



Mastication (Chewing)

Dr. Mohammed Alzoghaibi

Mastication (Chewing)

- Teeth organization
 - Anterior teeth (incisors) for cutting
 - Posterior teeth (molars) for grinding
 - Chewing muscles are innervated by CN V
 - Taste center (Hypothalamus) —→ rhythmical chewing movements
 - Can be voluntary or involuntary
 - Chewing reflex & stretch reflex
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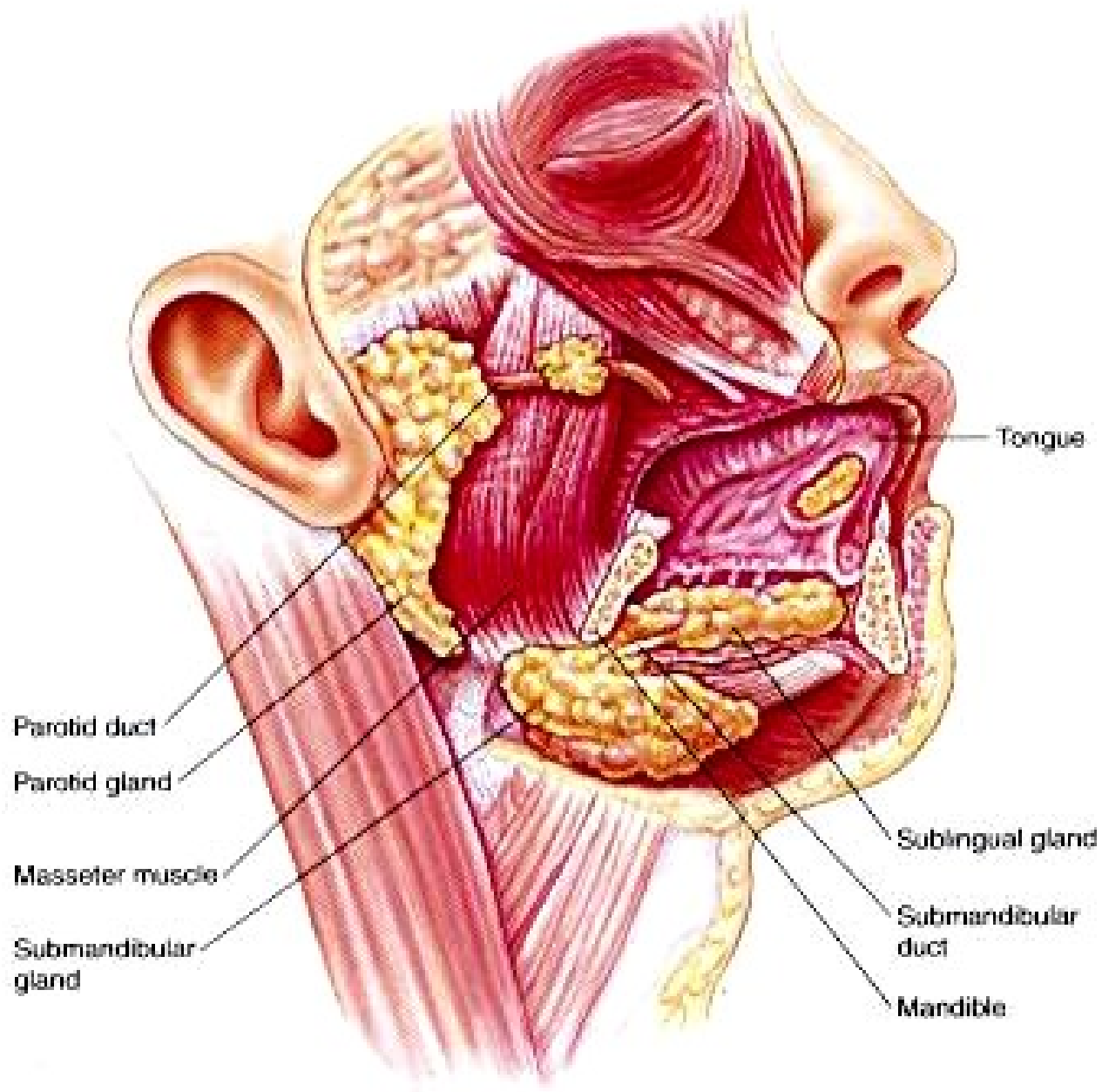
Mastication (Chewing)

