

Eye Examination

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Objective

- Describe the normal position of the eye lids.
- Identify the external anatomical structure of the eye.
- Demonstrate complete history taking for a patient with eye complaints.
- Demonstrate complete eye examination.

Review of Eye Anatomy and Physiology

- ✓ The eye is the sensory organ of vision.
- ✓ It is well protected by the bony orbital cavity surrounded with a cushion of fat.
- ✓ The eyelids further protect the eye from injury, strong light and dust.
- ✓ The eyelashes curve outward filtering out dust and dirt.

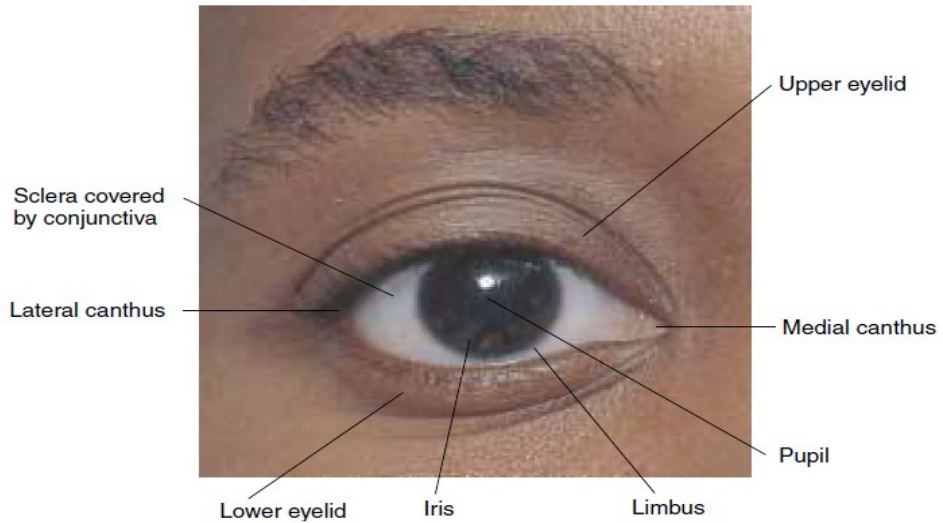
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- ✓ The palpebral fissure is the open space between the eyelids.
- ✓ When closed, the lid margins approximate completely. When open the upper lid covers the part of the iris.
- ✓ The lower lid margin is just at the limbus, the border between the cornea and sclera.

Cont...d

- ✓ The canthus is the corner of the eye, the angle where the lids meet.
- ✓ At the inner canthus, the carnucle is a small flesh mass containing sebaceous glands.
- ✓ Within the upper lid, there are tarsal plates that contain the meibomian glands that secrete an oily lubricating material onto the lids.

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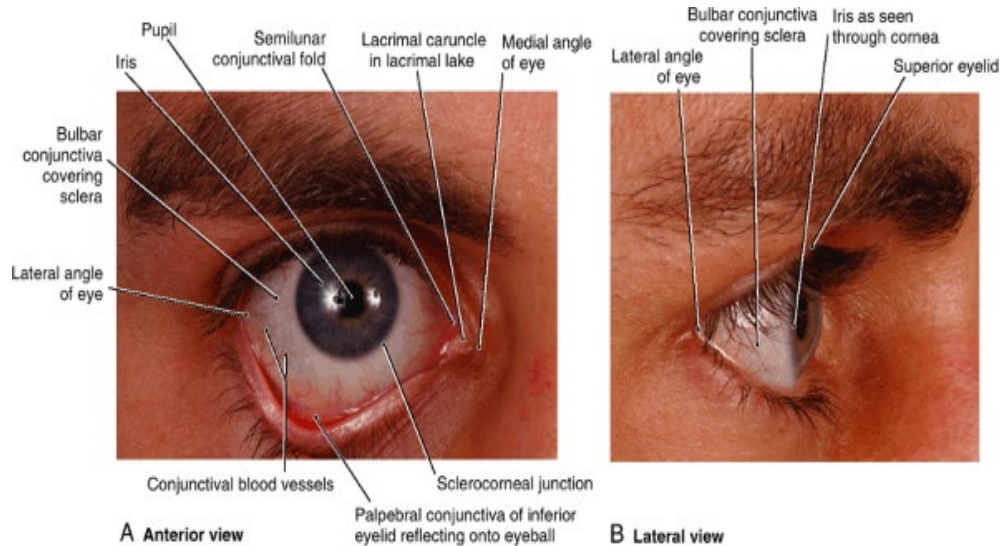
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- ✓ The exposed part of the eye has a transparent protective covering.
- ✓ The conjunctiva (thin mucous membrane) between the eyelids and the eyeball.
- ✓ The palpebral conjunctiva lines the lids and is clear, with many small blood vessels.

