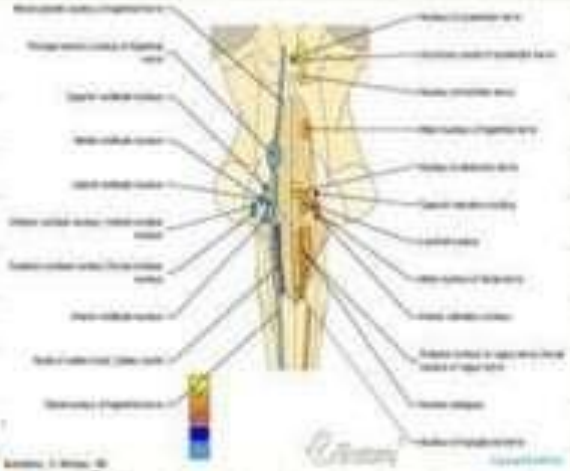


BRAINSTEM STROKE SYNDROMES

Dr. Piyush Ranjan Sahoo

LESIONS OF THE MEDULLA

- Medial medullary syndrome
- Lateral medullary syndrome

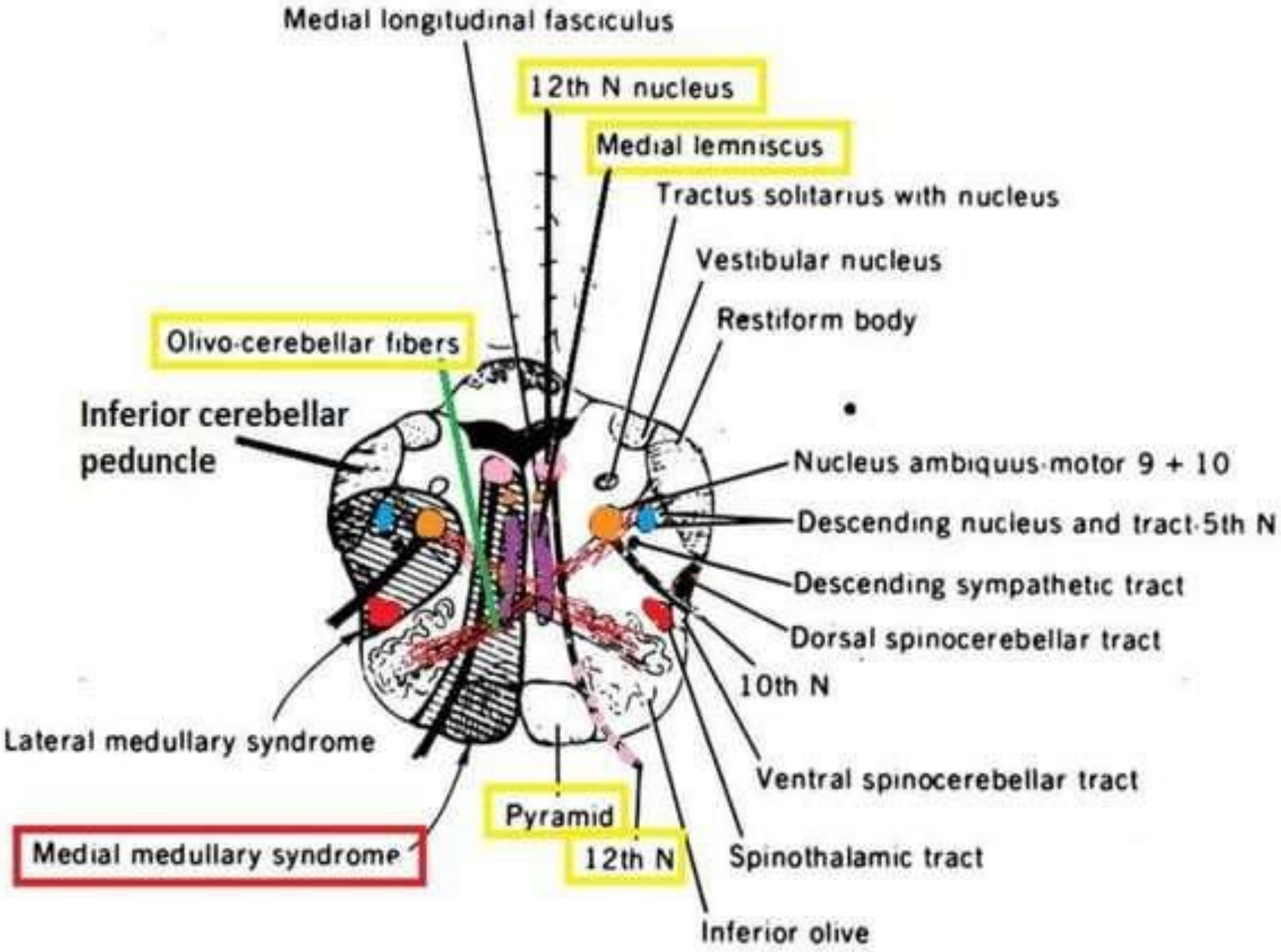
Medial Medullary Syndrome

Medial medullary syndrome (anterior spinal artery syndrome). Affected structures and resultant deficits include:

