Glandula Salivarius (BLOK 2)

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The salivary glands

divided into the major and minor salivary glands.

- The major glands are
  - much larger in size and
  - exocrine tissue
  - secretes as a whole into a salivary duct rather than acting individually and therefore end up producing a much larger amount of saliva per day than the minor glands.
  - digestive and protective saliva is produced by the major glands.
- The main role of the minor glands is to lubricate the walls of the oral cavity,

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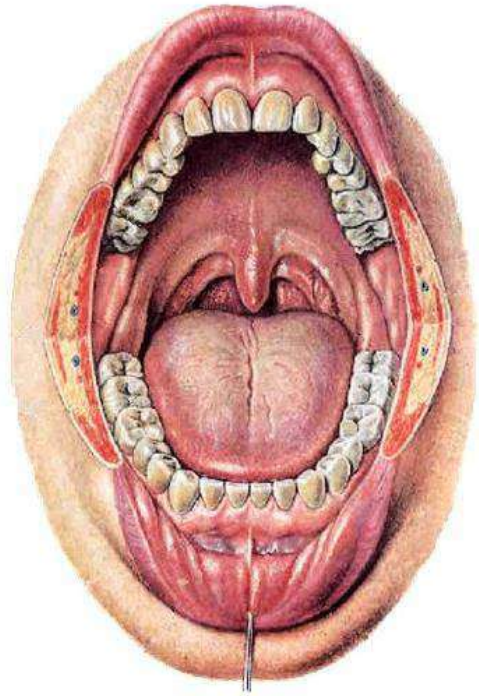
- Two major types of saliva
  - serous and mucous = 3:2
  - The parotid gland is the only gland that secretes purely serous saliva
  - sublingual gland and minor salivary glands secrete mainly mucous saliva.
- The total daily output of saliva in an adult is between 1-1.5 liters of saliva.

Salivary Glands (overview)

- Location:
  - Vestibule
  - Oral cavity proper
- Size:
  - Major
  - Minor
- Nature of secretion:
  - Mucous
  - Serous
  - mixed

The Oral Cavity

- **Consists of two parts**
  - **Oral vestibule** : between cheeks and lip and teeth
  - **Oral cavity proper** : within arch of teeth
- **Boundaries**
  - Anterior and lateral: gum and teeth
  - Posterior: isthmus of fauces
  - Roof: palate
  - Floor: tongue, muscles and mucous membrane
- Oral vestibule leads, by the space behind the molar teeth, into the oral cavity proper

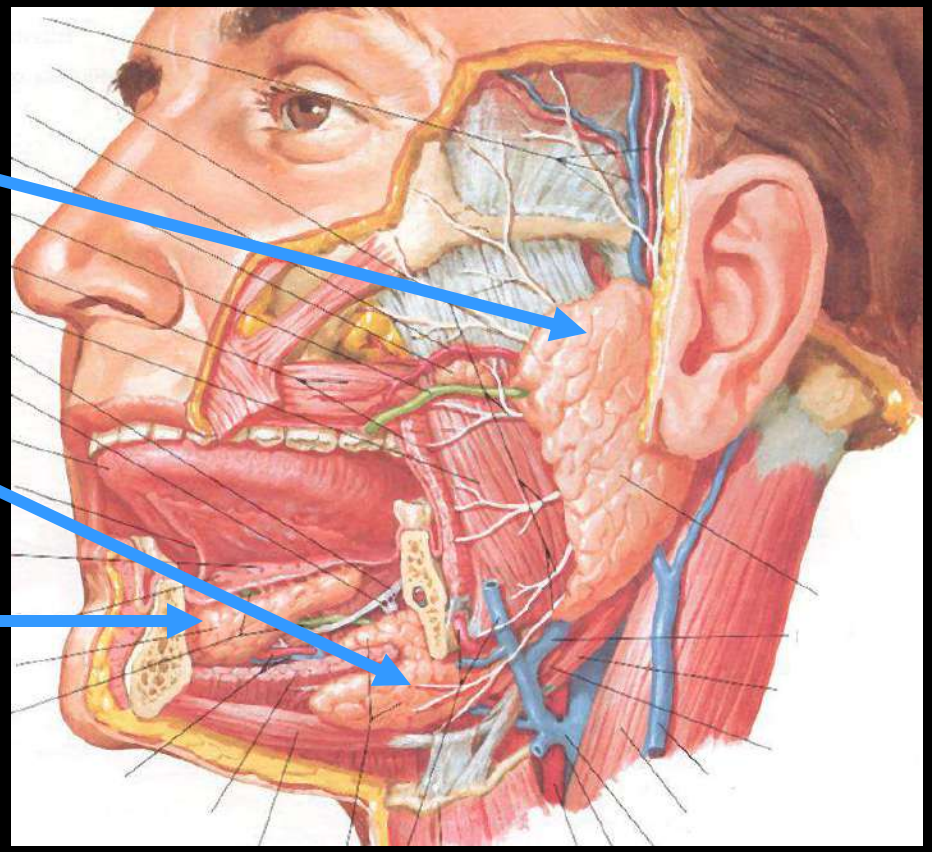


Major salivary glands:

Parotid:
- location
- duct: Stenson's
- secretion: serous (25% of volume)

Submandibular:
- location
- duct: Wharton's
- secretion: mixed (serous) (60-65%)

