Neurology Overview

- General inspection, speech and gait
- Higher functions
- Cranial nerves
- Tone
- Power
- Reflexes
- Sensation
- Co-ordination

In clinical examinations, usually only one aspect of these is required. For example, “Would you test this patient’s co-ordination?” or “Examine the upper limbs neurologically.”

Motor system of upper limb

- Ask patient to hold arms out in supination- if you see pronation drift, think upper motor neurone (may be worse with closed eyes)
- Look for slow movements and pill rolling tremor of Parkinson’s
- Look for ataxia of movements (swinging)

The first muscle to become weak in an upper motor neurone (pyramidal) lesion is supinator and the earliest sign is for the arm (contralateral to the lesion) to “drift” into pronation. This is why neurologists ask patients to hold their arms outstretched with their palms up. (Endocrinologists, looking for tremor and feeling for sweating examine the arms in pronation-palms down). Pronation drift is often worse with the eyes closed, as a degree of conscious compensation for weakness can be made.

Three tests of tone

Shake hands supporting patient’s elbow, then...
- Rapid supination feeling for a supinator catch (first weak muscle in upper motor neurone lesion, with increased tone)
- Flexion and extension of elbow for lead pipe and clasp knife (UMN)
- Wrist movements with synkinesis for cogwheeling

To check for a supinator catch, use your right hand to grip the patient’s left, as though going to shake hands. Then use your left hand to support their elbow, which helps the patient to let all the muscles relax. Then rapidly supinate the forearm with your right hand, feeling for the increased resistance at the extreme of supination- the supinator catch.
Static versus dynamic testing
- Doesn't matter which you use but be consistent
- Dynamic approach says “Pull me towards you” or “Push me down”
- Static (isomorphic) approach says “Hold your arm in this position. Don’t let me move it/ straighten it/ bend it
- I prefer the static approach

Testing power
- Test one side then the other
- Much easier to find a difference with consecutive stimuli than with simultaneous comparison
- Pyramidal pattern of weakness- think of the pyramidal posture; what you see is what is relatively strong

Pyramidal weakness
- Shoulder abduction weak- some adduction
- Elbow extension weak- some flexion
- Wrist extension weak- some flexion
- Finger extension weak- some flexion
- Thumb abduction weak- some adduction
- So test two movements at each joint and compare

If in doubt, use this method
- But there is a short cut which only tests one movement at each joint which is called the lower motor neurone scheme
- Useful in casualty if no obvious pyramidal drift or if you suspect no abnormality
- Particularly appropriate if you suspect a nerve root lesion
- One movement for each nerve root
- Useful way of remembering nerve roots

Nerve root scheme
- C5- shoulder abduction
- C6- elbow flexion (half-supinated- brachioradialis)
- C7- wrist extension (with a bit of C6)
- C8- finger extension
- T1- finger abduction

Finally, check ulna and median
- Radial nerve already checked- dorsiflexion of wrist, while checking C7
- Check contours of thenar eminences for median
- Then test abductor pollicis brevis (median)
- First dorsal interosseous for ulna
- Froment’s sign- pincer grip uses aDDuctor pollicis, the one ulna-innervated muscle in the thenar eminence
Ulna mafia
M medial lumbricals weak- priest’s blessing
A adductor pollicis is weak- Froment’s sign
F first dorsal interosseous
I interossei- small hand muscles
A abductor digiti minimi and hypothenar eminence

Median nerve
• Usually damaged at wrist- carpal tunnel
• Symptoms of tingling plus
• PAIN; often referred pain in upper arm, waking patient at night
• Shaking hand makes it better- “circulation?”
• APB, Tinel, Phalen, sensory loss 3.5 fingers

Lower limb roots
• L2 Hip flexion
• L3 Knee extension
• L4 Inversion of foot
• L4 Dorsiflexion of foot
• L5 Dorsiflexion big toe
• S1 Eversion of foot
Cerebellar signs
- D Dysdiadokokinesia
- A Ataxia
- N Nystagmus
- I Intention tremor
- S Scanning speech or slurred speech
- H Hypotonia
Neurology 2

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Examine the eyes
• Inspection
• Visual acuity (monocular for each eye)
• Fields
• External ocular movements
• Fundi
• Pupils (brightest light last) including swinging torch test

