

LAB 22: ORAL CAVITY, PHARYNX, AND MUSCLES OF MASTICATION

Students:

- ✎ **Unlike most lab sessions, which are dissection-based, this session is a “prosection lab.”**
- › Assemble in 5 groups, each having ~16 members.
- › There are 5 learning stations situated around the labs. Pick a station to start at.
- › Groups will spend about 25 minutes at each station, rotating around the labs until they have visited all the stations. Instructors will facilitate discussions at the stations.
- ⓘ Use the checklists provided to make sure you have identified all the relevant structures.

Lab 22 Navigation

- [Station 1: Osteology Associated with the Oral Cavity](#)
- [Station 2: Muscles of Mastication and TMJ](#)
- [Station 3: Nerves and Vessels Associated with the Oral Cavity](#)
- [Station 4: Oral Cavity and Pharynx—Sagittal View](#)
- [Station 5: Oral Region and Salivary Glands—Lateral View](#)

LAB 22, STATION 1: OSTEOLOGY ASSOCIATED WITH THE ORAL CAVITY

STATION 1: OSTEOLOGY ASSOCIATED WITH THE ORAL CAVITY

This station will be self-guided. Use the skull bones and laminated images provided to practice identifying the structures listed.

- Frontal bone
- Parietal bone
- Temporal bone
- Zygomatic bone
- Maxilla
 - Body** (contains maxillary air sinus)
 - Alveolar process** (contains tooth sockets)

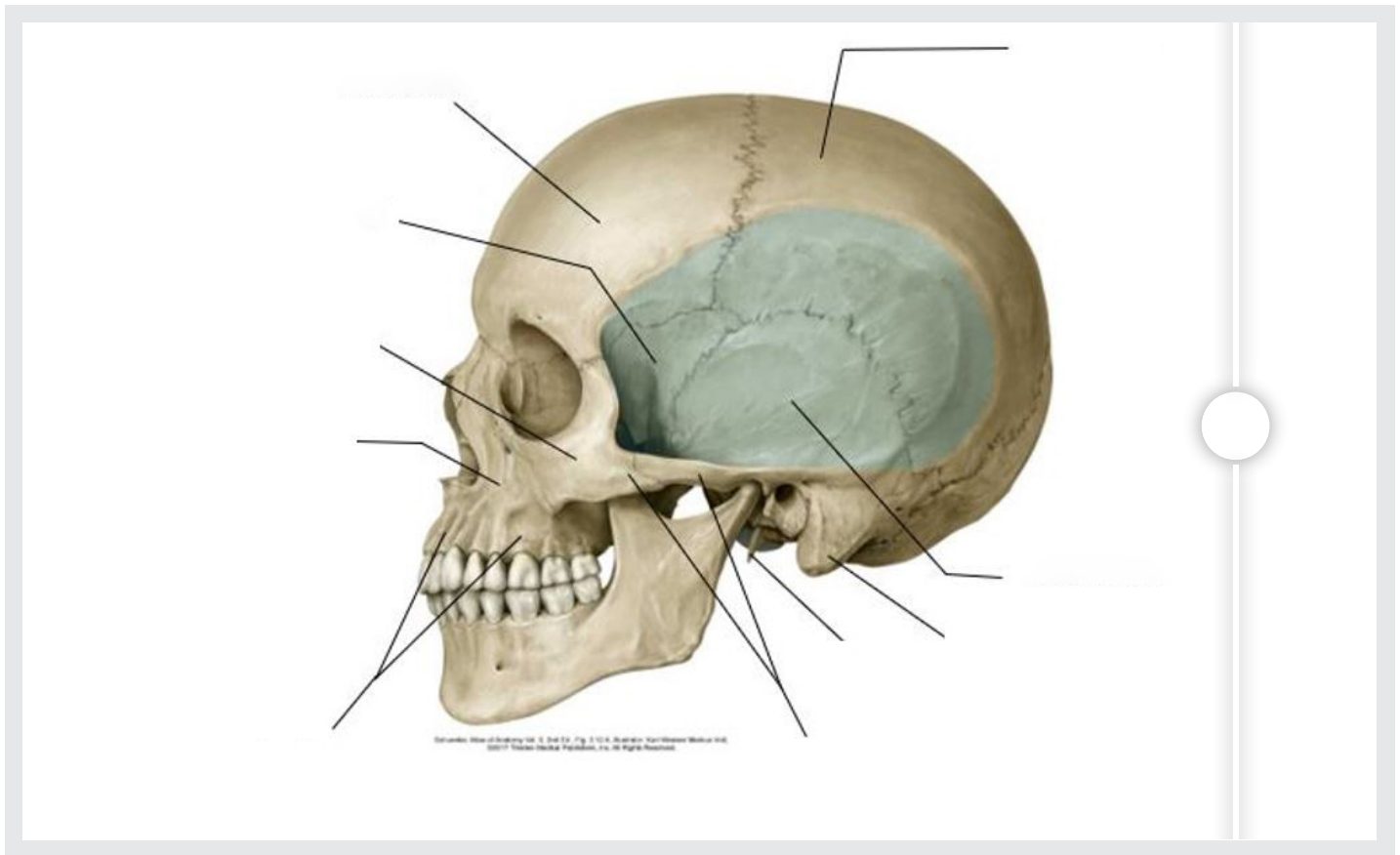


Figure 22.1. (Drag the slider to show labels.)

Sphenoid bone

Greater & lesser wings

Medial and lateral pterygoid plates

Foramen rotundum, ovale, and spinosum

Temporal bone

Mastoid process

Styloid process

Zygomatic arch (contributions from zygomatic and temporal bones)

Temporal fossa (contains temporalis muscle)

Infratemporal fossa (contains mandibular nerve, maxillary artery, and the pterygoid muscles)

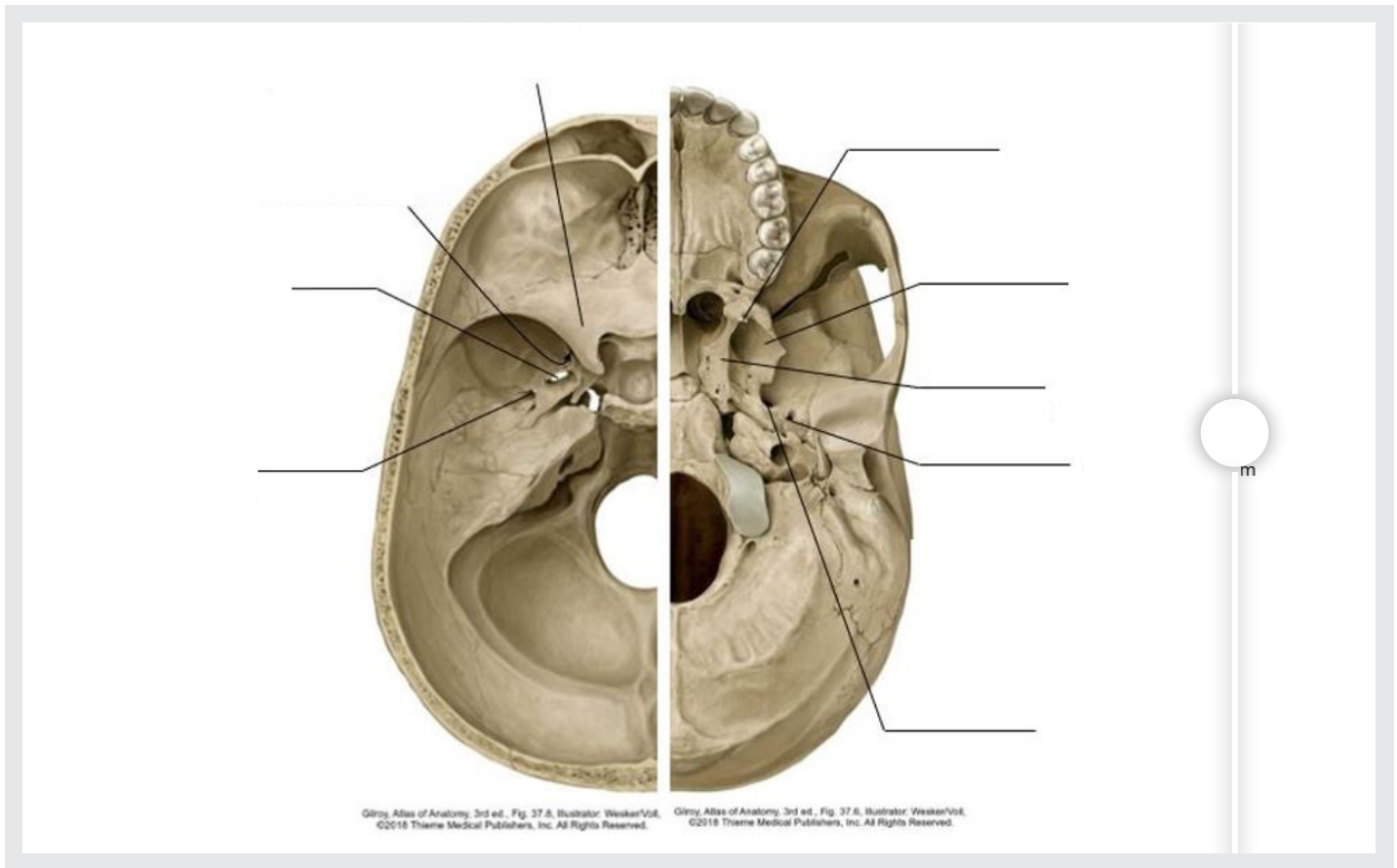


Figure 22.2. (Drag the slider to show labels.)

