



# Lower Limb Neuro Examination

## 1. Introduction

- Wash Your hands
- Introduce yourself by name and role
- Check their Identity – name and DOB
- Explain the procedure - why you need to do it and what does it involve
- Ask for consent
- Expose the patient appropriately
- Check if the patient is currently in any pain
- Ask if right or left-handed

e.g. Good morning, my name is .. and I am a medical student. Can I check your name and date of birth? I have been asked to do an examination of the nerves in your legs, this will involve having a look and feel of your legs and testing the movement and sensation in your legs. Is that ok?  
 - For the purposes of this examination I will need to see your whole legs, so would you mind undressing below the waist please?  
 - And can I just check whether you are in any pain?

## 2. Bedside Inspection

- Observe the patient: Patient is **A – Alert**      **B – (normal) Body habitus**      **C – Comfortable at rest**
- Observe the surroundings: mobility aids (wheelchair, walking stick), NG tube

## 3. Gait and screening tests

- Ask patient to stand up with arms folded – tests proximal weakness
- Walk around back and observe for any spinal scars, cutaneous signs
- Ask patient to walk – assess start (hesitant in PD), rate, gait, arm swinging and turn
- Ask patient to do heel-toe walking – if impaired signals, cerebellar lesion
- Stand on toes (tests S1, sciatic nerve power, plantarflexors) and heels (tests L4/5, impaired in footdrop)
- Assess balance using Romberg’s test – Ask patient to put feet together and close eyes whilst standing
  - o Reduced stability with eyes closed (+ve sign) – indicates proprioceptive/dorsal column dysfunction.
  - o Reduced stability with eyes open (-ve sign) – indicates cerebellar ataxia

## 4. Inspection of the legs- lie the patient back down

Action	Signs	What it may indicate
Inspect patient’s legs	<b>S - Scars</b>	Could indicate previous surgery, or trauma
	<b>W - Wasting</b>	Indicates loss of innervation to muscles
Look closely for plantar foot wasting and dorsal foot guttering (LMN lesion)	<b>I - Involuntary movements</b>	Indicates upper motor neuron lesions: <b>Chorea</b> – Huntington’s disease, <b>Myoclonus</b> - central nervous system disorders, <b>Athetosis</b> - damage of thalamus, basal ganglia, <b>Pseudoathetosis</b> - disruption of the proprioceptive pathway, from nerve to parietal cortex.
	<b>F - Fasciculations</b>	Indicates lower motor neuron lesions
Look for bony deformity (pes cavus)	<b>T - Tremor</b>	Can be fine or course. Resting tremor found in Parkinson’s
	<b>P - Posture</b>	Indicates curvature of the spine
	<b>H - Hypertrophy</b>	

## 5. Tone

- Ask patient to relax muscles so you can passively move them
- **Roll leg side to side:** Increased tone = UMN lesion, Decreased tone = LMN lesion
- **Lift knee up and down quickly:** Look for spasticity (foot kicks out involuntarily = UMN lesion)
- **Clonus- rotate and quickly dorsiflex:** Feel for rhythmic beats of gastrocnemius (>2 = UMN lesion)

## 6. Power

- Test one joint at a time and support the joint being tested.
- Assess using MRC grades: 5 = full power 4 = some resistance, 3 = Can support against gravity 2= gravity eliminated, 1 = flicker of muscle contraction, 0 = nothing

Action	What it tests
Hips- lift legs up with knee extended, stabilises contralateral hip	L <sub>2,3</sub> – Hip flex – <i>iliopsoas</i> – lift up leg (femoral nerve) L <sub>4,5</sub> – Hip extension – <i>gluteal muscles</i> – Press leg into bed (sciatic – inf gluteal) L <sub>2,3</sub> – Hip abductors/adductors
Knee- knee flexed to 90 degrees	L <sub>3,4</sub> – Knee extensors (femoral) – <i>quadriceps</i> – straighten knee (femoral) L <sub>5</sub> , S <sub>1</sub> – Knee flexors – <i>hamstrings</i> (sciatic)
Ankle- legs straight ankle plantar/dorsiflexed	L <sub>4,5</sub> – Ankle extensors (dorsiflexion) – <i>tibialis anterior</i> (sciatic – common peroneal) S <sub>1,2</sub> – Ankle plantar flexors – <i>gastrocnemius</i> (sciatic)
Foot- eversion and inversion	L <sub>5</sub> – foot evertors – <i>peroneus longus and brevis</i> (peroneal) L <sub>5</sub> – foot invertors – <i>tibialis posterior</i> (tibial)
Toes	L <sub>5</sub> , S <sub>1</sub> – Toe extensors – <i>extensor digitorum longus</i> S <sub>1,2</sub> – Toe flexors – <i>flexor digitorum longus</i> L <sub>5</sub> – Hallux extension – <i>extensor hallucis longus</i> (common peroneal) S <sub>2,3</sub> – Hallux flexion – <i>flexor hallucis longus</i> (tibial)

### 7. Reflexes

- **Knee jerk** reflex (L3/4, kick the door), **Ankle** (S1/2, in the shoe), **Plantar Babinski (S1)** – Scrape sole from down later up and across. If hyperreflexia = UMN lesion
- Can ask patient to close eyes and clasp hands and pull outwards to accentuate the reflex

### 8. Coordination

- **Heel shin test** – ask patient to touch knee to hand and then contralateral knee. Move heel down tibia and back up to hand. Repeat 3 times. Impairment = cerebellar lesion.

### 9. Sensation

- Ask the patient 2 questions throughout: Can you feel it on both sides, and do they feel the same?
- Assess **light touch** (with cotton wool or tapping) – assesses dorsal column neurons
- Assess responsiveness to **pain** stimuli using neurotip – assesses spinothalamic tract fibres
- Can offer to test responsiveness to **temperature** – ask for hot or cold object
- Touch sternum as a reference point, followed by subsequent dermatomes:
 

T12- ASIS	L4- medial leg
L1- high pocket	L5- dorsum of big toe
L2- lateral thigh	S1- sole of foot
L3- medial thigh/patella	S2- popliteal fossa
- Assess responsiveness to vibration (dorsal column) – twang tuning fork and place on sternum as a reference point. Hold it on interphalangeal joint of the hallux, if can feel stop there. If not, work more proximal, move to metatarsophalangeal joint → ankle → knee
- Assess proprioception: - hold proximal phalanx of hallux and explain moving up and down With eyes closed, move up/down >3 times and assess whether patient can tell direction. If fail, move to ankle and then knee.

**Thank the patient and wash your hands again.**

“To complete the examination, I would do a number of steps...”

**Bedside – (History)** Take a full history including effects on life

- **(Observations)** Full set of observations
- **(Corresponding examination)** Conduct a neurological assessment of upper limbs and cranial nerves. Offer a full assessment of cognitive and higher order functions like speech