Eyes and Ears

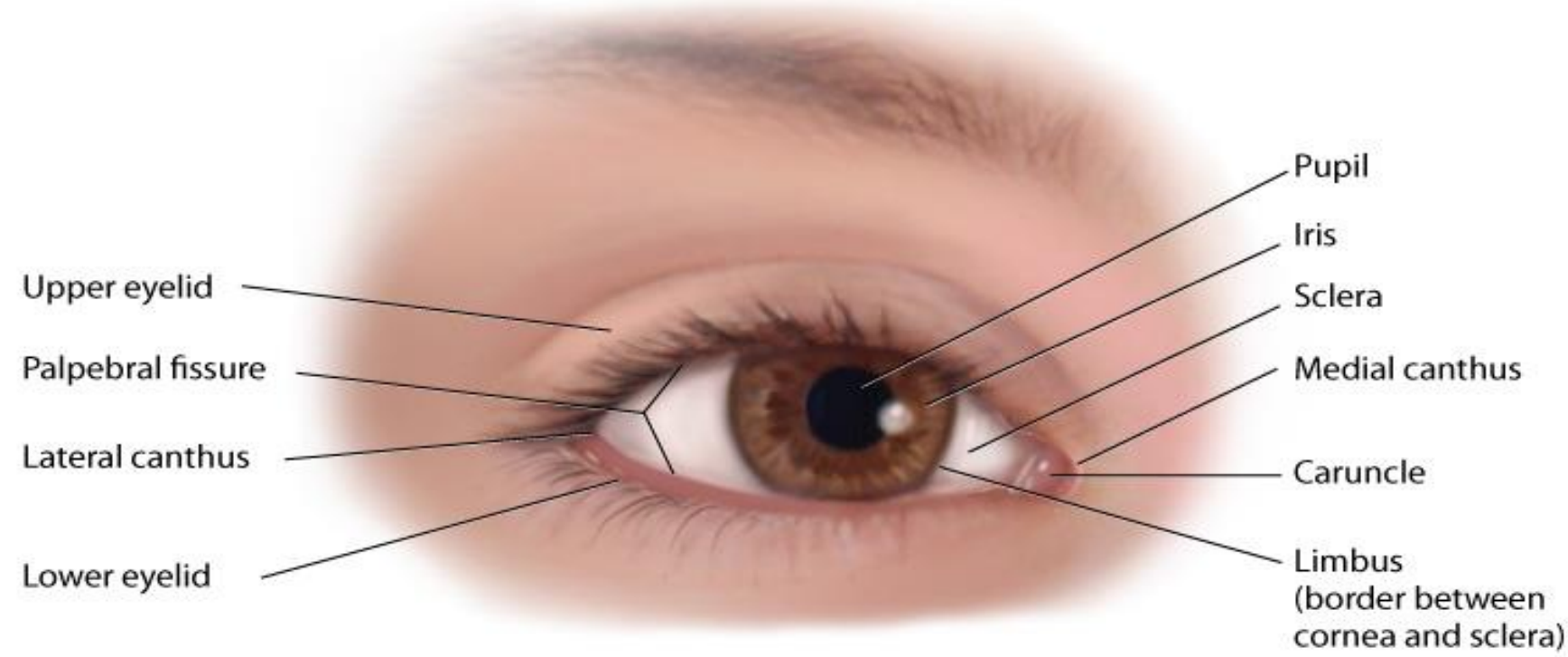
Prof. Suhair Al-Ghabeesh

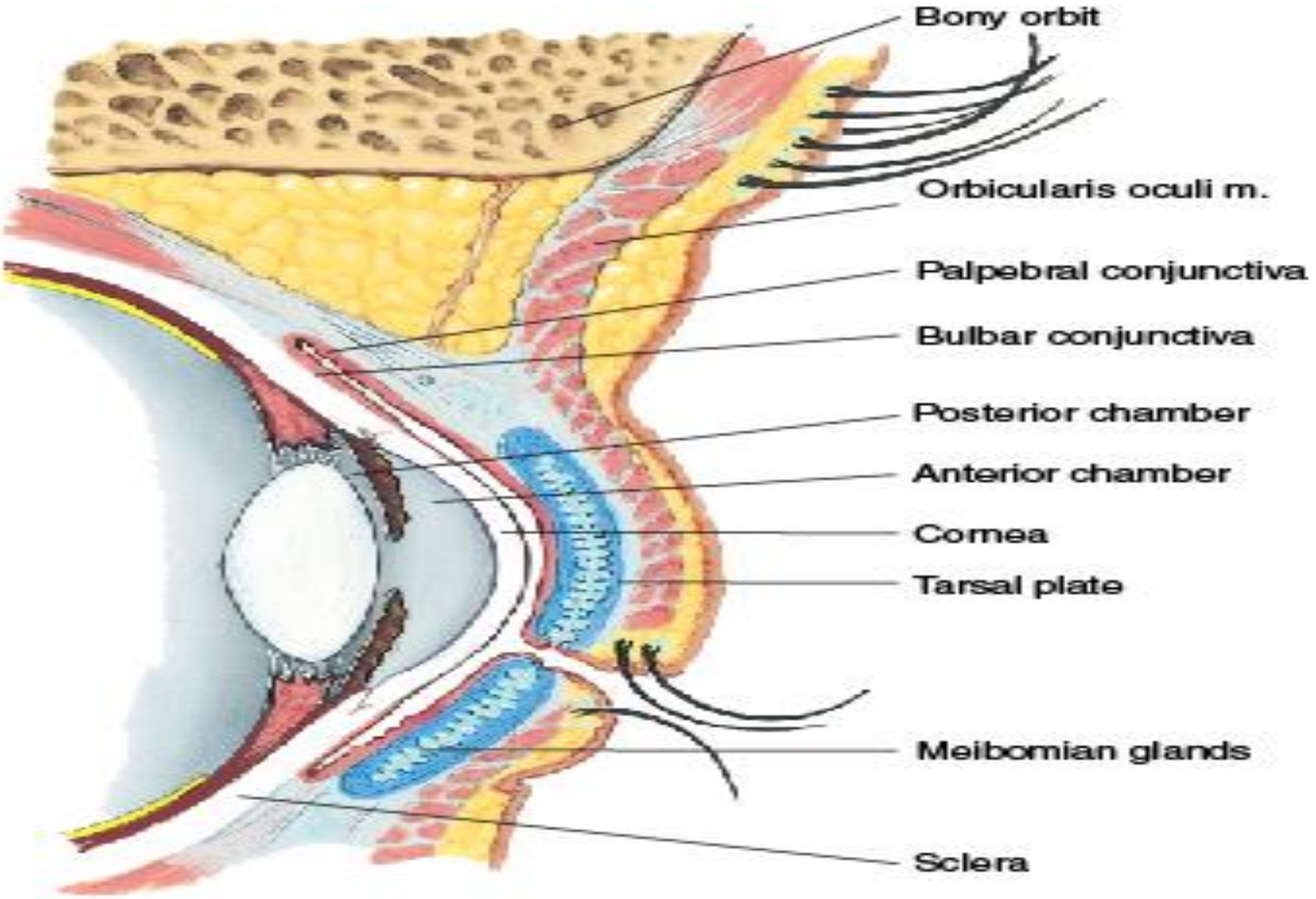
Eyes

- Eye is the sensory organ of vision
- Because it is very important to human, it is well protected by the bony orbital cavity and surrounded with a cushion of fat
- The eyelids are like two rapid window shades that protect the eye from injury, light and dust.
- The eyelashes are also filtering out dust and dirt.
- Meibomian glands secrete an oily lubricating material onto the lids. This stops the tears from overflowing and helps form an airtight seal when the lids are closed
- Palpebral conjunctiva: lines the lids and is clear, with many small blood vessels.
- Bulbar conjunctiva: overlays the eyeball, with the white sclera showing through.

Anatomy: Eyes - outer

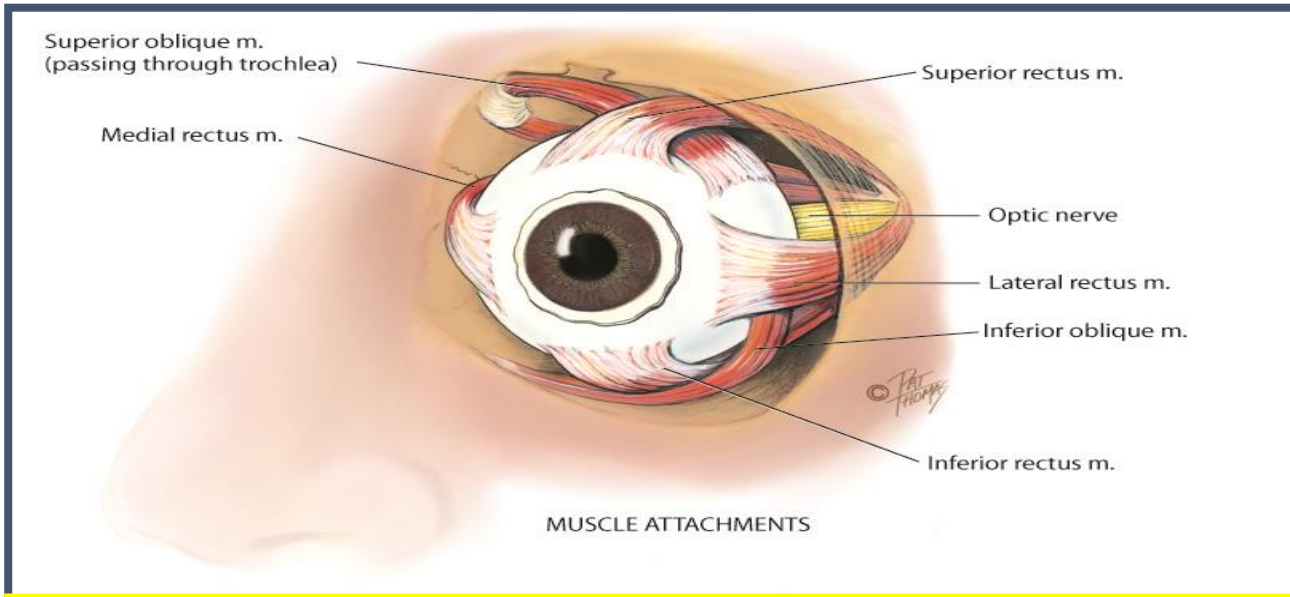
- Eyelids
- Palpebral fissure: open space between eyelids
- Limbus
- Canthus: medial and lateral
- Caruncle: small, fleshy mass containing spacious gland
- Conjunctiva
- Lacrimal apparatus: produces tears
- Cornea: covers pupil / iris
- Tarsal plates which contain meibomian glands

