Role of Salivary Glands and Stomach in Digestion

Processes of the digestive system	Digestion:	End Products of Digestion:	Role of Salivary Glands in Digestion
• Motility • Secretion • Absorption • Elimination	○ **Mechanical effects:** e.g., mastication ○ **Enzymatic effects:** Digestive enzymes (hydrolases)	➢ **Carbohydrates** → Monosaccharides ➢ **Triacylglycerols (TAG)** → Fatty acid + monoacylglycerols ➢ **Proteins** → Amino acids	○ **They secrete saliva** ○ **Saliva:** 1. Acts as lubricant 2. Contains **salivary α-amylase** 3. Contains **lingual lipase**

Role Of Salivary Gland And Stomach In Digestion

Role of Salivary Glands:
digestion of carbohydrates

Role of Stomach:
- ❖ No further digestion of carbohydrates
- ❖ Lipid digestion begins by lingual and gastric lipases
- ❖ Protein digestion begins by pepsin and rennin

	Salivary α-Amylase	Lingual and Gastric Lipase	Pepsin	Rennin
Secreted by:	Parotid glands	The dorsal surface of the tongue (Ebner's glands)	chief cells of stomach as inactive proenzyme, **pepsinogen**	**chief cells of stomach in neonates and infants**
Optimum pH:	**6.6 – 6.8** **Salivary amylase is inactivated by the acidity of stomach (The enzyme is inactivated at pH 4.0 or less)**	Acts in the **stomach** **Acid-Stable Lipases**	**Acid-stable**	
Substrate:	• Starch and glycogen • Its digestive action on the polysaccharides is of little significance because of the short time during which the enzyme can act on the food in the mouth	**TAG molecules, containing medium- and short-chain fatty acids; such as found in milk fat**	**denatured dietary proteins (by HCl)**	**Casein of milk (in the presence of calcium)**
How they act on the substrate (IMP)	❖ **Hydrolyzes:** **α(1,4) glycosidic bonds (α 1-4 endoglycosidase)** ❖ **Salivary α-amylase does not hydrolyze:** 1. **α(1,6) glycosidic bonds (The branch points of starch and glycogen)** 2. **Salivary α-amylase cannot act on: β(1,4) glycosidic bonds of cellulose** 3. **Salivary α-amylase does not hydrolyze disaccharides**		**endopeptidase**	

Produces:	Short oligosaccharides	2-monoacylglycerols and fatty acids	Smaller polypeptides	Paracasein with the formation of milk clot
Comment	❖ **Sugar Types:** **1. Monosaccharide:** • Glucose • Galactose • Fructose **2. Disaccharide** • Sucrose (α 1 − 2 Glucose +Fructose) • Lactose (β 1 − 4 Glucose + Galactose) • Maltose (α 1 − 4 Glucose + Glucose)	• Its role is of little significance in adult humans , The lipids in the stomach is not yet emulsified. Emulsification occurs in **duodenum .** • They are important in **neonates** and infants for the digestion of TAG of milk and production of short- and medium-chain fatty acids . • They are also important in patients with **pancreatic insufficiency** where there is absence of pancreatic lipase	**Activated by** **1.HCl** **2.autocatalytically by pepsin**	**Effect:** **It prevents rapid passage of milk from stomach, allowing more time for action of pepsin on milk proteins**
Example / Conclusion	❖ **Effect of α-Amylase on Glycogen:** • **Hydrolysis of: α(1,4) glycosidic bonds** • **Products:** **1. Mixture of short oligosaccharides both** 1- branched (Limit dextrins) 2- unbranched (maltotriose) **2. Disaccharides:** Maltose and isomaltose	❖ **Digestion of Lipids in Stomach:** 1. In adults, no significant effects because of lack of emulsification that occurs in duodenum 2. In neonates and infants, digestion of milk TAG and production of short- and medium-chain fatty acids	❖ **Digestion of Dietary Proteins in Stomach :** **1. HCl:** **Denatures proteins** **Activates pepsin** **2. Pepsin:** **Cleaves proteins into polypeptides** **3. Rennin: Formation of milk clot**	