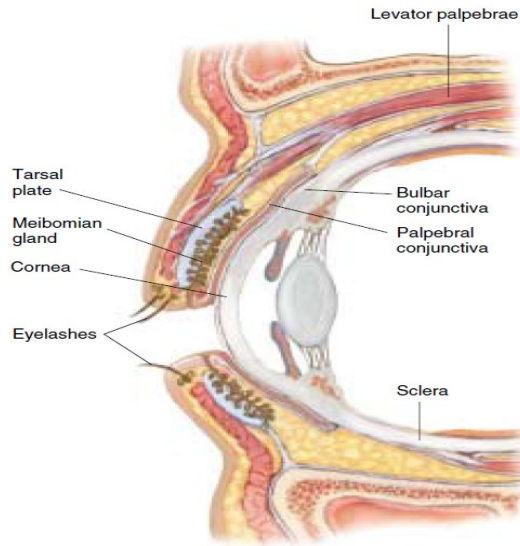
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- ✓ The bulbar conjunctiva overlays the eyeball with the white sclera showing through.
- ✓ At the limbus the conjunctiva merges with the cornea.
- ✓ The cornea covers and protects the iris and pupil.

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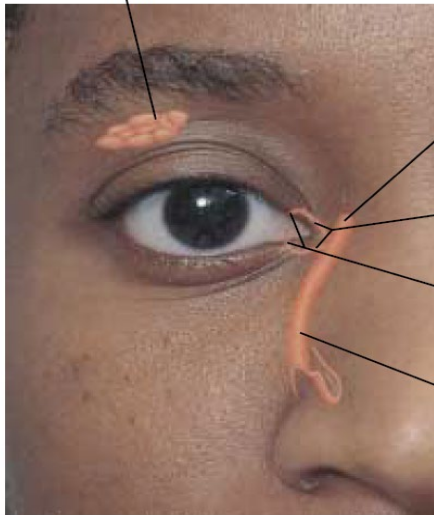
- ✓ The lacrimal apparatus provides constant irrigation to keep the conjunctiva and cornea moist and lubricated.
- ✓ The lacrimal gland, in the upper outer cornea over the eye, secretes tears.

Cont...d

- ✓ The tears wash across the eye and drain in to the puncta at the inner canthus.
- ✓ The tears then drain in to the nasolacrimal sac through the nasolacrimal duct and empty into the inferior meatus inside the nose.

Cont...d

Lacrimal gland
(within the bony orbit)



Lacrimal sac
(within the bony orbit)

Canaliculi

Puncta

Nasolacrimal duct

Cont...d

Internal anatomy

- ✓ The eye is sphere composed of three concentric coats:
 - 1) the outer fibrous sclera,
 - 2) the middle vascular choroids.
 - 3) the inner nervous retina

Cont...d

- ✓ The only parts accessible to examination are the sclera interiorly and the retina through the ophthalmoscope.

Cont...d

The outer layer (the sclera);

- ✓ Tough, white covering is continuous anteriorly with the smooth transparent cornea, which covers the iris and the pupil.
- ✓ The cornea is a refracting media, bending the incoming light rays to be focused on the inner retina.