Mandible

- Body
- Angle
- Ramus
- Coronoid process
- Condylar process
 - Head (condyle) of the mandible (part of TMJ)
- Mandibular foramen (this is the opening of the **mandibular canal** in the mandibular body – contains the inferior alveolar nerve and vessels)
- Mental foramen (for mental nerve & vessels)

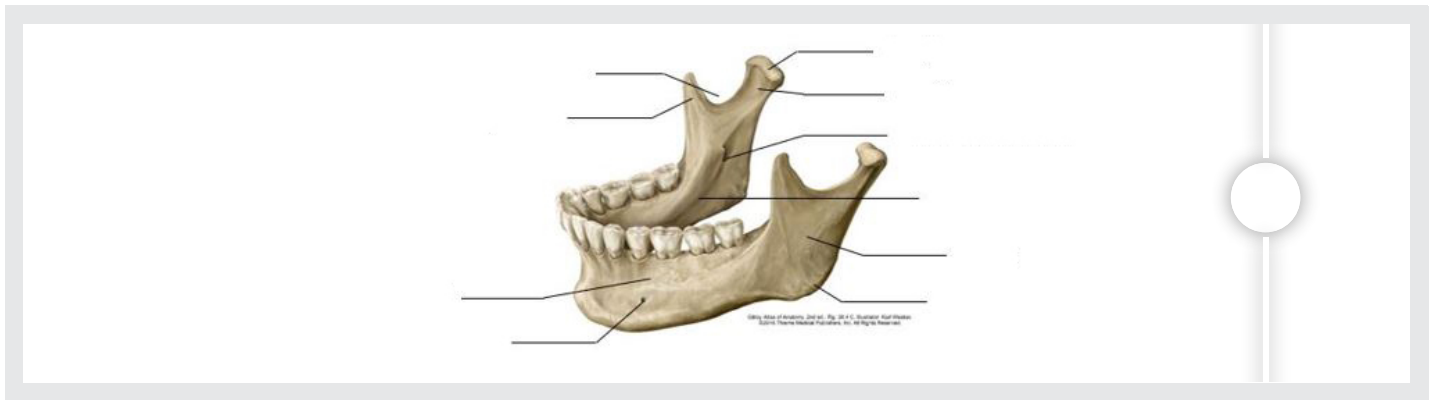


Figure 22.3. (Drag the slider to show labels.)

Hard palate

- Palatine process of maxilla**
- Horizontal plate of palatine bone**
- Greater palatine foramina** (transmit greater palatine n. from V2 and greater palatine artery from maxillary a.)
- Lesser palatine foramina** (lesser palatine n. from V2 and lesser palatine artery from maxillary a.)
- Incisive canal** (contains nasopalatine n. from V2)

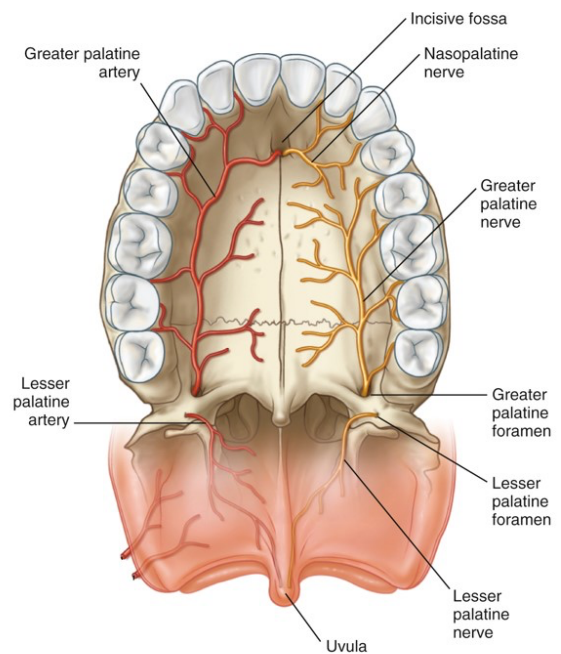


Figure 22.4.

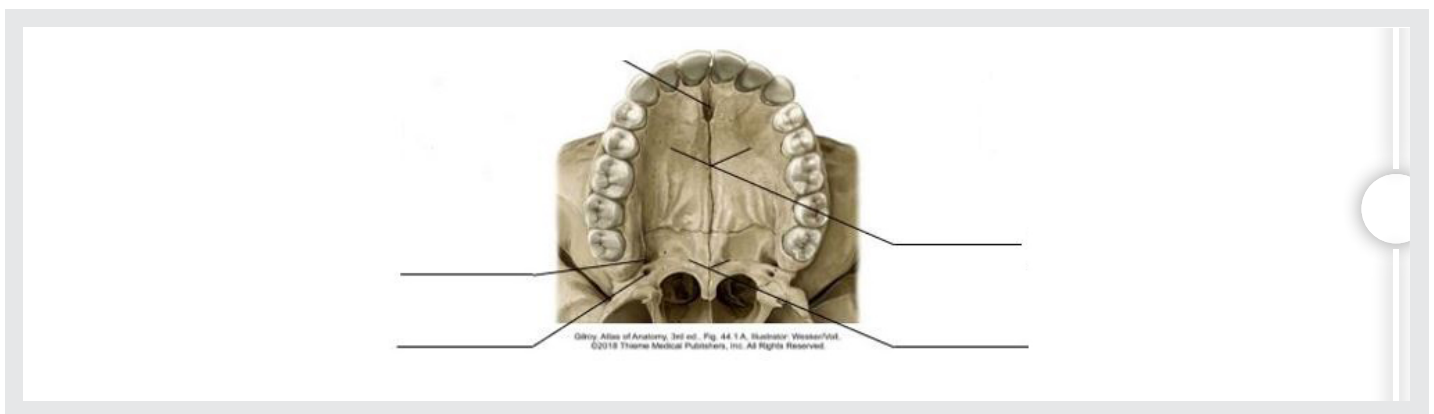


Figure 22.5. (Drag the slider to show labels.)

LAB 22, STATION 2: MUSCLES OF MASTICATION AND TMJ

MUSCLES OF MASTICATION

There are four chewing muscles (muscles of mastication):

- Temporalis** – in the temporal fossa
- Masseter** – on the face
- Lateral pterygoid** – in the infratemporal fossa; has **upper and lower heads**
- Medial pterygoid** – in the infratemporal fossa
- Buccinator muscle** – NOT a chewing muscle. This muscle compresses the cheeks and assists the chewing muscles by keeping food in the oral cavity and positioning it on the molars where it can be ground into a pasty bolus.

