



GIT Lecture 8

GIT Secretions
(Introduction)

Secretory functions of Alimentary tract

Objectives

- General principals of alimentary secretion
- Saliva
- Esophageal Secretion
- Gastric Secretion
- Pancreatic Secretion
- Bile
- Secretions of small intestine
- Secretions of large intestine

Secretory glands

- Functions
 - Digestive enzymes
 - Mucus for lubrication and protection
 - Amount & composition depends on
 - Presence of food
 - Quantity of food
 - Type of food

4 Anatomical types of Secretory glands

1. Single-cell mucus glands (Mucous cells/Goblet cells)
 - On surface of epithelial cells in most parts of GIT
 - Stimulus: Local irritation
 - Secretion: Mucus
 - Function:
 - Lubrication
 - Protection
2. Pits
 - Localized invaginations
 - e.g. Crypts of Lieberkühn
 - Contain specialized Secretory cells

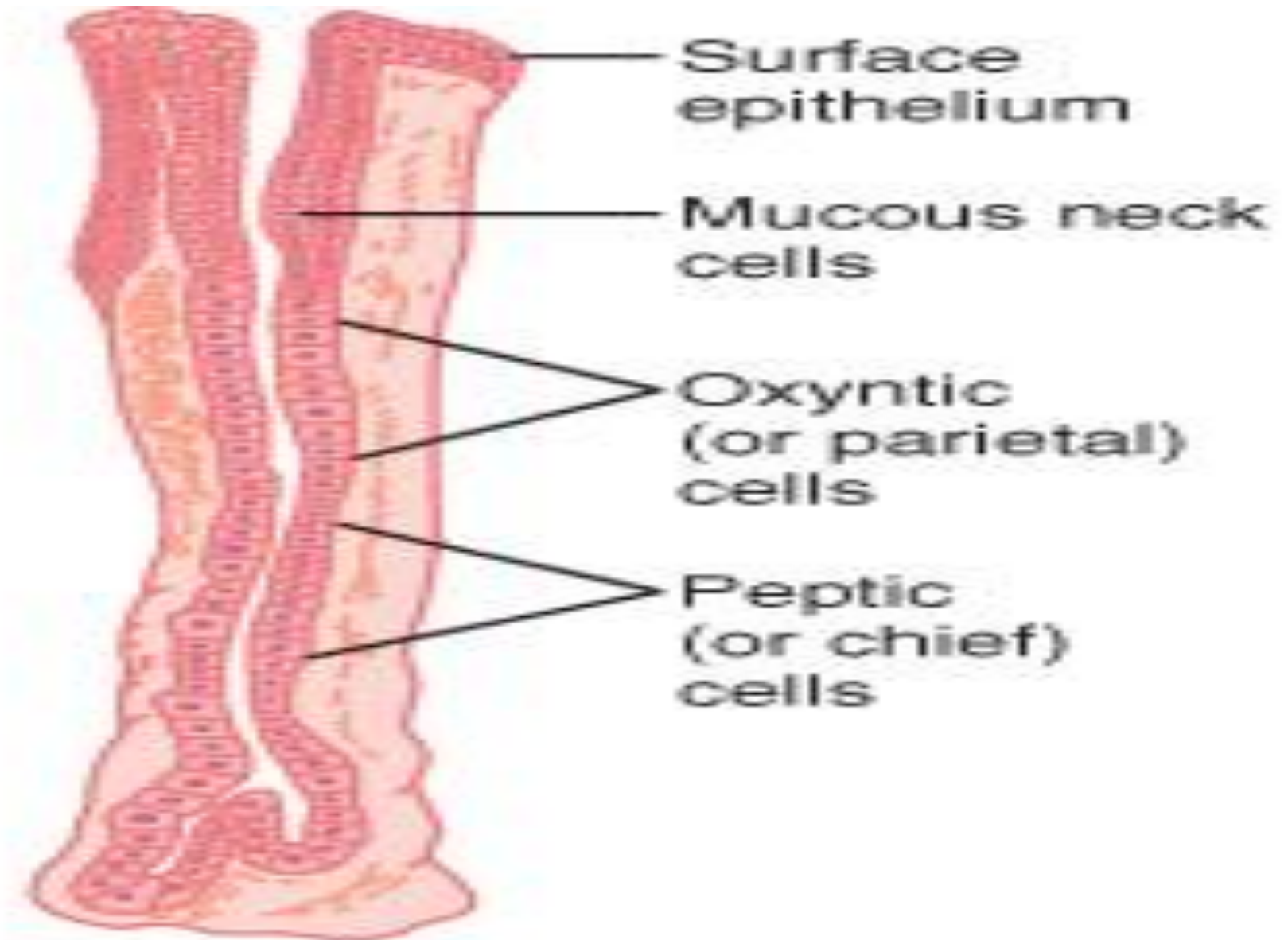
3. Tubular glands

- Deep
- Stomach & upper duodenum

4. Associated complex glands

- Salivary glands
- Pancreas
- Liver

Tubular Gland



Basic Mechanisms of Stimulation of the

- Stimuli: Alimentary Tract Glands

- Contact of food with Epithelium
 - Tactile stimulation
- Chemical stimulation
- Distention

- Receptors:

- Epithelium of GIT

- Afferent and efferent pathways

- Local
- Enteric Nervous System

- Controlled by

- Hormones
- Nervous system

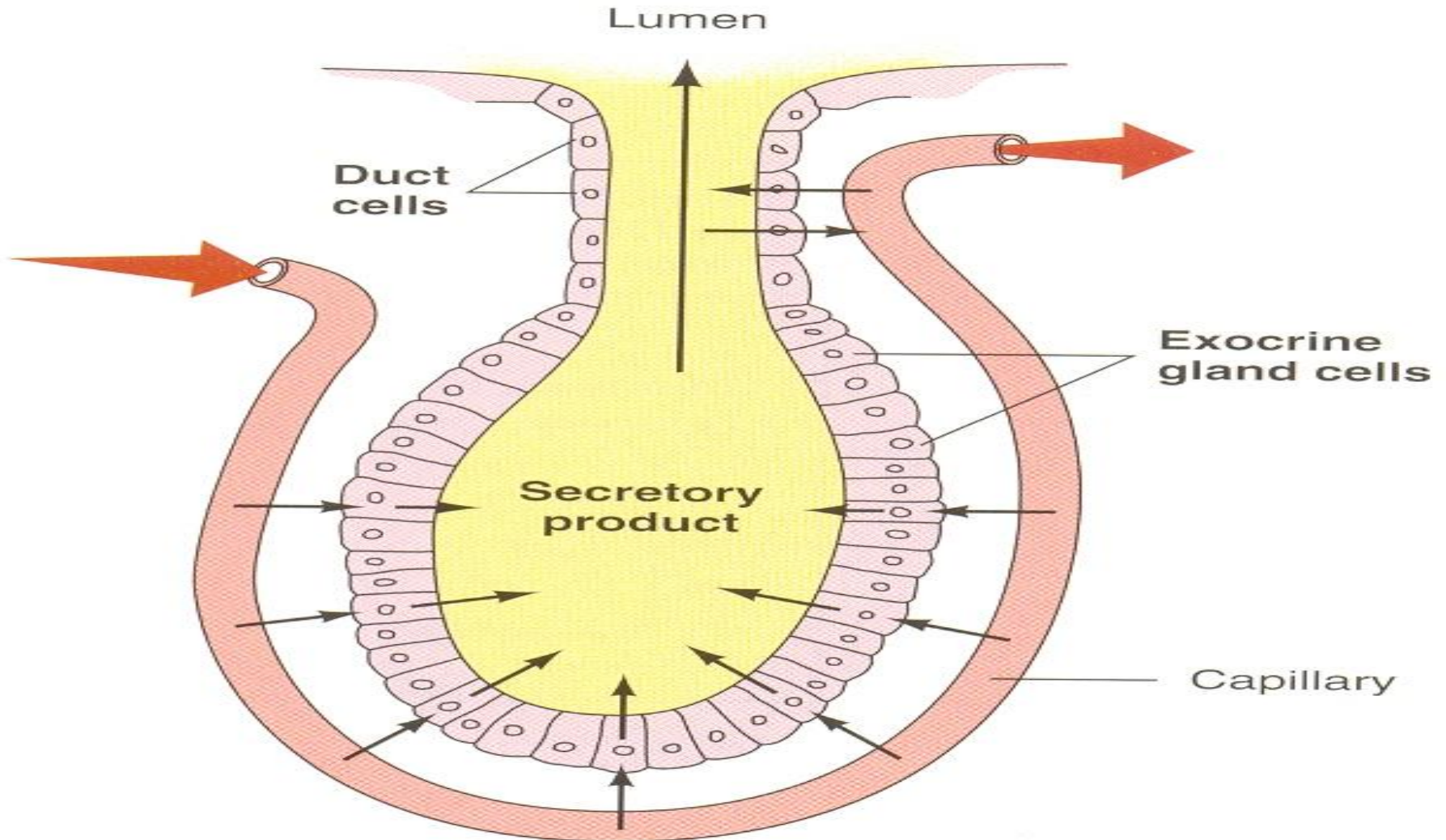
- Effects:

