Head & Neck Tumours
Part I

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Salivary Glands

Content

- **Anatomy**
- **Physiology**
- **Acute and Chronic Infections**
- **Auto Immune Diseases**
- **Tumours of Salivary Glands**

Basics

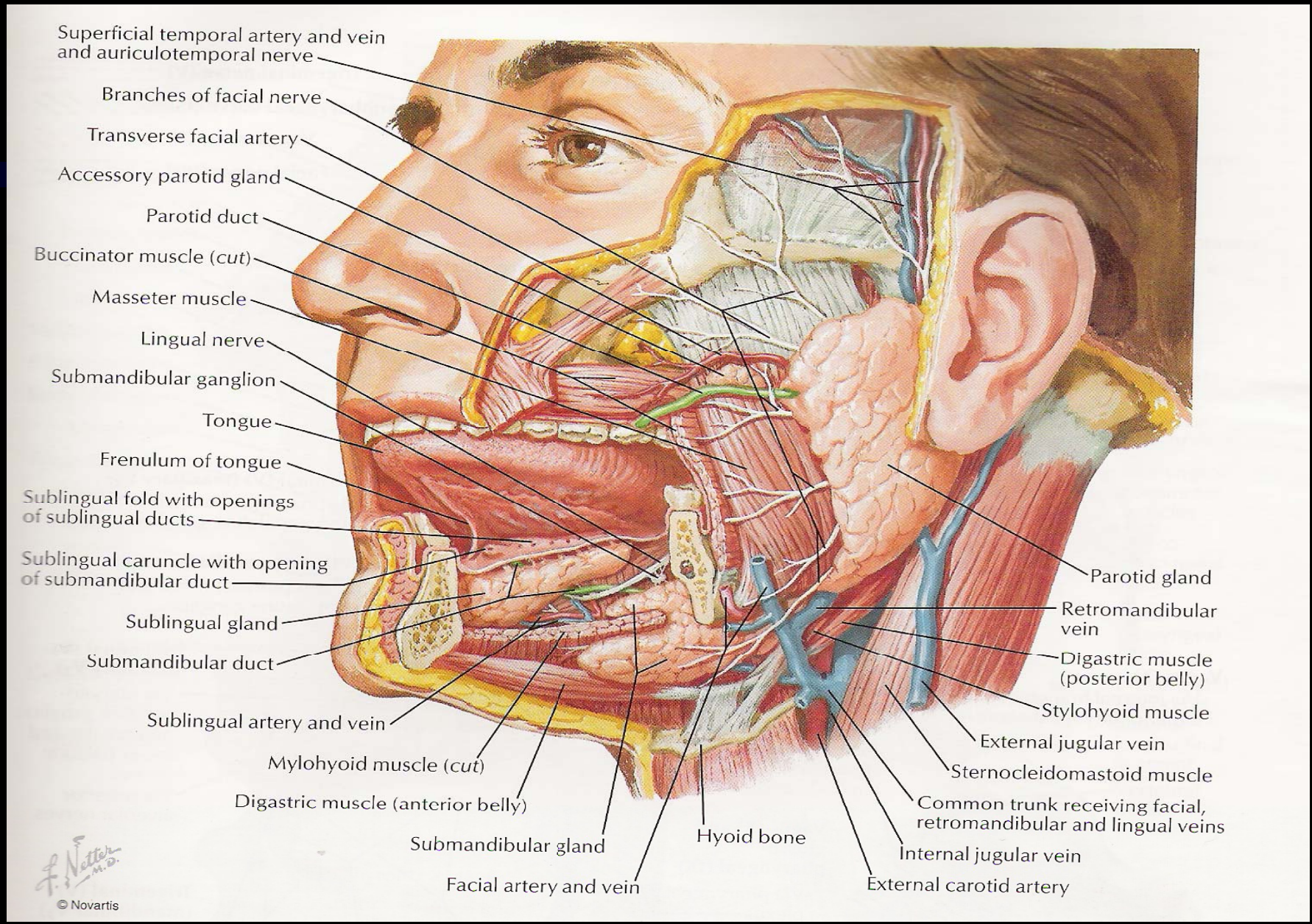
- **6 major salivary glands: 2 parotid, 2 submandibular, 2 sublingual.**
- **100’s of minor salivary glands lining the upper aerodigestive tract**
- **Main job…. Saliva!!!!**

Anatomy-Parotid

- **Serous cells only**
- **On side of the face, deep to skin, subcutaneous tissue, superficial to the masseter.**
- **Parotid compartment borders superior-zygoma, posterior-external auditory canal, inferior-styloid process, styloid muscles, internal carotid and jugular.**
- **Tale of parotid extends superficial to SCM.**

Parotid duct

- **Stensen's duct begins at anterior border of the gland 1.5cm below the zygoma. Traverses the masseter 5-6cm, pierces the buccinator.**
- **Opens in mouth lateral to 2nd upper molar.**


Superficial temporal artery and vein and auriculotemporal nerve
Branches of facial nerve
Transverse facial artery
Accessory parotid gland
Parotid duct
Buccinator muscle (*cut*)
Masseter muscle
Lingual nerve
Submandibular ganglion
Tongue
Frenulum of tongue
Sublingual fold with openings of sublingual ducts
Sublingual caruncle with opening of submandibular duct
Sublingual gland
Submandibular duct
Sublingual artery and vein
Mylohyoid muscle (*cut*)
Digastric muscle (anterior belly)
Submandibular gland
Facial artery and vein
Hyoid bone
External carotid artery
Internal jugular vein
Common trunk receiving facial, retromandibular and lingual veins
Sternocleidomastoid muscle
External jugular vein
Stylohyoid muscle
Digastric muscle (posterior belly)
Retromandibular vein
Parotid gland
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Submandibular gland

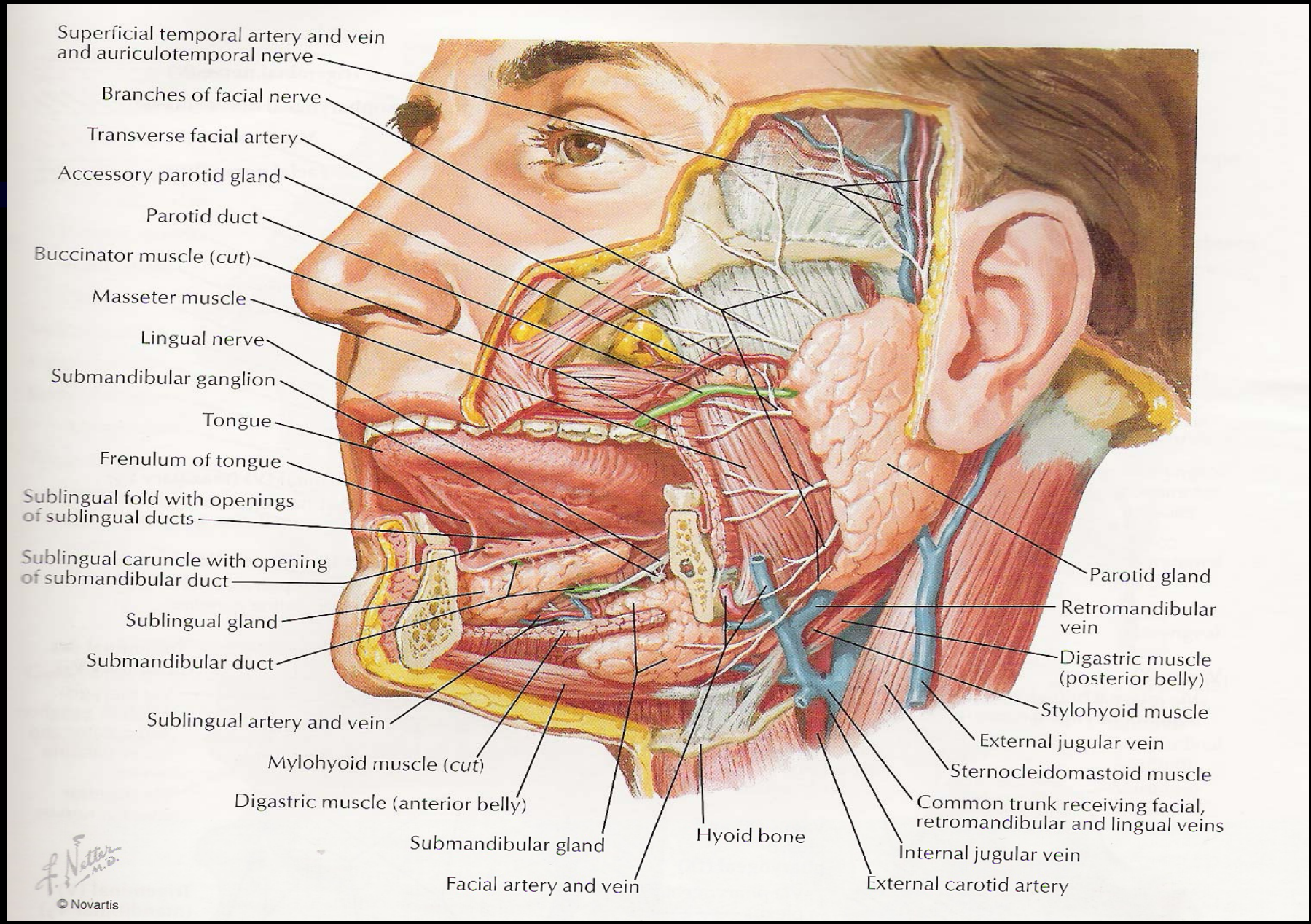
- **Mucous and serous cells.**
- **Submandibular triangle: anterior and posterior bellies of digastric and inferior margin of the mandible.**
- **Medial and inferior to the mandible.**
- **Wraps around the mylohyoid. C-shaped, superficial and deep lobe.**
- **Superficial layer of deep cervical fascia splits to envelop the gland.**

