

# Understanding of the Meaning in Neurological Examination

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# Understanding of the Meaning in Neurological Examination

- Mental Status
- Cranial Nerves
- Motor
- Coordination
- Reflexes
- Sensory
- Gait and Station

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# Mental Status

- Check for orientation x 3 (time, place, person)

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# Cranial Nerve 1

- Olfactory nerve:
  - Smelling of vinegar
  - Usually skip this test
  - Skull base lesion

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# Cranial Nerve 2

- Optic nerve:
  - Fundus: Papilledema, optic disk pallor
  - Visual field: Look at instructor's nose, cover one eye, and count fingers in all four quadrants
  - Visual acuity: with eyeglasses, one eye at one time, using the “near card”

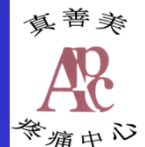
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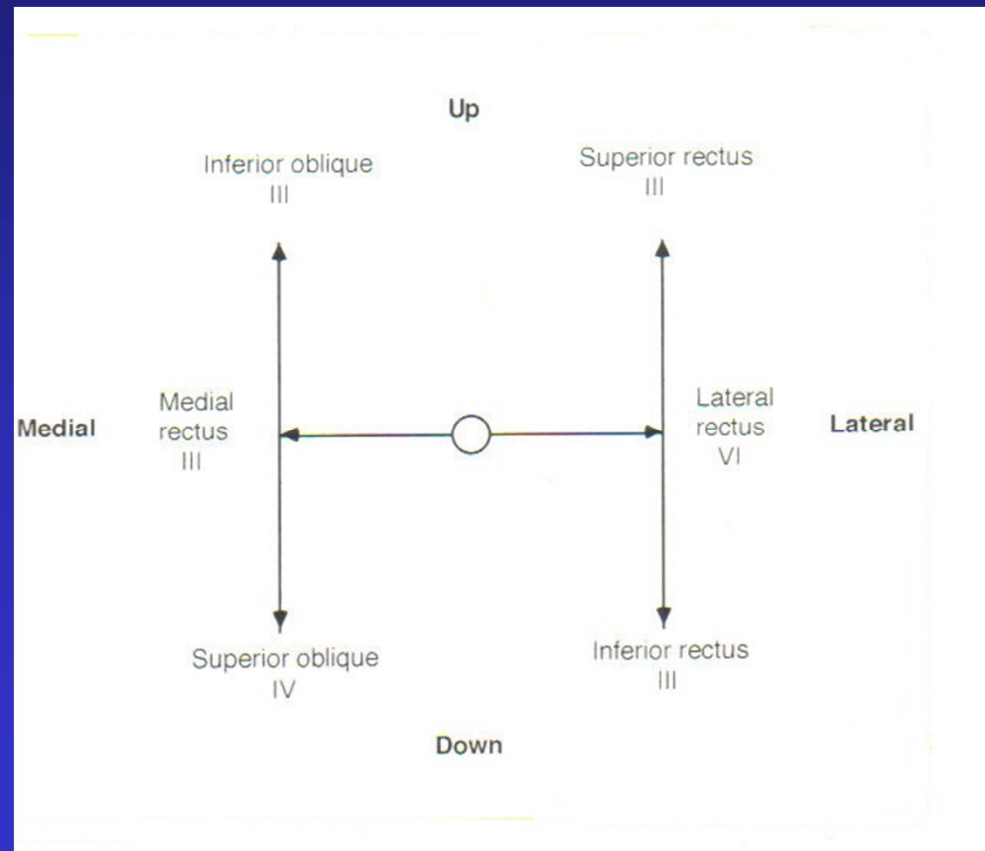
# Cranial Nerve 3

- Oculomotor nerve:
  - Eyelids: look for drooping eyelid (levator palpebrae muscle)
  - Pupils (sphincter pupillae muscle)
    - Shape and symmetry: equal size?
    - Reactivity to light: Using the swinging flashlight test (optic nerve sense the light, oculomotor nerve constrict the pupils)
  - Extraocular movements: to fixate on and follow examiner's finger in all directions of gaze (inferior and superior rectus, medial rectus, inferior oblique)

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# CN 3,4,6 – Extraocular Eye Movement



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# Cranial Nerve 4

- Trochlear nerve:
  - Superior oblique muscle
  - Extraocular eye movement (depression and intortion of the eye ball. Lesion causes inferomedial gaze palsy)

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# Cranial Nerve 6

- Abducens nerve:
  - Lateral rectus muscle
  - Extraocular eye movements
  - Lateral gaze palsy raises the suspicion of increased intracranial pressure (e.g. pseudotumor cerebri)

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# Cranial Nerve 5

- Trigeminal nerve:
  - Sensory: Check deficits to light touch, pinprick, and temperature (face, eye, tongue, partly oropharynx)
    - V1: Forehead
      - Also check corneal reflex: light touch to the cornea with a cotton wisp
    - V2: Cheek
    - V3: Chin
  - Motor: Checking for asymmetry of lateral jaw movements (jaw deviates to the paralyzed side)

