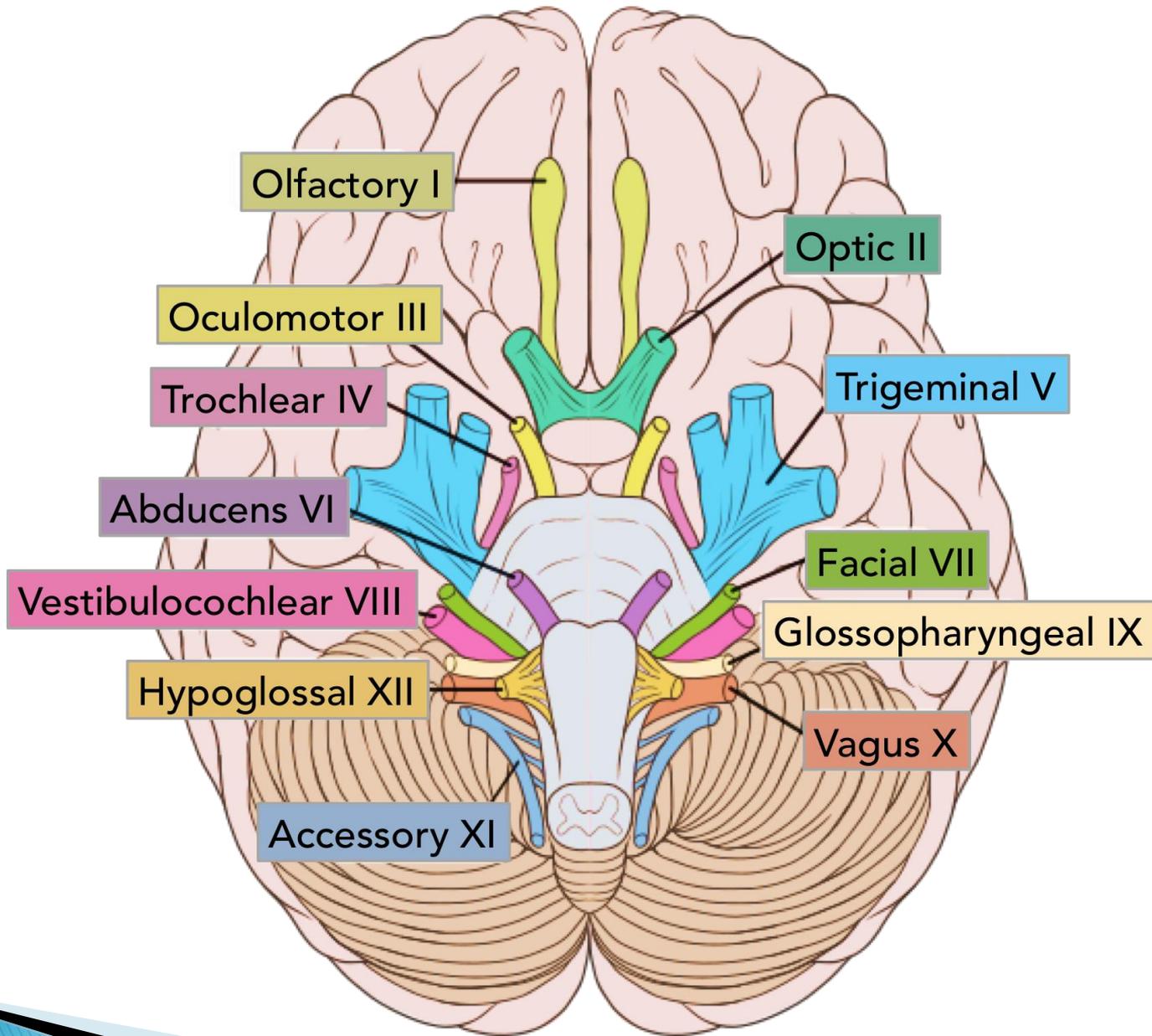


Cranial Nerves Examination





Introduction

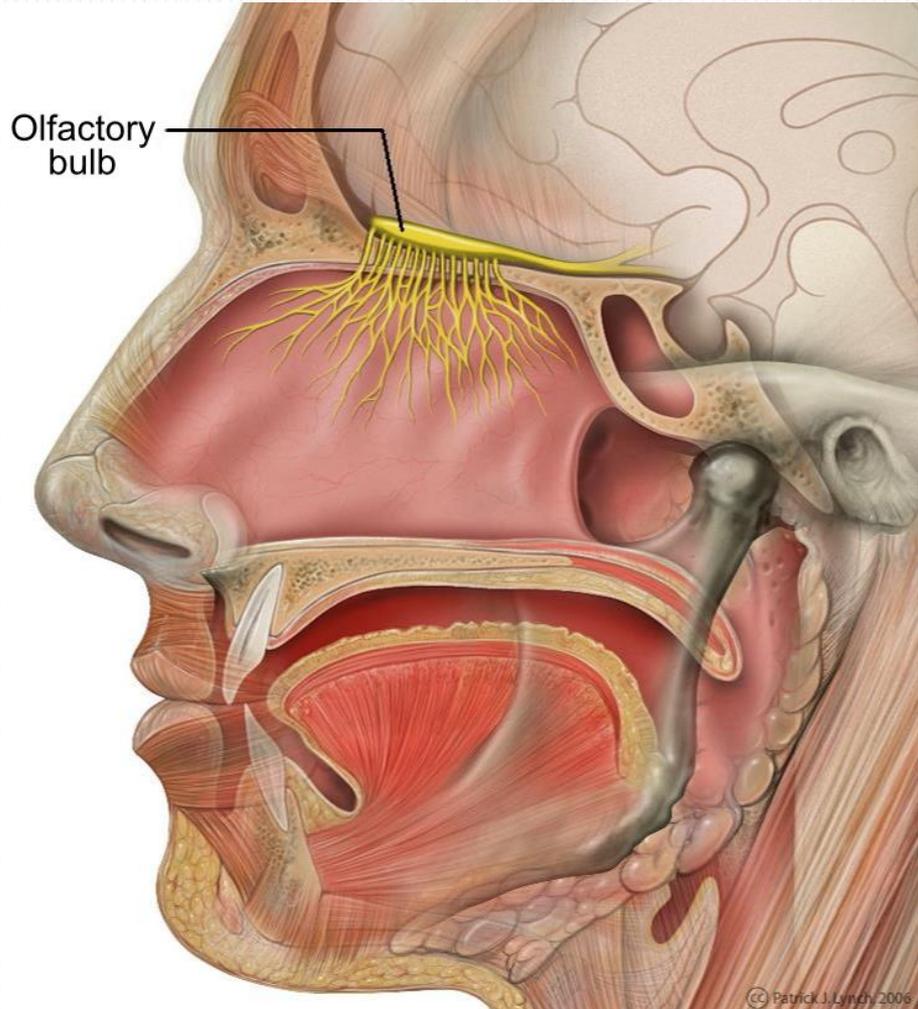
- ▶ 12 CNs arising from the brainstem
- ▶ CNs 1 and 2 arise from the cerebral cortex
