Neurological examination

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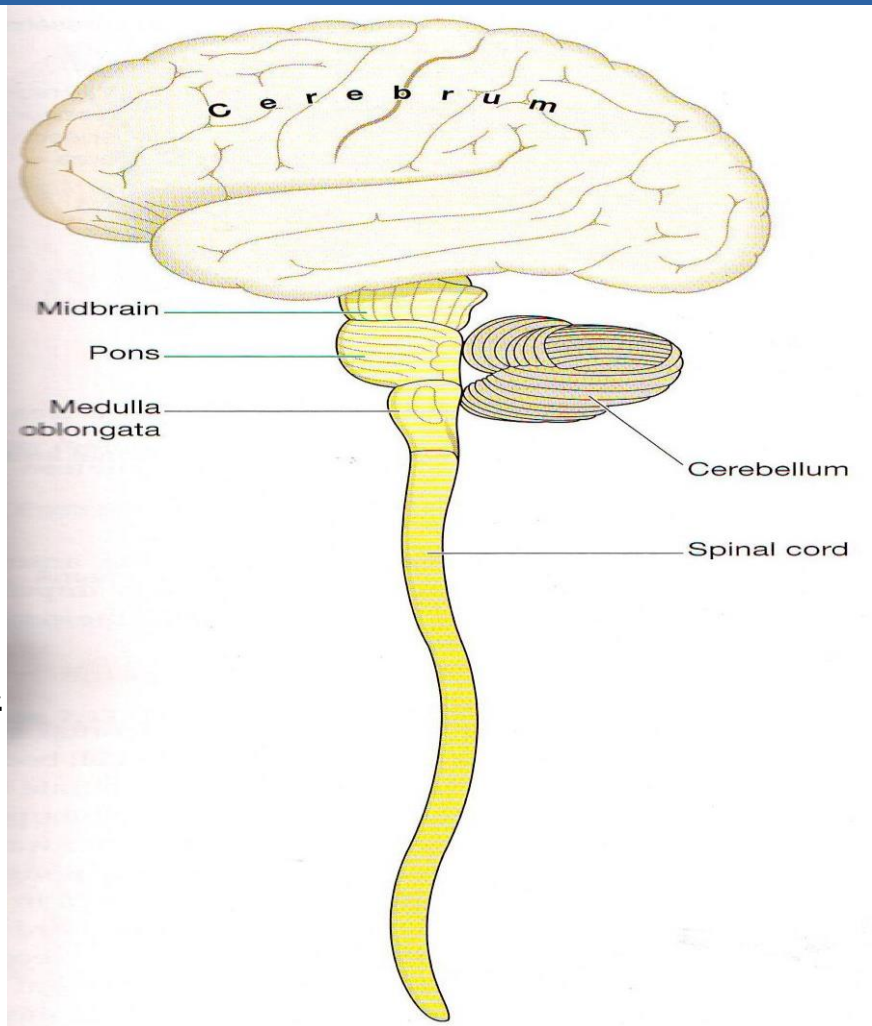
Nervous System

Central Nervous System

- Brain
- Spinal cord

Peripheral Nervous System

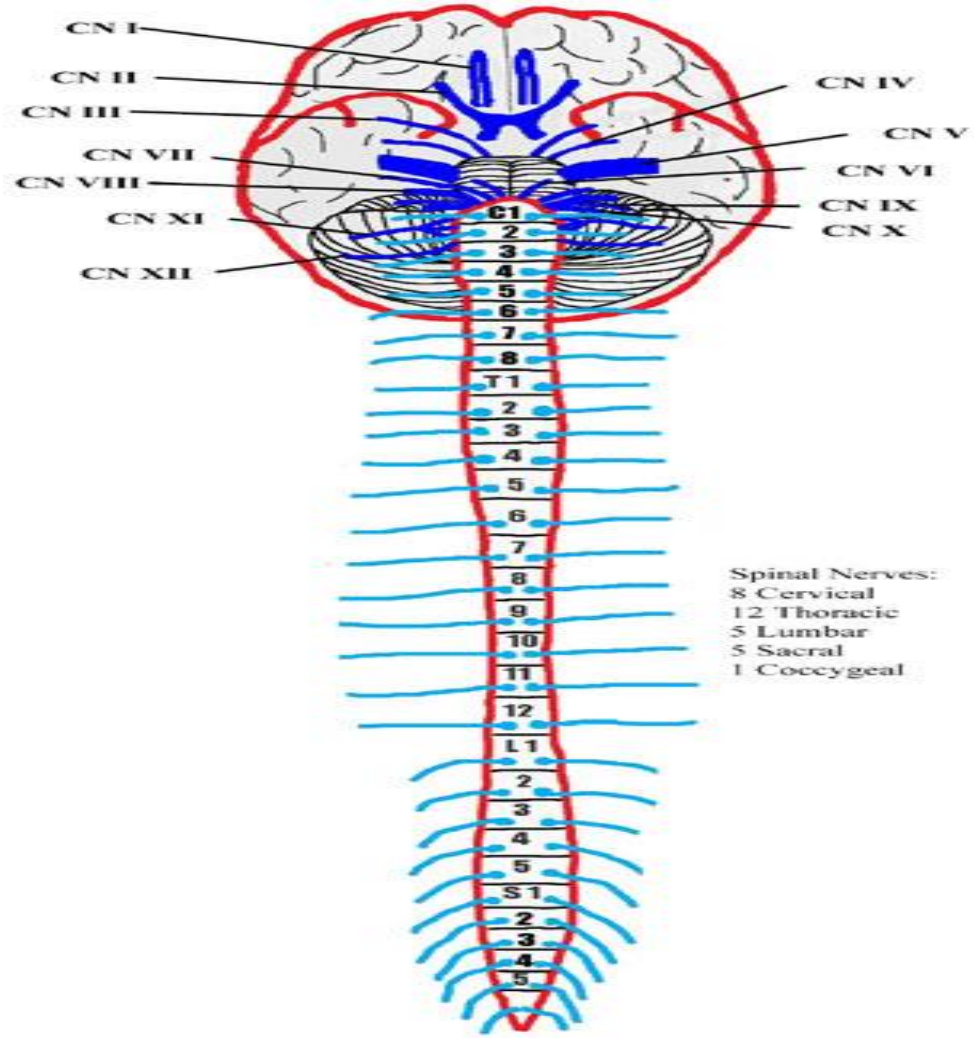
- Cranial nerves
- Spinal nerves



The parts of the central nervous system.

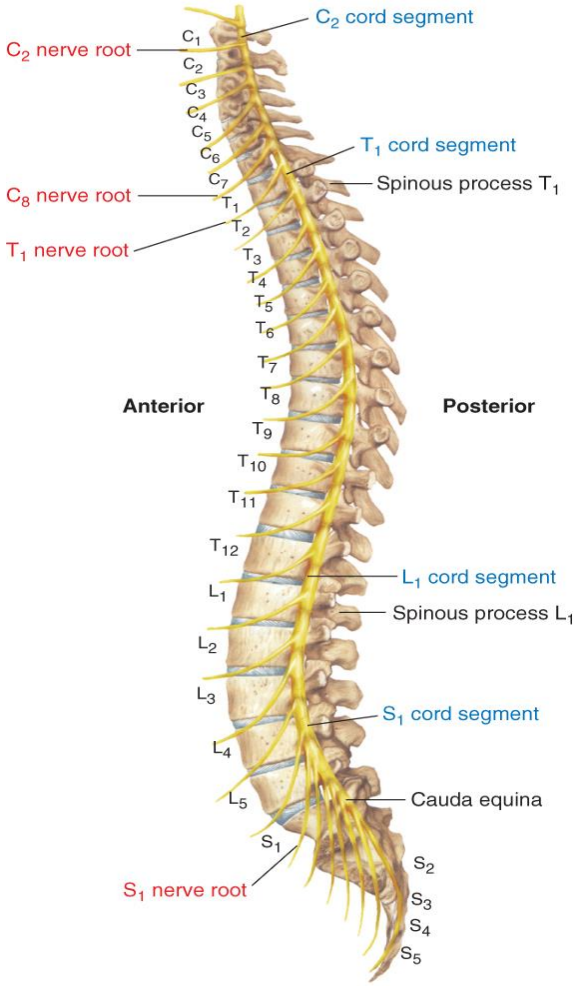
Peripheral Nervous System-12 Pairs of Cranial Nerves

