

# Week 1

## Neurological Examination

### Sensory Examination

**OBJECTIVE:** To conduct a complete Sensory Examination as a part of Neurological Examination.  
**MATERIALS:** Well illuminated examination room, examination table, clean gloves, tendon hammer, Ophthalmoscope, penlight, tuning fork, pins and needles, brush, a piece of cotton wool.

*D: Appropriately done PD: Partially done ND: Not done/Incorrectly done*

STEP/TASK	D	PD	ND
<b>Preparation</b>			
1. Introduce yourself to the patient.			
2. Confirm patient's ID.			
3. Explain the procedure and reassure the patient.			
4. Get patient's consent.			
5. Wash hands.			
6. Prepare the necessary materials.			
7. Show the patient each object and allow him/her to touch the pin/needle, brush and cotton prior to beginning the exam to reduce any fear of being hurt during the examination.			
8. Position the patient in a lying or sitting position and uncover arms and legs.			
<b>Examination</b>			
<b>9. Pain (pinprick) testing:</b> <ul style="list-style-type: none"> <li>• Ask the patient to close his/her eyes.</li> <li>• Demonstrate to the patient "sharp" and "dull" sensation by touching a normal area (<i>e.g. lower arm</i>) with a new pin/needle and brush.</li> <li>• Instruct the patient to say "sharp" or "dull" when they feel the respective object.</li> <li>• Begin proximally and apply alternate touching the patient with the needle and the brush at intervals (~5 sec).</li> <li>• Test each dermatome comparing left and right sides.</li> </ul> <i>(Make certain to instruct the patient to tell the physician if they notice a difference in the strength of sensation on each side of their body.)</i>			
<b>10. Light-touch testing:</b> <ul style="list-style-type: none"> <li>• Ask the patient to close his/her eyes.</li> <li>• Instruct the patient to say "yes" when the touch is felt.</li> <li>• Begin proximally and apply touch to the skin of the patient with a wisp of cotton wool.</li> </ul> <i>(Do not stroke skin because this moves hair fibres).</i> <ul style="list-style-type: none"> <li>• Test each dermatome comparing left and right sides.</li> </ul>			
<b>11. Vibration testing:</b> <ul style="list-style-type: none"> <li>• Ask the patient to close his/her eyes.</li> <li>• Place a vibrating 128 Hz tuning fork (<i>not a 256 or 512 Hz fork</i>) on one distal interphalangeal joints (<i>patient should be able to describe a feeling of vibration</i>).</li> <li>• Ask the patient to inform you when the vibration stops.</li> <li>• Deadend the vibrations of the tuning fork with your hand (<i>patient should be able to say exactly when it occurs</i>).</li> <li>• Compare one side with the other.</li> </ul>			

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## Neurological Examination: Sensory Examination

STEP/TASK	D	PD	ND
<b>Preparation</b>			
<b>12. Position sense (Proprioception) testing:</b> <ul style="list-style-type: none"><li>• Ensure that the patient has no problem with interphalangeal joints (<i>e.g. pain, arthritis etc.</i>)</li><li>• While holding one of his/her fingers by its sides, demonstrate to the patient "up" and "down" sensation by moving one of his/her distal interphalangeal joints.</li><li>• Instruct the patient to identify the direction of each movement as "up" or "down".</li><li>• Ask the patient to close his/her eyes.</li><li>• Apply same movement on different fingers and directions a couple of times.</li></ul>			
<b>After the examination</b>			
<b>13.</b> Ensure that the patient is comfortable.			
<b>14.</b> Make explanations to the patient, answer his/her questions and discuss management plan.			
<b>15.</b> Dispose of sharps and waste material according to infection control standards.			
<b>16.</b> Wash hands.			
<b>17.</b> Document the procedure.			

## Week 2

# Neurological Examination

## Examination of Cranial Nerves

**OBJECTIVE:** To conduct a complete Examination of Cranial Nerves as a part of Neurological Examination.

**MATERIALS:** Well illuminated examination room, examination table, tendon hammer, scent stimuli, Snellen chart/near vision card, ophthalmoscope, penlight, tuning fork, pins and needles, a piece of cotton wool.

