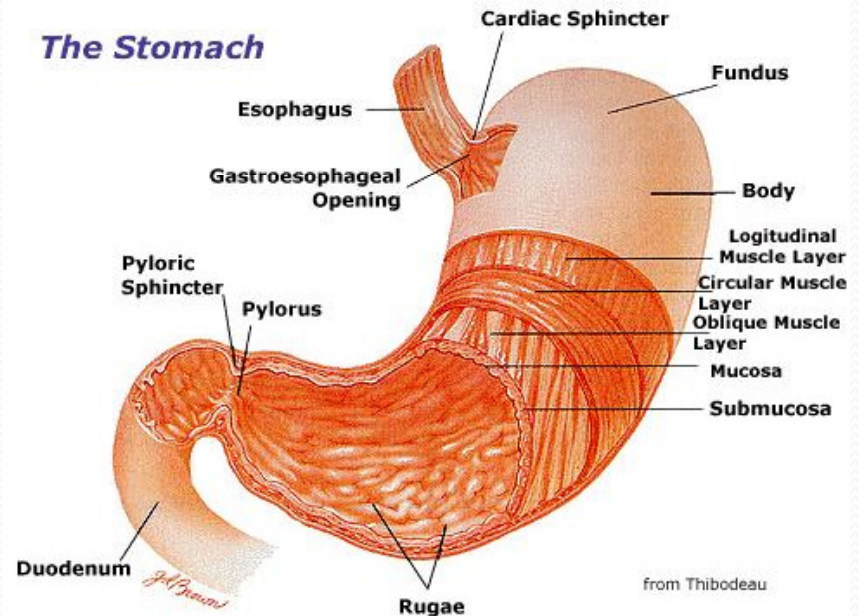


# Stomach

- Food is broken down further by mechanical digestion (muscular contractions)
- The stomach wall secretes pepsinogen, HCl, and mucus.
- Pepsinogen is an inactive version of the enzyme pepsin
- HCl activates pepsinogen by converting it to pepsin
- HCl provides the acid (pH2) environment for optimal pepsin functioning
- Pepsin breaks proteins down into peptides (hydrolysis)
- Mucus protects the stomach wall from the acid

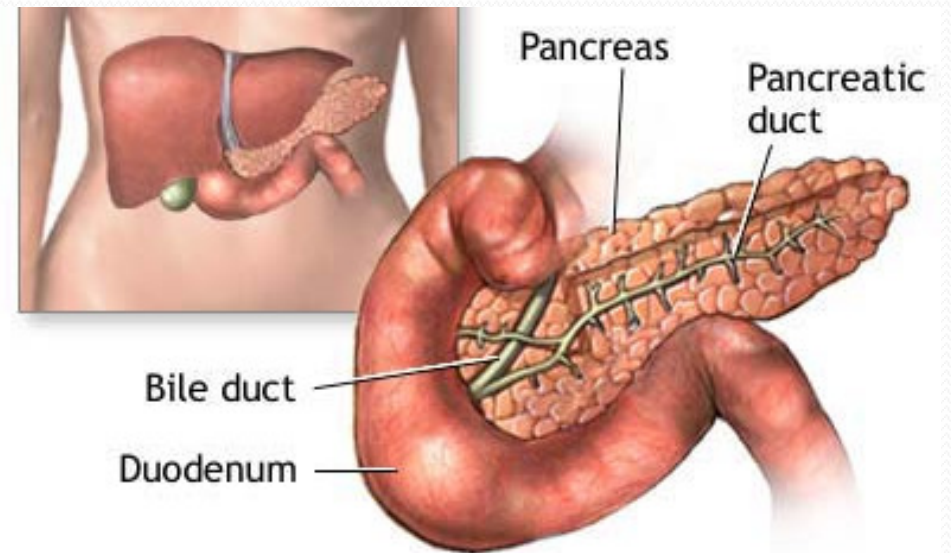
# Stomach – pyloric sphincter

- The pyloric sphincter releases small amounts of chyme into the duodenum (the first section of the small intestine)