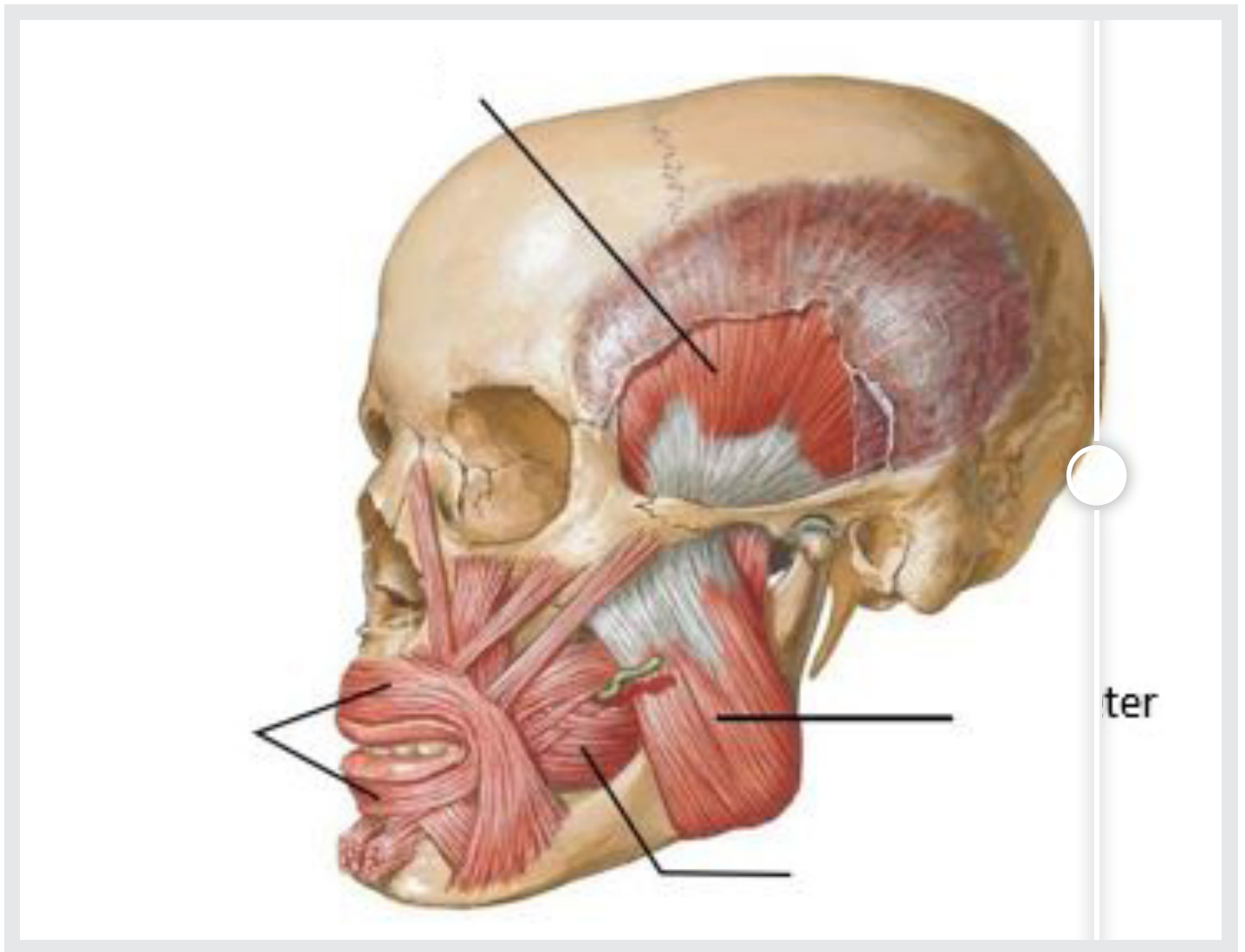


Figure 22.6. Netter, Atlas of Human Anatomy, 7th ed. (Drag the slider to show labels.)

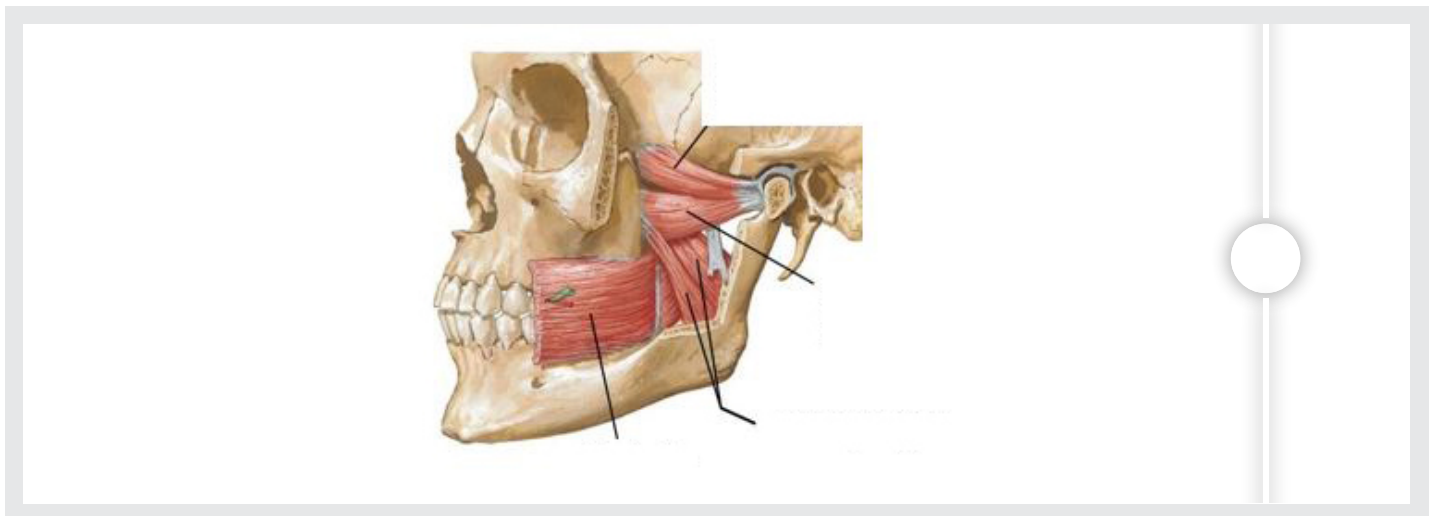


Figure 22.7. Netter, Atlas of Human Anatomy, 7th ed. (Drag the slider to show labels.)

The trigeminal nerve is the fifth cranial nerve (cranial nerve V).



What are the names of its three divisions?



Which division innervates the muscles of mastication?

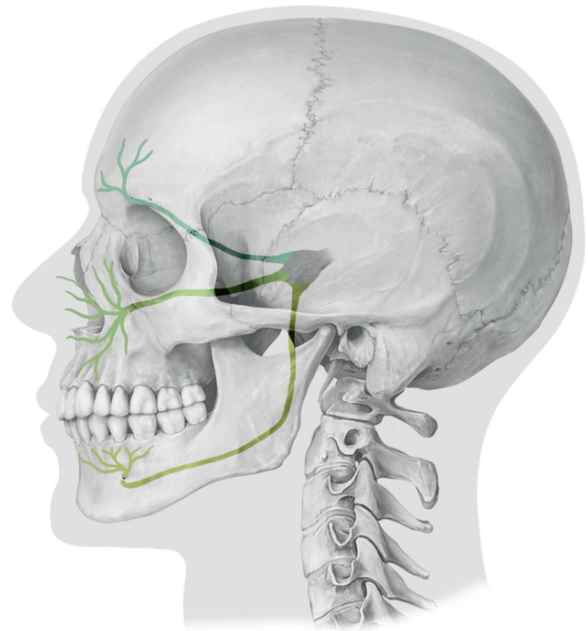


Figure 22.8.

Muscle	Origin	Insertion	Action	Innervation
Masseter				
Temporalis				
Medial pterygoid				
Lateral pterygoid				

TEMPOROMANDIBULAR JOINT (TMJ)



The TMJ is a synovial joint. What structural features do all synovial joints have?

Bony anatomy of TMJ:

- **Condyle (head) of mandible**
- **Mandibular fossa of temporal bone**
- **Articular eminence of temporal bone** – on the zygomatic arch, anterior to the mandibular fossa – this tubercle is important for TMJ stability as it prevents excessive anterior displacement of the mandibular condyle



The TMJ is a modified hinge joint. Which movements are possible at the TMJ?

- Consider this – simple rotation (hinge movement) at the TMJ won't allow the mouth to open very wide, because there is a gland behind the mandible, between it and the ear. **What is this gland?**
 - To open the mouth wider, the mandible must also move anteriorly (translation), in combination with hinge rotation.
- Articular disc (meniscus) of TMJ** – a special feature of the TMJ, made of fibrocartilage, the disc divides the joint cavity into separate upper and lower joint spaces.
 - The **TMJ joint capsule** and **lateral ligament** have been opened so we can view the articular disc
 - The **lateral pterygoid muscle** inserts on the mandibular condyle and the articular disc. **What is the function of the lateral pterygoid muscle, again?** Both the mandible and disc slide forward as the mouth opens. Note the position of the articular disc in the figures below.

