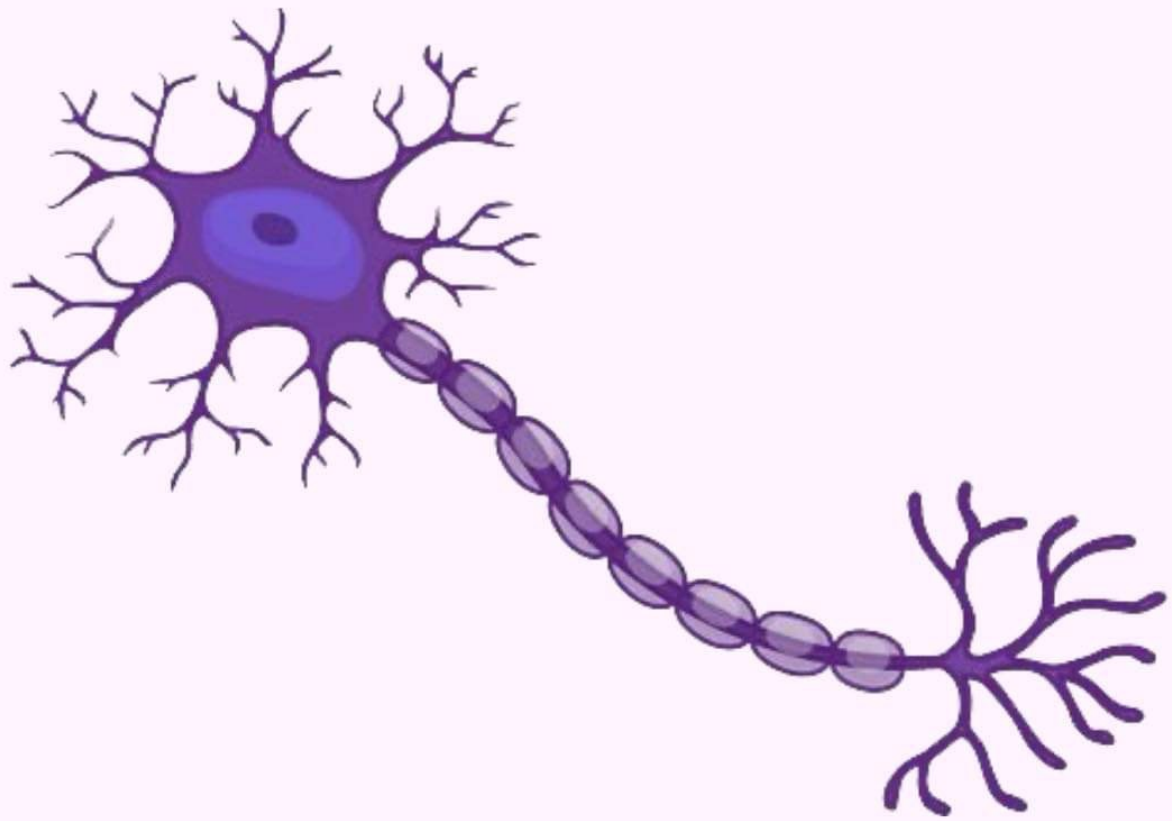




# PHYSIOLOGY



LEC NO. : 20

DONE BY : Rana Altarawneh

وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Digestive System

By d Gehan el wakeel

وظيفة الجهاز الهضمي

**Digestion is the breakdown of food & nutrients into smaller particles that can be absorbed in the small intestine.**

امتصاصه

**The digestive system consists of:**

مسار الجهاز الهضمي (يبدأ بالفم)

**1. Alimentary canal (gut):**

- It is a muscular tube **about 4.5 meters long extending from the mouth to the anus.**



