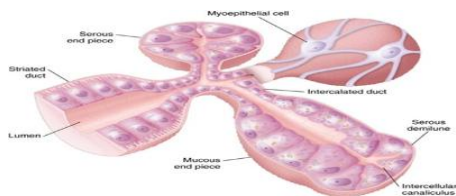




# SALIVA



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# LECTURE- 4 LEARNING OUTCOMES

**By the end of this lecture, students should be able to:**

1. Discuss saliva and its composition
2. Describe the Functions of saliva
3. Discuss saliva as a diagnostic tool



1. Salivary glands are: Exocrine or Endocrine
2. Parotid gland is: pure serous or pure mucous
3. Sublingual gland is: pure serous or pure mucous
4. Difference between serous and mucous acini?

# CLASSIFICATION OF SALIVARY GLANDS

## Based on size

- Major
- Minor

F, M, L  
B, L, P, I

## Based on nature of secretion

- Serous
- Mixed  
(seromucous)
- Mucous

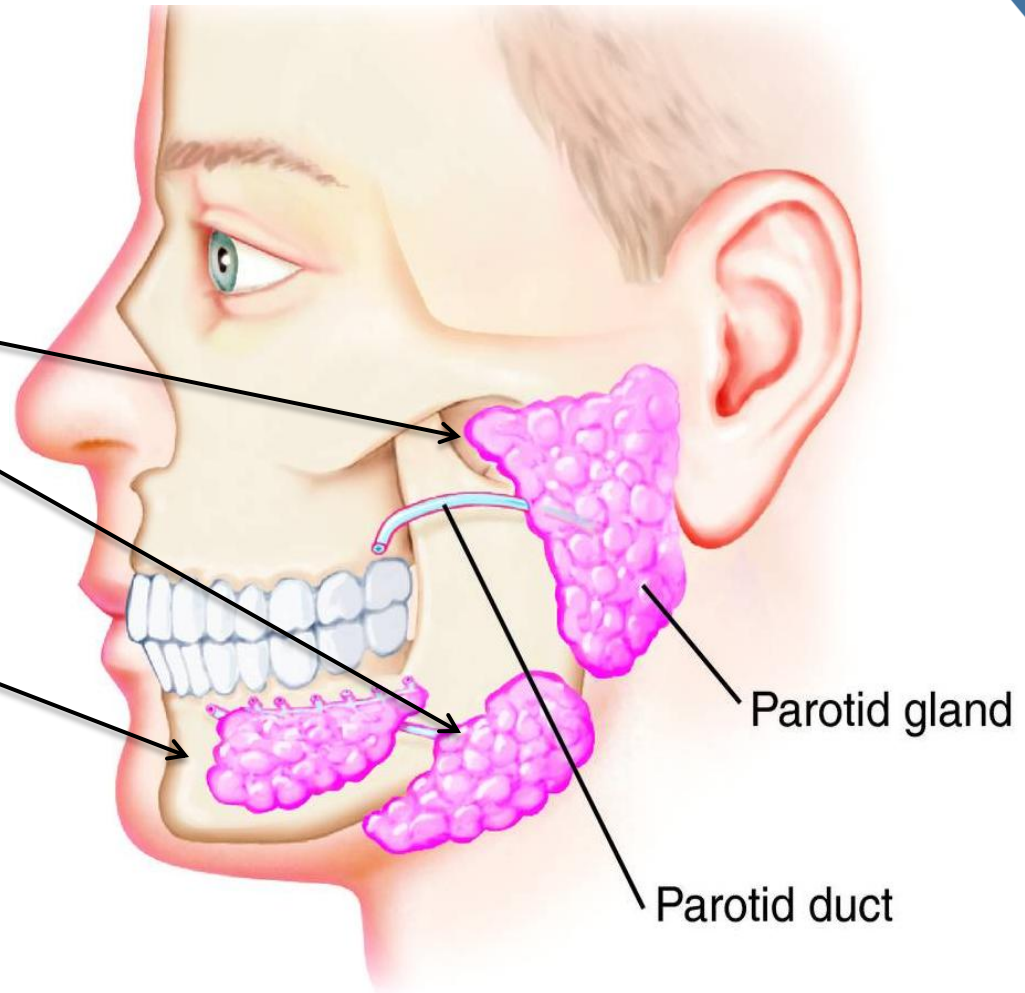
## Based on location

- Extra oral
- Intra oral

P, L  
M

# MAJOR SALIVARY GLANDS

- Parotid
- Submandibular
- Sublingual



# SALIVA

The oral cavity is kept moist by a film of fluid called saliva that coats the teeth and the mucosa

Thin, watery, slightly viscid fluid secreted by the salivary glands.