- ▶ CNs 3 and 4 arise from the midbrain
- ▶ CNS 5,6,7 and 8 arise from pons
- ▶ CNs 9,10,11 and 12 arise from medulla



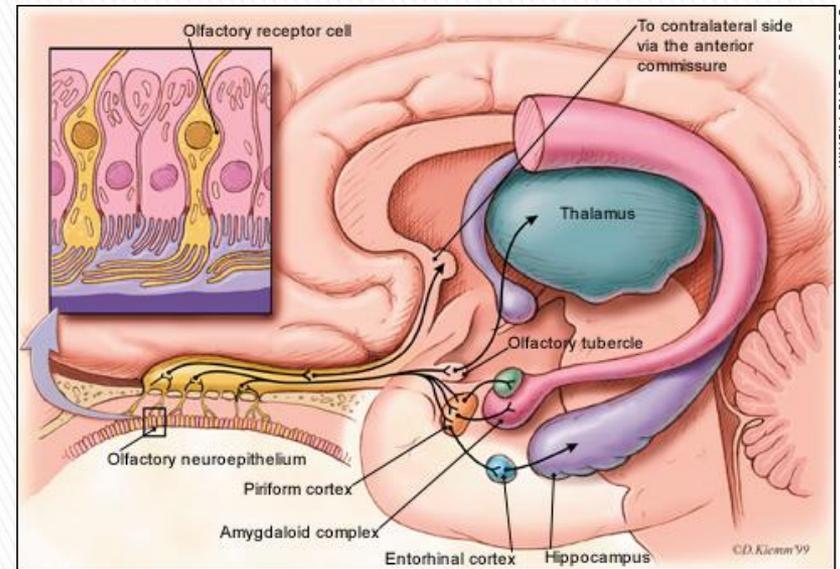
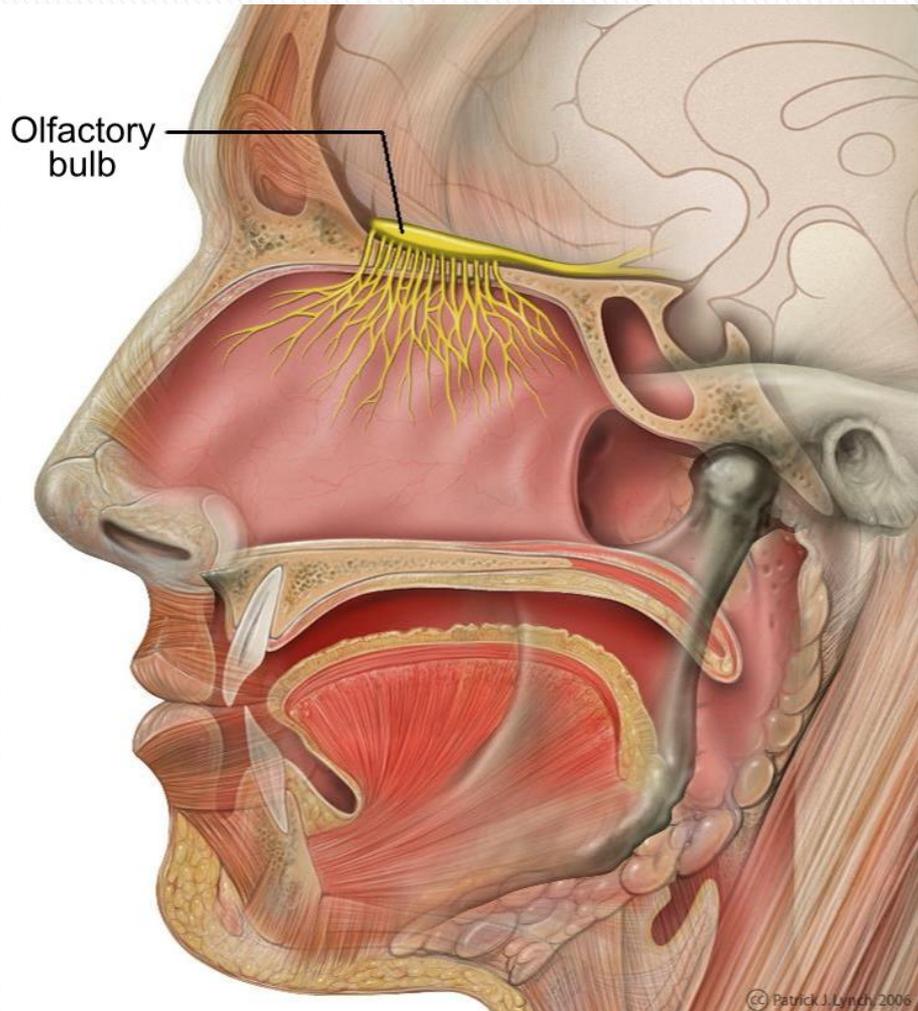
Olfactory Nerve (I)