- It consists of **buccal cavity, pharynx, esophagus, stomach, duodenum, and small and large intestine.**

mouth

بلعوم

فريجي

أمعاء دقيقة وعلية



يصاحب هذه العناية بعض الغدد

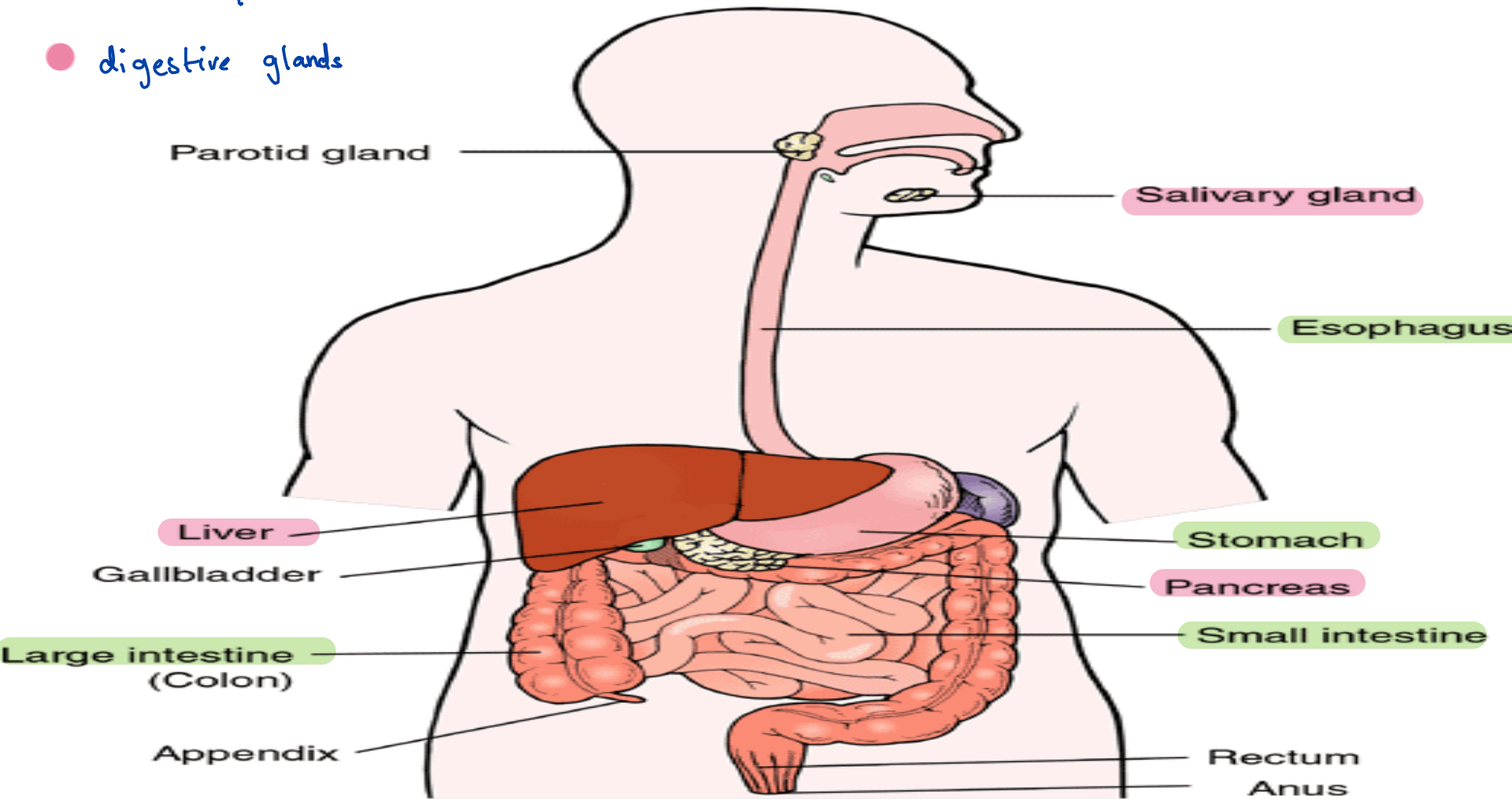
تحت لعابية

**2. Digestive glands** → **salivary glands, liver and pancreas.**

# Digestive System

● Alimentary canal

● digestive glands



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Fig.: Digestive system

## General functions of the digestive system

1. Motility      حَتَاَج لِحِرْكَة
2. **Secretion of digestive juices**      لِإِفْرَاز عَصَارَات هَاضِمَة
3. Digestion of food
4. **Absorption**