Major and minor glands  SALIVA

Secretion is controlled by salivary center in the brain



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*Imagine.....*

*If **no** saliva in oral cavity...*





► Difficulty in....Speaking, mastication and Swallowing

► Mucosal infections common

► Rampant caries





# COMPOSITION of SALIVA



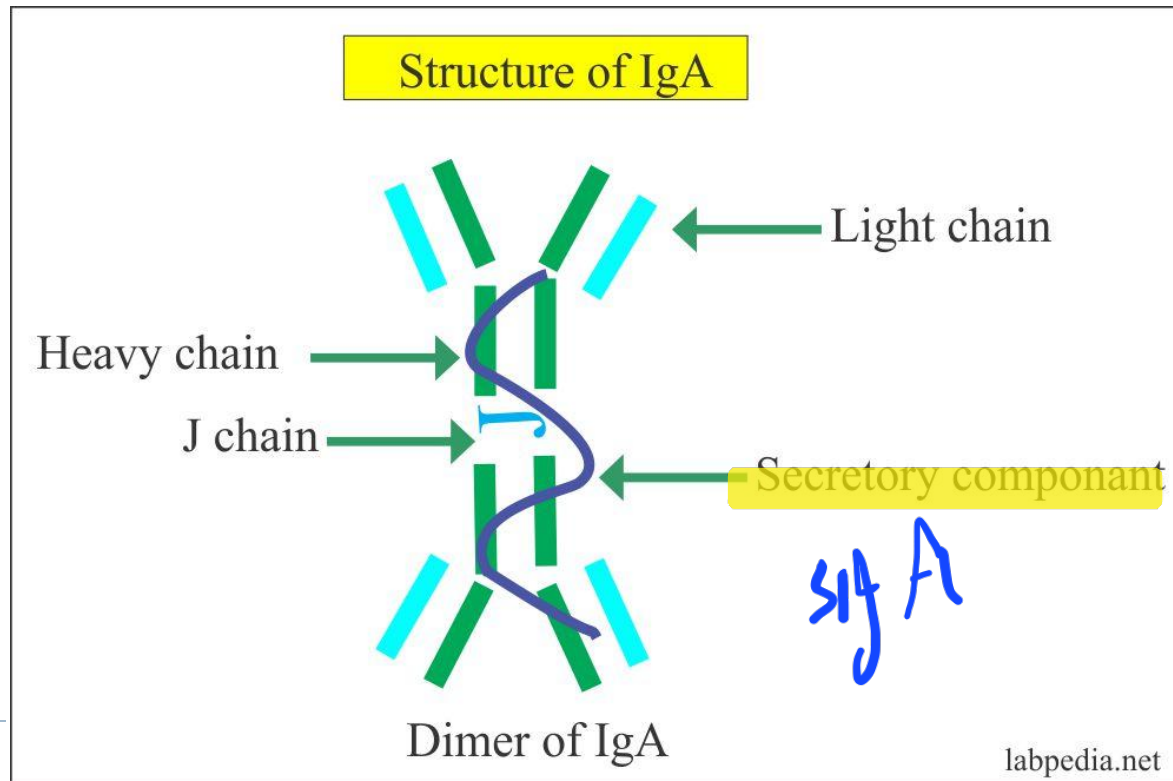
**Water:** 99 to 99.5%  
**Solids:** 0.5 to 1 %

- ✓ **Inorganic ions:** Ca & F & Na,K & Cl & HC03 & Mg & HP04 .
- ✓ **Organic substances:** include :–
  - 1– **Enzymes:** Amylaze & Lactoferin & kalikrine & lysozyme & per–oxidase & acid–phosphatase .
  - 2– **Mucin:** Carbohydrate rich in glycoprotein .
  - 3– **Other organic molecules:** Amino–acid & Uric–acid & urea & lipids & Corticosteroids
- ✓ **Some Serum constituents:** Ig ( A , G , M ) & albumin & clotting factors .

