

The Neurologic Exam

Sources: UST-FMS Med1 Lecture (Sept 24, 2014), **Mosby's Guide to Physical Exam**, Internet (pictures), **OSCE checklist**

"One learns by doing the thing; for though you think you know it, you have no certainty until you try."

- Sophocles

- At all times, one must treat patients with respect and kindness.
- When you enter the room, identify yourself and tell the patient why you are there.
- Do not persist with the history or examination past the point at which the patient is tired or uncooperative.
- Patients are most cooperative with students and doctors who are clean, neat and polite.

"Have a system of examination and learn to follow it in the same way each time."

MOSBY'S NOTES

The Nervous System: Anatomy and Physiology

1. CNS – brain and spinal cord, main network of coordination and control for the body
2. PNS – cranial and spinal nerves, ascending and descending pathways, carries information to and from the central nervous system
3. ANS – coordinates and regulates the internal organs of the body

Sympathetic – prods the body into action during times of stress

Parasympathetic – functions in a complementary and a counterbalancing manner to conserve body resources and maintain day-to-day functions such as digestion and elimination

Functions of the nervous system

- Receive sensory stimuli from the environment
- Identify and integrate adaptive processes needed to maintain current body functions
- Orchestrate body function changes required for adaptation and survival
- Integrate the rapid responsiveness of the central nervous system with the more gradual responsiveness of the endocrine system
- Control cognitive and voluntary behavioral processes
- Control subconscious and involuntary body functions

Protection

- Skull and vertebrae
- Meninges: pia, dura, arachnoid
 - assists in protection and drainage of CSF
- Cerebrospinal fluid – shock absorber

LEVEL OF LESION

- **Cerebral** – general higher cognitive function
 - Parietal – sensory
 - Frontal – motor
 - Temporal – sounds, reception of speech
 - Occipital – visual
- **Brainstem** – 10 cranial nerves
 - Midbrain
 - Pons
 - Medulla – decussation of CS tracts
- **Cerebellum** – balance and coordination
- **Spinal Cord** – *weakness bilaterally*
 - *Paraparesis* – weakness of lower limbs
 - *Paraplegia* – complete paralysis of lower limbs
 - *Quadriparesis* – weakness of upper and lower limbs
 - *Quadriplegia* – complete paralysis of upper and lowerlimbs

Upper Motor Neuron vs Lower Motor Neuron

UMN signs	LMN signs
Spasticity	Flaccidity
Hyperreactivity	Atrophy
Babinski (lower limb)	Hyporeflexia
Hoffman's (upper limb)	

- **Peripheral Nerve**
 - Generalized
 - *Polyneuropathy* - metabolic or endocrinologic problems, *distal muscle weakness*
 - Focal
 - Peroneal neuropathy – foot drop
 - Radial neuropathy – wrist drop
- **Neuromuscular Junction**
 - Myasthenia Gravis – fatigability in the afternoon, ptosis, *proximal muscle weakness*
- **Muscle**
 - Myopathy – Duchenne's, *proximal muscle weakness*

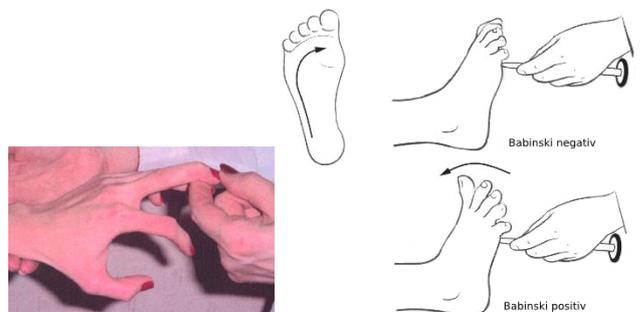


Figure: *Hoffman's sign*. It is elicited by tapping or flicking the terminal phalanx of the middle or ring finger and a (+) response is seen with flexion of the terminal phalanx of the thumb. *Babinski reflex*. "Fanning" of toes

MOSBY'S NOTES**Brain**

- Receives its blood supply (20% of cardiac output) from the *two internal carotid arteries and two vertebral arteries*
- Venous drainage: *venous plexuses and dural sinuses* that empty into the *internal jugular veins*

Cerebrum

- *Gray outer layer*: higher mental functions, general movement, visceral functions, perception, behavior, and integration of these functions
Commissural fibers – corpus callosum, interconnect the two hemispheres
- **Frontal lobe** – motor cortex associated with voluntary skeletal movement and fine repetitive motor movements; control of eye movements
- **Parietal lobe** – sensory cortex; visual, gustatory, olfactory and auditory sensations; proprioception
Association fibers – provide communication between the sensory and motor areas
- **Occipital lobe** – primary visual center
- **Temporal lobe** – perception and interpretation of sounds and determination of their source; integration of taste, smell and balance
Wernicke's area – reception of speech
- *Basal ganglia system* – extrapyramidal pathway and processing station between the cerebral motor cortex and upper brainstem with the thalamus, motor cortex, reticular formation, and spinal cord; refine motor movements

Cerebellum

- Integration and Coordination

Brainstem

- Controls involuntary functions

Medulla oblongata – decussation of CS tracts

Pons – transmits info between brainstem and cerebellum, relaying information from the cerebral cortex to the contralateral cerebellum