- **corticospinal tract**
medullary pyramid Lesions result in contralateral spastic hemiparesis.

- **medial lemniscus.**
Lesions result in contralateral loss of tactile and vibration sensation from the trunk and extremities.

- **hypoglossal nucleus or intraaxial root fibers [cranial nerve (CN) XII].**
Lesions result in ipsilateral flaccid hemiparalysis of the tongue
When protruded the tongue points to the side of the lesion (i.e., the weak side).


Medial longitudinal fasciculus
12th N nucleus
Medial lemniscus
Tractus solitarius with nucleus
Vestibular nucleus
Restiform body
Olivo-cerebellar fibers
Inferior cerebellar peduncle
Nucleus ambiquus-motor 9 + 10
Descending nucleus and tract-5th N
Descending sympathetic tract
Dorsal spinocerebellar tract
10th N
Lateral medullary syndrome
Ventral spinocerebellar tract
Pyramid
Medial medullary syndrome
12th N
Spinothalamic tract
Inferior olive

Lateral Medullary syndrome

Lateral medullary syndrome or posterior inferior cerebellar artery (PICA) syndrome characterized by
dissociated sensory loss
Affected structures -- resultant deficits include:

1. **vestibular nuclei**
Lesions result in
nystagmus, nausea, vomiting, and vertigo.

2. **inferior cerebellar peduncle** Lesions result in ipsilateral cerebellar signs
e.g., dystaxia, dysmetria (past pointing), dysdiadochokinesia].

3. nucleus ambiguus of CN IX, CN X, and CN XI.

Lesions result in

· ipsilateral laryngeal, pharyngeal, and palatal hemiparalysis

· i.e., loss of the gag reflex (efferent limb) dysphagia

dysphonia (hoarseness)].

4. glossopharyngeal nerve roots.

■ Lesions result in

loss of the gag reflex (afferent limb).

5. Vagal nerve roots

Lesions result in

• same deficits as seen in lesions involving the nucleus ambiguus

6. Spinothalamic tracts

Lesions result in
contralateral loss of pain and
temperature sensation
from the trunk and extremities.

