Neuroanatomy

**Lingual Muscles**
- Your tongue is comprised of both intrinsic and extrinsic muscles.

**Intrinsic Muscles**
- Shapes the tongue
- Tongue Base Retraction-propels bolus into pharynx
- Reflexive lingual groove-maintains cohesive bolus for pharyngeal transfer.
- Innervated by CN XII
- Sensory is CN V, VII, IX
- XII meets with above nerves at nucleus solitarius in the brainstem.

**Transverse**
- Origin: median fibrous septum
- Insertion: mucosa at sides of tongue
- Action: narrows and elongates the tongue.
- Innervation CN XII

**Vertical**
- Origin: submucosal fibrous layer of dorsum of tongue.
- Insertion: inferior surface of the tongue.
- Action: flattens and broadens the tongue.
- Innervation CN XII

**Superior Longitudinal**
- Origin: median fibrous septum, near epiglottis.
- Insertion: sides of tongue
- Action: retracts the tongue with the inferior longitudinal muscle, making the tongue short and thick.
- Establishes lingual-dental connection.
- A-P pattern.
- Innervation CN XII

**Inferior Longitudinal**
- Origin: root of the tongue.
- Insertion: apex of tongue.
- Action: widens, shortens tongue; creates convex dorsum, depresses teeth.
- A-P pattern-assists in propulsion of the bolus.
- Innervation CN XII.

**Extrinsic Muscles of the Tongue**
- Give movement to the tongue.
- Tongue retraction-primitive, protective reflex.
Styloglossus with glossopalatine generate posterior lingual elevation.
○ Tongue base retraction-propels bolus into pharynx.
○ Reflexive lingual groove-maintain cohesive bolus for pharyngeal transfer.
○ Reflexive protective retraction.prevents pharyngeal infiltrate, or premature lingual spillover during mastication.
○ Innervation: CN XII

**Styloglossus**
○ Origin: inferior portion of the styloid process of the temporal bone.
○ Insertion: lateral border of the tongue.
○ Action: elevates rear of tongue; retracts protruded tongue during mastication.
○ Innervation: CN XII.

**Genioglossus**
○ Origin: upper mental spine on lingual surface of the mandible.
○ Insertion: Dorsum of tongue and body of hyoid bone.
○ Action: Inferior fibers help the tongue protrude, middle fibers depress the tongue, superior fibers draw the tongue tip back and down.
○ Innervation: CN XII.

**Hyoglossus**
○ Origin: greater cornu of hyoid bone.
○ Insertion: posterior half of the side of the tongue.
○ Action: depress and retracts tongue.
○ Innervation: CN XII.

**Intrinsic Muscles of Mastication**
○ Rotary-normal mastication pattern.
○ Vertical-no lateral jaw movement, jaw jerk reflex absent (trigeminal affected.)
○ Suck-swallow-primitive, motoric innervation, oral XII, pharyngeal X
○ Absent O-M pattern-bilateral destruction of CN motor lines V, X, XII.
○ Tonic bite: Contraction of temporal, masseter and internal pterygoid bilateral deficit muscles exterior pterygoid, platysmus, digastric, mylohyoid, geniohyoid.

**Temporalis**
○ Origin: temporal fossa on the parietal bone and the whole of the covering fascia.
○ Insertion: anterior borders of mandibular ramus and coronoid process.
○ Action: raises and retracts the mandible.
○ Innervation CN V (mandibular division).
○ Antagonist: platysma.

**Masseter**
○ Origin: lower edge of the zygomatic arch (superficial) medial edge of the zygomatic arch (deep).
- Insertion: coronoid process, ramus of mandible.
- Action: raises the mandible against the maxilla, protraction of mandible (closing the mouth).
- Innervation: CN V (mandibular division).
- Antagonist: Platysma

**Internal Pterygoid (Medial pterygoid)**
- Origin: lateral pterygoid plate; slips from the palatine bone; maxillary tuberosity.
- Insertion: medial angle of the mandible.
- Action: elevates mandible, closes jaw, helps lateral pterygoids in moving the jaw from side to side.

**External Pterygoid**
- Origin: great wing of sphenoid and pterygoid plate.
- Insertion: mandibular condyle and the disc of the joint of the jaw.
- Action: depresses mandible and draws mandible forward and sideways.
  (additional mandible depressors: platysma, digastric posterior, mylohyoid, geniohyoid.)
- Innervation: CN V (mandibular division)

**Muscles of the Soft Palate**
- Velopharyngeal closure
- Maximize nutritional intake
- Provide passage of bolus
- Cease nasal inhalation
- Triggered by anterior faucial arches
- The velum is activated by chewing.