Midbrain

Diencephalon (Thalamus) – relay system

Cranial Nerves

- Olfactory, Optic, Oculomotor, Trochlear, Trigeminal, Abducens, Facial, Vestibulocochlear or Acoustic, Glossopharyngeal, Vagus, Spinal Accessory, Hypoglossal

Midbrain: CN III and IV

Pons: CN V to VIII

Medulla: CN IX to XII

Diencephalon: CN I and II

MOSBY'S NOTES**Diencephalon**

- Relays impulses between cerebrum, cerebellum, pons and medulla
- *Thalamus* – conveys all sensory impulses (except olfaction) to and from cerebrum before distribution to appropriate associative sensory areas; Integrates impulses between motor cortex and cerebrum, influencing voluntary movements; Controls *state of consciousness*, conscious perception of sensations, and abstract feelings
- *Epithalamus* – houses the pineal body, sexual development and behavior
- *Hypothalamus* – main processing center of internal stimuli for autonomic nervous system; maintains temperature, water metabolism, body fluid osmolarity, feeding behavior, and neuroendocrine activity
- *Pituitary gland* – hormonal control for growth, lactation, vasoconstriction and metabolism

SPINAL CORD AND SPINAL TRACTS

- *Spinal cord* – 40 to 50 cm long, begins at the foramen magnum as a continuation of the medulla oblongata and terminates at L1 or L2 of the vertebral column
Gray matter – butterfly-shaped, anterior and posterior horns, sensory and autonomic
- *White matter* – contains the ascending and descending spinal tracts

Ascending Spinal Tracts

- *Spinothalamic* – light and crude touch, pressure, temperature and pain
- *Spinocerebellar*
- *Dorsal column (fasciculus gracilis and cuneatus)* – fine touch, 2-point discrimination, conscious proprioception

Descending Spinal Tracts

- *Corticospinal (Pyramidal)* – skilled, delicate and purposeful movements
- *Reticulospinal*
- *Vestibulospinal* – causes the extensor muscles of the body to suddenly contract when the individual starts to fall
- *Corticobulbar* – motor func. of cranial nerves

Upper Motor Neurons – within CNS; influencing, directing and modifying reflex arcs and circuits

Lower Motor Neurons – cranial and spinal motor neurons; from anterior horn of spinal cord; transmit neural signals directly to the muscles to permit movement

Spinal Nerves

- 31 pairs, exit at each intervertebral foramen
- Spinal nerve supply: dermatome
- Motor/Efferent: Anterior
- Sensory/Afferent: Posterior

HISTORY

- Chief Complaint – dizziness, weakness, facial asymmetry, numbness, headache
- HPI – characterize chief complain and associated symptoms
- Past Medical Hx
- Family Hx
- Personal and Social Hx

PHYSICAL EXAM

MOSBY'S NOTES

EQUIPMENT FOT PHYSICAL EXAM

- Penlight
- Tongue blade
- Sterile needles
- Tuning forks, 200 to 400 Hz and 500 to 1000 Hz
- Familiar objects – coins, keys, paper clip
- Cotton wisp
- 5.07 Monofilament or Waardenberg wheel
- Reflex hammer
- Vials of aromatic substances – coffee, orange, perppermint extract, oil of cloves
- Vials of solutions – glucose, salty, lemon or vinegar, quinine – with applicants
- Test tubes of hot and cold water for temperature sensation testing
- Denver Developmental Screening (for infants and children)

INSPECTION

Gait/Station

- Observe the patient while walking normally, on heels & toes following a straight line
- Romberg’s Test
- Ex. Hemiparetic gait, Ataxic gait, Parkinsonian gait

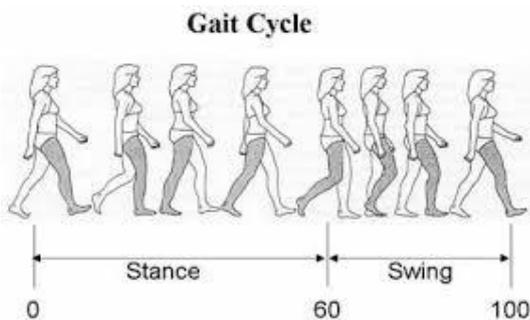


Figure: Typical gait disturbance of a hemiparetic patient.

Circumduction of the spastically paretic leg with predominantly extensor tone, and flexion of the spastically paretic arms at the elbow because of predominantly flexor tone.

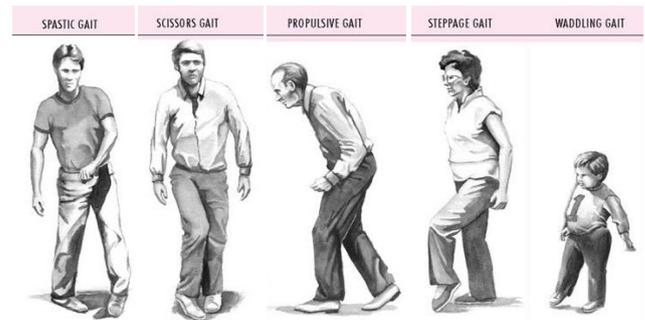
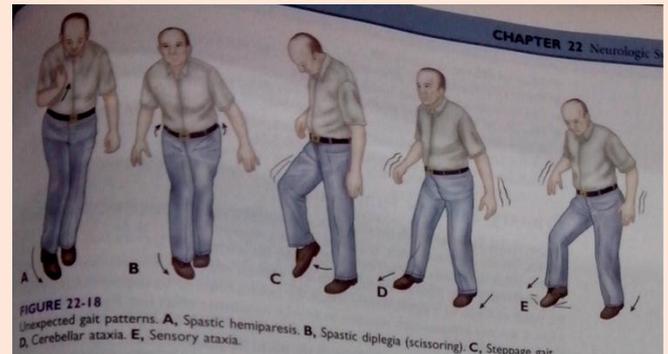