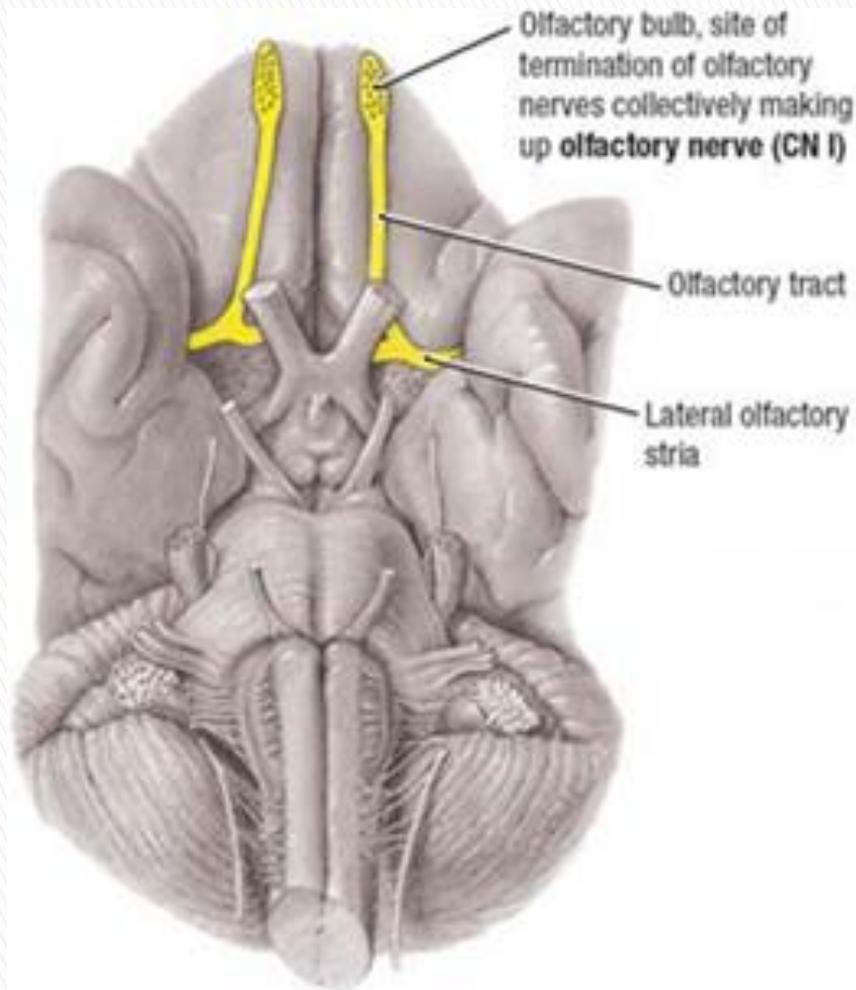
Anatomy



Anatomy



Anatomy



- ▶ Bipolar cells in the olfactory bulb form olfactory filaments
- ▶ with small receptors projecting through the cribriform plate high in the nasal cavity.
- ▶ These cells synapse with second-order neurons, which project centrally via the olfactory tract
- ▶
- ▶ to the medial **temporal lobe** and amygdala.



The olfactory nerve (1)

- ▶ Purely sensory
- ▶ function
Conveys the sense of smell



The olfactory nerve (1)

- ▶ Abnormal findings ??



The olfactory nerve (1)

- ▶ Abnormal findings
 - hyposmia–anosmia
 - parosmia
 - olfactory hallucinations

Patients usually complain of altered ability to taste when they have lost the sense of smell



Examination sequence

- ▶ Limited clinical value
- ▶ RARELY performed



Examination sequence

- ▶ **Limited clinical value**
- ▶ Check the nasal passages for clearance.
- ▶ Ask the patient to close his eyes.
- ▶ Close one nostril at a time.
- ▶ Use ‘scratch and sniff’ test cards, e.g. the University of Pennsylvania Smell Identification Test (UPSIT).