- Stimulation of glands

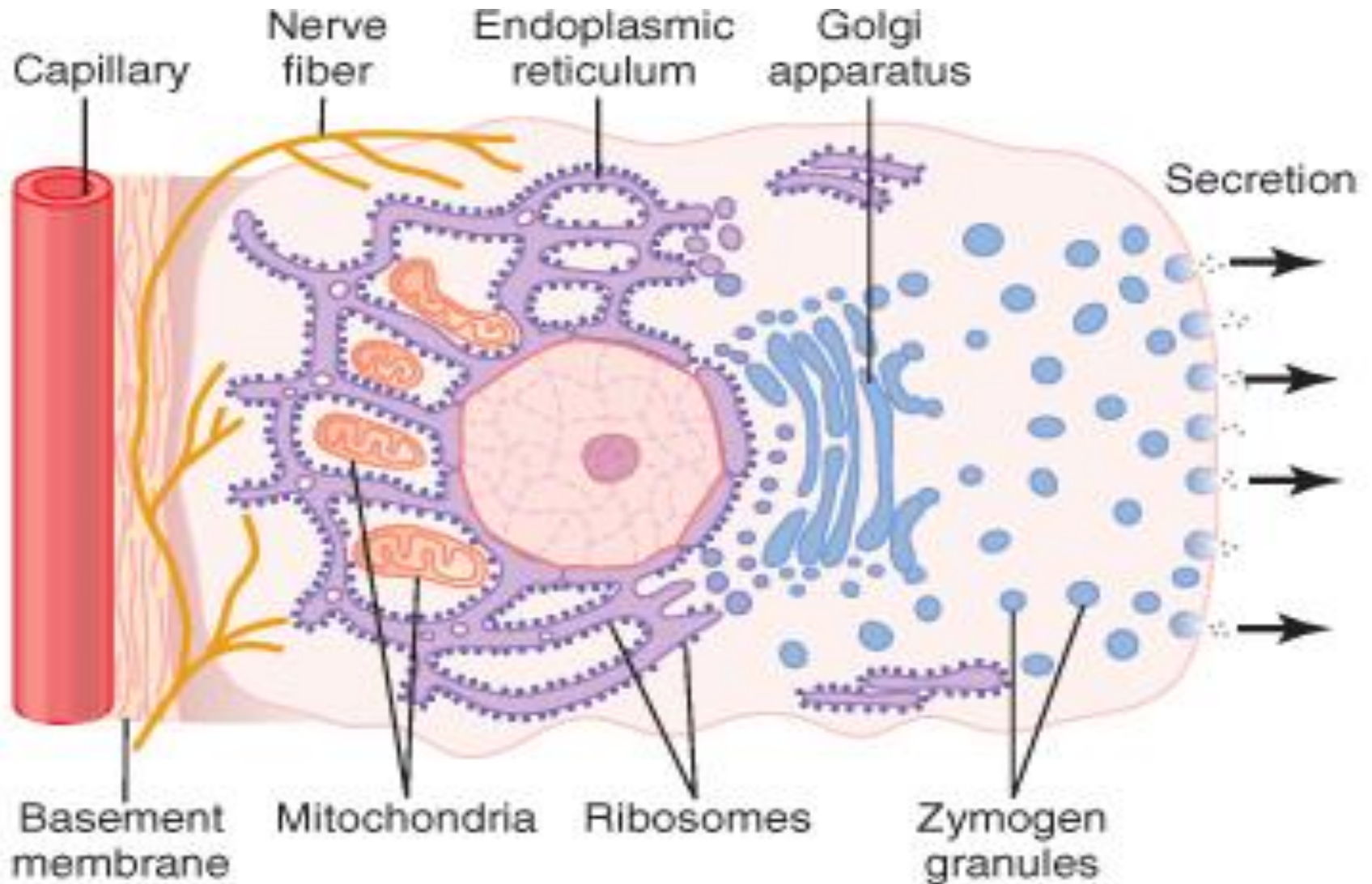
Basic Mechanisms of Stimulation of the Alimentary Tract Glands