Figure: Some abnormal gait patterns

MOSBY'S NOTES

UNEXPECTED GAIT PATTERNS



- A. **Spastic hemiparesis** – bilateral, lesion at spinal cord; The affected leg is stiff and extended with plantar flexion of the foot; movement of the foot results from pelvic tilting upward on the involved side; the foot is dragged, or it is circled stiffly outward and forward (circumduction); the affected arm remains flexed and adducted and does not swing
- B. **Spastic diplegia (scissoring)** – injury to pyramidal system; Short steps, dragging the ball of the foot across the floor; the legs are extended, and the thighs tend to cross forward on each other at each step
- C. **Steppage gait** – patient cannot dorsiflex the foot; to compensate he will excessively flex the knee
- D. **Cerebellar ataxia** – feet are wide-based, staggering and lurching from side to side often accompanied by swaying of the trunk
- E. **Sensory ataxia** – also wide-based, patient watches the ground to guide his steps; present: (+) Romberg’s sign
- F. **Tabetic** – the legs are positioned far apart, lifted high and forcibly brought down with each step; the heel stamps on the ground
- G. **Parkinsonian gait** – the patient’s posture is stooped and body held rigid, steps are short and shuffling, with hesitation on starting and difficulty stopping
- H. **Dystonia** – Jerky, dancing, nondirectional
- I. **Ataxia** – Uncontrolled falling occurs
- J. **Antalgic limp** – Patient limits the time of weight on the affected leg to limit pain

THE NEUROLOGIC EXAM

Sequence of Examination

1. Cerebrum
2. Cerebellar functions
3. Cranial Nerves
4. Motor System
5. Sensory System
6. Reflexes

1. CEREBRUM

LEVEL OF CONSCIOUSNESS

Awareness of patient to his own surroundings

- *Confusion* – inappropriate response to question
- *Lethargy* – drowsy, falls asleep quickly
- *Delirium* – confusion with disordered perceptions and decreased attention span
- *Stupor* – arousable for short periods, slow responses
- *Coma* – neither awake nor aware
 - Decerebrate posturing to painful stimuli

GLASGOW COMA SCALE

If there is decreased sensorium

Glasgow Coma Scale			
Eye Opening Response	Spontaneous – open with blinking at baseline	4	Generally, brain injury is classified as: Severe: GCS ≤ 8 Moderate: GCS 9-12 Minor: GCS ≥ 13
	Open to verbal command, speech or shout	3	
	Open to pain, not applied to face	2	
	None	1	
Verbal Response	Oriented	5	
	Confused conversation, but able to answer questions	4	
	Inappropriate responses, words discernable	3	
	Incomprehensible speech	2	
	None	1	
Motor Response	Obeys commands for movement	6	
	Purposeful movement to painful stimulus	5	
	Withdraws from pain	4	
	Abnormal (spastic) flexion, <i>decorticate post.</i>	3	
	Extensor (rigid) posture, <i>decerebrate posture</i>	2	
	None	1	

MENTAL STATUS EXAM

Enumerate (at least 4 of the following):

- General behavior/appearance
 - Stream of thought
 - Mood and affect
 - Thought content
 - Intellectual capacity
 - Orientation
 - Memory
 - Calculation
 - Insight
 - Judgment
 - Impulse control
- Difficulties with communication
 - Determine whether recall & insight into recent & past events are intact
 1. Level of consciousness
 2. Orientation
 3. Memory
 4. Language
 5. Speech
 6. Insight & Judgment
 7. Abstract Thinking
 8. Calculation

The Mini-Mental State Exam

Patient _____ Examiner _____ Date _____

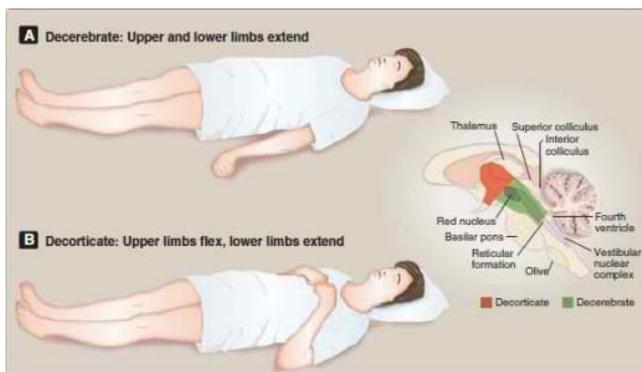
Maximum	Score	
5	()	Orientation What is the (year) (season) (date) (day) (month)?
5	()	Where are we (state) (country) (town) (hospital) (floor)?
3	()	Registration Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he/she learns all 3. Count trials and record. Trials _____
5	()	Attention and Calculation Serial 7s. 1 point for each correct answer. Stop after 5 answers. Alternatively spell "world" backward.
3	()	Recall Ask for the 3 objects repeated above. Give 1 point for each correct answer.
2	()	Language Name a pencil and watch.
1	()	Repeat the following "No ifs, ands, or buts"
3	()	Follow a 3-stage command: "Take a paper in your hand, fold it in half, and put it on the floor."
1	()	Read and obey the following: CLOSE YOUR EYES
1	()	Write a sentence.
1	()	Copy the design shown.



