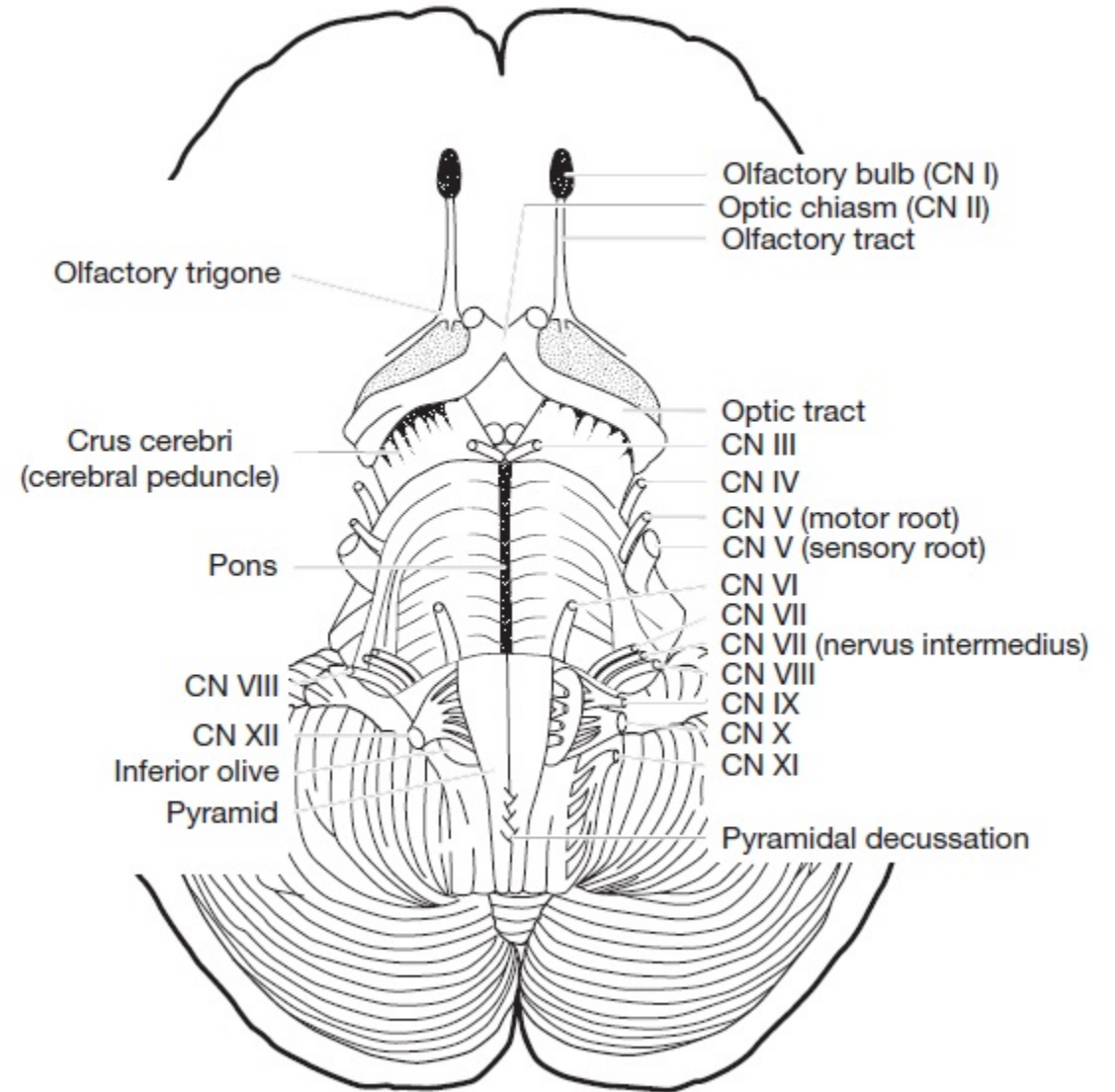


Cranial nerve disorders

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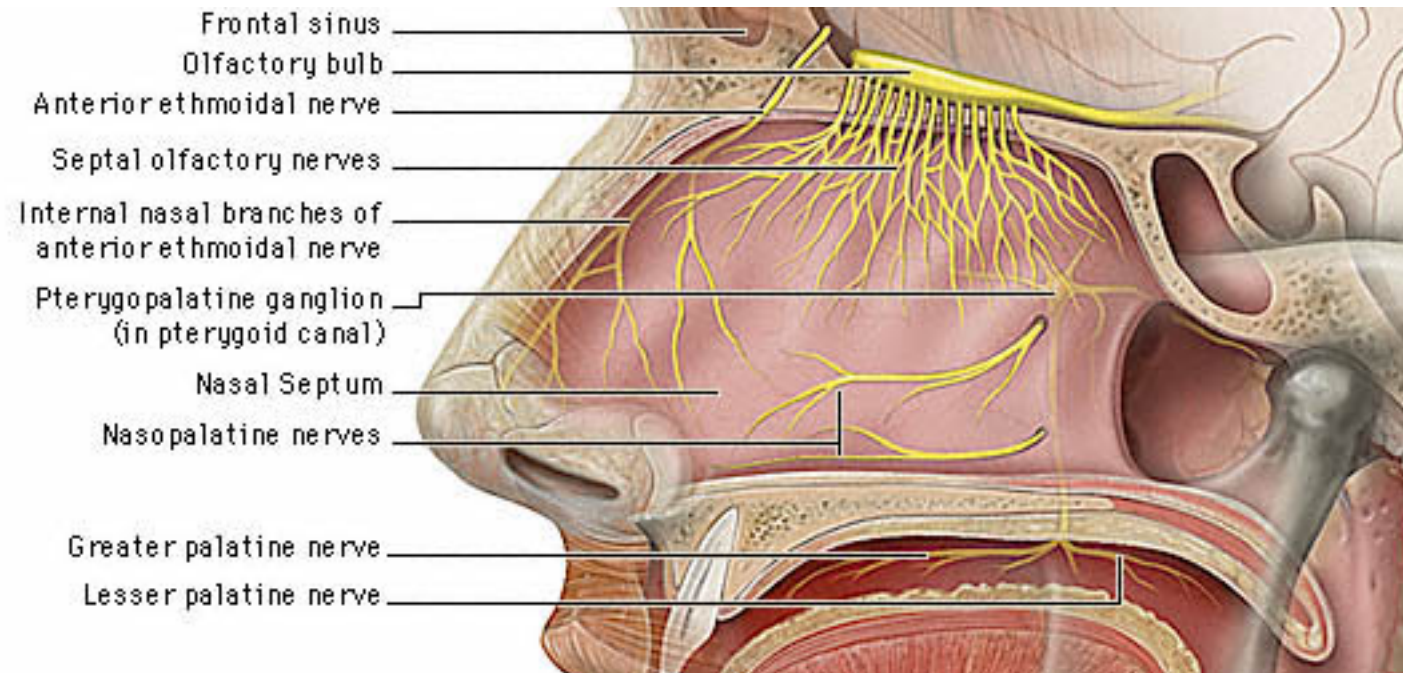
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- The cranial nerves are susceptible to a numbers of special diseases, some of which do not affect the spinal peripheral nerves. For this reason alone they deserve to be considered separately.
- Cranial nerves, like spinal nerves, contain sensory and motor fibers.

