VA
Ophthalmoscopy

Suggested Resources

Amblyopia [Preferred Practice Pattern]. San Francisco: American Academy of Ophthalmology; 1992.

Frisen L. *Clinical Tests of Vision.* New York: Raven Press; 1990.

Optics, Refraction, and Contact Lenses. Basic and Clinical Science Course, Section 3. San Francisco: American Academy of Ophthalmology; updated annually.

Pediatric Ophthalmology and Strabismus. Basic and Clinical Science Course, Section 6. San Francisco: American Academy of Ophthalmology; updated annually.

Rehabilitation: The Management of Adult Patients With Low Vision [Preferred Practice Pattern]. San Francisco: American Academy of Ophthalmology; 1994.

Clinical Protocol 4.1

Testing Distance Visual Acuity

1. Ask the patient to stand or sit at a designated testing distance (20 feet from a well-illuminated wall chart is ideal). If a projected chart is used, distance may vary; the projected optotype size must be focused and adjusted to be equivalent to the corresponding Snellen acuity for the distance used. Most clinics are set up to test vision with projected charts at predetermined distances.
2. Occlude the left eye. Ask the patient or check for yourself to be sure that the occluder is not touching or pressing against the eye. Observe the patient during the test to make sure there is no conscious or inadvertent peeking.
3. Ask the patient to say aloud each letter or number, or name the picture object on the lines of successively smaller optotypes, from left to right or, alternatively, as you point to each character in any order, until the patient correctly identifies only half the optotypes on a line.

4. Note the corresponding acuity measurement shown at that line of the chart. Record the acuity value for each eye separately, with correction and without correction, as illustrated below. If the patient misses half or fewer than half the letters on the smallest readable line, record how many letters were missed; for example, $20/40^{-2}$. If acuity is less than 20/20, recheck with a 2.4 mm pinhole (see Clinical Protocol 4.2).
5. Repeat steps 1 through 4 for the left eye, with the right eye covered.
6. Retest acuity with the patient using both eyes simultaneously and record acuity OU (see example below).

$$D \bigvee \overline{sc} \begin{matrix} OD\ 20/200 \\ OS\ 20/100 \end{matrix} \quad OU\ 20/80$$

$$D \bigvee \overline{cc} \begin{matrix} OD\ 20/20 \\ OS\ 20/25 \end{matrix} \quad OU\ 20/20$$

7. Record the power of the corrective lenses worn for the distance acuity determination (see Clinical Protocol 5.1, "Performing Manual Lensometry").

Clinical Protocol 4.2

Testing Pinhole Visual Acuity

1. Position the patient and occlude the eye not being tested, as done for the distance acuity test.
2. Ask the patient to hold the pinhole occluder in front of the eye that is to be tested. The patient's habitual correction should be worn for the test.
3. Instruct the patient to look at the distance chart through the single pinhole or through any one of the multiple pinholes.
4. Instruct the patient to use small hand or eye movements to align the pinhole to resolve the sharpest image on the chart.
5. Ask the patient to begin to read the line with the smallest letters that are legible as determined on the previous vision test without the use of the pinhole.
6. Record the Snellen acuity obtained and precede or follow it with the abbreviation *PH*.

Clinical Protocol 4.3

Testing Near Visual Acuity

1. With the patient wearing the habitual corrective lens for near and the near card evenly illuminated, instruct the patient to hold the test card at the distance specified on the card.
2. Ask the patient to occlude the left eye.
3. Ask the patient to say each letter or read each word on the line of smallest characters that are legible on the card.
4. Record the acuity value for each eye separately in the patient's chart according to the notation method accepted (see example below).
5. Repeat the procedure with the right eye occluded and the left eye viewing the test chart.
6. Repeat the procedure with both eyes viewing the test card.
7. Record the binocular acuity achieved (see example below).