Wharton's duct

- **Exits the gland from the medial surface travels b/w the hyoglossus and mylohyoid muscles enters the genioglossus muscle and opens into mouth just lateral to lingual frenulum.**
- **CN XII inferior to the duct and lingual nerve is superior to the duct.**

SM gland innervation

- **Sympathetic stimulation stimulates mucoid saliva.**
- **Parasympathic stimulates watery saliva.**
- **PNS pre-ganglionic fibres come from the chorda tympani n. via the lingual n. to the submandibular ganglion. Then to the gland itself.**
- **SNS fibres originate in the superior cervical ganglion and travel with the lingual artery to the gland.**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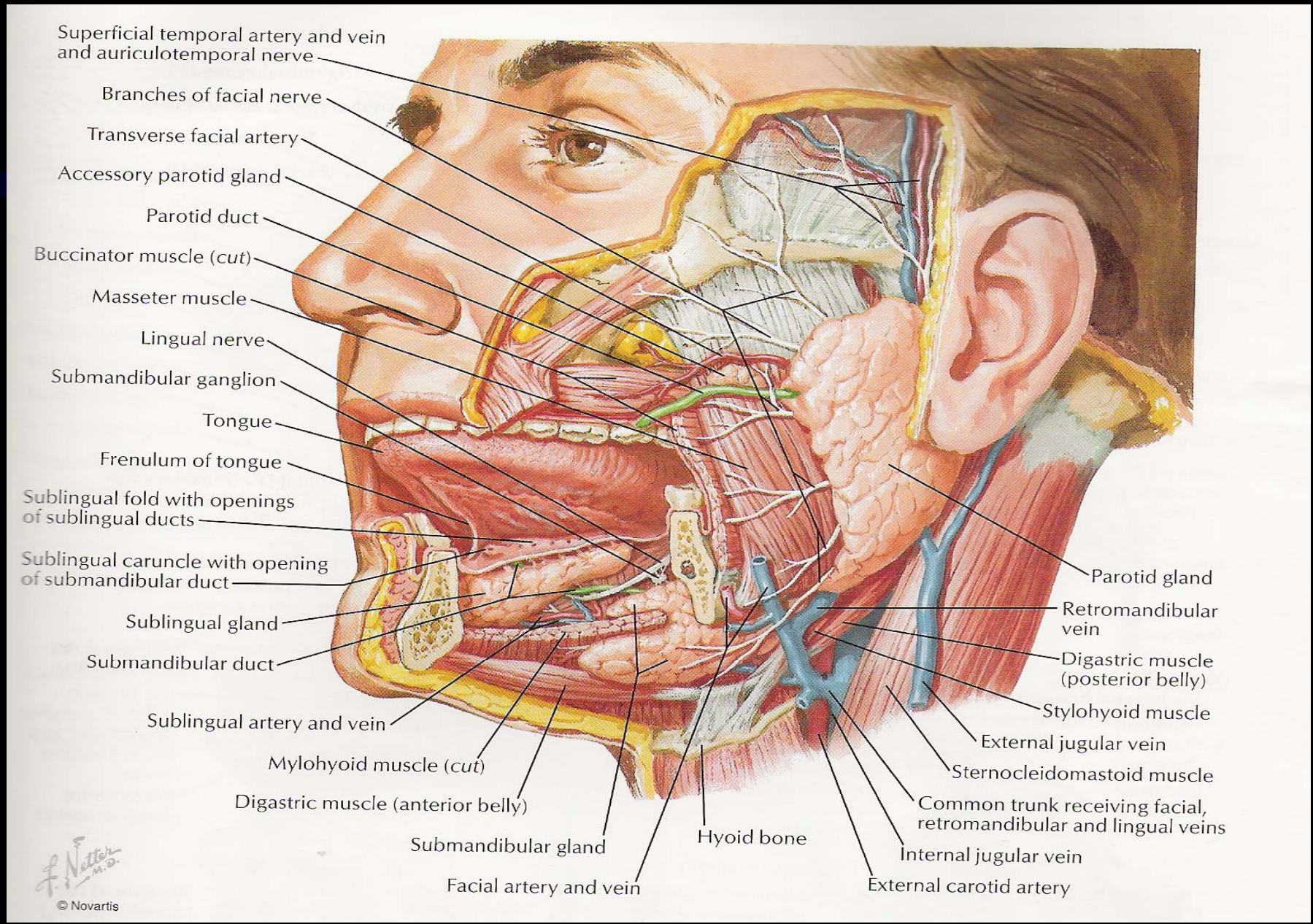
Sublingual glands

- **Mucous secreting.**
- **Just below the floor of mouth mucosa.**
- **Bordered by genioglossus/hyoglossus medially, mandible laterally, and mylohyoid inferiorly.**
- **Wharton's duct and lingual n. travel b/w SL gland and genioglossus muscle.**
- **No fascial capsule.**

SL glands cont'd

- **Ducts of Rivinus (~10) along the superior aspect of the gland open into the mouth along sublingual fold in the floor of mouth.**
- **Innervated by the PNS/SNS systems in the same way as the SM gland.**
- **Gland supplied by sublingual branch of the lingual a. and the submental branch of the facial a. Drained by the corresponding veins.**
- **Lymphatic drainage is primarily by the submandibular nodes.**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Minor salivary glands

- **Either mucous serous or both**
- **600-1000 /person**
- **Each gland has it’s own duct.**
- **Found most commonly in buccal, labial, palatal, and lingual regions.**