Olfactory nerve

- Olfactory nerve disorder can present as:
 - a. Anosmia/hyposmia: decreased or lack of smell/decrease sense of smell.
 - b. Dysosmia: smell perception is distorted; can occur with seizure disorder of temporal lobe.
- Common causes of Anosmia and Hyposmia:
 - a. Common cold
 - b. Basal skull meningioma
 - c. Parkinson disease
 - d. Megaloblastic anemia
 - e. Kallmann syndrome



Optic neuritis

Causes

- 1) Demyelinating (most common)
- 2) Other causes: infections such as cat-scratch disease, syphilis, Lyme disease, cytomegalovirus; systemic inflammatory disorders such as sarcoidosis, systemic lupus erythematosus; toxic causes such as bee stings, snake bites

Clinical features

- 1) Typically young (<40 years)
- 2) Acute, typically unilateral loss of vision with impaired visual acuity, contrast sensitivity, and visual field impairment
- 3) RAPD may be evident
- 4) Pain of the eye (90%); often worse with movement
- 5) Edema of optic nerve head (papillitis): one-third of cases
- 6) Normal optic nerve with retrobulbar involvement: two-thirds of cases
- 7) In most patients, visual recovery occurs in 2 to 4 weeks (may be delayed up to a year)

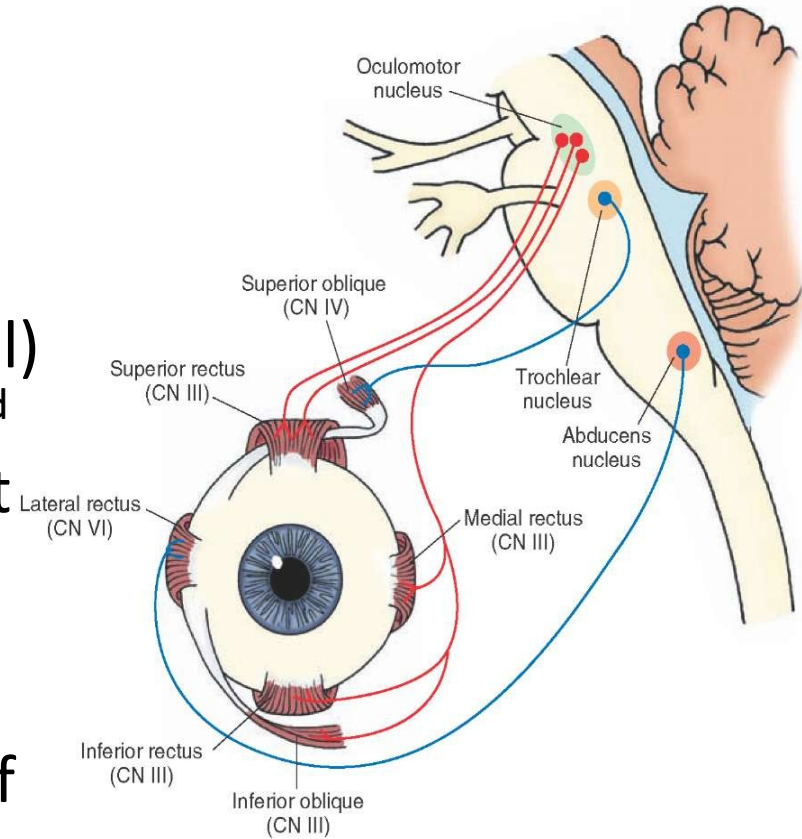


Treatment

- Intravenous methylprednisolone 1000 mg for 3-5.
- Corticosteroids: hasten recovery in vision within first 2 weeks.