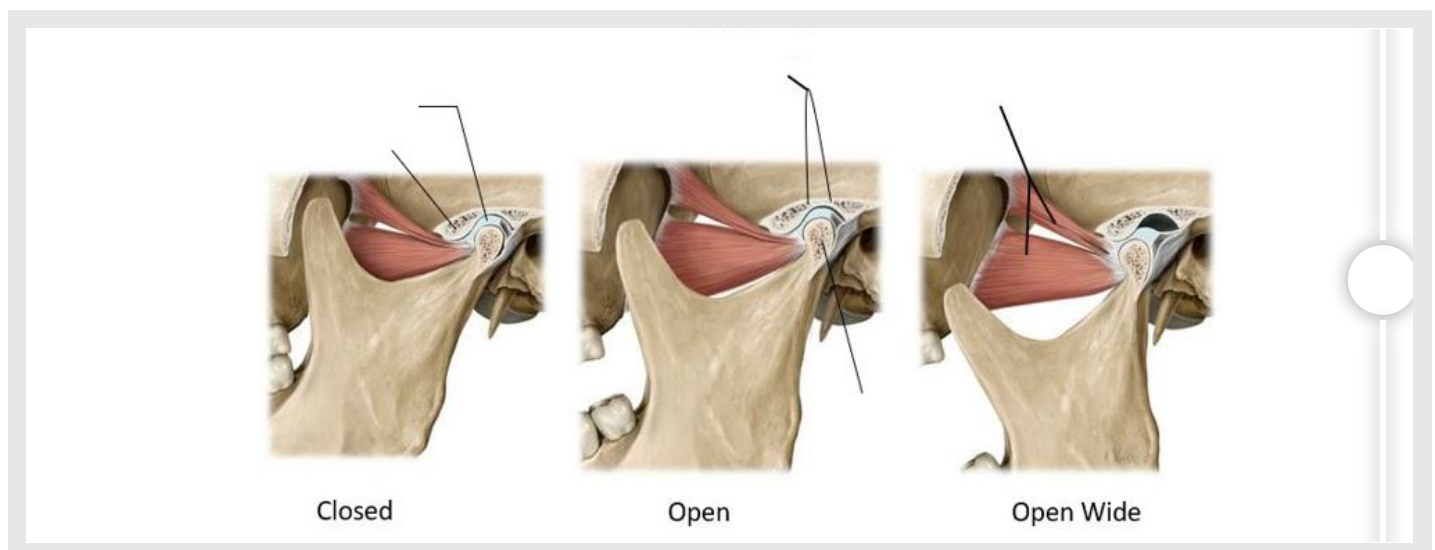


Figure 22.9. Thieme, Anatomy for Dental Medicine, 2nd ed. Fig. 5.21. (Drag the slider to show labels.)



Which muscles elevate the mandible (i.e., close the mouth/clench the teeth)?



Place your fingers on your face over the mandibular ramus and clench and release your jaw. **Which muscle is this?**



Place your fingers above your zygomatic arch/directly behind your orbit and clench/release. **Which muscle is this?**



Place your fingers on your cheek and blow through your lips like you're playing the trumpet. **Which muscle is this?**

LAB 22, STATION 3: NERVES AND VESSELS ASSOCIATED WITH THE ORAL CAVITY

STATION 3: NERVES AND VESSELS ASSOCIATED WITH THE ORAL CAVITY

Branches of V₃ in the Infratemporal Fossa

Mandibular nerve (V₃) – enters the infratemporal fossa via foramen _____

Its branches include:

- Inferior alveolar nerve** – supplies lower teeth
- Lingual nerve** – supplies the anterior 2/3 of tongue with general sensation
 - Chorda tympani nerve (from CN VII)** – joins the lingual nerve
 - Carries taste from anterior 2/3 of tongue
 - Carries preganglionic parasympathetic fibers that innervate the submandibular and sublingual glands
- Buccal nerve** – sensory nerve to cheek (skin & mucous membranes)
- Auriculotemporal nerve** – sensory to scalp and TMJ, also carries postganglionic parasympathetic fibers that innervate the parotid gland
- V₃ supplies motor branches to the muscles of mastication**

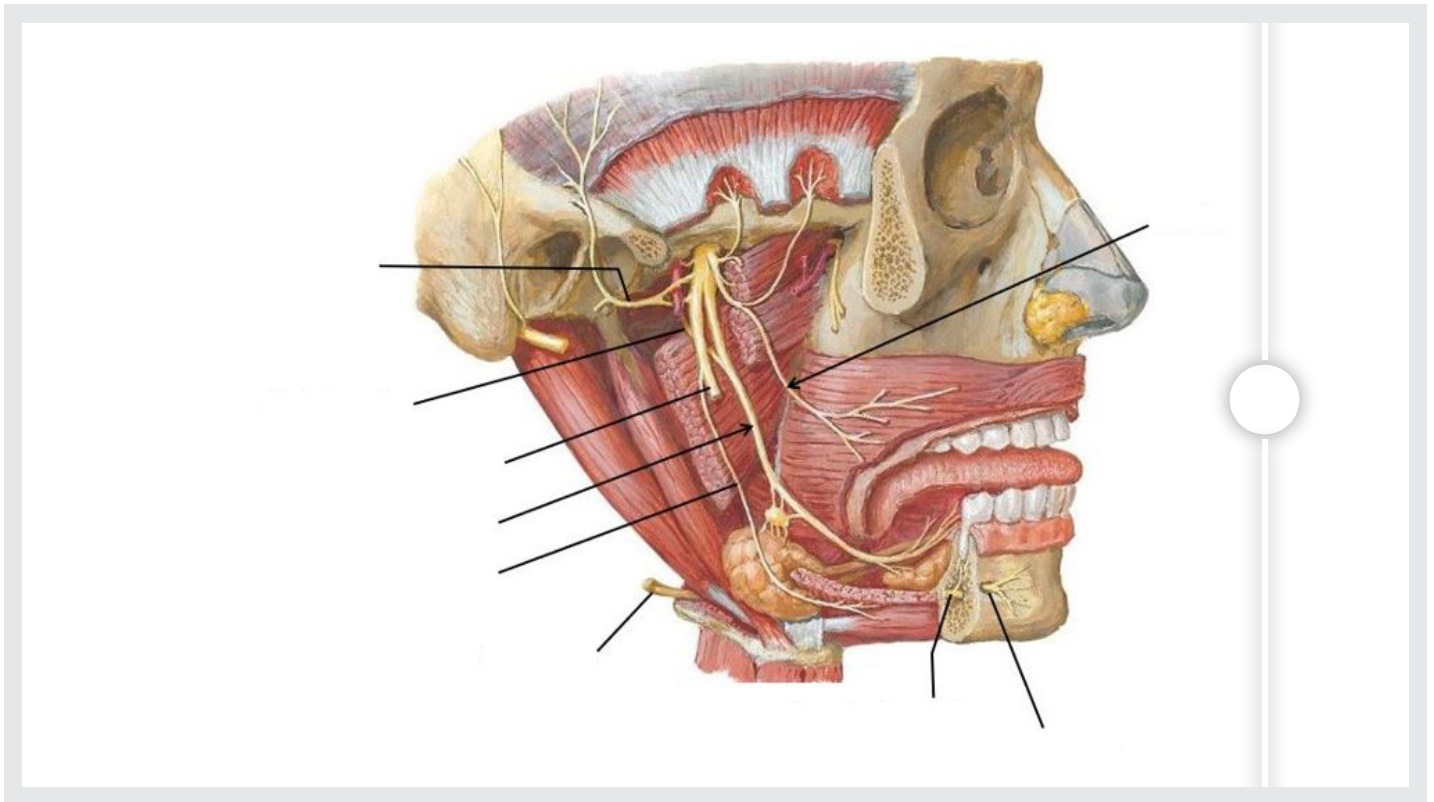


Figure 22.10. Netter, Atlas of Human Anatomy, 7th ed., Plate 59. (Drag the slider to show labels.)

Oral Cavity Branches of the External Carotid Artery

External carotid artery

Lingual artery—blood supply to the tongue

Maxillary artery—passes through the infratemporal fossa

The maxillary artery supplies branches to the upper and lower teeth (**Superior and inferior alveolar arteries**) and hard and soft palates (**Greater and lesser palatine arteries**).