*D: Appropriately done PD: Partially done ND: Not done/Incorrectly done*

STEP/TASK	D	PD	ND
<b>Preparation</b>			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
<b>Examination</b>			
<b>The olfactory nerve (CN I):</b>			
9.			
<ul style="list-style-type: none"> <li>• Ask the patient if she/he has noticed a change in his sense of smell or taste.</li> <li><i>(If yes, perform an olfactory examination: test each nostril separately)</i></li> <li><i>(Ask the patient to close his/her eyes and block one nostril.)</i></li> <li><i>(Take one of the scent stimuli and ask patient to sniff and describe the scent.)</i></li> </ul>			
<b>The optic nerve (CN II): (examine each eye separately)</b>			
10.			
<ul style="list-style-type: none"> <li>• Test visual acuity on a Snellen chart or using a near vision card <i>(or a page in a book)</i>.</li> <li>• Test the visual fields by confrontation.</li> <li>• Examine the retina and optic nerve by direct fundoscopy.</li> </ul>			
<b>The oculomotor, trochlear, and abducens nerves (CN III, IV, and VI):</b>			
11.			
<b>Inspect the eyes:</b> <ul style="list-style-type: none"> <li>• Look for the size, shape, equality and regularity of the pupils.</li> <li>• Look for a visible ptosis (Horner's syndrome) or squint.</li> <li>• Test the direct and consensual pupillary light reflexes.</li> <li>• Test accommodation by asking patient to look into the distance and then focus his/her eyes on an object <i>(finger or pen)</i> brought to a point about 30 cm in front of the nose.</li> </ul>			
12.			
<b>Examine eye movements:</b> <ul style="list-style-type: none"> <li>• Ask the patient to keep his/her head still and to follow your finger with his/her eyes and to tell you if he sees double at any point <i>(move your fingers laterally-left to right- and vertically - up and down-)</i>.</li> <li>• Look for nystagmus at the extremes of gaze.</li> </ul>			
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Neurological Examination: Examination of Cranial Nerves			
STEP/TASK	D	PD	ND
<b>Examination</b>			
<b>The trigeminal nerve (CN V):</b>			
<p>13. <b>Sensory Part</b> (<i>Ask patient to close his/her eyes</i>).</p> <ul style="list-style-type: none"> <li>• Test light touch, pain and temperature senses in the three branches of the trigeminal nerve. Compare both sides.</li> <li>• Test the corneal reflex (<i>Inform patient that this is likely to cause some discomfort</i>).</li> </ul> <p><b>Motor Part</b></p> <p>Test the muscles of mastication by asking the patient to:</p> <ul style="list-style-type: none"> <li>• Clench his/her teeth (<i>palpate his temporal and masseter muscles bilaterally</i>).</li> <li>• Open and close his/her mouth against resistance (<i>place your fist under his chin</i>). (<i>Inform patient that you would hold his/her chin and test the jaw jerk</i>).</li> <li>• Ask the patient to let his mouth fall open slightly.</li> <li>• Place your index finger on his/her chin and hold chin with your middle finger</li> <li>• Gently tap on your index finger with a tendon hammer and observe jaw jerk.</li> </ul>			
<b>The facial nerve (CN VII):</b>			
<p>14. • Look for facial asymmetry. (<i>Note that the nasolabial folds and the angle of the mouth are especially indicative of facial asymmetry</i>).</p> <p><b>Sensory Part</b></p> <ul style="list-style-type: none"> <li>• Test the anterior two-thirds of the tongue for taste sensation by applying either/or salty, bitter sour, sweet solutions on the tongue.</li> </ul> <p><b>Motor Part</b></p> <p>Test the muscles of facial expression by asking the patient to:</p> <ul style="list-style-type: none"> <li>• Lift his/her eyebrows as far as they will go.</li> <li>• Close his/her eyes as tightly as possible. (<i>Try to open them.</i>)</li> <li>• Blowout his/her cheeks. • Purse his/her lips or whistle. • Show his/her teeth.</li> </ul>			
<b>The acoustic nerve (CN VIII): (<i>remove patient's hearing devices</i>)</b>			
<p>15. • Test hearing sensitivity in each ear by occluding one ear and rubbing your thumb and fingers together in front of the other.</p> <ul style="list-style-type: none"> <li>• Apply Rinne and Weber tests and examine the ears by auroscopy.</li> </ul>			
<b>The glossopharyngeal nerve (CN IX):</b>			
<p>16. • Test the gag reflex by touching the tonsillar fossae on both sides. (<i>Inform patient that this is likely to cause some discomfort</i>).</p>			
<b>The vagus nerve (CN X):</b>			
<p>17. Ask the patient to phonate (say aaah~) and look for deviation of the uvula with a pen light.</p>			
<b>The hypoglossal nerve (CN XII):</b>			
<p>18. Aided by a pen light, inspect the tongue for wasting and fasciculation.</p> <p>Ask the patient to stick out his tongue and to wiggle it from side to side.</p>			
<b>The accessory nerve (CN XI):</b>			
<p>19. Look for wasting of the sternocleidomastoid and trapezius muscles.</p> <p>Ask the patient to:</p> <ul style="list-style-type: none"> <li>• Shrug his shoulders against resistance. • Turn his/her head to either side against resistance.</li> </ul>			
<b>After the examination</b>			
20. Ensure that the patient is comfortable.			
21. Make explanations to the patient, answer his/her questions and discuss management plan.			
22. Dispose of sharps and waste material according to infection control standards.			
23. Wash hands.			
24. Document the procedure.			