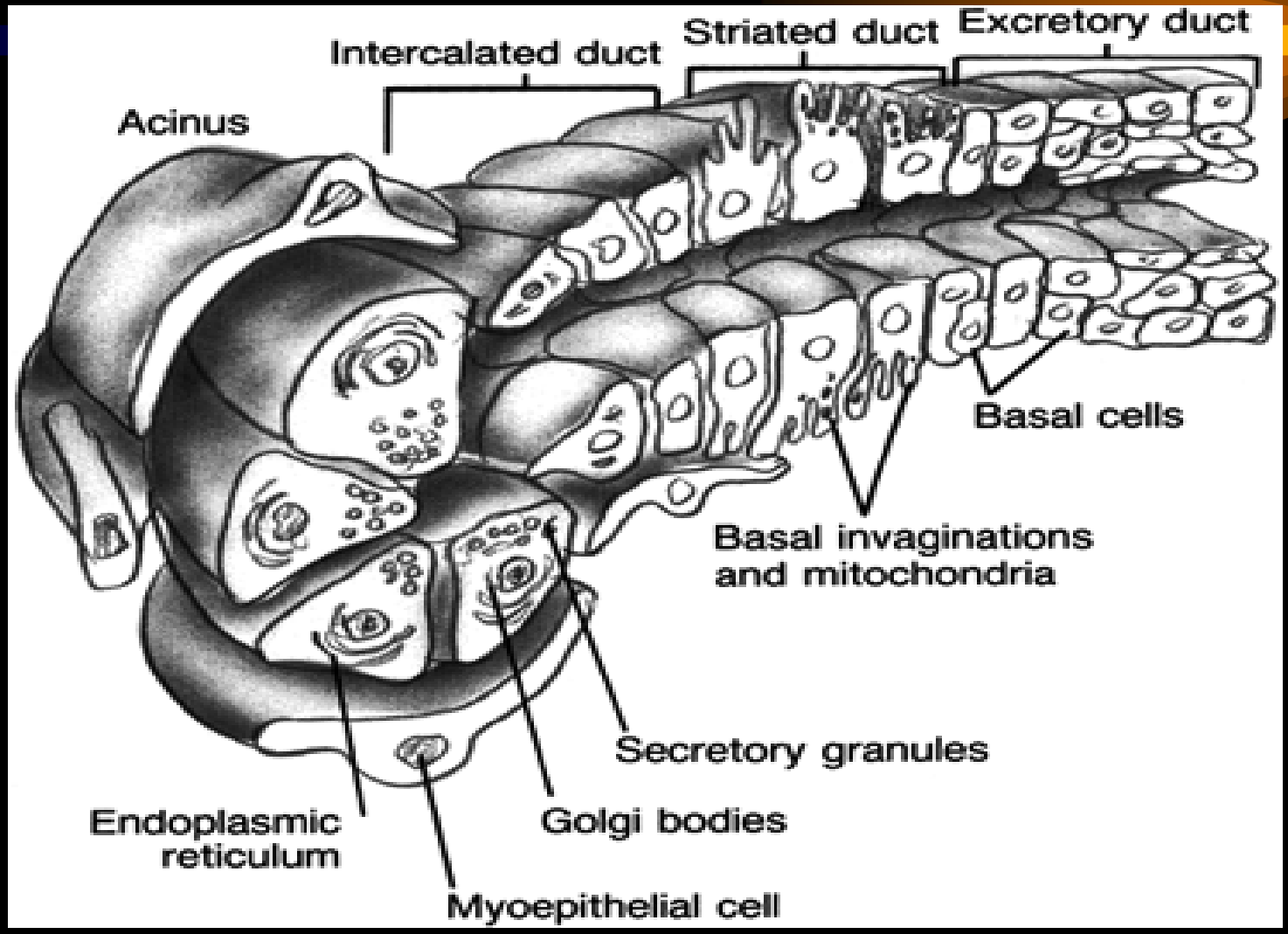
Physiology

- **Role of saliva:**
  - Lubricates
  - Moistens, help with mastication
  - Cools hot food
  - Buffers chemicals
  - Cleans the mouth (lavage)
  - Protects mucosa
  - Prevent dental caries
  - Helps form enamel, provides inorganic ions
  - Antibacterial (lysozyme, IgA, peroxidase)
  - Homeostasis

Physl. Cont'd

- **Secretory unit: acinus, secretory tubules, and the collecting duct.**
- **Secrete saliva, hypotonic solution (compared to plasma).**

Secretory Unit



Secretory Process

- **Active process involving cell synthesis and active transport.**
- **Primary secretion: produced by acinar cells composition and osmolality more similar to plasma.**
- **Ductal secretion: tubule modifications make it more hypotonic.**
- **Degree of modification depends on flow rate. Fast rate less time for modification. It's still hypotonic.**
- **Serous acinar cell granules contain amylase, mucous acinar cells contain mucin.**

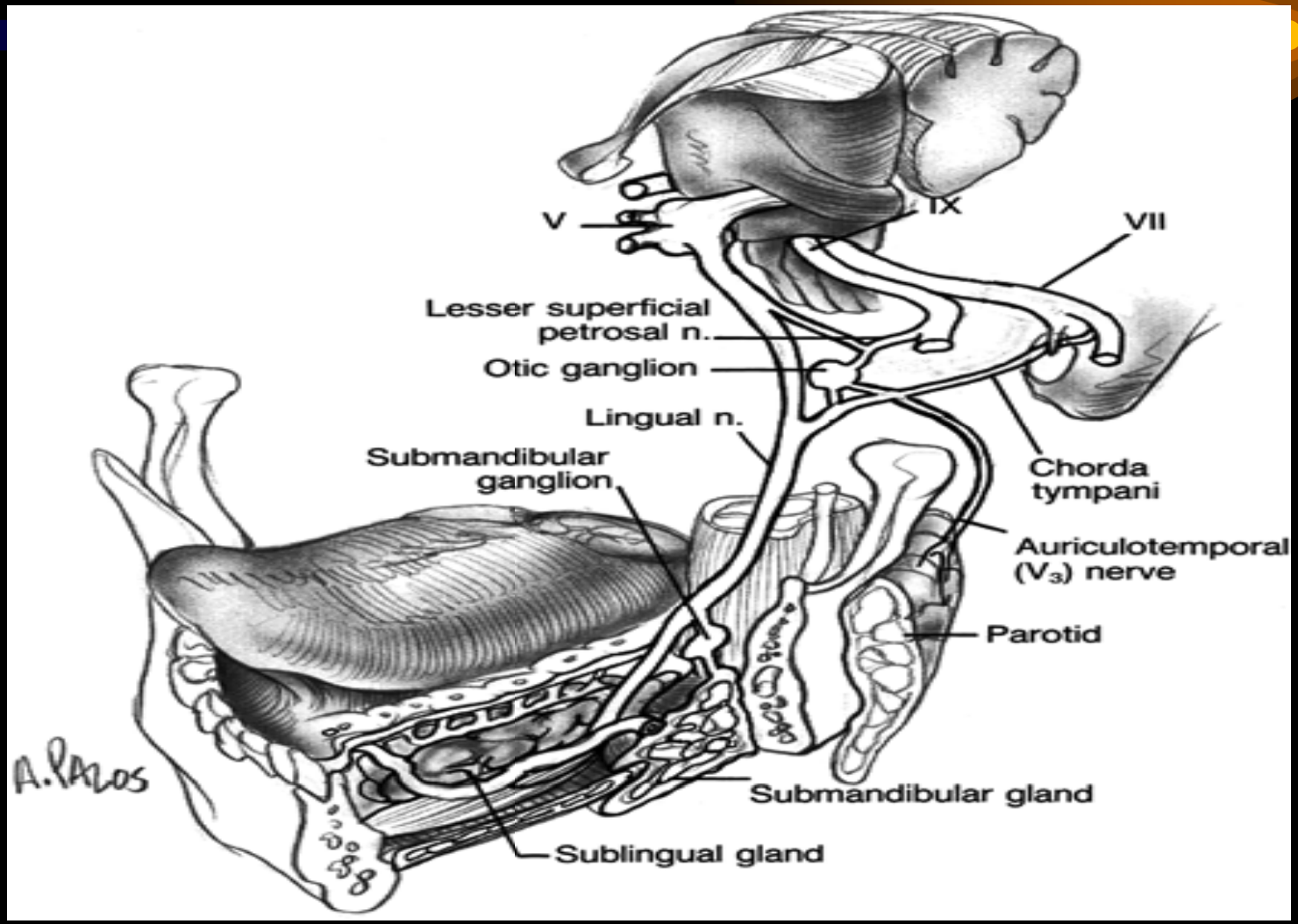
Autonomic Nervous System

- **Anatomy above**
- **ANS stimulation causes hyperpolarization (more -), K out into saliva, Cl into cells. Known as the secretory potential.**

Parasympathetic NS

- **Pre-ganglionic PNS fibers originate from the salivary nucleus in the brainstem.**
- **No true synapses b/w post-ganglionic fibers and the SL/SM glands. ACh passively diffuses into glands.**
- **ACh main transmitter.**
- **Muscarinic solely involved in saliva production.**

PNS innervation



Sympathetic NS

- **Norepinephrine is the main transmitter.**
- **All synapses are adrenergic.**
- **SNS stimulation produces scant viscous saliva.**
- **SNS simulation augments that of the PNS.**