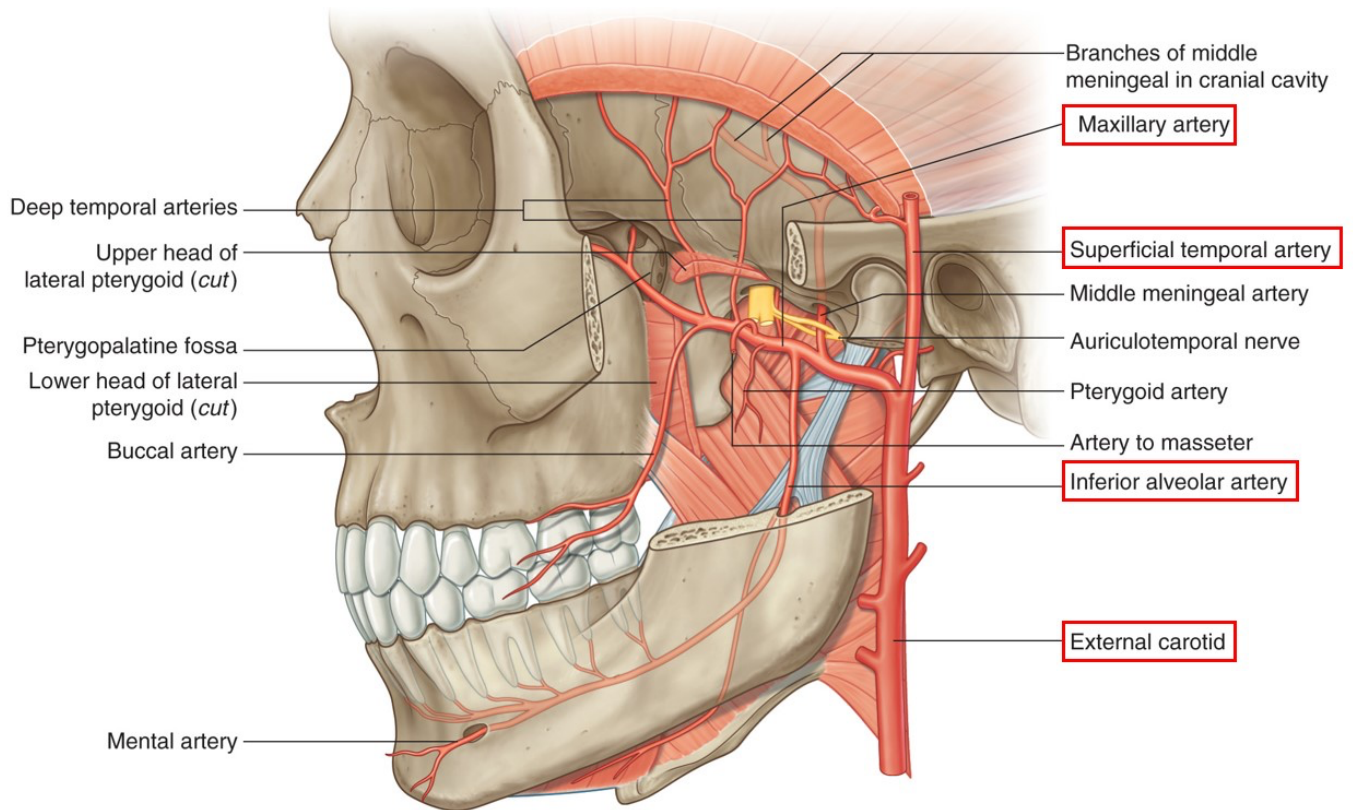


Figure 22.11.

Innervation of Salivary Glands

The following autonomic nervous pathways pass through the infratemporal fossa to innervate the salivary glands.



Which division of the autonomic nervous system stimulates salivation?

Reference: pp. 136–139 in Chapter 36 (Volume 6) in the Anatomy iBook.

Parotid Gland = Preganglionic nerve fibers are in the **glossopharyngeal nerve (CN IX)**;

Postganglionic fibers “hitch-a-ride” on the **auriculotemporal nerve (V3)**. Pre-G fibers synapse on Post-G neuron cell bodies in the **otic ganglion**.

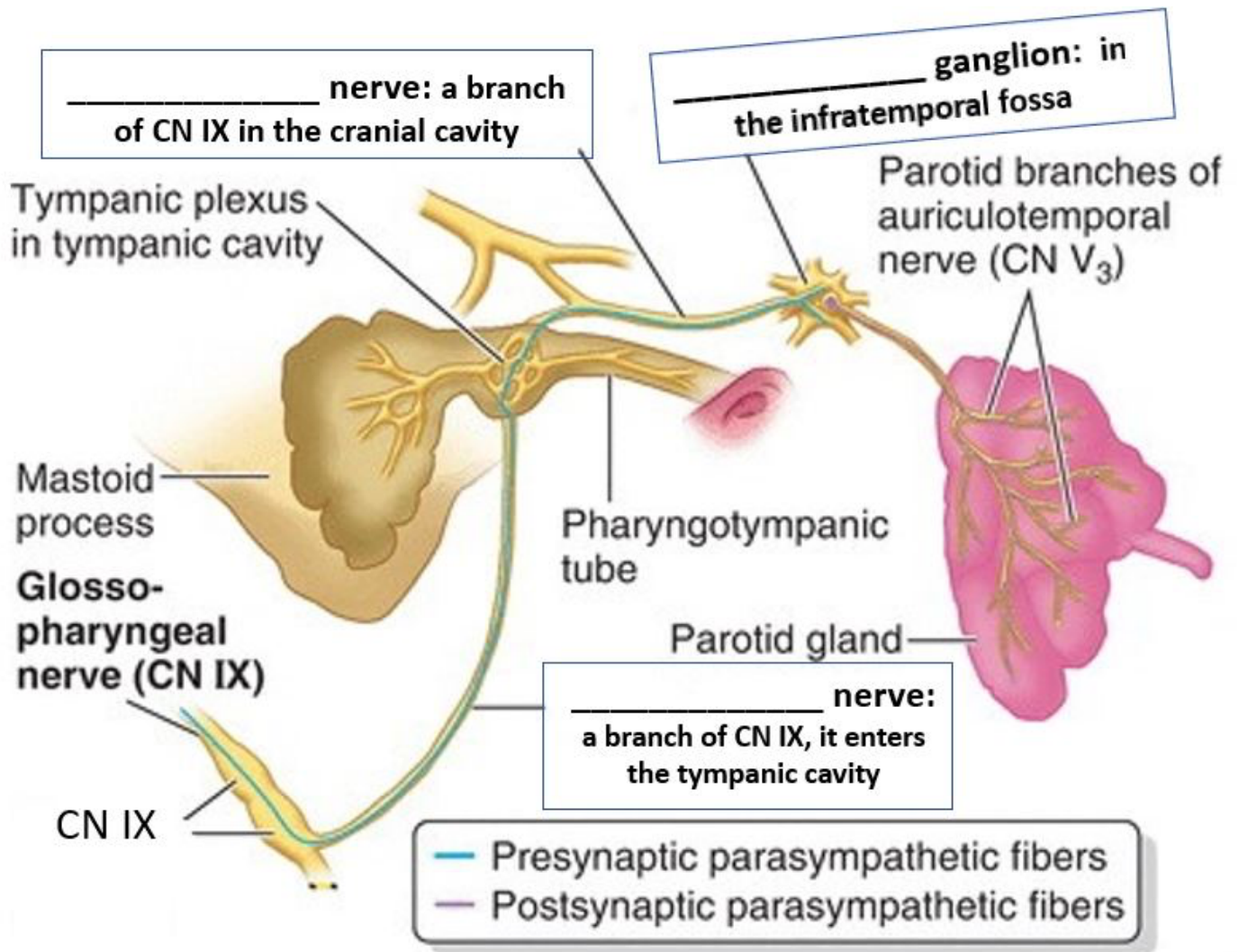


Figure 22.12.

- **Submandibular and sublingual glands** = Preganglionic nerve fibers are in the **facial nerve (CN VII) – chorda tympani branch**; Postganglionic fibers “hitch-a-ride” on the **lingual nerve (V₃)**. Pre-G fibers synapse on Post-G neuron cell bodies in the **submandibular ganglion** (hangs off the lingual nerve below the tongue).