7. **spinal trigeminal nucleus** and tract

- Lesions result in

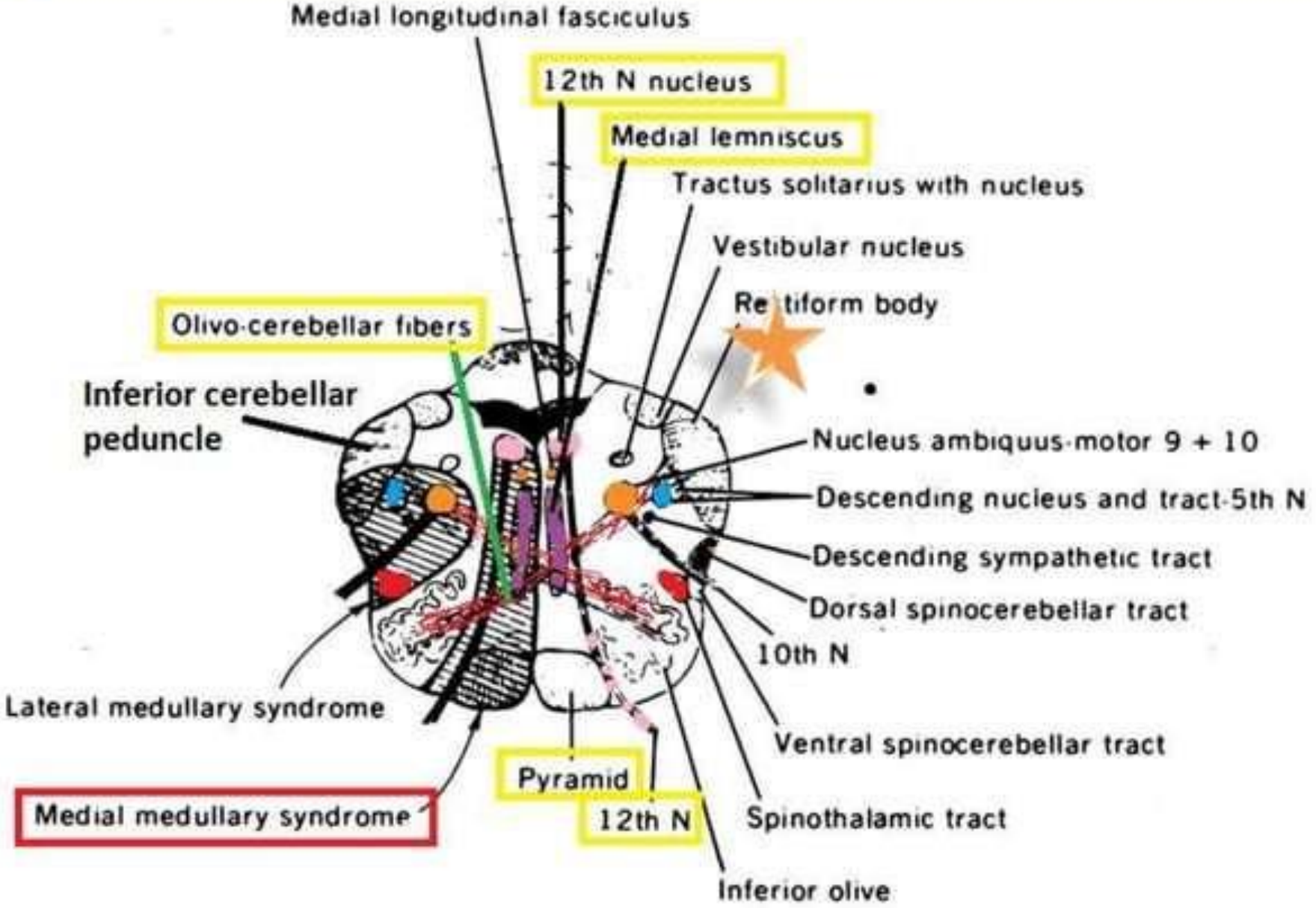
ipsilateral loss of pain and temperature
sensation from the face
facial hemianesthesia).

