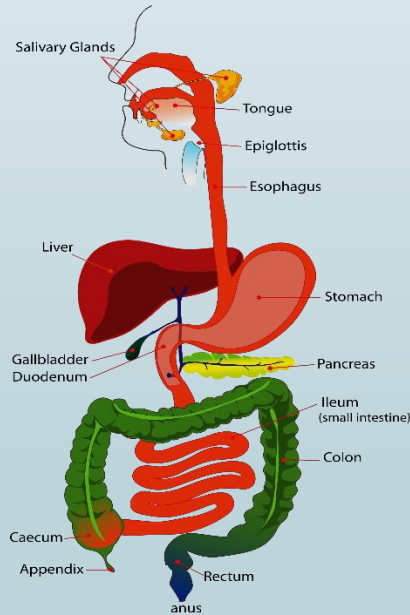




1. SALIVARY SECRETION, SWALLOWING & ESOPHAGEAL MOTILITY.



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2020-2021

GIT

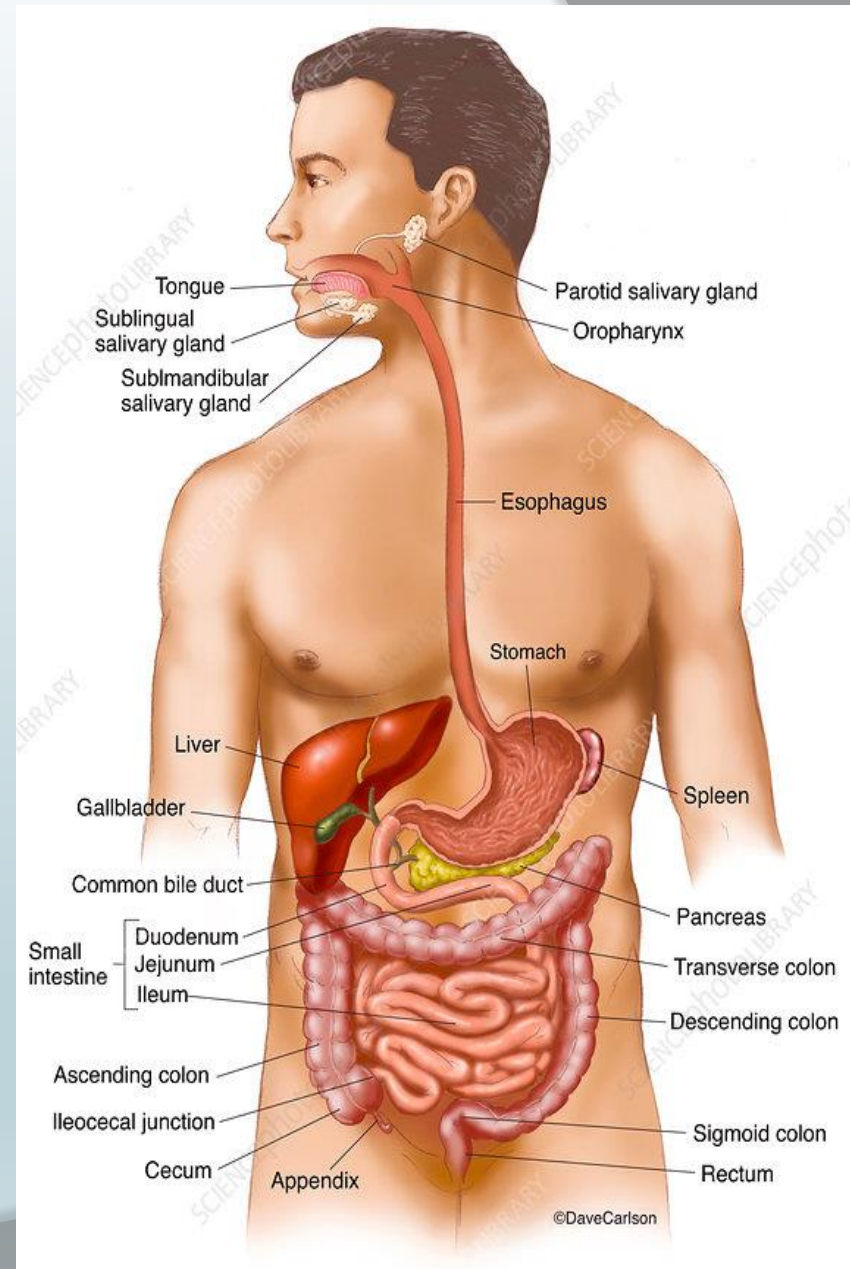
Oral cavity

Mastication : (chewing)

- It is the process of mechanical breakdown of large food particles into smaller ones in the mouth.
- The crushing force of incisors 11-25 & of molars 20-40 kg.
- Its importance :
 - a- Stimulation of taste and smell receptors → sense of satiety.
 - b- Help swallowing by lubrication of food by saliva.
 - c- Help digestion by break down of indigestive cellulose membrane around the digestive portion of fruits and vegetables also by increasing the exposed surface area to enzymatic effect.
- It is partly voluntary and partly reflexly by chewing reflex in which :

Presence of food in mouth → reflex relaxation of chewing muscles → drop of mandible and open the mouth → stretch on the muscles → reflex re-contraction and closure of the mouth and so on. (the mastication muscles are supplied by the motor branch of the trigeminal nerve).