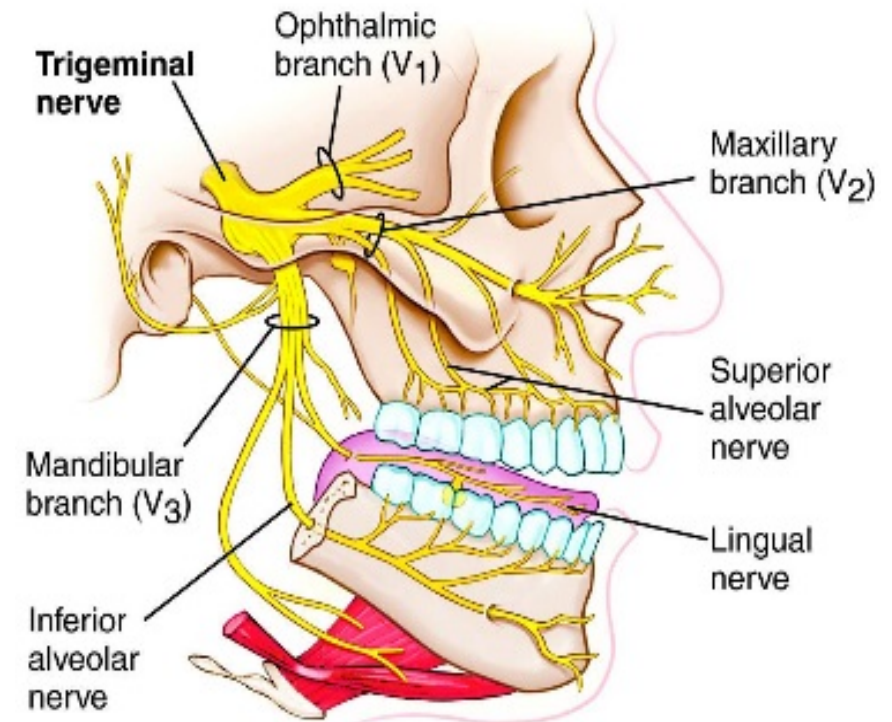
Ocular motor nerves (3rd, 4th, and 6th)

- These cranial nerves are responsible for eye movements and eye openings.
- There are six ocular muscles for each eye. Four rectus muscles (superior, inferior, medial and lateral) and two oblique muscles (inferior and superior), 3rd cranial nerves supply all extraocular muscles except the superior oblique (supplied by 4th cranial nerve) and lateral rectus (supplied by 6th cranial nerve).
- Disorders of these cranial nerves can produce malalignment of the eye and diplopia and in case of 3rd cranial nerve, ptosis and midriasis can also occur.



Trigeminal nerve

- It is the largest cranial nerves, it has both sensory and motor components:
 - a. Motor component: innervates muscles of mastication.
 - b. Sensory components: ipsilateral pain and temperature sensation of face and supratentorial dura mater, vibration, proprioception, tactile sensation of ipsilateral face and unconscious proprioception of jaw.



Trigeminal Neuralgia

- Is a chronic pain disorder that affects the trigeminal nerve.
- It results in episodes of severe, sudden, shock-like pain in one side of the face that lasts for seconds to a few minutes
- It is one of the most painful conditions and can result in depression

Pathophysiology

- Usually idiopathic but may be related to structural causes: multiple sclerosis, aneurysm, arterial compression, tumor, dental problem and vascular compression may cause demyelination of trigeminal nerve, producing pain

Clinical presentation

- a. Lancing (electric shock like) pain within trigeminal nerve distribution
- b. Most commonly unilateral, rarely bilateral
- c. May be provoked by wind, touch, talking, brushing teeth
- d. Episodes typically occur several times daily and last seconds to less than 2 minutes
- e. Idiopathic trigeminal neuralgia: physical examination is generally normal; concern for structural cause if trigeminal sensory loss or motor dysfunction

Treatment

- Pharmacologic treatment

- 1) Carbamazepine , oxcarbazepine (first-line treatment)
- 2) Baclofen, lamotrigine (Second-line treatment).
- 3) Others: pregabalin and gabapentin

- Ablative procedure

Procedure choices include

- a) Gamma knife radiosurgery
- b) Radiofrequency ablation
- c) Alcohol block
- d) Glycerol block

- **Surgery-microvascular decompression**

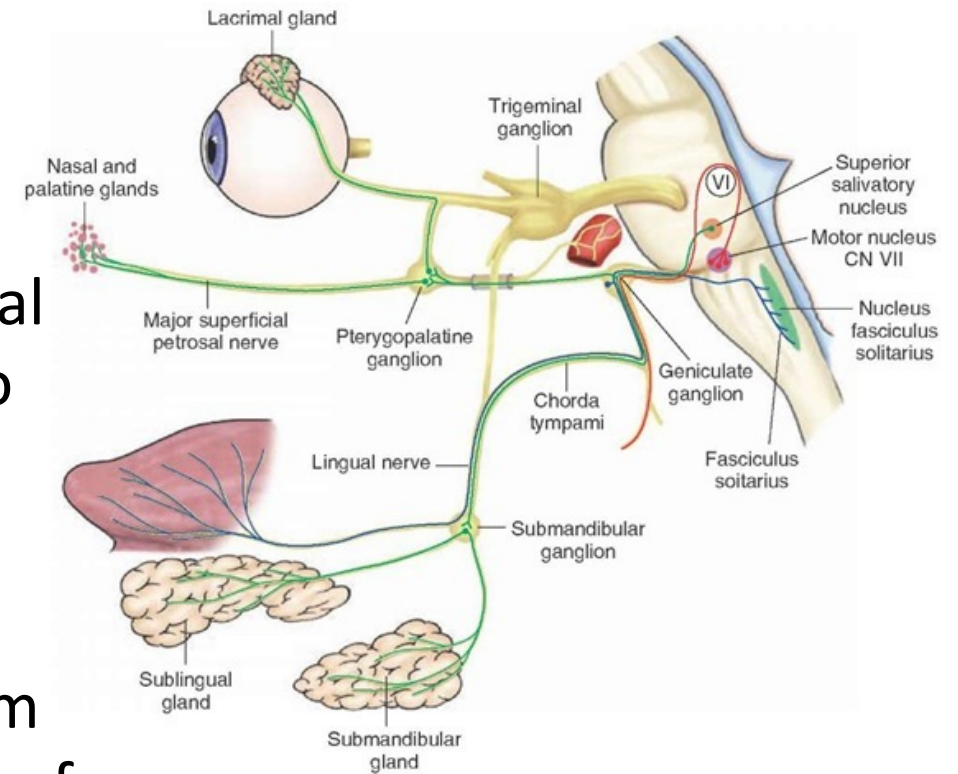
- 1) Efficacious, with immediate pain relief reported in as many as 90% of patients
- 2) Recurrence rate of pain: 3.5% annually
- 3) Less efficacious for trigeminal pain that is atypical or due to multiple sclerosis
- 4) Advantages: preservation of facial sensation, highly efficacious
- 5) Disadvantages:
 - a) Complications can include cranial nerve deficits, CSF leak, and hemorrhage
 - b) Anesthesia dolorosa (continuous burning pain) can develop in approximately 5% of patients