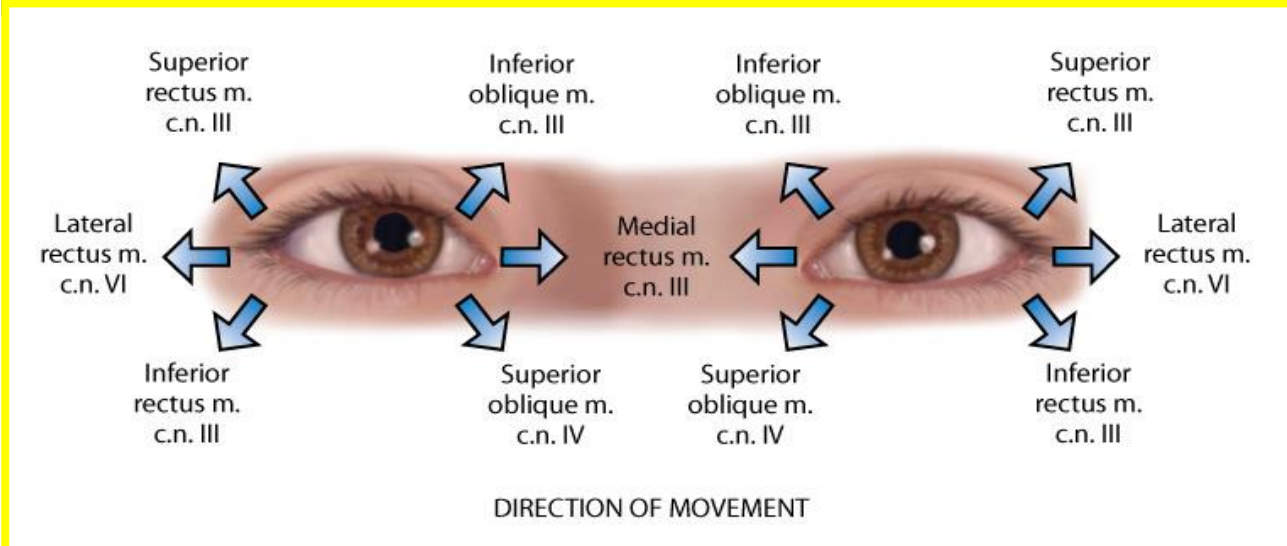



Bony orbit
Orbicularis oculi m.
Palpebral conjunctiva
Bulbar conjunctiva
Posterior chamber
Anterior chamber
Cornea
Tarsal plate
Meibomian glands
Sclera

Extraocular Muscles

- Superior rectus
- Inferior rectus
- Lateral rectus
- Medial rectus
- Superior oblique
- Inferior oblique





Extraocular Muscles (EOMs)

- Each muscle is coordinated with one in the other eye.
- When the two eyes move, their axes remain parallel (called conjugate movement).
- Parallel axes are important because the human brain can tolerate seeing only one image.
- Movement of EOMs is stimulated by three cranial nerves

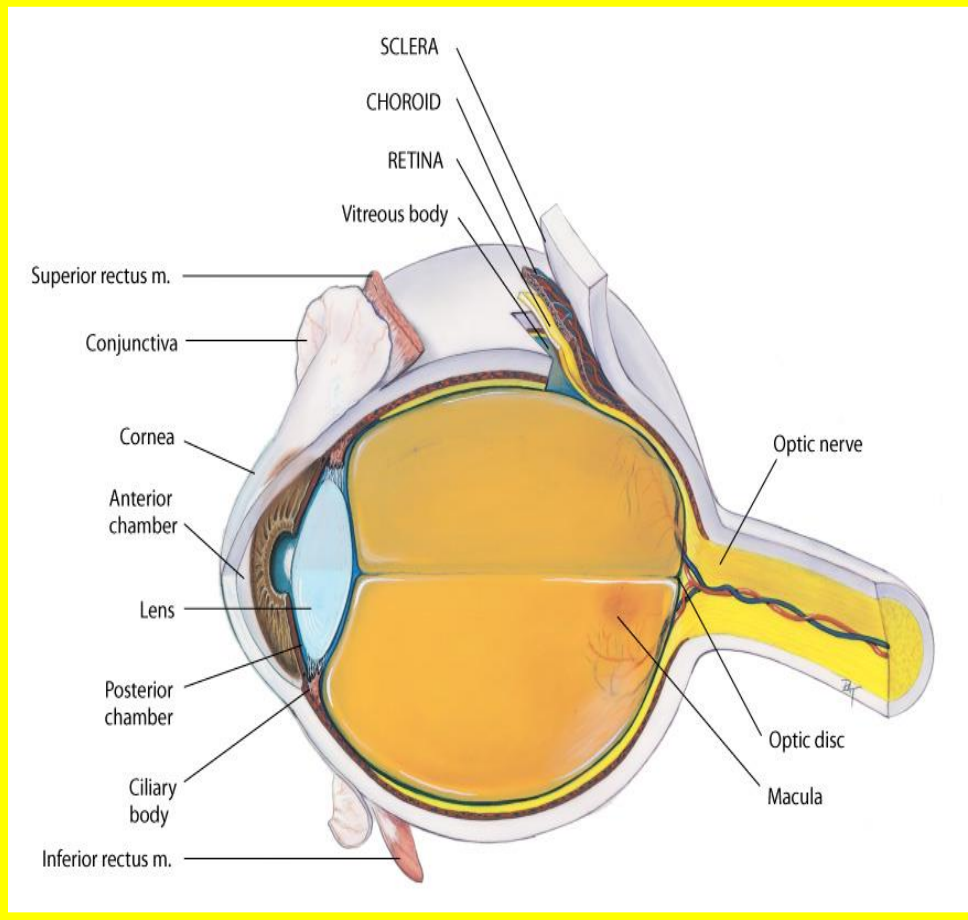
    1- Abducens nerve (VI) innervate lateral rectus muscle

    2- Trochlear nerve (IV) innervate superior oblique muscle

    3- Oculomotor nerve (III) innervate all the rest

Anatomy: Eye - inner

- Outer fibrous layer—sclera
- Middle vascular layer—choroid
  - Ciliary body and iris
  - Pupil
  - Lens
  - Anterior chamber
  - Posterior chamber
- Inner nervous layer—retina
  - Optic disc
  - Retinal vessels
  - Macula



Anatomy: Eye - inner

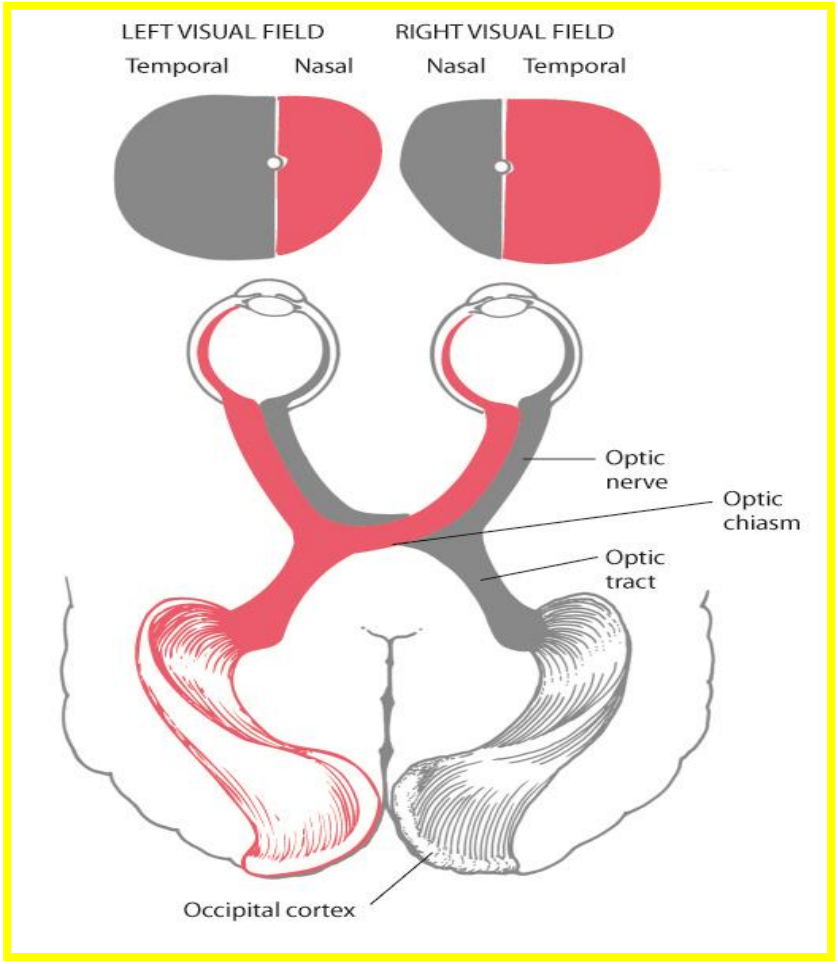
- Inside the retina is the transparent vitreous body
- The only parts accessible to examination are the sclera anteriorly and the retina through the ophthalmoscope.

Visual pathways and visual fields

- Refraction of light rays through the transparent media

(cornea, aqueous humor, lens and vitreous body) and strike the retina. The retina transforms the light stimulus into nerve impulses

- Crossing of fibers at optic nerve



Visual reflexes

- Pupillary light reflexes: is the normal constriction of the pupils when bright light shines on the retina.

- Fixation: is a reflex direction of the eye toward an object attracting our attention.

- Accommodation: is adaptation of the eye for near vision

Subjective Data—Health History Questions

- Vision difficulty (decreased acuity, blurring, blind spots)
- Pain
- Strabismus, diplopia
- Redness, swelling
- Watering, discharge
- History of ocular problems
- Glaucoma
- Use of glasses or contact lenses
- Patient-centered care