**Levator Veli Palatine**
- Origin: apex of the petrous portion of the temporal bone; eustachian tube
- Insertion: aponeurosis of soft palate
- Actions: Raises soft palate to meet posterior pharyngeal wall
- Innervation: CN X (Pharyngeal plexus)

**Tensor Veli Palatine**
- Origin: medial pterygoid plate of the sphenoid bone (scaphoid fossa)
- Insertion: palatine aponeurosis; eustachian.
- Action: Tenses the soft palate
- Innervation: CN V (mandibular division)

**Palatine Uvula**
- Origin: posterior nasal spine; palatal aponeurosis (anterior)
- Insertion: mucous membrane of uvula
- Action: raises and shortens the uvula.
- **Innervation:** CN X (pharyngeal plexus)

**Palatoglossus**
- **Origin:** palatine aponeurosis
- **Insertion:** tongue
- **Action:** Raises posterior part of tongue
- **Innervation:** CN X (pharyngeal plexus) (only muscle of the tongue not innervated by CN XII).

**Palatopharyngeus**
- **Origin:** palatine aponeurosis and hard palate
- **Insertion:** upper border of thyroid cartilage
- **Action:** pulls pharynx and larynx
- **Innervation:** CN X (pharyngeal plexus) and XI

**Muscles of the Pharynx**
- **Peristalsis reflex:** propels the bolus to the esophagus
- **Sensory and motor innervation:** CN IX, X, XI

**Superior Constrictor**
- **Origin:** Lower posterior border of medial pterygoid plate; pterygomandibular raphe; alveolar process.
- **Insertion:** pharyngeal raphe, pharyngeal tubercle.
- **Action:** Contracts pharynx; aids movement of food bolus toward the esophagus.
- **CN X - Pharyngeal Plexus**

**Middle Constrictor**
- **Triggers Peristalsis**
- **Origin:** both cornua of hyoid bone; stylohyoid ligament.
- **Insertion:** posterior median raphe of pharynx.
- **Action:** Contracts pharynx; aids movement of food bolus toward esophagus.
- **CN X (pharyngeal plexus)**

**Inferior Constrictor**
- **Triggers peristalsis**
- **Origin:** inferior side of cricoid cartilage; obliques line of thyroid cartilage.
- **Insertion:** posterior median raphe of pharynx.
- **Action:** Contracts pharynx; aids movement of food bolus.
- **CN X (pharyngeal plexus)**
- **Helps to form the pharyngoesophageal segment (PES).**

**Cricopharyngeal**
- **Origin:** cricoid and thyroid cartilage.
- **Insertion:** posterior median raphe of pharynx.
- **Actions:** contracts pharynx.
- CN X (pharyngeal plexus)
- PES between vertabrae 5 and 6

**Stylopharyngeal**
- Origin: base of styloid process of temporal bone.
- Insertion: thyroid cartilage.
- Action: elevates the larynx, elevates the pharynx.
- CN IX (only group of muscles to be innervated by IX)
- Salpingopharyngeal
- Origin: lower edge of eustachian cartilage.
- Insertion: muscos membrane of pharynx.
- Action: elevates pharynx.
- CN X (pharyngeal plexus)

**Intrinsic Muscles of the Larynx**
- Lingual-laryngeal connection=CN XII
- Reflexes:
  - Glottal Effort Closure Reflex which generates the airway.
  - Reflexive throat clearing/cough reflex.
- Cricothyroid
- Origin: anterior and lateral surfaces of arch of cricoid cartilage.
- Insertion: caudal border of the thyroid cartilage; anterior surface of lower cornu of thyroid cartilage.
- Action: tension and elongation of the vocal folds.
- CN X (superior laryngeal nerve)
- Cricoarytenoids Lateral
- Origin: superior borders of cricoid cartilage.
- Insertion: anterior surface of muscular process.
- Action: draws arytenoids forward; aids in rotating arytenoids; tenses and adducts vocal folds.
- CN X (recurrent laryngeal nerve)
- Origin: posterior surface of cricoid cartilage.
- Insertion: muscular process of arytenoid cartilage.
- Action: rotates arytenoid, abducting vocal processess.
- CN X (recurrent laryngeal nerve).
- Interarytenoids Transverse
- Origin: posterior surface of arytenoid cartilage.
- Insertion: posterior surface of opposite arytenoid.
- Action: draws together arytenoid cartilages; adducts vocal folds.
- CN X (recurrent laryngeal nerve).
**Oblique**
- Origin: base of one arytenoid cartilage at muscular juncture.
- Insertion: apex of the opposite arytenoid.
- Action: draws arytenoid cartilages together.
- CN X (recurrent laryngeal nerve).