8. **descending sympathetic** tract. Lesions result in

ipsilateral Horner's syndrome

- i.e., ptosis, miosis
- hemianhidrosis

apparent enophthalmos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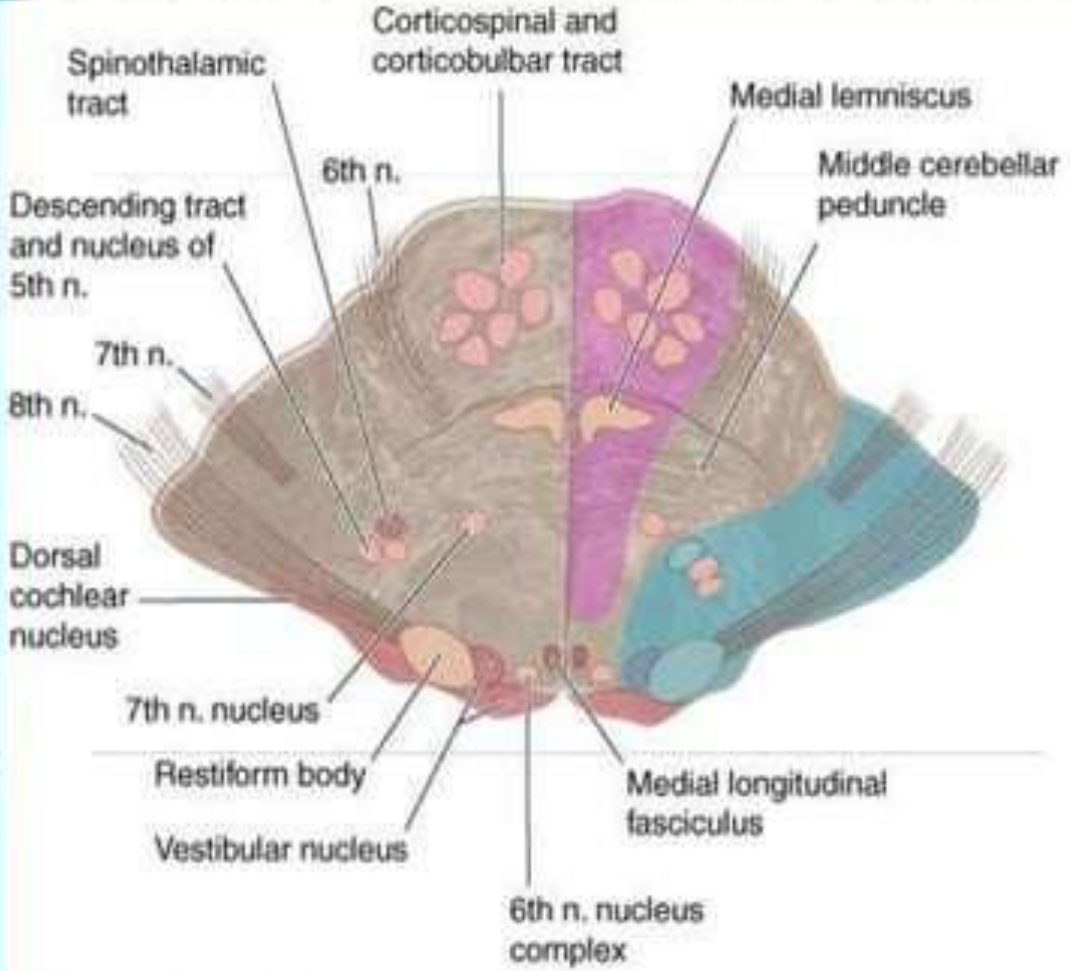
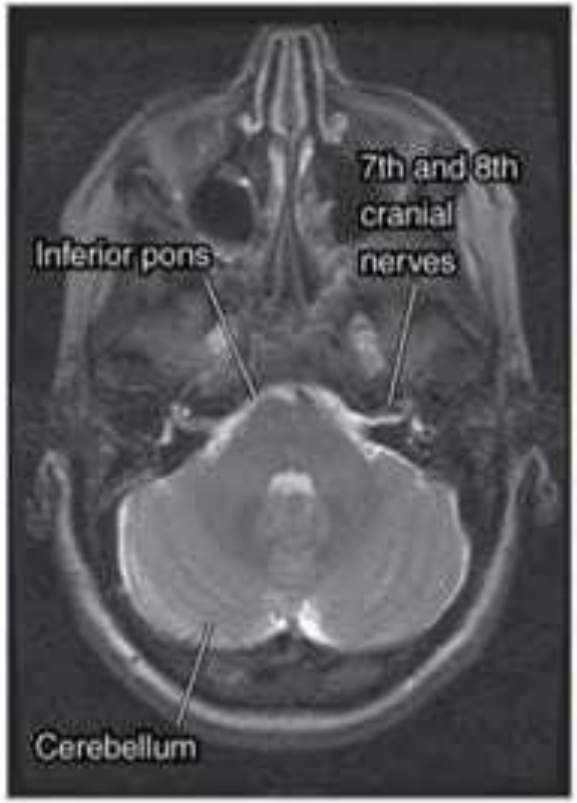
Lateral medullary syndrome
Ventral spinocerebellar tract
Pyramid
Medial medullary syndrome
12th N
Spinothalamic tract
Inferior olive

Pontine Syndromes





Inferior pontine syndrome:

Lateral Medial

Source: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine*, 17th Edition: http://www.accessmedicine.com

Medial inferior pontine syndrome

- results from thrombosis of the para median branches of the basilar artery. Affected structures--
- **Corticospinal tract**

Lesions result in

contralateral spastic hemiparesis.

- **Medial lemniscus**

Lesions result in

contralateral loss of tactile sensation from the trunk extremities.

- **Abducent nerve roots**

Lesions result in

ipsilateral lateral rectus paralysis.