Objective Data/ Physical Exam

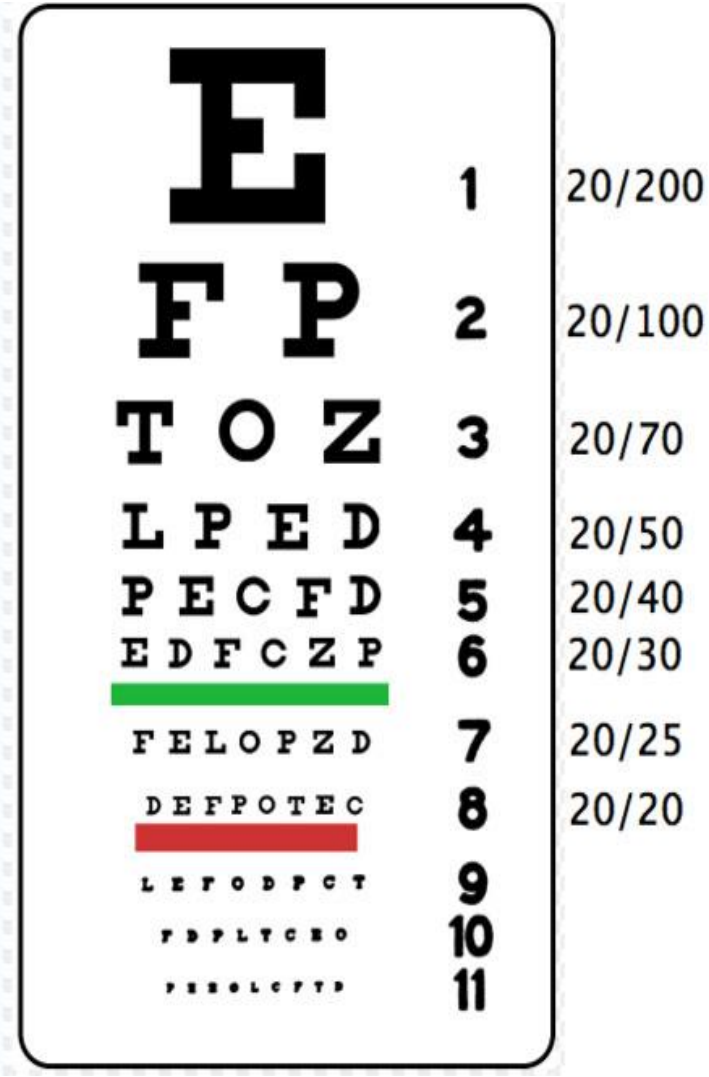
Preparation

- Position

- Equipment
  - **Snellen eye chart**
  - Handled visual screener **(for people experiencing difficulty reading, test near vision with a handheld vision screener)**
  - Opaque card or occluder
  - Penlight
  - Applicator stick
  - Ophthalmoscope

Assessment: Eyes

- Inspection by Visual acuity:
  - Snellen chart – 20/20
    - first number (Numerator) is distance the person is standing or sitting from chart,
    - Second number (Denominator) is distance at which a normal eye could have read that line

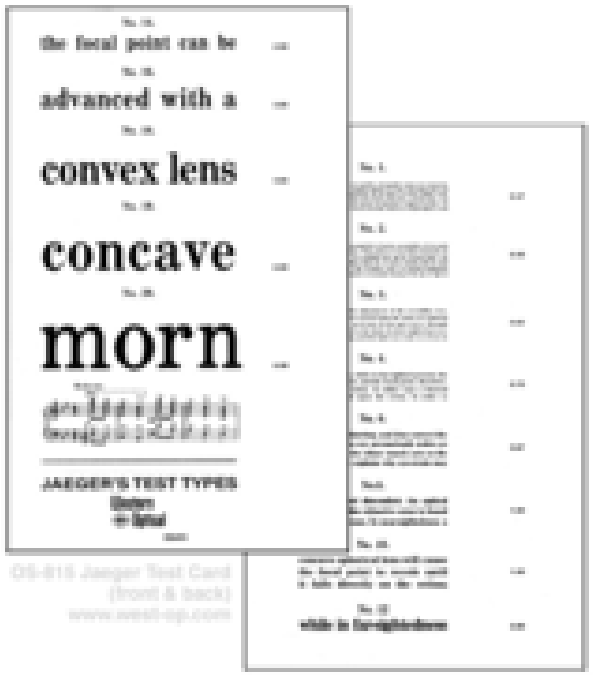


Objective Data/Physical Exam

- Jaeger card - 14/14

For people who report increasing difficulty reading, test near vision using handheld vision screener

- Near vision (> 40 y/o or problems reading)
- Test eyes separately with glasses on
  - *Normal:* 14/14 in each eye



Jaeger Card

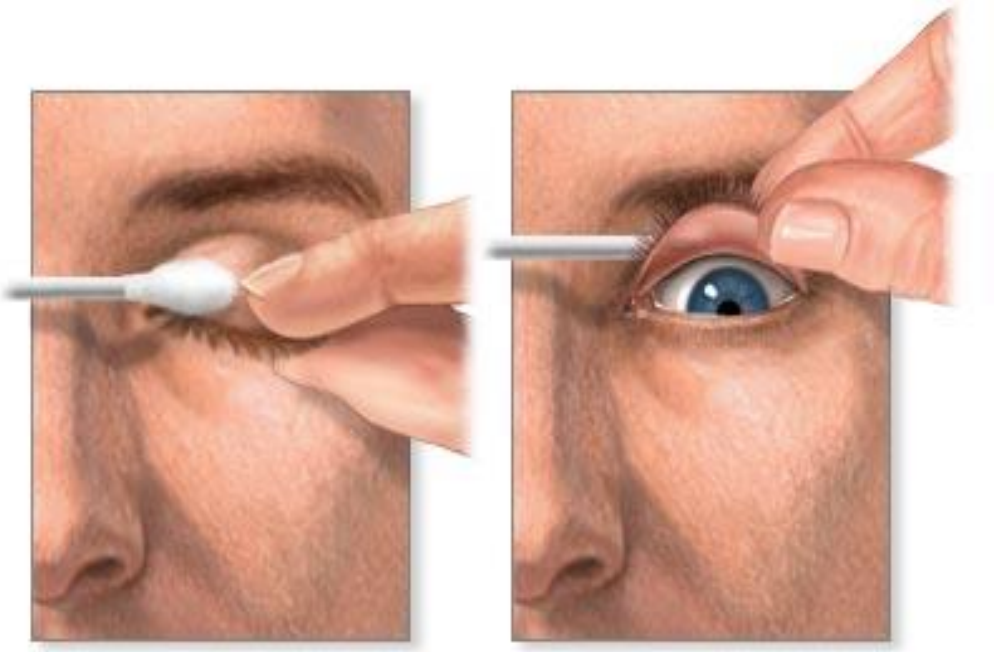
Snellen Eye Chart

Objective Data—Physical Exam

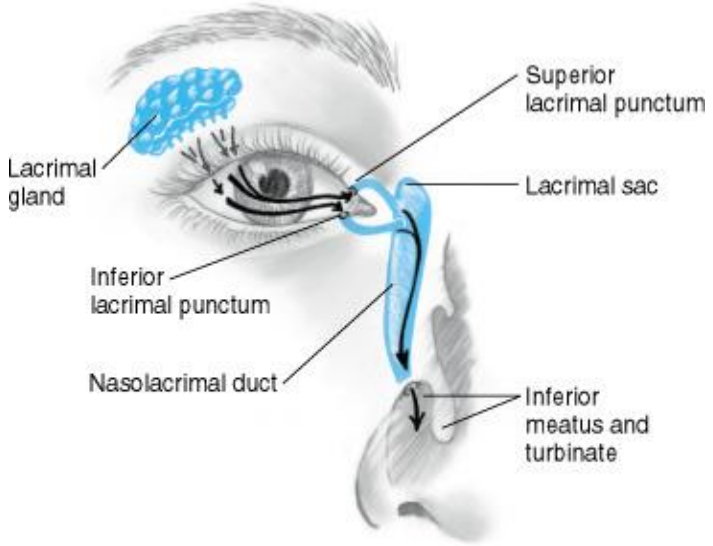
Inspect external ocular structures

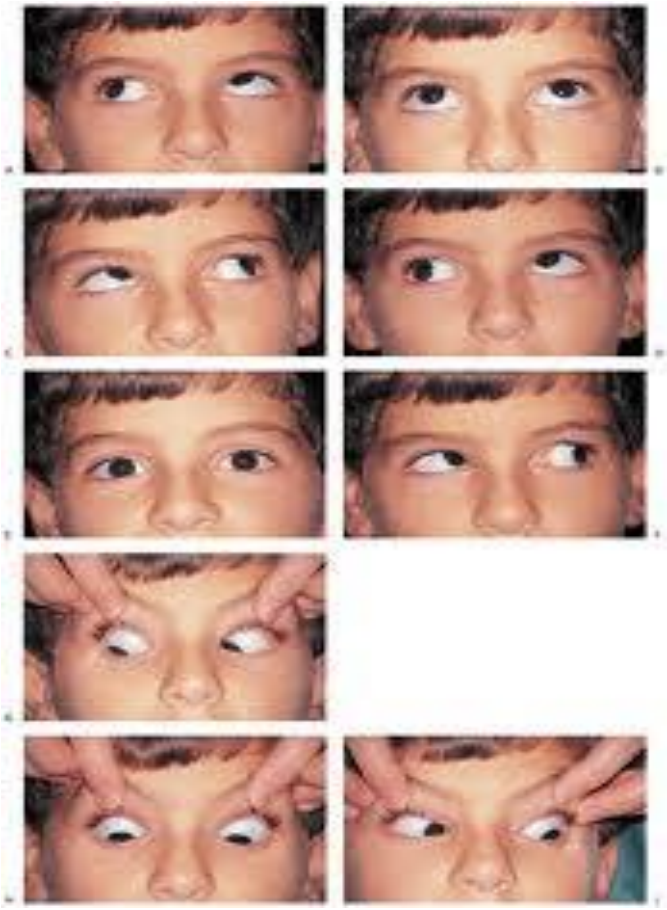
- General (ability to move in the room)
- Eyelids and lashes
- Eyebrows
- Eyeballs position and symmetry (note for protrusion, sunken appearance)
- Conjunctiva and sclera(note for color change, lesion or swelling)
- Eversion of the upper eyelid
- Lacrimal apparatus
    - Inspect for any redness or swelling under the upper lid
    - Inspect for excessive tearing
        - Press the index finger against the sac

Examination of Conjunctiva & Sclera



Upper Eyelid Eversion





Inspection of Nasolacrimal Duct

Objective Data/Physical Exam

Inspect anterior eyeball structures—

- Cornea and lens (check for smoothness and clarity by shining a light from side)
- Iris and pupil
  - Size and shape

  Iris: flat, round regular shape, even coloration

  Pupils: round, regular, equal size

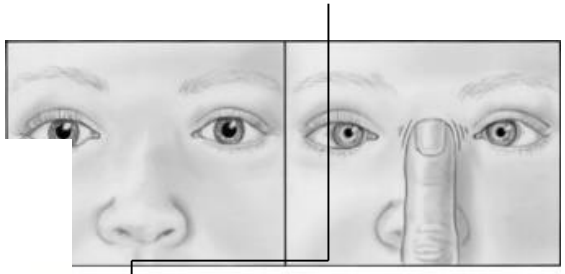
Assessment: Eyes

- Pupil response to light and accommodation:
  - Papillary light reflex: Pupils constrict on light, (dilate for dimness and distance)
  - Accommodation: accommodate for near vision

  (ask person to focus on a distant object, notice papillary constriction)

  (then near object, notice convergence of the axes of the eyes)

- Corneal light reflex



Testing Accommodation & Convergence

Corneal light reflex

Inspect Extraocular muscle function

Cover test

Ask patient to stare strait ,cover one eye with opaque card, note the uncovered eye, normal response is a steady fixed gaze

Cover Test

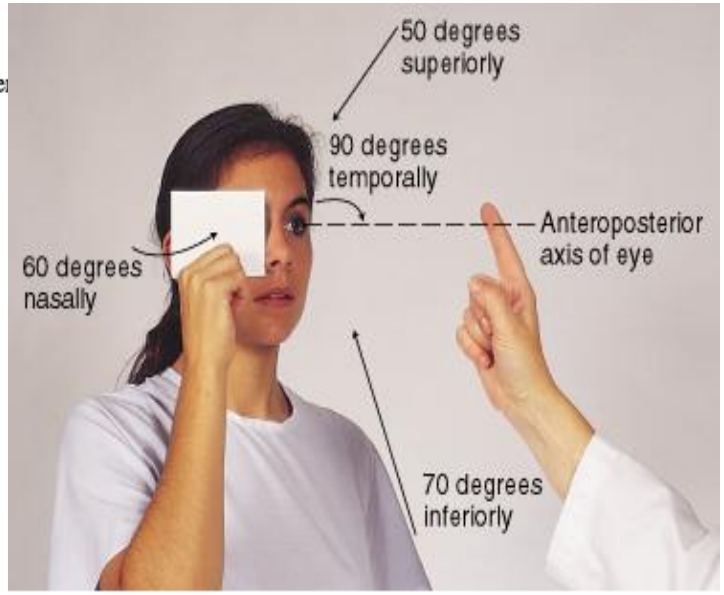
Assessment: Eyes

- Visual fields - assess peripheral vision
- Checks 6 ocular movements; tests CN 3, 4, and 6
- Fundoscopic exam – ophthalmoscope.