**Thyroarytenoid**
- Origin: internal and inferior surface of the angle of the thyroid cartilage.
- Insertion: vocal process and anterior lateral surface of the base of the arytenoid cartilages.
- Action: draws arytenoids forward; shortens and relaxes vocal folds.
- CN X (recurrent laryngeal nerve).

**Vocalis**
- Origin: inferior surface of the angle of the thyroid cartilage.
- Insertion: vocal process of the arytenoid cartilage and vocal ligament.
- Action: differentially tenses vocal folds.
- CN X (recurrent laryngeal nerve).

**Extrinsic Muscles of the Larynx**
- Laryngeal elevation reflex: epiglottal ROM
- Laryngeal depression reflex: epiglottal recoil speed.

**Suprahyoid**

**Stylohyoid**
- Origin: styloid process of the temporal bone.
- Insertion: body of the hyoid bone.
- Action: elevates and draws hyoid bone backward.
- CN VII

**Digastric**
- Origin: anterior belly arises from internal aspect of mandible close to midline, posterior belly arises on medial side of mastoid process of temporal bone.
- Insertion: intermediate tendon and the hyoid bone.
- Action: elevates hyoid; depresses mandible.
- CN V (anterior belly) CN VII (posterior belly).

**Mylohyoid**
- Origin: mylohyoid ridge of mandible.
- Insertion: hyoid bone and median raphe.
- Action: raises and projects hyoid bone and tongue.
- CN V.

**Geniohyoid**
- Origin: internal surface of the mandible at the inferior mental spine.
- Insertion: anterior surface of the hyoid bone.
  - Action: draws tongue and hyoid bone forward.
  - CN XII.

**Infrahyoid**
- Unsupervised cup drinking and straw usage.
- Goes with larynx muscles.

**Sternohyoid C1-C3**
- Origin: medial extremity of clavicle; superior and posterior portion of the sternum; sternoclavicular ligament.
- Insertion: body of the hyoid bone, inferior surface.
- Action: depresses hyoid bone.
- CN XII.

**Sternothyroid C1-C3**
- Origin: superior and posterior portion of the sternum and first costal cartilage.
- Insertion: oblique line of thyroid cartilage.
- Action: depresses the thyroid cartilage.
- CN XII

**Thyrohyoid**
- Origin: oblique line of the thyroid cartilage.
- Insertion: body and greater cornu of hyoid bone.
- Action: depresses hyoid bone or elevates larynx.
- CN XII

**Omohyoid C1**
- Origin: superior margin of scapula.
- Insertion: inferior border of the body of the hyoid bone.
- Action: depress and retracts the hyoid bone.
- CN XII.

**Muscles of Facial Expression**
- Cortical (conscious): middle brain
- Brainstem (oral stage swallow)

**Quadratus Labii Superior**
- Origin: frontal process maxilla; lower margin of orbit; zygomatic bone.
- Insertion: upper lip at midline.
- Action: elevates upper lip
- CN VII

**Zygomatic Minor**
- Origin: canine fossa of the maxilla.
- Insertion: angle of mouth, upper lip.
- **Action:** elevates portion of upper lip.
- **CN VII.**

**Zygomatic Major**
- **Origin:** zygomatic bone.
- **Insertion:** angle of mouth; upper lip.
- **Action:** draws corner of mouth up and back.
- **CN VII.**

**Risorius**
- **Origin:** fascia over masseter.
- **Insertion:** skin at angle of mouth.
- **Action:** retracts corner of mouth.
- **CN VII.**

**Depressor Anguli**
- **Origin:** oblique line of mandible.
- **Insertion:** angle of mouth, lower lip.
- **Action:** depresses angle of mouth.
- **CN VII.**

**Quadratus Labii Inferior**
- **Origin:** oblique line of mandible (anterior).
- **Insertion:** lower lip at angle of mouth.
- **Action:** depresses and retracts lower lip.
- **CN VII.**