Lateral inferior pontine syndrome

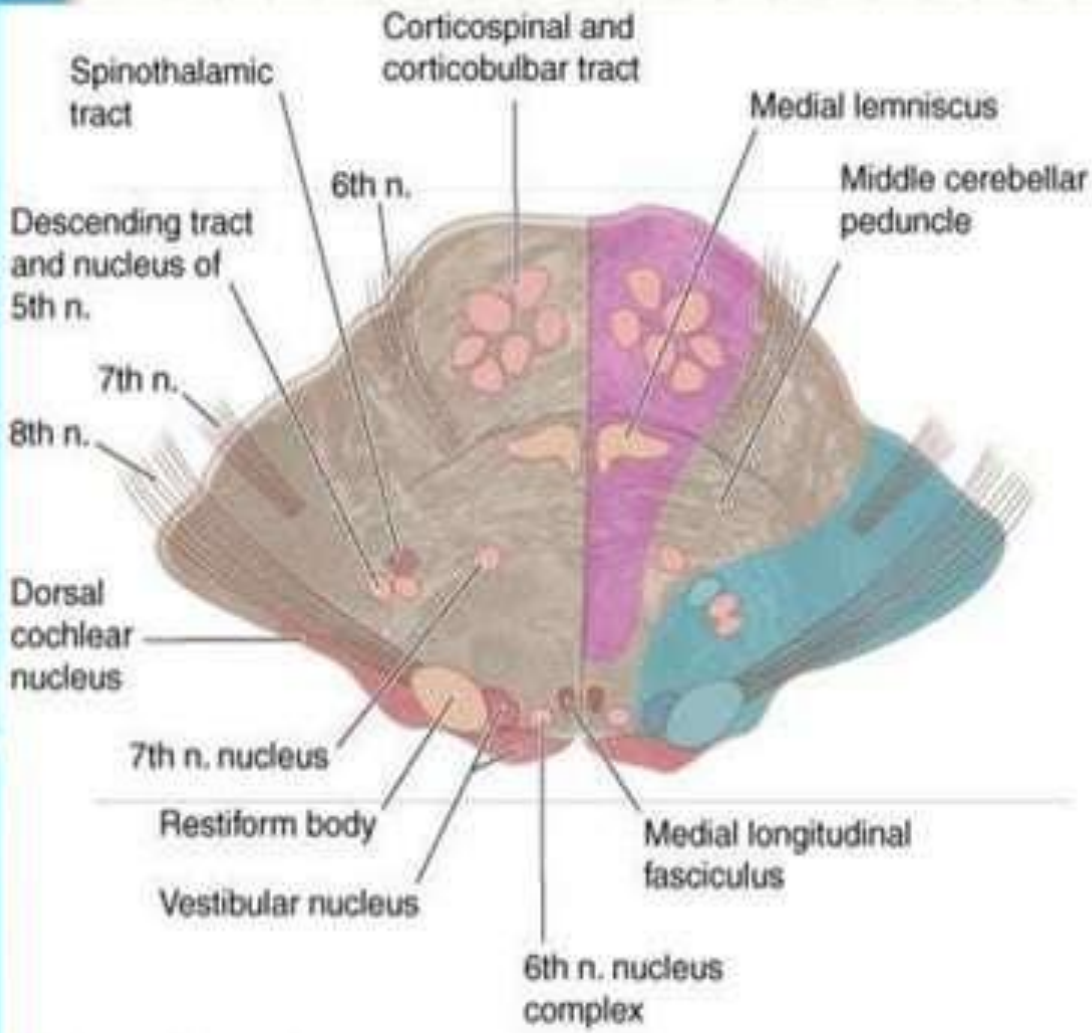
- anterior inferior cerebellar artery (AICA) syndrome

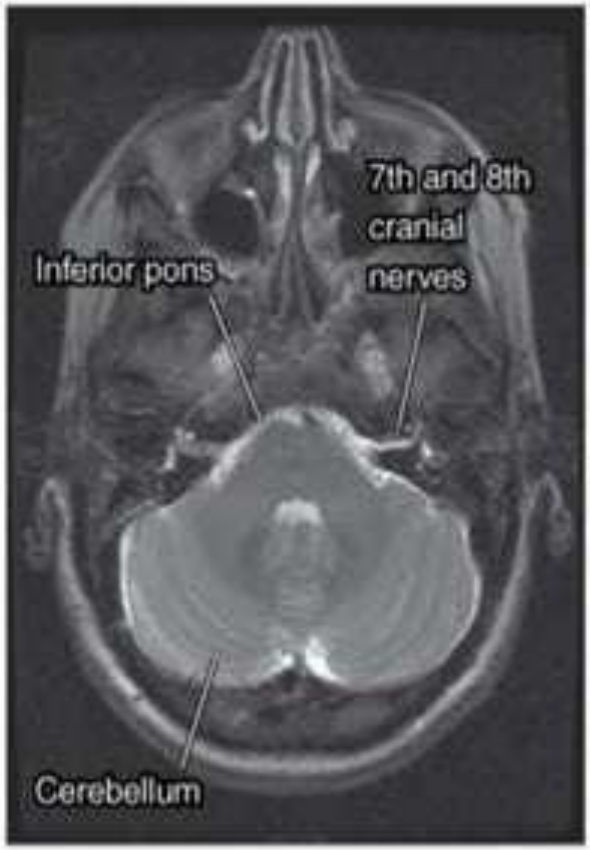
Affected structures and resultant deficits include--

- **facial nucleus and intraaxial nerve fibers**

Lesions result in:

- Ipsilateral facial nerve paralysis
- Ipsilateral loss of taste from the ant. 2/3 of tongue
- Ipsilateral loss of lacrimation and reduced salivation
- Loss of corneal and stapedial reflexes (efferent limbs).

