PRE-CLINICAL CLERKSHIP, YEAR 1
Physical Examination

Session Two A
How to Use the Ophthalmoscope Cheryl
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1. Learning Objectives

To identify the external structures of the eye and the landmarks of the retina.
To practice handling the ophthalmoscope.
To describe and appreciate the pupillary light reflexes, normal retinal disc, veins and arteries.
To develop a flow for the head to toe exam.

2. Student Prep

Read pp. 208-214, 219-257, Chapter 10 The Eye
View the companion portion of the CD

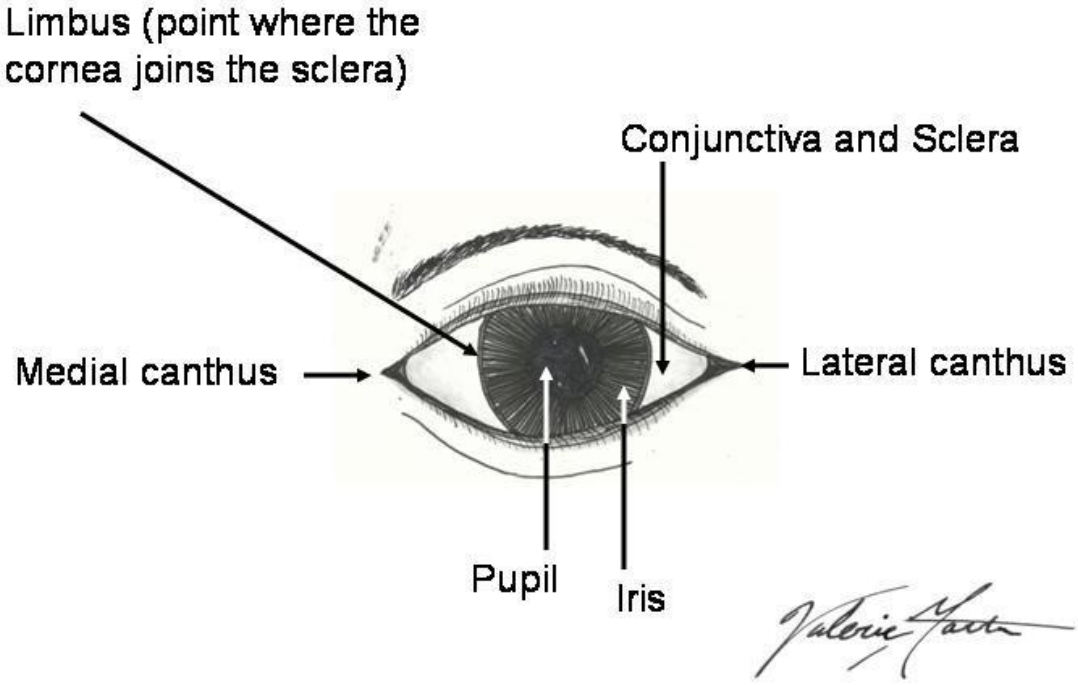
Practice exercises: Begin to get a feel for handling the ophthalmoscope by making a cone from a sheet of paper with the small opening about 5 mm in diameter. While holding the scope in your right hand and looking through the scope with your right eye, and with the large aperture of the cone closest to you, practice aiming the light through the small aperture of the paper cone. Get a sense of how small movements with your right hand result in seemingly large sweeps of the light beam and your view within the small aperture.