_____ Total Score
ASSESS level of consciousness along a continuum _____
Alert Drowsy Stupor Coma

Mental Status Exam: *Language*

Classification of Aphasia				
Classification	Fluency	Comprehension	Repetition	Naming
Global	Poor	Poor	Poor	Poor
<i>Broca</i> (motor)	Poor	Good	Variable	Poor
Isolation	Poor	Poor	Good	Poor
Transcortical motor	Poor	Good	Good	Poor
<i>Wernicke</i> (sensory)	Good	Poor	Poor	Poor
Transcortical sensory	Good	Poor	Good	Poor
Conduction	Good	Good	Poor	Poor
Anomic	Good	Good	Good	Poor



Mental Status Exam: *Speech*

- Fluency, rhythm, ease of expression
- Speech with rapid fire delivery, stuttering, repetitions, slow utterances
- Irregular speech with unnatural separation of syllables

Mental Status Exam: *Insight and Judgment*

- *Insight* – awareness of patient regarding his own medical condition or impairment
 - Is he aware that he has the condition or he's just denying it?
- *Judgment* –ability to solve a hypothetical question or real life problems
 - E.g. What would you do if you find a hundred peso bill on the floor?

Mental Status Exam: *Abstract Thinking*

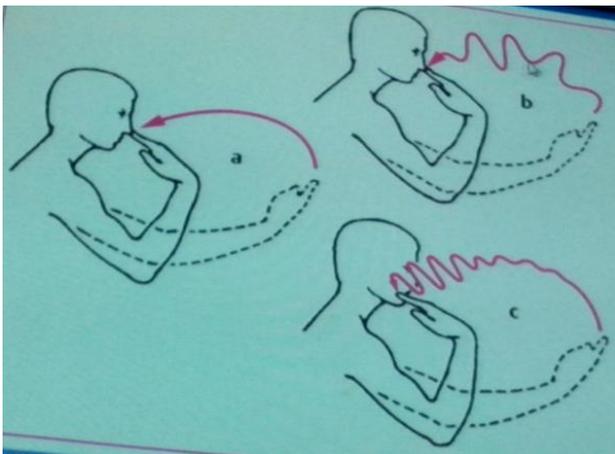
- a) Interpret some common proverbs
- b) “Ang hindi marunong lumingon sa pinanggalingan, hindi makararating sa paroroonan.”

2. CEREBELLUM

MOTOR COORDINATION

I. FINGER TO NOSE TEST

- Test the accuracy of movements and fine motor function
- Patient alternatively touches own nose and the examiner’s index finger with the index finger of one hand



- a. Normal
- b. **Ataxia** – alternating movements seen throughout the movement
- c. **Intention tremor** – alternating movements seen in proximal location of finger to nose

If the movement is not smooth, there is dysmetria (ataxia or intention tremor).



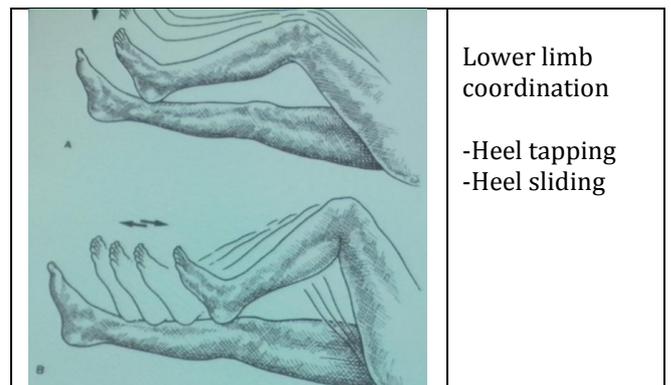
II. ALTERNATING PRONATION SUPINATION TEST (APST)

- a. Tap your thigh in alternation
- b. Rapid-rhythmic alternation movements
- c. Observe for lagging: **dysdiadochinesia**



III. HEEL TO KNEE TO SHIN TEST

- a. Slide the heel up & down the front of the shin to the knee
- b. Look for *side to side tremor or buckling*
- c. Test R: put the R heel over the Lshin, then move leg going up, going down
- d. **Movement should be in straight line**
- e. Test both legs



BALANCE/EQUILIBRIUM

IV. ROMBERG'S TEST

- a. Feet together, look straight ahead with *eyes open*: steady or excessive sway?
- b. *Eyes closed*: steady or excessive sway?
- c. To further evaluate balance, have the patient stand with feet slightly apart. Push the shoulders with enough effort to throw patient off balance. (Be ready to catch patient if necessary.)
- **Sensory Ataxia** – The moment the patient closes the eyes, the patient will sway excessively
- **Cerebellar Ataxia** – The patient will sway excessively even with eyes open or closed

