Salivary Glands and Teeth

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Teeth

- The **crown** is the part of the tooth above the gum line.
- The **root** is the part of the tooth below the gum line.

- The **pulp** contains the nerves and blood vessels of the tooth.
- It is underneath the dentine.
- This is the bit which hurts when you have toothache!
(a) Tooth, sectional view

- Enamel
- Dentin
- Pulp cavity
- Gingiva
- Gingival sulcus
- Cementum
- Periodontal ligament
- Root canal
- Bone of alveolus
- Apical foramen
- Branches of alveolar vessels and nerve
Permanent (adult) teeth

- Central incisor
- Lateral incisor
- Cuspid (canine)
- First premolar (bicuspide)
- Second premolar (bicuspide)
- First molar
- Second molar
- Third molar

Upper

Lower

Adult 21-25 years old
How to Whiten Your Teeth with Banana peel

Take a piece of the inside of the banana peel and gently rub around on your teeth for about 2 minutes. The amazing minerals in the peel like potassium, magnesium and manganese absorb into your teeth and whiten them.
Anatomy and Histology of salivary glands
Functions of Saliva

- Keeps the mouth moist
- Aids in swallowing
- Aids in speech
- Keeps the mouth and teeth clean
- Antimicrobial action
- Digestive function
- Bicarbonate acts as buffer
Introduction

- The Salivary Gland is any cell or organ discharging a secretion into the oral cavity.
- Major and minor Salivary Glands
  - **Major** (Paired)
    - Parotid
    - Submandibular
    - Sublingual
  - **Minor**
    - Those in the Tongue, Palatine Tonsil, Palate, Lips and Cheeks
PAROTID GLAND

The Largest

Average Wt - 25gm

- Mainly serous but contains a few scattered mucous acini.

Irregular, Lobulated mass lying mainly below the External Acoustic Meatus between the mandible and the Sternoclidomastoid muscle.

- Occupies the region between the ramus of mandible in front and the mastoid process and sternoclidomastoid muscles behind.

- Pyramidial in shape. Its apex extend beyond the angle of the mandible and the base is closely related to the external acoustic meatus.

Located On the surface of the masseter, small detached part lies b/w zygomatic arch and parotid duct-ACCESSORY PAROTID GLAND

https://www.youtube.com/watch?v=guuGVsPMOnA
Parotid Capsule

- The investing layer of deep cervical fascia forms the capsule.
- Superficial lamina-thick, closely adherent to the gland.
- Deep lamina-thin- attached to styloid process, mandible and tympanic plate.
- A portion of deep lamina between styloid process and mandible is thickened to forms Stylomandibular ligament.

(which separates the parotid from submandibular gland)
External Features

- Resembles an inverted 3 sided pyramid

- Four surfaces
  - Superior (Base of the Pyramid)
  - Superficial
  - Anteromedial
  - Posteromedial

- Separated by three borders
  - Anterior
  - Posteromedial
  - Medial
1- Surfaces:
   a- superficial
   b- anteromedial
   c- posteromedial

Mastoid process

2- Borders:
   a. anterior
   b. posterior
   c. Medial

3- Base and Apex
**Base:** (directed upwards & concave)

**Related to**
- Cartilaginous part of external acoustic meatus
- Post. Aspect of temporo mandibular joint
- Auriculo-temporal Nerve & Sup. Temporal vessels

**Structures passing thro’ base**

1) Temporal br. of facial nerve
2) Superficial temporal vessels
3) Auriculo-temporal nerve
**Superficial Surface**

- Covered by Skin
- Superficial fascia containing facial branches of great auricular N
- Superficial parotid lymph nodes and post fibers of platysma
Posteromedial Surface

- Related

  - to the mastoid process with sternomastoid and posterior belly of digastric.
  - Styloid process with structures attached to it.
  - External Carotid A. which enters the gland through this surface
  - Internal Carotid A. which lies deep to styloid process

Anteromedial Surface

Grooved by posterior border of ramus of mandible

Related to

- Emerging branches of Facial N
- Masseter
- Lateral Surface of temporo-mandibular joint
- Medial pterygoid muscles
Parotied Duct

• The parotid duct (stensen's duct) appear at the anterior border of the gland and passes horizontally across the masseter muscle, it turn medially at the front edge of masseter, pierces the buccinator to terminate in the oral cavity opposite to the maxillary 2nd molar.