Cont...d

The middle layer;

- ✓ Vascular choroid is continuous inferiorly with the ciliary body and the iris.
- ✓ The muscle fibers of the iris contract the pupil in the bright light and to accommodate for near vision, and dilate the pupil when the light is dim and for far vision.

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- ✓ The color of the iris varies from person to person.
- ✓ The pupil is round and regular.
- ✓ The lens is a biconvex disc located just posterior to the pupil.

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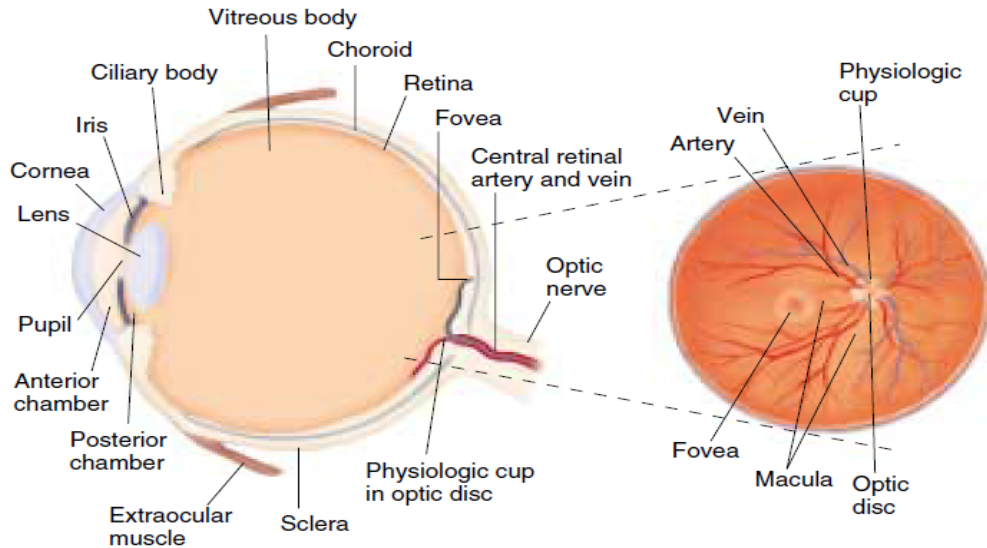
- ✓ Anterior chamber is posterior to the cornea and in front of the iris and lens. It contains aqueous humor that is produced continually by the ciliary body.

Cont...d

The Inner layer;

- ✓ The retina is the visual receptive layer in which light waves are changed into nerve impulses.
- ✓ The retinal structures viewed through the ophthalmoscope are the optic disc, the retinal vessels, the general background and the macula.

Cont...d



Subjective data

- ✓ Vision difficulty (decreased acuity, blurring), pain, strabismus, diplopia, redness, swelling, watering and discharge, past history of ocular problems, any eyeglasses.

Objective data

Important Areas of Examination

- Visual acuity
- Visual fields
- Conjunctiva and sclera
- Cornea, lens, and pupils
- Extraocular movements
- Fundi, including
 - Optic disc and cup
 - Retina
 - Retinal vessels

Method of Examination

Snellen's eye chart;

- To test the acuity of central vision use a Snellen's eye chart (adult and older children), if possible, and light it well.
- Has lines of letters arranged in decreasing size.

Cont...d

- Place the Snellen's chart in a well lit spot at eye level exactly 20 feet from the chart.
- Hand the person an opaque card (to prevent peeking through the fingers) to shield one eye at a time during the test. If the person wears glasses leave them on.

Cont...d

- ✓ Remove only reading glasses because they will blur distance vision.
- ✓ Ask the person to read through the chart to the smallest line of letters possible. (Note: use a Snellen's "E" chart for people who cannot read letters (preschoolers and people who cannot read)).

Cont...d

- ✓ Record the result using the numeric fraction at the end of the last successful line read.
- ✓ Example: "O.D, 20/30 -1- with glasses."
Normal vision acuity is 20/20.
- ✓ Numerator indicates the distance the person is standing from the chart while,

Cont...d

- ✓ The denominator gives the distance at which a normal eye could have read that particular line.
- ✓ Thus "20/20" means you can read at 20 feet what the normal eye could have read at 20 feet.