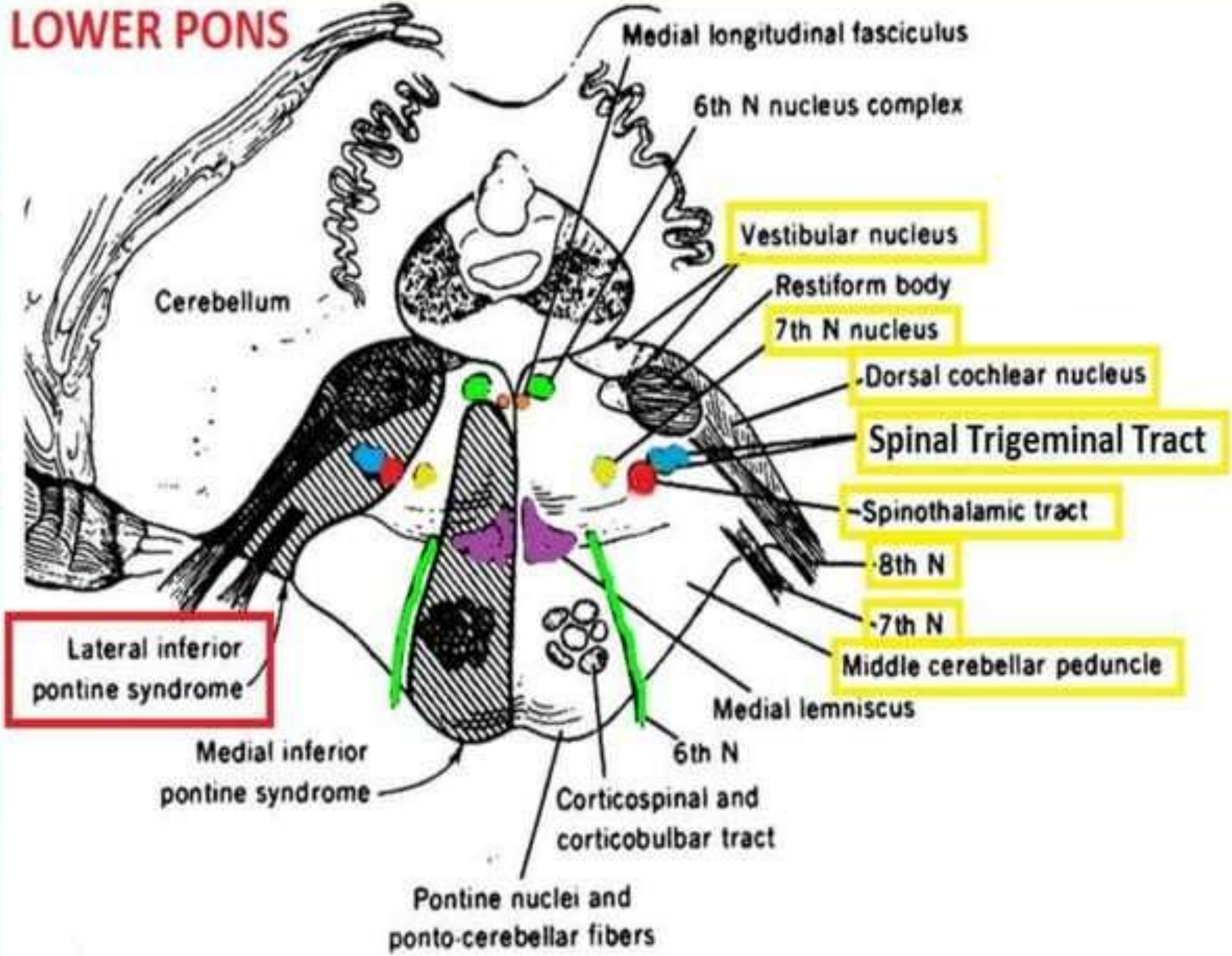




Inferior pontine syndrome:

Lateral Medial

LOWER PONS


Medial longitudinal fasciculus
6th N nucleus complex
Vestibular nucleus
Restiform body
7th N nucleus
Dorsal cochlear nucleus
Spinal Trigeminal Tract
Spinothalamic tract
8th N
7th N
Middle cerebellar peduncle
Medial lemniscus
6th N
Corticospinal and corticobulbar tract
Pontine nuclei and ponto-cerebellar fibers
Medial inferior pontine syndrome
Lateral inferior pontine syndrome
Cerebellum