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# Cranial Nerve 7

- Facial nerve:
  - Facial muscle: ask the patient to raise the eyebrows, close the eye, bare the teeth
  - Tear and salivary glands: Schirmer's test (tear secretion)
  - Stapedius muscle: nerve to stapedius.
    - Stapedius reflex: pull the stapes away from the cochlear, to reduce the transmission of sound vibration energy.
    - Paralysis causes hyperacusis, e.g. Bell's palsy.
  - Taste: anterior 2/3 of tongue: taste test

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# Cranial Nerve 8

- Vestibulocochlear nerve:
  - Balance: in benign positional vertigo, meniere's disease
  - Hearing (use 516 Hz tuning fork):
    - Weber's test: striking the tuning fork and placing it against the middle of the forehead
      - Conductive deafness: lateralization to the affected ear, middle ear.
      - Sensorineural deafness: lateralization to the better ear, inner ear
    - Rinne test: striking the tuning fork and place it on the mastoid process until the tone no longer being heard, then place it over the external auditory meatus
      - Conductive deafness: not hear the sound over the external auditory meatus
      - Sensorineural deafness: still hear the sound over the external auditory meatus
    - Acoustic neuroma

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# Cranial Nerve 9

- Glossopharyngeal nerve:
  - Pharynx muscle (swallowing)
  - Sensation back of tongue, pharynx, middle ear
    - sensory input for gag reflex
  - Taste posterior 1/3 tongue:
  - Salivation
  - Check gag reflex: CN 9 sensory, CN 10 motor. Lightly touching the posterior oropharynx with a cotton swab
    - May be absent in older patients

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# Cranial Nerve 10

- Vagus nerve:
  - Parasympathetic innervation
  - Larynx muscles and sensation: voice
  - Soft palate muscle: soft palate elevation
    - Ask the patient to say “Ah”
  - Check gag reflex: provide motor output (CN 9 sensory, CN 10 motor-ambiguous nucleus).

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# Cranial Nerve 11

- Spinal accessory nerve:
  - Sternocleidomastoid muscle: head rotation and tilt.
    - Flex and turn the head to each side against resistance
  - Trapezius muscle: shoulder elevation.
    - Shrug the shoulders against resistance

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# Cranial Nerve 12

- Hypoglossal nerve:
  - Tongue muscle
  - Deviate to the weak side
    - Stick out the tongue
    - Push it into each cheek.

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# Motor

- Muscular bulk: check atrophy (myopathy)
- Muscular tone: look for spasticity (stroke) vs. cogwheel rigidity (tension in a muscle that gives way in little jerks when the muscle is passively stretched, Parkinsonism)
- Muscular strength: grade the strength
  - 0: no muscle contraction visible
  - 1: barely visible muscle contraction
  - 2: active movement of part of limb with gravity eliminated
  - 3: active movement of part of limb against gravity
  - 4: active movement against moderate resistance
    - 4 - : against slight resistance
    - 4+ : against strong resistance
  - 5: normal power

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# Coordination

- Involving sensory feedback, motor output, integration center (mainly by cerebellum)
- Tests:
  - Finger-to-nose test:
    - Alternatively touch a fingertip to the nose and examiner's finger
  - Rapid rhythmic alternating movements:
    - Touch each each of the fingers to the thumb
  - Heel-to-shin test:
    - Slide the heel up and down the front of the shin
  - Trunk:
    - Ask the patient to sit up from lying without using this hands, falling to one side?

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# Reflexes – Deep Tendon Reflex

- Striking the muscle tendon with a reflex hammer
  - Stimulation of a stretch-sensitive afferent from a neuromuscular spindle, which, via a single synapse, stimulates a motor nerve leading a muscle contraction.
  - Increased reflex in upper motor neuron disease, decreased in lower motor neuron lesion and muscle disease.
  - Grading:
    - 4 + : increase with clonus
    - 3 + : increased without clonus
    - 2 + : normal
    - 1 + : decreased
    - 0 : absent

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# Reflexes – Plantar Reflex

- Bakinski's sign (upper motor neuron lesion):
  - Firmly stroke the sole of the patient's foot with the handle end of the reflex hammer, beginning at the heel and following up the lateral margin and across the ball of the foot to the base of the big toe
  - Negative: The toes all flex, flexor plantar response
  - Positive: Big toe extends, the other toes spread, extensor plantar response
  - No response: no toe movement
    - Profound motor weakness to extend the big toe
    - Sensory abnormality
  - Need to repeat test: If big toe extends, the other toes extend and ankle reflexes, withdrawal response, repeat test more gently

