Guide to the Cranial Nerve Examination including examining eyes/vision and ears/hearing

Please note: as with other examinations, different clinicians will perform these examinations in slightly different ways – and different resources (Macleod’s Clinical Examination, www.geekymedics.com etc) may describe the examination slightly differently. Students need to establish their own routine for performing these examination and this Guide is intended to help them do this. Students do NOT fail ISCEs/OSCEs if they do the examination slightly differently to as described here.

Feedback is welcome – please send to Paul Kinnersley (kinnersley@cf.ac.uk)

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At the start of every examination

Clean hands
Introduce yourself to the patient
Explain what you are going to do, check patient consents and check if patient in any pain
Expose the patient appropriately preserving dignity

Outline of Cranial Nerve Examination

Observe the patient’s general condition – aids (e.g., frame, wheelchair) at the bedside, reading glasses, hearing aid. Look for muscle wasting (temporalis), ptosis (drooping eyelid), drooping mouth, asymmetric facial creases.

Patient sitting comfortably. Usually examine at the same height as the patient so examiner should sit also (or stand with patient sitting on plinth/couch).

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<td>I Olfactory</td>
<td>Assess patency of each nostril. Enquire about changes in sense of smell.</td>
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| II Optic      | Visual acuity (Snellen chart) and ask patient if recent change
Visual fields – each eye separately
Pupillary reflexes – light and accommodation (remember to check the other eye) and the swinging light test; observe direct reflex – constriction of pupil in eye you shine light into and consensual reflex – constriction of other pupil
Ophthalmoscopy - For more detail see below |
| III/IV/VI Oculomotor | Inspect eyelids and pupils – for symmetry, reactions to light and accommodation
Eye movements – ask patient to follow finger – move in H shape, ask if see double at any time |
| **Check for nystagmus** – flickering movements of eyes – hold finger at approximately 30 degrees of lateral/vertical vision (at the extremes of gaze physiological nystagmus is seen) |
| For more detail see below |
| **V Trigeminal** | Sensory – cotton wool touch over 3 divisions – ask patient to close eyes, check for symmetry |
| | Motor – clench teeth; open mouth against resistance |
| | Consider corneal reflex/jaw jerk |
| **VII Facial** | Observe face for asymmetry/ involuntary movements |
| | Wrinkle forehead/Bare teeth/screw eyes shut tight/blow out cheeks |
| | Remember upper half of face innervated by both cerebral hemispheres so if upper motor neurone lesion can still wrinkle forehead |
| **VIII Vestibulocochlear** | Ask patient if any recent change in hearing |
| | Test hearing by rubbing fingers together or whispering |
| | Otoscopy |
| | Rinne’s test – place 512 Hz tuning fork on mastoid process then move to in front of ear – ask which is louder? Air conduction better than bone conduction is normal. If not, then conductive hearing loss |
| | Weber’s test – place tuning fork middle of forehead – should ‘hear’ vibration equally in both ears; if lateralises can suggest conductive hearing loss in louder ear or sensorineural loss in other ear |
| | For more detail see below |
| **IX/X Glosopharyngeal Vagus** | Unusual to have abnormalities and difficult to test |
| | Observe for palatal elevation with “ahh”. The uvula will be pulled away from the affected side (opposite of tongue). |
| **XI Accessory** | Shrug shoulders (trapezius); turn chin against resistance (sternocleidomastoid) |
| **XII Hypoglossal** | Examine tongue for wasting/fasciculation (flickering movements) |
| | Ask patient to stick out tongue – if deviates suggests lesion on that side |
Ophthalmology

Ask patient if they wear glasses or contact lenses

Ask if any recent change in vision or any other eye symptoms

General

Orbits
Any obvious swellings around the eyes or bulging of the eyes

Eyelids
Any swelling, drooping or lumps

Sclera/conjunctiva
Pallor? Jaundice? Infection?

Cornea
Opacity? Arcus?

Visual acuity

Sit/stand the patient at standard distance – 6m for standard chart, 3m for 3m chart

Test each eye separately asking patient to cover other eye

Test first with glasses on – ‘best corrected’ then with pinhole as well ‘best corrected and pinhole’

Ask patient to read letters on chart; lowest full correct line is their visual acuity

Repeat with glasses – or pinhole correction

Record visual acuity (with/without glasses) as a fraction – numerator distance from chart (6 with standard chart) denominator line reached on chart – so 6/6, 6/12 and so on. This means patient can read at 6 m what a person with normal vision can read at X where X is the line the patient can read.

Near vision can be tested using an appropriate chart – again one eye at a time.

Visual Fields

Patient and examiner sit facing each other about 1 m apart

Each covers opposing eye (eg patient left, examiner right) and stare into each other’s open eye

Examiner brings a hand (positioned halfway between self and patient) from the periphery into the field of vision successively in each quadrant until the patient detects the movement.

