Appendix 1 – Session Objectives for Preceptors

Kindly prepared by Dr. E Weis

Session 1: Basic Ophthalmology Examination Skills & Direct Fundoscopy

1. Test and record visual acuity using the Snellen Chart and reading card
2. Perform confrontational visual field testing
3. Observe direct and consensual pupillary responses
4. Perform and describe the findings and neural pathways of a swinging flashlight test for an afferent pupillary defect
5. Test and record extraocular movements
6. Perform the cover-uncover and cross-cover test to diagnose strabismus (phoria and tropia)
7. Test and record color vision using red desaturation test
    a. Understand that formal testing available eg. Ishihara color plates
8. Use the direct ophthalmoscope to perform a red-reflex test for the identification of an ocular media opacity.
9. Perform fundoscopy to examine the optic nerve.
10. Determine cup-to-disc ratio using the direct ophthalmoscope.
11. Examine the retinal vessels and macula.

Session 2: Eyelid and Anterior Segment

1. Instill fluorescein dye on the ocular surface and examine with blue light with direct ophthalmoscope or slit lamp.
2. Perform upper lid eversion to look for a foreign body.
3. Apply an eye patch.

Appendix 2 – Eye Examination Information to be Provided to Students Kindly prepared by Dr. E Weis

Session 1: Basic Ophthalmology Examination Skills & Direct Fundoscopy

1. **Vision**
   - visual acuity using any method available (Snellen eye chart with patient 20 feet away, near card held ~ 14 inches away)
     - a poor measurement is better than no measurement at all
       - subjective difference in reading something from a book or bottom of tissue box, etc.
   - grading vision: acuity (understanding numerator and denominator of 20/20 and 6/6) > counting fingers > hand motion > light perception > no light perception
   - if patient does not have glasses with them, or says they have "blurred vision" use pinhole (if not one available can make one with needles poked in bottom of paper cup)
   - make sure to check one eye at a time (ensure patient is not peeking through other eye); may need to cover it yourself

2. **Confrontational Visual Fields**
   - sit in front of patient, put hand equidistance between you and patient
   - examine yourself against the patient
   - if examining right eye, close your right eye, and vice versa
   - we put up fingers, and ask patient to tell us "how many" in each quadrant
     - can also do finger wiggling, or kinetic testing (ask when patient can see a target as it moves towards the center of the visual field)

3. **Pupils**
   - inspect size, shape, symmetry of pupils; if anisocoria document size in light and dark
   - test reaction to light in a dark room with a bright light; does it react, is it brisk or sluggish?
   - look for a relative afferent pupillary defect; swinging flashlight test: shine in one eye for 3 seconds, swing to other eye and do same

thing, "swing" back and forth to decide if pupil constricts or dilates. Both should constrict slightly and equally when light is shone in them
    - explain the 4+ scale and that it can be used to describe the severity of the RAPD

4. Extraocular Muscles

- ask patient to follow an object; could be your finger, a pen, an object, a light
- patient should follow the object as you move through all the directions of gaze; books say make an "H" in the air to patient's right, up and right, down and right, through the middle, to the left, up and left, down and left
- can check corneal light reflex; should be symmetric in both eyes
- look for nystagmus
- if patient has diplopia or 'eye wandering':
    - perform cover-uncover test and cross-cover test in primary and direction of gaze in which patient feels they have diplopia

5. Color Vision

- can test with "red desaturation" test
- show red item to patient with problem eye covered; tell them that red is "worth one dollar"
- show same red time to patient with good eye covered; ask them what the red is worth now?

6. Optic Nerve Assessment

- use direct ophthalmoscope; check for red reflex first
    - important to stress importance of red reflex testing in babies and children
- remove your glasses and patients' unless severe refractive error
- start at 0 diopters on the dial
- red numbers (myopic); green numbers (hyperopic); keep index finger on dial so you can easily adjust
- use right hand and right eye for patient's right eye; left hand and left eye for patient's left eye; try to keep both eyes open
- ask patient to look slightly up and over your shoulder at specific point behind you on the wall
- start about 15 inches away at ~15 degrees lateral to patient's line of vision. Move closer to patient until vessels come into view. Assess vessels (look for AV nicking, dilation, tortuosity). Move around until disc in view, and adjust power until in focus. Look temporally for view of macula.