Facial nerve

- It has both motor and sensory components

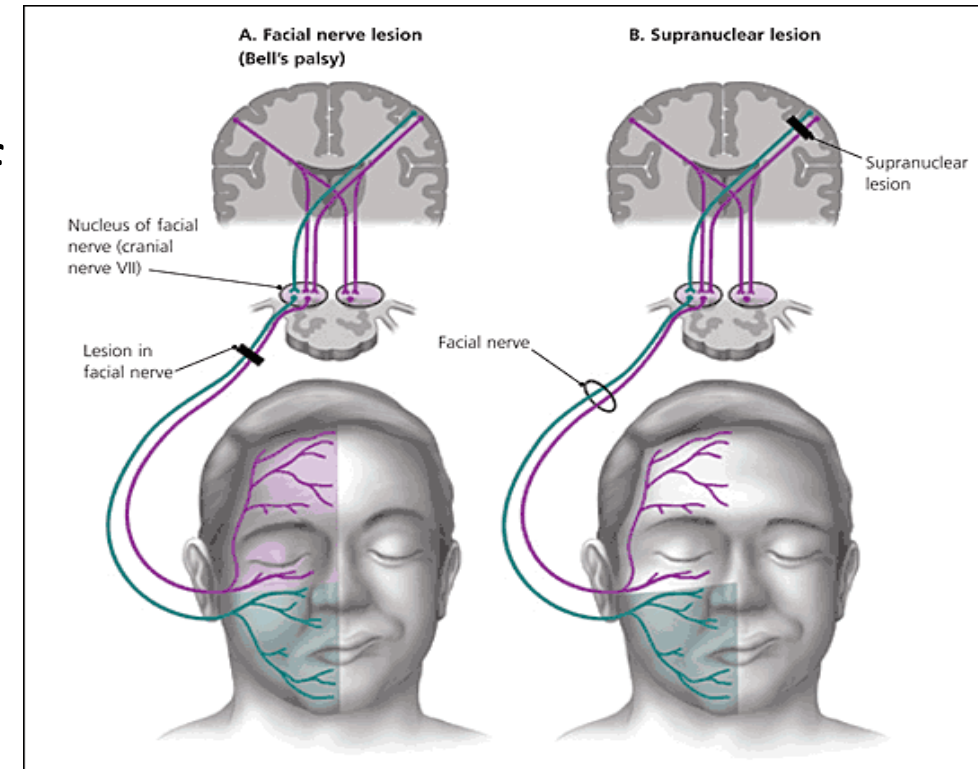
Function:

1. Motor component: innervates muscles of facial expression and stapedius muscle (functions to dampen sound).
2. Sensory component: innervation of lacrimal glands, nasal mucosa, submandibular and sublingual salivary glands, taste sensation from anterior 2/3rd of tongue and tactile sensation of skin of ear



Dysfunction:

1. Contralateral paralysis of lower face only (if the lesion involve the upper motor neuron) or paralysis of entire ipsilateral face (if the lesion involve the lower motor neuron).
2. ipsilateral dry eye, dry nasal mucosa, reduced salivation (dry mouth), decreased taste sensation from ipsilateral anterior 2/3rd of tongue



Idiopathic Bell's palsy

Epidemiology

- 1) Common disease
- 2) Equal occurrence in males and females
- 3) Mean age at presentation: 40 years

- Clinical features

- 1) Acute onset
- 2) Unilateral facial paralysis of lower motor neuron type.
- 3) May have abnormal ipsilateral tearing or taste
- 4) May complain of ipsilateral ear pain or increase in sound



Pathology

- Inflammatory changes in geniculate ganglion extended from internal auditory canal to the stylomastoid process, with demyelinating changes in nerve

Diagnosis

- 1) Can be made on clinical basis
- 2) Determine that paralysis is truly lower motor neuron
- 3) Evaluate (history and examination) for involvement of any other cranial nerves
- 4) Examine ear canal for any lesions suggestive of active herpes lesions, which may indicate diagnosis of Ramsay Hunt syndrome
- 5) Evaluate (history and examination) patient for systemic symptoms suggesting more widespread disease (e.g., Lyme or neoplastic disease)



Treatment

- Corticosteroids (reduce nerve edema) and acyclovir (reduce viral replication) are generally considered for treatment and may increase number of patients with full recovery
 - a) Treat within 72 hours (up to 1 week)
 - b) Prednisolone 1 mg/kg daily for 1 week, then taper (maximum 80 mg/day) or 1 mg/kg prednisone (up to maximum of 70 mg/day) for 5 to 7 days, with subsequent taper
 - c) Acyclovir 1,000 to 2,400 mg/day in divided doses for 5 days (dose variable in studies)