Confrontation Test

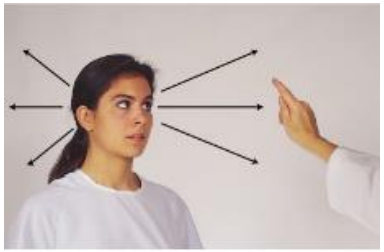
Visual fields

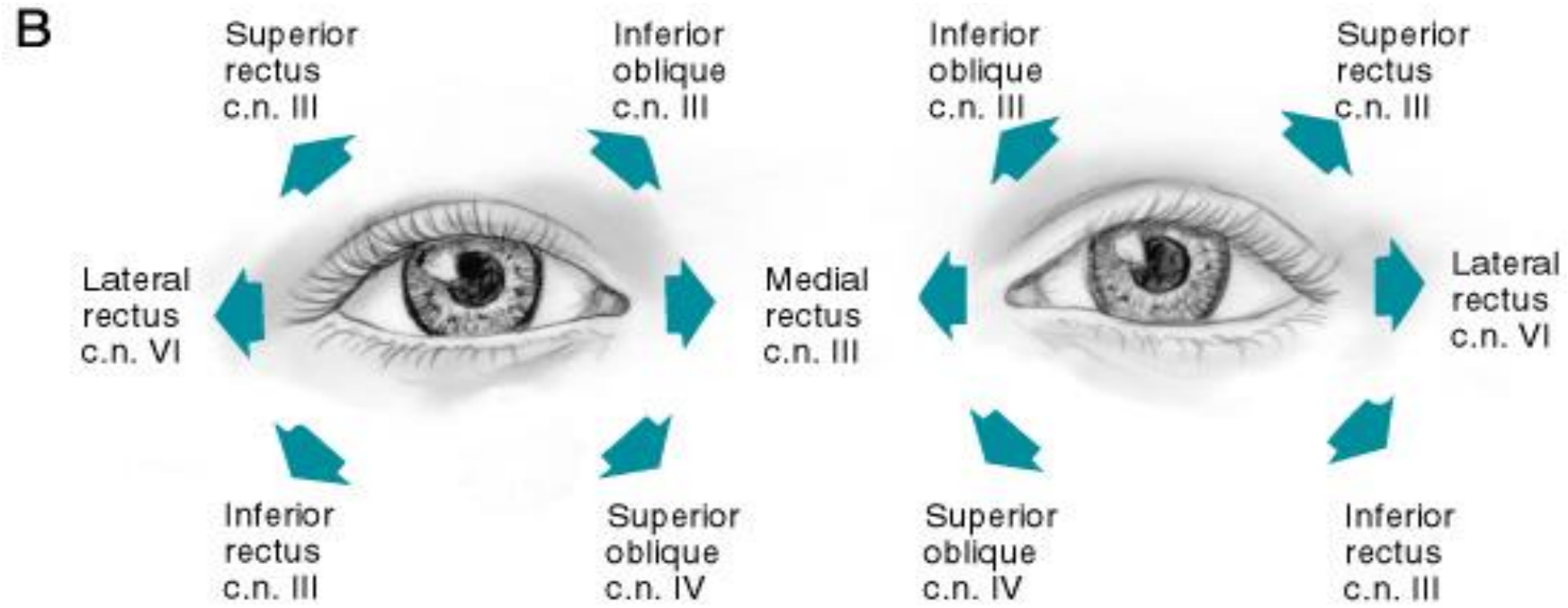
Confrontation test
Measure of peripheral vision, it compares the persons peripheral vision with your own



Range of Peripheral Fields

Six Cardinal Positions of Gaze





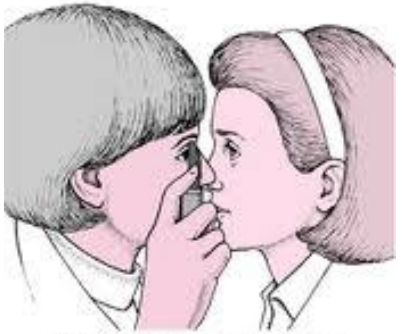
Objective Data/ Physical Exam

Inspect Ocular fundus

Use of the ophthalmoscope **(25 cm, or 10 inches away from the person)**

- Red reflex

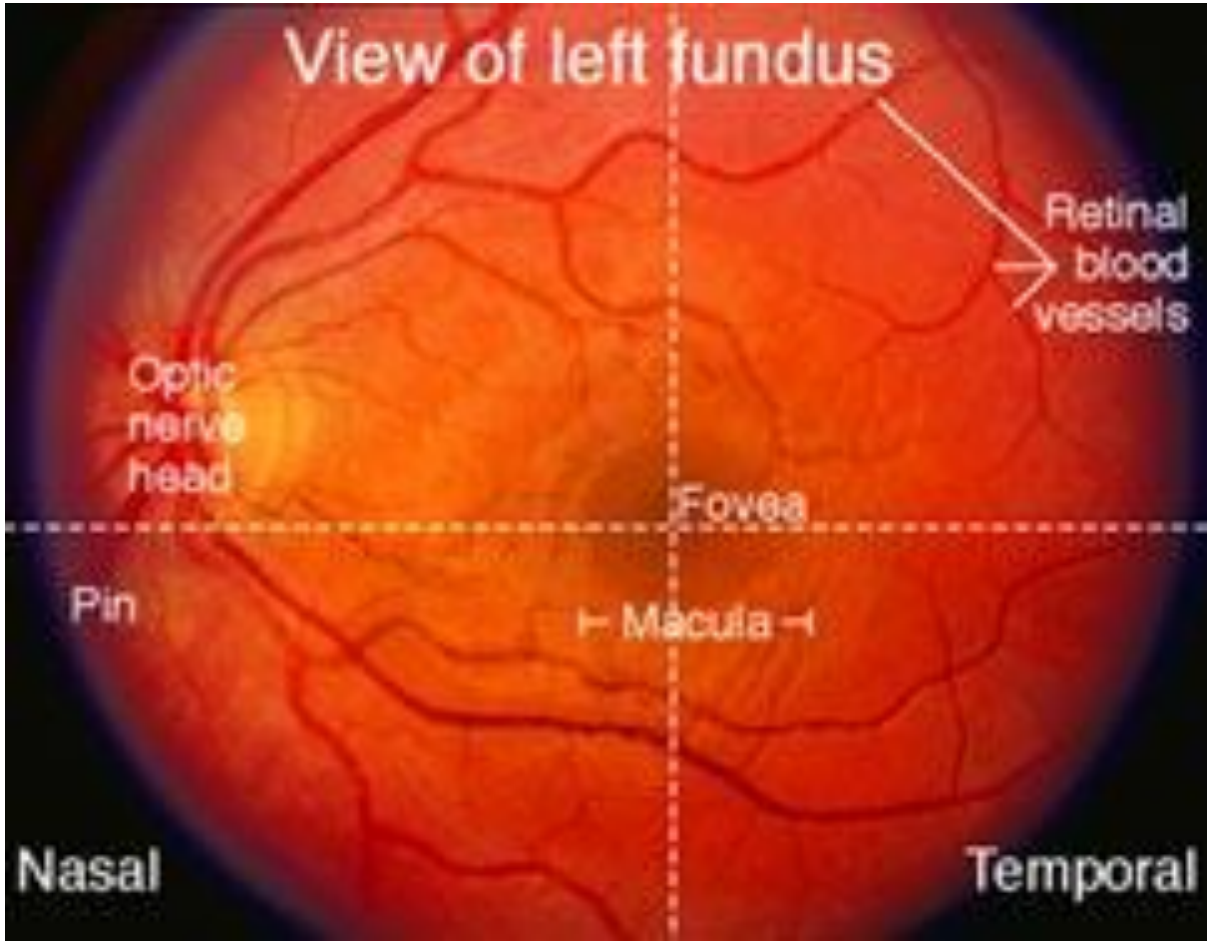
- Optic disc
  - Color / creamy yellow-orange to pink
  - Shape / round or oval
  - Margins