# Salivary Secretion

Principal Salivary Glands: <sup>3 Glands</sup> Parotid, <sup>1</sup> submandibular and <sup>2</sup> sublingual <sup>3</sup> glands.  
عندة نكافينه عندة الغدة عندة تحت اللسان  
[ear]

ما هو structure لل salivary gland عبارة عن salivon هو (secretory acini) حاجة مجوفة. مليئة secretion. متصل فيها duct

## b) Histology:

- Each gland is formed of **group of secretory acini called salivons.**
- The salivons **consists of acinus and ducts**
- The **acinar cells** include 2 types;
  - a. Serous cells** which **secrete watery secretion rich in amylase enzyme**  
إمراز عاني غني بـ أميليز ← هضم carbohydrate بالفم
  - b. Mucous cells** which **secrete viscid secretion rich in mucin**  
لزج (مخاطي) ← لزج غني بـ ميوسين

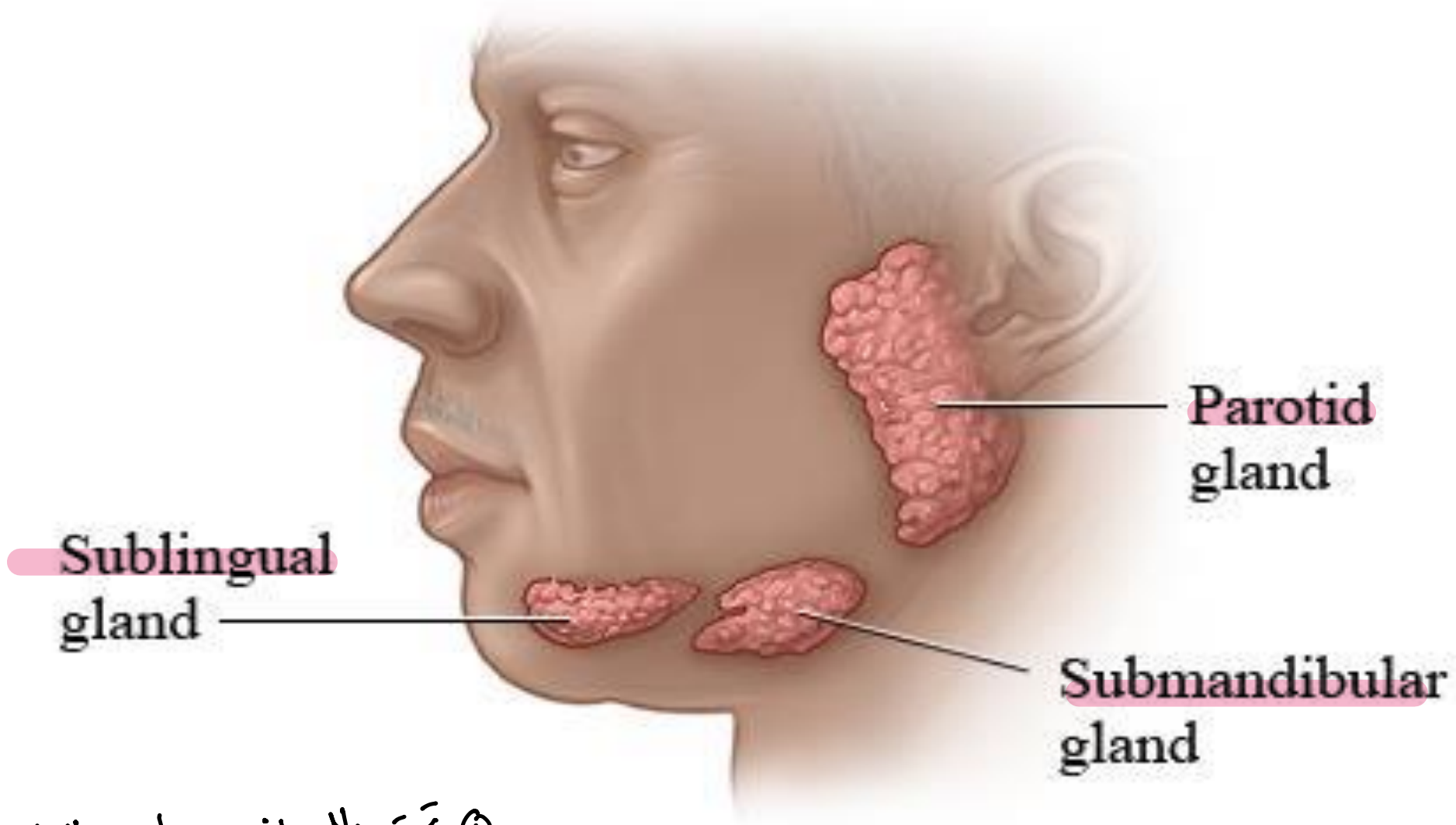
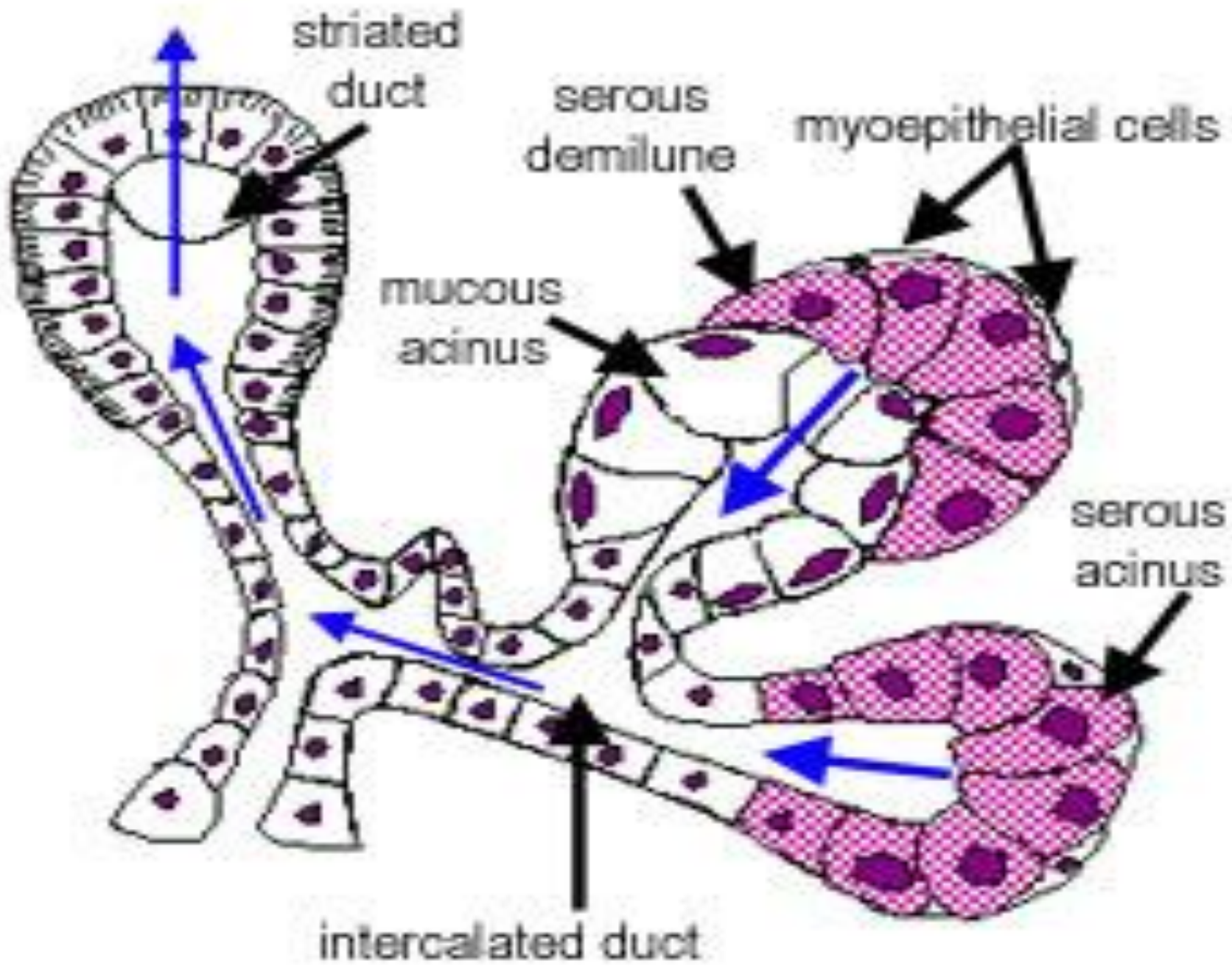