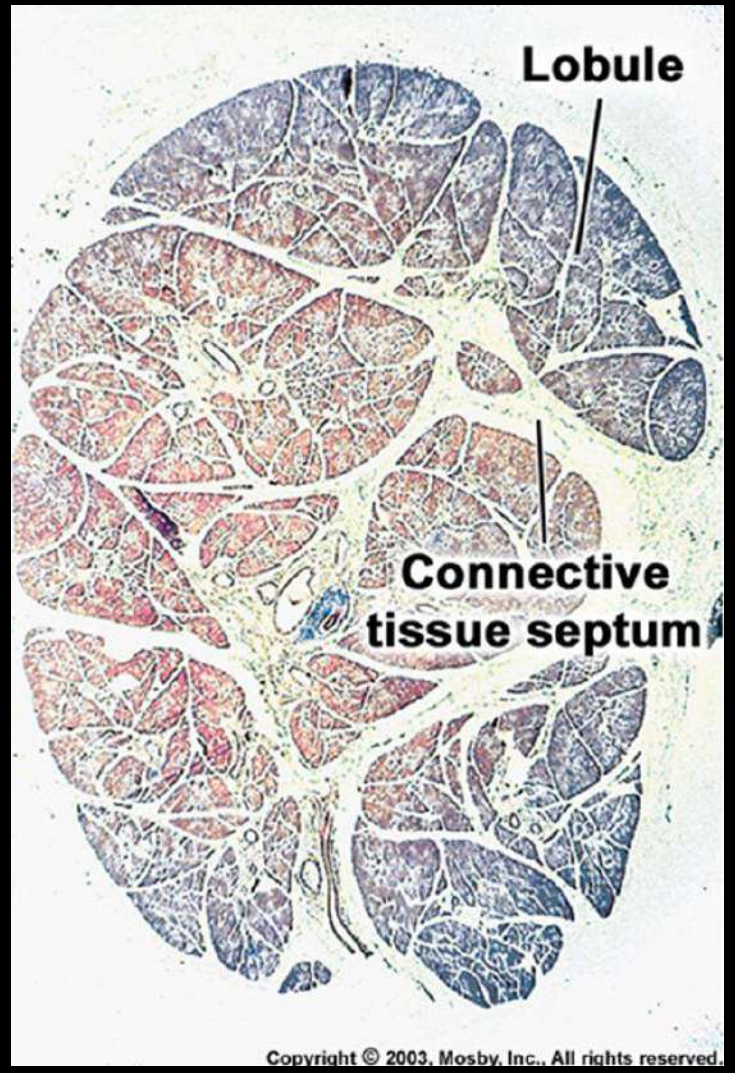
Sublingual:
- location
- duct: Bartholin's
- secretion: mixed (mucous) (15%)