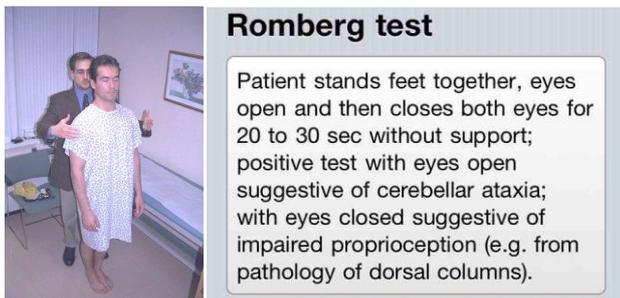


Figure: Romberg's test demonstration



V. TANDEM GAIT

- d. Ask patient to **walk in a straight line**
- e. In an ataxic patient, feet cannot be close together



3. CRANIAL NERVES

▪ **CN I (Olfactory)**

Sensory - skill usually not tested but student should narrate how it is done

- Usually neglected/omitted
- *Close both eyes and one naris*
- Ask patient to sniff and identify a mild stimulus (e.g. coffee, cigarette)
- Allow a short rest period between the different odors
- Inferior frontal lobe disease (e.g. meningioma) may compress the olfactory tract
- Significant if unilateral *anosmia* (loss of sense of smell) is detected

▪ **CN II (Optic)**

Sensory – see assessment of visual acuity, confrontation test and funduscopy

- **Visual acuity** – Snellen's and Jaeger's
- **Visual fields** – Confrontation testing (temporal, nasal)
- **Funduscopy** – ROR, fundus
- Check visual acuity using Snellen's chart
- Optic disk should be examined
- Test visual fields by confrontation
- Further tests:
 - Perimetry
 - Tangent screen
 - Visual evoke potential



Figure: Funduscopy and Confrontation Testing

▪ **CN III, IV, VI (Oculomotor, Trochlear, Abducens)**

III-OCULOMOTOR – motor – see testing of extraocular muscles (EOM) and papillary testing

- Pupillary light reflex (Direct and Consensual)
- *sensory component of the light reflex is the OPTIC nerve

IV,VI-TROCHLEAR and ABDUCENS – motor – testing of EOM muscles LR6S04

- Describe size and shape of pupils
- Check reactivity of pupils to light and accommodation
- Check extraocular movements and observe for any paresis and nystagmus
- *Cardinal gazes (EOM)*
 - Report as "full and equal"
- Trace the letter "H"

- Lateral rectus- Abducens
- Superior oblique - Trochlear
- *Opening the eyes - Oculomotor*
- *Closing the eyes - Facial*

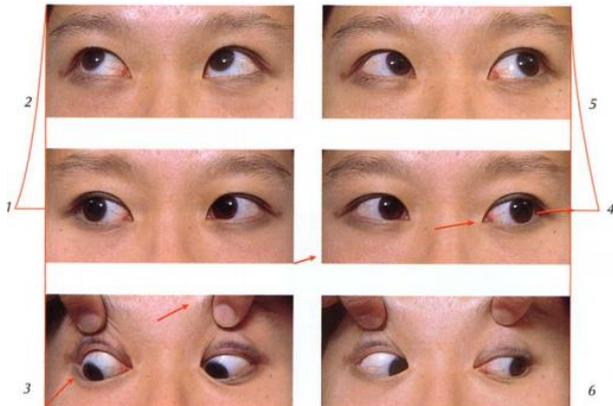
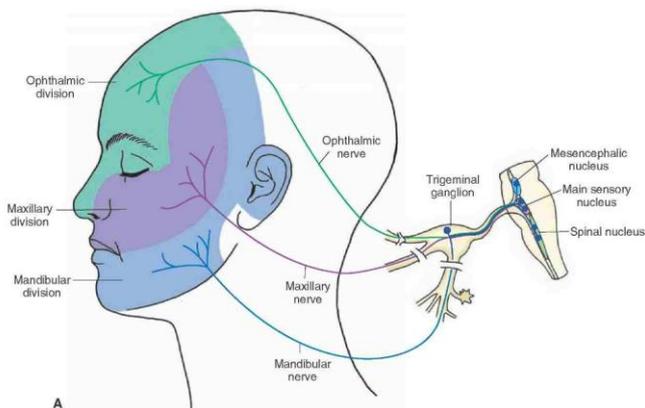


Figure: Testing of Extraocular Muscles (EOM). Trace the letter "H" for the cardinal gazes

▪ **CN V (Trigeminal)**

Mixed

- ➔ Sensory - Face (student may opt to do the corneal reflex)
- ➔ Motor - Muscles of Mastication - masseter and temporalis



- Sensory testing to sharp, dull, light touch & temperature/ or pain involving:
 - Ophthalmic (V1)
 - Maxillary (V2)
 - Mandibular (V3)
- Motor testing - Jaw clench
 - Observe face for muscle atrophy, deviation of jaw to one side, and fasciculations
 - Muscles of mastication
 - Masseter
 - Temporalis
- Corneal reflex is done if patient is unable to follow commands or has altered sensorium
 - (+) symmetric blink reflex

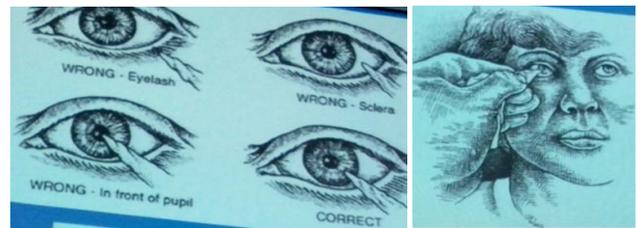


Figure: *Corneal reflex*. A cotton wisp/soft cloth is used to touch the cornea. Normal response: Blinking