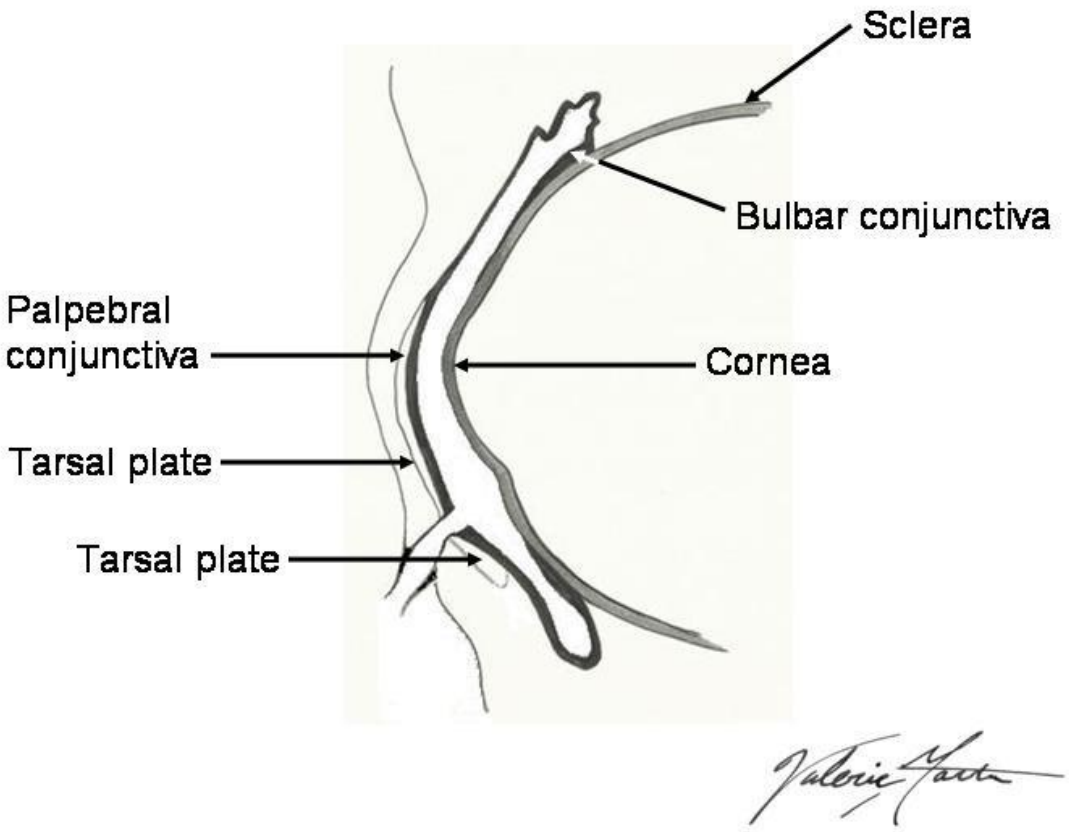
3. Clinical Anatomical Landmarks

External eye structures
eyelid, lacrimal apparatus, conjunctiva, sclera, cornea, pupil, iris, anterior chamber

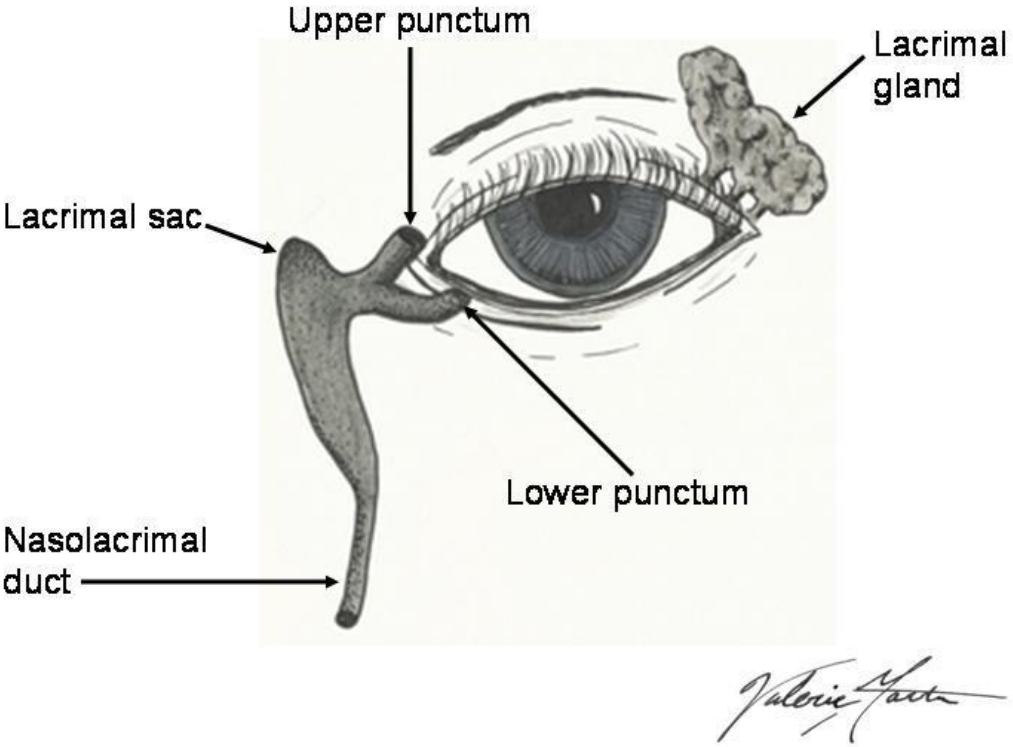
Retinal structures
optic disc, arteries, veins, macula