**Mental**
- **Origin:** incisive fossa of mandible.
- **Insertion:** integument of chin.
- **Action:** raises and protrudes lower lip.
- **CN VII.**

**Orbicularis Oris**
- **Origin:** a sphincteric muscle, driving from others of the area, with no definite origins or insertions.
- **Action:** closes mouth and puckers lip.
- **CN VII.**

**Buccinator**
- **Origin:** alveolar ridges of maxilla and mandible; pterygomandibular raphe.
- **Insertion:** angle of the mouth mingling with fibers of mm forming upper and lower lips.
- **Actions:** flattens cheek.
- **CN VII.**
**Platysma**
- Origin: thoracic fascia over pectoralis major, deltoïd and trapezius mm.
- Insertion: mental protuberance of the mandible, skin of cheek and corner of mouth.
- Action: depresses mandible; aids in pouting reaction; depresses corner of mouth, wrinkles skin of neck and chin.
- CN VII.

**Esophagus**
- Swallowing starts primary peristaltic wave.
- Something stuck in the esophagus starts a secondary wave.
- Negative pressure
- Peristalsis depends on size/temperature of bolus.

**Hyoid**
- Only bone in the swallowing mechanism.
- Forms foundation of the tongue-embedded in the base of the tongue suspended by floor of mouth muscles and posterior belly of the digastric and stylohyoid.

**Larynx**
- Suspended from hyoid by thyrohyoid ligament and thyrohyoid muscle.
- Movement of hyoid moves larynx unless stabilized by other muscles.
- The opening is known as the laryngeal vestibule.
- Contains false vocal folds, true vocal folds, ary-epiglottic folds, arytenoid cartilage.

**Tongue**
- Entirely made of muscle.
- Consists of tip, blade, front, center, back
- Pharyngeal tongue at circumvallate papillae to hyoid.
- Contains taste buds allowing us to taste foods.
- Moves the bolus within the oral cavity for proper mastication of bolus and propels the bolus posteriorly initiating the pharyngeal stage of the swallow.

**Teeth**
- Dentition is important for swallowing and it is important to assess dentition for appropriate diet recommendations.
- Poor oral hygiene can contribute to aspiration pneumonia in patients with dysphagia.

**Cheeks**
- Buccal tension
- Assists in creating appropriate pressures for initiating the pharyngeal swallow.
- Assists in maintaining the bolus.
Roof of Mouth

- Helps to prevent lateral pocketing of the bolus.
- Maxilla (hard palate, velum, soft palate and uvula.
- Soft palate is pulled down by palatoglossus, elevated/retracted by palatopharyngeus, levator palatal and superior pharyngeal constrictor.

Salivary Glands

- Parotid, submandibular, sublingual
- Found on sides, tongue, lips, cheeks and roof of mouth.
- 2 types of fluid: viscid (from parotid-thicker, mucous-like fluid) and serous (thinner, watery).
- Maintains oral moisture, reduces tooth decay, assists in digestion, natural neutralizer of stomach acid.

Salivation

- Pair of nuclei-superior and inferior salivatory nuclei.
- Send axons through VII and IX

Cranial Nerves

- Originate in the brainstem (midbrain, pons, medulla), except I and II.
- Sensory nerve nuclei tend to be lateral brainstem.
- Motor nuclei tend to be medial.
- Nerves with both have more than 1 nucleus of origin.
- Sensory=afferent
- Motor=efferent
- Always located in the ganglion.

Cranial Nerve V: Trigeminal

- Mouth opening (ext. pterygoids).
- Mandible movement (temporalis, masseter, lat/med pterygoids)-moves mandible from side to side, elevate and protrude the jaw.
- Innervates muscles of mastication.
- Innervates floor muscles with aid in elevation of larynx (mylohyoid, ant. Belly of digastric)-depresses mandible, raises hyoid bone, stabilizes hyoid bone.
- Aids in velopharyngeal closure (tensor veli palatine)-tenses soft palate prior to elevation.
- Everything powered to contraction by V is mandibular (mastication).
- Also innervates tensor tympani.
- Mesencephalic Nucleus, Motor Nucleus, Main Sensory Nucleus, Spinal Nucleus of V.
  - **Motor**
    - Mastication
    - Assists with Hyolaryngeal Excursion (HLE)
    - Tenses velum
  - **Sensory**
    - Cheek (Pocketing)
    - Position of bolus in the mouth
  - **Impairment**
    - Decreased awareness of pocketing
    - Possible nasal regurgitation
    - Pharyngeal symptoms