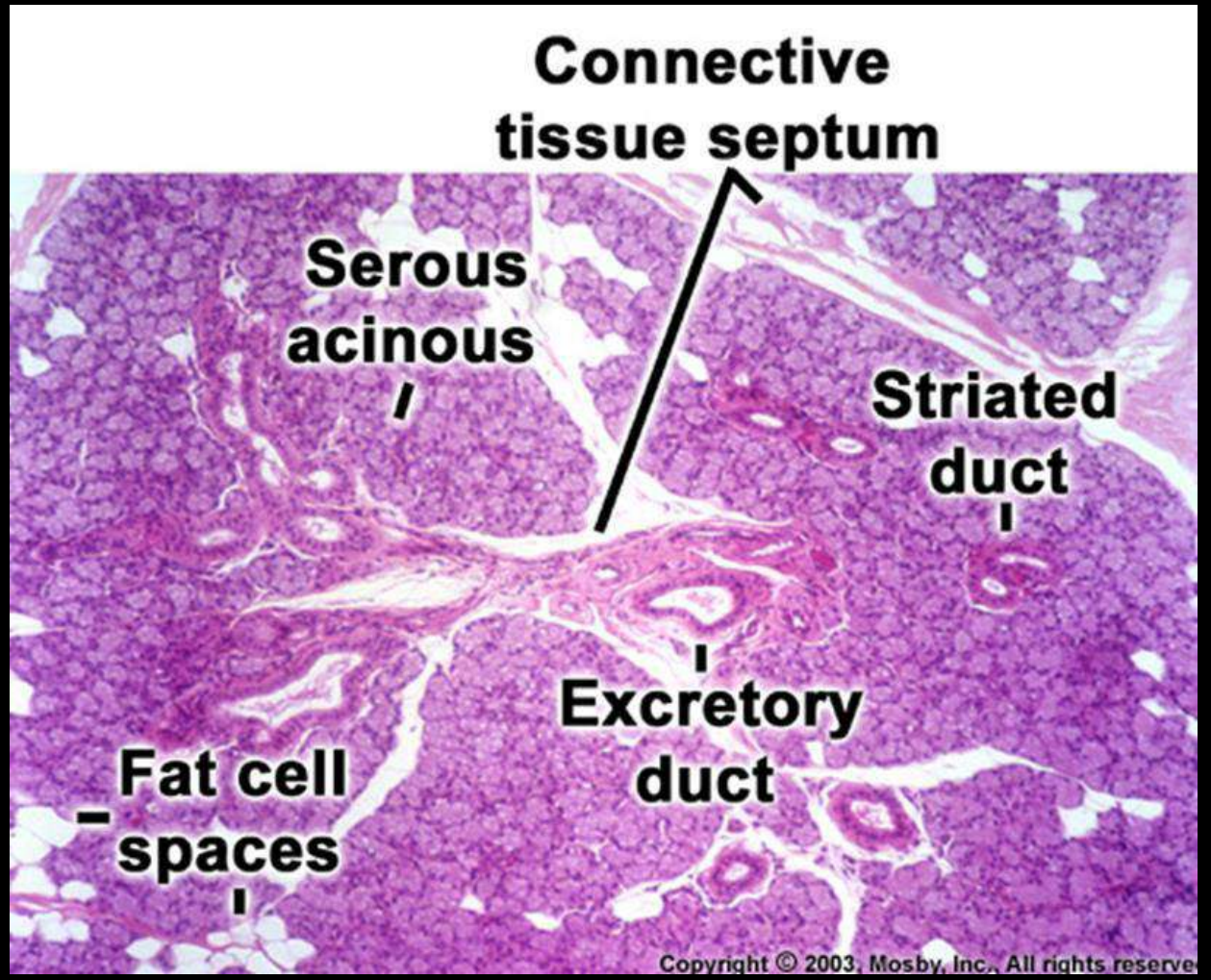


Minor salivary glands:

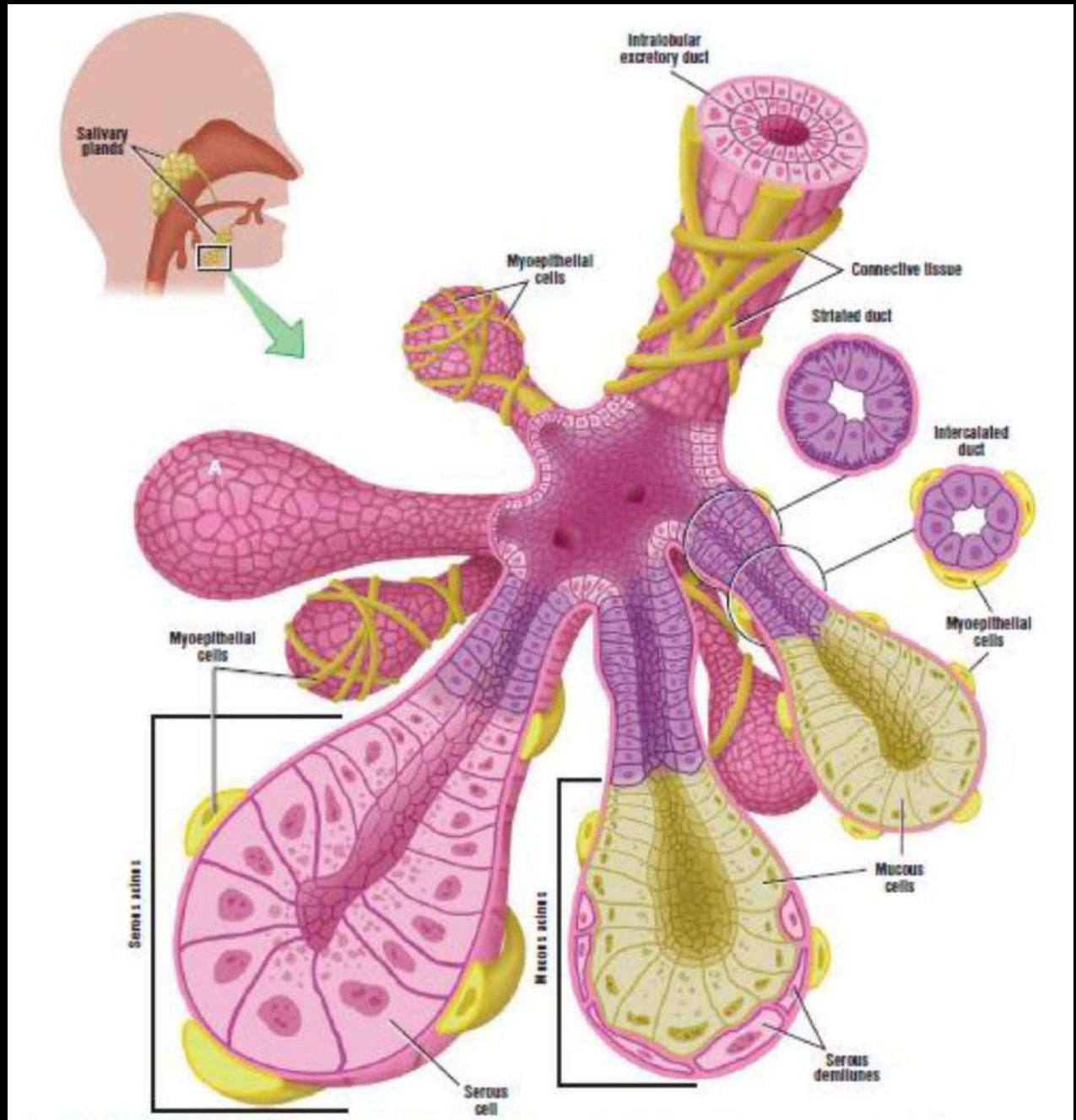
- **labial:** labial mucosa; mucous and serous secretions
- **buccal:** buccal mucosa; mucous and serous secretions
- **palatal**: posterior and lateral aspect of soft palate; mucous secretions
- **lingual:** tip and posterior aspect of tongue; mucous and serous secretion

