

NEUROLOGICAL SYSTEM • ASSESSMENT

# Cranial Nerves I–XII

A high-yield NCLEX 2026 review of the 12 cranial nerves — function, bedside assessment, red-flag findings, and the clinical-judgment cues that separate priority from distractor.

12 Nerves

Sensory • Motor • Both

Bedside Assessment

Stroke / ↑ICP / Bell's Palsy

NCJMM Integrated

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## ● Definition &amp; Overview

## THE BIG PICTURE

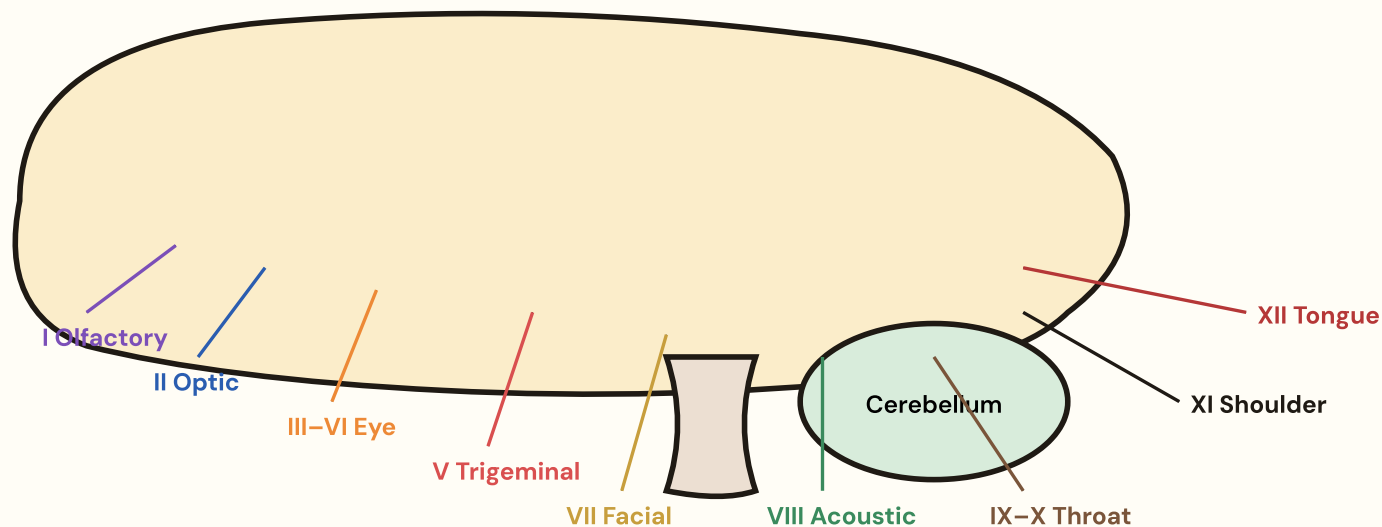
### What They Are

- ▶ 12 paired nerves that emerge **directly from the brain** (not the spinal cord)
- ▶ Numbered **I–XII** in order from anterior → posterior along the brainstem
- ▶ Carry **sensory, motor, or both (mixed)** signals between the brain, head, neck, and viscera

### Why It Matters for NCLEX

- ▶ Cranial nerve deficits are **early indicators of stroke, ↑ICP, brain tumor, MS, and Bell's palsy**
- ▶ Pupil changes (CN III) and tongue deviation (CN XII) are **priority neuro-decline cues**
- ▶ CN IX & X loss = **aspiration risk** → airway is the priority intervention

### Lateral View — Origin of the 12 Cranial Nerves



CRANIAL NERVES EMERGE IN NUMERICAL ORDER FROM ANTERIOR (FOREBRAIN) TO POSTERIOR (BRAINSTEM)

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## • Pathway & Function — The 12 Nerves