• The part overlying masseter maybe separated from the remainder of the gland and is then termed (ACCESSORY PART OF THE GLAND).
Surface Anatomy of Parotid Duct

- Tragus of the ear
- Middle ⅓ of the horizontal line
- Midway between the ala of the nose and the angle of the mouth
Structures Passes within the gland:

1. **The external carotid artery:** Enter the gland through lower part of its posteriomedial surface divided into maxillary artery and superfacial temporal artery.

2. **The retromandibular vein:** Foremed by the union of maxillary and superfacial temporal vein, it runs downwards lateral to the external carotid artery and in the lower part of the gland or after emerging therefrom spletes into anterior and posterior divisions. The posterior divisions joins the posterior auricular vein to form the external jugular vein. The anterior division joins the facial vein.

3. **The auriculotemporal nerve:** passes behind the tempromandibular joint runs through the glenoid lobe of the parioted gland or within its covering fascia.
FACIAL NERVE

- **Extracranial course:**
  1. The nerve leaves the cranial cavity through the **stylomastoid foramen**
  2. The nerve enters the parotid gland & divides into **5 terminal motor branches** that emerge from the gland

- **Extracranial distribution:**
  - **After emergence from stylomastoid foramen:**
    1. **Posterior auricular:** to occipital belly of occipitofrontalis muscle
    2. **Muscular branch** to posterior belly of digastric
    3. **Muscular branch** to stylohyoid
  - **After emergence from parotid gland:**
    1. **Temporal:** to orbicularis oculi, frontal belly of occipitofrontalis muscles
    2. **Zygomatic:** to orbicularis oculi muscle
    3. **Buccal:** to buccinator, muscles of upper lip & nose
    4. **Mandibular:** to muscles of lower lip
    5. **Cervical:** to platysma
Parotid gland innervation

- **Parasympathetic N**
  - Secretomotor via auriculotemporal N

- **Sympathetic N**
  - Vasomotor
  - Delivered from plexus around the external carotid artery

- **Sensory N**
  - Reach through the Great auricular and auriculotemporal N
Submandibular gland.

- Hook shaped.
- Divided into deep and superficial part by the mylohyoid muscle.
- Submandibular duct emerges from the deep part and lies on the summit of the sublingual papilla besides the frenulum of the tongue.
Figure 11-28  A. Submandibular and sublingual salivary glands (lateral view). B. Coronal section through the superficial and deep parts of the submandibular salivary glands. C. Coronal section (anterior to B) through the sublingual salivary glands and the ducts of the submandibular salivary glands.
Superficial Part

- This part fills the digastric triangle
- extends upwards deep to the mandible up to the mylohyoid muscle
- has inferior, lateral and medial surfaces
- partially enclosed between two layers of deep cervical fascia
- superficial layer of fascia covers the inferior surface of the gland and is attached to the base of mandible
- deep layer covers the medial surface of the gland and is attached to the mylohyoid line of mandible
Relations

- **Inferior** - covered by
  - Skin
  - Superficial fascia containing platysma and cervical branches of facial N
  - Deep Fascia
  - Facial Vein
  - Submandibular Nodes
Lateral surface

- Related to submandibular fossa on the mandible
- Madibular attachment of Medial pterygoid
- Facial Artery
Medial surface

- Anterior part is related to myelohyoid muscle, nerve and vessels
- Middle part - Hyoglossus, styloglossus, lingual nerve, submandibular ganglion, hypoglossal nerve and deep lingual vein.
- Posterior Part - Styloglossus, stylohyoid ligament, 9th nerve and wall of pharynx
Submandibular duct (Wharton’s duct)

- About 5 cm long
- Runs fwd from the deep part of the gland to enter floor of the mouth
- Opens on a papilla beside the frenulum of the tongue
Nerve Supply

- supplied by branches from the submandibular ganglion
  - these branches convey:
    - secretomotor fibres
    - sensory fibres from lingual nerve
    - vasomotor fibres from plexus on facial artery

- secretomotor pathway (parasympathetic) - begins in the superior salivary nucleus
  - preganglionic fibres pass through sensory root of facial nerve, geniculate ganglion, facial nerve, chorda tympani, lingual nerve, to reach submandibular ganglion
  - post ganglionic fibres emerges from the ganglion and enter submandibular gland
- **vasomotor function (sympathetic)**
  - regulates submandibular secretions through *vasoconstriction* of the arteries that supply it
  - increased sympathetic activity → reduces glandular bloodflow → decreasing salivary secretions → producing an enzyme rich serous saliva.
Control of Salivary Secretion

- Under neural control
- Mainly by parasympathetic signals from Sup & Inf salivatory nuclei
Sublingual gland.