Fig. : Salivary Glands

Sublingual      ① تحت اللسان  
 Submandi      ② تحت الفك السفلي  
 Parotid        ③ عند الأذن





## d) Innervation of salivary glands:

The salivary glands are innervated by sympathetic and

أكثر دم ، نسبة ماء أعلى

parasympathetic nerve

لصينيق الشرايين - نسبة ماء قليلة

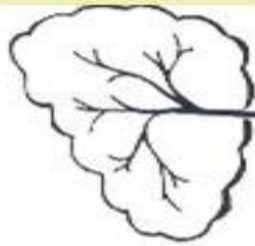
	Sympathetic Supply	Parasympathetic Supply
Origin	LHCs of T1 and T2	-Facial nerve → submandibular and sublingual glands لعصب رقم 7 -Glossopharyngeal nerve → parotid لعصب رقم 9
Functions	1-Trophic secretion: is small in volume and rich in enzymes and mucin. 2-Vasoconstriction.	1-True secretion: is large in volume, watery in consistency & rich in electrolytes 2-Marked vasodilatation (V.D.)

# Innervation of salivary gland

## Parasympathetic

Auriculotemporal n

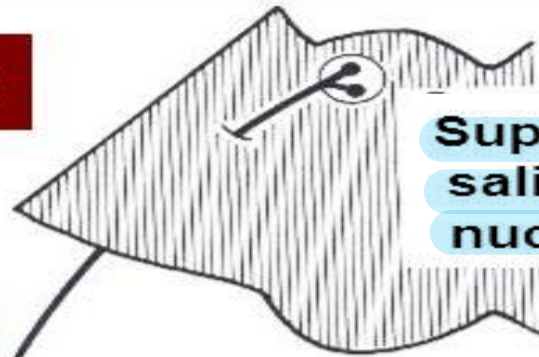
عصب  
الرقم 9  
Parotid  
gland



Otic  
ganglion

VII

Superior  
salivary  
nucleus



Inferior  
salivary  
nucleus



IX

(facial nerve)

Chorda  
tympani

بغذي

\* Sublingual  
gland



Submandibular  
ganglion



Superior  
cervical  
ganglion

Sympathetic

\* Submandibular gland

# Saliva

Saliva Volume:

800-1500

ml/day. Composition: Saliva is composed of:

1. 99.5 % water

المكون الأساسي water بنسبة 99.5%

2. 0.5 % solids; are:

بمضرات بسيطة

• **Inorganic: Na, K, Cl & HCO<sub>3</sub>** which act as buffers and activators.

simple ions → work as activators HCO<sub>3</sub> زي كالملائمات

a) Organic: HCO<sub>3</sub> → buffer

- Enzymes:

• **Digestive enzymes** ( $\alpha$ -amylase and lingual lipase).

• **Lysozyme** which attacks walls of the bacteria.

(بمضرات الفم) يشتغل بالمناة

- **Mucin.**

- **IgA.**

# Functions of Saliva

**1-Digestion:** It contains  **$\alpha$ -amylase enzyme** which starts the **digestion of the starches.**

**2-Deglutition:** It contains **mucin** which acts a **lubricant** to facilitate swallowing. مليّن  
بلع مخاط (يرطب الأكل)

**3-Diluting medium:** It acts as a diluting medium for irritating substances. - تخفيف بعض المواد .

**4-Speech:** It keeps the **buccal cavity wet**; which aids speech by **facilitating movements of lips and tongue.**

**5-Solvent:** It acts as solvent for food particles **to be an effective stimulus to taste receptors.**

## 6-Buffering action:

Bacteria تدخل مع الأكل وتخرج مواد حامضية  
→ تؤدي إلى تسوس الأسنان وصدون تروس

- It keeps the PH of the mouth about 7.
- This alkalinity preserves calcium in the teeth.
- Acidity of the buccal cavity (e.g. by bacterial action on food remnants) will cause dissolving of Ca from teeth.
- Loss of Ca from teeth will lead to dental caries.