- Originate in the brain
- Control many activities in the body
- Take impulses to and from the brain



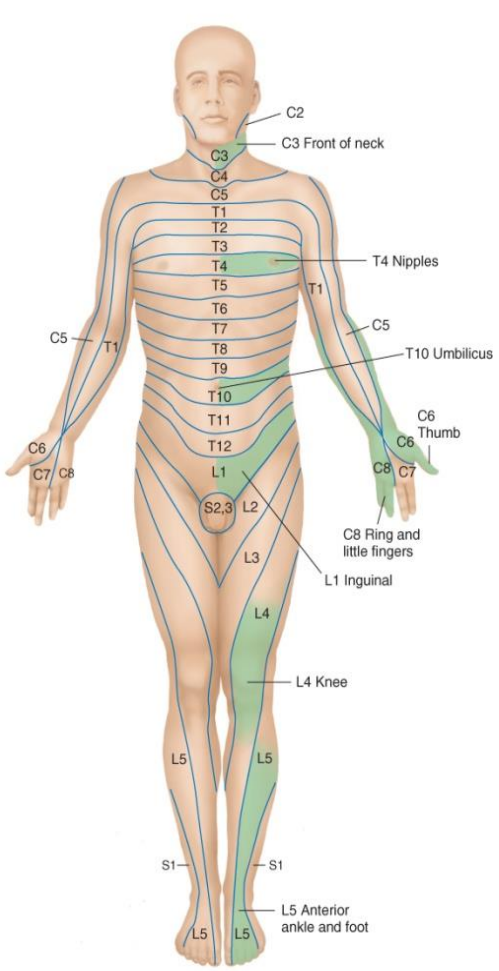
Peripheral Nervous System-Spinal nerves

- 31 pairs of spinal nerves
  - 8 pairs of cervical nerves
  - 12 pairs of thoracic nerves
  - 5 pairs of lumbar nerves
  - 5 pairs of sacral nerves
  - 1 pair of coccygeal nerves



SPINAL NERVES

Dermatome: band of skin innervated by the sensory root of a single spinal nerve



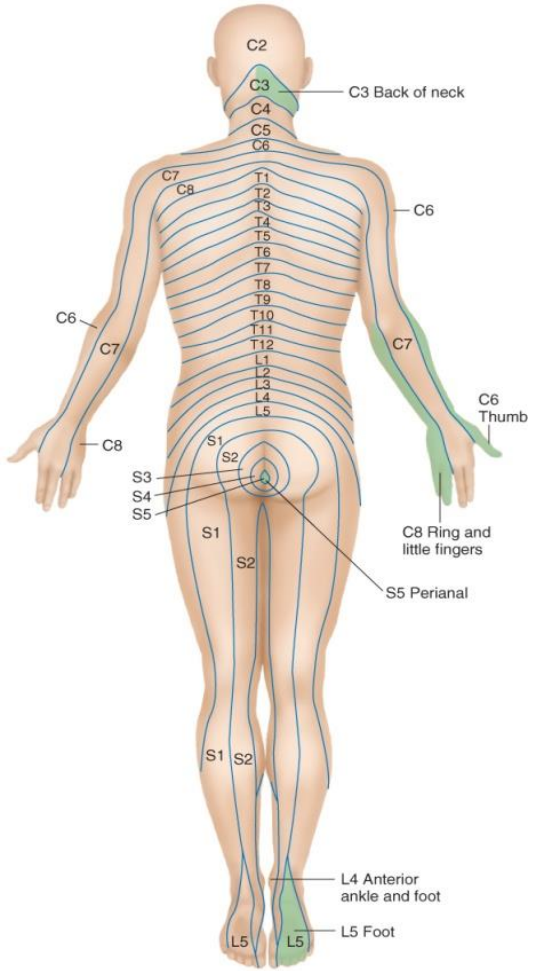
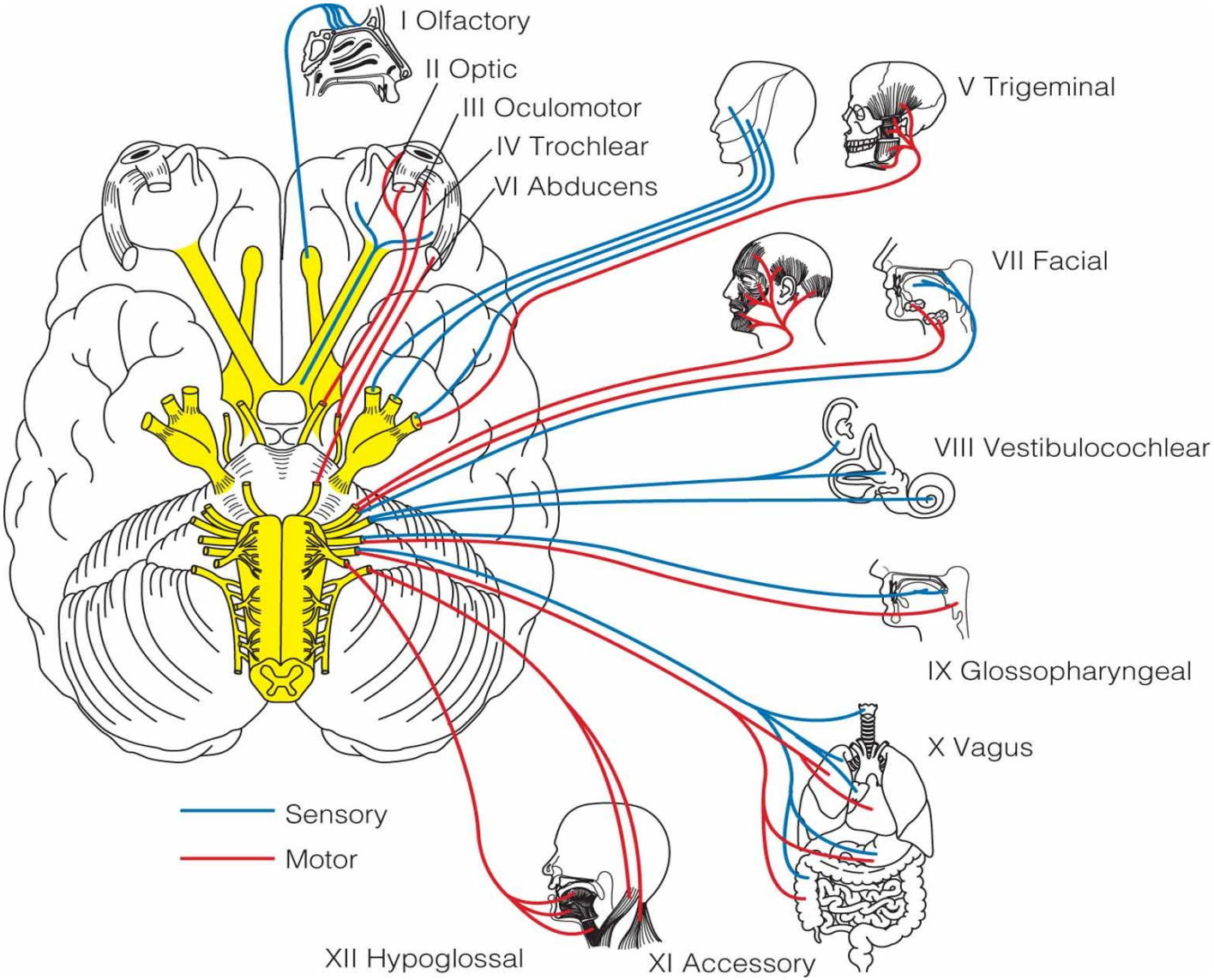


Figure 24.4 Cranial nerves and their target regions. (Sensory nerves are shown in blue; motor nerves, in red.)