### Branches of Nerve V
- Greater Palatine-Sensory: Mucosa of the hard palate.
- Palatine Lesser-No motor. Sensory: Mucous membrane of soft palate and posterior hard palate.
- Submandibular Ganglion-Secretomotor to the submandibular and sublingual glands and small glands of lingual mucosa.
- Zygomatic-Motor: secretomotor fibers. Sensory: skin of the face lateral and superior to the orbit.
- Zygomaticofacial- No motor. Sensory: skin of face lateral to the orbit.
- Zygomaticotemporal- Motor: carries secretomotor fibers. Sensory: skin of face superolateral to the orbit.
- Buccal- No motor. Sensory: skin of cheek, mucosal lining of cheek.
- Ganglion, submandibular- Motor: secretomotor to the submandibular and sublingual glands and the glands of the lingual mucosa.
- Alveolar, middle superior- No motor. Sensory: maxillary premolar teeth and gingiva.
- Alveolar, posterior superior- No motor. Sensory: maxillary molar teeth and gingiva.


Maxillary Division- No motor. Sensory: skin of upper lip, cheek, lower eyelid, mucous membrane of palate, teeth and gingiva of maxillary alveolar arch.

Mandibular Division- Motor: mylohyoid, anterior belly of digastric, tensor tympani, tensor veli palatini, temporalis, masseter, medial pterygoid and lateral pterygoid. Sensory: skin of lower lip and jaw, mucous membrane of tongue and floor of mouth, lower teeth and gingiva of the mandibular alveolar arch.

Cranial Nerve VII: Facial

- Muscles of facial expression.
- Lip shape and movement (orbicularis oris).
- Closure of lips, cheeks and tongue (buccinator- aids in mastication by pressing the bolus laterally into the molar teeth, platysma-depresses the mandible, stylohyoid-elevates the hyoid, retracts hyoid distally, stapedius).
- Lip closure and prep of bolus for transfer (orbicularis oris).
- Assists in hyoid bone elevation by raising and stabilizing the hyoid bone (mylohyoid, post belly of digastric).
- Raises larynx for airway protection (epiglottic ROM).

Motor
- Lip closure
- Buccal tone
- Assists with HLE

Sensory
- Sensation of tongue

Impairment
- Anterior loss of bolus
- Oral residue
- Decreased taste
- Residue in the lateral sulci
- Pharyngeal symptoms

Branches of VII

- Mandibular Marginal- Motor: orbicularis oris, depressor anguli oris, depressor labii inferioris, mentalis. No sensory.
- Temporofacial - Motor: muscles of facial expression of the upper part of face, frontalis and anterior and superior auricularis. No sensory.
- To digastric posterior belly - Motor: posterior belly of digastric. No sensory.
- Cervicofacial Division - Motor: muscles of facial expression of the lower part of the face, platysma. No sensory.
- Buccal branches of the facial - Motor: zygomaticus major and minor, buccinator, orbicularis oris, levator anguli oris, levator labii superioris and alaque nasi, risorius, procerus, nasalis. No sensory.
- Chorda Tympani - Motor: secretomotor to submandibular and sublingual glands. Sensory: taste to anterior 2/3 of the tongue.
- Nervus Intermedius - Motor: secretomotor to submandibular and sublingual glands. Sensory: taste from the anterior 2/3 of the tongue.
- Ganglion Pterygopalatine - Motor: secretomotor to mucous glands of the palate. No sensory.
- Posterior belly of the digastric - Motor: posterior belly of the digastric. No sensory.

**Cranial Nerve IX: Glossopharyngeal**

- Autonomic secretory function of parotid salivary glands, parasympathetic.
- Assists in velopharyngeal closure to prevent reflux to nose at start of pharyngeal and end of oral phase through elevation of larynx and pharynx (stylopharyngeal-only muscle).
- Upper pharyngeal constrictor fibers.
- Gag reflex.
- Has no nucleus, shares with VII and X. (Sensory Solitary Nucleus, Motor Stylopharyngeus Nucleus Ambiguous.)