$N \bigvee \overline{sc}$ OD 20/200 OS 20/100 OU 20/80

$N \bigvee \overline{cc}$ OD 20/20 OS 20/25 OU 20/20

Direct Ophthalmoscopy

The direct ophthalmoscope gives approximately 15× magnification (depending on the patient's refractive error) and is most useful for examining the optic disc and posterior pole. The rheostat is generally turned to get the brightest light, unless the patient is very light sensitive. Some instruments have a sliding polarizing filter for reducing glare. Besides the open light, filters contain different spot sizes, a streak projection, a calibrated grid, a fixation target, and a red-free filter. These illumination options and their uses are listed in Table 13.4. The grids are meant for localizing and determining the size of fundus lesions but are not normally used because it is customary to describe lesions in terms of disc diameters. The slit aperture is not used much because of difficulties in seeing contour clues monocularly.

The monocular direct ophthalmoscope (and its measuring reticule aperture) is particularly useful for viewing through a small pupil to

Table 13.4 Illumination Openings of the Direct Ophthalmoscope

Aperture	Description	Use
	Full spot	Viewing through a large pupil
	Small spot	Viewing through a small pupil
	Red-free filter	Help in detecting changes in the nerve fiber layer and identifying microaneurysms and other vascular anomalies
	Slit	Evaluating retinal contour
	Reticule or grid	Measuring vessel caliber or diameter of a small retinal lesion (marked in 0.2 mm increments)
	Fixation target	Identifying central or eccentric fixation

determine the shape and contour of the optic nerve. Even with pupillary dilation, the examiner will not be able to see beyond the equator with the direct ophthalmoscope.

Overview of the Examination

Direct ophthalmoscopy is performed with the eye that corresponds to the eye being examined, putting the examiner cheek to jowl with the patient. Even if you have a strong monocular dominance, you must learn to perform direct ophthalmoscopy with the correct eye and in a comfortably balanced position. Beginners sometimes hold their breath, but this is not necessary for the examiner without halitosis. The right eye conventionally is examined first.

The direct ophthalmoscope is focused by twirling the dial for the Rekoss disk, which has several plus- and minus-powered lenses. The optimal focusing lens on the Rekoss disk depends on the patient's refractive error, the examiner's refractive error (including unintended accommodation), and the examination distance (Table 13.5).

To begin a basic direct-ophthalmoscopic examination, the focusing lens is set at zero (or the examiner's refractive error), and the patient's red reflex is checked from a distance of 2 feet (Figure 13.17A). By focusing the ophthalmoscope on the iris, opacities in the refractive media can be seen as dark shadows. Vitreous floaters are seen as the patient rotates the eye up and down.

The examiner then approaches the patient's eye without accommodating, perhaps by imagining looking into the distance through a keyhole or by keeping the other eye open to look at a distant wall. The instrument is steadied against the patient's face by resting the ulnar border of the hand holding the instrument against the patient's cheek; the thumb of the free hand raises the upper eyelid (Figure 13.17B). The patient is instructed to stare into the distance. Many lanes and hospital rooms have a target marked on the wall opposite the examining chair or on the ceiling for this purpose.

While holding the patient's eyelids open, the examiner dials the ophthalmoscope's focusing lenses into place to clarify the fundus image. Minus lenses, for example, are used to correct for the patient's myopia and for the examiner's unintended accommodation. With the examiner's eye being emmetropic or corrected, the power of the ophthalmoscope's focusing lens is near the patient's distance refraction for low myopia or hyperopia. Optimal viewing occurs 2–3 cm from the patient's eye.

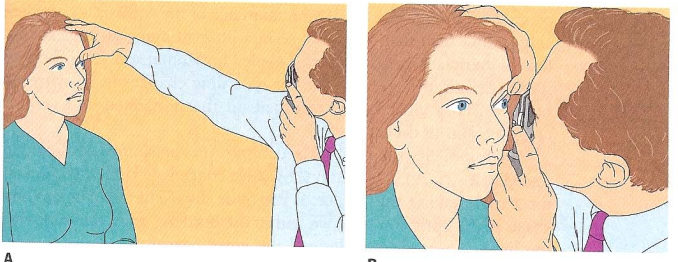
As the patient stares at a distance target, the ophthalmoscope is angled about 15° temporal to fixation so that the patient's optic disc is at or near the first visible field. The light beam must remain centered within the pupil, although slight tilting of the ophthalmoscope can

Table 13.5 Focusing the Direct Ophthalmoscope

Comparison of the direct ophthalmoscope's refractive power with the patient's spherical equivalent*

Direct Ophthalmoscope	Patient's Refractive Error
−30 D	−15 D
−20 D	−12 D
−10 D	−8 D
−5 D	−4 D
0	plano
+5 D	+6 D
+10 D	+15 D

* Assuming the examiner's eye is emmetropic or corrected and the examination distance between the ophthalmoscope and cornea is 20 mm.



