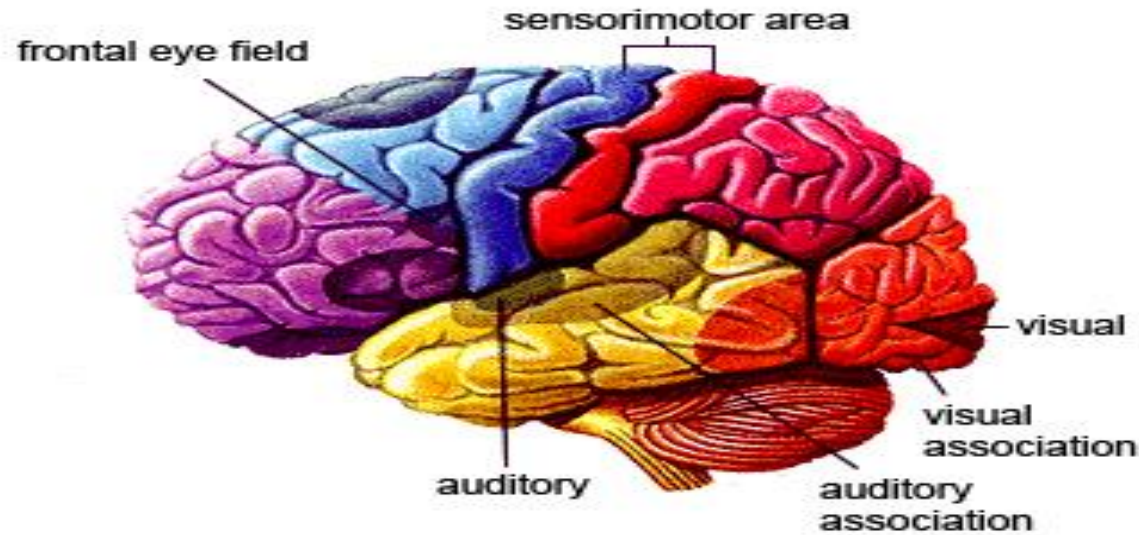


# PHYSIOLOGY TEAM



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( these notes are combination of female and male slides + our notes )