Prognosis

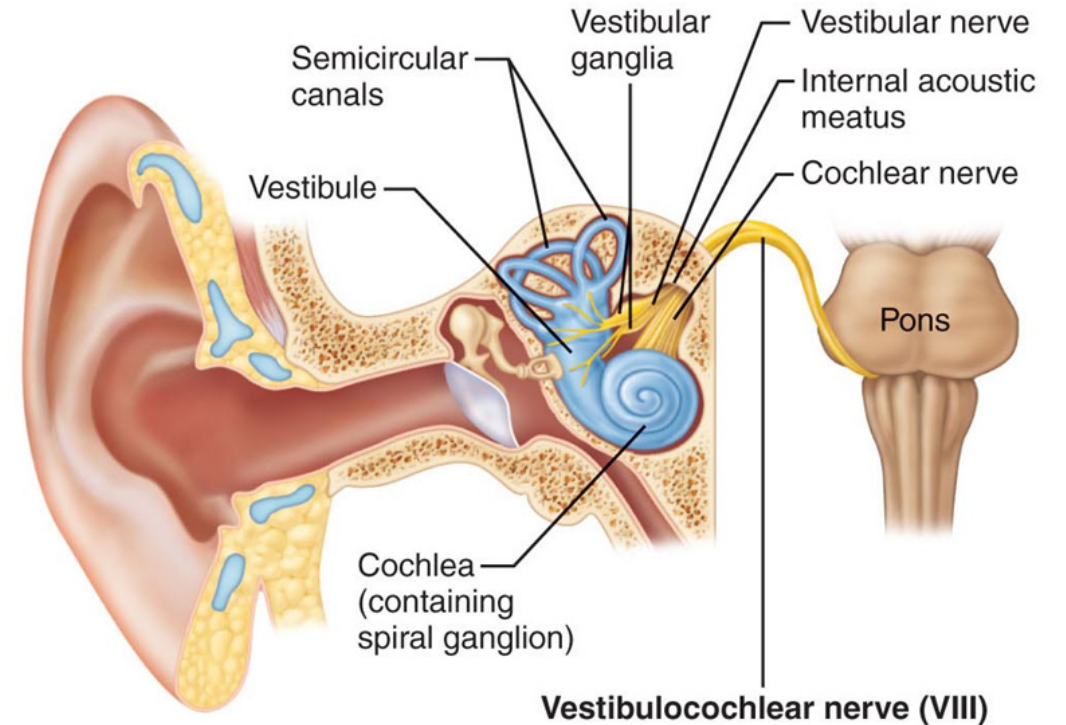
- Majority (70%) have complete recovery of facial paralysis within 3 to 6 months.
- Younger age, partial paralysis, and early recovery portend good prognosis.

Vestibulocochlear nerve

Function:

- Control of posture and movements of body and eyes relative to external environment
- Hearing

The Vestibulocochlear Nerves - VIII



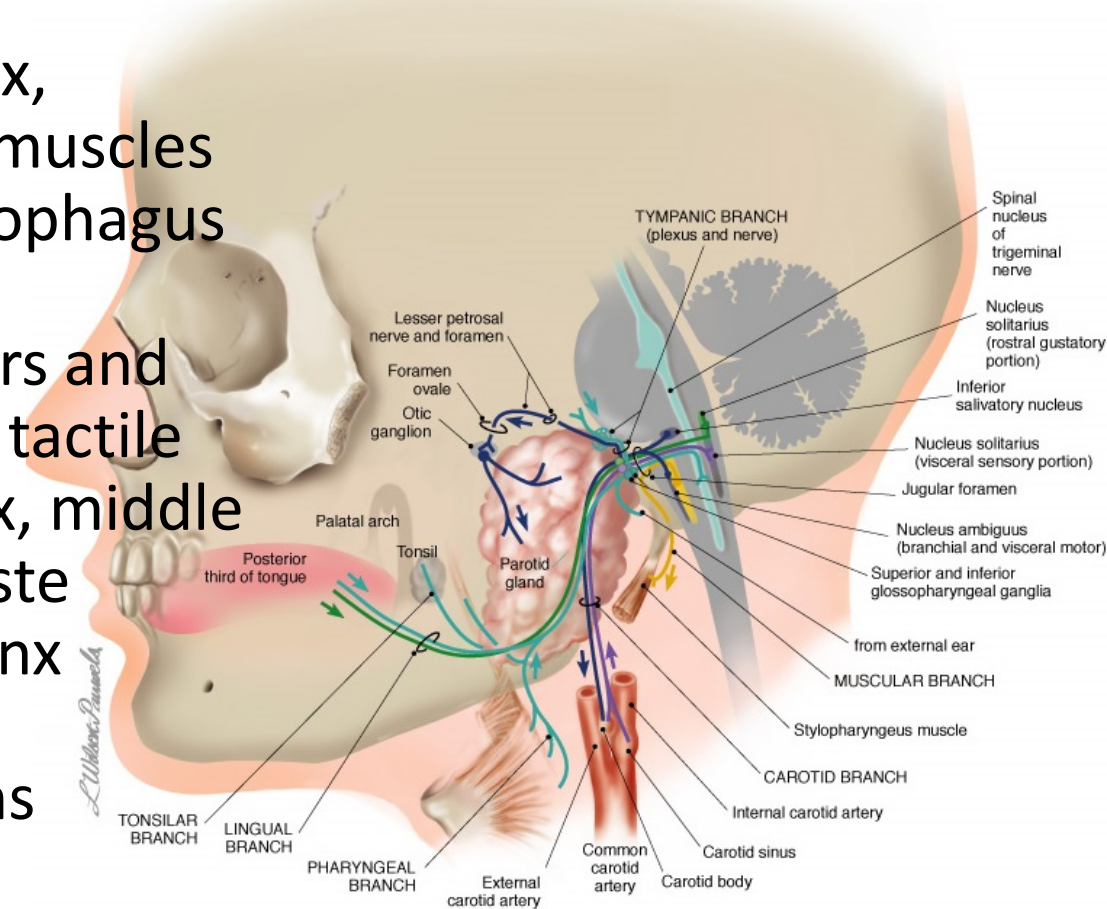
Dysfunction:

- a. Nystagmus, disequilibrium and vertigo
- b. Lesion of CN VIII or cochlear nucleus: unilateral loss of hearing
- c. Unilateral lesion at level of cerebral cortex: no hearing loss but sound localization may be impaired

Glossopharyngeal and Vagus nerve

• Function:

1. Innervates stylopharyngeus muscle of pharynx, innervates palatal muscles, most pharyngeal muscles laryngeal muscles, and striated muscles of esophagus and innervate parotid gland (salivation)
2. Sensory input from carotid sinus baroreceptors and carotid body chemoreceptors and input from tactile receptors on posterior 1/3 of tongue, pharynx, middle ear, auditory canal (glossopharyngeal) and taste sensation from epiglottis and posterior Pharynx (vagus).
3. Parasympathetic innervation of visceral organs



• Dysfunction

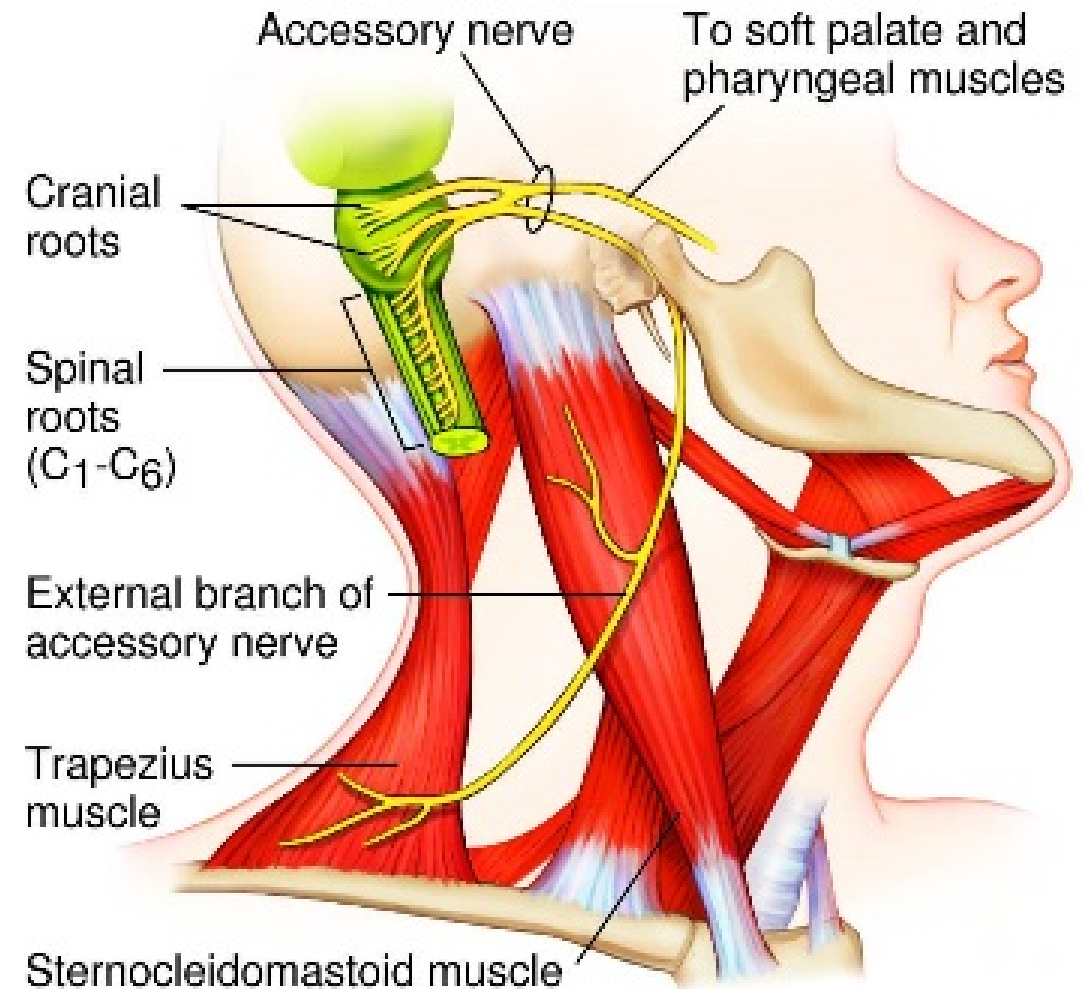
- 1) Unilateral: nasal speech (palatine weakness), hoarse (laryngeal paralysis), uvula deviates to normal side
- 2) Bilateral: dysphagia (difficulty swallowing), hoarseness, difficulty breathing (paralysis of laryngeal muscles), and decreased salivation
- 3) Patients with hypersensitive carotid sinus reflex may present with recurrent syncope

Accessory nerve

- It has only a motor component

Function

- a. Cranial component: innervates muscles of larynx (with CN X)
- b. Spinal component: innervates ipsilateral sternocleidomastoid and trapezius muscles