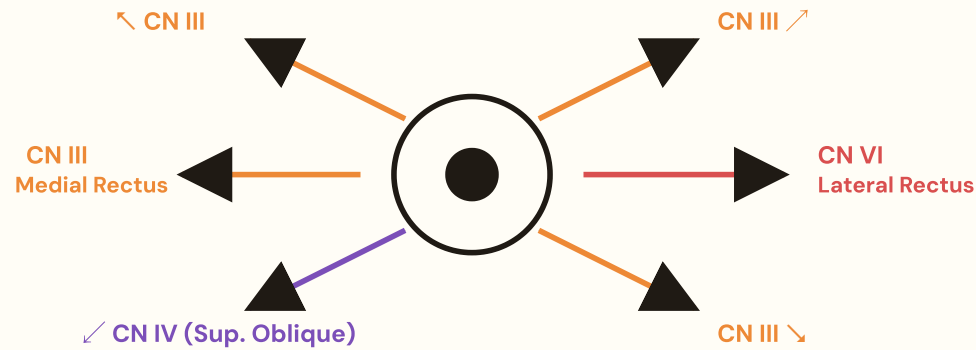
SENSORY · MOTOR · BOTH

**Function key:** S = Sensory M = Motor B = Both Use the mnemonic "**Some Say Marry Money But My Brother Says Big Brains Matter Most**" for I–XII.

| #    | Nerve                        | Type | Primary Function                             | Bedside Test                                                                      |
|------|------------------------------|------|----------------------------------------------|-----------------------------------------------------------------------------------|
| I    | Olfactory                    | S    | Smell                                        | Identify familiar scent (coffee, peppermint) — eyes closed, one nostril at a time |
| II   | Optic                        | S    | Vision (acuity & visual fields)              | Snellen chart, confrontation visual fields                                        |
| III  | Oculomotor                   | M    | Pupil constriction, eyelid lift, most EOM    | PERRLA, 6 cardinal fields of gaze                                                 |
| IV   | Trochlear                    | M    | Eye <b>down &amp; in</b> (superior oblique)  | Look down toward nose                                                             |
| V    | Trigeminal                   | B    | Face sensation (3 divisions); chewing        | Light touch face / corneal reflex / clench jaw                                    |
| VI   | Abducens                     | M    | Eye <b>lateral</b> movement (lateral rectus) | Look to the side                                                                  |
| VII  | Facial                       | B    | Facial expression; taste anterior 2/3 tongue | Smile, frown, raise eyebrows, puff cheeks                                         |
| VIII | Vestibulocochlear (Acoustic) | S    | Hearing & balance/equilibrium                | Whisper test, Weber/Rinne, Romberg                                                |
| IX   | Glossopharyngeal             | B    | Swallow, gag, taste posterior 1/3 tongue     | Gag reflex, swallow assessment                                                    |
| X    | Vagus                        | B    | Parasympathetic (HR, GI), voice, swallow     | Say "Ahh" — uvula midline, voice quality                                          |

| #   | Nerve            | Type | Primary Function                           | Bedside Test                                   |
|-----|------------------|------|--------------------------------------------|------------------------------------------------|
| XI  | Spinal Accessory | M    | Shoulder shrug; head turn (SCM, trapezius) | Shrug shoulders / turn head against resistance |
| XII | Hypoglossal      | M    | Tongue movement                            | Stick out tongue — should stay <b>midline</b>  |

### EOM Cardinal Fields of Gaze — LR6, SO4, Rest 3



LR<sub>6</sub> SO<sub>4</sub> — LATERAL RECTUS = CN VI · SUPERIOR OBLIQUE = CN IV · ALL OTHER EOMS = CN III

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## ● Abnormal Findings — What to Watch For

ASSESSMENT CUES

### CN I–II (Smell & Sight)

- ▶ **Anosmia** (loss of smell) → head trauma, frontal lobe lesion
- ▶ **Sudden vision loss / diplopia** → stroke, MS, ↑ICP
- ▶ **Visual field cut** (homonymous hemianopia) → stroke

### CN III–IV–VI (Eye Movement)

- ▶ **Unequal/sluggish/dilated pupil** 🚑 → ↑ICP, herniation
- ▶ **Ptosis** (drooping eyelid) → CN III lesion, myasthenia gravis
- ▶ **Diplopia** on lateral gaze → CN VI palsy