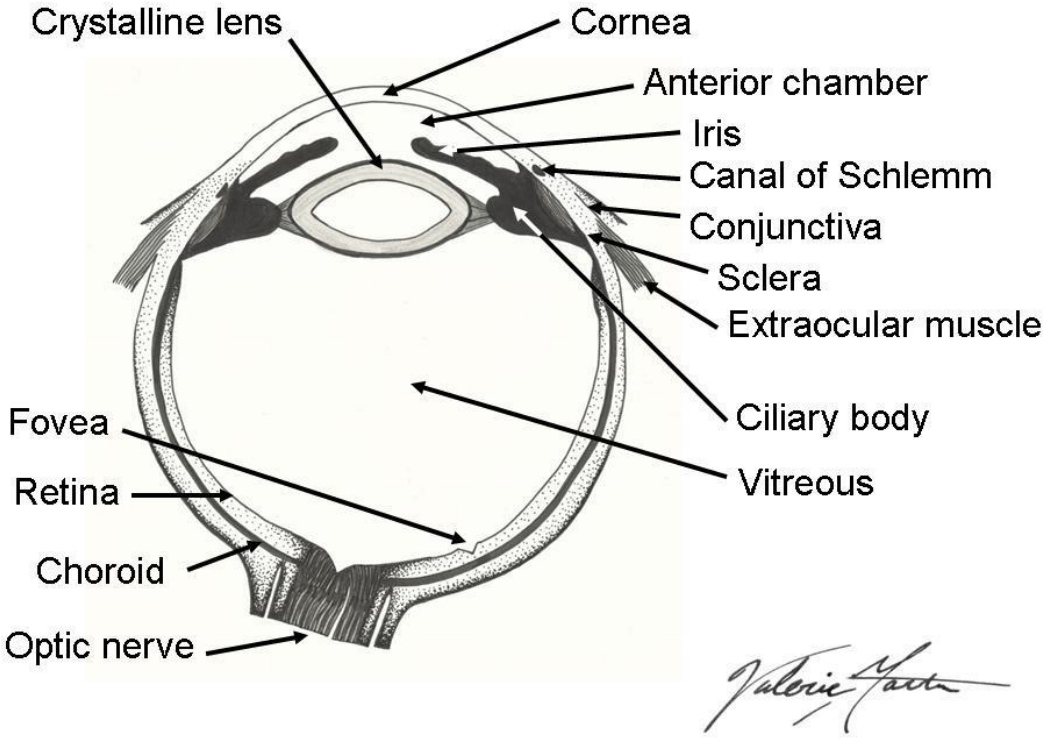
External Eye Structures


Limbus (point where the cornea joins the sclera)
Conjunctiva and Sclera
Medial canthus
Lateral canthus
Pupil
Iris

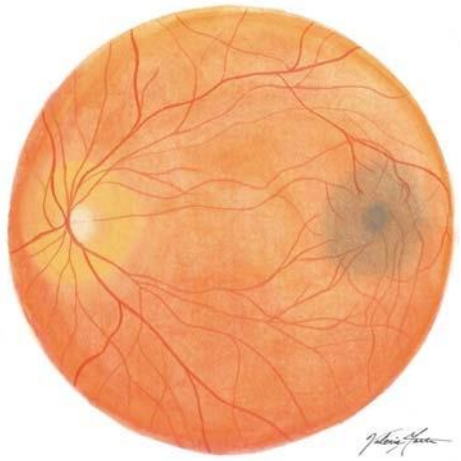

Sclera
Bulbar conjunctiva
Palpebral conjunctiva
Cornea
Tarsal plate
Tarsal plate

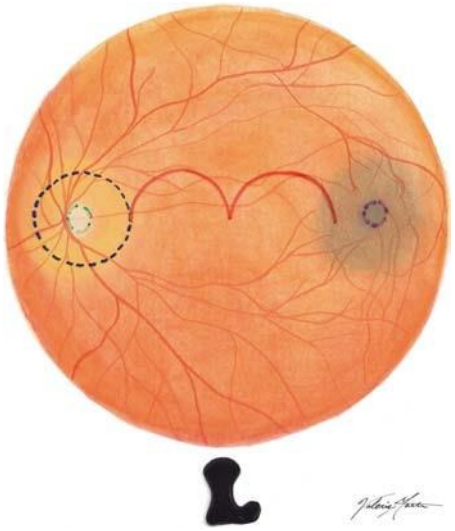
Lacrimal Apparatus (upper and lower puncta, or tear ducts, and lacrimal gland)