Dysfunction

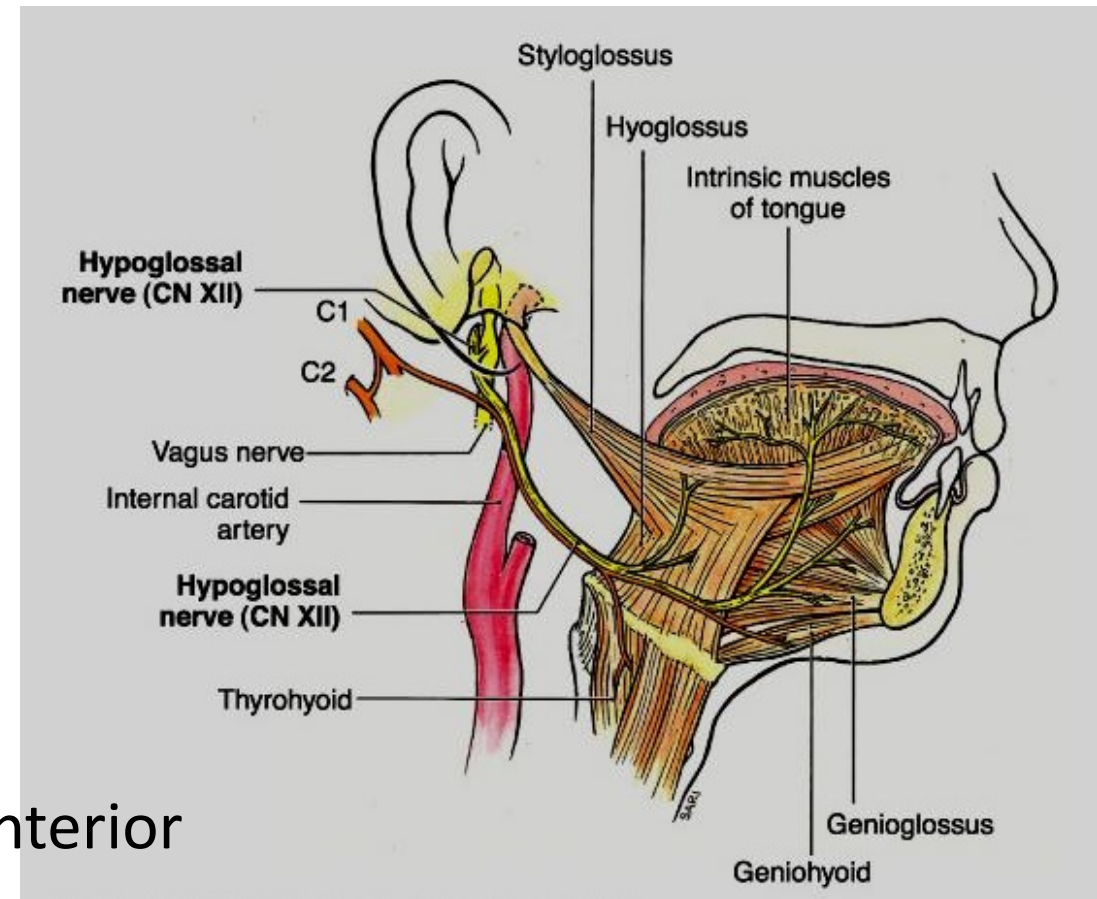
- a. Upper motor neuron lesion: impaired contralateral head rotation and ipsilateral tilting (weak ipsilateral sternocleidomastoid) ,may be contralateral shoulder droop (weak contralateral trapezius)
- b. Lower motor neuron lesion: ipsilateral shoulder droop and impaired contralateral head rotation and ipsilateral head tilting (weak ipsilateral sternocleidomastoid muscle); fasciculations and atrophy may be seen
- c. Lower motor neuron (cranial portion): hoarseness