Cont...d

- Record the last line of which the client can read at least 50% of the numbers.
- Always record whether corrective lenses are worn during the examination.

Cont...d

- ✓ The results of visual acuity testing are recorded for each eye and for both eyes: for example, OD (right eye) 20/30; OS (left eye) 20/20; and OU (both eyes) 20/20.

Cont...d

- ✓ Testing near vision with a special handheld card helps to identify the need for reading glasses or bifocals in patients over age 45. Held 14 inches from the patient's eyes, the card simulates a Snellen chart.

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Abnormal:-

- ✓ The larger the denominator the poorer the vision.
- ✓ Refer vision poorer than 20/30 impaired vision may be due to refractive error, opacity in the refractory media (cornea, lens, vitreous), retinal or optic pathway disorder.

Cont...d

- ✓ If the person is unable to see even the largest letters, shorten the distance to the chart until it is seen and record that distance. Ex "10/200".

Cont...d

Visual fields examination;

- Called confrontation test.
- ✓ This is a gross measure of peripheral vision.
- ✓ It compares the person's peripheral vision with your own, assuming yours is normal.
- ✓ Not always performed routinely.

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- It needs to be performed with a client suspected of having a visual problem, on the older adult who is at higher risk for glaucoma, and on the client with neurologic symptoms.

Procedure;

- ✓ Position yourself at eye level with the person about 2 feet away.

Cont...d

- ✓ Direct the person to cover one eye with an opaque card and with the other eye to look straight at you.
- ✓ Hold your fingers midline between you and the other person and slowly advance it in from the periphery in several directions.

Cont...d

- ✓ Ask the person to say “now” as the object is first seen; this should be just as you see the objects also.
- ✓ Estimate the angle b/n the antero-posterior axis of the eye and the peripheral axis where the object is first seen.

Cont...d

Normal:-

- ✓ The horizontal field of vision is smaller because of interference by the eyebrow, nose, and cheekbone.
- ✓ The field of vision is about 60° medially (nasal), 50° upward, 70° downward, and 90° temporal.

Cont...d

Abnormal:-

- ✓ If the person is unable to see the object as the examiner does, the test suggests peripheral field loss.

Cont...d



Cont...d

Extra ocular muscles function;

1. Corneal light reflex (Hirschberg test):
 - Assess the parallel alignment of the eye axes by shining a light toward the person's eyes.
 - Direct the person to stare straight ahead as you hold the light about 30cm (12 inches) away.

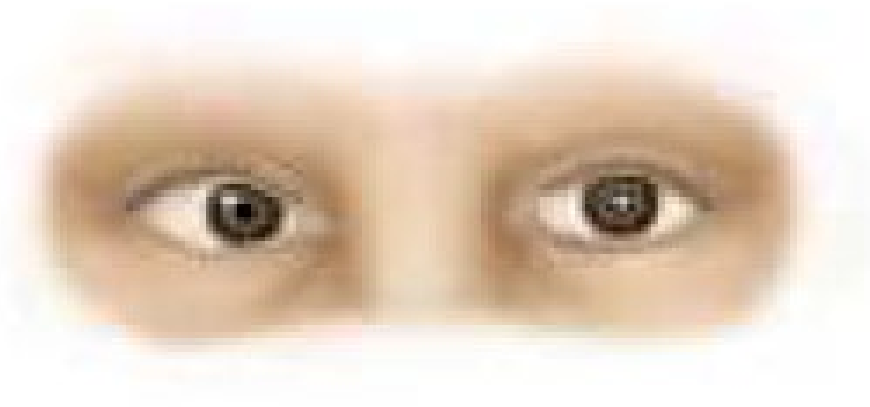
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- Note the reflection of the light on the corneas; it should be in exactly the same spot on each eye.

Abnormal:-

- ✓ Asymmetry of the light reflex indicates deviation in alignment due to eye muscle weakness or paralysis. If you see this, perform cover uncover test.