# Accommodation & Pupillary light reflex



# VISUAL ACUITY :-

Definition :- Degree to which details of objects are perceived

Visual threshold is minimal amount of light that elicit sensation of light

- Snellen s chart is used to test for visual acuity

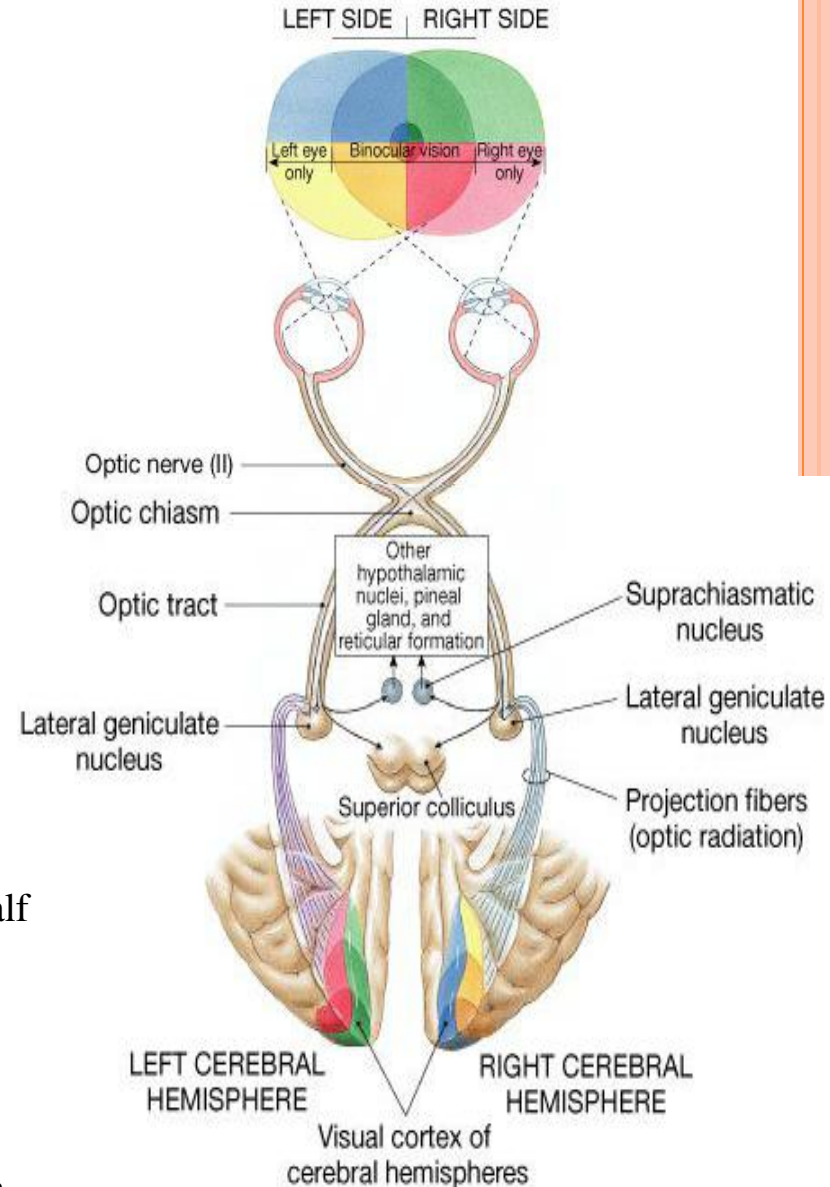
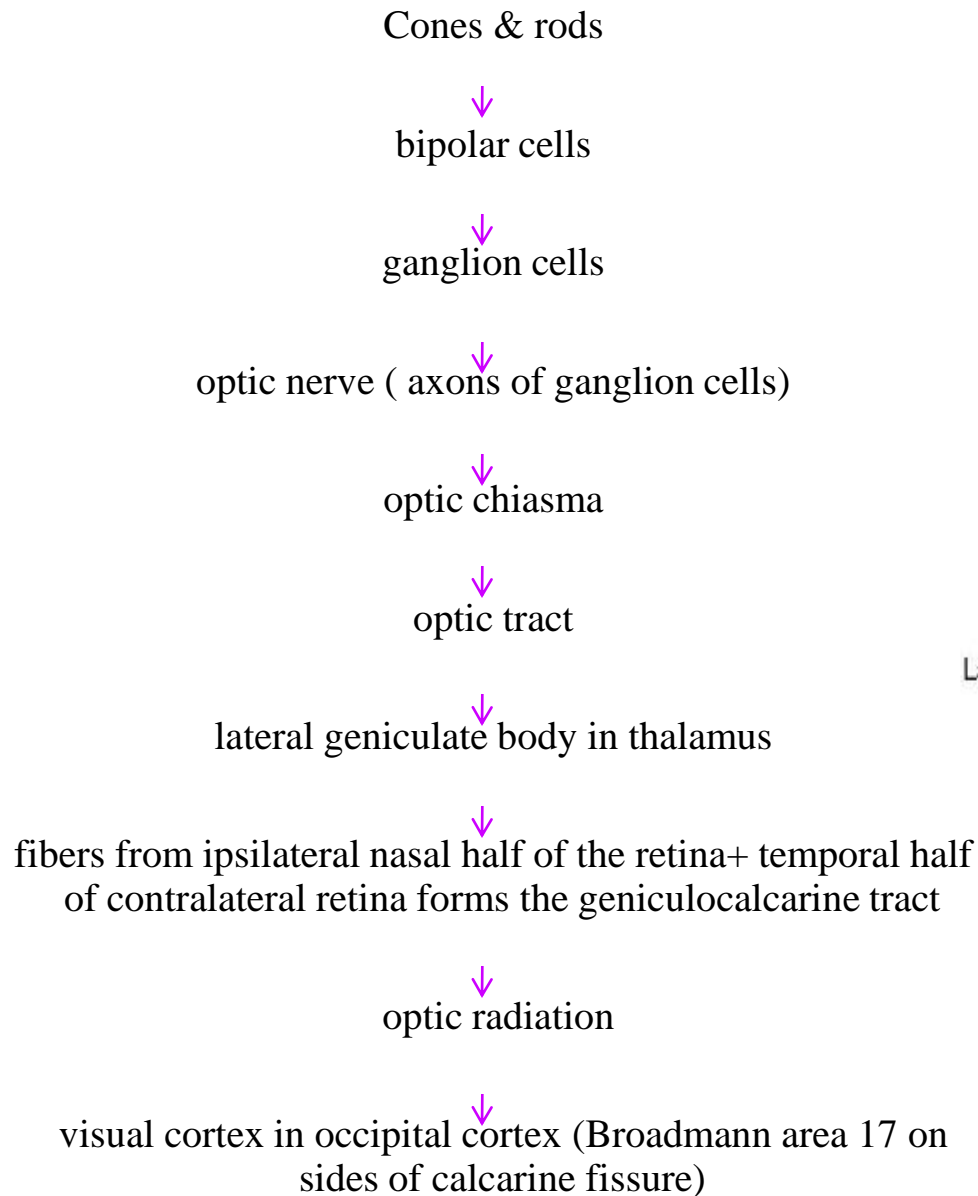
Normal acuity = 6/6