Salivary flow rates

- **No ANS stimulation 0.001-0.2 ml/min/gland, 0.8-1.7 ml/min/gland with ANS stimulation.**
- **~1000-1500 ml/24hrs, or 1 ml/min.**
- **Unstimulated 69% of flow from SM gland, 26% parotid, 5% SL.**
- **Stimulated parotid and SM reverse contributions.**
- **Minor glands independent of stimulation usually account for 7-8% total flow.**
- **Flow independent of age. Acinar cells degenerate with age, flow still constant. Xerostomia in elderly likely due to meds.**

Infections of the Salivary Glands

Viral Infections - Mumps

- **Most common nonsuppurative infection**
- **Children**
- **Parotid (occ. SMG)**
- **bilateral, generalized swelling**
- **Paramyxovirus**
  - Highly contagious
  - Air-borne droplet spread
  - Incubation 18 days
  - Virus spread for 1 week following swelling

Mumps

- **Ductal epithelial desquamation leads to obstruction and secondary infection**
- **Low grade fever, arthralgia, HA, malaise**
- **Hydration**
- **Rest**
- **Modify diet to decrease gland stimulation**
- **Complications**
- **Parainfluenza, echovirus, EBV, choriomeningitis virus**

Acquired Immunodeficiency Syndrome

- **HIV-SGD**
- **Lymphoproliferative and cystic enlargement of the major salivary glands**
- **High suppressor T-cells and lymphocytosis**
- **Can be initial presentation**
- **Parotid (15- 30% bilateral) with lymphocytic interstial pneumonitis**
- **HIV in saliva**

HIV – Clinical Features

- **Infected newborns or adults (20-60 yo)**
- **Gradual nontender enlargement of glands**
- **Xerostomia, dry eyes, arthralgia**
- **Glandular swelling fluctuates**
- **Surgical treatment**
  - Ddx: lymphoma, Kaposi's
- **CT, MRI, FNA - observation**
- **Steroids and zidovudine**
- **Good oral hygiene, sialagogues, topical fluoride**

Acute Suppurative Sialoadentitis

- **“Surgical parotitis”, “Surgical mumps”**
- **0.01-0.02% of all admissions**
- **0.002-0.04% of all postops**
- **Retrograde migration of bacteria from the oral cavity**
- **Parotid gland most frequently involved**
  - Inferior bacteriostatic properties

Pathogenesis of Acute infections

- **Normal healthy flow flushes ducts**
- **Stasis permits retrograde flow**
- **Compromised host resistance**
- **Poor oral hygiene (increase oral bacteria)**
- **Chronic disease or prolonged recovery**
- **DEHYDRATION**
- **Anticholinergics or diuretics**
- **Anorexia reduces salivation**
- **25% bilateral**

Symptoms of Acute infections

- **Rapid onset of pain, swelling, induration**
- **Fever, chills, malaise**
- **Increased WBC count**
- **Suppurative discharge from the gland**

- **S. aureus**
- **Streptococcus spc**
- **Strept pyogenes**
- **Strept viridans**
- **Strept pneumo**
- **H. influenzae**
- **anaerobes**

Treatment

- **Antibiotics**
- **Steroids**
- **Analgesics**
- **Local heat application**
- **Massage**
- **Increased fluid intake**
- **Surgical treatment if no improvement**
- **CT or US to rule out abscess**
- **Sialogram C/I in acute phase**

Chronic Sialoadenitis

- **Repeated episodes of pain and inflammation**
- **Parenchymal degeneration and fibrous replacement of the gland**
- **Initial severe acute infection**
- **Duct obstruction**
- **Depressed glandular secretion**
- **Parotid**
- **More infections = more damage to gland and duct**

Pathophysiology and Treatment

- **Obstruction of salivary flow**
- **Intraductal calculus**
- **Stricture**
- **Mucous plug**
- **Ductal papilla lesion**
- **Extrinsic compression**
- **No consistent Tx**
- **Tympanic neurectomy**
- **Duct ligation**
- **Gland excision**

Sialolithiasis

- **Formation of hardened intraluminal deposits in the ductal system**
- **Common with chronic sialoadenitis**
- **Causes:**
  - Stagnation of saliva
  - Focus for formation from duct injury
  - Biologic factors (Calcium salts)
- **Hilus of the gland most common site**

Location

- **80% Wharthon's duct**
- **19% Stenson's**
- **1% sublingual**
- **Why Wharthon's?**
  - Alkaline and viscous saliva
  - Increased Ca and Phos
  - Angulation of the duct at Mylohyoid
  - Vertical orientation at the distal segment

Composition

- **Calcium phosphate and carbonate**
- **Mg, Zn,NH3**
- **Glycproteins, mucopolysaccharides, cellular debris**
- **No correlation with calcium and phosphate levels**

Symptoms and Management

- **Colicky postprandial pain**
- **Swelling**
- **Erosive extrusion**
- **Plain films**
- **Sialography**
- **Like sialoadenitis**
- **Avoid vigorous probing**
- **Incise duct orifice**
- **Sialodochoplasty**
- **Stenting**
- **Surgical excision**
- **ECSL**

Salivary Gland Neoplasms

- **The Tumors**
  - Benign
  - Malignant
- **Work Up**
  - Hx, Px & Imaging (previously covered)
  - FNAs
- **Management**
  - Surgery
    - Superficial Parotidectomy
    - Submandibular Gland Resection
  - Complications
  - Contraversial
    - The N0 Neck

Salivary Gland Neoplasms

- **Diverse histopathology**
  - Determines Aggressiveness
- **Relatively uncommon**
  - 2% of head and neck neoplasms
- **Distribution**
  - 95% in adults
  - Parotid: 80% overall; 80% benign
  - Submandibular: 15% overall; 50% benign
  - Sublingual/Minor: 5% overall; 40% benign

Most Common Parotid Tumours

- **Benign**
  1) Pleomorphic adenoma
  2) Warthin tumour
- **Malignant**
  1) MEC
  2) AdenoCa

Most Common SMG Tumours

- **Benign**
  1) Pleomorphic adenoma
- **Malignant**
  1) ACC
  2) MEC
  3) Malignant mixed

Most Common Minor Salivary Gland Tumours

- **Benign**
  1) Pleomorphic adenoma
  2) Monomorphic adenoma
- **Malignant**
  1) ACC
  2) MEC
  3) AdenoCa
  4) SCC

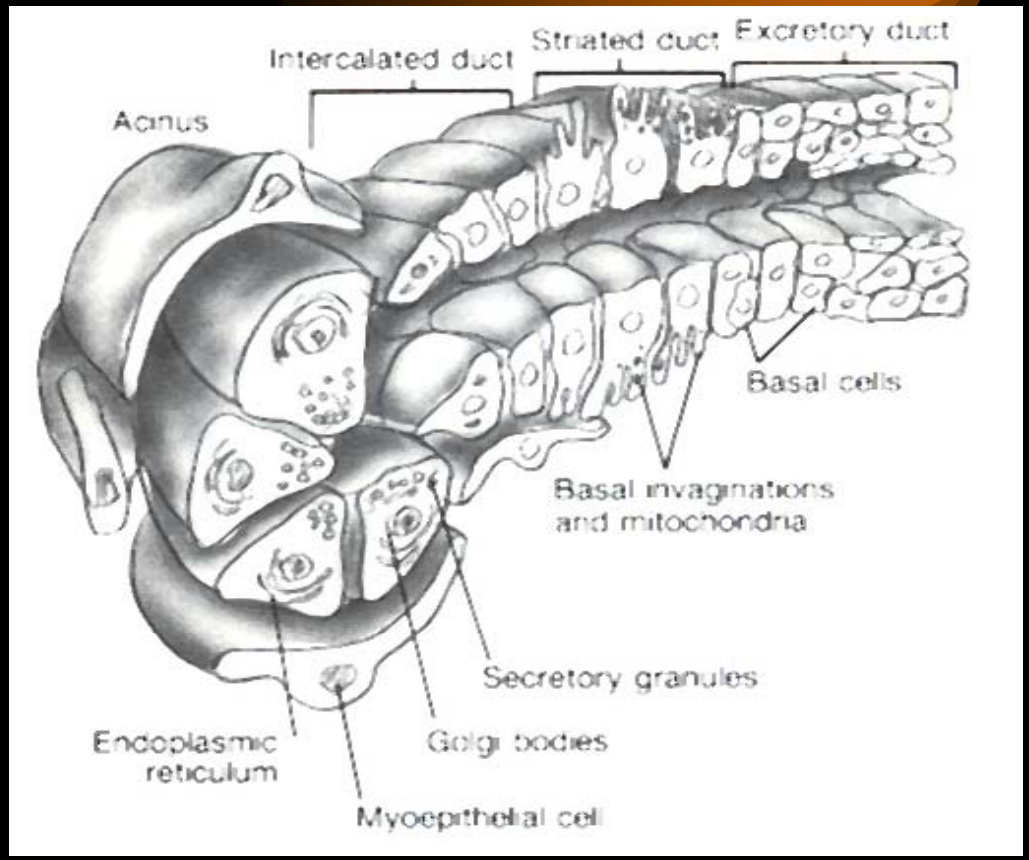
Common Salivary Gland Tumours in Children