Histology of Salivary Gland

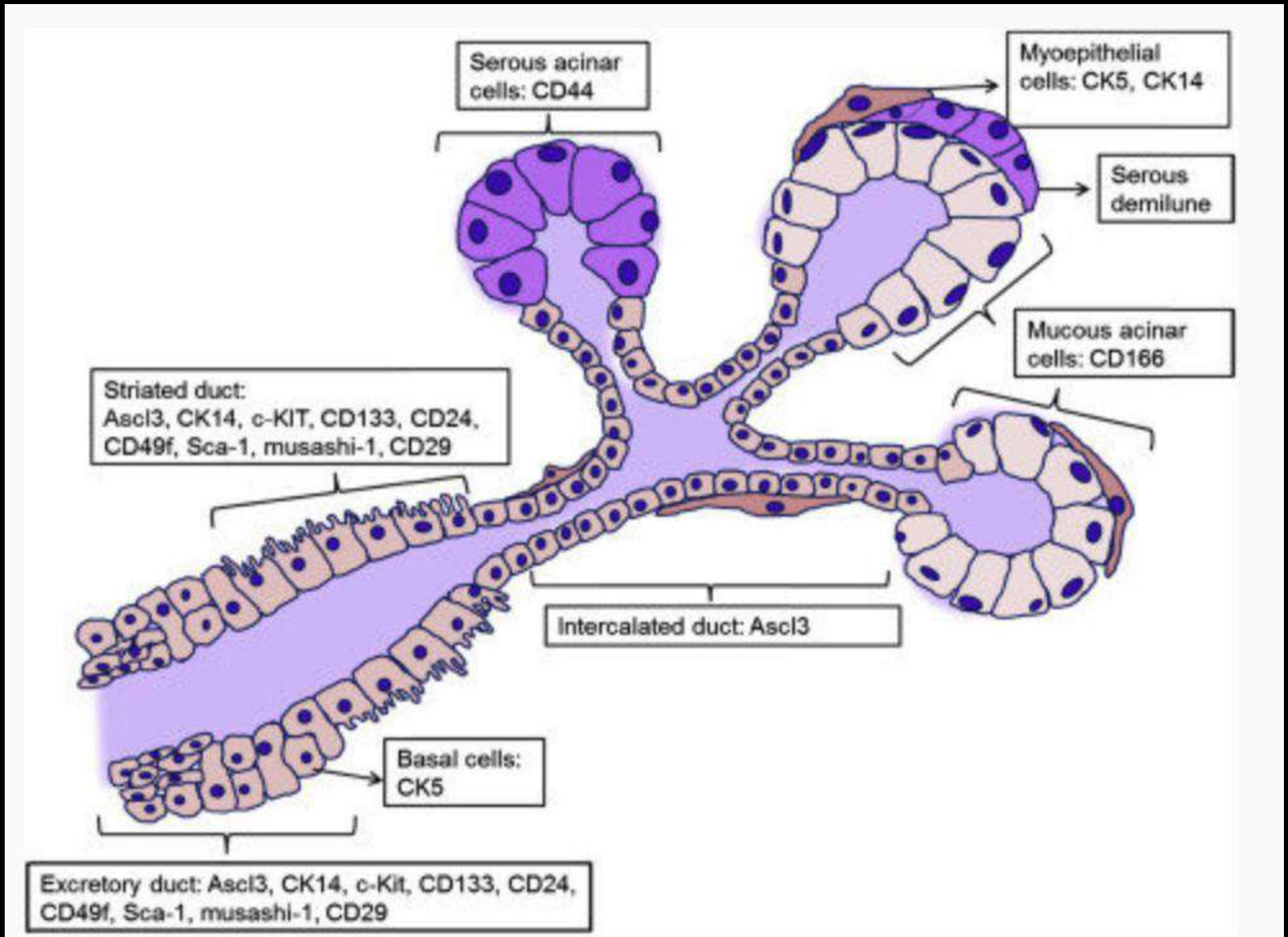




- Stage 1 (Primary Secretion)
  - Acinar cells
    - mucouse acinar
    - serouse acinar
  - isotonic
- Stage 2 (modification)
  - Duct
    - Intercalated
    - Striated
  - hipotonic