Retina (view of left eye)

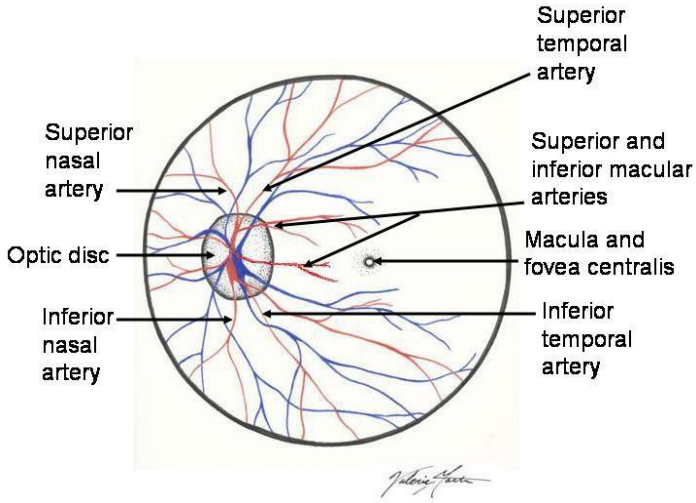




Left retina with a conceptual overlay

Note in this picture of the left retina with a conceptual overlay, the optic disc is a yellowish appearing structure nasally, the physiologic cup is a paler area at the disc's center and normally measures ≤ 1/3 of the disc diameter, and in the same horizontal plane about 2 -3 disc diameters temporally is a nonvascular area of increased pigment called the macula, with a central area called the fovea centralis. There is a tremendous amount of normal individual variation in the pattern of branching vessels. Arteries are bright red, and you may note a central lighter reflex stripe. Veins are darker red, with no reflex stripe, and about ¼ wider in diameter than arteries.

Left retina conceptual representation



4. List of Maneuvers to be Demo/Practiced

Inspection and Examination with patient sitting:

Identify the following external eye landmarks on your partner:

External eye structures (eyelid, lacrimal apparatus, conjunctiva, sclera, cornea, pupil, iris, anterior chamber)

Assess visual acuity bilaterally.
Test visual fields by confrontation.
Test eye alignment bilaterally. --- Check for convergence and accommodation.
Evaluate extraocular muscle function in six directions bilaterally.
Observe pupillary response to penlight (direct) bilaterally.
Observe pupillary response to penlight (consensual) bilaterally.
Inspect external ocular structures of each eye (lid, lacrimal apparatus, conjunctiva, sclera, cornea, pupil-size, shape, equality, iris, depth of anterior chamber).

Ophthalmoscope held properly and index finger used to switch lenses.
Hold ophthalmoscope with right hand when inspecting patient's right eye.
Inspect anterior structures with ophthalmoscope.
Inspect optic disc.
Trace arteries and veins in four quadrants. Observe macula.
Ophthalmoscope held at proper distance to visualize posterior structures in eye (i.e., appropriately close to the patient's eye)

Hold the scope with left hand when inspecting patient's left eye.
Inspect anterior structures with ophthalmoscope.
Inspect optic disc.
Trace vessels in four quadrants. Observe macula.