Physical Assessment of the Neurologic System

- Mental status
- Cranial nerves
- Motor function
- Sensory function
- Reflexes

(Always consider left to right symmetry)

Mental status

Level of consciousness: A patient's **LOC** is the earliest and most sensitive indicator of a change in the neurologic status. To describe the patient's LOC, you may use the following terms:

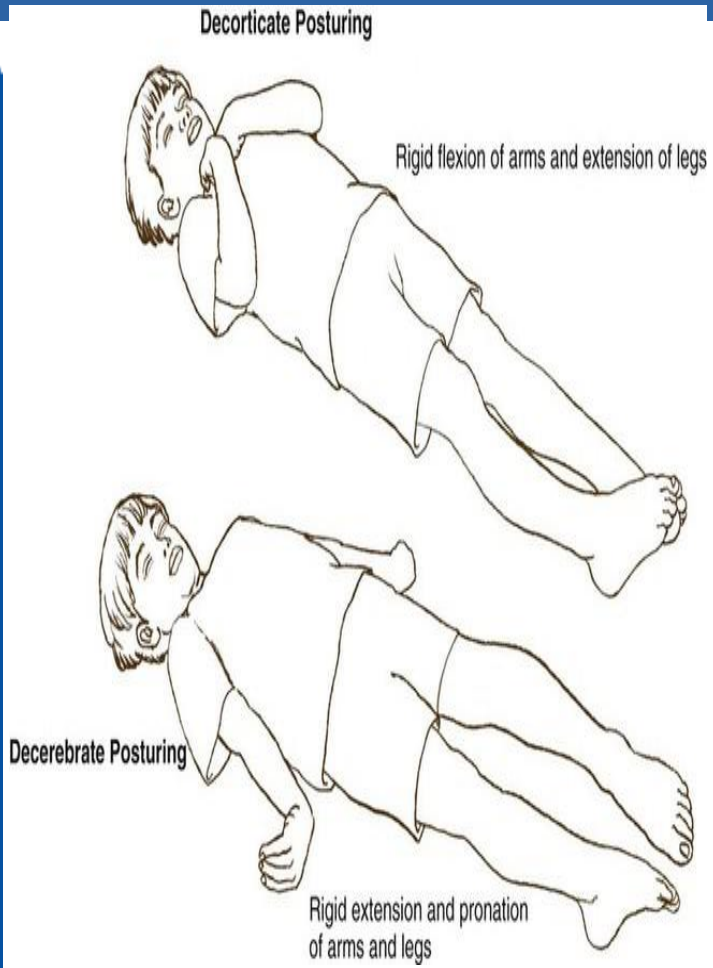
- **Alert**. The patient is awake and responds fully and appropriately to all stimuli.
- **Lethargic**. The patient is drowsy and indifferent, and his verbal responses to stimuli are delayed. He reacts to stimuli but falls asleep when stimulation stops.
- **Obtunded**. The patient is even more lethargic and sleeps unless aroused.
- **Stupor**. The patient can be aroused from sleep only by vigorous stimulation.
- **Comatose**. The patient has lost consciousness and no longer interacts with the environment. As an alternative to using these terms, you may use the Glasgow Coma Scale to assess and document your patient's LOC.

Assessment of patient's level of consciousness through application of Glasgow-Coma Scale

Glasgow Coma Scale

The Glasgow Coma Scale is a tool for assessing a patient's response to stimuli. Scores range from 3 (deep coma) to 15 (normal).

Eye opening response	Spontaneous	4
	To voice	3
	To pain	2
	None	1
Best verbal response	Oriented	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	None	1
Best motor response	Obeys command	6
	Localizes pain	5
	Withdraws	4
	Flexion	3
	Extension	2
	None	1
Total		3 to 15



Orientation: patient is oriented to time, person and place.

Appearance and behavior: Observe the patient's clothing, grooming, and personal hygiene. Are his clothes appropriate for the setting and the weather? A manic patient may dress flamboyantly. Someone suffering from dementia or schizophrenia may have poor hygiene and grooming. Observe the patient's posture and motor behavior.

Memory: Registration of memory, recent memory, and remote memory.

Speech: Listen to the patient's speech, noting how well he expresses himself and how well he comprehends your speech.

Aphasia: a speech impairment that usually results from an injury to the cerebral cortex. A CVA or brain tumor may cause such an injury. Types of aphasia include the following:

- **Expressive (Broca's) aphasia: The patient may use single words without articles or prepositions. His ability to repeat words and to write may also be impaired. This type of aphasia results from damage to the anterior cerebral cortex.**
- **Receptive (Wernicke's) aphasia: A patient with this disorder can't understand written words or speech. Receptive aphasia results from damage to the posterior cortex.**
- **Global aphasia: Damage to both the anterior and the posterior cortex results in the loss of expressive and receptive speech.**

Perception

The examiner may now consider more specific areas of higher cortical function. **Agnosia** is the inability to interpret or recognize objects seen through the special senses. The patient may see a pencil but not know what it is called or what to do with it. The patient may even be able to describe it but not to interpret its function. The patient may experience auditory or tactile agnosia as well as visual agnosia.

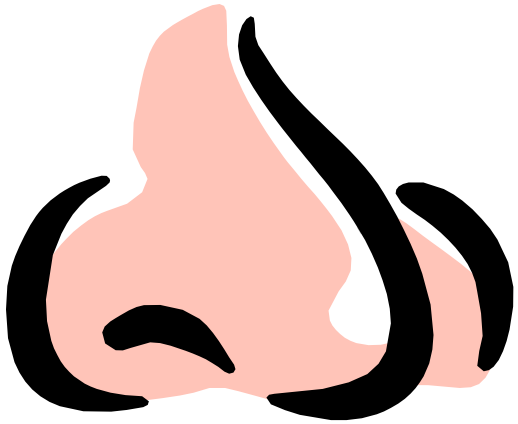
Table 60-2 • Cranial Nerves

CRANIAL NERVE	TYPE	FUNCTION
I (olfactory)	Sensory	Sense of smell
II (optic)	Sensory	Visual acuity
III (oculomotor)	Motor	Muscles that move the eye and lid, pupillary constriction, lens accommodation
IV (trochlear)	Motor	Muscles that move the eye
V (trigeminal)	Mixed	Facial sensation, corneal reflex, mastication
VI (abducens)	Motor	Muscles that move the eye
VII (facial)	Mixed	Facial expression and muscle movement, salivation and tearing, taste, sensation in the ear
VIII (acoustic)	Sensory	Hearing and equilibrium
IX (glossopharyngeal)	Mixed	Taste, sensation in pharynx and tongue, pharyngeal muscles
X (vagus)	Mixed	Muscles of pharynx, larynx, and soft palate; sensation in external ear, pharynx, larynx, thoracic and abdominal viscera; parasympathetic innervation of thoracic and abdominal organs
XI (spinal accessory)	Motor	Sternocleidomastoid and trapezius muscles
XII (hypoglossal)	Motor	Movement of the tongue

I. Olfactory: smell

- Client both eyes and one naris are closed

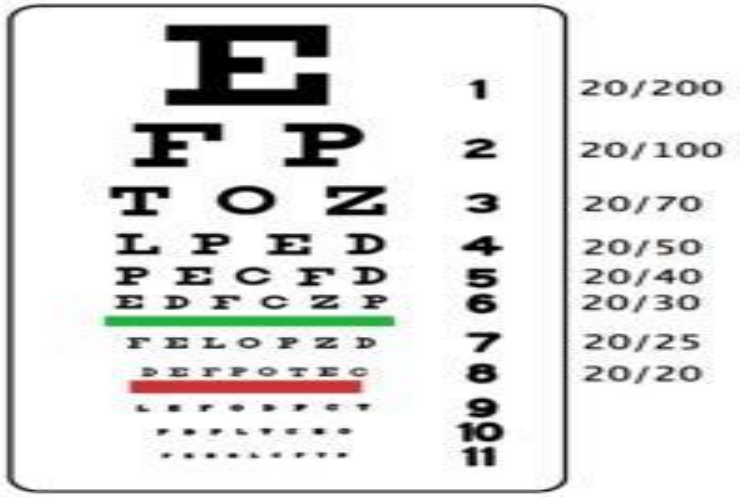
- Place a strong smelling item under each nostril individually and ask the person to identify it.