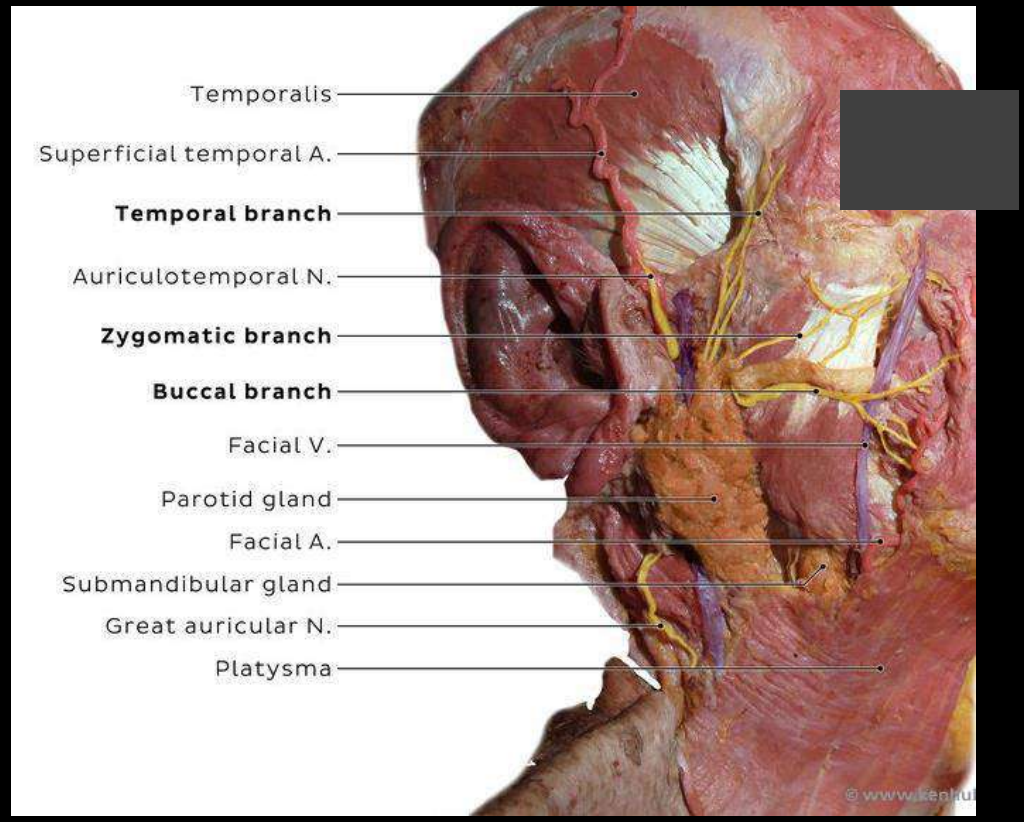


OVERVIEW FIGURE 11.2 ■ Salivary glands. The different types of acini (serous, mucous, and serous demilunes), different duct types (intercalated, striated, and interlobular), and myoepithelial cells of a salivary gland are illustrated.


Serous acinar cells: CD44
Myoepithelial cells: CK5, CK14
Serous demilune
Mucous acinar cells: CD166
Striated duct: Ascl3, CK14, c-KIT, CD133, CD24, CD49f, Sca-1, musashi-1, CD29
Intercalated duct: Ascl3
Basal cells: CK5
Excretory duct: Ascl3, CK14, c-Kit, CD133, CD24, CD49f, Sca-1, musashi-1, CD29

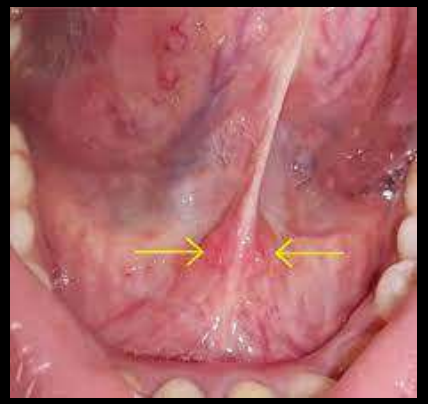
Glandula parotidea

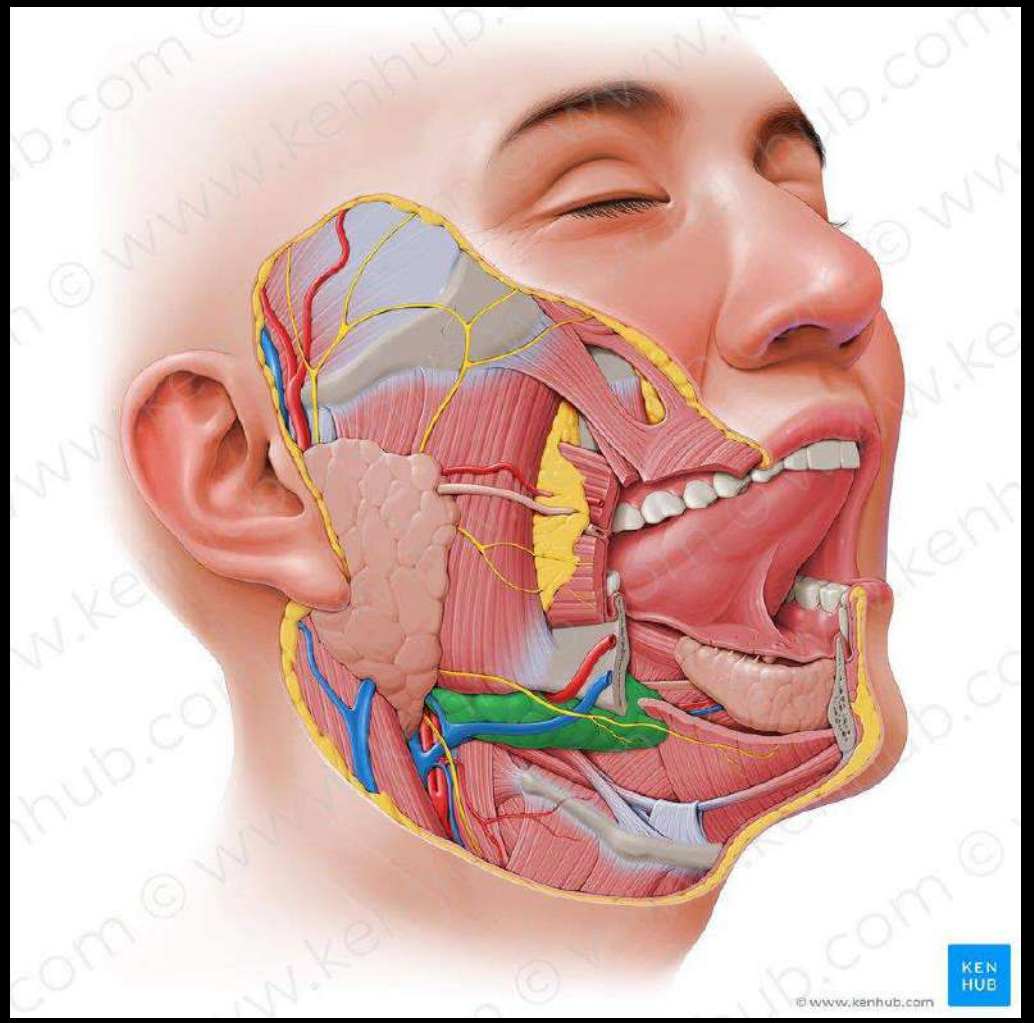
- the largest of the major salivary glands
- bilaterally in between the ramus of the mandible and the sternocleidomastoid muscle.
- 25-30% of the total daily salivary output
- Stensen’s duct (parotid duct)
- orifice : buccal wall at the level of the maxillary second molar