- look for clarity of disc outline, colour, size of cup, symmetry between two eyes. Look for any hemorrhages.

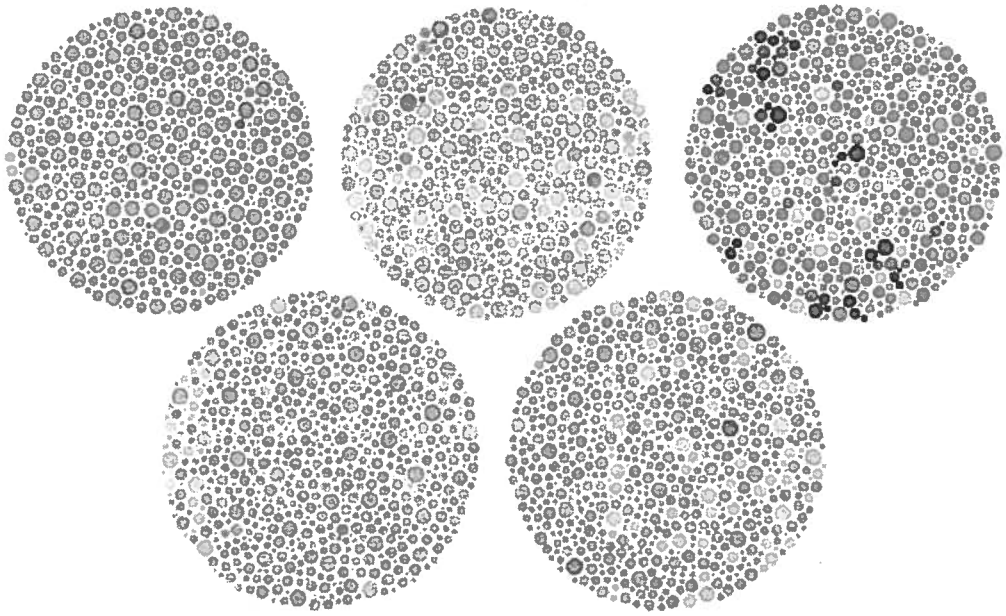
Session 2: Anterior Segment Examination & Special Situations

The following can be done with or without slit-lamp:

1. **Anterior Exam: Work anatomically from outside to inside**
   - **Position and alignment of eyes:** can look for proptosis, enophthalmos
   - **Eyelids:** width of palpebral fissures (lid retraction, ptosis), lid edema, lid colour, lesions, trauma, adequacy of lid closure (VII nerve palsy); lid direction (ectropion, entropion)
   - **Lashes:** direction, masses
   - **Lacrimal system:** tearing, redness or mass over lacrimal sac (dacryocystitis)
   - **Conjunctiva and sclera:** have patient look up and pull down lower lid; look for redness (and distribution of redness), nodules, jaundice, foreign bodies, discharge. Evert upper lid with q-tip to look for same. Use pH paper to check pH if history of chemical injury (normal is 7-7.5). If trauma look for any lacerations of sclera, or cornea. Look for uveal tissue (looks black where it shouldn't be!)
   - **Cornea:** Look with light for corneal clouding, haze. Check for corneal sensation. Use SMALL amount of fluorescein and look with blue light for any epithelial defects.
   - **Iris:** Look for any pigmented lesions. Can attempt to assess the anterior chamber depth by shining light on temporal aspect and look for reflection on medial side of the iris.
   - **Lens:** use red reflex to assess density of opacity.
   - **Intraocular pressures:** can use tonopen or applanation tonometer attached to slit lamp. In the office, with no worry about trauma or ruptured globe, can palpate to assess rigidity of eye (this is inaccurate)