# Week 3

## Neurological Examination

### Motor Examination

**OBJECTIVE:** To conduct a complete Motor Examination as a part of Neurological Examination.

**MATERIALS:** Well illuminated examination room, examination table, clean gloves, reflex hammer and tuning fork.

*D: Appropriately done PD: Partially done ND: Not done/Incorrectly done*

STEP/TASK	D	PD	ND
<b>Preparation</b>			
1. Introduce yourself to the patient.			
2. Confirm patient's ID.			
3. Explain the examination steps reassure the patient.			
4. Get patient's permission			
5. Wash hands.			
6. Prepare the necessary materials.			
7. Show the patient each object and allow him/her to touch them prior to beginning the exam to reduce any fear of being hurt during the examination.			
8. Position the patient in a lying or sitting position and uncover arms and legs.			
<b>Examination</b>			
<b>Inspection</b>			
9. Look for posture of the body ( <i>e.g. deformities, asymmetry, abnormal posture</i> ).			
10. Look for abnormal movements ( <i>e.g. tremor, fasciculation, dystonia, athetosis</i> ).			
11. Look for muscle bulk of the body and compare both sides.			
<b>Muscle Tone</b>			
12. Test the tone in the upper limbs by holding the patient's hand and simultaneously pronating and supinating and flexing and extending the forearm.			
13. Test the tone in the legs by rolling the leg on the bed, by flexing and extending the knee, or by abruptly lifting the leg at the knee.			
<b>Power</b>			
14. Test muscle strength for shoulder abduction elbow flexion and extension. Wrist flexion and extension, finger flexion, extension, abduction and adduction, and thumb abduction and opposition. Compare muscle strength on both sides, and grade it on the muscle strength scale*.			
15. Test muscle strength for hip flexion, extension, abduction and adduction, knee flexion and extension, plantar flexion and dorsiflexion of the foot and big toe, and inversion and eversion of the forefoot. Compare muscles strength on both sides, and grade it on the muscle strength scale*.			
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## Neurological Examination: Motor Examination