IgA is produced locally in salivary glands by plasma cells

# Secretory Immunoglobulin A

- ▶ Secretory Immunoglobulin A (SIgA) is a subclass of Immunoglobulin A (IgA), an antibody that plays a **critical role in mucosal immunity**.



# WHOLE SALIVA

- ▶ In addition to the secretions from **major and minor salivary glands**, saliva also contains:
- ▶ 1 – Microorganisms and products
- ▶ 2 – Food remnant
- ▶ 3 – Leukocytes
- ▶ 4 – Desquamated oral epithelial cells
- ▶ 5 – Gingival fluid
- ▶ It called **oral fluid or mixed saliva or whole saliva** ..

# pH of saliva

Neutral

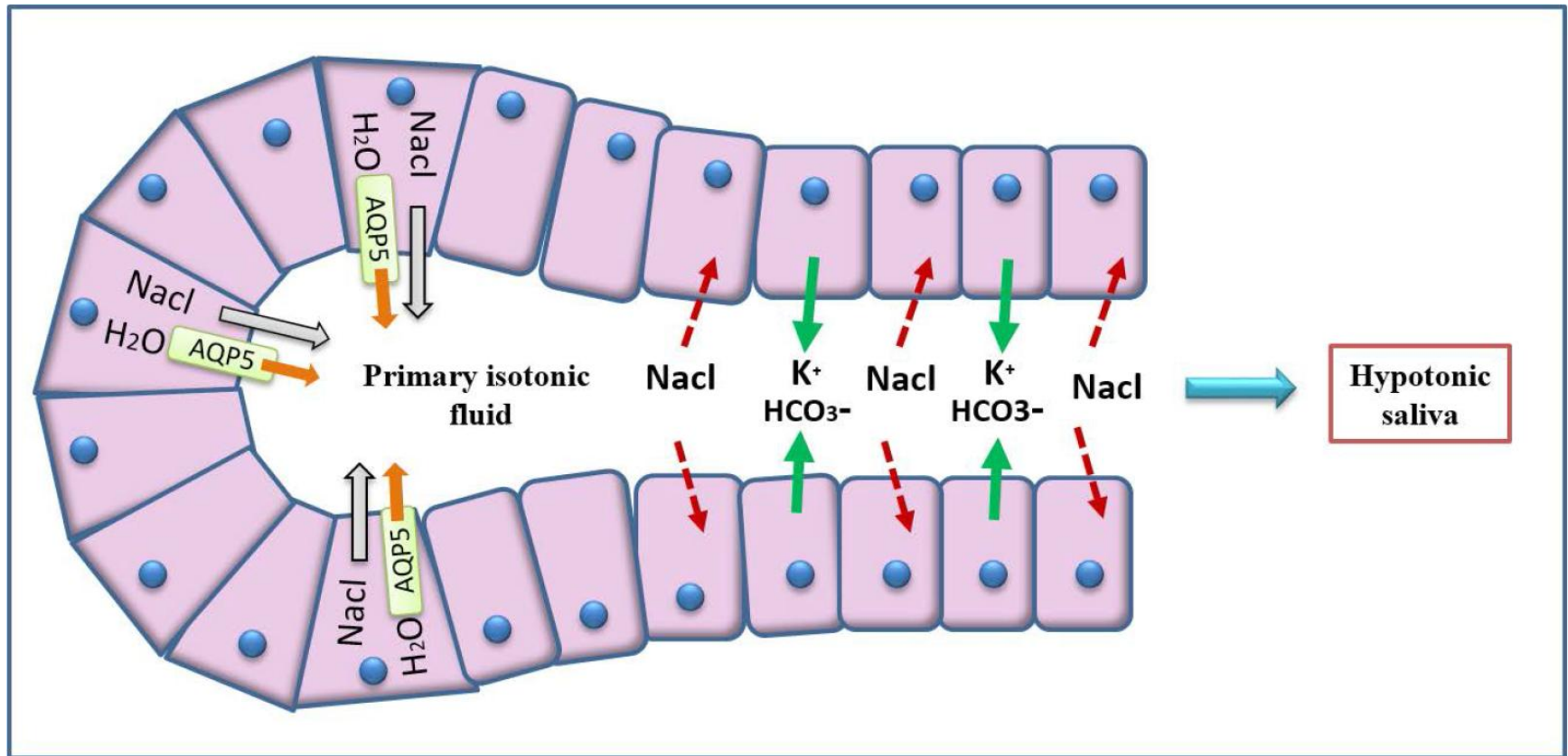
Parameter	Range
pH	6.7-7.4



# Tonicity of saliva

## Q- tonicity of saliva

Hypotonic





# VOLUME AND FLOW RATE

Volume and Flow rate	Quantity
Volume per day	600-1000ml/day or (0.6-1 lit/day)
Stimulated	2-5ml/min
Resting	0.2-0.4ml/min



The saliva produced by each gland , differs in amount and composition:

▶ Parotid glands: (30%)

• Watery saliva.