- Functions:
 1. To lubricate the bolus with salivary secretion
 2. To breakdown the bolus to small particles
 3. To begin digestion of carbohydrate (amylase)
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SALIVARY SECRETION

Anatomy

- Parotid glands
 - Submandibular (submaxillary) glands
 - Sublingual glands
 - Smaller glands in mucosa of tongue, palate, etc.
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Parotid duct

Parotid gland

Masseter muscle

Submandibular gland

Tongue

Sublingual gland

Submandibular duct

Mandible

Composition of Saliva

- Aqueous fluids
 - Water, ions and enzymes
 - Parotid, submaxillary and sublingual glands

 - Mucus secretion (mucin)
 - Submaxillary and sublingual glands
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Composition of Saliva

■ Aqueous Fluids

- H_2O , K, HCO_3 , Na, Cl, α -amylase, lingual lipase, IgA, kallikrein, muramidase (lyses muramic acid of *Staphylococcus*), lactoferrin and EGF
- Hypotonic Solution
 - ❖ at low flow rate
 - ❖ ions (Na, K, Cl, HCO_3 : concentrations altered with altered flow rates)
 - ❖ High K and HCO_3
 - ❖ Low Na and Cl

Composition of Saliva

■ Enzymes

➤ α -amylase, parotid glands

- cleaves α -1,4-glycosidic bonds
- pH optimum of 7
- inactivated @ pH 4 but continues to work for sometime in unmixed food in orad portion of stomach

➤ Lingual lipase

- hydrolyzes lipids
- continues working into duodenum

Composition of Saliva

- **Enzymes (Cont)**

- **Kallikrein (protease, acinar cells)**

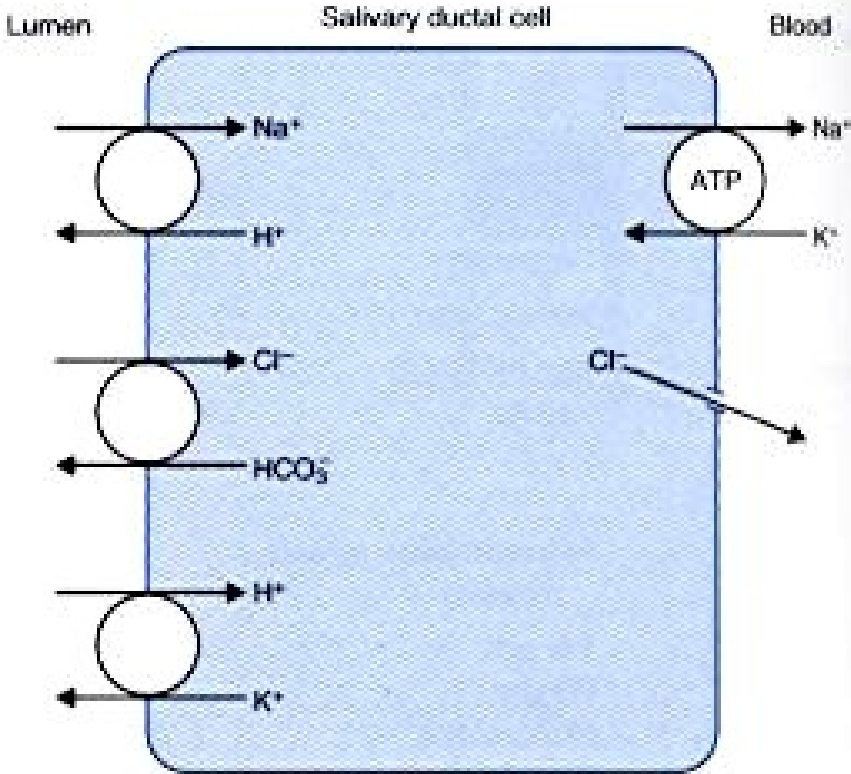
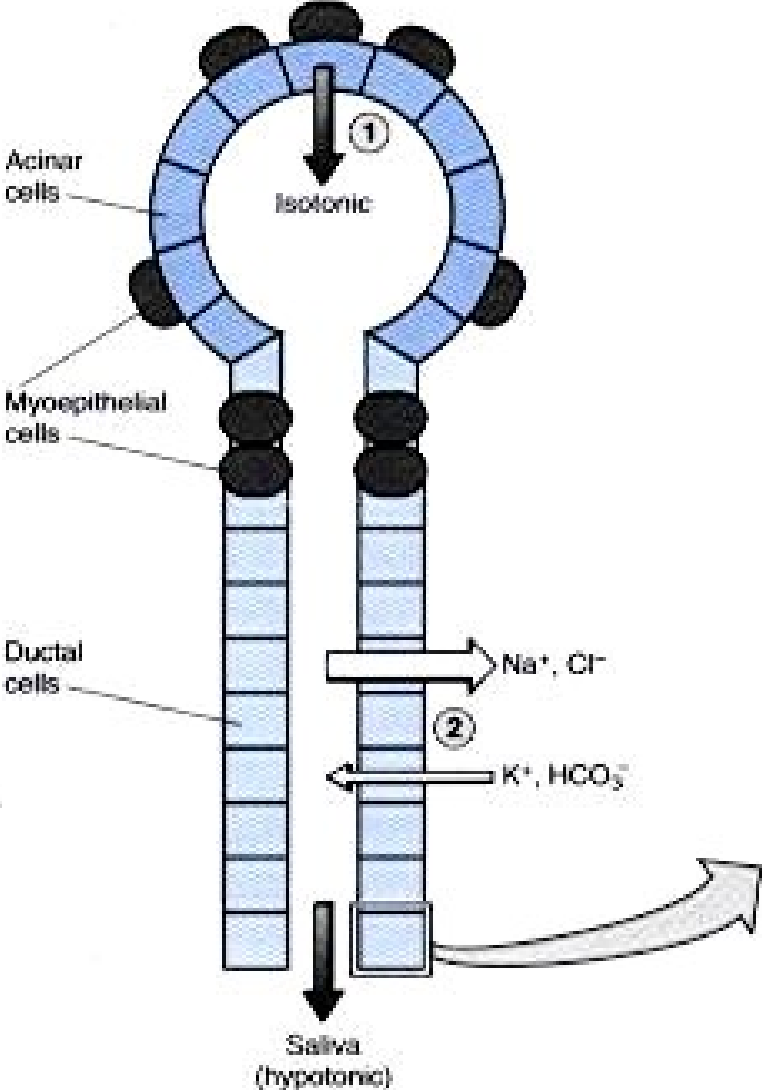
- Catalyzes production of bradykinin from α -globulin
- Increase local blood flow