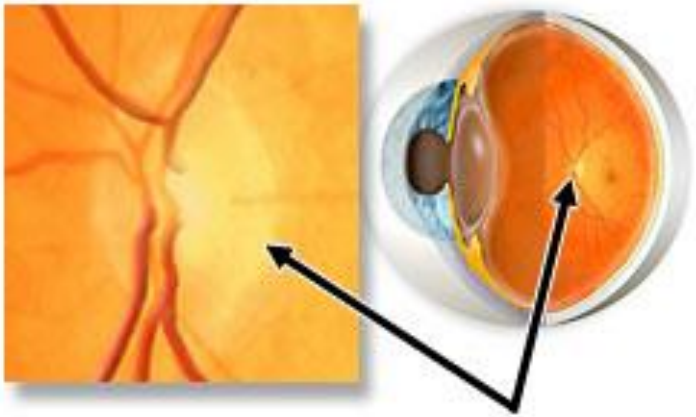


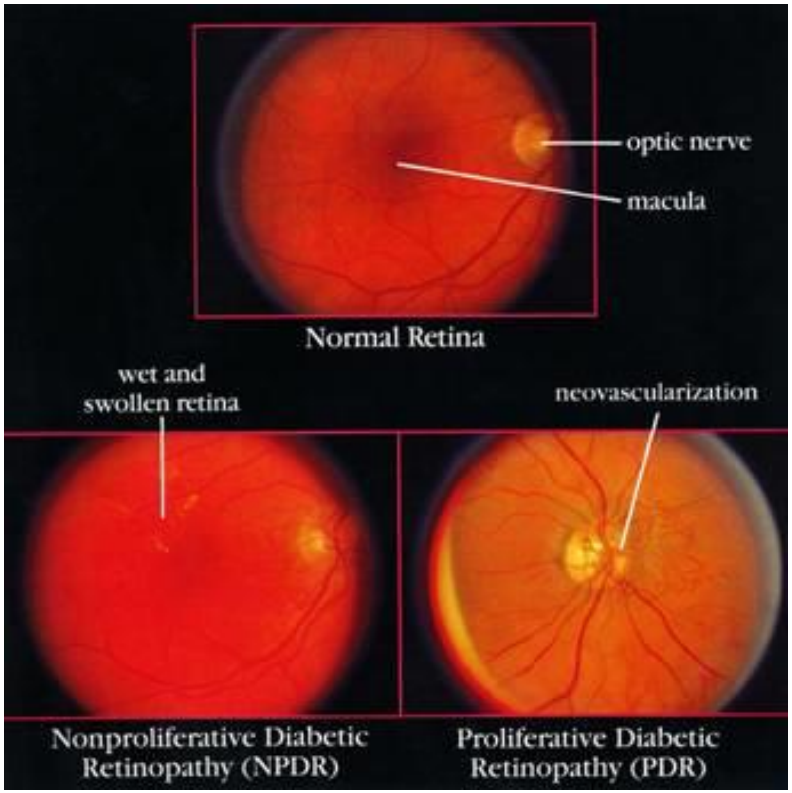
Ophthalmoscopic Examination

- Retinal vessels
  - Color

- General background of the funds-Macula


View of left fundus
Retinal blood vessels
Optic nerve head
Fovea
Pin
Macula
Nasal
Temporal

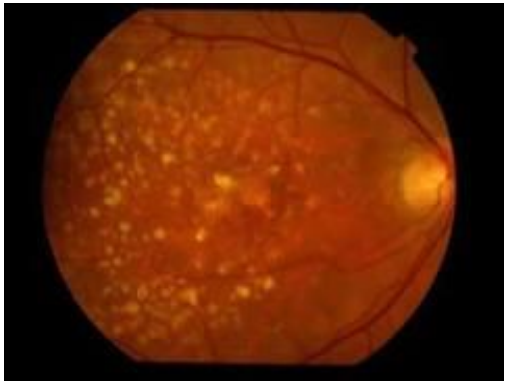

Optic disc


optic nerve
macula
Normal Retina
wet and
swollen retina
neovascularization
Nonproliferative Diabetic
Retinopathy (NPDR)
Proliferative Diabetic
Retinopathy (PDR)

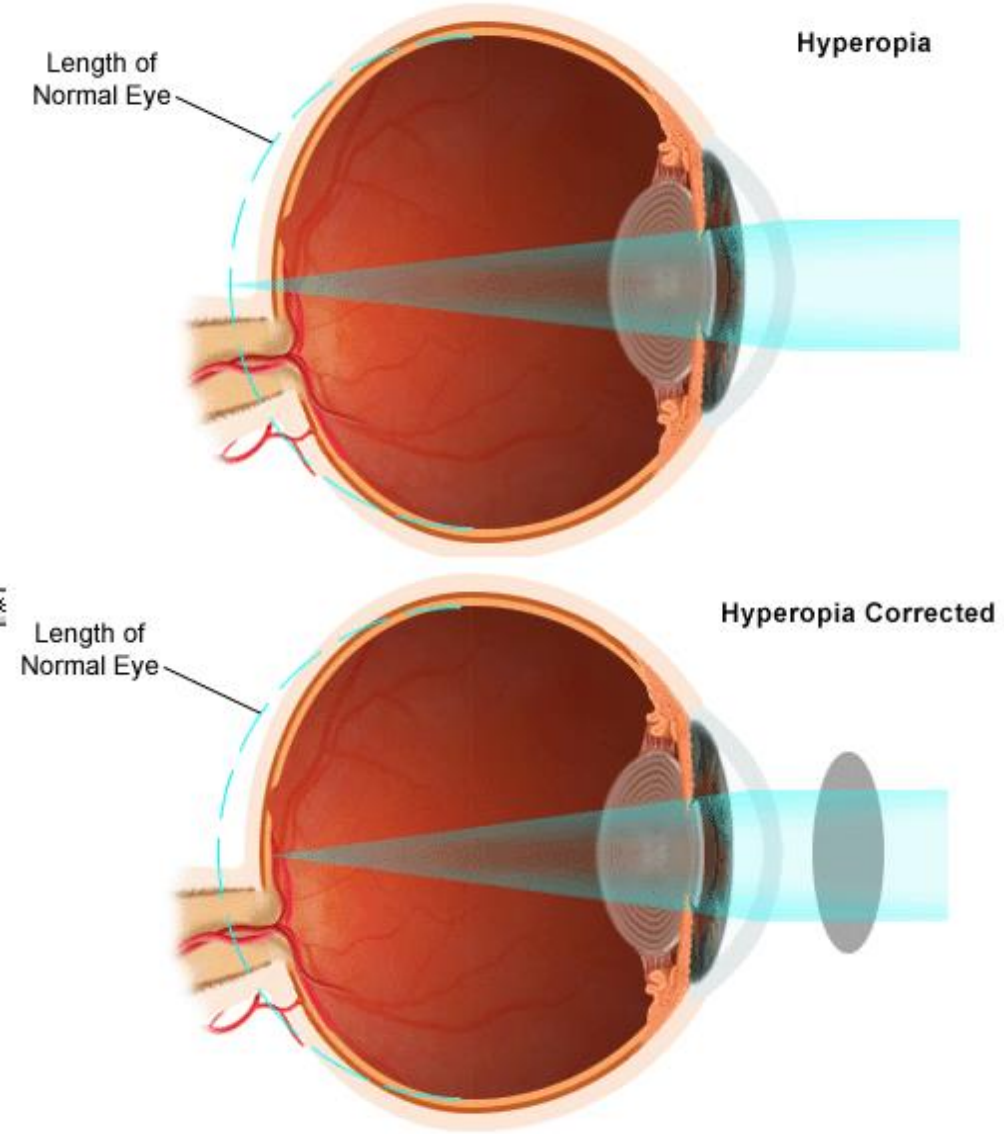
Red reflex

Eye variations

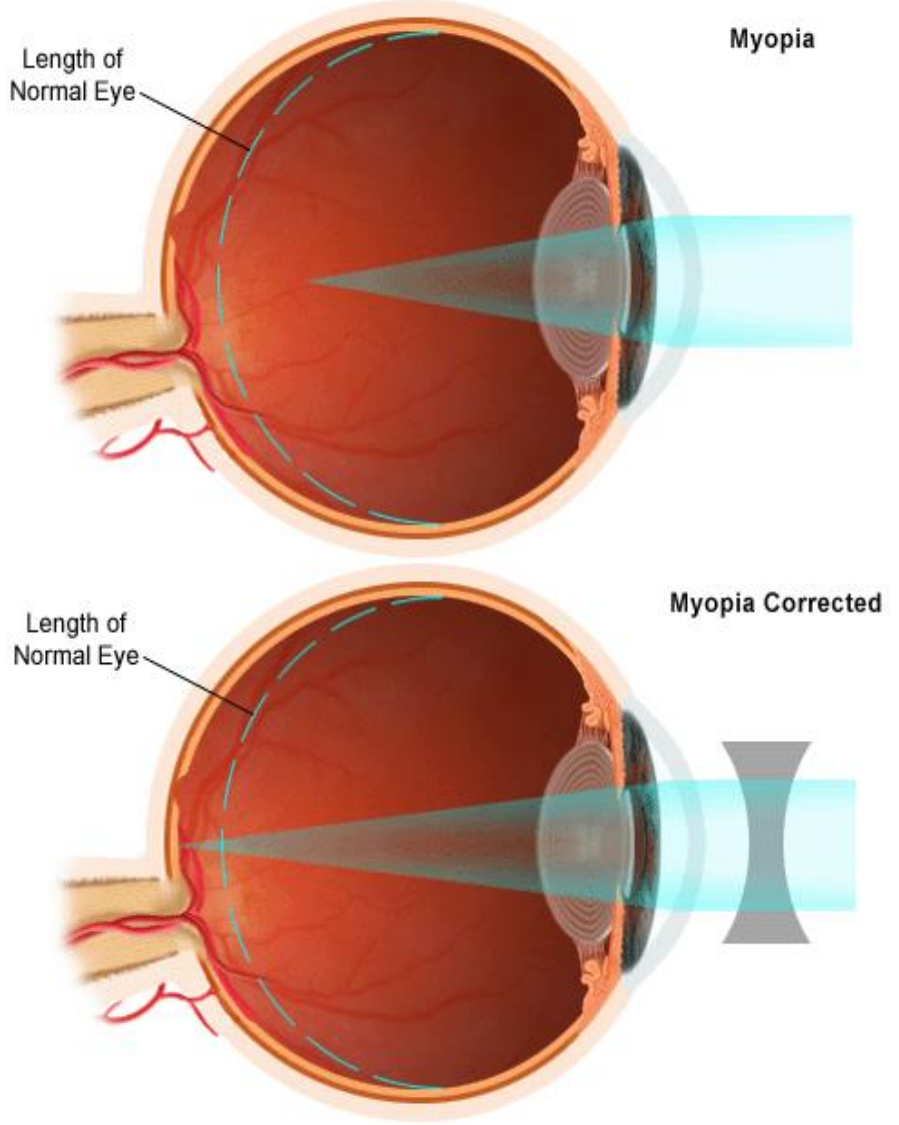
- Near sightedness (Myopia): cannot see object far away.
- Far sightedness (Hyperopia): cannot see objects nearby.
- Presbyopia: become farsighted as age.
- Astigmatism: uneven curvature, blurred vision.
- Drusen: small, round, yellow dots scattered on the retina.