The Trigeminal nerve (5)



The Trigeminal nerve (5)

- ▶ Motor, sensory and two reflexes
- ▶ Function: provides sensation to the face, mouth and part of the dura, and motor supply to the muscles of the jaw involved in chewing
- ▶ Anatomy: has three major branches;
 1. Ophthalmic (V1)
 2. The maxillary (V2)
 3. mandibular (V3)



Trigeminal nerve distribution

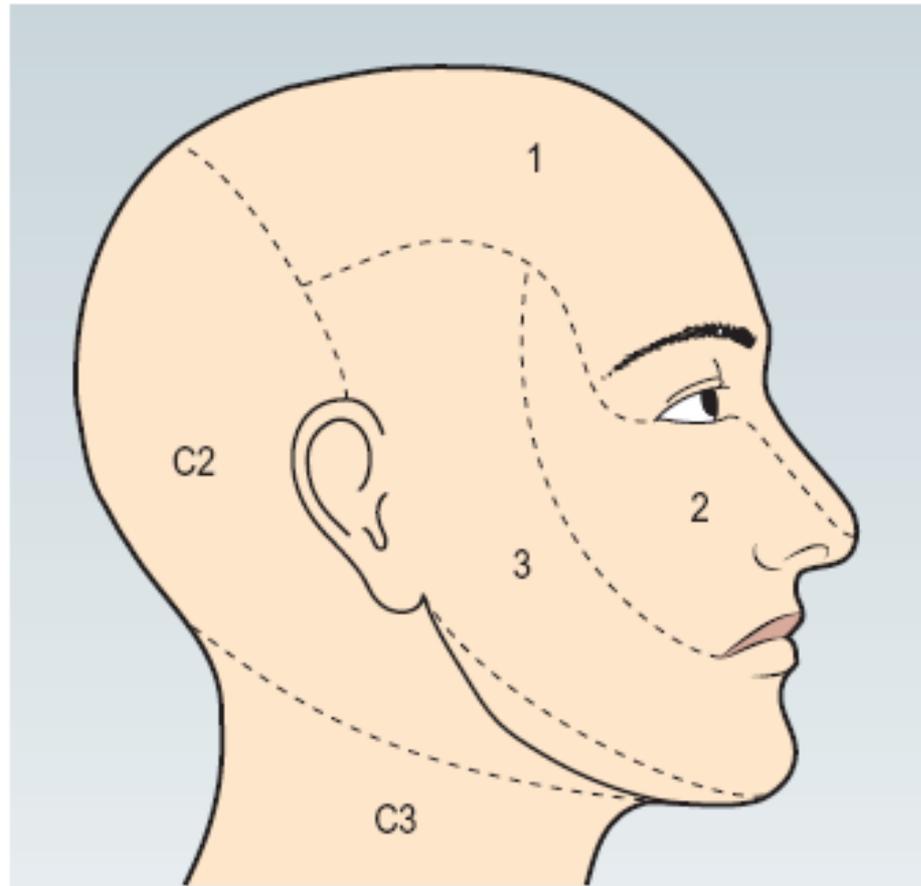


Fig. 11.5 The sensory distribution of the three divisions of the trigeminal nerve. (1) Ophthalmic division. (2) Maxillary division. (3) Mandibular division.



▶ Examination

1. Sensory
2. Motor
3. corneal reflex
4. Jaw jerk

*Common sensation from the anterior two thirds of the tongue.





Trigeminal nerve examination 1



Trigeminal nerve examination 2



Trigeminal nerve examination 3



Corneal reflex test





Masseter muscles



Temporalis muscles





Abnormal findings

- ▶ Unilateral loss of sensation in one or more branches of the trigeminal nerve → direct injury e.g. fractures, tumour
- ▶ Loss of corneal reflex and V1 cutaneous sensory loss → lesions within the cavernous sinuses e.g. cancer
- ▶ Herpes zoster → V1 distribution
- ▶ Brisk jaw jerk → bilateral UMN lesions above the level of pons.







The facial nerve (7)



The facial nerve (7)

- ▶ Function: sends motor fibers to the muscles of facial expression
- ▶ Send parasympathetic fibers to the lacrimal, submandibular and sublingual salivary glands
- ▶ Receives taste sensation from the anterior 2/3 of the tongue
- ▶ Several reflexes