- **Benign**
  1) Hemangioma (mesenchymal)
  2) Pleomorphic adenoma (epithelial)
  3) Lymphangioma
- **Malignant**
  1) 85% in parotid
  2) MEC
  3) Acinic cell carcinoma
  4) AdenoCa

Multicellular Theory

Neoplastic cells originate from secretory unit counterparts

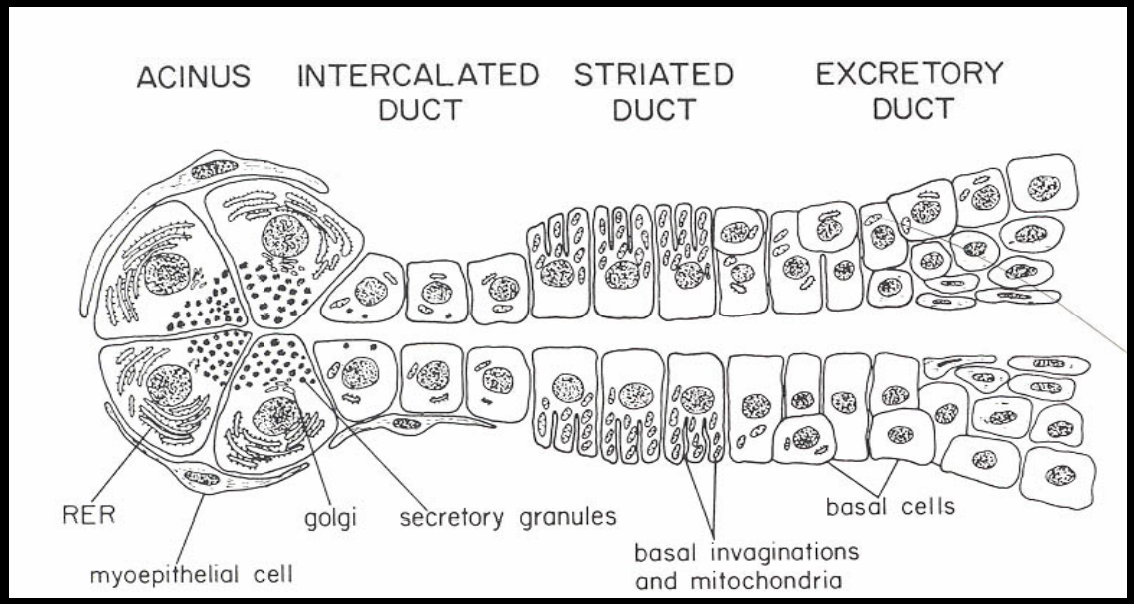
- **Striated duct—oncocytic tumors, Warthin's, adenoca**
- **Acinar cells—acinic cell carcinoma**
- **Excretory Duct—squamous cell and mucoepidermoid carcinoma**
- **Intercalated duct and myoepithelial cells—pleomorphic tumors, adenoid cystic & adenoca**



Bicellular Theory

Neoplastic cells originate from basal cells in intercalated and excretory ducts

- **Intercalated Ducts**
  - Pleomorphic adenoma
  - Warthin's tumor
  - Oncocytoma
  - Acinic cell
  - Adenoid cystic
- **Excretory Ducts**
  - Squamous cell
  - Mucoepidermoid