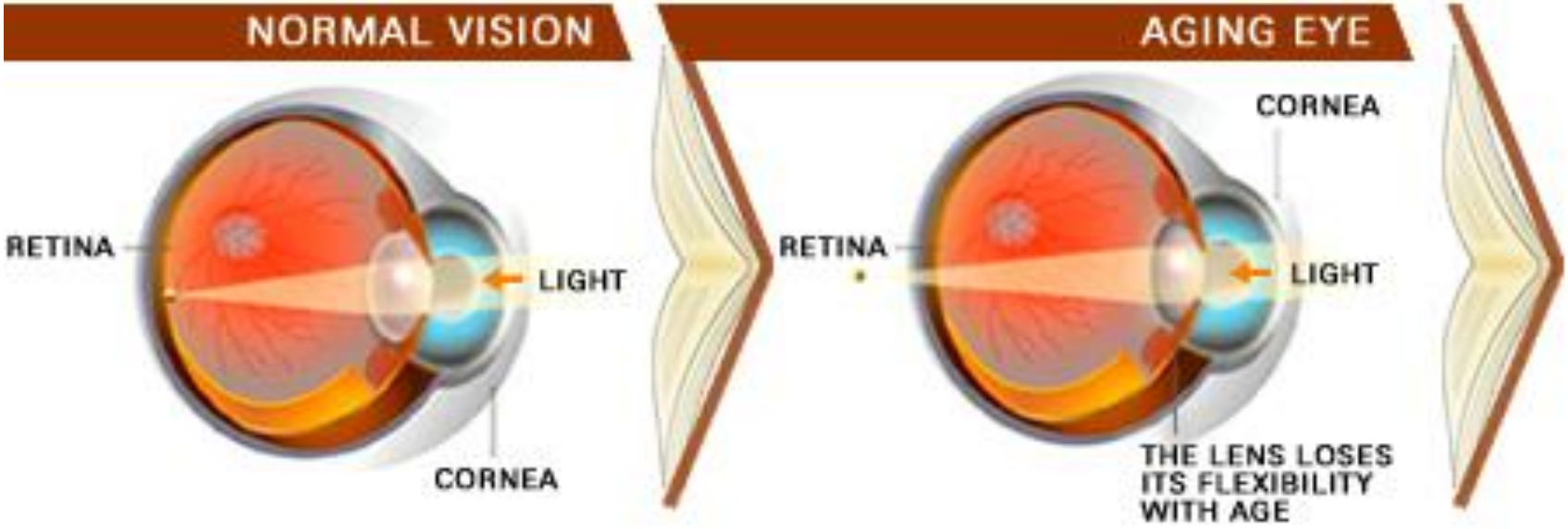


Hyperopia

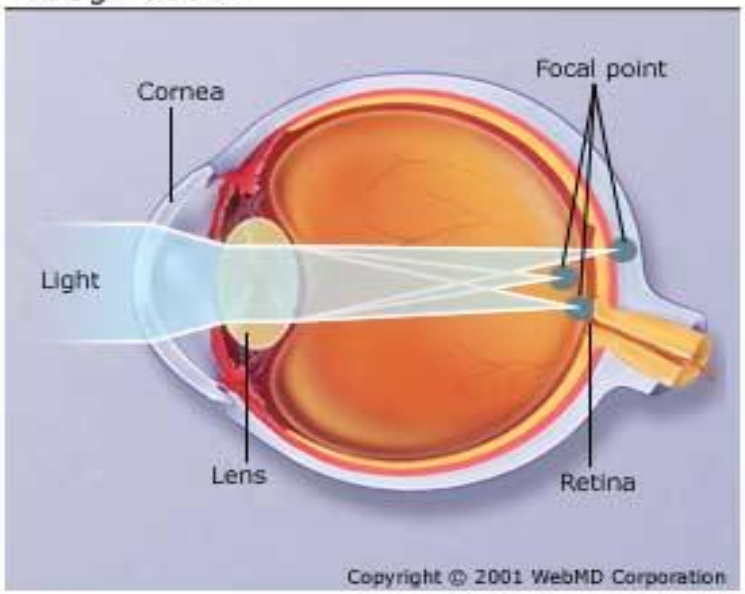


Myopia





Astigmatism



Original

aio

Compromise

aio

Horizontal Focus

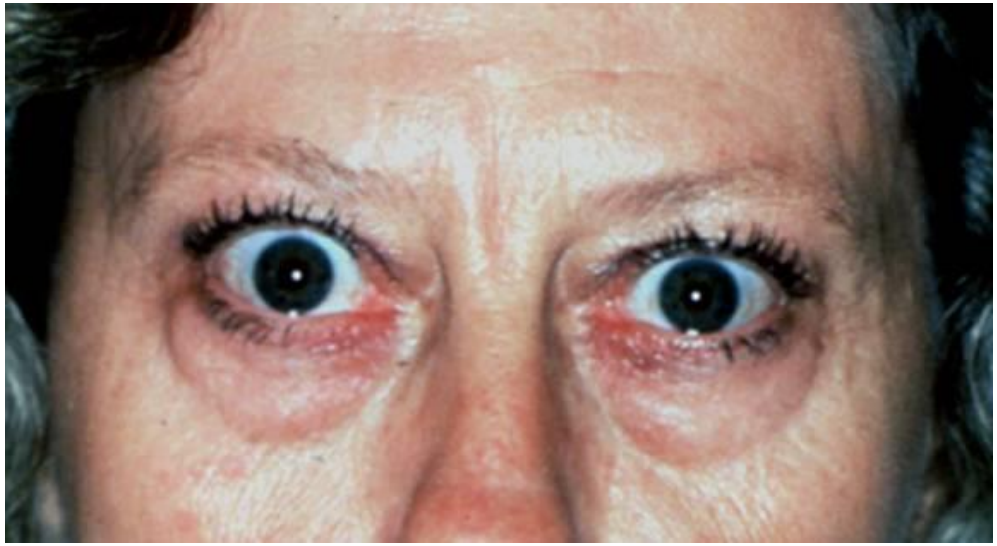
aio

Vertical Focus

aio

Eye variations

- Exophthamos: protrusion of eyeball
- Ptosis: drooping upper eyelid
- Hordeolum: stye
- Conjunctivitis: “pink eye”.
- Arcus senilis: white ring around cornea that is normal with age



Exophthamos

Conjunctivitis

ADAM.

Ptosis (drooping of the eyelid)

ADAM.

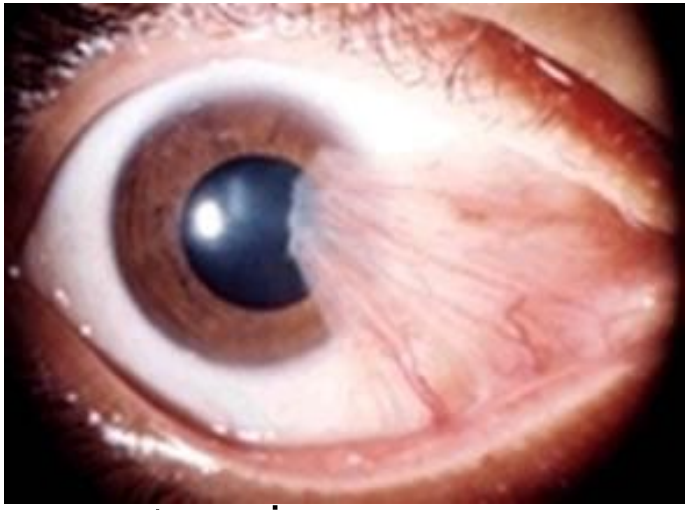
Eyes variations

- Pseudoptosis: upper eyelid elongated and rest on lashes.
- Ectropion: atrophy of fibrous tissue, causing lower lid to drop away from the globe.
- Pingueculae: yellowish elevated nodules on sclera due to prolonged sun and dust exposure.
- Pterygium: a growth over the cornea.
- Xanthelasma: soft, raised yellow plaues occuring on the lid of the eye.

Pseudoptosis

ectropion

pingueculae



pterygium

Sample Charting

- **Subjective:**
  - Vision reported good with no recent change, no eye pain, no inflammation, no discharge, no lesions, wears no corrective lenses, vision last tested 1 year ago, test for glaucoma at that time was normal.
- **Objective:**
  - Snellen chart: O.D (oculus Dexter) (right eye) 20/20, O.S (oculus sinister) (left eye) 20/20. Fields normal by confrontation. Corneal light reflex symmetric bilaterally. Brows and lashes present. Conjunctiva clear. Sclera white. No lesions.
  - Fundi: red reflex present bilaterally. Vessels present in all quadrants without crossing defects. Retinal background have even color with no hemorrhages.

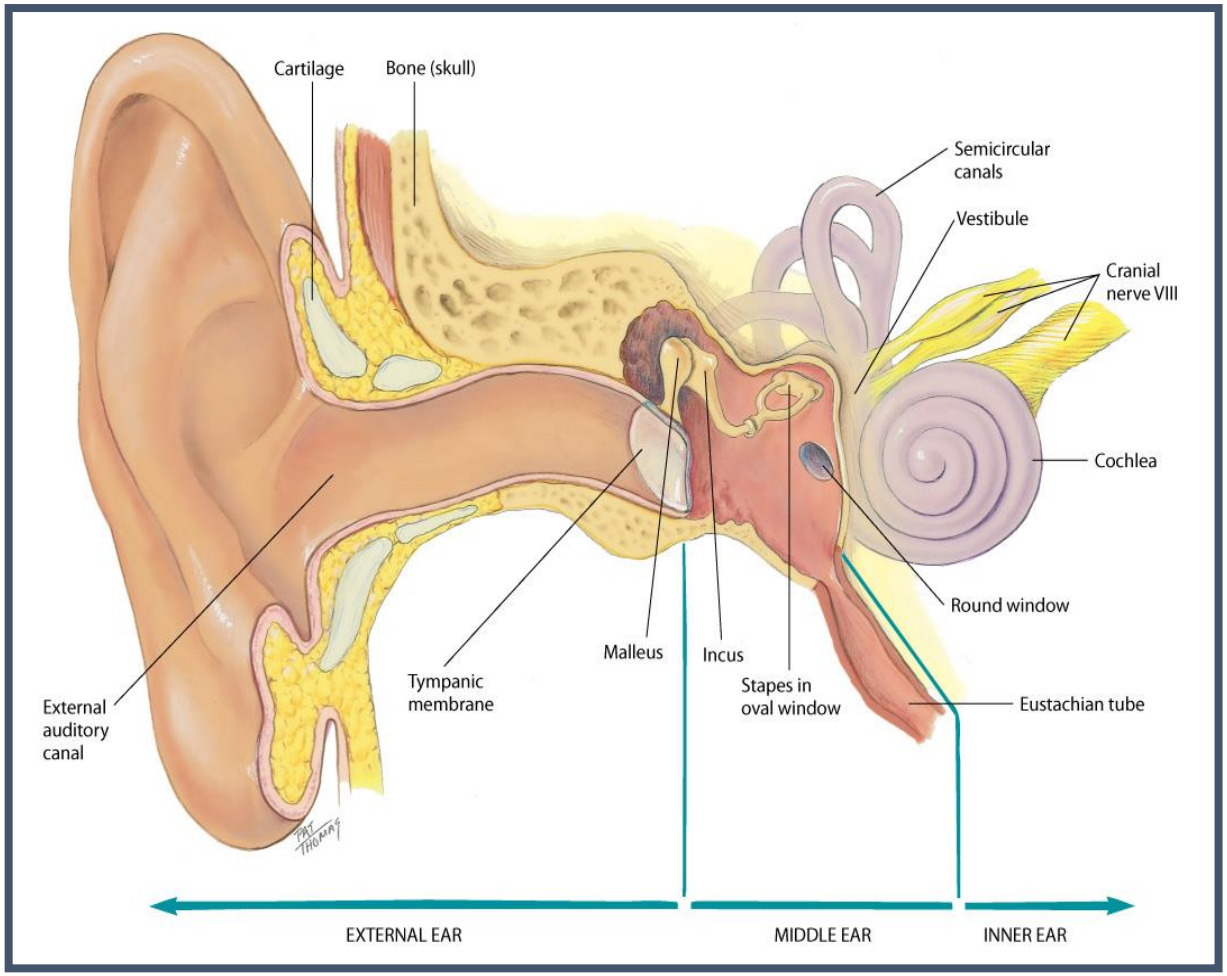
Actual Nursing Diagnosis

- Alterations in visual sensory perception related to improper use of contact lenses as evidenced by excessive tearing and inflammation.