II. Optic: vision

1- Visual acuity

- Distance/Central vision: **Snellen eye chart**; position patient 20 feet (**6 meters**) from the chart
  - -Near vision (**hand-held card**)
    - **Patients should wear glasses if needed**
    - Test one eye at a time

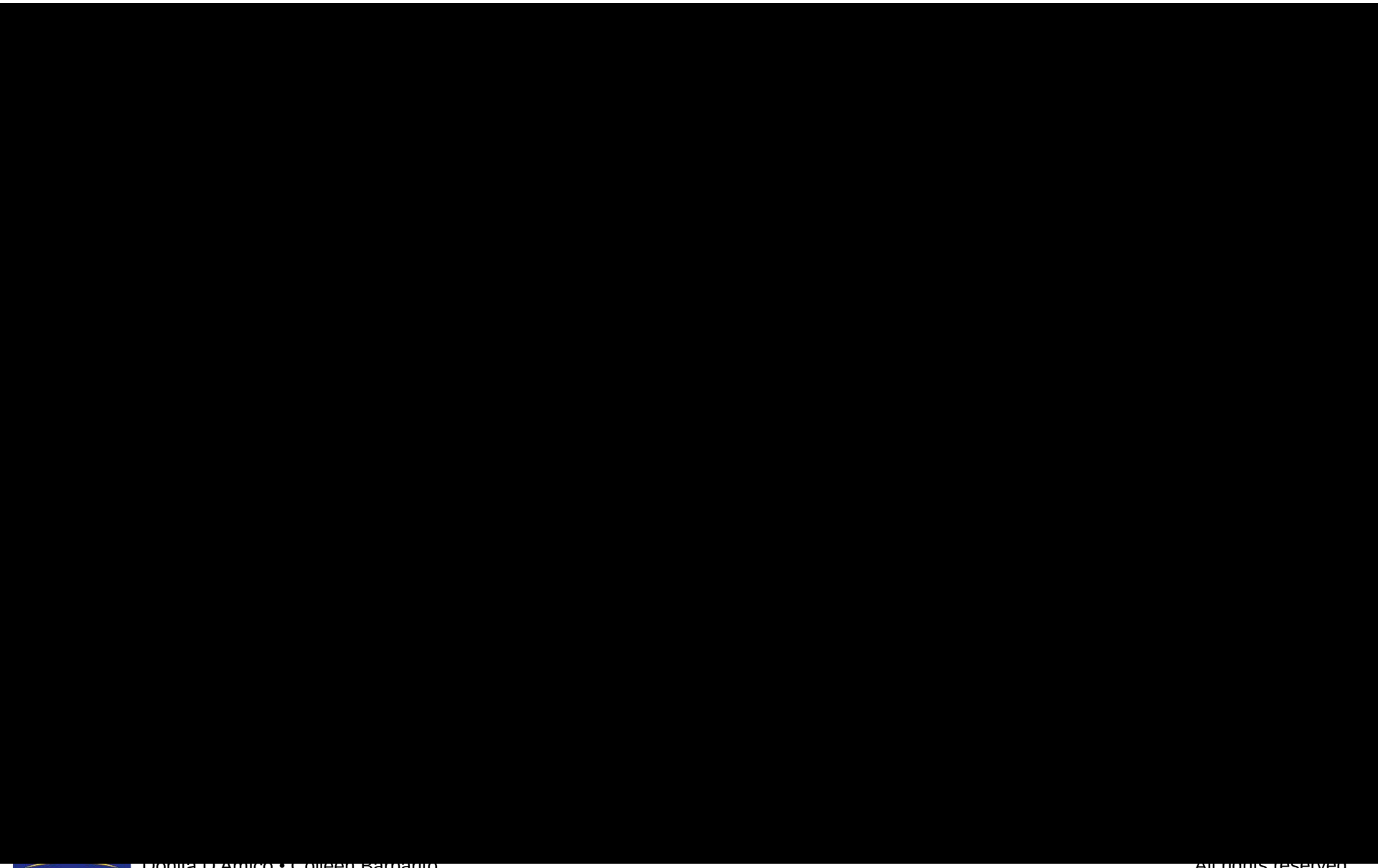


Eyes – Techniques of Examination

2- Examine the Optic Fundi by using the Ophthalmoscope

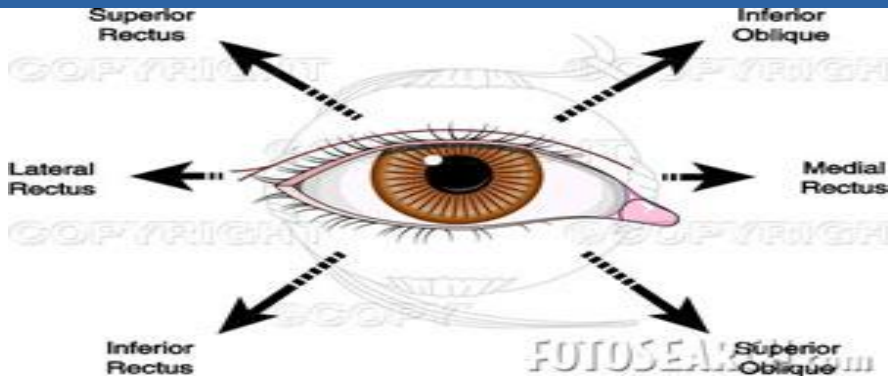
3- Visual field

Video for Visual field



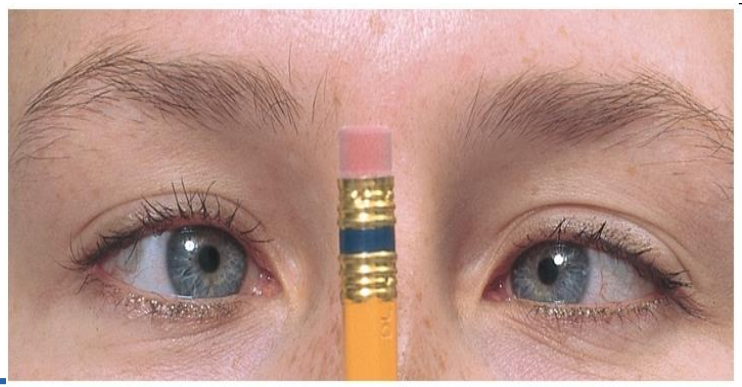
lll. Oculomotor
lV. Trochlear
Vl. Abducens

1. Test Extraocular Movements



2. Test direct and consensual pupillary reaction to light

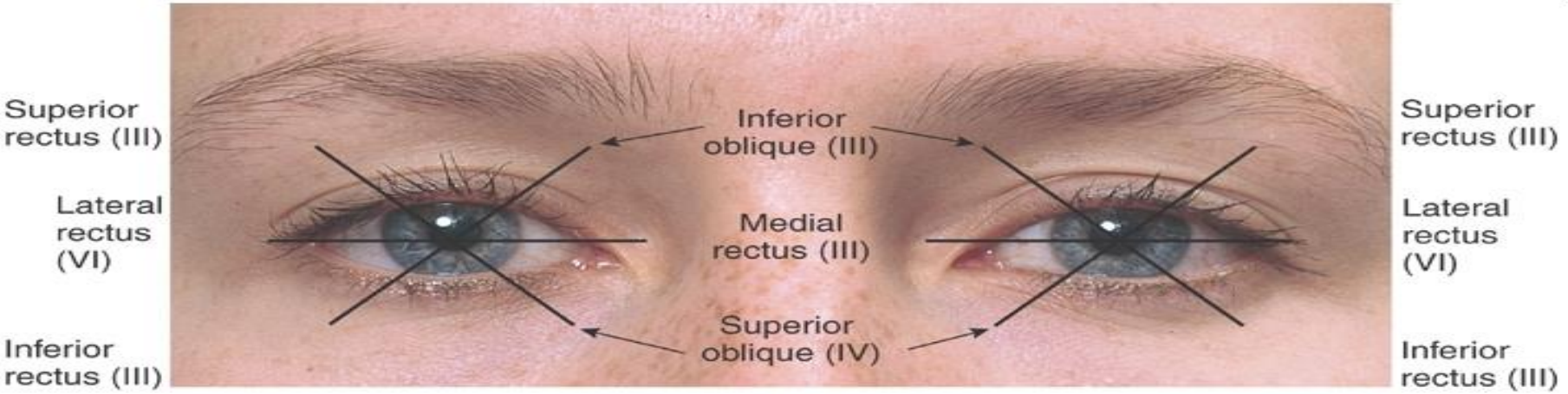
3. Accommodation: An object held about 10 cm from the client's nose



The Near Reaction (B)

Eyes – Techniques of Examination

- **Extra**ocular **m**ovements **EOMs/six cardinal directions** of gaze/wagon wheel method
- The client must keep the head still while following a pen that you will move in several directions to form a star in front of the client's eyes.
- **Always return the pen to the center** before changing direction.