- Rich in enzymes such as amylase, Proteins such as proline rich proteins and other glycoproteins.
- Human parotid gland produces a hormone, known as Parotin.

▶ Submandibular glands: (60%)

▶ Major amount of saliva is secreted by submandibular gland

- In addition to above component + rich in mucins

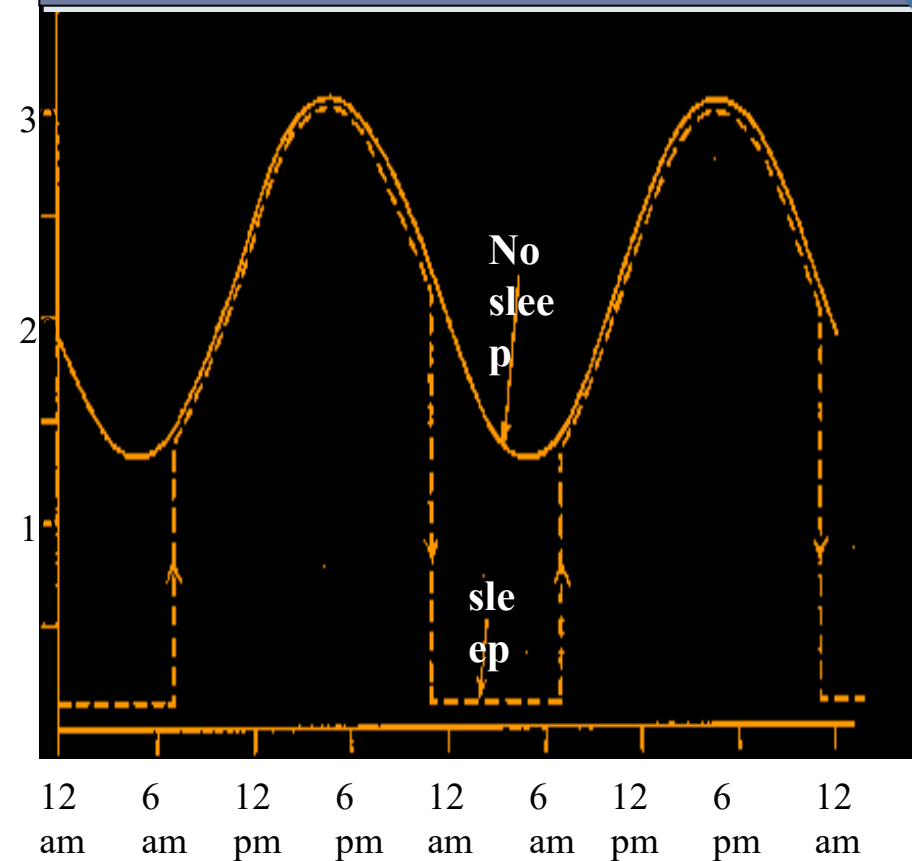
▶ Sublingual glands:(5%)

- Viscous rich mucins.

# SALIVARY FLOW RATE

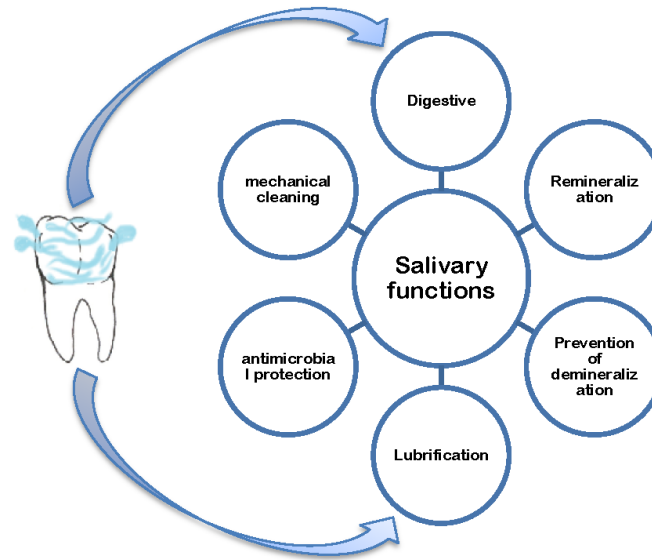
- ▶ Exhibit diurnal and seasonal variations
- ▶ Peak : Mid afternoon
- ▶ Negligible: During sleep flow