STEP/TASK	D	PD	ND
<b>Examination</b>			
<b>Reflexes</b>			
16. Test biceps, supinator, and triceps reflexes with a reflex hammer. <i>(Compare both sides. If a reflex cannot be elicited retest with reinforcement).</i>			
17. Test the knee jerk and ankle jerk with a reflex hammer. <i>(Compare both sides. If a reflex cannot be elicited retest with reinforcement).</i>			
18. Test for clonus by holding up the ankle and rapidly dorsiflexing the foot.			
19. Test for the Babinsky sign ( <i>extensor plantar reflex</i> ) using the sharp end of a reflex hammer.			
<b>Co-ordination</b>			
20. <b>Resting tremor:</b> • Ask the patient to rest his hands in his lap and to close his eyes.			
21. <b>Test for Intention tremor:</b> • Ask the patient to do something ( <i>e.g. remove his watch or write a sentence</i> ).			
22. <b>Fine finger movements:</b> • Ask the patient to oppose his thumb with each of his other fingers in turn. Once he is able to do this, ask him to do it as fast as he can, remember that he has two hands.			
23. <b>Finger to-nose test</b> carry out to test dysynergia and dysmetria: • Place your index finger at about two feet from the patient's face. Ask him to touch the tip of his nose and then the tip of your finger with the tip of his index finger. • Do the test bilaterally.			
24. <b>Test for dysdiadochokinesis:</b> • Ask the patient to clap and then show him how to clap by alternating the palmar and dorsal surfaces of one hand. Once he is able to do this, ask him to do it as fast as he can. Ask him to repeat the test with his other hand.			
25. <b>Heel to-shin test:</b> • Lie the patient down. Ask him to run the heel of one leg down the shin of the other, and then to bring the heel back up to the knee and to start again. • Ask him to repeat the test with his other leg.			
<b>Gait examination</b> ( <i>Always be in a position to steady the patient should he threaten to fall</i> ).			
26. <b>Inspection:</b> • Ask the patient to stand up. Ensure that he is steady on his feet and inspect his posture from both front and side.			
27. <b>Gait and arm swing:</b> • Ask the patient to walk to the end of the room and to turn around and walk back. <b>Heel-to-toe test:</b> Ask the patient to walk (as if on a tightrope): heel-to-toe, then on their toes only, and finally on their heels only.			
28. <b>Romberg's test:</b> Ask him to stand unaided with his arms by his sides and with his eyes closed. <i>(If the patient sways or loses balance then this test is positive)</i>			
<b>After the examination</b>			
29. Ensure that the patient is comfortable.			
30. Make explanations to the patient, answer his/her questions and discuss management plan.			
31. Dispose of sharps and waste material according to infection control standards.			
32. Wash hands.			
33. Document the procedure.			

## Muscle Strength Scale\*

Major skeletal muscles can be functionally assessed for their strength. Muscles are evaluated individually with comparison to that of the same muscle on the opposite side of the body. Muscle strength can be monitored over time to follow progression or remission of disease.

Findings	Grade
Normal motor power.	5
Able to overcome gravity and significant resistance but strength not quite normal.	4++
Able to overcome gravity and moderate resistance.	4+
Able to overcome gravity and mild resistance.	4
Able to overcome gravity but not resistance.	3
Unable to overcome the force of gravity but able to move in the plane of the supported extremity.	2
Flicker movements only.	1
Total paralysis (NO movement).	0

\* Miller DW Hahn JF. Chapter 1: General methods of clinical examination. pags 31-32. IN: Youmans JR. Neurological Surgery 4 edition. W.B. Saunders Company. 1996.

## Muscle Actions and Innervations\*

Upper Extremity			
Action	Muscle(s)	Nerve(s)	Nerve Roots
Arm abduction	Deltoid	Axillary	C5, C6
Elbow flexion	Biceps	Musculocutaneous	C5, C6
Elbow extension	Triceps	Radial	C6, C7, C8
Extension at the wrist	Forearm extensors	Radial	C6, C7, C8
Flexion of the wrist	Forearm flexors	Median & ulnar nerves	C6, C7, C8, T1
Wrist abduction	Flexor carpi radialis	Median	C6, C7
Finger extension	Extensor digitorum	Posterior interosseous	C7, C8
Finger flexion	flexor digitorum superficialis and flexor digitorum profundus (FDP)	median, anterior interosseous (FDP I & II), & ulnar (FDP III & IV)	C7, C8, T1
Abduction of index finger	First dorsal interosseous	Ulnar	C8, T1
Abduction of little finger	Abductor digiti minimi	Ulnar	C8, T1
Thumb abduction	Abductor pollicis brevis	Median	C8, T1
Thumb adduction	Adductor pollicis	Ulnar	C8, T1
Thumb extension	Extensor pollicis longus	Posterior interosseous	C7, C8
Lower Extremity			
Action	Muscle	Nerve	Nerve Roots
Hip flexion	Iliopsoas	Femoral	L1, L2, L3
Hip extension	Gluteus maximus	Inferior gluteal	L5, S1, S2
Hip abduction	Gluteus medius, minimus & tensor fasciae latae	Superior gluteal	L4, L5, S1
Hip adduction	Adductors	Obturator	L2, L3, L4,
Knee extensors	Quadriceps femoris	Femoral	L2, L3, L4
Knee flexion	Hamstring	Sciatic	L5, S1, S2
Ankle dorsiflexion	Tibialis anterior	Deep peroneal	L4, L5
Ankle plantar flexion	Gastrocnemius & soleus	Tibial	S1, S2
Toe extension <sup>+</sup>	Lower leg extensors (extensor digitorum longus, extensor digitorum brevis, extensor hallucis longus [to the big toe])	Deep peroneal	L5, S1
Toe flexion	Flexor digitorum longus, flexor hallucis longus	Tibial	L5, S1, S2
Foot eversion	Peroneus longus & brevis	Superficial peroneal	L5, S1
Foot inversion	Tibialis posterior	Tibial	L4, L5