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Cont...d

2. Cover-uncover test;

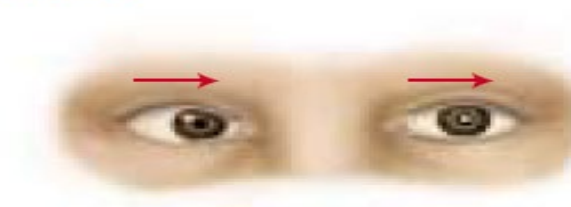
- Procedure: cover one eye, watch for any movement of the uncovered eye, remove the cover & repeat covering the other eye & watching for any movement of uncovered eye. Reveals a slight or latent muscle imbalance not otherwise seen.
- The result may be: normal-no manifest squint, abnormal-manifest squint.

Cont...d

COVER



UNCOVER



Cont...d

3. Diagnostic position test;

- Leading the eyes through the six cardinal positions of gaze will elicit any muscle weaknesses during movement.
- Ask the person to hold the head steady and to follow the movement of your finger or pen only with the eyes.

Cont...d

- Hold the object back about 12 inches and move it to each of the six positions hold it momentarily then back to center. Progress clockwise.
- Making a wide H in the air, lead the patient's gaze.

Cont...d

- ✓ Pause during upward & lateral gaze to detect nystagmus.
- ✓ A normal response is parallel tracking of the object with both eyes.

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Abnormal:–

- Failure to follow in certain direction indicates weakness of an extra ocular muscle (EOM) or dysfunction of cranial nerve innervating it.

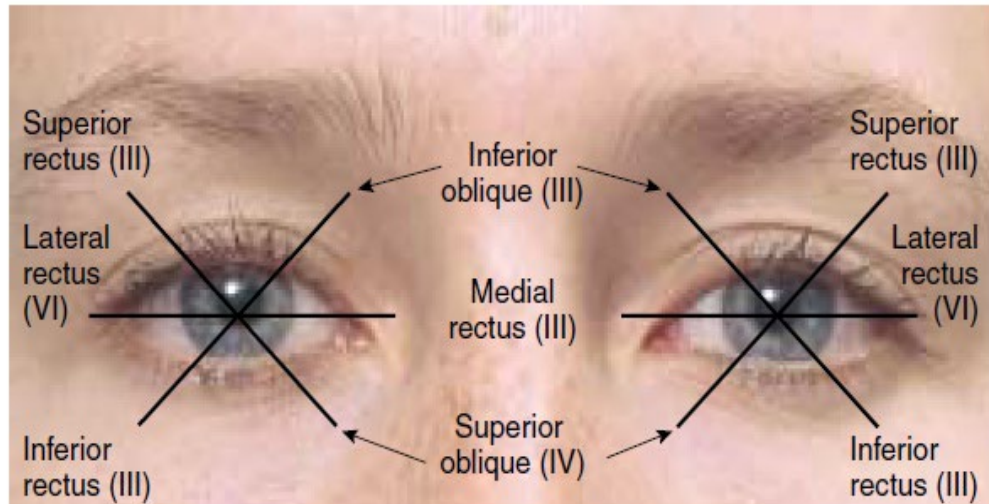
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- ✓ While assessing the extra ocular movements, looking for:
 - Conjugate.
 - Nystagmus, a fine rhythmic oscillation of the eyes. A few beats of nystagmus on extreme lateral gaze are within normal limits.

Cont...d

- Multiple sclerosis, brain lesion, paretic eye muscle, ear semicircular canal disease cause nystagmus.
- A lid lag occurs as the eyes move from above to downward in hyperthyroidism.

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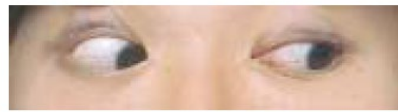
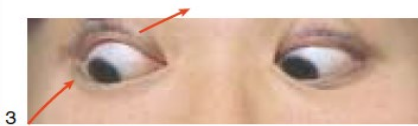


CARDINAL DIRECTIONS OF GAZE

Cont...d

- (1) to the patient's extreme right,
- (2) to the right and upward, and
- (3) down on the right;
- (4) then without pausing in the middle,
to the extreme left,
- (5) to the left and upward, and
- (6) down on the left.