Examine the visual fields
• Introduce yourself and ask permission
• Ask for a chair- so you are at same level with patient
• Ask patient to cover one eye; you close one eye leaving both your hands free
• Check your distance- a hand beyond arm's length
• Position the object- just beyond your elbow
• Explain- I want to check your field of vision; please look straight into my eye and keep looking at me; I want to check if you can see this object without looking at it directly; I'm checking if you can see it "out of the corner of your eye"
• Check central vision- avoiding horizontal meridian (blind spot)
• Check outside boundary of each quadrant- moving slowly, in diagonal direction, from periphery

Fundi
• Mainly testing instructions and technique
• “Gaze into the distance”
• “Choose a spot to look at”
• “Keep looking towards it even if my head gets in the way slightly”
• “Don’t hold your breath- breathe normally”

Papilloedema: signs
• Loss of venous pulsation
• Pink disc
• Nasal blurring
• Loss of cup
• Swelling and haemorrhages
Papilloedema: causes
- Optic neuritis
- Raised intracranial pressure
- Malignant hypertension
- Retinal vein thrombosis
- Hypercapnia

Optic neuropathy: signs
- Pale disc
- Loss of visual acuity
- Loss of red colour vision
- Central scotoma
- Afferent pupillary defect

Swinging torch test
- In the good eye, light causes constriction and this is consensual
- Release of stimulus from good eye causes dilatation- also consensual
- Light in "bad" eye is a weak stimulus: there is a relative afferent defect
- Release stimulus acting consensually on bad eye pupil
- It competes with weak afferent stimulus: result dilatation of pupil on affected side

Optic atrophy: causes
- Demyelination
- Trauma
- Compression eg pituitary tumour or meningioma
- Diabetes
- Toxic eg methanol
- Secondary to papilloedema

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Optic neuropathy: terminology

- Optic neuropathy
- Optic neuritis
- Bulbar neuritis
- Papillitis
- Optic neuritis with Papilloedema
- Retrobulbar neuritis (fundus initially normal)
- Six weeks later
- Optic atrophy
- Primary optic atrophy

Oculomotor palsy: complete
- Partial ptosis (lid has joint supply from 3rd and sympathetic)
- Eye abducted and depressed (oculomotor fibres; “down and out”)
- Pupil dilated (loss of parasympathetic fibres from Edinger Westphal nucleus)

Oculomotor palsy - causes
- Diabetes (pupil often spared)
- Posterior communicating artery aneurysm (surgical 3rd - often painful)
- Raised intracranial pressure (false localising sign)
Acquired Ptosis

- Acquired ptosis
  - Normal pupil
  - Myasthenia
    - Partial third
  - Small pupil
  - Horner's
  - Large pupil
    - Complete third
Fourth nerve - trochlear
- Depresses the adducted eye
- Superior oblique causes depression as it hooks around a pulley (trochlear) and inserts into the eye behind the midline

![Diagram of eye muscles](image)

Nose

Superior rectus (3) Inferior oblique (3)
Lateral Rectus (6)
Inferior rectus (3) Superior oblique (4)

Cerebral cortex
cerebral cortex
right hemisphere left hemisphere

Lower pons: facial nerve motor nuclei

Internal capsule-corticospinal fibres

Upper motor neurones from both hemispheres supply part of nucleus for upper part of face: "bilateral cortical representation of upper face"

Fibres for lower part of face receive a single input from contralateral cortex

LMN does NOT cross over
No "bilateral innervation of face"

Exit through stylo-mastoid foramen and then through parotid gland to supply facial muscles

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**Parkinson’s disease: quadrad**
- Tremor
- Rigidity
- Bradykinesia
- Loss of postural reflexes

**Parkinson’s history**
- Activities of daily living
- Handwriting
- Buttons and shoe laces
- Turning over in bed at night
- Getting in and out of a car

**Parkinson’s: inspection**
- Poverty of facial expression
- Flexed extrapyramidal posture
- Loss of arm swing early
- Hesitancy
- Shuffling
- Hurrying (festination)
- Retropulsion

**Extras**
- Synkinesis reinforces tone
- Thumb finger test for bradykinesia
- Loss of attenuation to the glabellar tap response
Demyelination
- Optic nerves (acute optic neuropathy eg retrobulbar neuritis)
- Medial longitudinal bundle (ataxic nystagmus or internuclear ophthalmoplegia)
- Cerebellar signs
- Spinal cord- typically spastic paraparesis

Medial longitudinal bundle
- myelinated bundle which connects 6 with opposite 3 for conjugate gaze
- failure of adduction on the side of the lesion
- with nystagmus of contralateral eye in abduction

Third nerve nuclei in midbrain

Right eye adducts (3)

Sixth nerve nuclei in pons

Left eye looks left- abducts