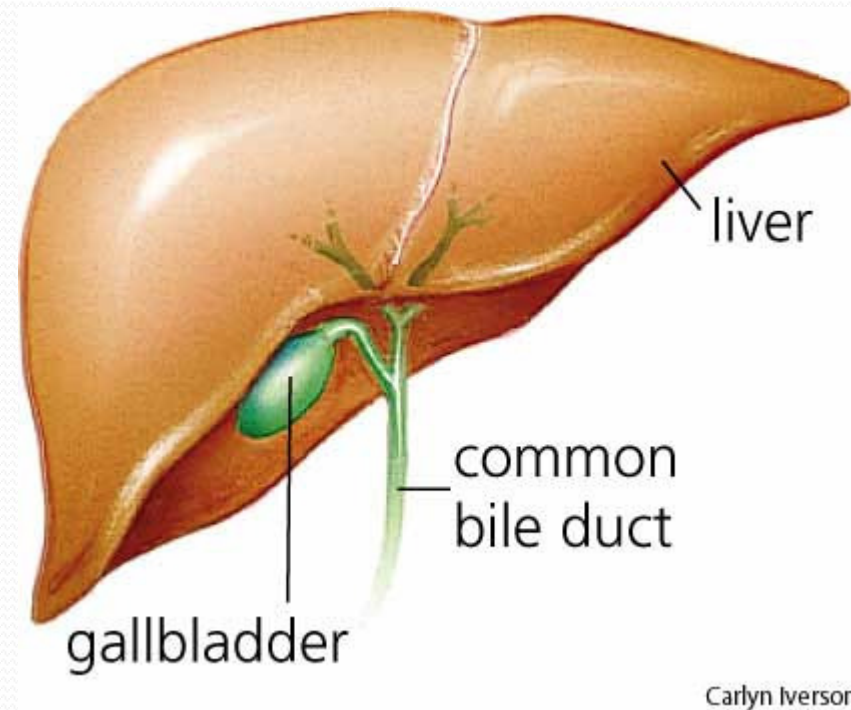
# Pancreas

- Secretes pancreatic juice (sodium bicarbonate, pancreatic amylase, trypsinogen, lipase, and nuclease)
- Secretes insulin (a hormone that helps regulate blood glucose levels)



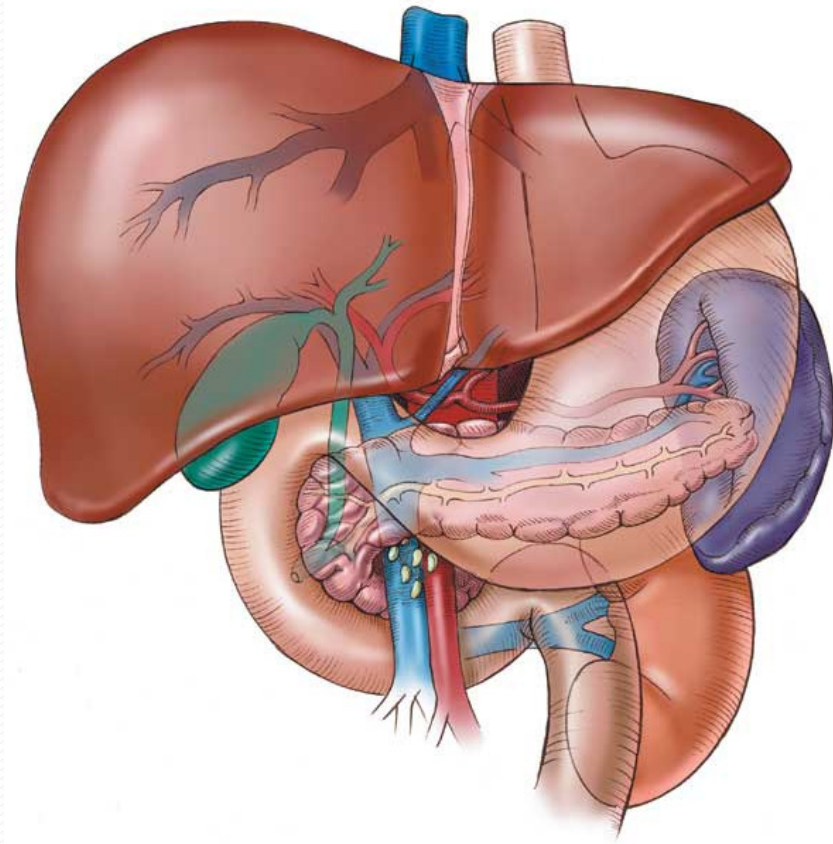
# Gall Bladder

- Stores bile that is produced by the liver
- When released bile emulsifies fats (breaks big fat droplets into small fat droplets) in the duodenum - increases the surface area of the fat/lipid



# Liver: (more detail later)

- Produces bile
- Detoxifies blood
- Stores iron & fat soluble vitamins
- Makes plasma proteins
- Produces Urea
- Breaks down old hemoglobin
- Stores glucose as glycogen; converts glycogen to glucose



# Small Intestine (duodenum)

- Sodium bicarbonate from the pancreas makes this a 'basic' environment (pH8.5)
- Bile from the bile duct emulsifies fats/lipids
- Lipase from the pancreas breaks lipids down into glycerol and fatty acids
- Trypsin (the activated trypsinogen from the pancreas) breaks proteins down into peptides
- Pancreatic amylase breaks starch into maltose
- Nucleases (from pancreas) break nucleic acids (DNA/RNA) into nucleotides