### CN V (Trigeminal)

- ▶ **Facial numbness** (one side) → stroke, tumor
- ▶ **Severe lancinating facial pain** → trigeminal neuralgia
- ▶ **Absent corneal reflex** → CN V or CN VII deficit

### CN VII (Facial)

- ▶ **Bell's palsy**: sudden one-sided facial droop **including forehead**
- ▶ **Stroke**: facial droop with **forehead spared** (key differentiator!)
- ▶ Loss of taste anterior 2/3, drooling, can't close eye

### CN VIII (Acoustic)

- ▶ **Hearing loss, tinnitus, vertigo, nystagmus**
- ▶ Positive Romberg → vestibular dysfunction
- ▶ Common with **aminoglycoside / loop diuretic toxicity**

### CN IX–X (Glosso & Vagus)

- ▶ **Absent gag reflex** 🚑 → **aspiration risk**
- ▶ **Hoarseness**, dysphagia, uvula deviation
- ▶ Bradycardia/syncope (vagal involvement)

### CN XI (Spinal Accessory)

- ▶ Inability to **shrug shoulders** against resistance
- ▶ Weak head turn (SCM weakness)

### CN XII (Hypoglossal)

- ▶ **Tongue deviation** on protrusion 🚑 → stroke
- ▶ Tongue points **toward the lesion** side

### Pattern Recognition

- ▶ **Multiple CN deficits** on same side → brainstem lesion
- ▶ **CN III + ↓LOC** → herniation in progress

▶ Common after radical neck dissection

▶ Slurred speech, dysarthria

▶ **CN VII + VIII** together → acoustic neuroma

### **RED FLAG — Cushing's Triad + CN III**

- ▶ **↑ Systolic BP with widening pulse pressure + ↓ HR + irregular respirations** alongside a **fixed, dilated pupil** = imminent brain herniation. Notify provider immediately, elevate HOB 30°, prepare for hyperventilation/osmotic therapy.
- ▶ **"Blown pupil"** (fixed, dilated, unilateral) is a **late and ominous** sign — never a normal variant.

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## • Priority Nursing Interventions

ABC • SAFETY • ACTION

### A — Airway / Aspiration (CN IX, X)

- ▶ **Assess gag and swallow BEFORE giving anything by mouth** — NPO until cleared
- ▶ Position upright (high Fowler's) for meals; chin tuck
- ▶ Have **suction at bedside** for any patient with neuro deficit
- ▶ Order swallow eval / SLP consult before resuming PO

### B — Breathing & Brainstem

- ▶ Monitor respirations: irregular pattern = brainstem involvement
- ▶ Pulse ox continuous; report  $\text{SpO}_2 < 92\%$
- ▶ Keep HOB  $30^\circ$  to reduce ICP

### C — Circulation & Cushing's

- ▶ Monitor for Cushing's triad ( $\uparrow$ BP wide pulse pressure,  $\downarrow$ HR, irregular RR)
- ▶ Avoid Valsalva, straining, suctioning  $> 10$  sec
- ▶ Avoid prone, hip flexion, neck flexion (raise ICP)

### S — Safety

- ▶ **CN II/VIII deficit** → fall precautions, clear pathways, call light in reach
- ▶ **CN VII Bell's palsy** → artificial tears + eye patch at night (corneal protection)
- ▶ **CN V deficit** → avoid hot food/drinks, inspect mouth for trauma after eating

### Neuro Reassessment

- ▶ Pupil checks (CN III) and GCS at minimum every 2 hr (more often if unstable)
- ▶ Document any **new** deficit immediately and notify provider

### Documentation Pearls

- ▶ Always specify **which side** and **which CN** ("left-sided CN VII facial droop with forehead sparing")
- ▶ Note **pupil size in mm**, shape, reactivity (e.g., "PERRLA 3 mm bilaterally")



- ▶ Compare to previous shift — trends matter more than single readings

- ▶ Record exact bedside test result, not "WNL"

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## ● Pharmacology — Drugs Tied to Cranial Nerves

HIGH-YIELD PHARM

**Atropine (CN III — pupil)**

- ▶ **Mechanism:** anticholinergic → dilates pupil (mydriasis), paralyzes accommodation
- ▶ **Side effects:** tachycardia, dry mouth, urinary retention
- ▶ **Nursing:** contraindicated in glaucoma; warn re: photophobia