Cardinal Directions of Gaze

Video for Extraocular movements

Video for Consensual Pupillary Reaction To Light and Accommodation

V. Trigeminal (mixed)

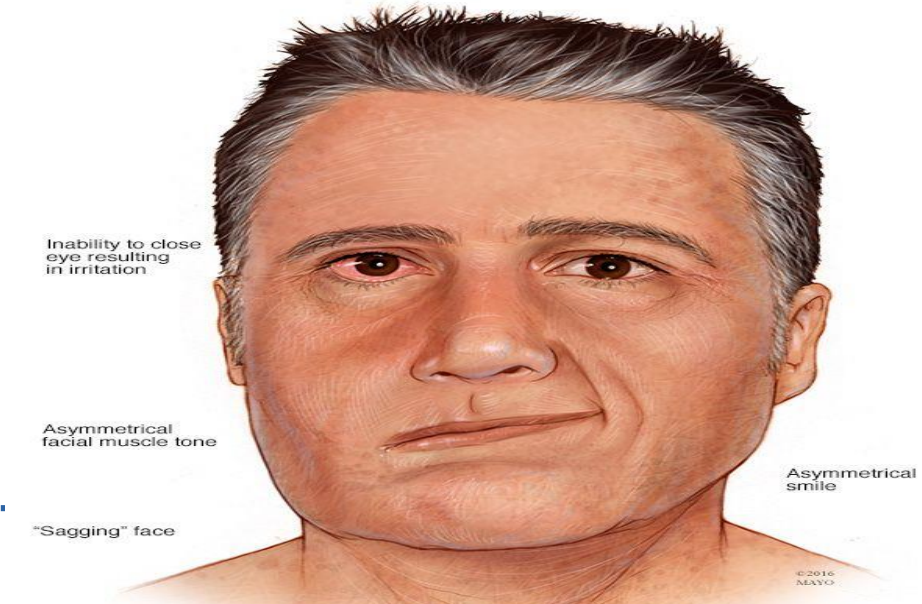
- Bilaterally palpate temporal and masseter muscles while patient clenches teeth

- (Sensation) Ask client to closed his eyes and test forehead, each cheek, and jaw on each side for sharp or dull (use a cotton swab) sensation. Direct the client to say ‘now’ every time the cotton is felt.

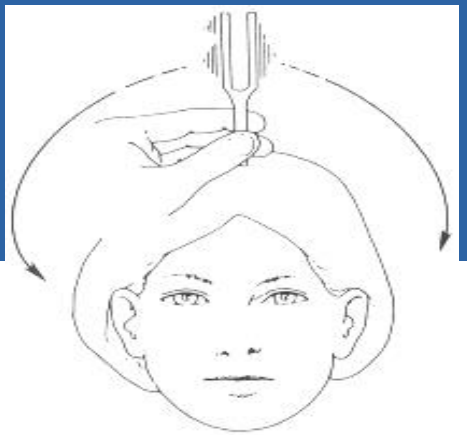
- (Reflex) With the individual's eyes open and looking upward, the practitioner takes a strand of cotton, approaches the cornea from the side, and touches it with the cotton. This should initiate a blink response. Both eyes should be tested independently.

VII. Facial (mixed)

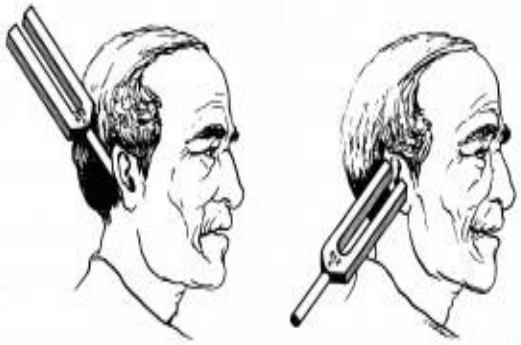
- Ask the client to close both eyes and keep them closed. Try to open them by retracting the upper and lower lids simultaneously and bilaterally.
- Ask patient to raise eyebrows, show teeth, grimace, smile, **puff both cheeks** (Assess face for asymmetry, abnormal movements)
- Use the **sweet, salty, sour and bitter** items to test taste (Between each solution the mouth needs to be rinsed with water)



VIII. Acoustic



- Weber Test (by using a tuning fork).



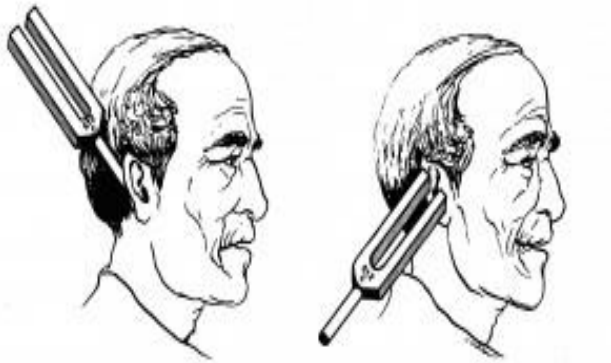
- Rinne test: to compares air and bone conduction

- Romberg test: Ask the patient to remain still and close their eyes (for about 20 seconds).

Ears – Hearing acuity

Air and bone conduction (AC and BC)

- **Rinne**
  - Compare time of air vs. bone conduction
  - Place the base of the tuning fork on the client's mastoid process- and note the number of seconds.
  - Then move the fork in front the external auditory meatus (1-2 cm)



lX. Glossopharyngeal
X. Vagus

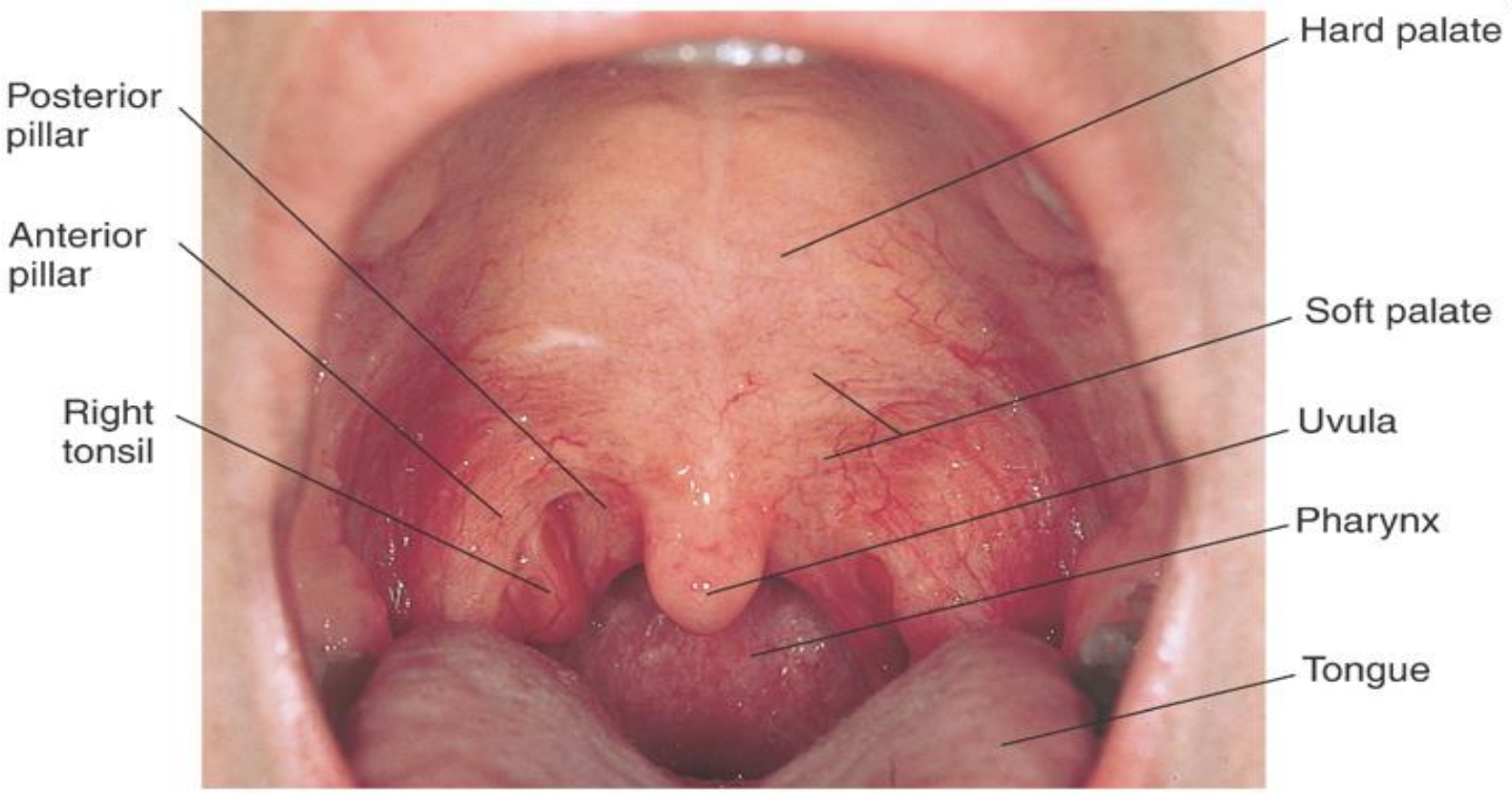
- Ask the client to open the mouth, depress the client's tongue with the tongue blade, ask the client to say "ah" . Usually, **the soft palate raises and the uvula remains in the midline**