## 7. Oral hygiene: saliva تحتوي على أشياء تكسر البكتيريا:

- The flow of saliva washes away the pathogenic bacteria.
- Saliva contains IgA which defends against bacteria and viruses.
- Thiocyanate ions which are bactericidal.
- Lysozyme يسبب ويقتل البكتيريا

# Mastication (Chewing)

## Definition

- It is the act **by which food is broken down to small particles to be swallowed easily**
- **It involves movements of the mandible, lips, cheeks and tongue.**
- **Teeth grind and break down food.**

– يتم تقطيع الطعام ليُسهل بلعه و حتى الانزيمات تستغل به مسافة سطح أكبر.  
\* وخاصة السيليلوز الموجود بالفراخه لا يمكن امتصاصه دون مضغ جيد.

شرح

## Functions of Mastication:

1. **Breakdown of the food into small particles to be easily swallowed**
2. **Chewing is important for digestion of all types of food, but it is especially important for digestion of fruits and raw vegetables.**

# Deglutition (Swallowing)

**Definition** - It is the act of transfer of food from the mouth cavity to the stomach.

## Phases:

- It is divided into three stages (phases).

### **A) Buccal (voluntary) stage:** بُحْبُوح

- During it, the food is pushed into the pharynx by the tongue.
- It is done by the upward and backward movement of the tongue

## B) Pharyngeal (involuntary) stage: لا إرادي

- It takes 1- 2 seconds
- **Presence of food in the back of the mouth** → stimulate **swallowing receptor in pharynx** → which causes;  
مسار الطعام بالمرحلة اللاإرادية.  
بالفم
- a) **Closure of the posterior nasal opening by soft palate** → تمنع دخول الأكل للأنف
- b) **Closure of the laryngeal opening by vocal cords and epiglottis.** صال صوتية  
فتحة الحنجرة  
لسان المزمار  
الذي بين مجرى التنفس والريء (يفتح وبسكرو)
- c) **Stop of breathing during swallowing.**
- d) **Relaxation of the upper esophageal sphincter** → the food moves to **the esophagus.** فتحة المريء العلوية
- e) **Relaxation of the lower esophageal sphincter and stomach to receive the food**



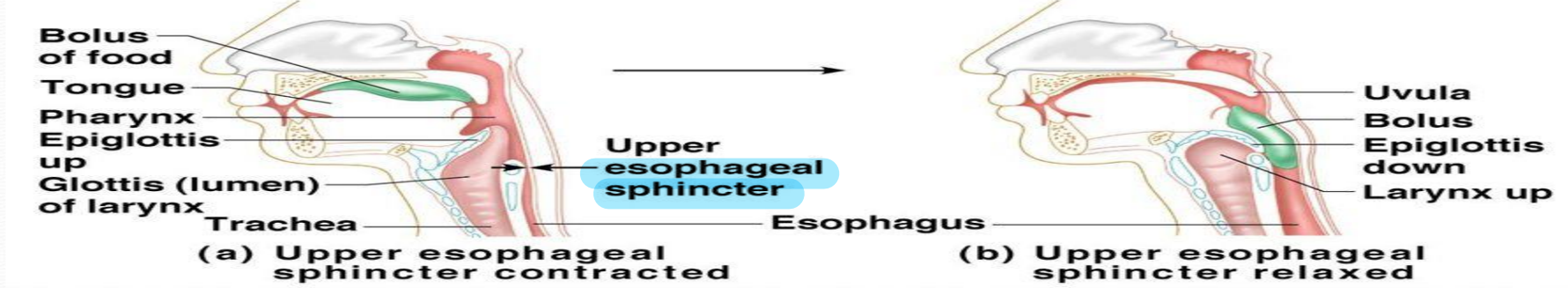


Figure 14.14a–b

## C) Esophageal Stage (Motor function of esophagus):

- It takes 8-10 seconds
- The food move into esophagus by peristalsis



Thank

You●