Temporal

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Zygomatic

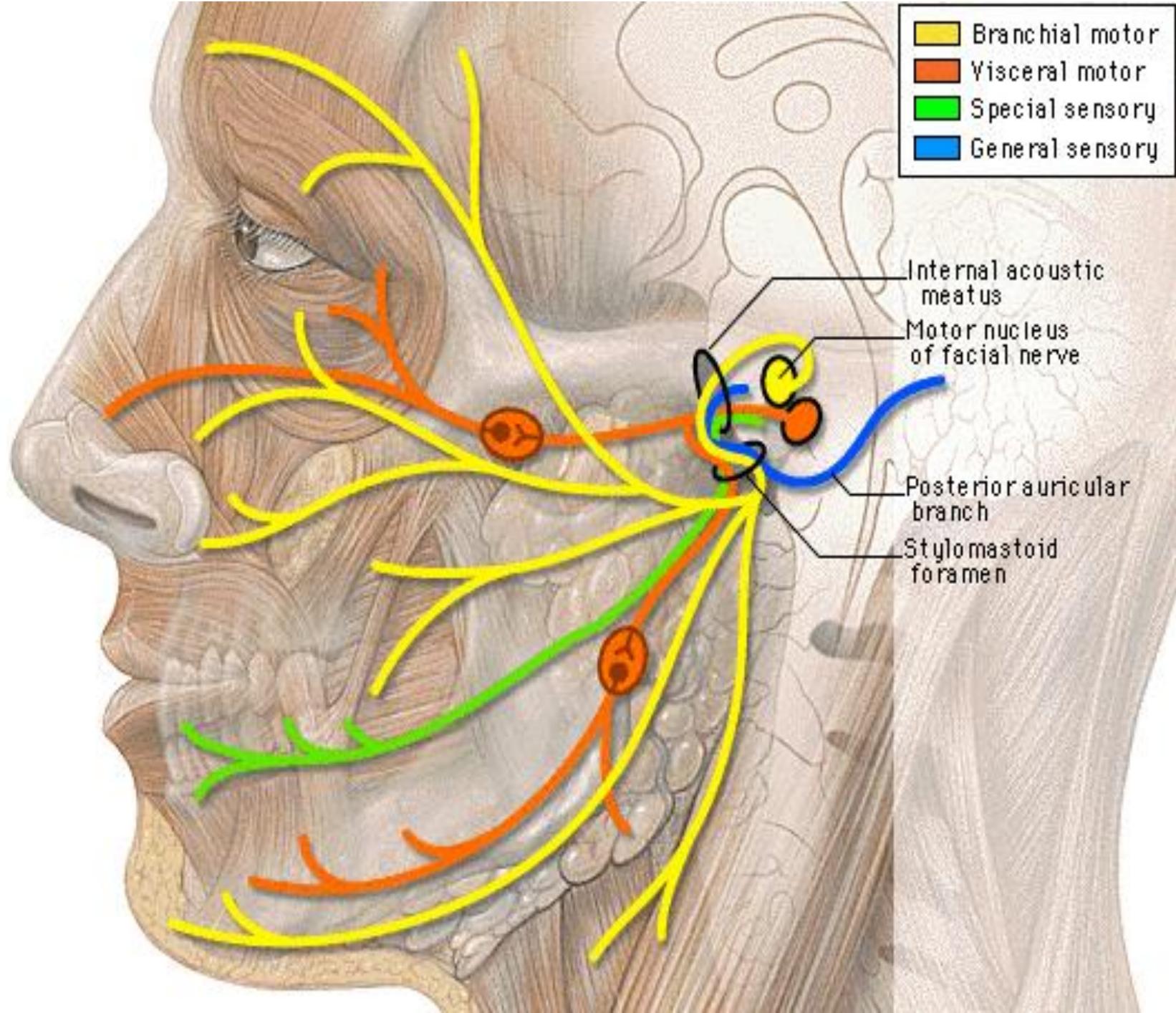
Buccal

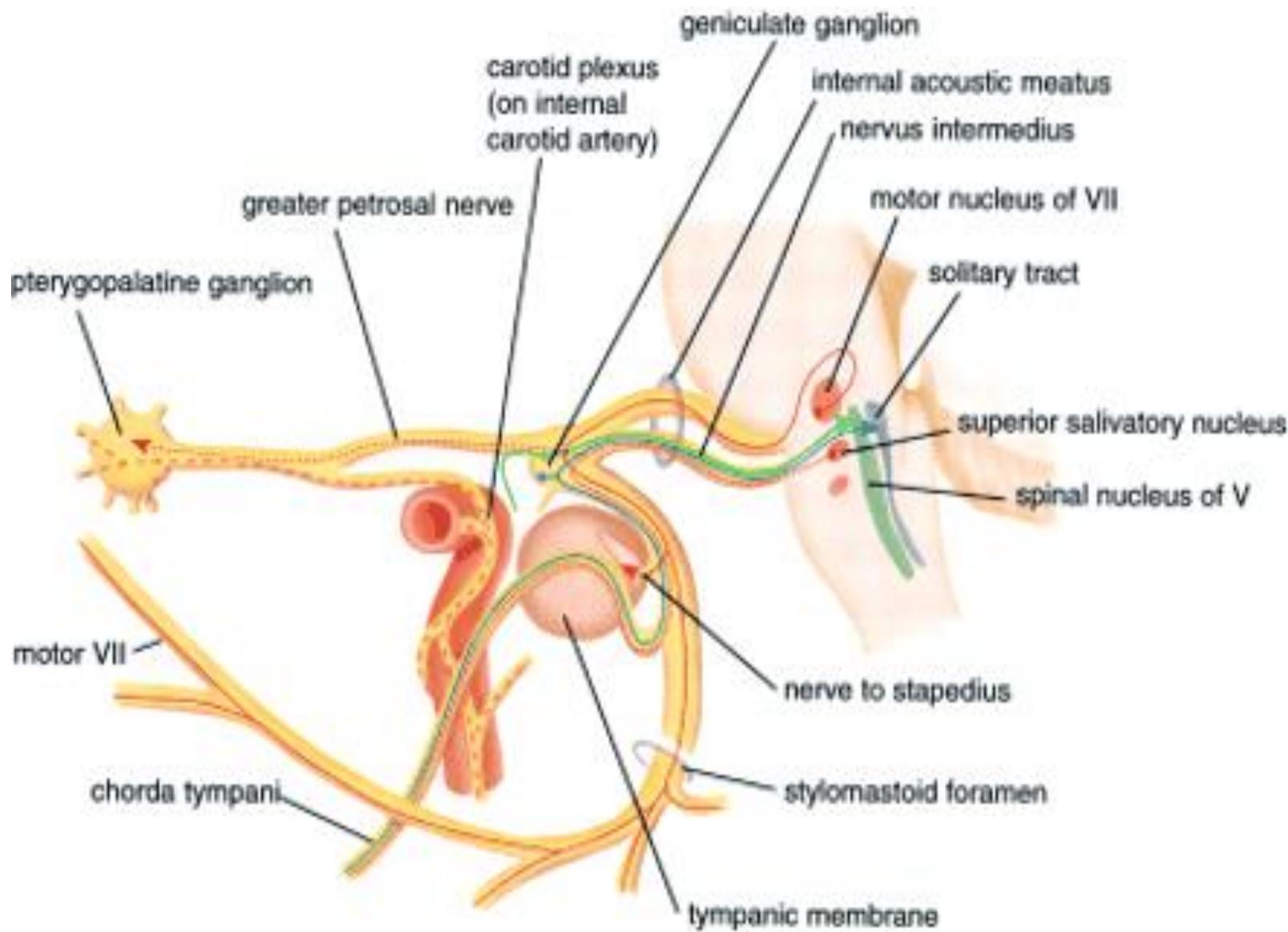
Mandibular

Cervical



- Branchial motor
- Visceral motor
- Special sensory