▪ **CN VII (Facial)**

Sensory: Anterior 2/3 of tongue

Motor: Facial muscles - student should ask the px to do at least 3 of the ff:

1. Raising eyebrows
2. Wrinking forehead
3. Puff out cheeks
4. Show teeth
5. Pry open tightly shut eyelids

- Search for facial symmetry at rest and with movement
- Listen to patient's speech and note any difficulties with enunciating labial sounds (b, m, and p)
- Muscle weakness
 - Mouth drooping
 - Flattened nasolabial fold
 - Lower eyelid sagging
- *In stroke patients (central), only lower quadrant is affected (below nasolabial fold).*
- *In Bell's palsy (peripheral), all quadrants are affected.*

MOSBY'S NOTES

EVALUATING TASTE

- Sensory function of CN VII and IX
- Have available the 4 solutions, applicators, and a card listing the tastes
- Ask patient to protrude the tongue
- Apply one solution at a time to the *lateral side* of the tongue
- Offer a sip of water after each stimulus
- Patient should identify each side bilaterally when placed correctly on the tongue surface



Figure: In general, taste is perceived better on the more posterior aspects (CN IX) of the tongue, palate and pharynx rather than on the anterior (CN VII).

- **CN VIII (Vestibulocochlear)**
 - Sensory – Hearing Acuity Test**
 - Check ability to hear a finger rub or whispered voice with each ear
 - Rinne’s (air vs. bone conduction)
 - Ratio of air:bone must be 2:1
 - Weber’s (laterality of lesion)
 - Further test: Audiometry
 - Vestibular function: Romberg’s test



Figure: Rinne’s test (bone conduction)

- **CN IX, X (Glossopharyngeal & Vagus)**
 - **CN IX**
 - Sensory: Posterior 1/3
 - Motor: say “ah” examine mouth and oropharynx, Gag reflex
 - **CN X –mixed**
 - Sensory: External ear
 - Motor: same as IX
 - *But normally, gag reflex is tested for both CN IX,X*
 - Position & symmetry of palate & uvula at rest and with phonation
 - Gag reflex is checked by stimulating *posterior pharyngeal wall* on each side
 - Gag reflex is may be absent in normal individuals
 - The uvula should remain in the midline, and no drooping or absence of arch on either side of soft palate should be noted.
 - Speech: note any hoarseness, nasal quality, or difficulty with guttural sounds

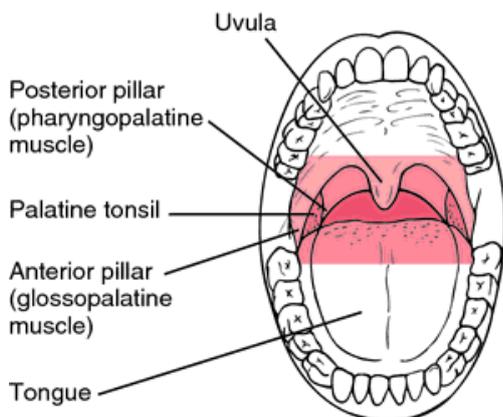


Figure: Uvula should be at the midline

- **CN XI (Spinal Accessory)**
 - Motor-SHOULDER RAISING**
 - TURN FACE AGAINST RESISTANCE**
 - Shoulder shrug (trapezius)
 - Shrug, then give resistance
 - Head rotation to each side against resistance (sternocleidomastoid)
 - Test L SCM: ask patient to turn to the R, offer resistance on the R cheek *only* after the patient has completely turned to R
 - You will see the L SCM becoming more prominent



Figure: Head rotation against resistance

- **CN XII (Hypoglossal)**
 - See examination of mouth and oropharynx (PART OF HEENT EXAM)**
 - Motor: Glossal muscles
 - Tongue atrophy or fasciculation
 - Position with protrusion
 - Strength when extended against inner surface of the cheek on each side
 - *Tongue mediated to R or L*



Figure: Test of tongue strength (against resistance)



Figure: Bilateral glossal atrophy and paresis in true bulbar palsy due to *amyotrophic lateral sclerosis (ALS)* [Ice Bucket Challenge]

4. MOTOR SYSTEM

TESTING OF BULK

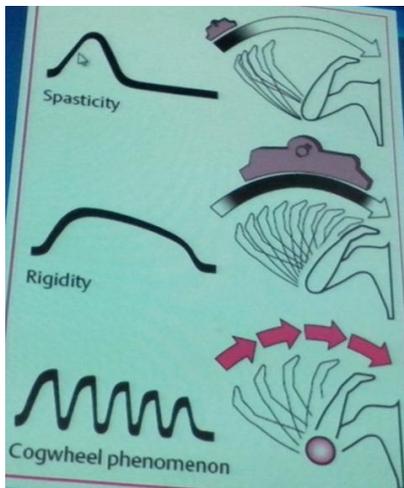
- **Atrophy:** Diminished muscle bulk, most marked with lower motor neuron disease, but also seen with chronic upper motor neuron disease
- **Fasciculations:** Seen with lower motor neuron disease and amyotrophic lateral sclerosis



Figure: (1) Typical “stork legs” and (2) “pes cavus” in Charcot Marie Tooth Disease (HSMN or Hereditary Sensory-Motor Neuropathy Type I).