<sup>+</sup> The muscles are called extensors, the action is also sometimes described as toe dorsiflexion. (Curling of toes is called plantarflexion).

In the accompanying videotape since the muscles are extensors, I describe the action as extension of the toe.

*\*The Neurological Exam, Faculty of Medicine, University of Toronto, Canada.*

Available from: [http://www.utoronto.ca/neuronotes/NeuroExam/MRC\\_scale.htm](http://www.utoronto.ca/neuronotes/NeuroExam/MRC_scale.htm).



# Week 4

## CNS History Taking

- **OBJECTIVE:** To take an ideal history related to CNS signs and symptoms.
- MATERIALS:** there will be standardized patient to take the history from him.

*D: Appropriately done PD: Partially done ND: Not done/Incorrectly done*

STEP/TASK	D	PD	ND
Introduce yourself to the patient.			
<b>1. Personal data</b>			
Name, Age, Gender, Nationality, Occupation.			
<b>2. Chief complain</b>			
Short statement of the problem that brought the PT, better recorded in the patient's own words.			
<b>3. History of presenting illness.</b>			
Symptom <b>Onset</b> (acute, subacute, chronic and insidious), <b>Duration, Course of the condition</b> (static, progressive, or relapsing and remitting), <b>Aggravating &amp; Reliving Factors</b> , and <b>Associated symptoms:</b> such as Pain (back, neck, muscular), Headache, Syncope, Vertigo, SEIZURES, Paresthesia or Numbness, Fever, Nausea, Vomiting, Motor Difficulties (weakness, Atrophy, ataxia, bradykinesia & involuntary movement's), Visual Disturbance (diplopia, blurring, scotoma), Auditory Disturbance (hearing loss, tinnitus, dizziness) Dysphagia, Speech & Language Symptoms (dysarthria, dysphonia, comprehension problem), Mental Symptoms ( memory difficulty, disorientation in the environment, confusion, lethargy, insomnia, forgetfulness anxiety, depression, hallucination, paranoid thoughts, personality change) Autonomic Dysfunction (bowel, bladder, sexual, postural hypotension). Pain should be further defined in terms of the following: Location, Radiation, Quality, Severity, and Aggravating & Reliving Factors.			
<b>4. Past Medical History</b>			
Same situation before, head trauma, toxic exposure.			
Chronic disease (DM, HTN, hyperlipidemia , renal or cardiac diseases , connective tissue diseases ...)			
History of hospitalization : Admission, Surgery			
<b>5. Family &amp; Social History</b>			
Same situation in the family, chronic disease (DM, HTM), congenital & hereditary diseases, history of stroke or transient ischemic attack.			
Marital status, No. of children, housing status, job status & environment / conclude: socioeconomic status. History of travelling.			
Habits: smoking, drinking Alcohol, using prohibited substances. Blood transfusion			
<b>6. Drug history:</b>			
Any recent medication, long term medication, Allergies, Herbal Medication.			
<b>7. Systemic review:</b>			
CNS , CVS&RES, GIT, UT, MS			
<b>SUMMARY</b>			