## CIRCAIDIAN RHYTHM OF SALIVA FLOW



■ Time of day

# Functions of saliva



# 1.PROTECTION:

**1. MECHANICAL WASHING ACTION:** To wash the surface of teeth, flushes away non-adherent bacterial and acellular debris from the mouth.

**2. LUBRICANT:** Because of water and mucin content, saliva helps to keep the oral tissues moist and protect against irritants and desiccation.

**3.PELLICLE FORMATION:** Salivary glycoproteins bind to surface of the teeth and oral mucosa, thus forming *salivary pellicle* which behaves as a protective membrane.

**4. SALIVARY ANTICARIES ACTIVITY:**

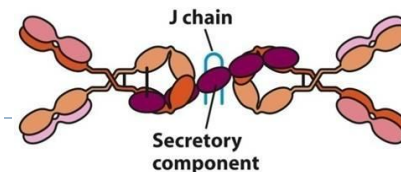
Remineralization of incipient carious lesion— $\text{Ca}^+$ ,  $\text{PO}_4^+$

Increase enamel resistance to acid decalcification— $\text{F}^-$

## 2. ANTIMICROBIAL ACTION:

- ▶ Lysozyme is an enzyme that can break down the cell wall of some bacteria leading to lysis of bacteria.
- ▶ Lactoferrin binds <sup>with</sup> free iron; therefore depriving bacteria of this essential element iron .
- ▶ Antibodies present in saliva: IgA,
- ▶ Mucin and specific agglutins: aggregate microorganisms therefore help in rapid clearance from oral cavity thereby preventing their adhesion to oral cavity