Cont...d



Cont...d

External ocular structure;

Eyebrows

- ✓ Inspect for quantity and distribution of hair, lesion, lump, swelling and any scaliness of the underlying skin.
- ✓ Position and Alignment at eye level.
- ✓ Normally present bilaterally, move symmetrically and have no scaling or lesions.

Cont...d

✓ Abnormal:-

- Loss of eye brows hair (lateral 3rd – hypothyroidism).
- Scaling-seborrhea.
- Asymmetric movement-Facial nerve damage.

Cont...d

Eyelids and Eyelashes

- ❖ Inspect for;
 - Width of the palpebral fissures
 - Edema, lesions, color (e.g., redness) of the eyelids.
 - Condition and direction of the eyelashes.

Cont...d

- Adequacy with which the eyelids close (CN-VII (facial)).

Look for this especially when the eyes are unusually prominent, when there is facial paralysis, or when the patient is unconscious.

Cont...d

Normally:-

- ✓ Upper lid normally overlap the superior part of the iris and approximate completely with lower lids when closed.
- ✓ The skin is intact without redness, swelling, discharge or lesions.
- ✓ The eyelashes are evenly distributed along the lid margins and curve outward.

Cont...d

Abnormal:—

- ✓ Incomplete closure (leprosy-CN VII), ptosis (CN III), periorbital edema (RF), lesion, entropion and ectropion.

Cont...d

✓ Eye ball;

- Normal:- no protrusion or sunken eye.
- Abnormal:- exophthalmos, enophthalmos (sunken eye).

Cont...d

Conjunctiva and sclera

- ✓ Ask the person to look up. Using your thumbs, slide the lower lids down along the body orbital rim.
 - Inspect the sclera and palpebral conjunctiva for color and note the vascular pattern against the white scleral background.

Cont...d

✓ Look for any nodules, lesion, or swelling.

Normal:-

✓ The eyeball looks moist and glossy.

✓ Blood vessels seen through the transparent conjunctive. The conjunctivas are clear pink over the lower lids and white over the sclera.

✓ Sclera is gray blue or "muddy (white, in African Americans-muddy) " in color.

Cont...d

Abnormal:-

- ✓ General reddening, cyanosis of the lower lids, pallor near the outer canthus (less pigmented) of the lower lid may indicate anemia.
- ✓ Sclera icterus is a yellowing of the sclera extending up to the cornea, indicating jaundice
- ✓ Sclera-best to exclude anemia.

Cont...d



Cont...d

Anterior eye ball structure

Inspection;

Cornea and lens

- ✓ Shine a light from the side across the cornea and check for smoothness and clarity.
- ✓ This oblique view highlights and abnormal irregularities in the corneal surface.

Cont...d

Normal:-

- ✓ There should be no opacities (cloudiness) in the cornea or in the lens behind the pupil.
- ✓ Surface and clearness: smooth and transparent (Corneal).

Cont...d

Abnormal

- ✓ A corneal abrasion causes irregular ridges in a reflected light.
- ✓ Corneal cloudiness-cataract.

Cont...d

Iris and pupils

- ✓ The iris normally appears flat with a round regular shape and even coloration.
- ✓ Normally the pupils appear round, reactive to light, regular, accommodate, and of equal size (anisocoria-20%) in both sides.
- ✓ In the adult resting size is from 3-5mm.

Cont...d

Papillary light reflex

- ✓ To test the papillary light reflex, darken the room and ask the person to gaze into the distance (this dilates the pupil). Advance a light in from the side and note the response.
- ✓ Testing one eye at a time makes it easier to concentrate on pupillary responses, without the distraction of extra ocular movement.

Cont...d

✓ Then look for (normal);

1. Constriction of the same-sided pupil (a direct light reflex) and
2. Simultaneous constriction of the other pupil (a consensual light reflex).