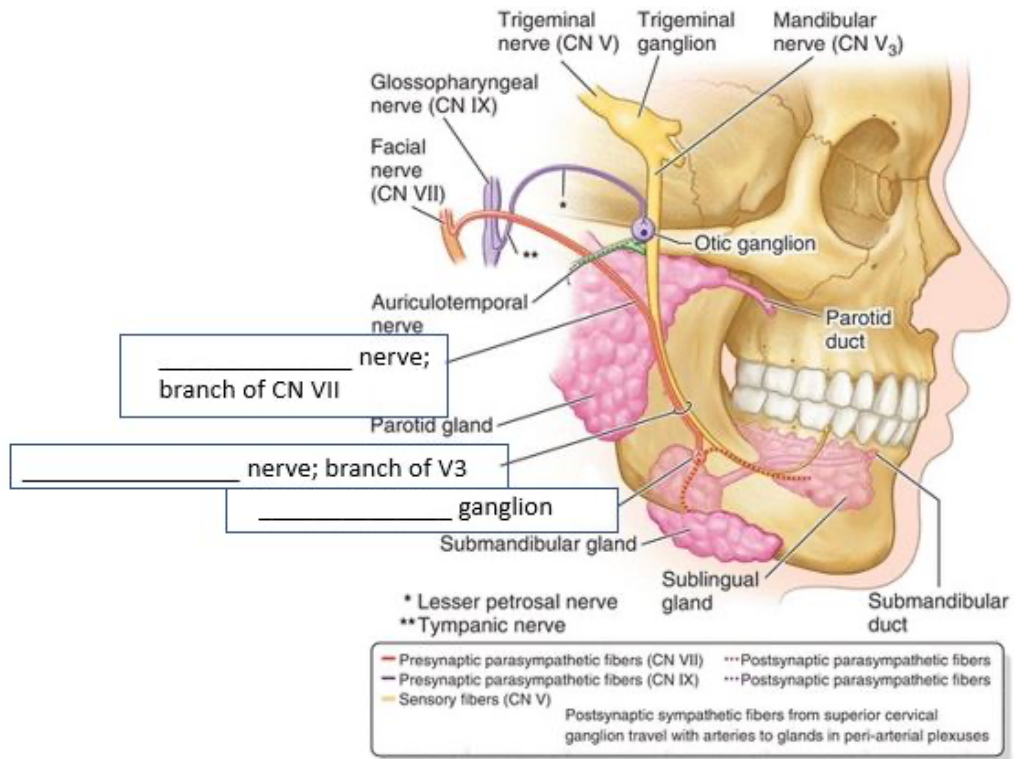


Figure 22.13. Clinically Oriented Anatomy; 8th ed. Figs. 8.66 and 8.95.

LAB 22, STATION 4: ORAL CAVITY AND PHARYNX—SAGITTAL VIEW

STATION 4: ORAL CAVITY AND PHARYNX—SAGITTAL VIEW

Oral Cavity

Oral Vestibule

Oral Cavity Proper

Palate

Hard palate – covered at Station 1.

Soft palate

Uvula

The mucosa of the soft palate is supplied by the **lesser palatine nerves** (V2).

Oral fauces – the “doorway” between the oral cavity proper and oropharynx

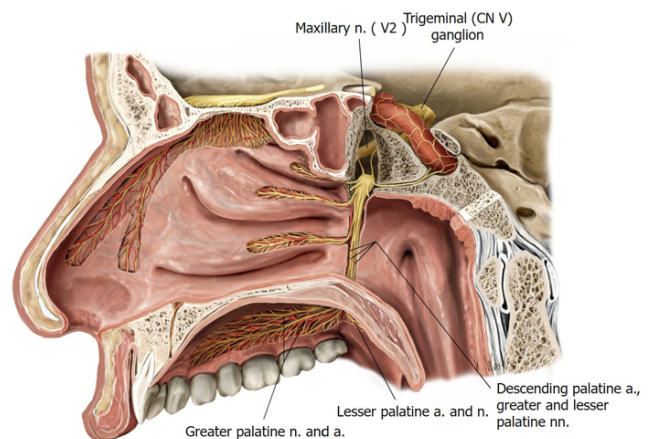


Figure 22.14.

In the lateral walls of the oral fauces are these structures:

Palatoglossal arch (palatoglossus muscle under it)

Palatopharyngeal arch (palatopharyngeus muscle under it)

Tonsillar fossa – between the palatoglossal and palatopharyngeal arches. The fossa contains the **palatine tonsil**.

- Pharynx** – has three named regions. See [Figure 22.15](#).
- Nasopharynx**
- Oropharynx**
 - Epiglottis**
 - Epiglottic valleculae**
- Laryngopharynx**
 - Laryngeal inlet**
 - Piriform recesses (piriform sinuses)** – troughs on either side of the laryngeal inlet.

NOTE



Ingested objects (fishbones, for example) can lodge in this area and must be carefully removed to prevent injury to the internal laryngeal nerves, which are deep to the recesses.

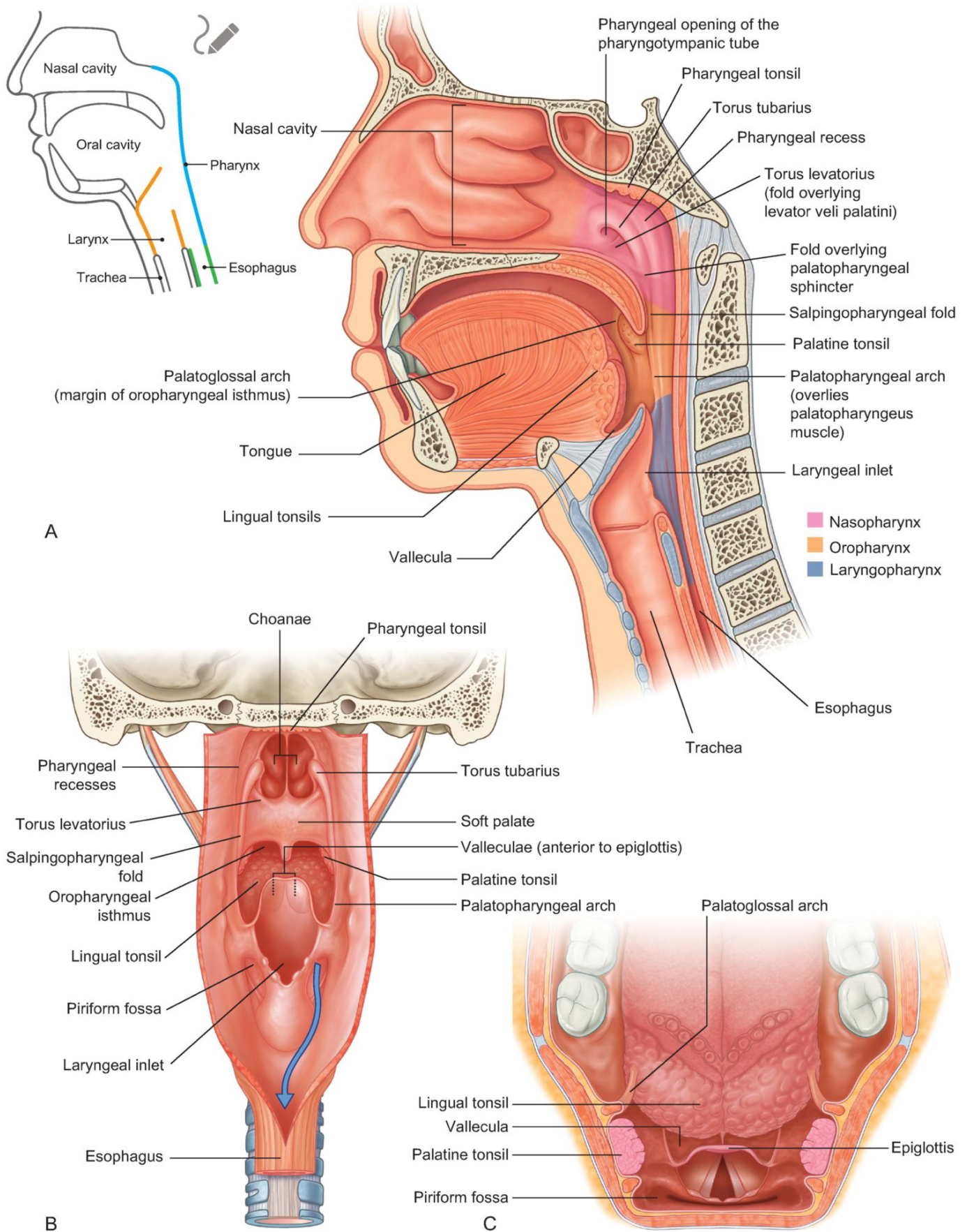


Figure 22.15.

- Tongue**
 - Root**
 - Apex**
 - Body**
 - Dorsal surface** – curved; faces the palate and pharynx
 - Inferior surface** – faces the floor of the mouth
- Muscles associated with the oral cavity** – seen in sagittal section
 - Genioglossus** – protrudes the tongue
 - Intrinsic muscles of the tongue (3 layers: longitudinal, vertical, and transverse)** – these change the shape, width, and length of the tongue.
- Geniohyoid**
- Mylohyoid**

NOTE



Geniohyoid and mylohyoid are muscles below the floor of the mouth that attach to the mandible above and hyoid bone below. They elevate the hyoid bone and thus support and elevate the tongue during swallowing. They also assist in opening the mouth.