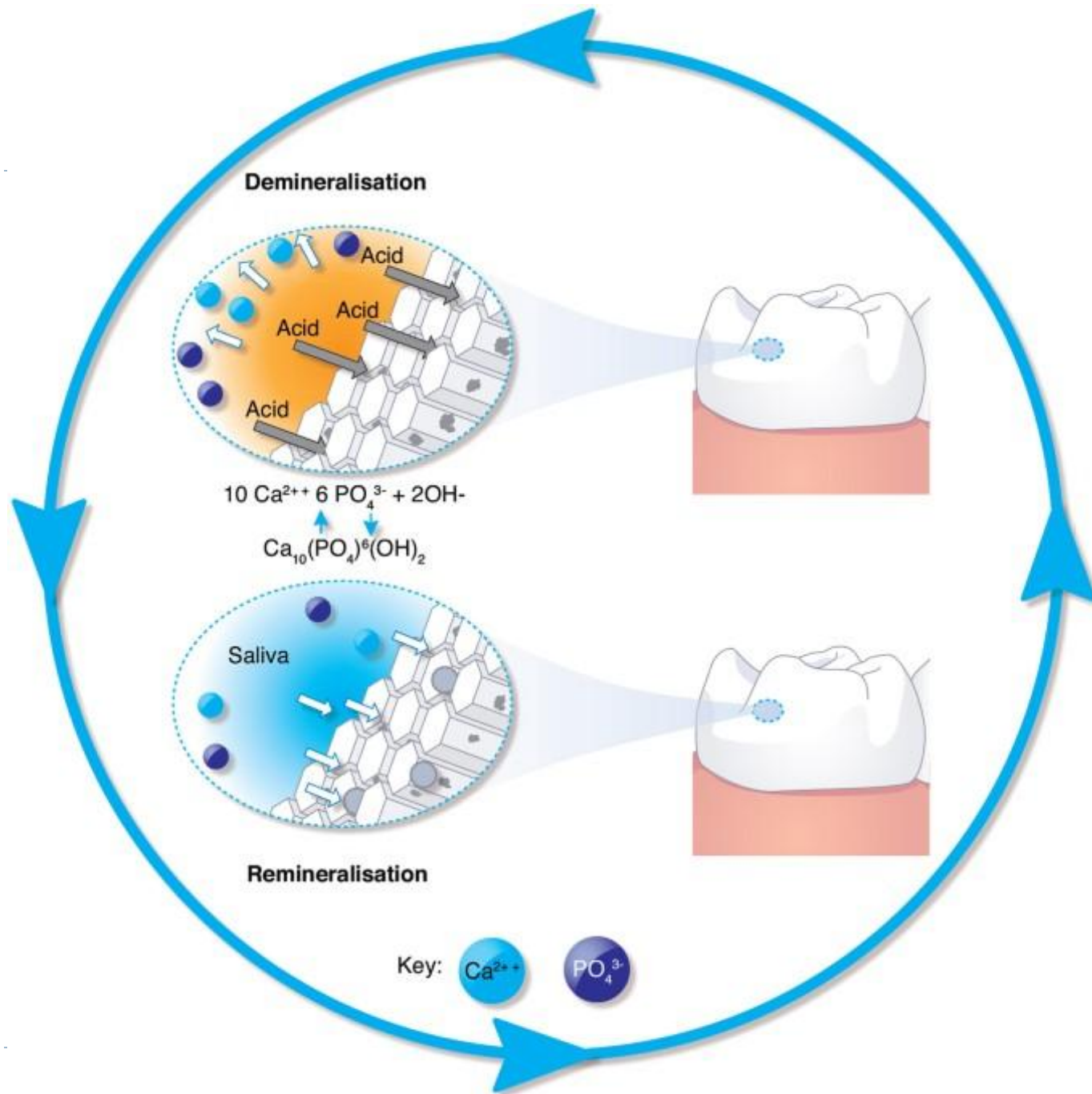
Structure of secretory IgA





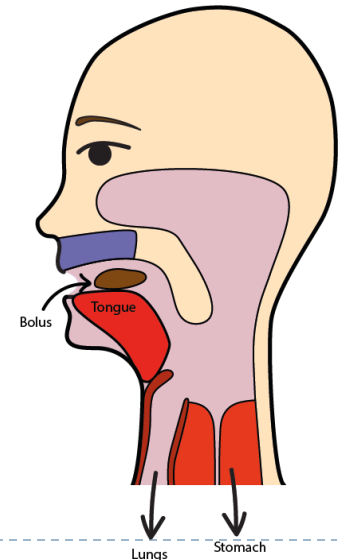
### 3.MAINTAINENCE OF TOOTH INTEGRITY:

- ▶ **Remineralization of initial caries:** Saliva is saturated with  $\text{Ca}^+$  &  $\text{PO}_4^-$ .
- ▶ **BUFFERING:** Buffering action to saliva are mainly due to **bicarbonates and phosphates**. It provides protection in **acid neutralizing** and **acid buffering** actions, which **prevent dissolution of enamel**.



## 4. MASTICATION AND SWALLOWING OF FOOD

- ▶ Saliva **moistens the food** and helps its breakdown into smaller particles to initiate digestion.
- ▶ The moistening and **lubricating** properties of saliva allow the **formation of bolus** and facilitate deglutition.



## 5.DIGESTION:

Saliva participates in digestion by providing

- ▶ a fluid environment for solubilization of food and
- ▶ through the action of the digestive enzymes like amylase (starch) and lipase (fat).

## 6. ROLE OF SALIVA IN TISSUE REPAIR:

A variety of growth factors are present in small quantities in saliva like Epidermal growth factor (EGF).

## 7.TASTE:

- ▶ Saliva is required to dissolve substance to be tasted & carry them to the taste buds.