A B

Figure 13.17 Direct ophthalmoscopy. **(A)** Checking the red reflex to detect any opacities in the refractive media. **(B)** Focusing on the optic disc.

avoid troublesome corneal light reflexes. At this point, the examiner is ready to begin examining the fundus. The steps for evaluating the fundus are described in Clinical Protocol 13.6.

The retinal nerve fiber layer bundles are seen as fine, bright striations fanning off the optic disc. The reflectivity of the inner limiting membrane may make the bundles harder to see in youngsters. The green (ie, red-free) filter enhances the visibility of the retinal nerve

fiber layer. Examination should begin where the retinal nerve fiber layer is best visualized, at the inferotemporal region close to the optic disc; the examination then proceeds to the superotemporal region, followed by the superonasal and the inferonasal parts. Except for spindle-shaped slits between bundles, localized defects of the retinal nerve fiber layer do not occur in normal eyes.

Evaluating the Fundus With the Direct Ophthalmoscope

1. Find the optic disc by following a retinal blood vessel. The arrows formed by vascular bifurcations point to the optic disc. Depending on the patient's refraction, the entire disc or only a portion of it will be visible in any one view.
2. Examine the peripapillary retina. Use a red-free absorption filter to examine arcuate nerve fiber layer defects that occur in glaucoma and other optic neuropathies.
3. From the optic disc, follow the blood vessels outward to examine the superonasal (1), inferonasal (2), inferotemporal (3), and superotemporal (4) areas around the posterior pole (Figure 1). Note the vascular color, caliber, bifurcations, crossings, and the surrounding background.

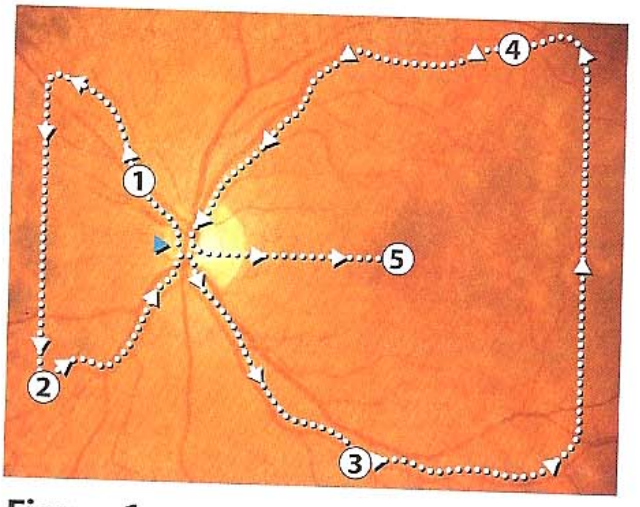


Figure 1

4. Use the red-free light to highlight the refractile changes in the vascular wall caused by arteriosclerosis, especially at points of arteriovenous compression.
5. Examine the macula (5) for irregularities. Use a slit beam to detect distortions of the retinal surface. Level differences can be seen by a blurring of a portion of the light stripe; lacking stereopsis, estimating the convexity or concavity of a fundus lesion with the slit beam of the monocular direct ophthalmoscope is difficult.

continued

6. If choroidal or retinal pigment epithelial abnormalities are suspected, direct the ophthalmoscope adjacent to the fundus detail under study. Allow proximal illumination to help you to distinguish between translucent and opaque lesions.
7. Approximate the height of an elevated lesion (eg, choroidal tumor or disc edema) by using the focusing dial.
   a. First focus on flat retina, then refocus on the lesion surface.
   b. Subtract the two dioptric values to deduce the level difference (in a phakic or pseudophakic eye, 3 diopters = 1 mm).
8. Find the patient's point of preferred fixation as follows:
   a. Reduce illumination intensity and dial in the fixation target.
   b. Ask the patient to look into the light at the center of the target.
   c. Determine whether the test mark falls on the central foveal reflex or at an eccentric location.
   d. Ask the patient whether the fixed object is seen as straight ahead or off center.