2. **Special Situations:**
   - Babies, Children, Patients with cognitive impairment
   - See if can fix and follow, different methods of vision assessment based on age (matching, etc)
   - **Always look at red reflex in babies and kids**
   - Evaluate for strabismus

Appendix 3 – Sample Ishihara Color Plates



Appendix 4 – Direct Fundoscopy Information to be Provided to Students Kindly prepared by Dr. G. Douglas

The Direct Ophthalmoscope – KEY POINTS

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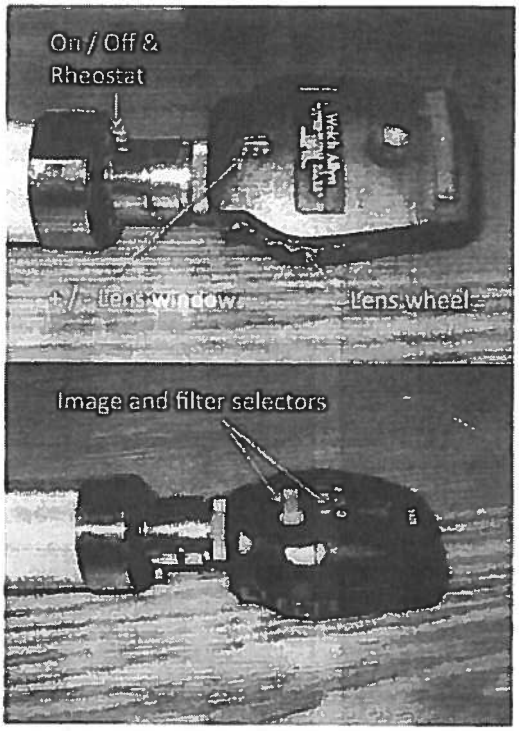
The "direct" is a very versatile and often underutilized instrument, that can be termed a "self-illuminated magnifying and examining device". It can replace a standard flashlight with its often-found dark beam centre. As such, it can therefore be used to exam pupil reflexes and provide a more reliable beam for checking the depth of the anterior chamber of the eye (tangential light test). An extra advantage is that it will provide a close up view of the anterior part of the eye – and any other part of the viewable body. By adjusting the lenses on the dial to a high "+" and moving very close to the patient you can see a very highly magnified image of the anterior segment of the eye or of the skin. In the absence of a binocular slit lamp, this small instrument may allow you to see monocularly, what may not otherwise be possible. It is found under many brand names, but the essential parts are all present as described below...

PARTS

Body - this is comprised of a battery (plug-in, loose batteries) or a cord attached to a main electrical source. Some have dedicated wells that allow recharging to occur continuously. The most important tool you have on this part is the on–off button which must be depressed to turn it on and also acts as a rheostat which allows the brightness of the light to be adjusted. The head of the ophthalmoscope attaches by a number of variations for coupling unique to the brand of instrument.

Ophthalmoscope Head - this is comprised of a series of lenses ("+" or hyperopic, "-" or myopic), which allow precise focusing of tissues in the eye according to their depth in the eye relative to the ophthalmoscope and compensates for refraction. In addition, there are 1 or more slide levers or additional wheels on the head, which allows selection of different patterns or sizes of light beam. These may also include a slit, blue and green lights.



The "Direct" front and back

USING the ophthalmoscope

It is not a difficult instrument to use but it does require both knowledge of its attributes and good technique before its full potential and utility can be appreciated. There are also some practitioners who for a number of reasons can't use it for a lack of ability to close one eye. Many can train themselves to get around this problem, but others must adapt as best they can.

Holding the instrument - The general rule is that the right eye of the doc / nurse view the right eye of the patient with the ophthalmoscope in his or her right hand. The reverse takes place for the left eye. To do it in any other way is to block patient fixation or bump noses with the patient. Neither of these positions results in a satisfactory examination.