- Autonomic Stimulation
 - Parasympathetic
 - ↑ secretion
 - Sympathetic
 - ↓ secretion (↓ blood supply)
 - Initially may be a little ↑ secretion
- Control by Hormones

General mode of exocrine gland secretion



Basic Mechanism of Stimulation of the Alimentary Tract Glands



Basic Mechanism of Secretion

- Water & Electrolyte secretion

Nerve stimulation →

active transport of chloride from blood to basal part of secretory cell →

↑ negativity →

Sodium ions →

↑ osmotic pressure →

↑ cell volume →

↑ pressure on secretory border →
secretion

Composition of Mucus

- Water
- Electrolytes
- Glycoproteins

Functions of Mucus

1. Lubrication

- Coats the wall of gut (prevents actual contact of food with gut wall)
- Low resistance for slippage

2. Protection

3. Adherent qualities

- Adherence of fecal particles

4. Resistant to digestion

5. Mild buffering properties

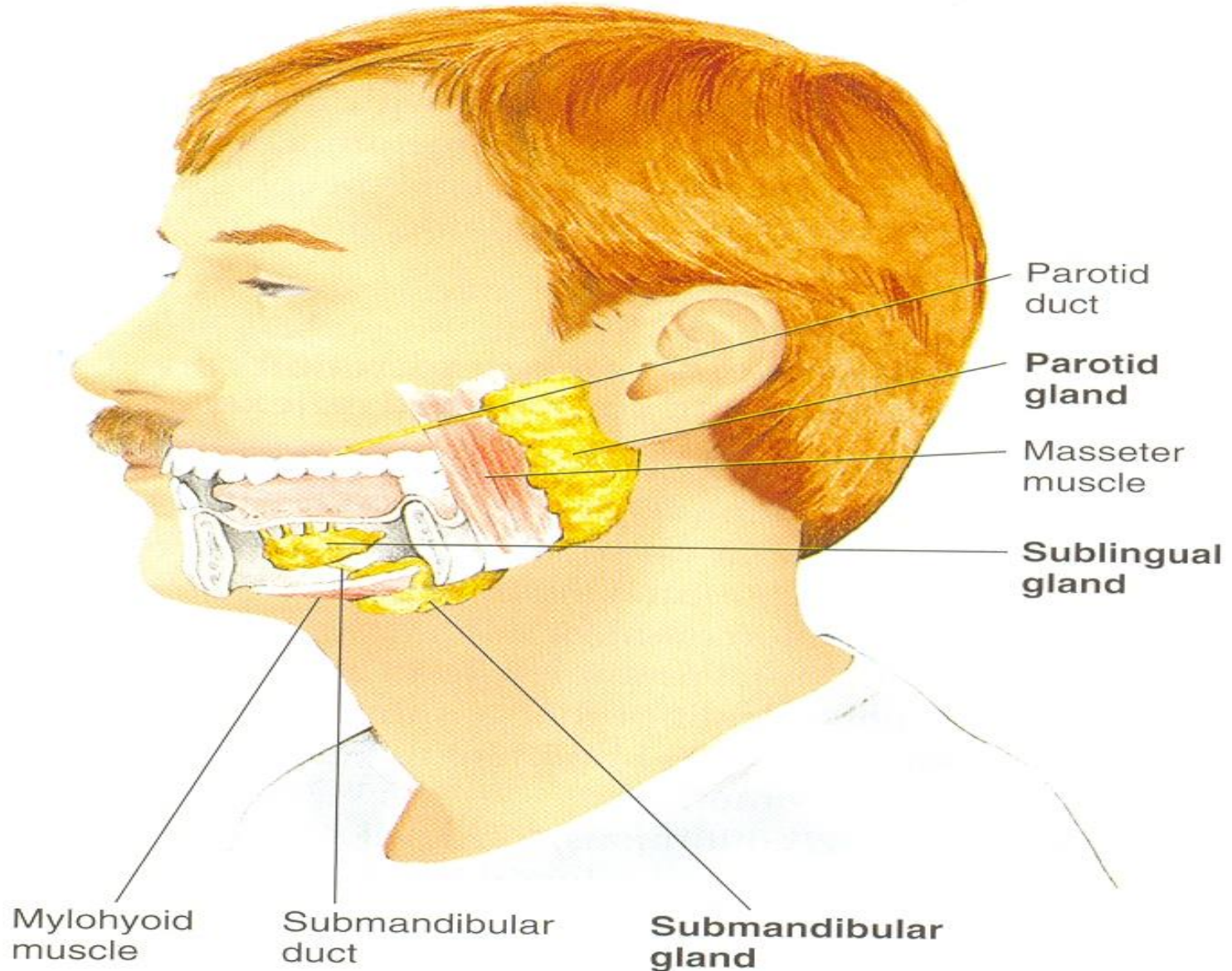
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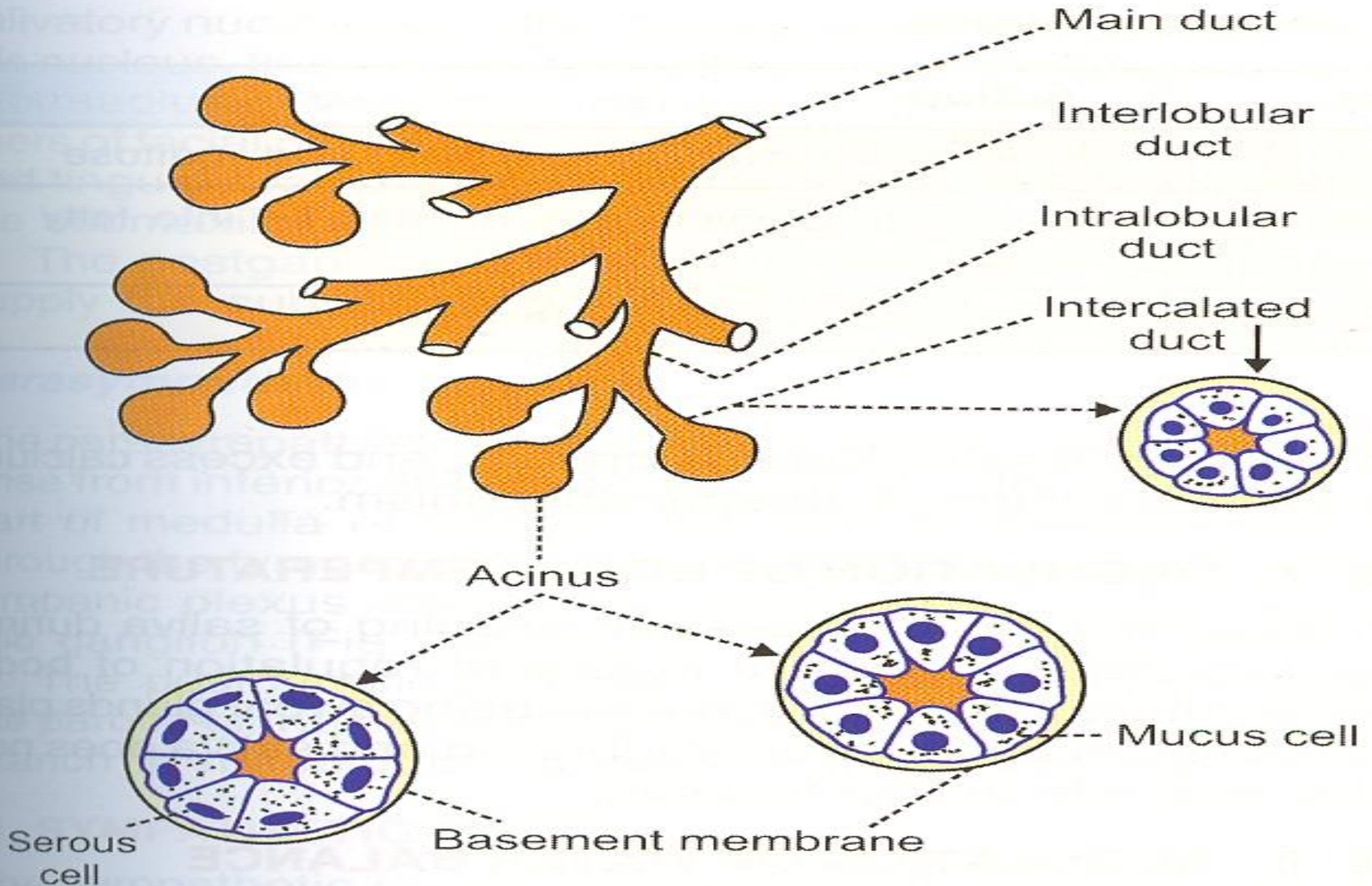
Secretion of Saliva