- General sensory





- special visceral efferent
 - special visceral afferent
 - - - sympathetic
 - - - parasympathetic
 - general somatic afferent
- special visceral efferent

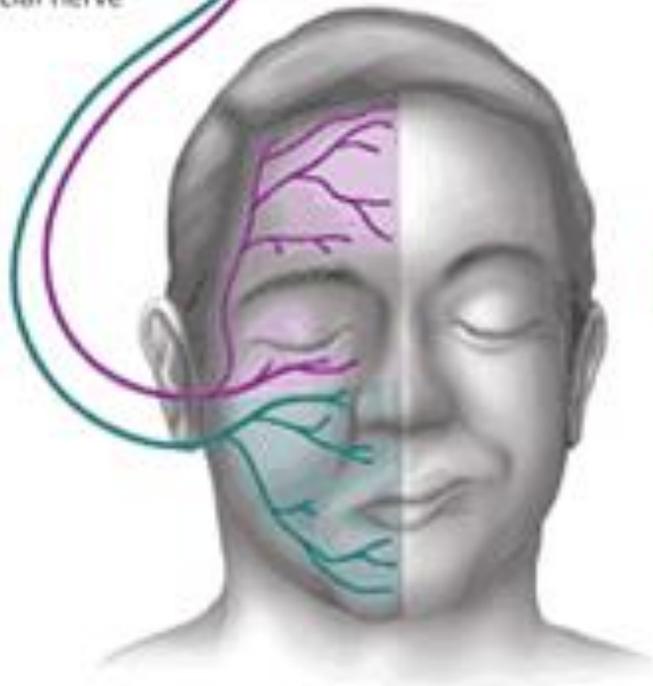
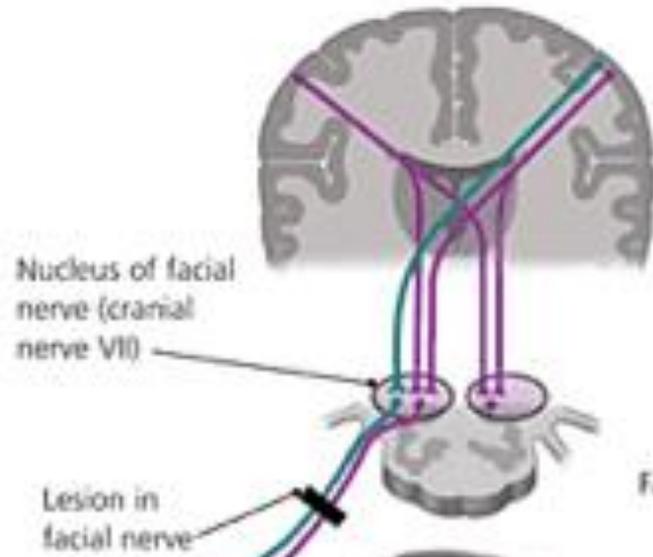