EARS

Structure and Function

- Aurcle: (Pinna)
  - Helix (outer), antihelix (inner).
- Tragus
- Tympanic membrane
  - Shiny, transparent, pearly gray color
- External ear
  - External auditory canal
  - Tympanic membrane
- Middle ear
  - Malleus, incus, and stapes
  - Eustachian tube
- Inner ear
  - Vestibule and semicircular canals
  - Cochlea



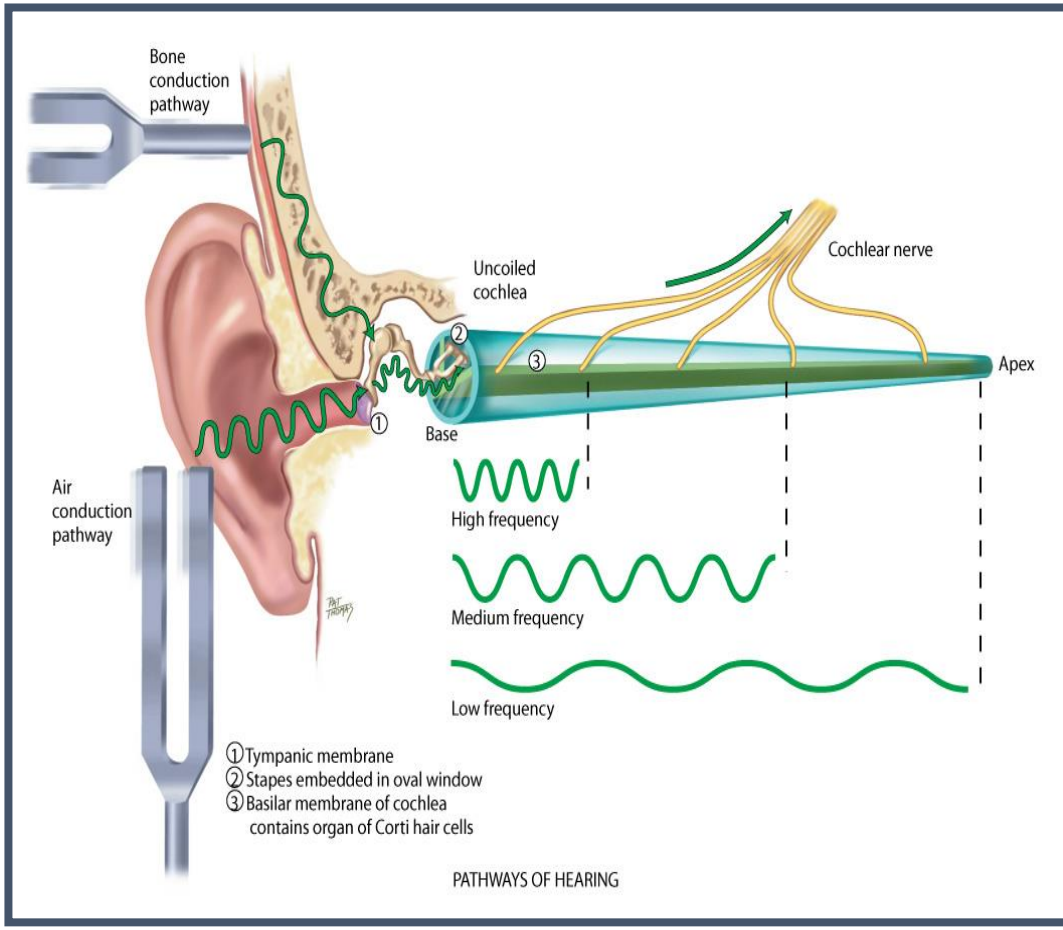
Structure and Function

Levels of auditory system

- Peripheral
  (the ear transmit sound to electrical impulses & send them which can be analyzed by brain)
- Brainstem
  (locating the direction and identifying the sound)
- Cerebral cortex
  (interpret the meaning and start the appropriate response)

Pathways of hearing

- Air conduction
- Bone conduction



Structure and Function

Types of Hearing loss

- Conductive: mechanical dysfunction of the external or middle ear (partial loss)
- Sensorineural (perceptive): pathologic
- Mixed loss

Equilibrium

- Vertigo (if the inner ear gets inflamed)

Subjective Data—Health History Questions

- Earaches
- Infections
- Discharge
- Hearing loss
- Environmental noise
- Tinnitus
- Vertigo
- Self-care behaviors

Objective Data—Physical Exam

Preparation

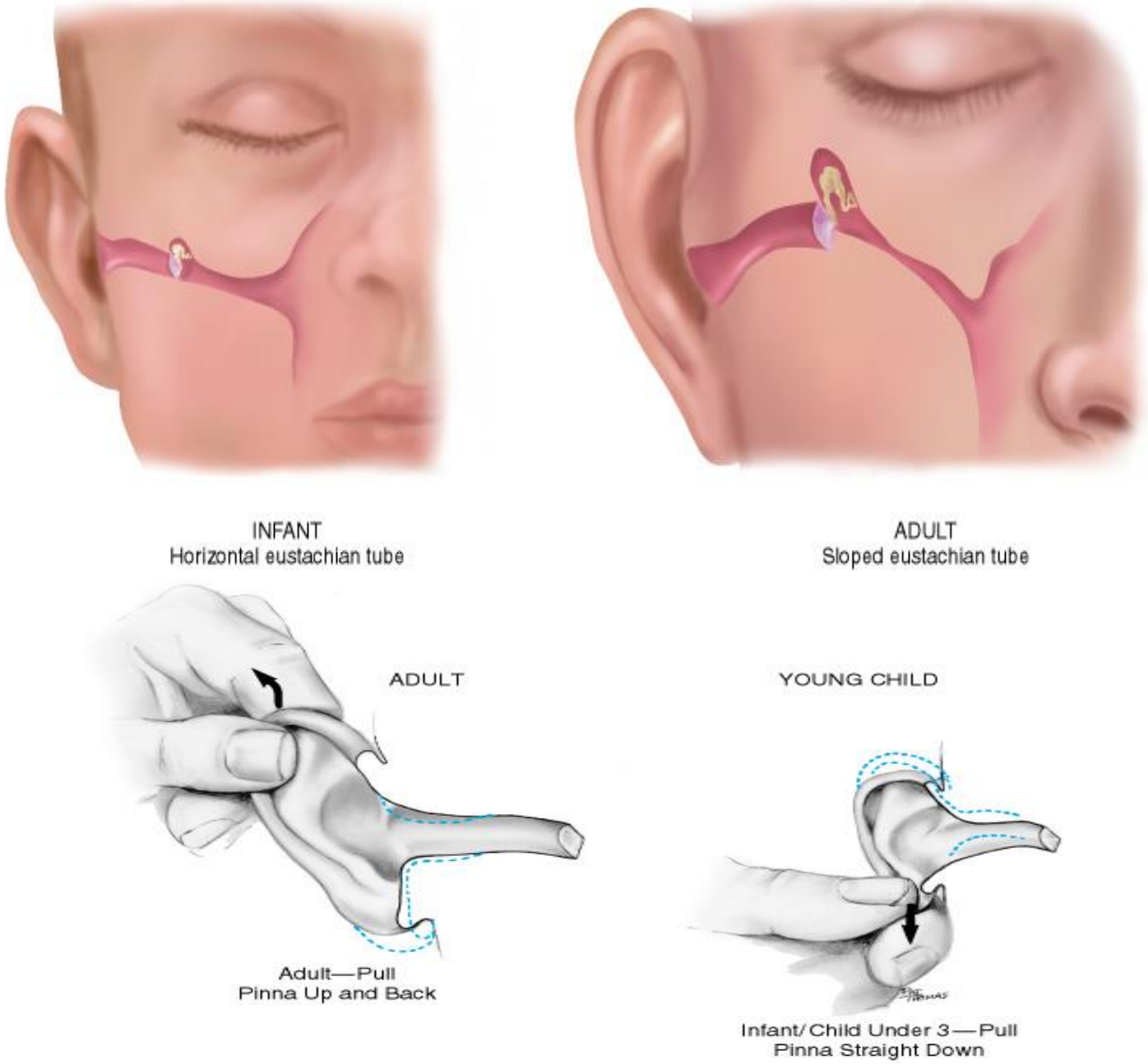
- Position
- Cleaning the ear canal

Equipment

- Otoscope with bright light
- Tuning forks in 512 and 1024 Hz

Assessment: Ears

- Inspection:
  - Position,
  - shape
  - size,
  - discharge,
  - Lesions,
  - Tenderness,
  - Edema
- Palpate:
  - Palpate for tenderness, any lesions
  - Tragus