- Observe the individual **swallowing.**

- Test **gag reflex**, warning patient first.

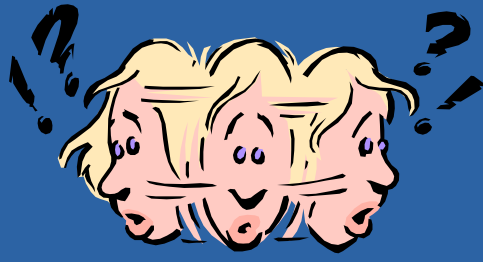
LX. GLOSSOPHARYNGEAL
X. VAGUS

Ask the client to open the mouth, depress the client's tongue with the tongue blade, ask the client to say "ah" . Usually, the soft palate raises and the uvula remains in the midline



Above and Behind the Tongue

XI. Spinal Accessory



- Test the Trapezius muscle: have the client shrug the shoulders while you resist with your hands

- Ask the client to try to touch the right ear to the right shoulder without raising the shoulder. Repeat with the left shoulder

XII. Hypoglossal

- Ask patient to protrude tongue and move it side to side. Assess for symmetry, atrophy.

Areas of the Neurologic System Assessment

- Motor function
  - Observation of gait and balance
  - Administration of the Romberg test
  - Administration of the finger-to-nose test
  - Observation of rapid alternating action movements

Observation of gait and balance

Ask the client to walk across the room and return

Romberg's test for balance.

Ask the patient to remain still and close their eyes (for about 20 seconds).

Finger-to-nose test.

-Ask the client to extend both arms from the sides of the body
-ask the client to keep booth eyes open
-ask the client to touch the tip of the nose with right index finger, and then return the right arm to an extended position.
-ask the client to touch the tip of the nose with left index finger, and then return the left arm to an extended position.
-Repeat the procedure several times.
-Ask the client to close both eyes and repeat the alternating movements

Areas of the Neurologic System Assessment

- Sensory function
  - Observation of light touch identification
  - Sharp, dull determination
  - Stereognosis
  - Graphesthesia (Number identification)

-Evaluation of light touch.

-Use wisp of cotton to touch the skin lightly on both sides simultaneously.
-Test several areas on both the upper and lower extremities.
-Ask the patient to tell you if there is difference from side to side or other "strange" sensations.

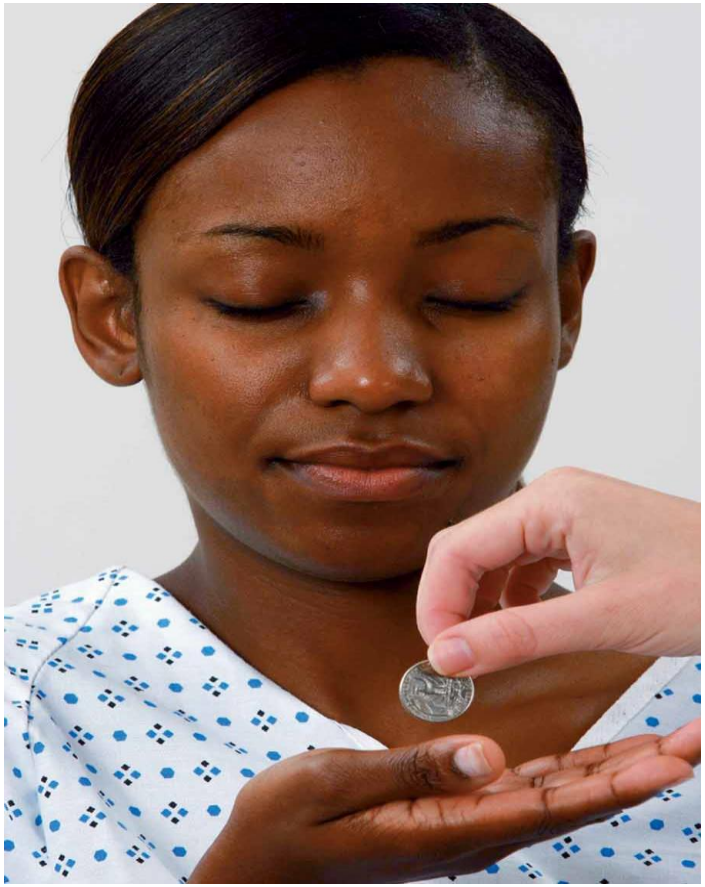
Testing the client's ability to identify sharp sensations.

-Ask the client to say "sharp" or "dull" when something sharp or dull is felt on the skin.
-Touch the client using random locations.

Testing the client's ability to identify dull sensations	Testing the client's ability to identify sharp sensations

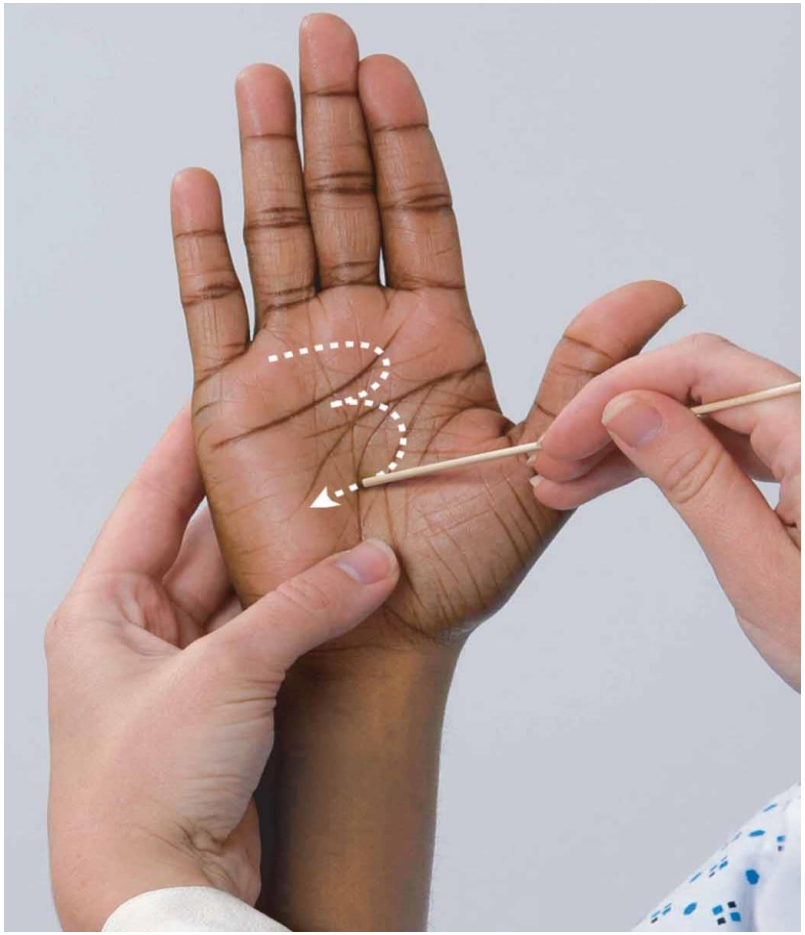
-Testing stereognosis using a coin

-Use as an alternative to graphesthesia.
-Place a familiar object in the patient's hand (coin, paper, pencil, etc.).
-Ask the patient to tell you what it is.