**Motor**
- Pharyngeal constriction
- Pharyngeal shortening

**Sensory**
- Senses arrival of bolus at the palate
- Gag reflex
- Impairment
  - Difficulty initiating a swallow
  - Pharyngeal residue
  - Decreased taste

**Branches of IX**
- Ganglion, Otic- Motor: secretomotor to the parotid gland. No sensory.
- Petrosal, Lesser- Secretomotor for the parotid gland. No sensory.
- Tympanic- Motor: secretomotor to the parotid gland.

**Cranial Nerve IX: Spinal Accessory Nerve**
- Cervical spinal cord.
- Trapezius and sternocleidomastoid.
- No sensory.
- No branches.

**Cranial Nerve XII: Hypoglossal**
- Only motor/no sensory pathways. Intrinsic and extrinsic muscles of tongue (except palatoglossus.)
- Tongue movement to posterior oral cavity (A-P propulsion pattern and lingual-alveolar seal).
- Creating bolus of proper size (int/ext muscles).
- Collection of food particles from lateral/anterior sulci, palate and molars (int/ext muscles).
- Mixing bolus with saliva.
- Alveolar-palatal contact before swallow (inf./sup. Longitudinals, transverse, vertical).
- Transporting bolus from mid-palate to posterior 1/3 of tongue (same as above).
- Bolus transport to pharynx.
- Raises and lowers the hyoid bone to protect the airway (supra/infra muscles).
- Tongue base retraction and lingual groove reflex and reflexive protective retraction.
- Genioglossus-depresses tongue and allows protrusion, hypoglossus-depresses and retracts tongue.
- Styloglossus-retracts tongue and draws up lateral borders to generate a chute.
- Tongue will deviate to the weak side (side of lesion).
- Motor
  - Tongue motility
- HLE (Hyoid-Thyroid approximation)
  - Impairment
    - Decreased bolus formation, propulsion and control
    - Pharyngeal residue
    - Possible decreased epiglottic inversion

**Cranial Nerve X: Vagus**
- Pharyngeal reflexes and pharyngeal constrictor muscles except stylopharyngeus. Superior, medial and inferior constrictors to constrict the walls of the pharynx.
- Salpingopharyngeus-elevates pharynx and larynx.
- Laryngeal reflexes-all laryngeal muscles (intrinsic laryngeal muscles-oppose vocal cords to protect the airway during the swallow, cricothyroid tips thyroid cartilage anteriorly to help protect the airway during the swallow).
- General sensation of abdominal viscera.
- Upper esophageal sphincter (UES) function-cricopharyngeus inhibits reflux.
- Peristalsis/motility of esophagus.
- Velopharyngeal closure-all muscles of soft palate except tensor veli palatine (levator veli palatini elevates the soft palate).
- Palatoglossus-elevates posterior part of the tongue and draws the soft palate onto the tongue. Palatopharyngeus tenses the soft palate, draws pharynx superiorly, anteriorly and medially.

**Motor**
- VP closure
- TBR
- UES closure/opening
- Esophageal motility
- Vocal Fold Approximation
- Middle/inferior pharyngeal constriction

**Sensory**
- Sensation of residue in the posterior/inferior portions of pharynx, larynx, esophagus

**Impairment**
- Nasal regurgitation
- Decreased airway protection (laryngeal vestibule closure decreased)
- Pharyngeal residue (decreased sensation/constriction)
- pyriform sinus residue (decreased UES opening) and vallecular residue (decreased tongue base retraction)

**Branches of X**
- **Inferior Laryngeal** - Motor: thyroarytenoid, oblique, transverse, arytenoid, posterior and lateral cricoarytenoid, aryepiglottic, thyroepiglottic, vocalis, secretomotor membrane of the larynx below V.C. Sensory: mucous membrane of the larynx below the V.C.

- **Laryngeal, Recurrent** - Upper esophagus, lower pharynx, laryngeal (except cricothyroid), smooth muscles of trachea, secretomotor to mucosal glands in the upper esophagus, lower pharynx, larynx below the v.c., trachea. Sensory: upper esophagus, lower pharynx, larynx below v.c.

- **Laryngeal, Superior** - Motor: cricothyroid, inferior pharyngeal constrictor, secretomotor to mucosal glands of larynx above the v.c. Sensory: mucous membrane of the larynx above the v.c.


- **Superior Laryngeal** - Motor: Cricothyroid, inferior pharyngeal constrictor, secretomotor to mucosal glands of the larynx above the v.c. Sensory: mucous membrane of the larynx above the v.c.