TESTING OF TONE

- **Spasticity:** initial resistance to quick movement of a joint which then diminishes by the end of the movement
- **Rigidity:** steady resistance through the entire movement of a joint
- **Flaccidity:** markedly diminished tone; suggests lower motor neuron disease, but may be observed acutely following upper motor neuron disease, such as stroke



ABNORMAL MOVEMENTS

- Tremors:** unintentional rhythmic movements
 - Enhanced physiologic tremor – drug/alcohol withdrawal, hyperthyroidism, hypoglycemia, drug toxicity
 - Essential tremor – inherited
 - Intention tremor – seen in intentional movements, cause: Multiple sclerosis
 - Resting tremor – seen when limb is at rest; cause: Parkinson disease

- Athetosis:** slow, sinuous, writhing movements in distal limbs
- Chorea:** semipurposeful, flowing movements that flit from one part of the body to another; quick involuntary incoordinated performance of willed movements
- Hemiballismus:** wild flinging/flailing movements that represent large amplitude proximal movement; damage to subthalamic nucleus of Luys
- Dystonia:** sustained contractions of both agonist and antagonist muscles, frequently causing twisting and repetitive movements or abnormal postures, more on trunk muscles
- Myoclonus:** brief, sudden shock-like jerk



MANUAL MUSCLE TESTING/GRADING

Always compare L and R

MANUAL MUSCLE TESTING	
0	no movement
1	flicker or trace of contraction but no associated movement, fasciculations
2	movement with gravity eliminated
3	movement against gravity but not against resistance
4	movement against moderate resistance
5	full power (against maximum resistance)

Level	Motor signs (weakness)
C5	Deltoid
C6	Biceps brachii
C7	Triceps brachii
C8	Interossei

© ELSEVIER, INC. - NETTERIMAGES.COM

5. SENSORY SYSTEM

- Ask patient whether he can feel light touch, temp. of cool object, pin prick in each distal extremity
- Vibration and position sense
- Check double simultaneous stimulation using light touch on the hands, face, legs
- Most difficult & unreliable due to *subjectivity*
- Loss of sensory modalities: Peripheral neuropathy
- Symmetric sensory loss: Polyneuropathy

Sensory Testing

- Pain and temperature
- Light touch and pressure
- Joint position and vibration
- Special sensory testing
 - 2-point discrimination
 - Stereognosis
 - Recognition of digits drawn in the palm

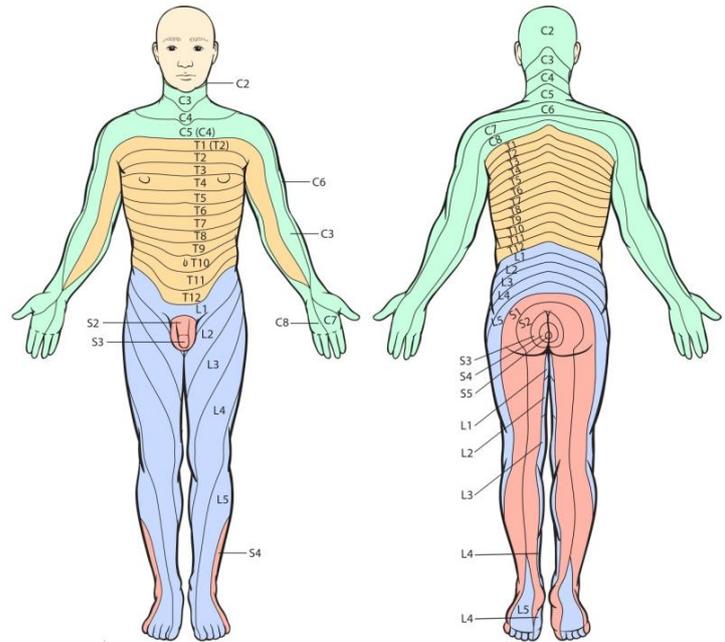
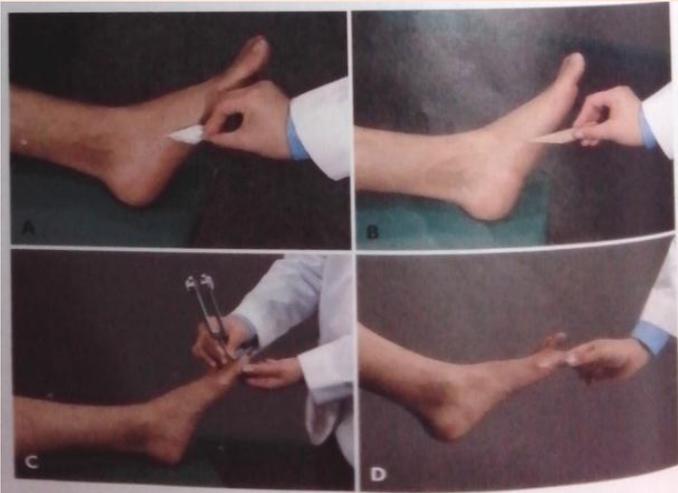