PROTECTION

MASTICATION  
AND  
SWALLOWING

MAINTAINENCE OF  
TOOTH INTEGRITY



## Functions of saliva

ANTIMICROBIAL  
ACTION

TISSUE REPAIR

TASTE

BUFFERING  
ACTION OF  
SALIVA

DIGESTION



# Saliva- A Diagnostic Tool

**Traditional Uses:** Assessing salivary flow rate (hyposalivation screening).

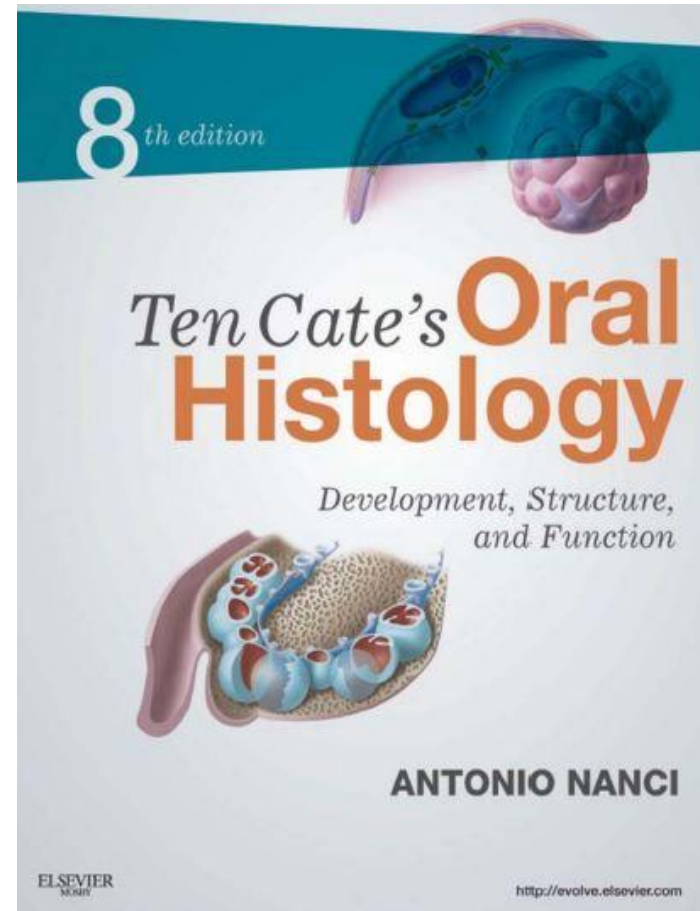
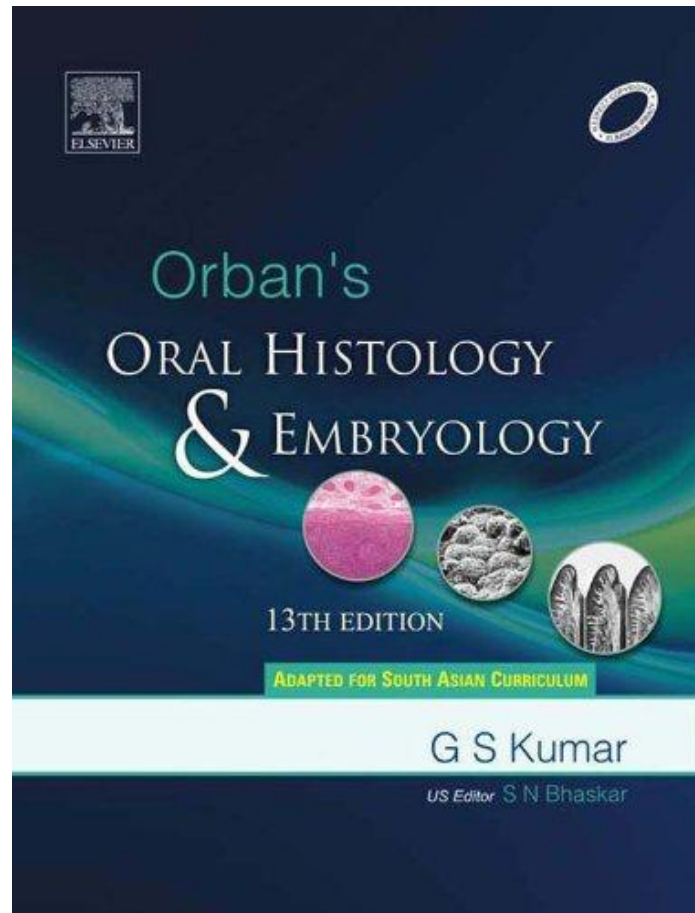


## **Emerging Applications:**

- ▶ **Biomarkers:** Detecting disease markers for systemic diseases (diabetes, autoimmune diseases, infections like HIV/HCV).
- ▶ **Oral Cancer Screening:** Detection of specific proteins or DNA mutations.
- ▶ **Caries Risk Assessment:** Measuring buffering capacity, IgA levels, specific bacterial counts.
- ▶ **Therapeutic Drug Monitoring.**

- ▶ **Advantages:** Non-invasive, easy collection

# Reference



***Thank you***