LAB 22, STATION 5: ORAL REGION AND SALIVARY GLANDS—LATERAL VIEW

STATION 5: ORAL REGION AND SALIVARY GLANDS—LATERAL VIEW

Salivary glands

Parotid gland


- Parotid duct (Stensen's duct)** – on the lateral surface of the masseter, then penetrates the buccinator muscle. **Where does it open in the oral cavity?**

Submandibular gland

- Submandibular duct (Wharton's duct)** – courses along the external surface of the hyoglossus muscle. **Which nerve twirls around the submandibular duct below the tongue? Where does the submandibular duct open in the oral cavity?**

- Sublingual gland** – sandwiched between the genioglossus muscle and mandible, below the tongue (of course). **Where do the ducts of the sublingual gland open in the oral cavity?**

NOTE

 The ducts of the submandibular glands (Wharton's ducts) open on the **sublingual caruncles**, which are the bumps just lateral to the lingual frenulum below the tongue (See Figure 22.16). The sublingual glands drain into the oral cavity via multiple small ducts that open atop the **sublingual folds** in the floor of the mouth (Figure 22.16).

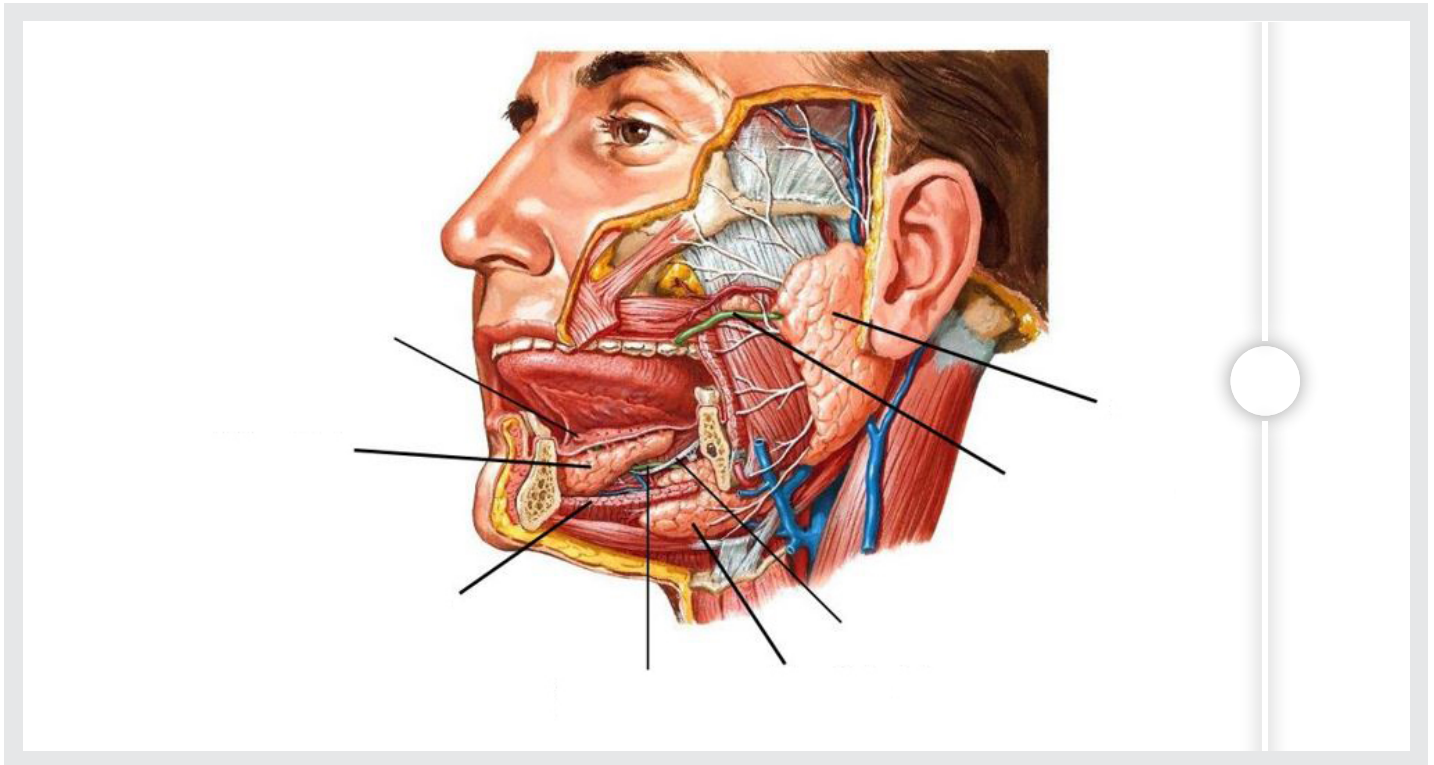


Figure 22.16. Netter, Atlas of Human Anatomy, 7th ed. Plate 53. (Drag the slider to show labels.)

Tongue

- Apex (tip)**
- Dorsal surface**
- Inferior surface**
- Papillae – on dorsal surface**
 - Filiform**
 - Fungiform**
 - Circumvallate**
- Terminal sulcus (sulcus terminalis)**
- Foramen cecum. What is its embryological significance?**
- Lingual tonsil – part of Waldeyer’s tonsillar ring. Can you name the other tonsils in the ring?**

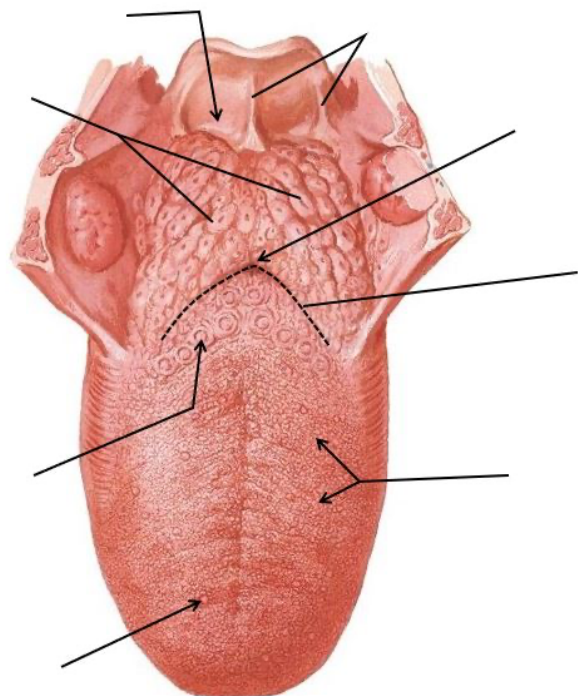


Figure 22.17. Netter, Atlas of Human Anatomy, 7th ed. Plates 71.

- Extrinsic muscles of tongue** – these control gross movements
 - Genioglossus** – protrudes tongue, wags it side-to-side, and creates a midline trough during swallowing.
 - Styloglossus** – retrudes the tongue
 - Hyoglossus** – depresses the tongue after its elevated during swallowing

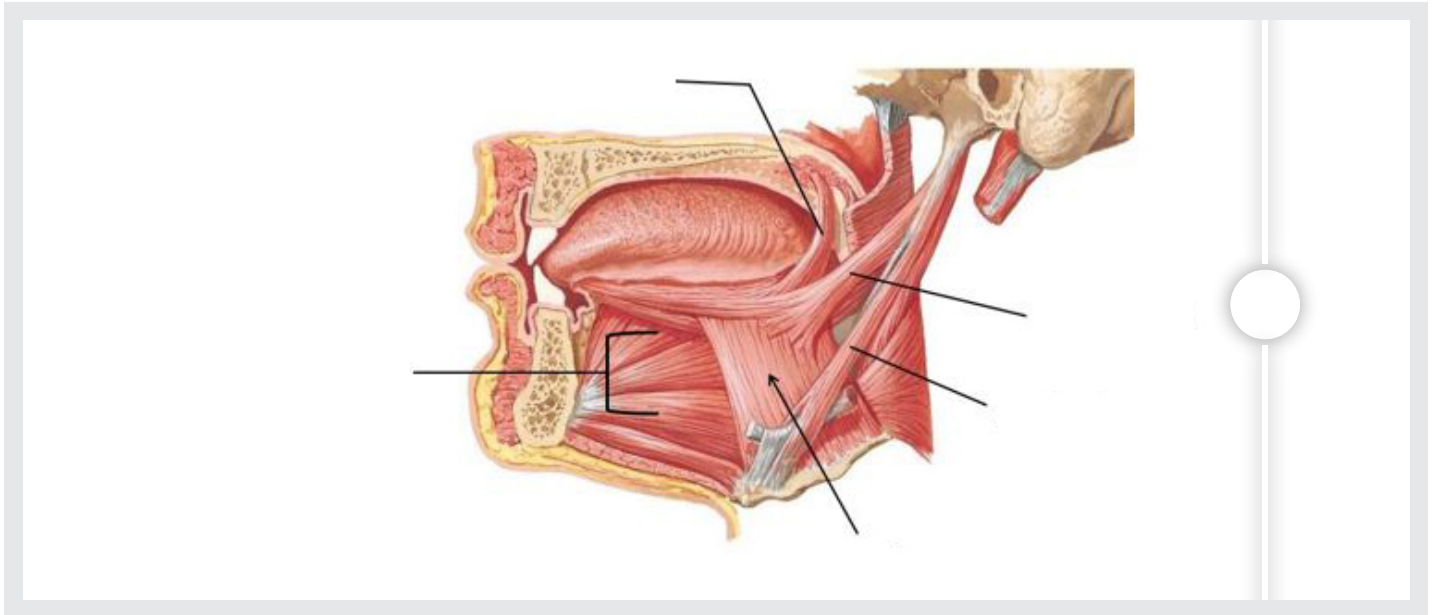


Figure 22.18. Netter, Atlas of Human Anatomy, 7th ed., Plate 70. (Drag the slider to show labels.)