-Testing graphesthesia (Number identification)

-With the blunt end of a pen or pencil, draw a large number in the patient's palm.
-Ask the patient to identify the number.



Areas of the Neurologic System Assessment

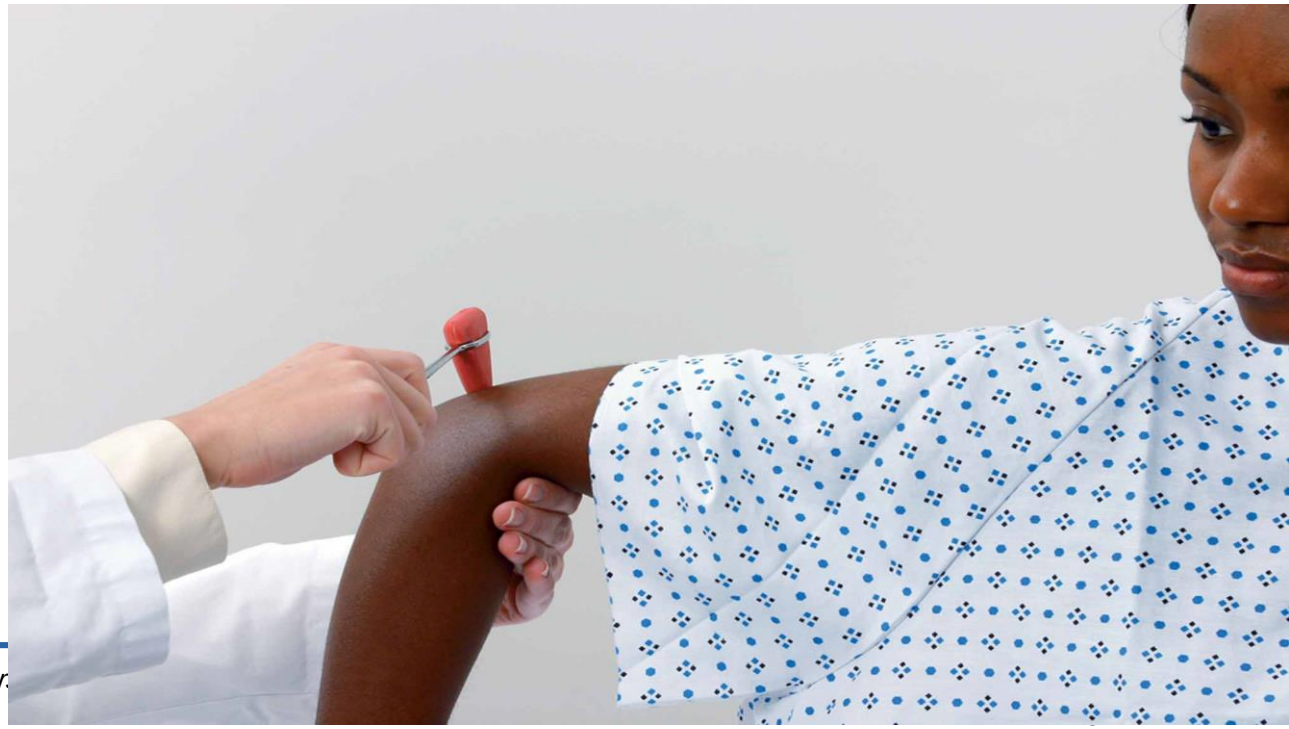
- Reflexes (Stimulus-response activities of the body).
  - Biceps
  - Triceps
  - Brachioradialsis
  - Patellar (knee)
  - Plantar (Babinski).

Testing the biceps reflex.

-The patient's arm should be partially flexed at the elbow with the palm down.
-Place your thumb or finger firmly on the biceps tendon.
-Strike your finger with the reflex hammer.
-look for contraction of the biceps muscle and slight flexion of the forearm.

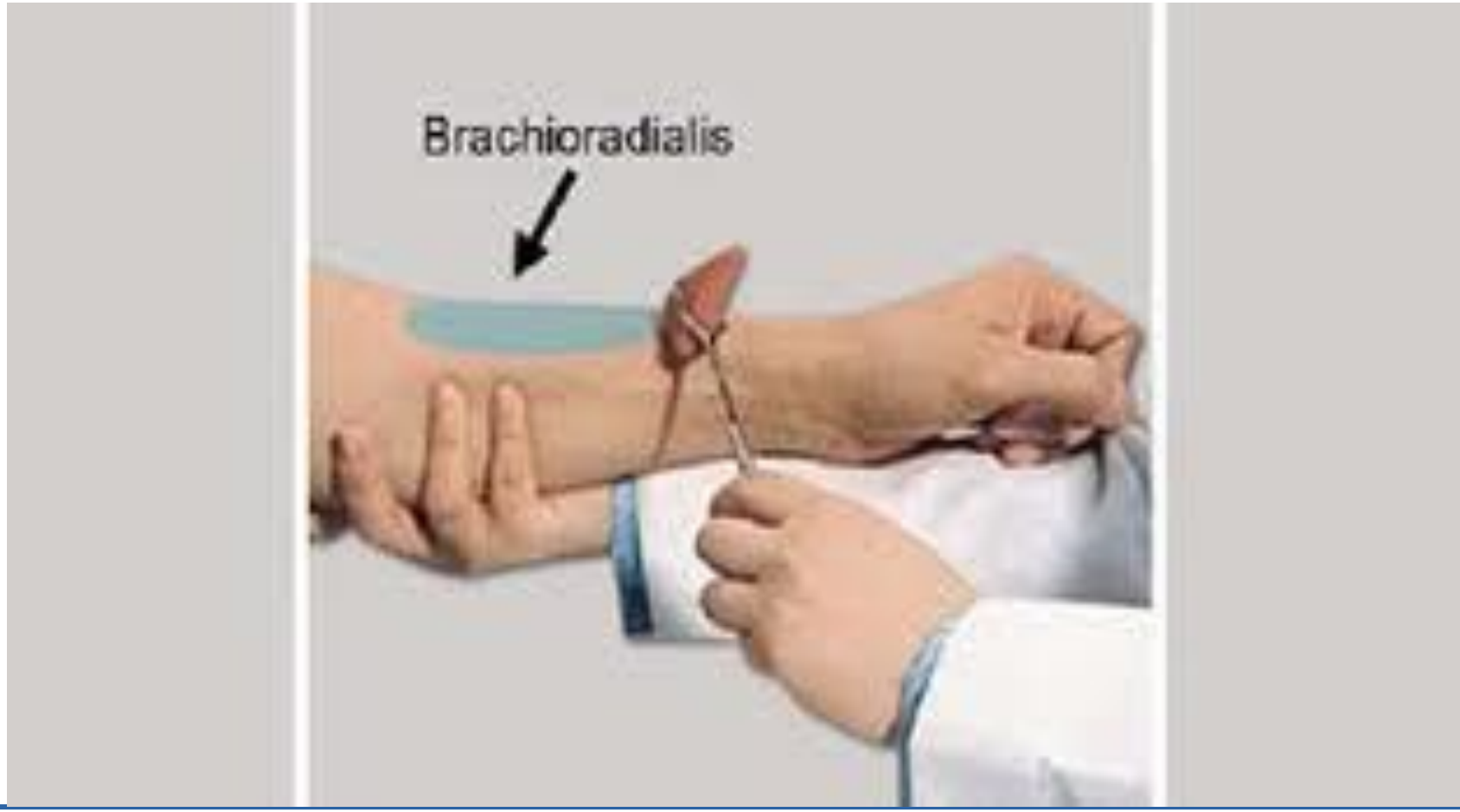
Testing the triceps reflex.