- The **chewing center** is present in the **pons**.



Salivary Secretion

- •Saliva : 1.5 L/day, hypotonic, pH is 6.3-6.8 but in the mouth it becomes more alkaline due to loss of CO₂.
- •Salivary glands : three pairs of salivary glands :

Parotid	Sub maxillary	sublingual
• 20 %.	• 75 %.	• 5 %.
• Serous acini for secretion (watery & rich in enzymes.).	• Mixed.	• Mucus acini (thick, rich in mucin).
• supplied by glossopharyngeal	• Facial.	• Facial.
N.B : Ebner's glands and buccal glands secrete 5% of saliva.		

- Composition of saliva : a- 99.5 % water. b- 0.5 % solids.
 - . **0.3 % organic** : as enzymes (amylase, Lipase, Lysozymes) , mucus, somatostatin, kalikrein enzyme, immuno-globulin A and blood groups substances.
 - (The protein in saliva are amylase enzyme & Mucus
 - . **0.2 % inorganic**:
 - Buffers as (H₂ Co₃ : Na Hco₃ & NaH₂Po₄ : Na₂ HPo₄).
 - Soluble calcium salts: Ca(Hco₃)₂, Ca(H₂Po)₂ which saturate saliva to prevent decalcification of teeth.
 - Some electrolytes as Na⁺ , Cl⁻, Hco₃⁻, and K⁺ ,they act as coenzymes for salivary enzyme amylase.

- **•Functions of saliva :**

- 1.Facilitation of speech and deglutition.
- 2.Cleaning (hygiene) of the mouth by washing and antibacterial effect of lysozymes , thiothianate ions and Immunoglobulins A.
- 3.Buffering function : by bicarbonate and phosphate systems to keep the PH at about 7.0 → the teeth do not loose their calcium. Also saliva neutralizes gastric secretion in case of gastroesophageal reflux.
- 4.Digestive function :
 - Ptyalin (salivary α - amylase) : digest starch to maltose in PH 6.9 so it is inhibited in the stomach.
 - Lingual Lipase: digest 30 % of lipids and secreted from Ebner's gland of tongue.
- 5.Excretory function : of lead, mercury, iodides, fluoride and some drugs as morphine and alcohol.
- 6.Facilitate taste sensation and the kalikrein enzyme produce bradykinin which acts as vasodilator during salivary secretion.
- 7.Regulation of water balance (\downarrow in dehydration and give thirst sensation).
- 8.Contains hormones as somatostatin & glucagone.

Control of salivary secretion

Nervous only via conditioned and unconditioned reflexes.

[I] Unconditioned reflex :

Inborn reflex that needs no previous learning.

a. **Stimuli** : direct contact of food, Chewing & Irritation of GIT.

b. **Receptor** : taste receptors. & Receptors in GIT wall.

c. **Afferent** :

-Chorda tympani : from ant. 2/3 of tongue.

-Glossopharyngeal : from post. 1/3 of tongue

-Lingual nerve : movement of tongue.

-Vagus nerve : from epiglottis.

d. **Center** : superior & inferior salivatory nuclei in M.O.

e. **Efferent**: chordae tympani & glossopharyngeal.

f. **Response**: ↑ salivary glands secretion.

[II] **Conditioned reflex** : Acquired reflexes and need previous learning.

a. **Stimuli** :

-Sight of food.

-Smelling of food.

-Hearing about food.

-Thinking of food.

b. **Receptors** : special sense receptors.

c. **Afferent** : optic, olfactory & auditory nerves.