Figure: Dermatomes

MOSBY'S NOTES

PRIMARY SENSORY FUNCTIONS



Superficial Touch	Cotton wisp or with fingertip. Use light strokes. Have patient point area touched.
Superficial Pain	Sharp and smooth edges of broken tongue blade or hub of sterile needle. Allow 2 seconds between each stimulus to prevent summative effect.
Temperature and Deep Pressure	Tested only when superficial pain is not intact. Roll hot and cold test tubes on skin. Ask patient which temp. is perceived. Deep pressure is tested by squeezing trapezius, calf or biceps muscle.
Vibration	Stem of vibrating tuning fork (lower Hz). Place against bony prominence (toe, finger, sternum, elbow, wrist, shin and ankle). Ask patient when and where vibration is felt.
Position	Hold the joint to be tested by lateral aspects to avoid giving clue about direction being moved

MOSBY'S NOTES

CORTICAL SENSORY FUNCTION



Stereognosis	Familiar object (coin, key) Tactile agnosia (inability to recognize objects by touch) - parietal lobe lesion
2-Point Discrimination	Two sterile needles Alternately touch the patient's skin over various points. Find the distance at which the patient can no longer distinguish the two points, ranging between 2 and 75 mm.
Extinction Phenomenon	Simultaneously touch two areas on each side of the body. Ask patient how many stimuli are there and where they are.
Graphesthesia	Blunt pen or applicator stick. Draw a letter on palm of patient.
Point Location	Touch an area on patient's skin and withdraw the stimulus. Ask patient to point the area touched.

For OSCE:

- Make sure that students test L against R side of the body
- Students should demo the following:
 - Light touch
 - Pain
 - Temperature
 - Vibration
 - Position

MOSBY'S NOTES

DEEP TENDON REFLEXES



Biceps reflex Flex patient's arm 45° at the elbow. Palpate biceps tendon at the antecubital fossa.

Place thumb over tendon and fingers under the elbow. Strike your thumb (rather than the tendon directly), with the reflex hammer. (+) – Flexion of elbow

Brachioradial reflex Flex patient's arm 45° at the elbow. Rest his forearm on your arm with hand slightly pronated.

Strike brachioradial tendon (about 1 to 2 inches above the wrist) directly with reflex hammer (+) – Pronation of forearm and flexion of elbow

Triceps reflex Flex patient's arm up to 90°, supporting the arm proximal to the antecubital fossa. Strike triceps tendon.

(+) – Extension of the elbow

Patellar reflex Flex patient's knee to 90° Support upper leg with your hand and allow lower leg to hang loosely. Strike patellar tendon just below the patella.

(+) – Contraction of quadriceps, Extension of lower leg

Achilles reflex Flex knee to 90° and keep ankle in neutral position, holding foot in your hand. (Alternatively, patient may kneel on a chair with toes pointing towards floor.) Strike Achilles tendon at the level of the ankle malleoli.

(+) – Contraction of gastrocnemius, Plantar flexion of the foot

Ankle Clonus Support patient's knee in partially flexed position and briskly dorsiflex the foot with your other hand, maintaining foot in flexion.

No rhythmic oscillating movements between dorsiflexion and plantar flexion should be palpated.

(+) sustained clonus – UMN disease

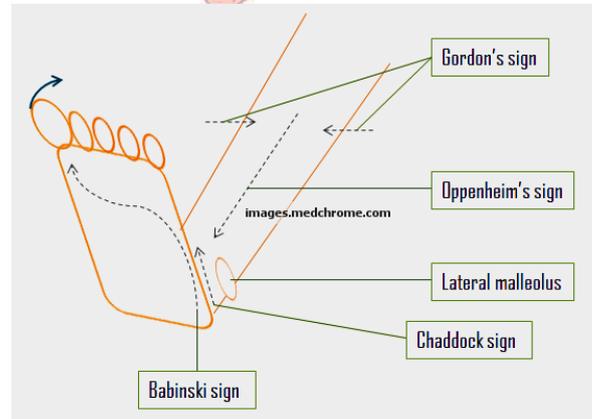


Figure: Pathologic reflexes

MENINGEAL SIGNS

A stiff neck, or nuchal rigidity, is a sign that may be associated with meningitis and intracranial hemorrhage.

- Symptoms
 - Disturbance of consciousness
 - Nausea, vomiting
 - Headache
 - Pain and resistance to neck motion
- **Kernig's sign** – There is resistance against passive extension at the knee joint with the patient in supine position and knee flexed
- **Brudzinski sign** – Flexing the neck brings about about involuntary flexion of both hip and knee joints

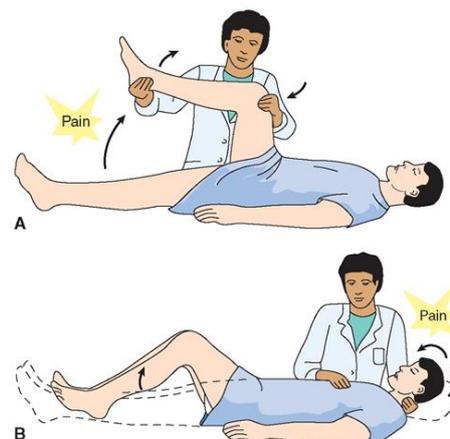


Figure: (A) Kernig's sign and (B) Brudzinski sign

"A physician is obliged to consider more than a diseased organ, more even the whole man – he must view the man in his world."

- Harvey Cushing, 1869-193