-Support the upper arm and let the patient's forearm hang free.
-Strike the triceps tendon above the elbow with the broad side of the hammer.
-observe contraction of the triceps muscle with extension of the lower arm.



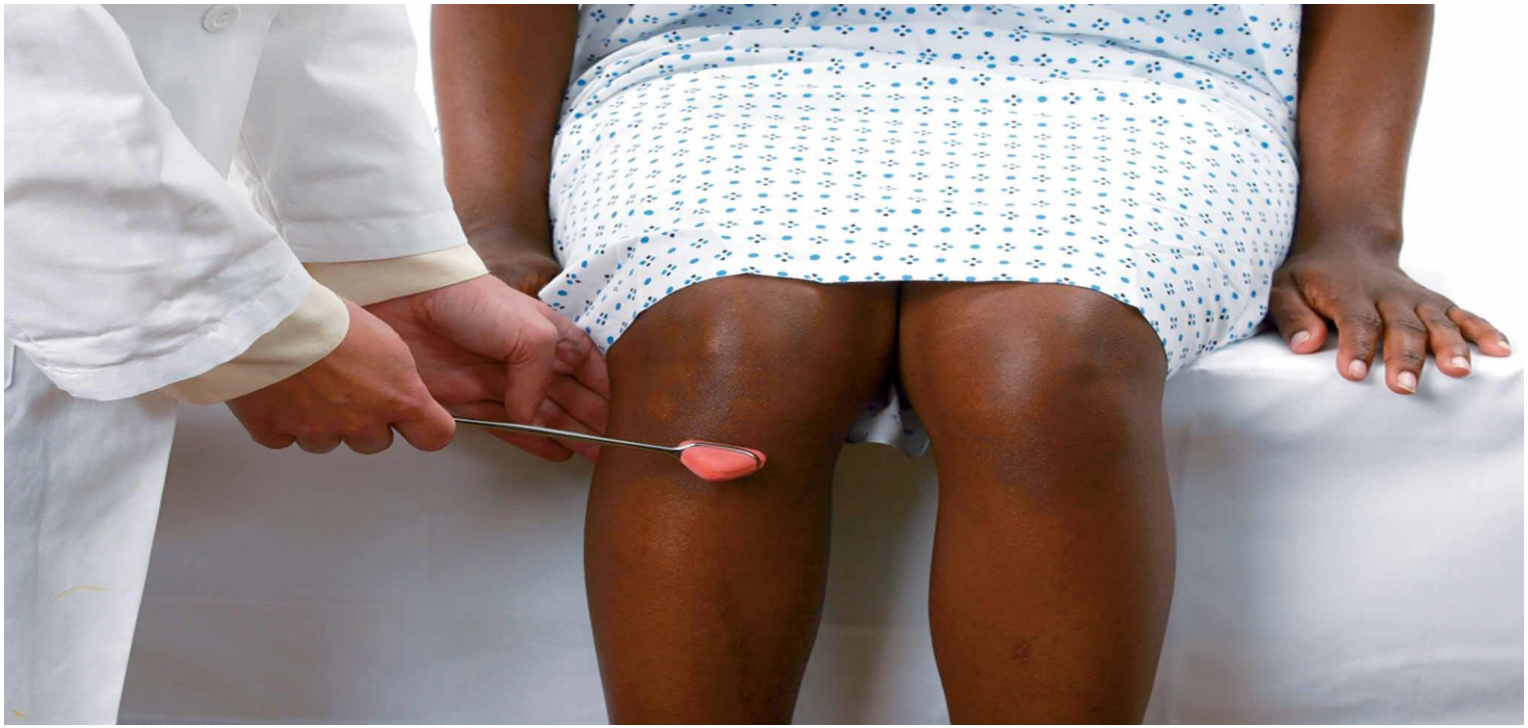
Testing the brachioradialis reflex.

-Have the patient rest the forearm on the abdomen or lap.
-Strike the radius about 1-2 inches above the wrist.
-Watch for flexion and supination of the forearm.



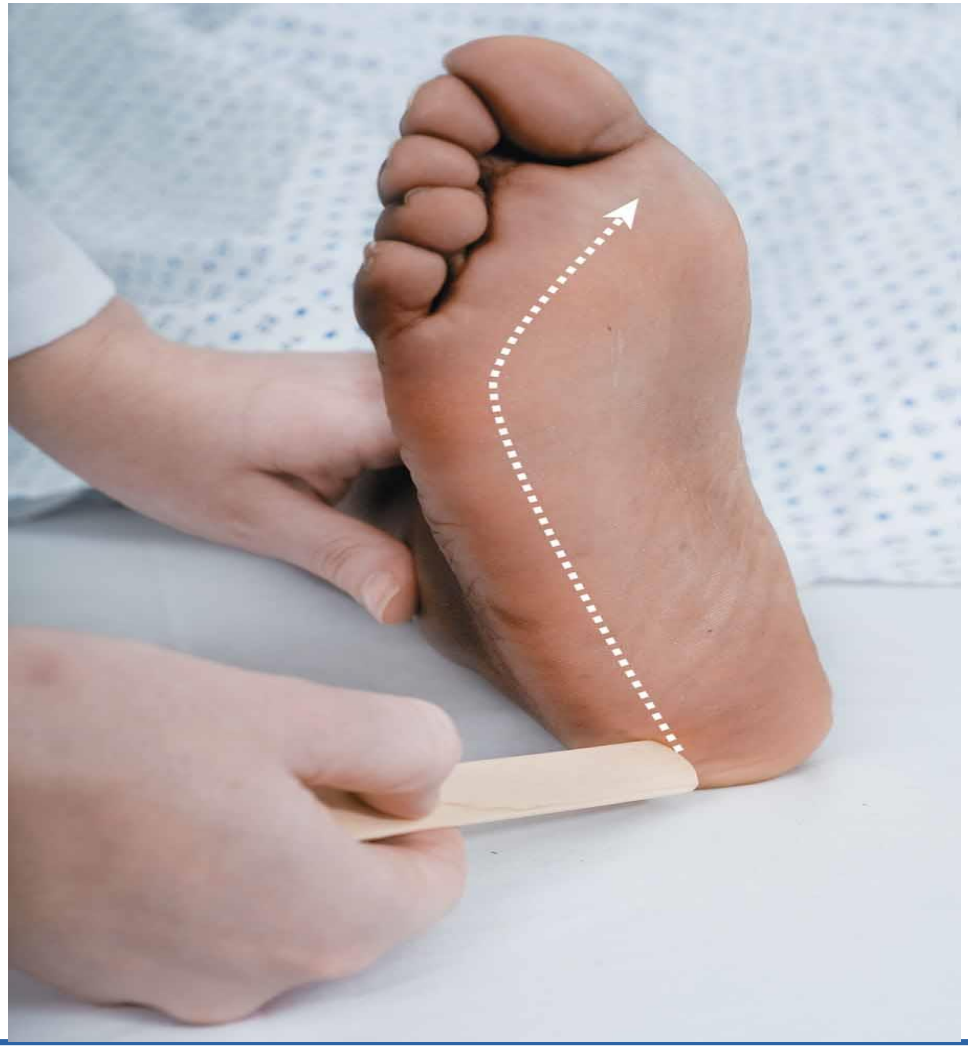
Testing patellar (knee) reflex, client in a sitting position.

-Have the patient sit with the knee flexed.
-Strike the patellar tendon just below the patella.
-Note contraction of the quadraceps muscle and extension of the knee.



Testing the plantar reflex (Babinski).

-Stroke the lateral aspect of the sole of each foot with the end of a reflex hammer or key.
-Observe for planter flexion of the foot .



REFLEXES: SCALE FOR GRADING

Reflexes are usually graded on a 0 to 4+ scale
4+ Very brisk, hyperactive, with clonus (rhythmic oscillations between flexion and extension)
3+ Brisker than average; possibly but not necessarily indicative of disease
2+ Average; normal
1+ Somewhat diminished; low normal
0 No response