Hypoglossal nerve

- It has only a motor component

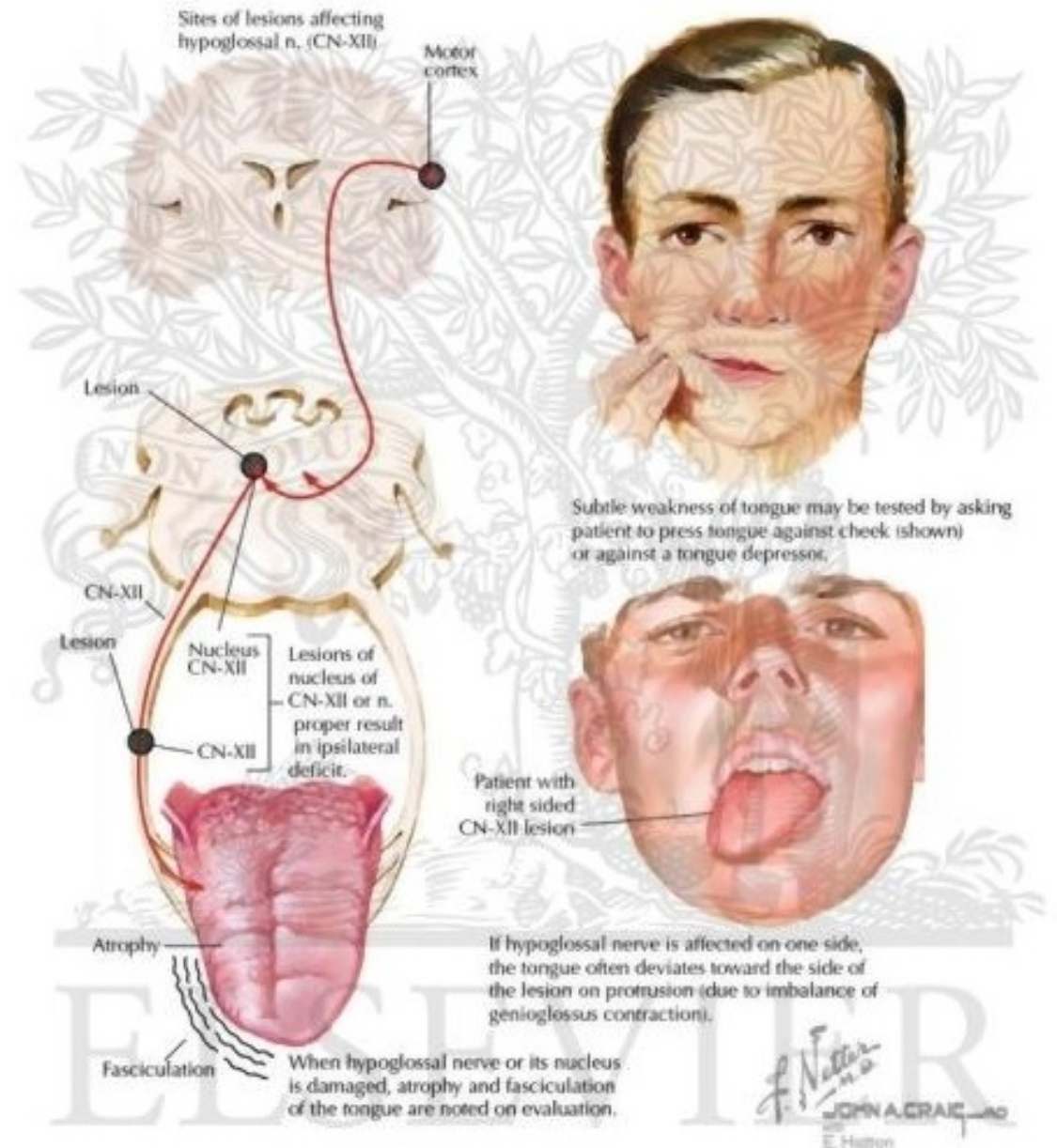
Function

- a. Innervates intrinsic and extrinsic tongue muscles (except palatoglossus)
- b. Each genioglossus muscle pulls tongue anterior and medial
- c. When paired genioglossi work together, tongue protrudes
- d. If one side is weak, tongue deviates to that side



- **Dysfunction**

- a. Upper motor neuron: tongue deviates to side opposite the lesion
- b. Lower motor neuron: tongue deviates to side of lesion, with associated atrophy and fasciculations



— sensory fibres
— motor fibres

Optic (II)
sensory: eye



Trochlear (IV)
motor: superior oblique muscle



Abducent (VI)
motor: external rectus muscle



Trigeminal (V)
sensory: face, sinuses, teeth, etc.

motor: muscles of mastication



Oculomotor (III)
motor: all eye muscles except those supplied by IV and VI



Facial (VII)
motor: muscles of the face

Hypoglossal (XII)
motor: muscles of the tongue



Intermediate motor: submaxillary and sublingual gland
sensory: anterior part of tongue and soft palate

intermediate nerve

Intermediate motor: submaxillary and sublingual gland
sensory: anterior part of tongue and soft palate



Vestibulocochlear (VIII)
sensory: inner ear



vestibular cochlear

Glossopharyngeal (IX)
motor: pharyngeal musculature
sensory: posterior part of tongue, tonsil, pharynx



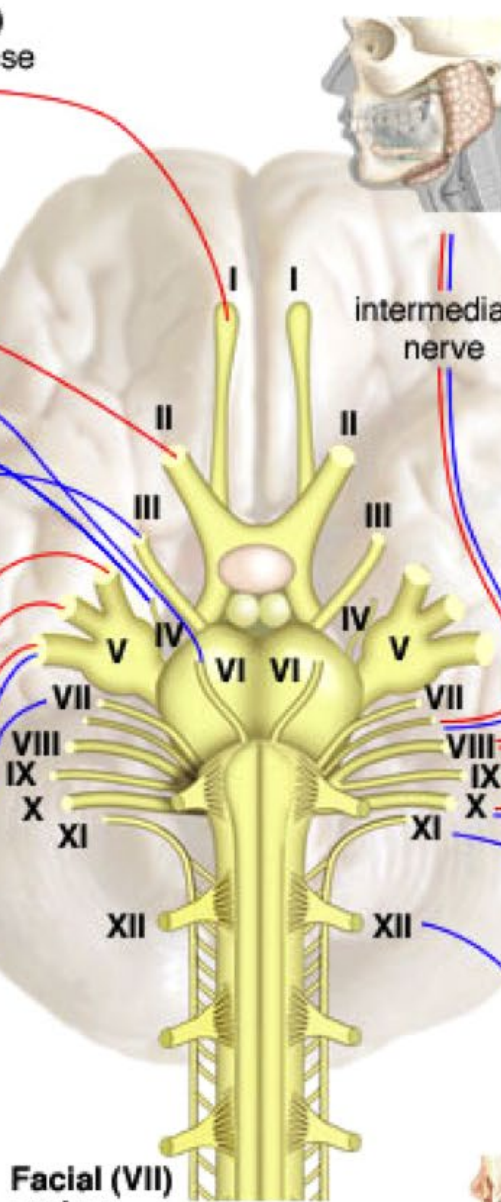
Vagus (X)
motor: heart, lungs, bronchi, gastrointestinal tract
sensory: heart, lungs, bronchi, trachea, larynx, pharynx, gastrointestinal tract, external ear



Accessory (XI)
motor: sternocleidomastoid and trapezius muscles



Olfactory (I)
sensory: nose



Quiz

1. What are the lines of pharmacological treatment of trigeminal neuralgia?
Enumerate it
2. How do you treat a patient with Bell's palsy?