Cont...d

Eye accommodation

- ✓ By asking the person to focus on a distant object. This process dilates the pupils, then have the person shift the gaze to a near object such as your finger held about 7-8cm from the nose.

Cont...d

A normal response (oculomotor nerve-CN III) includes;

- 1) Pupillary constriction and
- 2) Convergence (turn inward) of the eyes.
Record to Light and Accommodation.

Cont...d

Abnormal:–

- ✓ Failure of the eyes to converge and the pupils to constrict indicates dysfunction of CN III, IV, and VI.

Cont...d



THE NEAR REACTION

Cont...d

Corneal reflex

- ✓ The corneal reflex is controlled by cranial nerve V (trigeminal) and nerve VII (facial).
- ✓ Take a sterile cotton ball and twist it into a very thin strand. Using a lateral approach, gently touch the cornea on the outer aspect of each eye.

Cont...d

- ✓ Confirm the both eyes blink when either cornea is touched.

Abnormal:-

- ✓ Absence of the corneal reflex due to lack of corneal sensitivity indicates; injury of the sensory component of the: 5th cranial (trigeminal) nerve & 7th cranial (facial) nerve.

Ophthalmoscopic examination

- ✓ With or without pupillary dilation, based on the aim of examination.
- ✓ Remove your glasses unless you have marked nearsightedness or severe astigmatism.
- ✓ However, if the patient's refractive errors make it difficult to focus on the fundi, it may be easier to keep your glasses on.

Cont...d



Aperture

Indicator of diopters

Lens disc



Cont...d



Cont...d

✓ Remember;

- Hold the ophthalmoscope in your right hand to examine the patient's right eye; hold it in your left hand to examine the patient's left eye.
- Place yourself about 15 inches away from the patient and at an angle 15° - 20° lateral to the patient's line of vision.

Cont...d

- ✓ Shine the light beam on the pupil and look for the orange glow in the pupil—the red reflex. Note any opacities interrupting the red reflex.
- ✓ You may need to lower the brightness of the light beam to make the examination more comfortable for the patient, avoid hippus (spasm of the pupil), and improve your observations.

Cont...d

- ✓ Optic disc and retina;
 - Inspect the optic disc and note the following features:
 - The sharpness or clarity of the disc outline (nasally blurred).
 - The color of the disc (yellowish orange to creamy pink).

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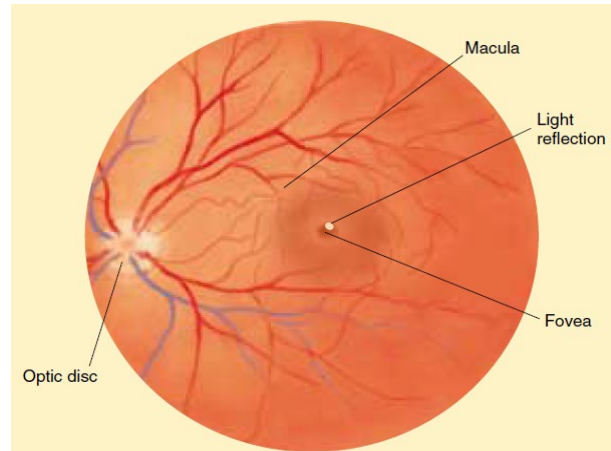
- The size of the central physiologic cup (the horizontal diameter is usually less than half the horizontal diameter of the disc).
- The presence of venous pulsations (vein-may or may not be present).
- The comparative symmetry of the eyes.

Cont...d

- ✓ Inspect the retina, including arteries and veins.

	Arteries	Veins
Color	Light red	Dark red
Size	Smaller ($\frac{2}{3}$ to $\frac{4}{5}$ the diameter of veins)	Larger
Light Reflex (<i>reflection</i>)	Bright	Inconspicuous or absent

Cont...d



RIGHT EYE

Tasman W, Jaeger E (eds): The Wills Eye Hospital Atlas of Clinical Ophthalmology, 2nd ed. Philadelphia, Lippincott Williams & Wilkins, 2001.