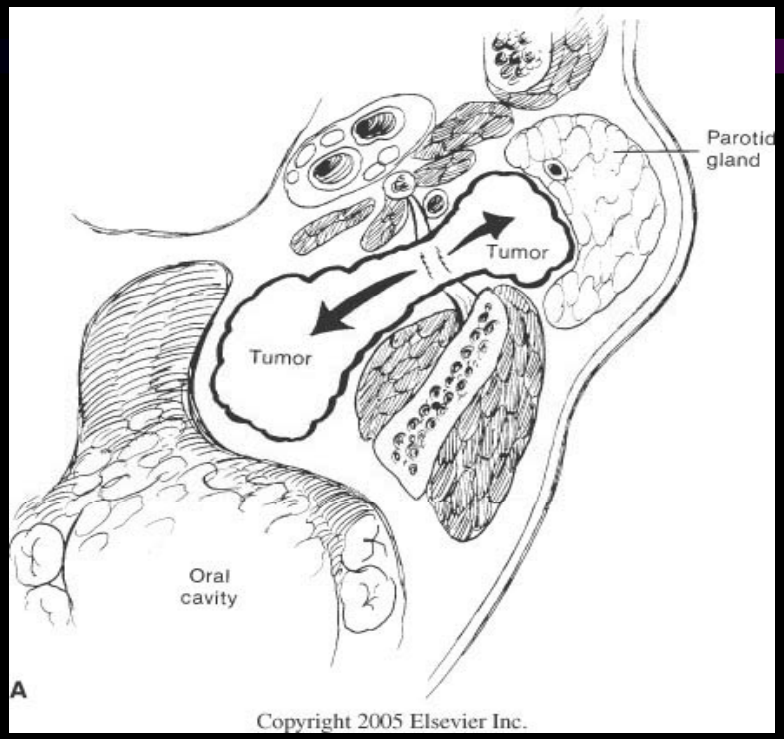
Benign Neoplasms

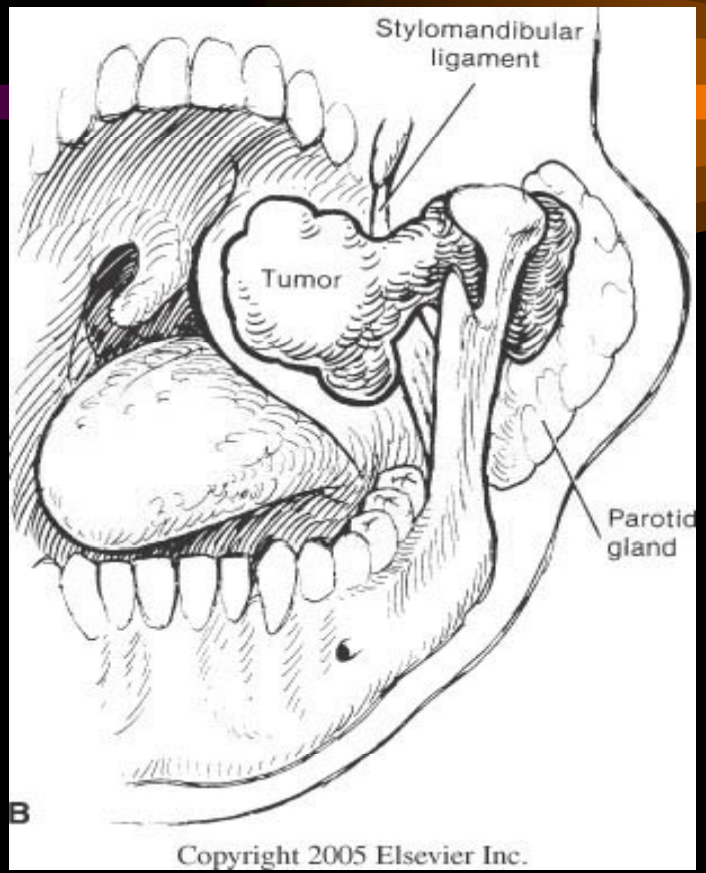
Pleomorphic Adenoma

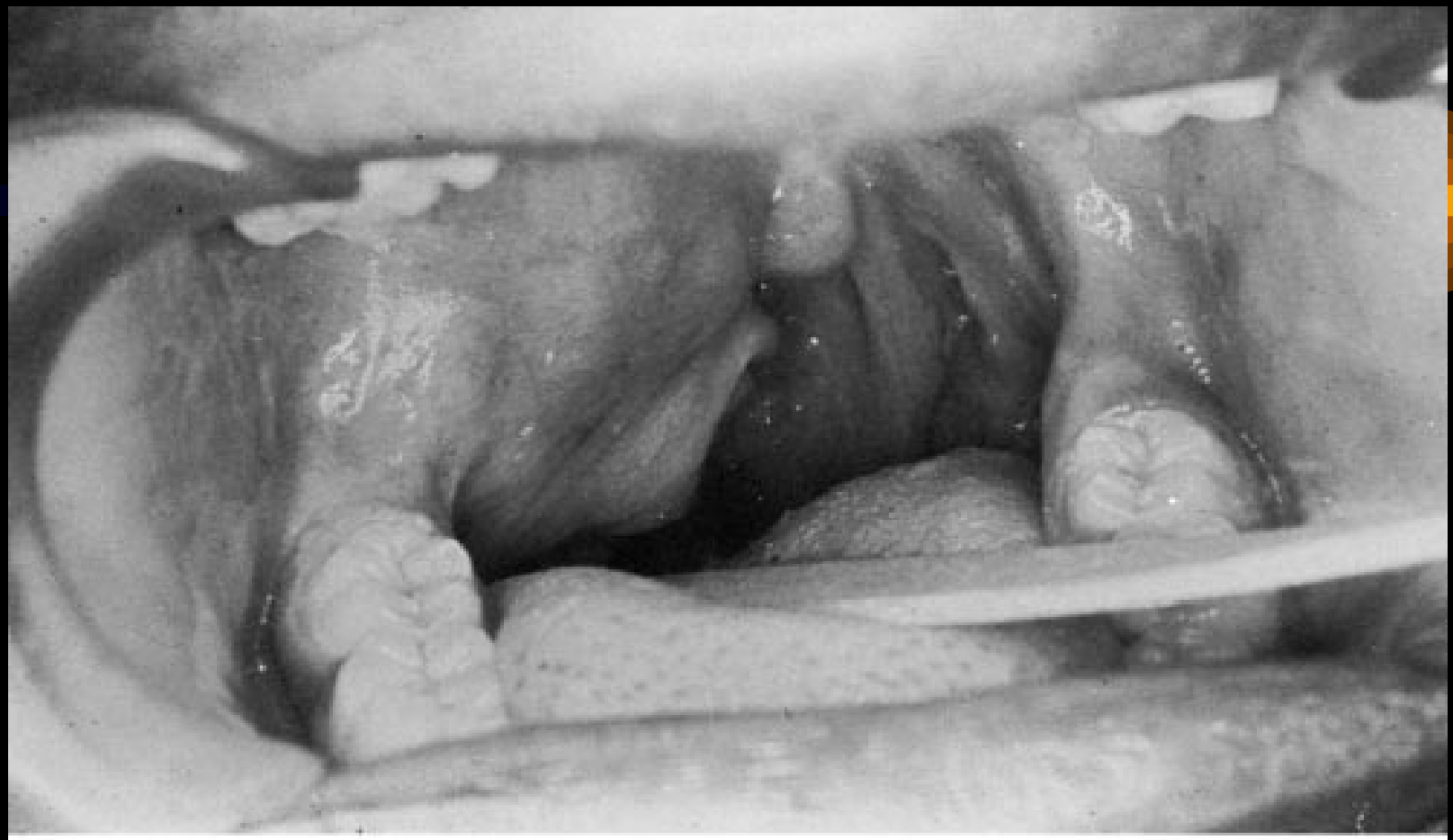
- **Most common of all salivary gland neoplasms**
  - 70% of parotid tumors
  - 50% of submandibular tumors
  - 45% of minor salivary gland tumors
  - 6% of sublingual tumors
- **4^{th}-6^{th} decades**
- **F:M = 3-4:1**

Pleomorphic Adenoma

- **Slow-growing, painless mass**
- **Parotid: 90% in superficial lobe, most in tail of gland**
- **Minor salivary gland: lateral palate, submucosal mass**







Pleomorphic Adenoma

- **Treatment: complete surgical excision**
  - Parotidectomy with facial nerve preservation
  - Submandibular gland excision
  - Wide local excision of minor salivary gland
- **Avoid enucleation and tumor spill**
  - 20-45% recurrence
- **can metastasize and yet remain benign histologically**

Warthin's Tumor

- **AKA: papillary cystadenoma lymphomatosum**
- **6-10% of parotid neoplasms**
- **Older, Caucasian, males**
- **Incidence increasing in women (smoking)**
- **10% bilateral; 20% multicentric**
- **3% with associated neoplasms**
- **Presentation: slow-growing, painless mass in parotid tail**

Malignant Tumors

BOX 61-4

MALIGNANT NEOPLASMS OF MAJOR SALIVARY GLANDS	HOCWALD 2001[62]
Mucoepidermoid carcinoma	28 (36%)
Adenocarcinoma	11 (14%)
Adenoid cystic carcinoma	16 (20%)
Carcinoma ex-pleomorphic adenoma	4 (5%)
Acinic cell carcinoma	7 (9%)
Squamous cell carcinoma	6 (8%)
Other	6 (8%)

Mucoepidermoid Carcinoma

- **Most common salivary gland malignancy**
- **5-9% of salivary neoplasms**
- **Parotid 45-70% of cases**
- **Palate 18%**
- **3rd-8th decades, peak in 5th decade**
- **F>M**
- **Caucasian > African American**

Mucoepidermoid Carcinoma

- **Presentation**
  - Low-grade: slow growing, painless mass
  - High-grade: rapidly enlarging, +/- pain
  - **Minor salivary glands: may be mistaken for benign or inflammatory process
    - Hemangioma
    - Papilloma
    - Tori

Mucoepidermoid Carcinoma

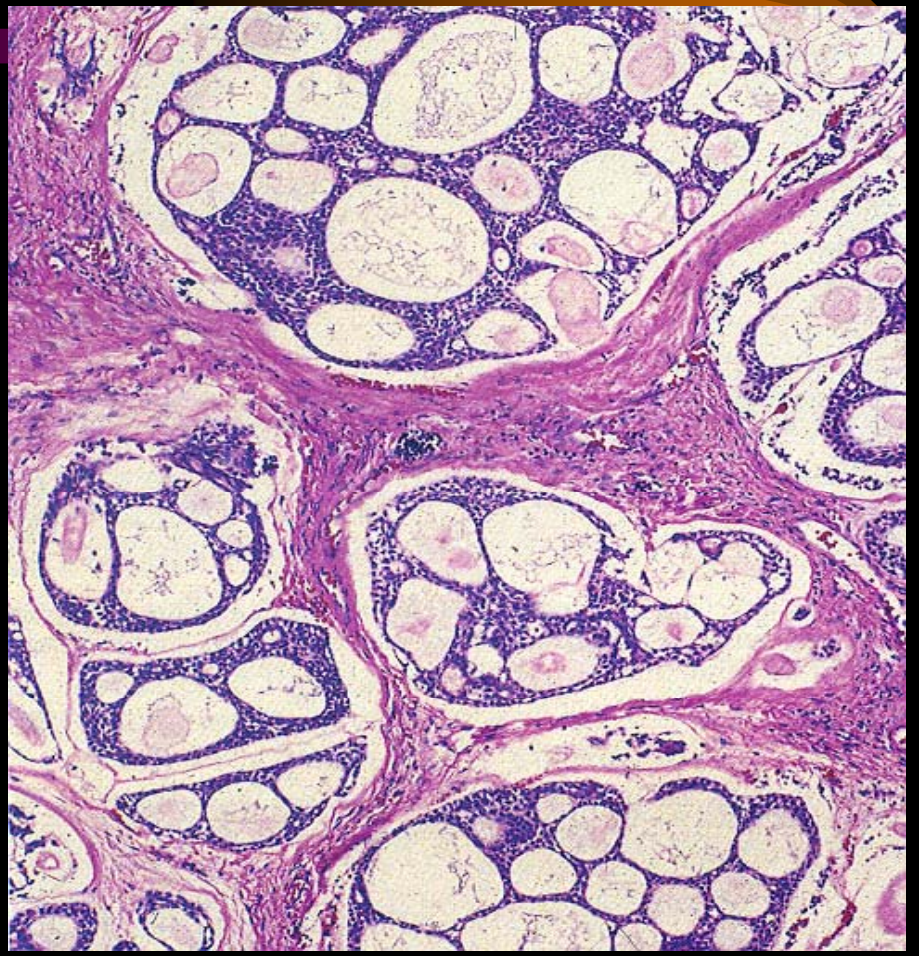
- **Treatment**
  - Influenced by site, stage, grade
  - Low-grade tumors: complete resection by parotidectomy
  - High-grade: parotidectomy, neck dissection (N0 neck) & RTX

