

The Neurological Examination

The neurological exam consists of several subdivisions we will discuss:

1. Sensory examination
2. Motor Examination
3. Reflexes
4. Coordination

Before you start the examination make sure to wash your hands, introduce yourself to the patient, take permission to perform the exam, explain to the patient the nature of each test before performing it and respect the patient's privacy and dignity.

You will need tendon hammer, neurotip (sterile sharp object), Cotton wool and tuning fork (128Hz)

Sensory Examination

- Ensure the patient has his eyes closed.
- Show the patient how the sensation feels on sternum first.
- Assess light touch sensation using a cotton wool use a dabbing technique.
- Assess pain sensation using a neurotip
 - ✓ For light touch and pain, assess sensation across each dermatomes, comparing left to right at equivalent regions as you progress.
- Assess vibration sensation using a tuning fork
- Assess Proprioception; joint position sense
 - ✓ For proprioception and vibration we start distally (distal interphalangeal joint) if the sensation is intact conclude the test, if there is an abnormality test a more proximal joint.
- Two-point discrimination can be tested with a special pair of calipers, or a bent paper clip, alternating randomly between touching the patient with one or both points.
- **Test Cortical Sensation**
 - To test **graphesthesia**, ask the patient to close their eyes and identify letters or numbers that are being traced onto their palm.
 - To test **stereognosis**, ask the patient to close their eyes and identify various objects by touch using one hand at a time.

Motor Examination

The examination consists of:

1. Inspection
2. Palpation
3. Testing muscle tone
4. Testing muscle power

Inspection

- Look for Asymmetry between the right and left limbs
- Look for **S**cars, **W**asting, **I**nvolutionary movements, **F**asciculations, and **T**remor. (**SWIFT**)

Palpation

Check the muscle bulk and look for tenderness in the muscles and joints.

Tone

- Ask the patient to relax (go floppy)
- Compare the right and left sides
- In the upper limbs: Passively move the shoulder, elbow and wrist joints
- In the lower limbs: test hip, knee and ankle muscle groups
- Feel for abnormalities of tone as you assess each joint (e.g. spasticity, rigidity, hypotonia).
- Test for ankle clonus:
 - Support the patient's leg, with both the knee and the ankle resting in 90-degree flexion. Briskly dorsiflex and partially evert the foot, sustaining the pressure.
 - Clonus is felt as repeated beats of dorsiflexion/ plantar flexion.
 - Associated with upper motor neuron lesions.

Power

- Compare the right and left sides
- Assess for the patient's ability to push against your hand
- Remember strength varies with age, occupation and fitness.
- In the upper limbs test: shoulder (abduction, adduction), elbow (flexion, extension), wrist (flexion, extension), fingers (flexion, extension), thumb (adduction, abduction)
- In the lower limbs test: hip (flexion, extension, abduction, adduction), knee (flexion, extension), and ankle (dorsiflexion, plantarflexion, inversion, eversion)
- Power is graded according to the MRC with a number. Minimum is 0 when no muscle contraction happens, and the maximum is 5 when the patient can perform a movement against resistance.

Reflexes

- Check the deep tendon reflexes using impulses from a tendon hammer delivered to the tendon NOT the muscle.
- The limbs should be in a relaxed and symmetric position, it is important to compare each reflex immediately with its contralateral counterpart so that any asymmetries can be detected.
- Upper limbs: Check the: Biceps reflex (C5, C6), Supinator reflex (C5, C6) and Triceps reflex (C7)
- Lower limbs: Check the: knee-jerk reflex (L3, L4), ankle-jerk reflex (S1),
- Deep tendon reflexes are often rated according to the following scale:
 - ✓ Increased (++++)
 - ✓ Normal (++)
 - ✓ Decreased (+)
 - ✓ Absent (0).
- Check plantar reflex : Run a blunt object (key) along the lateral border of the sole of the foot towards the little toe. **Normally** plantar flexion of the toes will happen.
 - ✓ Positive Babinski reflex = Dorsiflexion of the great toe and abduction (fanning) of the other toes indicates UMN lesion

Coordination

Upper limbs

- Perform Finger-to-nose test.
 - Ask the patient to touch their nose with the tip of their index finger and then touch your fingertip as fast as they can while you continually move your finger.
 - The presence of dysmetria and intention tremor is suggestive of a cerebellar disease.
- Perform rapid-alternating movement test
 - Ask the patient to place their left palm on top of their right palm then turn over their left hand and touch the back of it onto their right palm then return their left hand to the original position and repeat the sequence quickly
 - The inability to perform the test is a feature of a cerebellar disease.

• Lower limbs

- Heel-to-shin test
 - Ask the patient to lift the heel into the air and to place it on their opposite knee, then slide their heel up and down their shin between knee and ankle as quickly as he can.
 - Inability to perform the test might be due to cerebellar disease , loss of proprioception or muscle weakness (check muscle power first).

Important Notes

- Tremor is an involuntary, oscillatory movement about a joint or a group of joints, resulting from alternating contraction and relaxation of muscles.
 - Parkinson’s disease causes a slow , coarse, ‘pill-rolling’ tremor, worse at rest (resting tremor) but reduced with voluntary movement. It is more common in the upper limbs.
 - Intention tremor is absent at rest but maximal on movement and on approaching the target (hunting tremor), and is usually due to cerebellar disease. It is best assessed with the finger-to-nose test

- Spasticity and rigidity both involve increased tone
- Spasticity is associated with increased tone in the initial part of the movement which then suddenly reduces past a certain point. It is “Velocity-Dependent”, meaning the faster you move the limb, the worse it is. It is “Direction- dependent”, meaning it is worse with flexion or extension. It is associated with pyramidal tract lesions.

- Rigidity is a hypertonic state characterized by constant resistance throughout range of motion that is **INDEPENDENT OF THE VELOCITY AND DIRECTION OF MOVEMENT**. It is associated with extrapyramidal tract lesions (e.g. Parkinson’s disease).

7.6 Features of motor neurone lesions		
	Upper motor neurone lesion	Lower motor neurone lesion
Inspection	Usually normal (may be disuse wasting in longstanding lesions)	Muscle wasting, fasciculations
Tone	Increased with clonus	Normal or decreased, no clonus
Weakness	Preferentially affects extensors in arms, flexors in leg	Usually more focal, in distribution of nerve root or peripheral nerve
Deep tendon reflexes	Increased	Decreased/absent
Plantar response	Extensor (Babinski sign)	Flexor