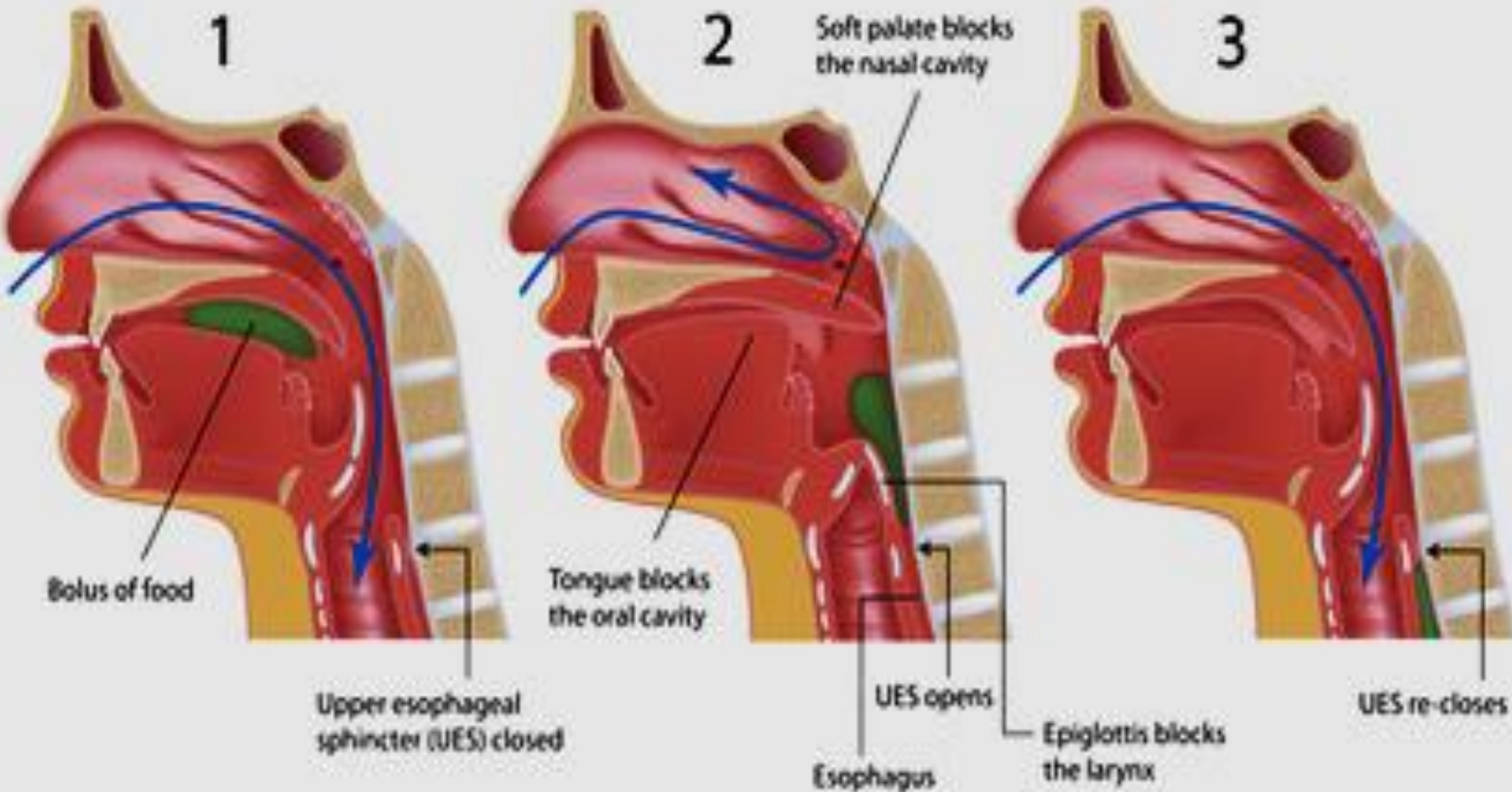
d. **Center** : to cerebral cortex → salivatory nuclei.

e. **Efferent & response** → as unconditioned reflex.

Swallowing (Deglutition)

- o It is the propelling of food bolus from mouth to stomach.
- o It is under control of the swallowing center in the medulla.
- o It can be divided into 3 phases:
- **1-Buccal phase:** (voluntary) elevation and retraction of tongue against the hard palate propels the bolus to the pharynx.
- **2-Pharyngeal phase** (involuntary) :
 - It is very rapid (1 second), occur reflexely via:
- **Swallowing reflex :**
 - •Receptor: in oropharynx (tonsillar pillars).
 - •Afferent: glossopharyngeal nerves.
 - •Center: medulla oblongata (swallowing center).
 - •Efferent: motor fibers of cranial nerves V, IX, X, XI.
 - •Response: series of reflexes to prevent entry of food in to air passages:
 - 1.Elevation of soft palate → closure of nasal cavity.
 - 2.Approximation of palate-pharyngeal folds → sagittal slit through which small food particles pass and prevent passage of large particles.
 - 3.Closure of glottis (opening of larynx) by approximation of vocal cords & elevation of larynx and folding of epiglottis
 - 4.Inhibition of breathing (swallowing apnea).
 - 5.Relaxation of pharyngo-esophageal sphincter and contraction of superior pharyngeal muscle → rapid pharyngeal peristalsis → forces the food into relaxed upper esophagus.

Swallowing



3-Esophageal phase (involuntary) :

a-Upper esophageal sphincter : (UES)

The pharyngo – esophageal junction is normally closed by striated muscle tone to prevent entry of inspired air into stomach. During swallowing the sphincter relaxes reflexly and then reclosed after swallowing.

b-Traveling along the esophagus :

Entry of food bolus into the esophagus initiate peristaltic waves of 2 types :

•Primary peristaltic waves :

a.They start at the upper end of oesophagus.

b.They are continuation of the pharyngeal peristalsis.

c.It travels at the rate of 2-4 cm/sec. But gravity may increase velocity of food bolus to about 4cm/sec.

• Secondary peristaltic waves :

a. Presence of bolus in the esophagus initiate peristaltic waves at site of bolus.

b-These waves repeated until food bolus is driven down the stomach.

c-Peristaltic movements in the upper half of esophagus is coordinated by vago – vagal reflex (striated ms.), while in lower half is coordinated by local enteric reflex so, bilateral vagotomy → difficult swallowing in the upper half only (In this case the food bolus must be small, soft and well lubricated and by aid of gravity).

Thank You