# Small Intestine:

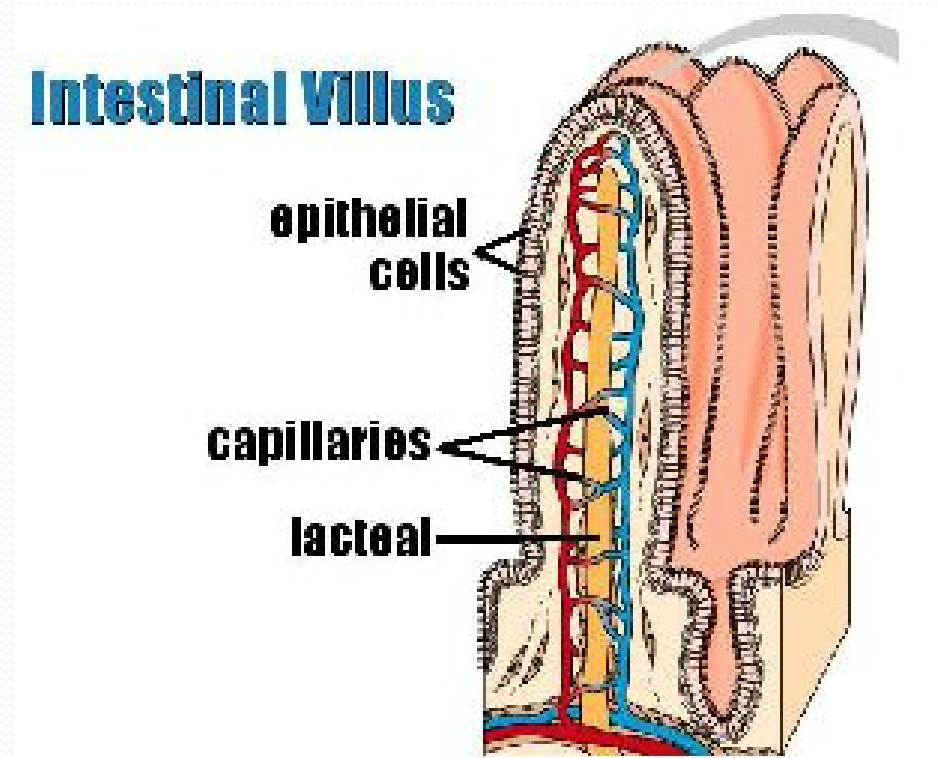
(enzyme production and reactions)

- Produces disaccharidases (maltase, lactase) to break down disaccharides (maltose, lactose)
- Produces peptidases to break peptides into amino acids
- Produces some nucleases (finishes digestion of nucleotides)

# Small Intestine:

## Absorption of nutrients

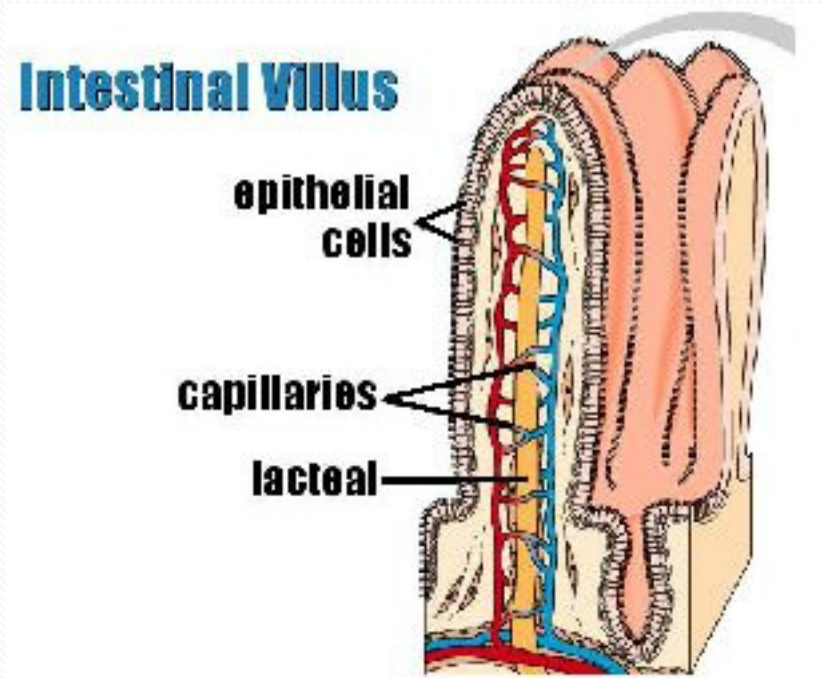
- The small intestine is lined with small finger-like projections called villi
- Villi increase the surface area for nutrient absorption
- Absorption occurs through active transport





# Small Intestine: absorption

- Products of fat digestion are absorbed into the lacteal (part of the lymph system)
- The remaining products of digestion enter the bloodstream through the villus capillaries



# Large Intestine (colon)

- The major function of the large intestine is absorption of water.
- E. coli bacteria live here
- Bacteria produce vitamin K
- Bacteria also convert waste materials to feces
- Rectum stores feces until we are ready to release the feces through the anus