- **Cochlear nuclei and intraaxial nerve fibers**
  Lesions result in unilateral central deafness.
- **Vestibular nuclei and intraaxial nerve fibers**
  Lesions result in
  nystagmus, nausea, vomiting and vertigo.
- **Spinal trigeminal nucleus and tract**
  Lesions result in
  ipsilateral loss of pain and temperature sensation from the face (facial hemianesthesia).
- **Middle and inferior cerebellar peduncles**
  Lesions result in
  ipsilateral limb and gait dystaxia.
- **Splnothalamic tracts (spinal lemniscus).**
  Lesions result in
  contralateral loss of pain and temperature sensation from the trunk and extremities.
- **Descending sympathetic tract**
  Lesions result in ipsilateral Homer's syndrome.

Medial longitudinal fasciculus (MLF) syndrome

- **internuclear ophthalmoplegia)**

interrupts fibers from the contralateral

- **abducent nucleus**

that projects through the MLF to the ipsilateral medial rectus

- **subnucleus of CN III**

causes-

-medial rectus palsy on attempted lateral conjugate gaze and

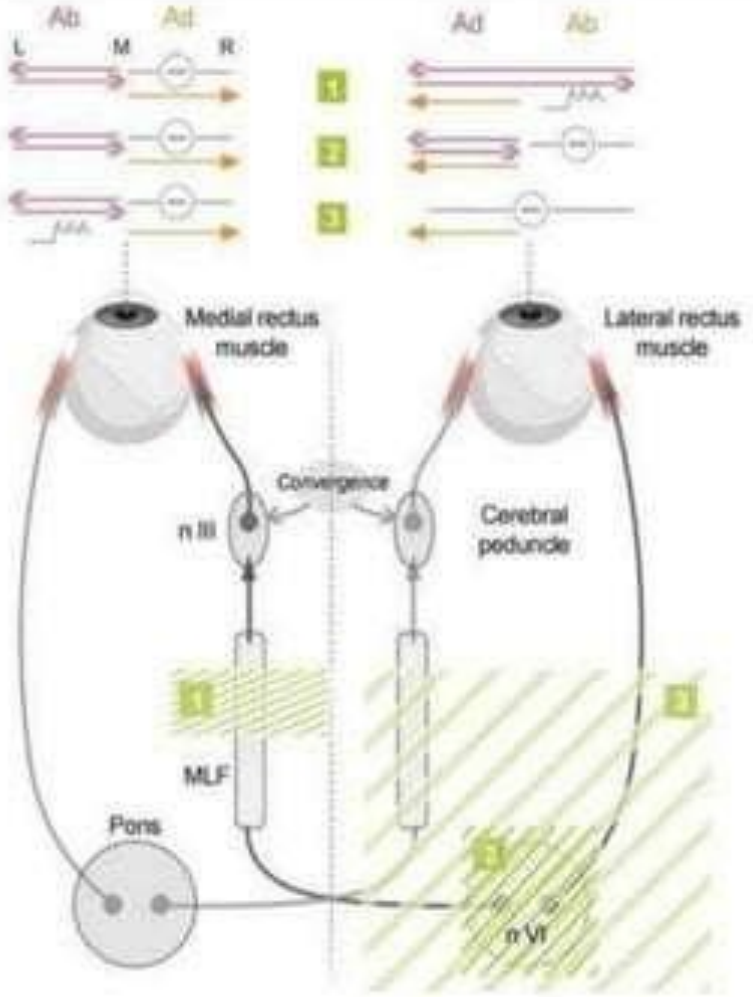
-nystagmus in the abducting eye.

-Convergence remains intact.

- This syndrome is often seen in patients with **multiple sclerosis.**

INTERNUCLEAR OPHTHALMOPLEGIA RESULTS FROM LESIONS IN THE MEDIAL LONGITUDINAL FASCICULUS CONNECTING THE IPSILATERAL CN VI AND THE CONTRALATERAL CN III NUCLEI

Central horizontal oculomotor syndromes



■ CENTRAL HORIZONTAL OCULOMOTOR DISORDERS
[FROM PIERROT-DESEILLIGNY, 2004]

lesioned area
normal saccade and vestibulo-ocular reflex
normal convergence
no possible movement
nystagmus in eccentric position

Central horizontal oculomotor syndromes
Central horizontal (or lateral) oculomotor syndromes lead to abduction and/or adduction palsy with horizontal diplopia, but with preservation of convergence.
1. Internuclear ophthalmoplegia (ipsilateral adduction palsy and horizontal diplopia), due to involvement of the medial longitudinal fasciculus (MLF) between nuclei (n) VI and III.
2. Horizontal gaze palsy (abduction and adduction palsy), due to involvement of nucleus VI.
3. "One-and-a-half" syndrome (total lateral palsy of the ipsilateral eye and adduction of the contralateral eye), due to involvement of nucleus VI and the MLF on the same side; Exceptionally, both nuclei VI may be involved simultaneously, resulting in bilateral palsy of lateral eye movements.
It should be noted that, in the case of internuclear ophthalmoplegia or "one-and-a-half" syndrome, a monocular nystagmus of the eye in abduction is observed, the origin of which is unclear.