5. Procedural Tips

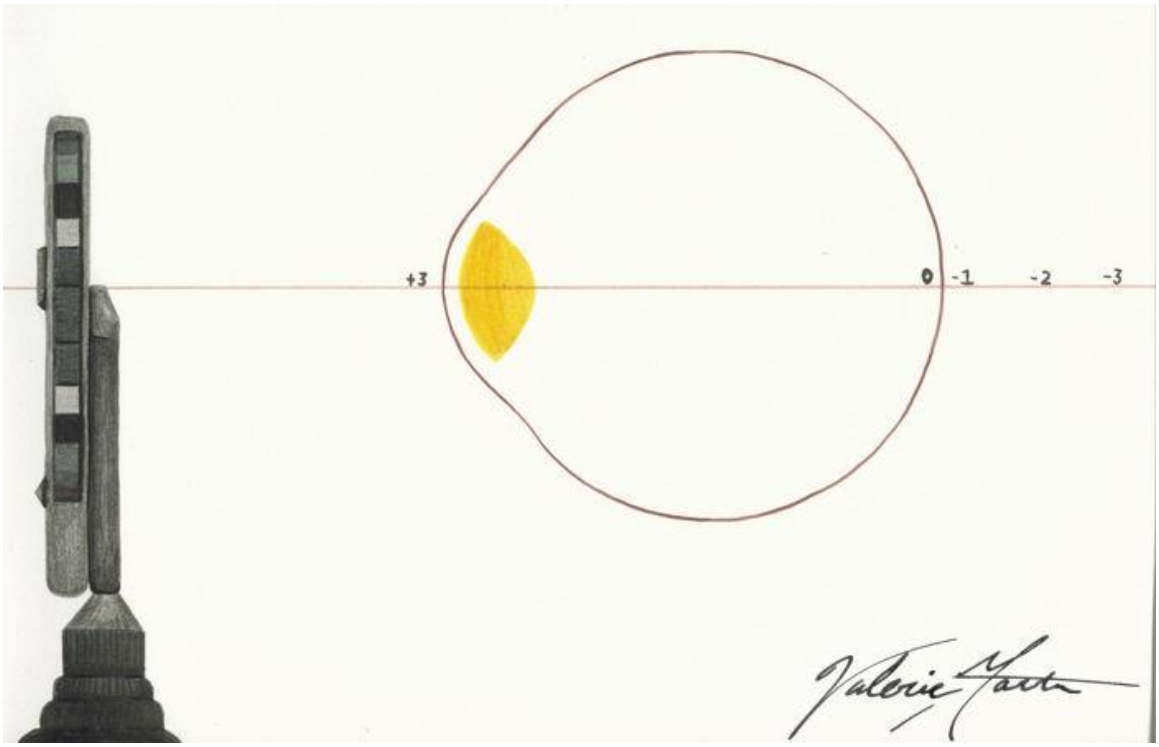
Handling of the Ophthalmoscope: Demonstrate with explanation the approach to handling the ophthalmoscope, and observe and guide students through the following steps.

1. Instruct the patient that he/she may blink, but should keep his eyes still and focus on a distant object. To examine the right eye, stand on the right side of the patient, and with your right hand hold the ophthalmoscope in front of your right eye. Put your left hand on the patient's head. This will help you to be aware of the location of the patient when looking through the ophthalmoscope. (Do the reverse to examine the left eye.). To stabilize the scope, brace it against your brow or nose. Once you have stabilized the scope, keep it in that same position and

move your entire head and hand with the scope. Rest your index finger on the lens wheel to permit focusing.

2. Use the small white circle aperture to inspect the undilated eye (the large circle is better for inspection of the dilated eye). Begin with the ophthalmoscope lens set at about +8 to +10 diopters. Focus on the external eye structures from about 20 cm (8 in) in front of the patient. Keeping the light aimed on the red reflex, move closer with the scope to focus on the retina (fundus). Turn the lens wheel toward zero to do so. You may need to refine the lens wheel setting based on the patient's nearsightedness or farsightedness. Minus numbers will focus farther away. Positive numbers will focus nearer. (This means that nearsightedness is neutralized by minus diopters, and farsightedness by plus diopters.) Rotate the angle of the scope to view the lighter yellow color of the optic disc nasal to the center of the retina. Then follow the course of

the arteries and veins in the four quadrants. Lastly, rotate the scope to view the macula a slightly darker spot temporal to the center of the retina.



6. Perceptual Tips

Pupillary light reflexes: Introduce the acronym PERRLA as a prompt to ensure the pupil assessment is complete. P = Pupils, E = Equal, R = Round, R = Reactive, L = to Light react, A = and Accommodation. In normal ambient light, the pupils should be equal in size, round, and about one quarter the diameter of the irises. Illustrate the pupillary direct and consensual responses to light. Hold a penlight about 50 cm (20 in) from the patient, and shine the light at the pupil from the side. Encourage students to observe and describe the constriction (constricted pupillary diameter in mm compared with baseline) of the pupil you are testing (direct response) and that of the opposite pupil (consensual response). Both pupils should constrict in the same way. Repeat the test with the other pupil. Illustrate the pupillary reaction to accommodation. Instruct the patient to first look at an object in the distance, and then to focus on your finger at about 10 cm (4 in) from the bridge of the patient's nose. Ask students to observe and describe convergence of the eyes and constriction of the pupils as the eyes focus on the near object.

Pupillary light reflexes

Focusing on  **distant object**

Focusing on **near object**

Accommodation

7. Description of Key Features

Eyes: Visual acuity bilaterally, visual fields by confrontation, eye alignment bilaterally (convergence and accommodation), extraocular muscle function in six directions bilaterally, pupillary size, shape, and reaction to light and accommodation, appearance of lids, lacrimal apparatus, conjunctivae and sclerae, and cornea, red reflex, retinal veins and arteries, optic disc (cup to disc ratio if appreciated), and macula.