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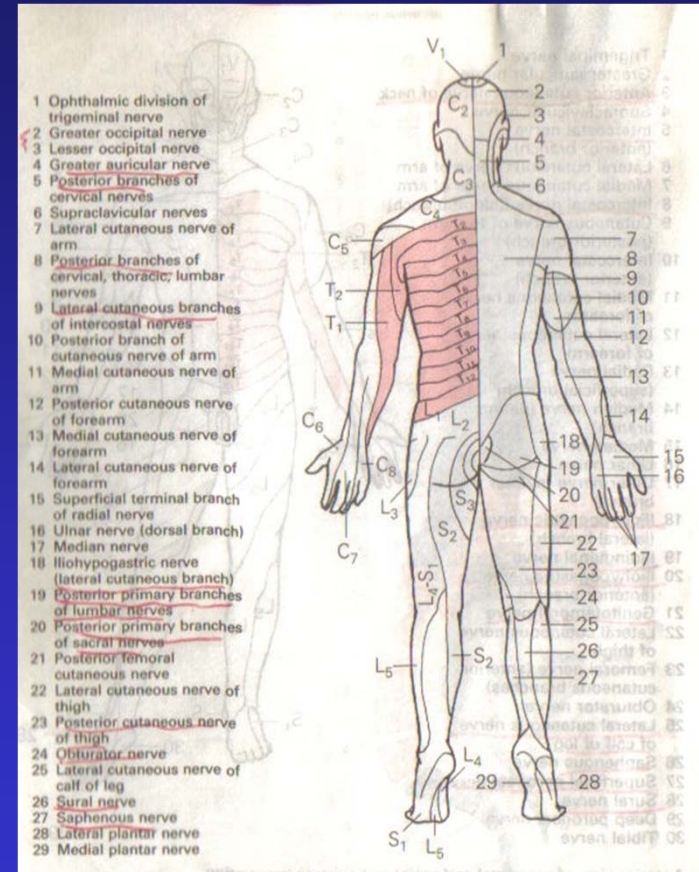
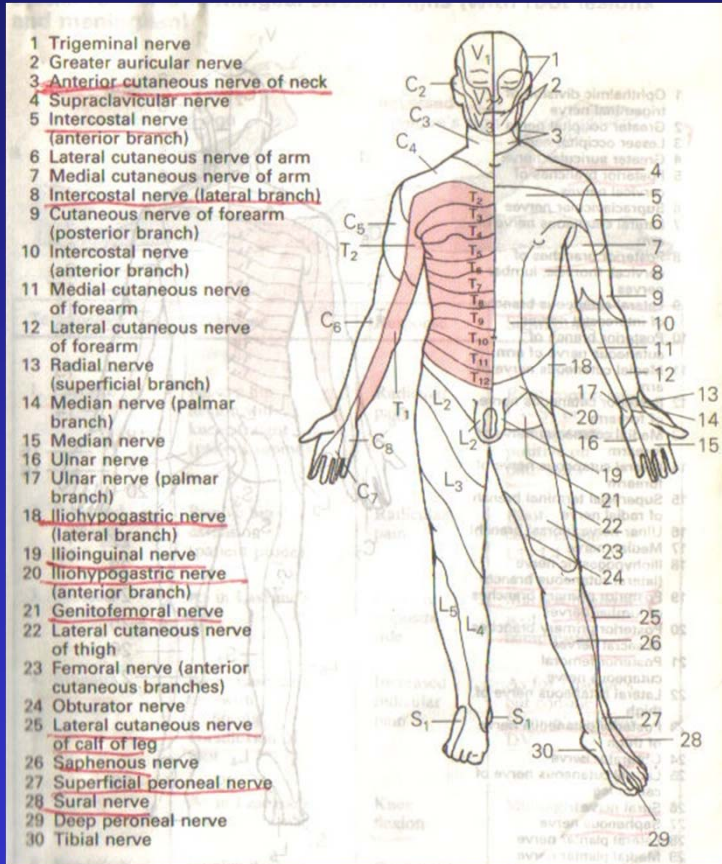


# Sensory - Primary Sensory Modalities

- Light touch, pinprick, temperature, vibration (128 HZ), and joint position (Proprioception)
  - Dermatome
  - Peripheral nerve

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# Sensory - Cortical Sensory Modalities

- Graphesthesia:
  - The ability to recognize writing on the skin purely by the sensation of touch.
  - Close the eye and identify a number traced on the palm
  - Contralateral parietal lobe damage, or damage to the dorsal columns pathway at any point between the tested point and the contralateral parietal lobe.
- Stereognosis:
  - The ability to perceive and recognize the form of an object using cues from texture, size, spatial properties, and temperature
  - Close the eye and identify a key, coin, paperclip
  - Test the intact of contralateral parietal lobe, and posterior column

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# Gait

- Casual walking
- Toe walking: lower extremity strength  $> 4/5$
- Tandem gait test: walk a straight line, touching toe to heel
  - To test ataxia, cerebellar dysfunction, drunk driving test
- Romberg's test: Stand with feet together and eyes close
  - Loss of joint positional sense:
    - Posterior column: cervical spondylosis, B12 deficiency
    - Peripheral neuropathy
  - Cannot proceed the test if the patient falls with eye opens
    - Cerebellar and central/peripheral vestibular syndrome
- Pull test: Stand behind the patient and pull back on the shoulders.
  - To test for postural instability in patients with Parkinson's disease

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# Suggested Readings:

- Memorix Neurology by Peter Berlitz, 1996
- Neurological Examination Made Easy by Geraint Fuller, 1995
- Clinical Neurological Neuroanatomy Made Ridiculously Simple, by Stephen Goldberg, 1990

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