Adenoid Cystic Carcinoma

- **Overall, 2nd most common salivary gland malignancy**
- **2nd most common of parotid**
- **Most common in submandibular, sublingual and minor salivary glands**
- **M = F**
- **5th decade**
- **Presentation**
  - Asymptomatic enlarging mass
  - Pain, paresthesias, facial weakness/paralysis

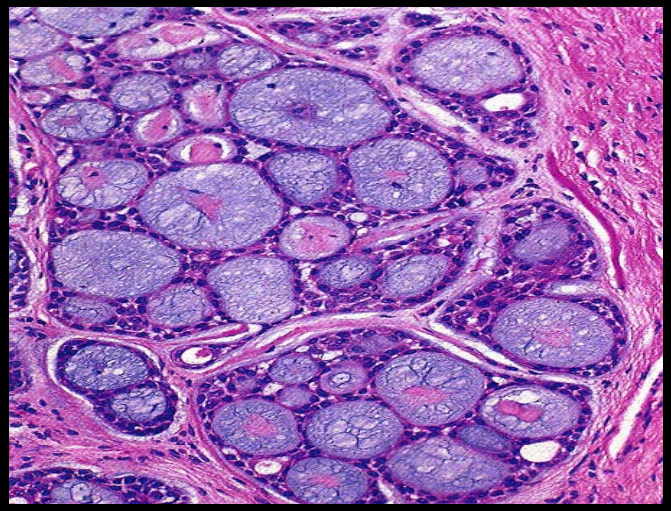
Adenoid Cystic Carcinoma

- **Histology**
- **i) cribriform pattern**
  - Most common
  - “swiss cheese” appearance

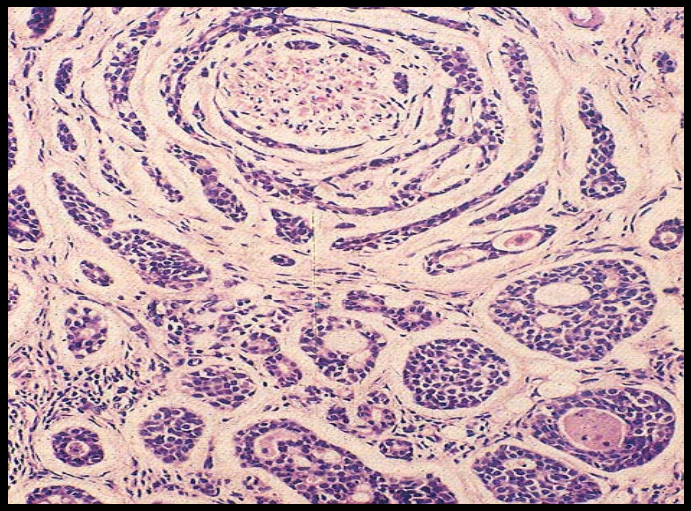


Adenoid Cystic Carcinoma

- **ii) tubular pattern**
  - Layered cells forming duct-like structures
  - Basophilic mucinous substance



- **iii) solid pattern**
  - Solid nests of cells without cystic or tubular spaces



Adenoid Cystic Carcinoma

- **Treatment**
  - Complete local excision
  - Tendency for perineural invasion: facial nerve sacrifice
  - Postoperative *Neutron Beam* XRT
  - Long-term F/U mandatory
- **Prognosis**
  - Local recurrence: 42%
  - Distant metastasis: lung, bone
  - Indolent course: 5-year survival 75%, 20-year survival 13%

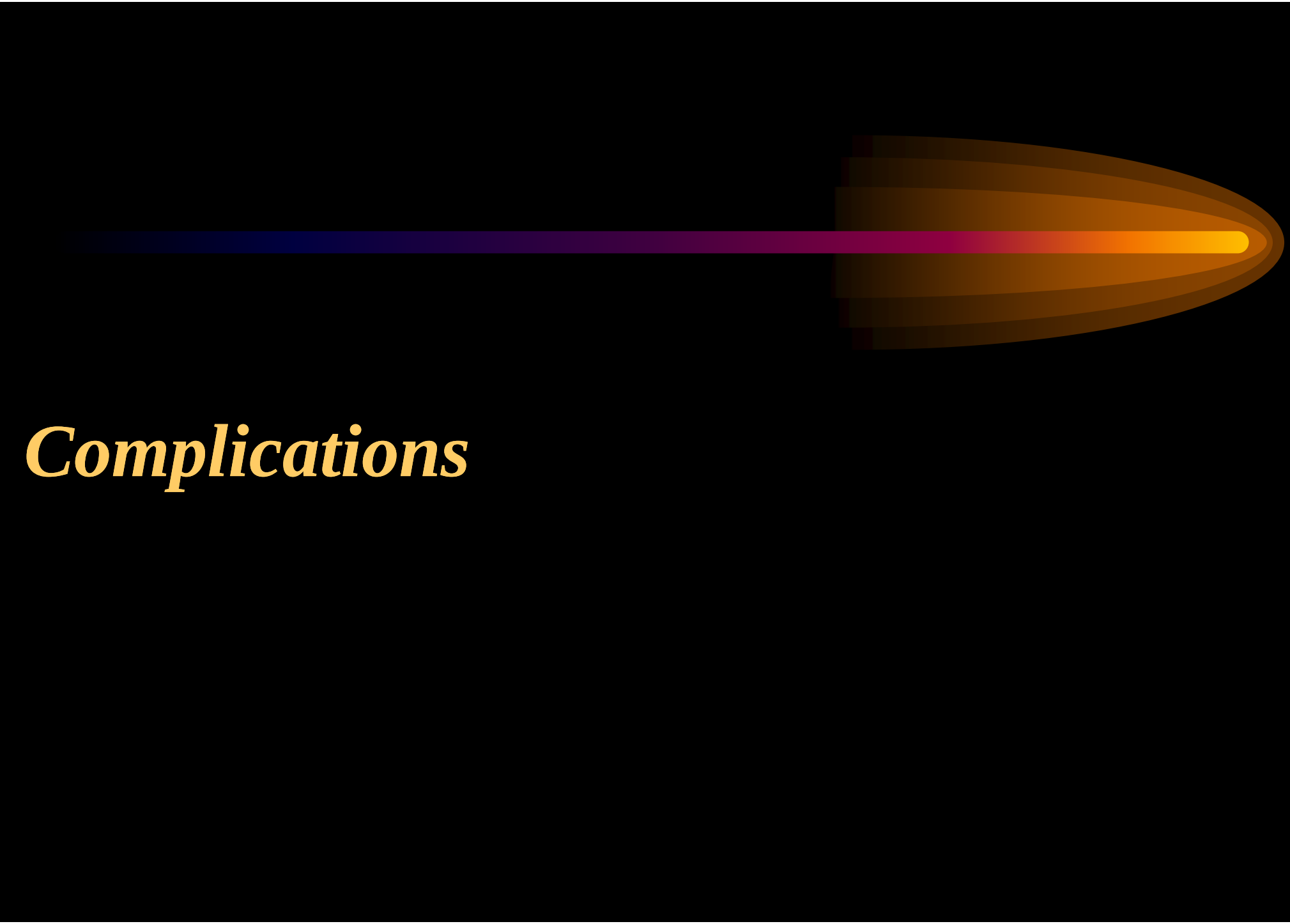

Complications

TABLE 107.8. COMPLICATIONS PAROTIDECTOMY

Early Complications	Long-term Complications
Facial nerve paralysis	Frey's syndrome
Hemorrhage or hematoma	Recurrent tumor
Infection	Cosmetic deformity
Skin flap necrosis	Soft-tissue deficit
Trismus	Hypertrophic scar or keloid
Salivary fistula or sialocele	
Seroma	