Review neurovasculature of the tongue

- Lingual artery** – **Where does this arise?**
- Hypoglossal nerve (CN XII)** – **What is its function in the tongue?**
- Lingual nerve (V3)** – General sensation, anterior 2/3
- Chorda tympani (VII)** – taste, anterior 2/3
- Glossopharyngeal (IX)** – General sensation and taste, posterior 1/3
- Vagus (X)** – general sensation and taste, epiglottis and epiglottic valleculae

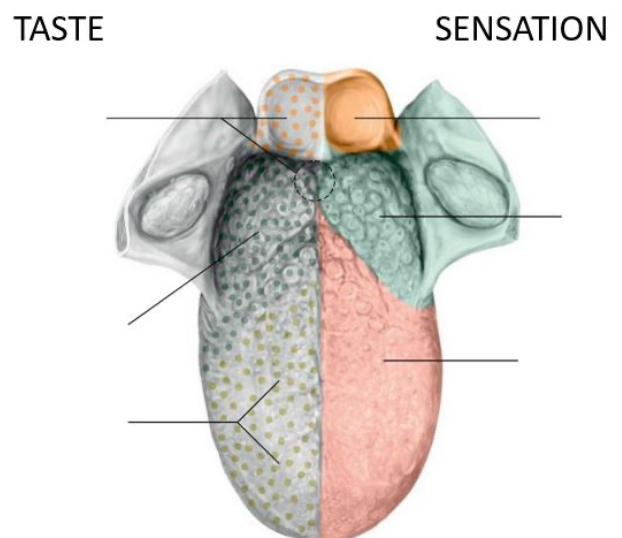


Figure 22.19. Gilroy, Atlas of Anatomy.

Teeth

Parts of a tooth

Root(s), crown, and cusps



Gilroy, Atlas of Anatomy, 3rd ed., Fig. 44.8 A, Illustrator: Wesker/Voll, ©2018 Thieme Medical Publishers, Inc. All Rights Reserved.

Figure 22.20.

Type of teeth

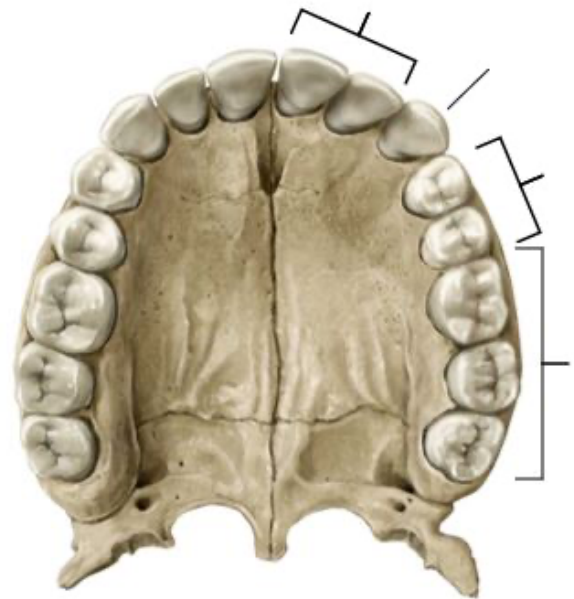
Incisors (central and lateral)

Canines

Premolars (first and second)

Molars (first, second, and third) – **What is the slang name for the 3rd molar?**

Dental alveoli (tooth sockets) – in the **alveolar processes** of the mandible and maxillae



Gilroy, Atlas of Anatomy, 3rd ed., Fig. 44.9 A, Illustrator: Wesker/Voll, ©2018 Thieme Medical Publishers, Inc. All Rights Reserved.

Figure 22.21.

Teeth are arranged in maxillary and mandibular (upper and lower) arches – each arch has two quadrants

QUESTION

Permanent teeth = how many of each type in a quadrant? How many total teeth in the mouth with full dentition?



Deciduous teeth (baby teeth) = there are 20 (2 incisors, 1 canine, and 2 molars in each quadrant)

Innervation of teeth. See [Figure 22.22](#).

Maxillary Teeth [cranial nerve division & specific branches] =

Mandibular Teeth [cranial nerve division & specific branch] =

Clinical correlation



The roots of the maxillary teeth are closely related to which air space?

Bottom line: Infection of the air space might masquerade as tooth pain and vice versa.

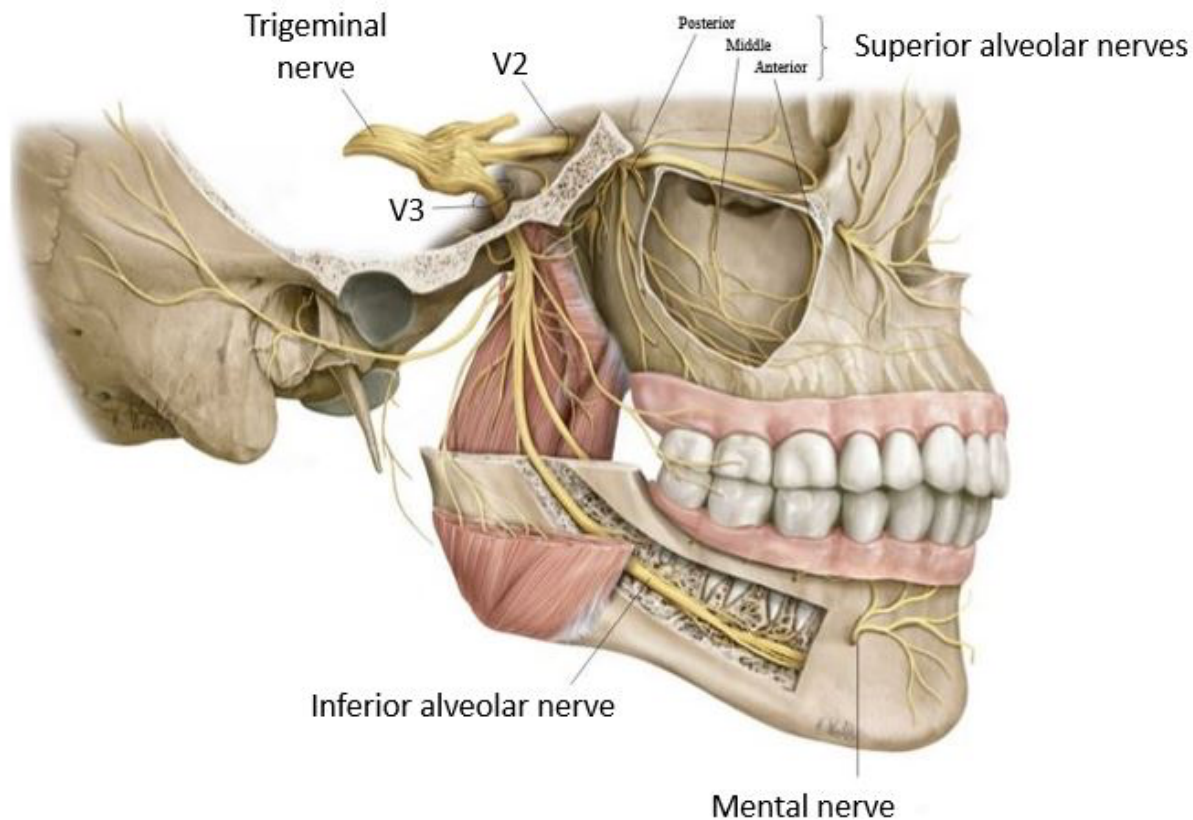


Figure 22.22.