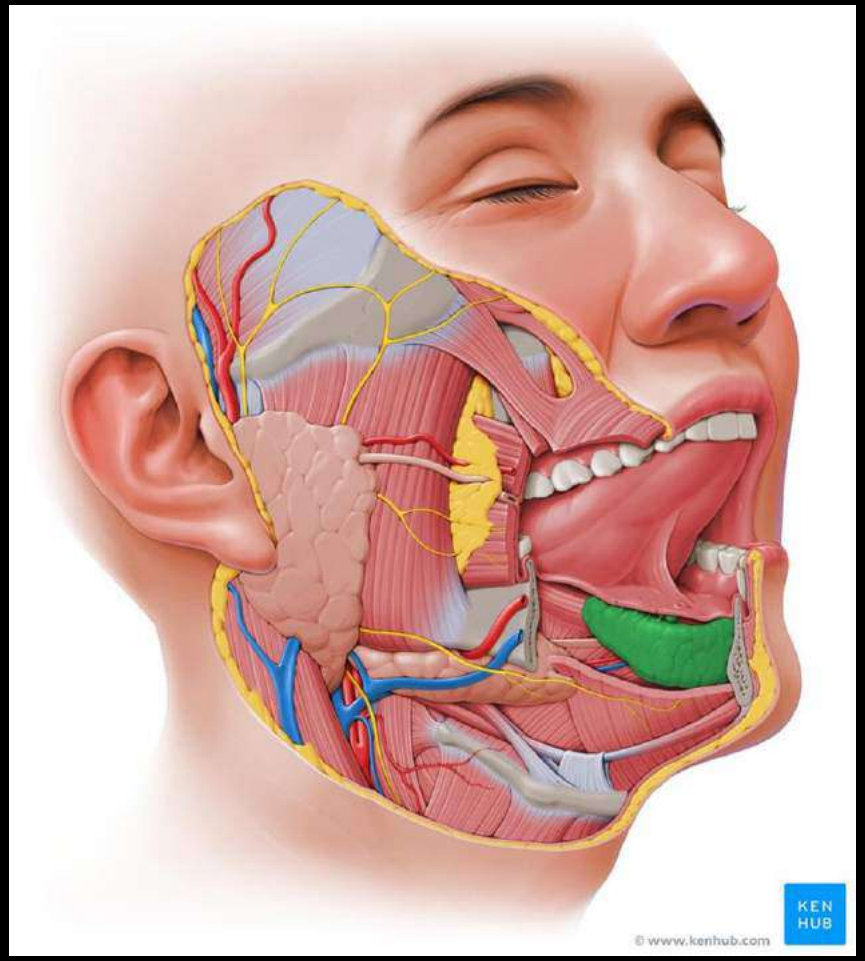
Submandibular gland

- the second largest of the major salivary glands
- up to 60-65% of the total daily output
- Wharton’s duct (submandibular duct) opens at the sublingual papilla under the tongue.





Sublingual gland



- the smallest of the major salivary glands
- it has several ductal openings that run along the sublingual folds.
- secretes the smallest portion of saliva per day (5%)

Minor salivary glands

- 1% or less of the total daily salivary output.
- in patches around the oral cavity such as the bucca, the labia, the lingual mucosa, the soft palate, the lateral parts of the hard palate, the floor of the mouth and between the muscle fibers of the tongue.
- approximately 800-1000 individual glands in total

Clinical aspects

- **Salivary stones or sialoliths**.
  - most common cause
  - swollen salivary glands
  - build of crystallized saliva deposits
  - block the flow of saliva
  - can't exit through the ducts ➡ backs up into the gland ➡ pain and swelling

- **Salivary gland infection or sialadenitis**
  - most commonly the parotid gland
  - duct into the mouth is blocked
  - painful lump in the gland
  - pus drains into the mouth

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- **Viral infections**
  - mumps, flu, and others can cause swelling of the salivary glands
  - parotid glands swelling on both sides ➡ "chipmunk cheeks.“
  - Other viral illnesses that cause salivary gland swelling include the Epstein-Barr virus (EBV), cytomegalovirus (CMV), Coxsackievirus, and the human immunodeficiency virus (HIV).
- **Bacterial infections**
  - one-sided salivary gland swelling (parotid gland)
  - fever and pain

Cont’

- **Cysts**
  - injuries, infections, tumors, salivary stones block the flow of saliva
  - parotid gland due to a problem with the development of the ears (baby)

- **Tumors**
  - pleomorphic adenomas (parotid glands, the submandibular gland and minor salivary glands)
  - Warthin's tumor (parotid gland)

- **Sjögren's syndrome**
  - chronic autoimmune disease
  - leading to dry mouth and eyes
  - enlargement of the salivary glands
  - usually painless.