**Pilocarpine / Timolol (CN II — IOP)**

- ▶ **Mechanism:** miotic → constricts pupil, ↓ intraocular pressure (glaucoma)
- ▶ **Side effects:** blurred vision (esp. at night), bradycardia (Timolol)
- ▶ **Nursing:** apply punctal pressure 1 min to prevent systemic absorption

**Carbamazepine / Gabapentin (CN V)**

- ▶ **Use:** first-line for trigeminal neuralgia (CN V neuropathic pain)
- ▶ **Side effects:** drowsiness, ataxia, ↓ Na<sup>+</sup> (carbamazepine), bone-marrow suppression
- ▶ **Nursing:** baseline CBC + Na<sup>+</sup>; teach to avoid trigger foods/cold air

**Prednisone / Acyclovir (CN VII Bell's)**

- ▶ **Use:** reduce inflammation of CN VII; antiviral if HSV suspected
- ▶ **Side effects:** hyperglycemia, ↑ infection risk, GI upset (steroid)
- ▶ **Nursing:** start within 72 hr of onset for best recovery; taper steroid

**Meclizine / Scopolamine (CN VIII)**

- ▶ **Use:** vertigo, motion sickness (vestibular branch dysfunction)
- ▶ **Side effects:** drowsiness, dry mouth, blurred vision

**Ototoxic Drugs — CN VIII Damage** 🚨

- ▶ **Aminoglycosides** (gentamicin, tobramycin, vancomycin)
- ▶ **Loop diuretics** (furosemide), **ASA** at high dose, **cisplatin**
- ▶ **Nursing:** baseline hearing; report tinnitus/vertigo immediately

- ▶ **Nursing:** fall precautions; remove scopolamine patch before MRI

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• NCLEX Test Traps ⚠️

DIFFERENTIATORS

| Trap                            | The Confusion                         | The Distinguisher                                                                                                                           |
|---------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bell's Palsy vs Stroke</b>   | Both = unilateral facial droop        | <b>Bell's</b> affects forehead (can't raise eyebrow). <b>Stroke</b> spares the forehead (CN VII upper branch has bilateral cortical input). |
| <b>CN III vs Sympathetic</b>    | What constricts vs dilates the pupil? | <b>CN III (parasympathetic) = constricts. Sympathetic = dilates.</b> A blown pupil = CN III compression from herniation.                    |
| <b>EOM Innervation</b>          | Which nerve does which direction?     | <b>LR<sub>6</sub> SO<sub>4</sub> R<sub>3</sub></b> : Lateral rectus = CN VI; Superior oblique = CN IV; everything else = CN III.            |
| <b>Tongue Deviation</b>         | Which way does it point?              | Tongue deviates <b>toward</b> the side of CN XII lesion (ipsilateral weakness). "Lick the lesion."                                          |
| <b>Gag Reflex Testing</b>       | "Push fluids and reassess in an hour" | NEVER give PO until gag/swallow are intact. NPO + suction at bedside is the priority — aspiration is the killer.                            |
| <b>Sensory vs Motor vs Both</b> | Easy to mix up                        | Mnemonic: " <b>Some Say Marry Money But My Brother Says Big Brains Matter Most</b> " — S/S/M/M/B/M/B/S/B/B/M/M.                             |
| <b>Vagus (CN X) Stimulation</b> | "Bear down to pass stool"             | Valsalva stimulates CN X → bradycardia. <b>Avoid</b> in ICP, post-MI, post-eye surgery.                                                     |
| <b>Pupil Priority</b>           | Choosing between assessments          | A new <b>unequal pupil</b> always trumps headache, BP, or pain rating — it signals herniation and is the priority finding.                  |

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## • NCJMM — Clinical Judgment Walkthrough

6-STEP MODEL

*Scenario:* A 62-year-old admitted with new-onset right-sided weakness and slurred speech. On assessment you note tongue deviates to the **right** on protrusion, right-sided facial droop sparing the forehead, and absent gag reflex.