III: nucleus of the common oculomotor nerve; VI: nucleus of the external oculomotor nerve; Ab: abduction; Ad: adduction; Convergence: centre of convergence; R: right; L: left; M: medial line. Hatching indicates the lesioned regions.

Facial colliculus syndrome

usually results from a pontine glioma

or

a vascular accident

- internal genu of CN VII
- nucleus of CN VI underlie the facial colliculus.
- Lesions of the **internal genu of the facial nerve** cause:

-Ipsilateral facial paralysis

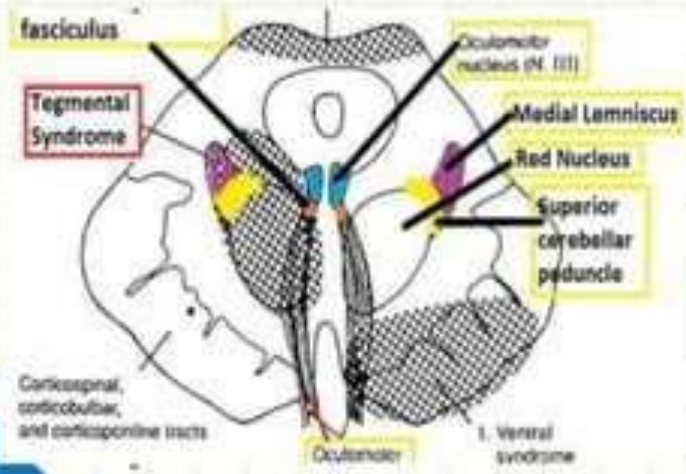
-Ipsilateral loss of the corneal reflex

- Lesions of the **abducent nucleus** cause:

-Lateral rectus paralysis

-Medial (convergent) strabismus

-Horizontal diplopia



LESIONS OF THE MIDBRAIN

Dr. Piyush Ranjan Sahoo

Dorsal midbrain (Parinaud's) syndrome

often the result of a

- pinealoma or germinoma of the pineal region.

Affected structures and resultant deficits include:-

- **superior colliculus** and **pretectal area**

  Lesions cause

-paralysis of upward and downward gaze

-pupillary disturbances(Pseudo-Argyll Robertson pupils)

-absence of convergence(Convergence-Retraction nystagmus on Attempts at upward gaze)

- **cerebral aqueduct**

-Compression causes noncommunicating hydrocephalus.

Paramedian midbrain (Benedikt) syndrome

- **oculomotor nerve roots** (intraaxial fibers).

Lesions cause

-complete ipsilateral oculomotor paralysis

-Eye abduction and depression

- caused by

intact lateral rectus (CN VI) and superior oblique (CN IV) muscles Ptosis

-paralysis of the levator palpebra muscle) and

-fixation and dilation of the ipsilateral pupil

-complete internal ophthalmoplegia) also occur.

- **dentatothalamic fibers**

Lesions cause

-contralateral cerebellar dystaxia with intention tremor.

- **medial lemniscus**

Lesions result in

-contralateral loss of tactile sensation from the trunk and extremities.

Medial midbrain (Weber) syndrome

Affected structures and resultant deficits include:

- **Oculomotor nerve roots** (intraaxial fibers).

Lesions cause-

-complete ipsilateral oculomotor paralysis

-Eye abduction and depression

caused by intact lateral rectus (CN VI) and superior oblique (CN IV) muscles.

-Ptosis and fixation

-dilation of the ipsilateral pupil also occur.

- **corticospinal tracts**

Lesions result in

contralateral spastic hemiparesis.

Contd...

- **corticobulbar fibers**

Lesions cause

-contralateral weakness of

· lower face (CN VII)

· tongue (CN XII)

· palate (CN X)

❑ upper face division of the facial nucleus receives bilateral corticobulbar input, uvula and

- pharyngeal wall pulled toward the normal side (CN
- X), protruded tongue **points to the weak side.**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