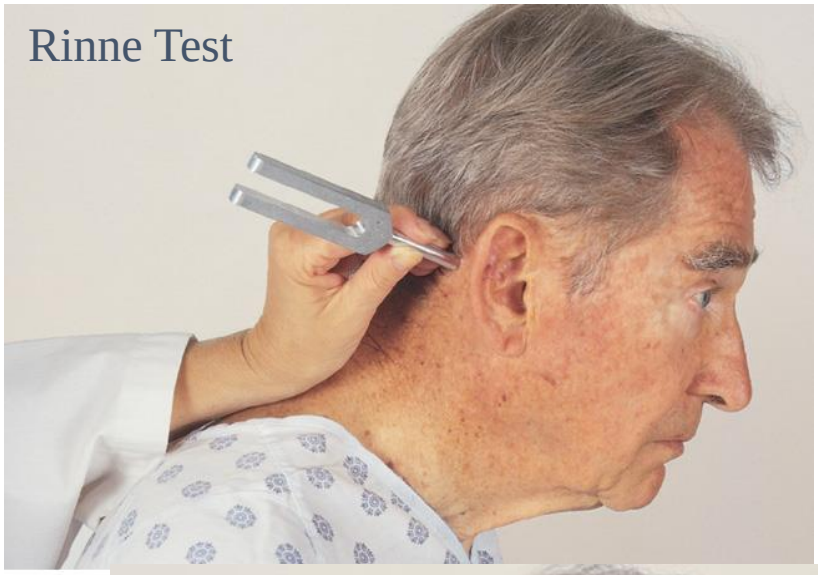


Assessment: Ears

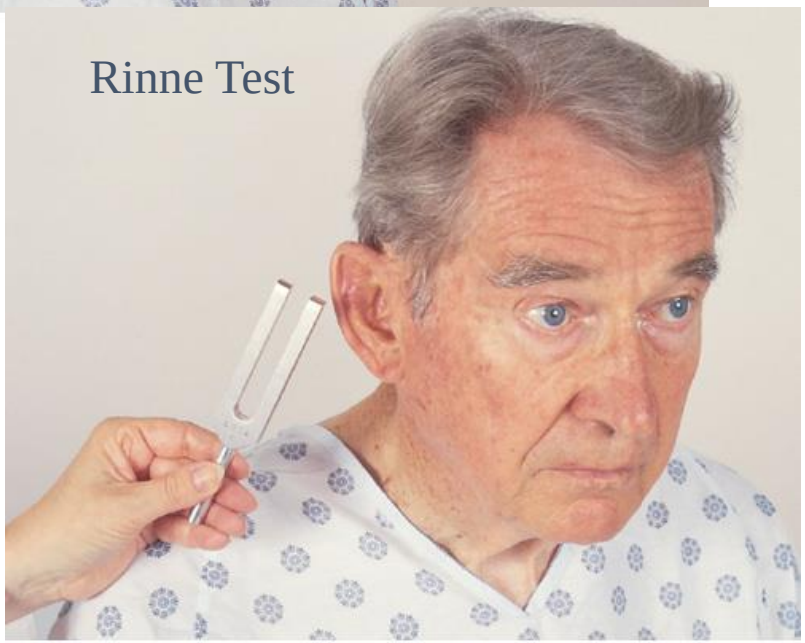
Hearing acuity tests:

1. Whispered voice test
2. Lateralization of sound (Weber test)
3. Rinne test (Comparison of air conduction to bone conduction
4. Romberg test for equilibrium

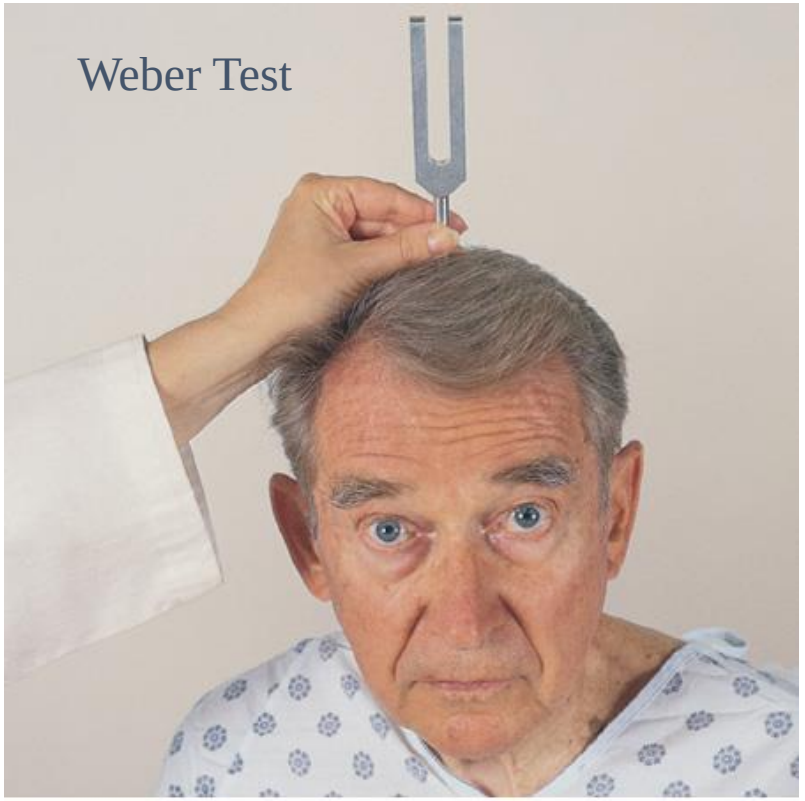
Rinne Test

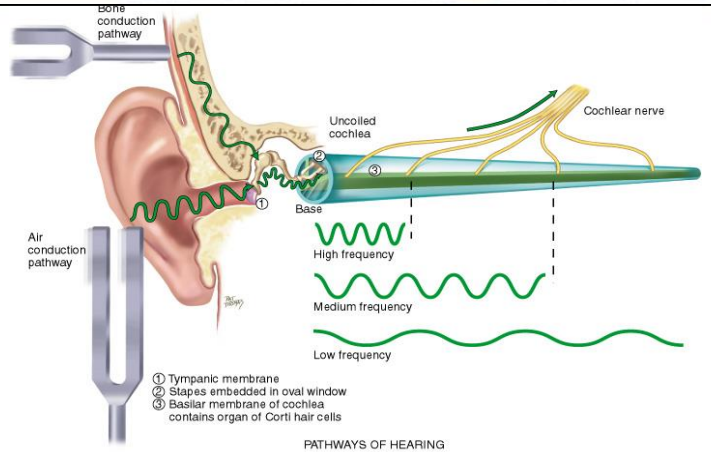


Rinne Test



Weber Test





Assessment: Ears

- Internal ear (behind tympanic membrane)

- Otoscopic Exam:
  - Auditory canal
  - Tympanic membrane
  - Landmarks

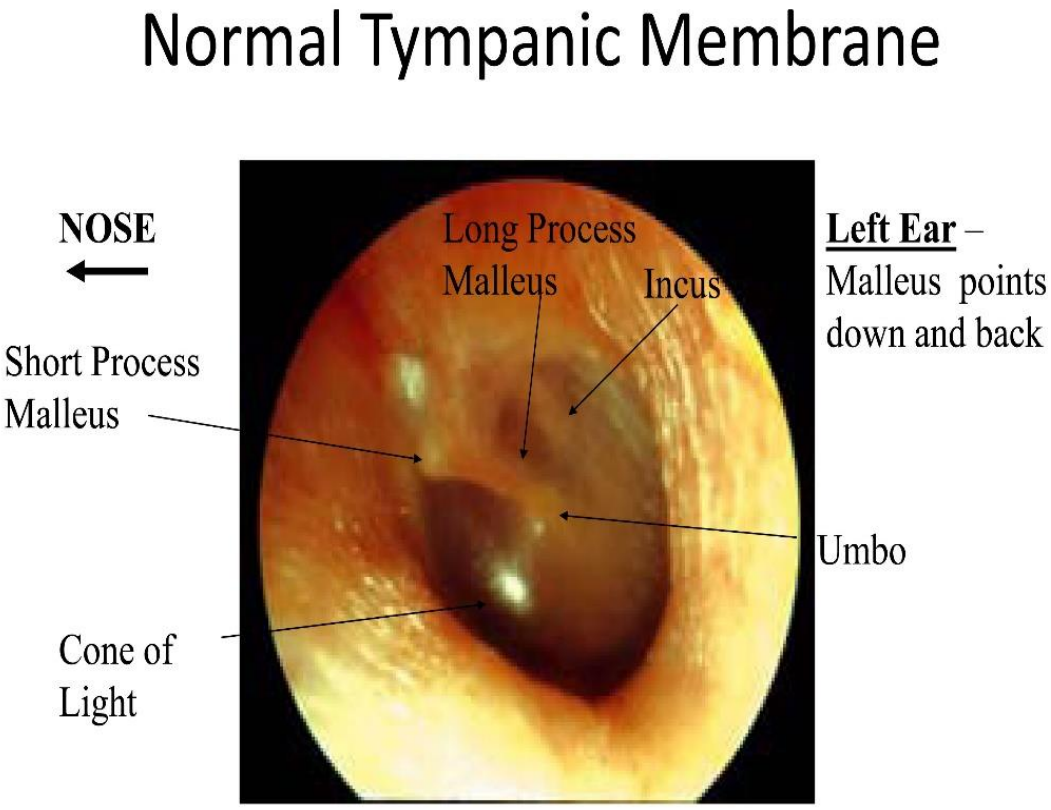


Image courtesy of: Dr. Stephen Berman, Denver Children's Hospital

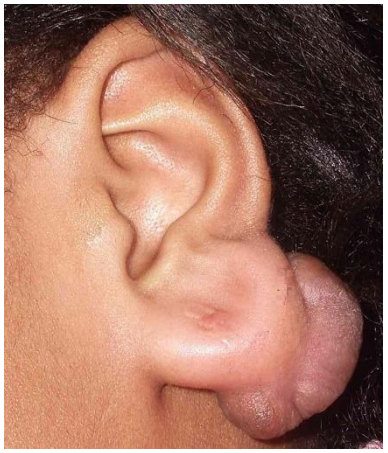
Assessment: Ears

Otoscopic examination

- Position of head and ear
- Method of holding and inserting otoscope
- Inspect External canal for
  - Color
  - Swelling
  - Lesions
  - Discharge
- Inspect Tympanic membrane for
  - Color and characteristics (Pearly-Gray)
  - Position
  - Integrity of membrane

From Adams GL, Boies LR Jr, Hilger PA: Boies Fundamentals of Otolaryngology: A Textbook of Ear, Nose and Throat Diseases, ed 6, Philadelphia, 1989, Saunders.

Ears variations



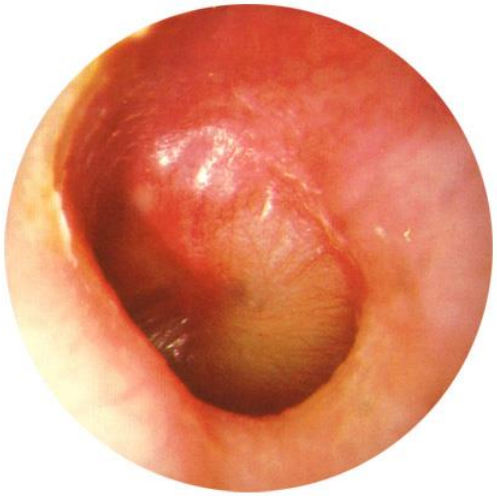
- Keloid: overgrowth of scar tissue.
- Darwin’s tubercle: small nodule at the helix.
- Tophi: small, whitish-yellow hard non tender nodules on helix, sign of gout.
- Cholesteatoma: malignant overgrowth of epidermal tissue.
- Scarred drum, insertion of tympanostomy tubes, otitis media – perforation.

Darwin’s tubercle

Tophi

Cholesteatoma

Normal Eardrum



Acute Otitis Media (ear infection)

Sample Charting

- Subjective:
  - States hearing is good, no earache, infections, discharge, hearing loss, tinnitus, or vertigo.
- Objective:
  - Pinna: skin intact with no masses, lesions, tenderness, or discharge
  - Otoscope: external canals are clear with no redness, swelling, lesions, foreign body, or discharge. Both TM are pearly gray in color.
  - Hearing: whispered words heard bilaterally. Weber test – tone heard midline without lateralization.

Thank you for listening