- Almond shaped.
- Lies against the medial surface of the mandible where it forms the sublingual fossa.
- Drains via numerous small ducts.
Relations

- **Above**
  - Mucosa of oral floor.

- **Below**
  - Mylohyoid

- **Behind**
  - Deep part of Submandibular gland
- **Lateral**
  - Mandible above the anterior part of mylohyoid line
- **Medial**
  - Genioglossus and separated from it by lingual nerve and submandibular duct
Fig. 4.89. Coronal section through the tongue and the floor of the mouth.
Duct

- 8-20 ducts Most of them open directly into the floor of mouth
- Few of them join the submandibular duct
- Sometimes form a major sublingual duct (Bartholin's duct), which opens with, or near to, the orifice of the submandibular duct.
Salivary glands are compound tubulo-alveolar glands

- Secretory elements (end pieces) may be
  - rounded (acini)
  - pear shaped (alveoli)
  - Tubular
  OR Mixture (tubulo-acinar or tubulo-alveolar)
The basic secretory unit is the acinus

The secretory cells are of three types.
1. Cells containing small granules are serous and secrete salivary proteins and enzymes.
2. Mucin-producing cells are cylindrical in shape and contain larger granules producing mucoproteins.
3. Seromucinous cells have an intermediate ultrastructure.
   - Parotid: are mostly serous
   - Submandibular: mucous & serous
   - Sublingual & Minor salivary gland: mostly mucous
secretory element leads into Series of ducts through Secretions are poured into the oral cavity
Serous acini:
- Dense, basophilic, PAS+ intracytoplasmic secretory granules containing amylase
- Have central lumen that is rarely visible by H&E

Mucinous / mucous acini:
- Larger than serous acini
- Irregular pattern
- Cells have abundant cytoplasm with clear mucin, well rounded basal nuclei, and are arranged around empty lumina
- Produce acid (positive for Alcian blue and mucicarmine) and neutral (PAS+) sialomucins
Serous acini

Mucous acini

Sd

Serous acini

m

Mucous acini
Secretions produced in alveoli

- pass along

A system of ducts

- (different parts of these have differing structure)

- smallest ducts

Intercalated ducts

- lined by

- Cuboidal / flattened cells

- open into

- Straited ducts

- Lined by

- Columnar cells

- Open into

Excretory ducts

- Lined by

Simple columnar epithelium
Parotid Gland
Serous acini only; contain numerous basophilic zymogen granules; nuclei are uniform, round and in the basal half of the cell
Intercalated ducts are long in comparison to striated ducts
Striated ducts are larger than intercalated ducts, 3-6 x size of acinus; striations are due to folds in basal plasma membranes
Contains small lymph nodes near or within the gland, which arise from interstitial lymphocytes
Resembles pancreatic tissue, but parotid gland had adipocytes and pancreatic tissue has islets and centroacinar cells
Submandibular gland:

- Predominantly serous but also mucous acini
- Branched tubuloacininar glands
- Lobes → lobules → adenomeres (secretory unit)
- Each adenomere contains one or more acini - small clusters of cells that secrete their products into a duct
- Mixed acini (serous or mucous cells), (mixed gland)
  - The mucous cells are the most active, and therefore the major product of the submandibular gland is saliva which is mucoid in nature
Submandibular gland - histology slide
Sublingual gland: Predominantly mucinous but also serous acini. The smallest of the three main salivary gland. Situated in front of the deep lobe of the submandibular, between the mylohyoid laterally and the genioglossus medially. Extending from the opposite of the second molar to the premolar region.

- Its covered by the mucous membrane of the floor of the mouth which it raises to form the sublingual fold.
- Lateral surface of the gland comes in contact with the sublingual fossa on the medial surface of the body of the mandible.
- The medial surface of the gland is crossed by the lingual nerve and submandibular duct.
- The gland opens onto the surface of the sublingual fold through a variable number (about 15) of small ducts called bartholins duct.
- Innervation: submandibular ganglion and para sympathetic fiber of chorda tympani.
- Blood supply and drainage: sublingual artery and vein.
Mandibular gland (mixed)  Parotid gland (serous)