Abnormal findings

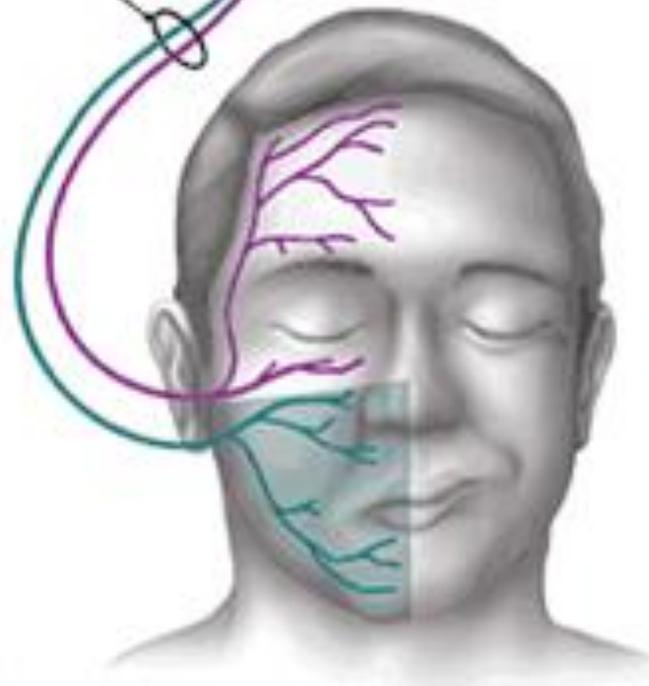
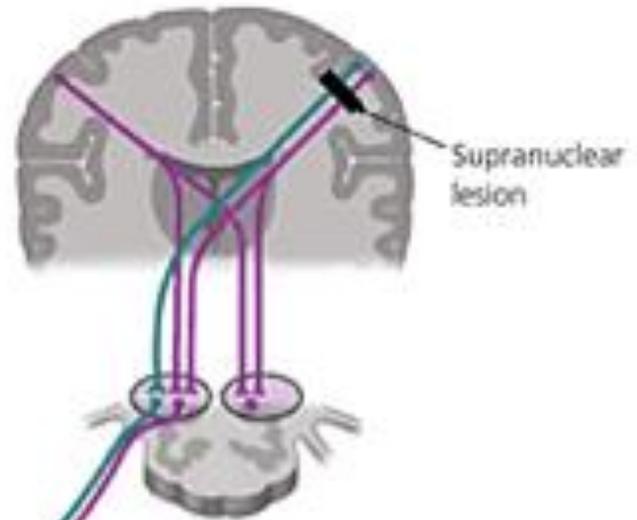
- ▶ Unilateral lower motor neuron nerve lesion
Bell's palsy
lesions distal to the stylomastoid foramen vs.
damage of the facial nerve in the facial canal
- ▶ Ramsay hunt syndrome: herpes zoster
infection of the geniculate ganglion
- ▶ Unilateral upper motor neuron lesions



**A. Facial nerve lesion
(Bell's palsy)**



B. Supranuclear lesion





Bell's phenomenon

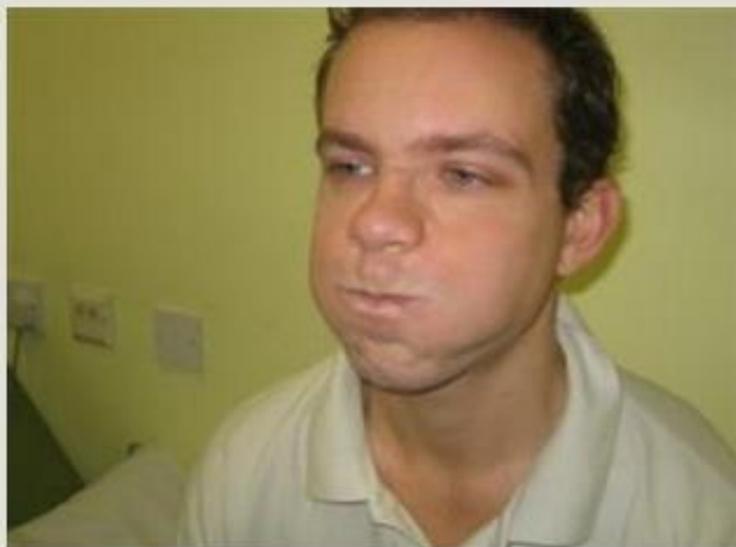




Crease forehead



Closed against resistance



Puff out their cheeks



Show teeth



The glossopharyngeal (IX) and vagus nerves (X)

▶ Function

- Both contain sensory, Motor and autonomic components
- (IX) nerve mainly carries sensation from the pharynx, tonsils, and taste from the posterior 1 / 3 of the tongue.
- (X) nerve carries important sensory information but also innervates upper pharyngeal and laryngeal muscles.

▶ Anatomy



- ▶ Examination sequence
 - Speech assessment
 - Uvula assessment by saying “Aaah!”
 - Ask the patient to puff out
 - Cough assessment
 - Gag reflex





Glossopharyngeal nerve examination



▶ Abnormal findings

- Unilateral (X) nerve damage → deviation of the uvula
- Bilateral (X) nerve lesions may cause;
 - bulbar and pseudobulbar palsies
 - Nasal regurgitation
- Damage to the recurrent laryngeal branch → dysphonia and bovine cough



The accessory nerve (11)

- **The accessory nerve has two components;**
 - A cranial part; closely related to the vagus
 - A spinal part(C1–5); which provides fibers to the upper trapezius and SCM muscles



▶ Examination

- Inspect and palpate the SCM from the front
 - *Assessing (Wasting, Hypertrophy, And Muscle Bulk)*
- Inspect and palpate the trapezius from behind
 - *Assessing (Wasting, and asymmetry)*
- Shrugging the shoulders against resistance
- Turn the neck against resistance





Accessory nerve examination 1



Accessory nerve examination 2



▶ **Abnormal findings**

- Wasting of the upper fibers of trapezius → displacement of the upper vertebral border of the scapula away from the spine, and the lower border is displaced towards it.
- Wasting and weakness of the SCM is characteristic of dystrophia myotonica.
 - Head drop → Myasthenia, Motor neuron disease, and some Myopathies



The hypoglossal nerve (12)

- ▶ Function
- ▶ Anatomy
 - It innervates the muscles of the tongue



▶ Examination sequence

- Inspect the tongue while its in its place and observe for wasting and fasciculation.
- Ask the patient to protrude the tongue; and look for deviation or involuntary movements.
- Assess movements of the tongue from side to side.
- Assess the power by asking the patient to press the tongue against the cheek and feel the strength of contraction.
- Assess hypokinesia of tongue movements by asking the patient to say “yellow lorry”, or “lah lah lah” as quickly as possible. and to make rapid in-and-out and side -to -side movements of the tongue.
- Assess swallowing with water swallow test.