- **Water (0.5 L saliva/day)**

Secretory Unit (salivon)

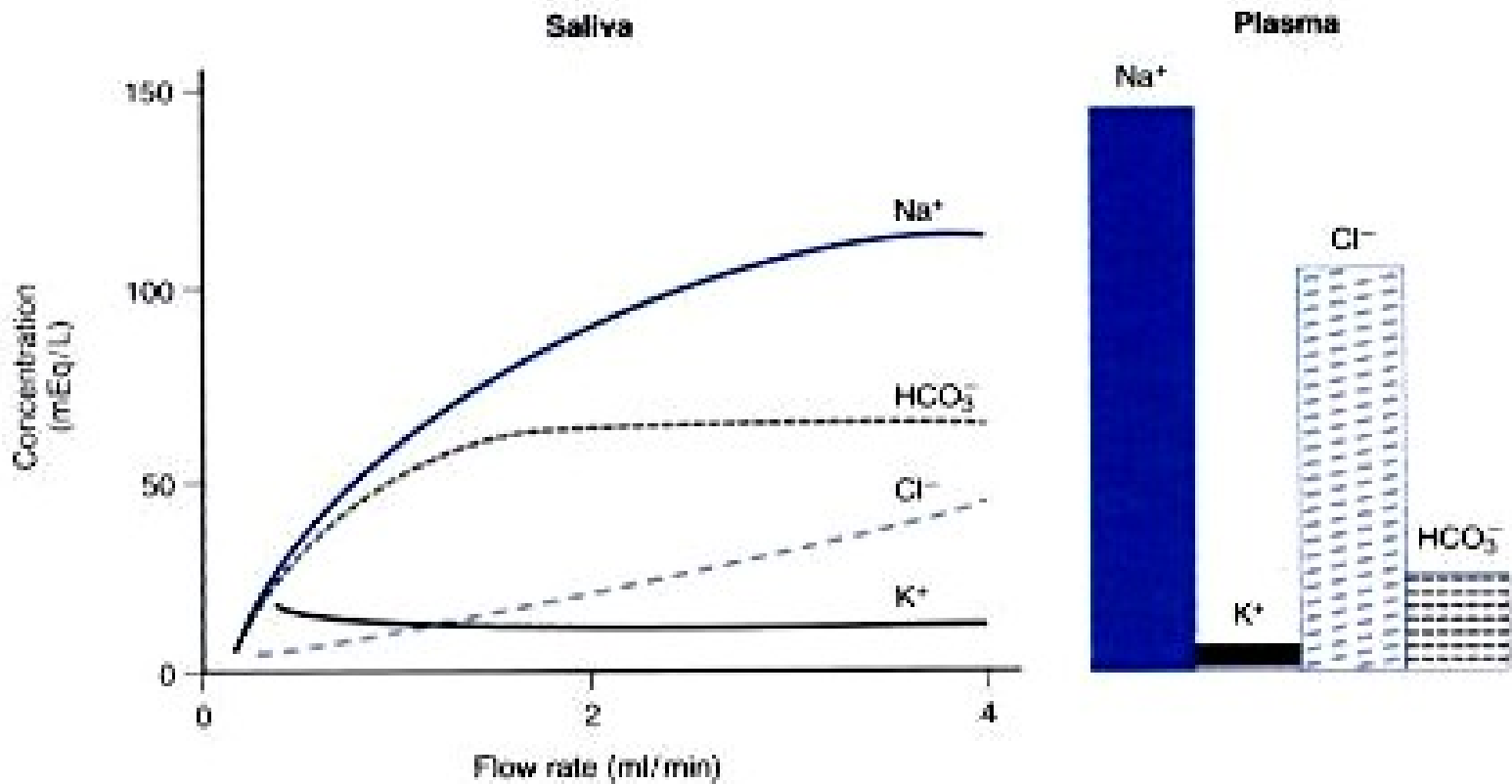
- ❖ The basic unit “salivon” consists of:
 - ❖ Acinus -initial secretory process
 - ❖ Intercalated duct -initial portion of duct
 - ❖ Striated duct -modification of secretory product
 - ❖ Myoepithelial cells
 - surround acinus and intercalated duct
 - contraction moves saliva, prevents development of back pressure

SALIVARY SECRETION



Characteristics of Saliva and Flow Rate

- Daily secretion = 800-1500 mL
- PH = 6-7



Functions of Saliva

- moisten food
 - begin digestion
 - adjust salt appetite
 - bacteriostatic
 - lysozyme active against bacterial walls
 - lactoferrin which chelates iron necessary for bacterial growth
 - Thiocyanate ions and antibodies
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Control of Secretion

- Unique aspects of control of salivary secretion
 - secretion rate depends entirely on neural control -ANS
 - both Parasympathetic and Sympathetic lead to increase secretion
 - Composition modified by Aldosterone
 - ❖ increases Na, Cl reabsorption
 - ❖ increases K secretion
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Parasympathetic

- ❖ Origin
 - salivary nucleus in medulla
- ❖ Outflow
 - CN VII & IX
- ❖ Transmitter
 - Ach
- ❖ Increased stimulation in response to
 - conditioned reflexes (taste, smell)
- ❖ Decreased stimulation due to
 - sleep, fear, dehydration

Parasympathetic

❖ Stimulates

- initiation & maintenance of secretion (protein poor, high k and HCO₃)

- contraction of myoepithelial cell

- metabolic rate

- blood flow

 - direct innervation of blood vessels

 - release of kallikrein -increased bradykinin

- growth

❖ Sectioning of parasympathetic markedly decreases flow & leads to atrophy

Sympathetic

❖ Origin

intermediolateral gray T1-T3

❖ Transmitter

norepinephrine

❖ Stimulates

- secretion (mostly enzymes)
 - contraction of myoepithelial cell
 - metabolic rate
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Sympathetic

- ❖ Stimulates (cont)
 - growth

- ❖ Sectioning of sympathetic nerves has minimal impact on secretion

REGULATION OF SALIVA SECRETION