Using Ophthalmoscope

Darken room/ideally sit patient on raised chair/couch so that can look into eyes without excessive bending

Switch on ophthalmoscope and check large bright white light (move switches on back of head if not)

Set focussing wheel to zero – unless you know you need some other number because of your own eyes

Remove patient’s glasses – optional to remove own glasses

Warn patient that you are going to shine bright light into eye

Ask the patient to look at distant object straight ahead and to keep looking into the distance even if your head gets in their way.
For patient’s right eye, hold ophthalmoscope in right hand and use your right eye; for left eye, left hand and your left eye (if possible).

Place thumb on patient’s eyebrow – to help keep head still and act as buffer

At arm’s length distance from patient, look at pupil – should see red reflex.

Now gradually move in towards patient until almost touching them, keeping looking through lens to focus on retina – rotating focusing wheel a few clicks if necessary (don’t go too far too fast)

Locate the optic disc – if can’t find disc follow major blood vessels until you do find it – the Vs of branching vessels point back towards the disc:

Look at the disc for pallor (atrophy), a swollen ill-defined edge (papilloedema), a large cup (cupping is a cup: disc ratio equal to or greater than 1:2) and at the vessels of the disc.

Examine the peripheral fundus. Each quadrant should be examined in turn. Do this either by asking the patient to look at each of the four quadrants in turn, or by moving your direction of gaze into each of the four quadrants. Look at the vessels, and for the presence of exudates, haemorrhages, or abnormal pigmentation of the fundus.

To look at the macula, focus on the disc with the patient focusing on a distant object in front of them. Then ask the patient to look into the light of the ophthalmoscope and you will be looking at the macular region and fovea. If all you can see is the reflected light, then reduce the intensity of the illumination.
Examination of the Ear and Hearing

Ask patient if any recent change in hearing or any other ear symptoms

General

Pinna
Congenital abnormalities, shape, skin disorders – remember to look and feel behind the ears and to check both sides

Opening of external auditory meatus
Look for discharge/inflammation

Using the otoscope

Explain procedure to patient

Place clean speculum on otoscope

For right ear hold otoscope in right hand and vice versa for left ear, light grip – to ensure gentle movements

Gently pull pinna upwards and backwards

Place tip of speculum in the external auditory meatus under direct vision

Start looking through the otoscope and gently advance it

The tympanic membrane is translucent and with a light reflex just below the malleolus

Diagnosing hearing loss

A diagnosis between the chief types of hearing loss can be made by means of a tuning fork, using a 512 Hertz fork gently sounded. Rinnes test and Webers test are done to differentiate between a conductive (middle and outer ear causes) and a sensorineural deafness (caused by damage to the cochlea or to the 8th nerve – or its central connections). These tests are always done together. The Rinne test is done first.

Rinne Test:

The tuning fork is presented with the tines at the external auditory meatus and then the base is pressed firmly on the mastoid process. The patient is asked which is heard the louder. If the tuning fork is heard louder at the external auditory meatus then this is normal and the patient is Rinne positive on that side (the ossicular chain is an amplifier). If the bone conduction through the mastoid process is heard louder then the patient is Rinne negative, ie abnormal. Causes for a negative Rinne include a build up of wax or chronic secretory otitis media.

Both ears need to be examined in a similar way to exclude the possibility of a false positive Rinne when the patient has a profound conductive deafness on the side being examined. In this case the sound will be conducted to the other side of the head where the remaining sensorineural apparatus is intact. The use of a complimentary Weber’s Test should confirm the above findings and should help discriminate between a true Rinnes negative and a false Rinnes negative.
**Weber’s Test:**

A tuning fork should be placed firmly on the skull vertex or at the forehead in the midline and the patient asked in which ear the sound is best heard. The back of the patient’s head should be supported by the examiner’s other hand. In a conductive hearing loss of one ear the patient can be expected to point to the ear in which there is a conductive hearing loss. A simple way to demonstrate and understand Weber’s Test is to place a finger occluding one ear (mimicking a conductive deafness) and with a tuning fork sounded over the vertex of the skull. Sound should be conducted to the occluded ear. If both ears are affected by a conductive hearing loss the tuning fork would be heard in the ear which is the more affected.

In sensorineural hearing loss the sound would be conveyed to the ear with the better functioning sensorineural apparatus. Acoustic neuroma is an example of a condition causing profound sensorineural deafness.

See pictures below

**Measurement of Hearing Loss**

The simplest and easiest procedure to measure hearing loss is to ascertain whether a patient can hear a whisper in one ear when the other ear is covered.
512 Hz Tuning Fork

Rinne's Test

Air > Bone = Normal = Positive
Bone > Air = Abnormal = Negative

Weber's Test

Right Middle Left

Normal

Left Conductive deafness

Rinne +ve +ve +ve -ve
Weber

Left partial sensorineural deafness

Rinne +ve +ve +ve -ve
Weber

Left profound sensorineural deafness

Rinne +ve +ve +ve -ve
Weber

Pictures courtesy of Mr Alun Tomkinson