Positioning the patient - Sitting is the best doc / nurse position so you can comfortably view the eye or fundus for the required time of examination. One may also view with a patient sitting/standing at the side of a stretcher. But, any position will work only if the practitioner is comfortable and not leaning in an awkward posture. The patient's position must be comfortable as well. In the case that both are sitting, the shoulder of the patient should be held and patient brought forward to meet the doc/nurse. Where excessive hair is a problem, the shoulder hand may be applied to the brow area. (This may be objectionable to Buddhists)

Patient instruction - Fixation is extremely important as your observation of the fundus or anterior parts of the eye depends on an immobile subject. Give them a specific object to look at and remind them of details on that object if their fixation wanders through your examination.

Proper viewing of the eye requires very close proximity to the eye – almost touching the eyelashes if you wish to have a good view of the fundus. Viewing from a greater distance results in magnification of the images so that you may see only one or two blood vessels or a portion of the optic nerve head at a time.

Practitioner's Technique - Okay, you and the patient are in position and comfortable and your fingers are all in position (check a.). Here, you may wish to adjust the light diameter to the mid size beam on your instrument. The small diameter may not allow a full view of an ONH, let alone the fundus. Also, *adjust the light intensity to an optimum value* so you don't cause an unnecessarily small pupil, and alienate the patient. Full–on brightness will lose you patients, especially small ones! Ensure the patient is looking at the distant object (pupil enlarges) and start at arm's length so as to find the red reflex. Without blocking the patient's fixation, approach the patient keeping the red reflex in view. When near enough, extend your little finger or ring finger to the patient's cheek. Proprioception then gives you an idea of how close you are. You can also position the uppermost tip of the ophthalmoscope head on the patient's brow, if their eye is not too prominent. *This close position is key to successful ophthalmoscopy and facilitates movement of the light beam and observation around the entire posterior pole of the retina.* The angle of approach from arm's length is about 15° from the patient's viewing axis so as to come in on the optic nerve head (ONH) or enough blood vessels to lead you toward the ONH. If all you can see is an arteriole or venule junction, the "arrowhead" made by the junction of the vessels points in the direction of the ONH.

Examination of the fundus — The ONH doesn't perceive light as brightly and so examination of it is easier for the patient. Note its features including "pinkness" of the rim, blood vessel pattern, and the cup/disc (judged by blood vessel deviation not by the relative pallor of the central cup. Once this is done, all 4 sets of blood vessel leashes (supero-nasal, supero-temporal, infero-nasal, and infero-temporal) can be viewed along with the adjacent areas of retina systematically in whatever order you prefer. The movement of the ophthalmoscope relative to the pupil is important! Use the pupil as a fulcrum so a wish to see left should mean you move right with your hand always keeping the fundus in view. Similar "opposite" motions are required to view the entire posterior pole. The last location is the macula as it is most light sensitive and is blood vessel-free. If you are not sure if you are seeing it ask the patient to look at your light. Of course, you are looking for any retinopathy be it due to diabetes, hypertension, malignancy, or any other of a large number of pathologies.

Dilation of the pupil - Let's assume all of the above is in the presence of an undilated pupil. This is reality for all of us unless we choose to dilate. The biggest fear that we all have is that of angle closure glaucoma but this is easily ruled out,

for the most part, by applying the "shadow" or "tangential light" test. By simply shining the beam of an ophthalmoscope tangential to the iris, you can detect a convex-forward iris configuration (shallow anterior chamber). If the light is shone from the lateral side then a positive test would be declared if most of the nasal iris is in shadow. If the light beam crosses the pupil and illuminates the nasal iris your test is negative and you can dilate by either a mydriatic (e.g. phenylephrine 2.5%) or by a cycloplegic (e.g. tropicamide 0.5%).

As in all cases of learning, practice does improve your technique, so persist with this instrument and you will follow your patients more efficiently and with greater precision, especially those with health issues associated with potential eye implications. There are lots of those!

Good luck!