▶ Abnormal findings

- Unilateral lower motor (XII) nerve lesions lead to wasting of the tongue on the affected side and deviation to that side on protrusion.
- Bilateral lower motor neuron lesion results in global wasting, and involuntary twitching (Fasciculation).
- Bilateral upper motor (XII) nerve lesions → Spastic tongue



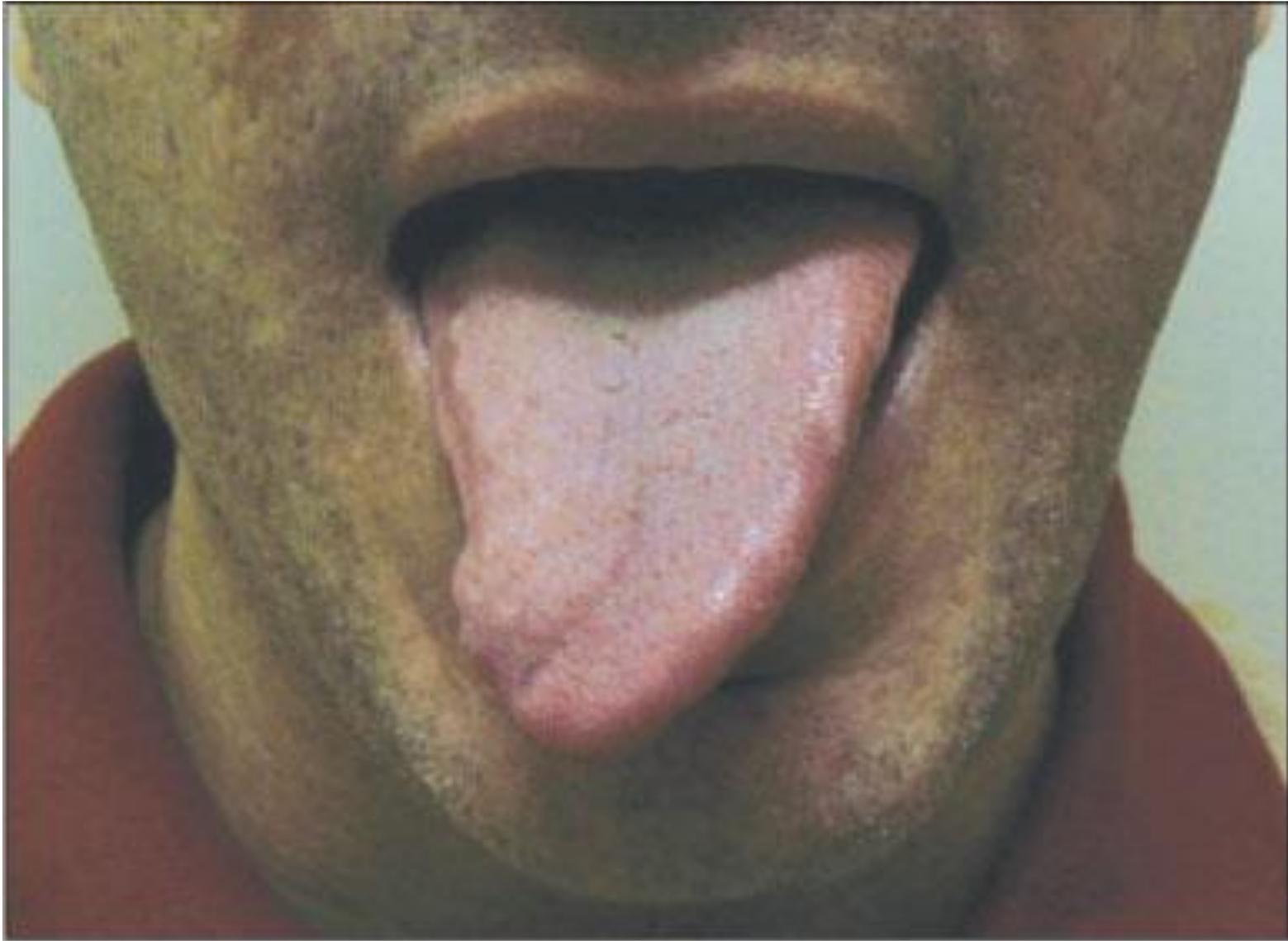


Fig 2. Residual right hypoglossal palsy on follow-up evaluation.



- ▶ **Bulbar palsy** refers to impairment of function of the cranial nerves IX, X, XI and XII, which occurs due to a *lower motor neuron* lesion either at nuclear or fascicular level in the medulla oblongata or from lesions of the lower cranial nerves outside the brainstem.^[1]
- ▶ In contrast, pseudobulbar palsy describes impairment of function of cranial nerves IX–XII due to *upper motor neuron* lesions of the corticobulbar tracts in the mid-pons. For clinically evident dysfunction to occur, such lesions must be bilateral as these cranial nerve nuclei receive bilateral innervation.
- ▶ Bulbar Palsy is an assortment of signs and symptoms, not the name of a precise disease.



Thank you