### 1. Recognize Cues

Tongue deviation right (CN XII), facial droop with forehead spared (UMN/CN VII central), absent gag (CN IX/X), slurred speech.

### 2. Analyze Cues

Pattern fits a **left-hemispheric ischemic stroke** (contralateral CN deficits + central CN VII pattern). Aspiration risk is acute.

### 3. Prioritize Hypotheses

**#1 Aspiration / airway compromise**, #2 stroke extension, #3 ↑ICP from infarct edema.

### 4. Generate Solutions

NPO + suction at bedside, HOB 30°, neuro checks q1h, stroke protocol/CT, SLP consult, pulse ox, IV access.

### 5. Take Action

Make NPO, raise HOB, place suction within reach, alert rapid response, complete NIHSS, pupil & GCS reassessment.

### 6. Evaluate Outcomes

SpO<sub>2</sub> ≥ 94%, no aspiration events, pupils equal/reactive, GCS stable or improving, swallow eval completed before any PO.

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## • Patient &amp; Family Education

## TEACH BACK

**Bell's Palsy (CN VII)**

- ▶ Most recover fully in 3–6 months
- ▶ Use **artificial tears during the day + eye patch + ointment at night** to protect the cornea
- ▶ Chew on the unaffected side; soft foods to prevent pocketing
- ▶ Start steroids/antivirals early (within 72 hr of onset)

**Trigeminal Neuralgia (CN V)**

- ▶ Avoid known triggers: cold air, brushing teeth on affected side, chewing hard foods
- ▶ Use lukewarm water; soft toothbrush; rinse rather than scrub
- ▶ Take carbamazepine/gabapentin **regularly, not PRN** — and report rash, fever, sore throat

**Vertigo / Vestibular (CN VIII)**

- ▶ Move slowly; avoid sudden head turns; sit before standing
- ▶ Identify trigger positions; consider vestibular rehab
- ▶ Report new tinnitus on aminoglycoside, ASA, or loop diuretic therapy

**Stroke Survivors / Multiple CN Deficits**

- ▶ Aspiration prevention: chin tuck, small bites, no straws (per SLP)
- ▶ Medication times around facial droop / dysphagia — crush only if approved
- ▶ Eye protection if blink is impaired
- ▶ When to call: new weakness, new vision change, sudden severe headache

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## • Memory Boosters & Mnemonics

LOCK IT IN

### NAMES — CN I THROUGH XII (IN ORDER)

*On Old Olympus' Towering Top, A Famous Vocal German Viewed Some Hops*

Olfactory · Optic · Oculomotor · Trochlear · Trigeminal · Abducens · Facial · Vestibulocochlear · Glossopharyngeal · Vagus · Spinal accessory · Hypoglossal

### FUNCTION — SENSORY / MOTOR / BOTH

*Some Say Marry Money But My Brother Says Big Brains Matter Most*

I–S · II–S · III–M · IV–M · V–B · VI–M · VII–B · VIII–S · IX–B · X–B · XI–M · XII–M

### EYE MOVEMENT — LR<sub>6</sub> SO<sub>4</sub> R<sub>3</sub>

*Lateral Rectus = CN 6, Superior Oblique = CN 4, the Rest = CN 3*

Use this for any "which CN moves the eye in this direction" question.

### TONGUE DEVIATION — "LICK THE LESION"

*Tongue points toward the side of the CN XII lesion*

Memory hook: the weak muscle can't push, so the strong side wins and shoves the tongue toward the bad side.

### BELL'S VS STROKE — "FOREHEAD TELLS YOU"

*Forehead Forgotten = Facial nerve (Bell's). Forehead Spared = Stroke.*

If the patient can wrinkle the forehead on the droop side, the lesion is central (stroke).

 **PRIORITY PUPIL RULE**

***Pupil change* → Provider Pronto**

A new fixed/dilated pupil is a herniation cue — never chart and watch. Notify, raise HOB 30°, prepare osmotic therapy.

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**Diane's NGN NCLEX 2026 Study Series** · Cranial Nerves I–XII · Neurological Assessment

Designed for high-yield review — pair with stroke, ↑ICP, Bell's palsy, and TBI cards for full integration.