Description of saliva:

- odorless
- colorless or cloudy
- ropy or watery
- bathes teeth and tissues
- resting: unstimulated
- active: stimulated (10 x resting rate)

Flow of saliva:

- continuous
- sources of resting saliva
- characteristics of flow:
  - amount: copious vs. scanty
  - viscosity (thickness; consistency):
    - ropy (more mucous)
    - watery (more serous)

Factors affecting salivary flow:

- increase flow:
  - sight/smell food
  - mastication
  - dental work
  - pain
- decrease flow:
  - fear/anxiety
  - sleep
  - fever
  - medications
  - after eating

Xerostomia: dry mouth and ongoing decrease of saliva. Can result in mucositis, mouth infections, increase in caries and tissue inflammation.

Composition of saliva

- Organic constituents
  - Main organic constituents: urea, uric acid, free glucose, free amino acid, lactate, fatty acid
  - Macromolecul in saliva: protein, amylase, peroxidase, thiocyanate, lysozyme, lipid, Ig A, Ig M, Ig G.
- Inorganic constituents
  - Ca, Mg, F, HCO_3, K, Na, Cl, NH_4.
- Gases
  - CO_2, N_2, and O_2
- Water
- Constituents derived from the oral cavity
  - Desquamated epithelial cells, Leukocytes PMN from crevicular fluid, bacteria.

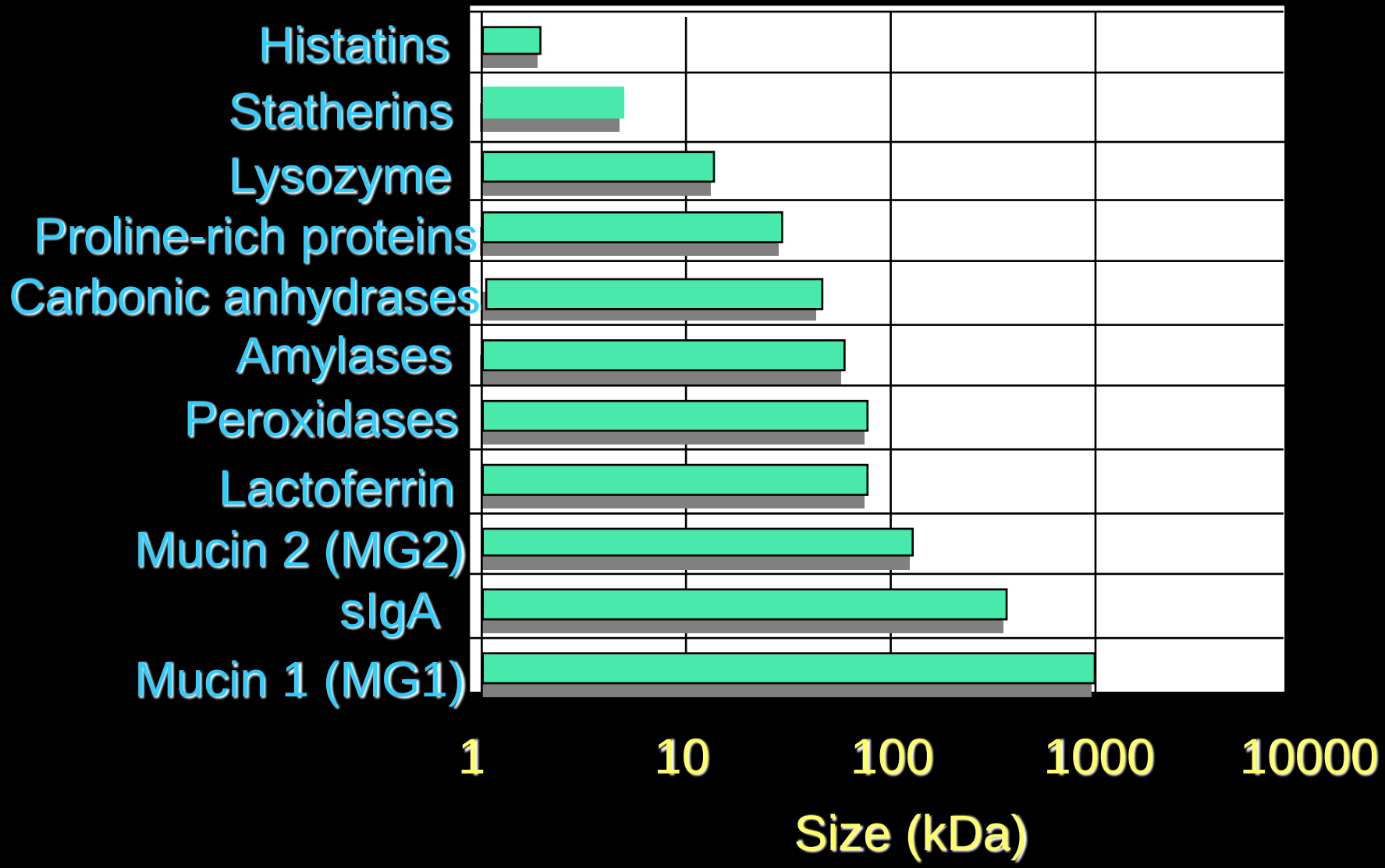
pH of saliva varies:

- normal levels are 6.0 to 7.9 (generally around neutral)
- ⬇ falls slightly during sleep
- ⬆ rises during eating
- ⬇ falls after eating (significant in caries)
- **increase in salivary flow = increase in buffers available = increase in pH**

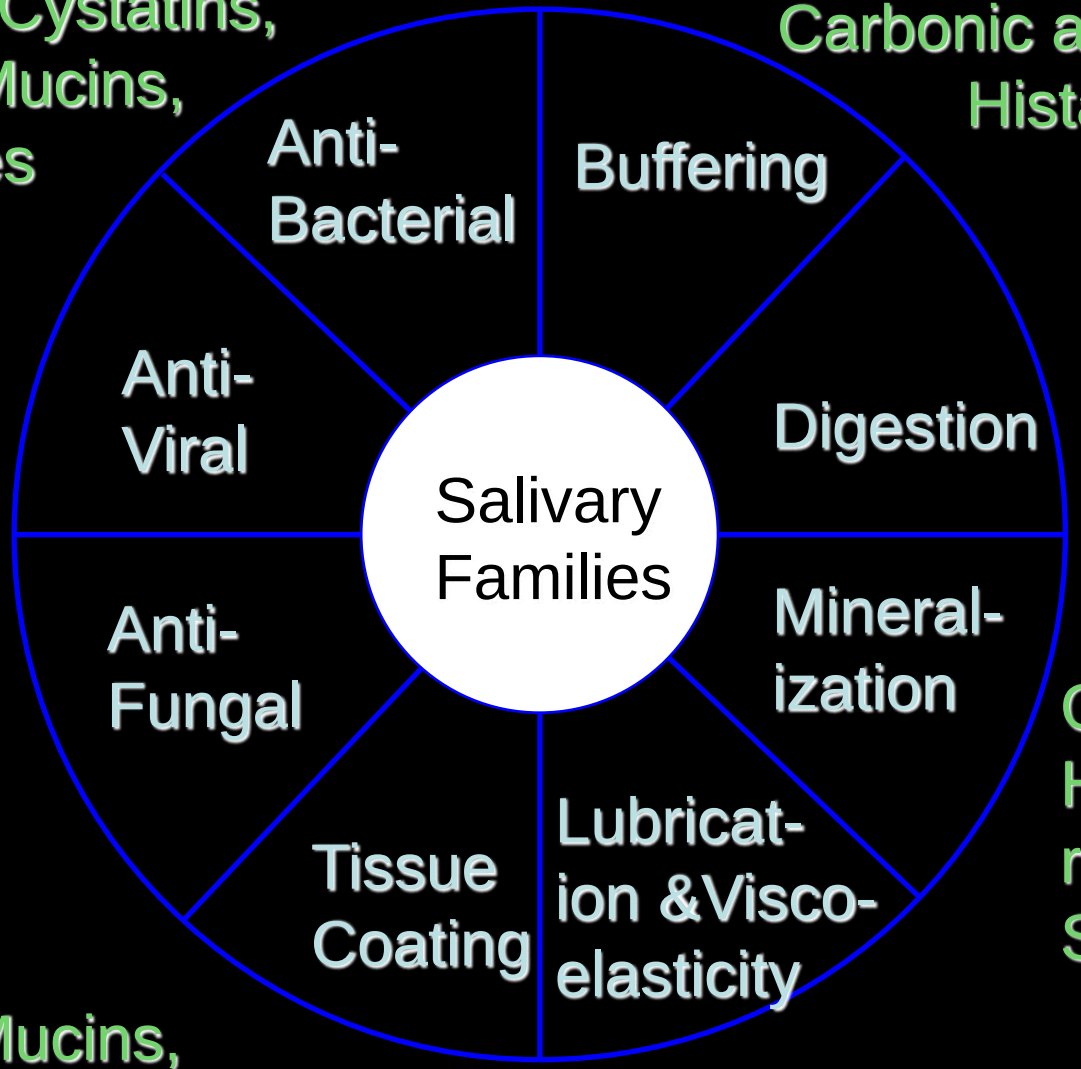
General Function

- It keeps the teeth healthy by providing a lubricant, calcium and a buffer.
- It helps to maintain the health of the gums, oral tissues (mucosa) and throat.
- It plays a role in the control of bacteria in the mouth.
- It helps to cleanse the mouth of food and debris.
- It provides minerals such as calcium, fluoride, and phosphorus.
- It helps in swallowing and digesting food.
- Lack of saliva will make the mouth more prone to disease and infection.
- Lead to a burning feeling.

Major salivary components



Multifunctionality



Amylases, Cystatins, Histatins, Mucins, Peroxidases

Carbonic anhydrases, Histatins

Cystatins, Mucins

Amylases, Mucins, Lipase

Histatins

Cystatins, Histatins, Proline-rich proteins, Statherins

Amylases, Cystatins, Mucins, Proline-rich proteins, Statherins

Mucins, Statherins

adapted from M.J. Levine, 1993

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