- Salivary glands
 - Parotid
 - Submandibular
 - Sublingual
 - Buccal

Three major pairs of salivary glands



Basic structure of salivary glands



Characteristics of Saliva

- Daily secretion of Saliva: 800-1500 ml
(Average: 1000 ml/day)
- 0.5 ml per minute (Resting, day)
- ↑ Secretion with ingestion
- ↓ Secretion at night
- pH: 6-7
 - May reach 8 during active secretion

Composition of Saliva

1. Protein Secretions

- i. Serous secretion (Parotid, Sublingual & Submandibular glands)
 - i. Ptyalin (an α Amylase)
 - i. Digestion of Starches
- ii. Mucus Secretion (Buccal, Sublingual & Submandibular glands)
 - Mucin
 - » Lubrication
 - » Protection

2. Electrolytes



3. Immune globulin IgA

4. Lysozyme

5. Proline-rich proteins

Under resting conditions mainly mucus
Secretion

Functions of Saliva

1. Digestion
 - i. Salivary Amylase
 - Secreted by salivary glands
 - ii. Lingual lipase
 - Secreted by glands on the tongue
 2. Articulation
 3. Moistening of food
 4. Mastication
 5. Water regulation (thirst)
 6. Taste receptors
 7. Swallowing
 8. Keeps mouth clean
 9. Neutralization of gastric acid
- Relieve of heartburn

Functions of Saliva

10. Protection from bacteria

- i. Wash away bacteria
- ii. Wash away the food of bacteria
- iii. Destroy bacteria
 - Thiocyanate ions
 - Protein antibodies
 - Proteolytic enzymes (e.g. Lysozyme)
 - a. Attack bacteria
 - b. Help Thiocyanate ions
 - c. Digest food of bacteria