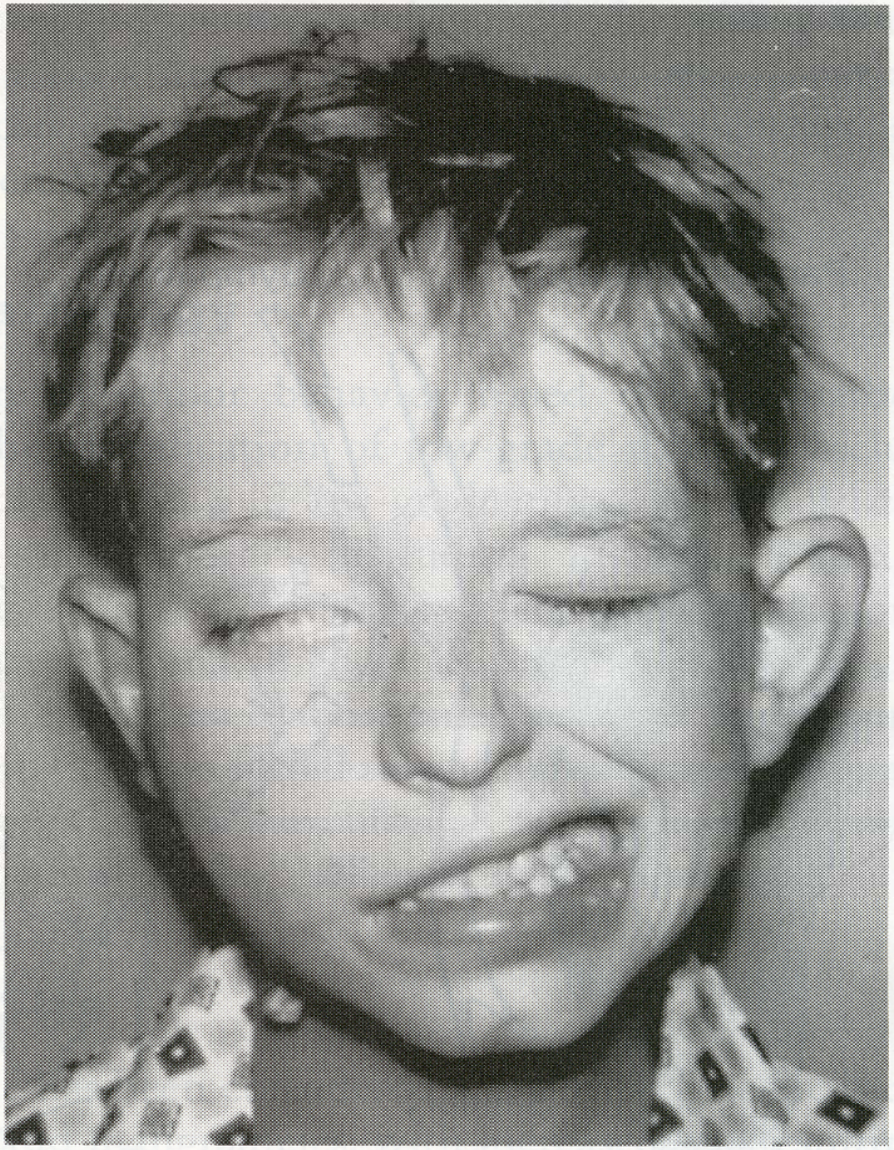


FIGURE 107.17. Right facial paralysis after parotidectomy.

Frey's syndrome (aka. Gustatory sweating)

- *Aberrant reinnervation of postganglionic parasympathetic nerves to the sweat glands of the face*
- 10% of patients overtly symptomatic
- Diagnosis: Minor's starch iodine test
- Afferent pathway
  - Parotid and sweat glands
  - Auriculotemporal nerve
  - Otic ganglion
  - LSPN (enters skull base via foramen ovale)
  - Jacobson's nerve (leaves skull base via inferior tympanic canaliculus)
  - CN IX
  - Inferior salivatory nucleus

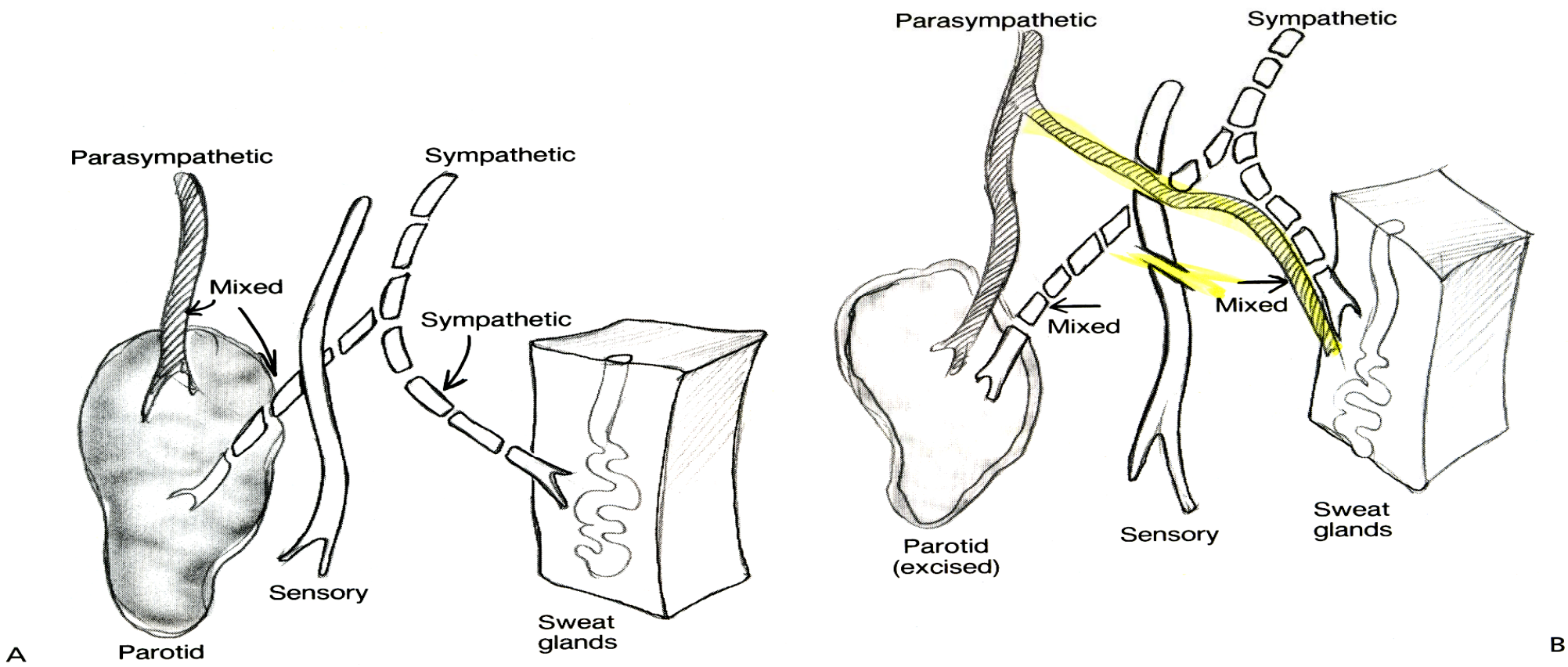


FIGURE 107.18. A: Normal innervation of parotid and sweat glands. **B:** Proposed mechanism of gustatory sweating (Frey's syndrome).

Figure 3. The Minor's test showed areas where the secretion of sweat gland diluted with iodine, which reacted with the starch.

BOX 61-13

TREATMENT OF GUSTATORY SWEATING

Nonsurgical
- Topical glycopyrrolate
- Topical antiperspirant

Botox injection

Surgical
- Fat grafting
- Dermal grafting
- Temporalis fascia interposition flap
- Sternocleidomastoid interposition flap
- Tympanic neurectomy

Thank You