Functions of Saliva

11. Tooth Protection

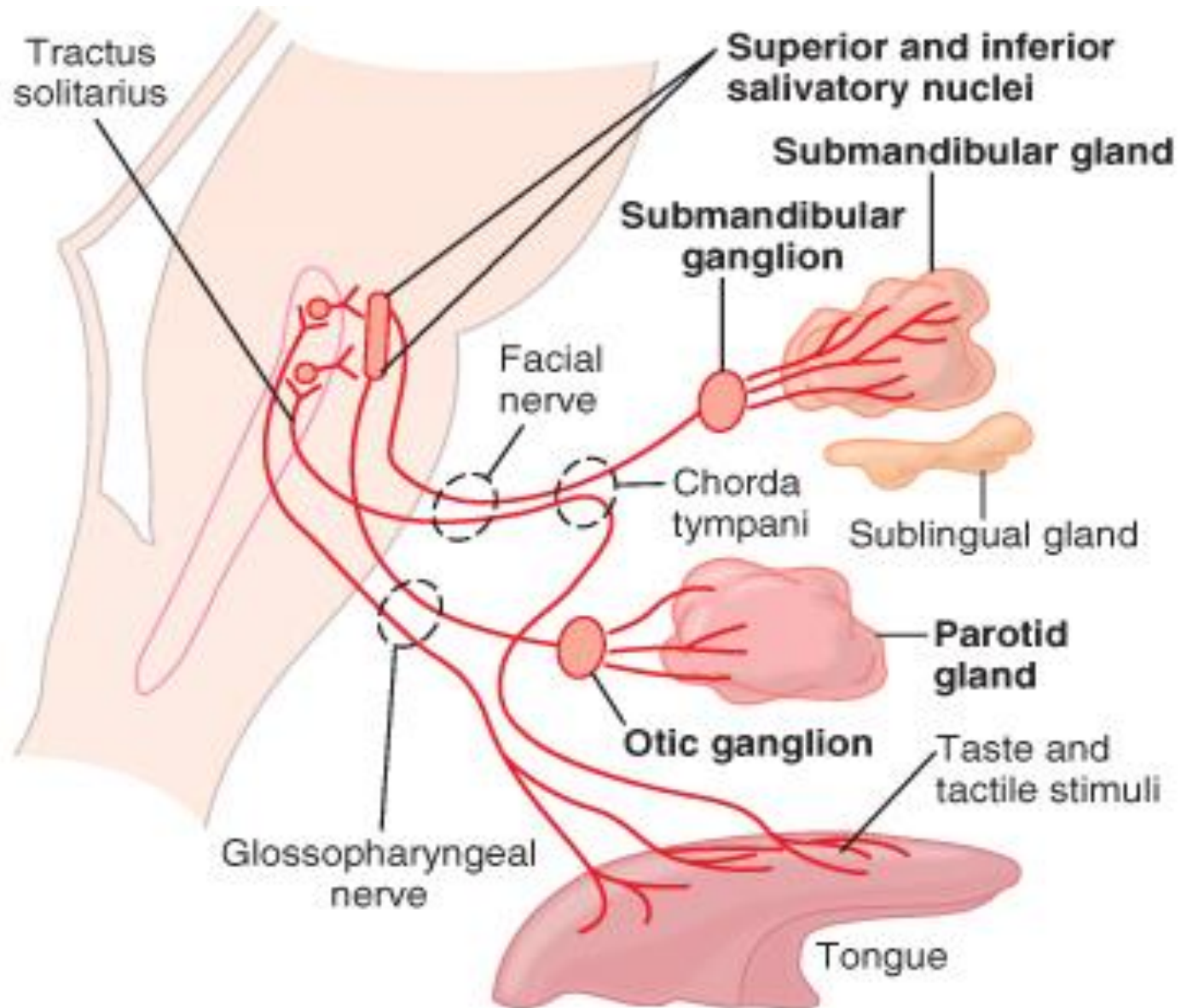
1. By neutralizing acid
2. By affecting mineral dissociation equilibrium by means of its calcium phosphate content.
3. Proline-rich proteins protect the tooth enamel and bind toxic tannins

Functions of Saliva

12. Excretion:

- I. Urea
- II. Heavy Metals
- III. Drugs
- IV. Alkaloids
- V. Ethyl alcohol
- VI. Bacteria

Nervous regulation of salivary secretion



Nervous regulation of salivary secretion

- Parasympathetic stimulation: ↑saliva
- Taste & tactile stimuli from tongue, mouth & pharynx → ↑saliva
- Food in stomach & upper intestine → ↑saliva
- Sympathetic stimulation
 - Slight ↑ in saliva



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