- A person of 12/6 has better vision than normal vision (not hyperope)
- A person of 6/12 has less vision than normal vision (d/D

Patient/normal)



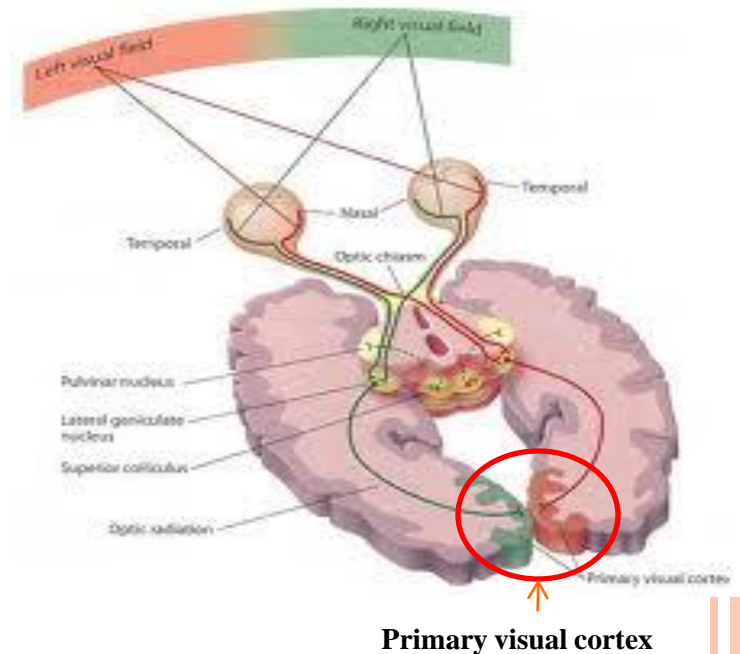
# VISUAL PATHWAY:-



- **The visual cortex**

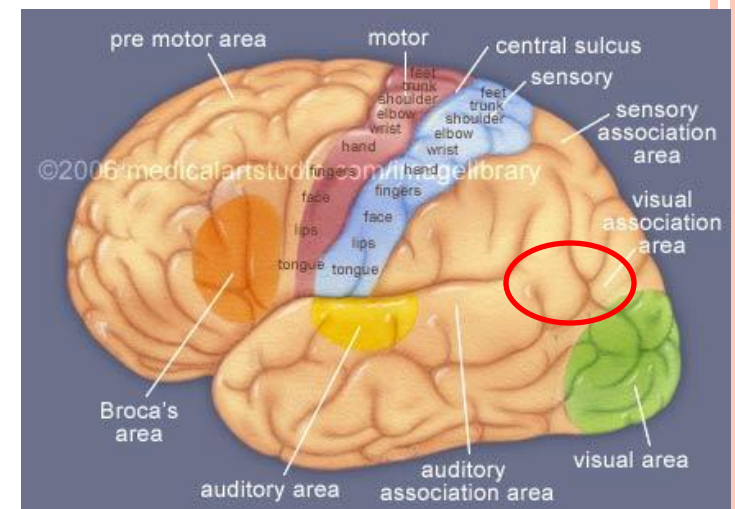
- 1-Primary visual cortex

- braodmann area 17
- perceive sensation of vision (movement + shapes+ stereognosis+ brightness) &has blobs for color detection



- 2-Association visual cortex

- area 18&19
- interpretation of visual stimuli ( without it you cant process the image )



## VISUAL PATHWAY & FIELD :-

- -The nasal fibers decussate (cross) to opposite side in the optic chiasma while the temporal fibers do not cross
- Therefore an Optic Chiasma lesion ( e.g,Pituitary Tumor ) will cause vision loss from the both lateral halves of the Field of Vision → Bitemporal hemianopia
- Nasal fibers conveys temporal ( lateral ) field of vision
- temporal fibers conveys nasal ( medial )field of vision

## • OPTIC TRACT :-

includes temporal fibers of the same side i.e nasal field of same eye + nasal fibers of the opposite side i.e temporal field of other eye



## LEFT OPTIC TRACT:-

Conveys temporal fibers of the Left eye + nasal fibers of the right eye

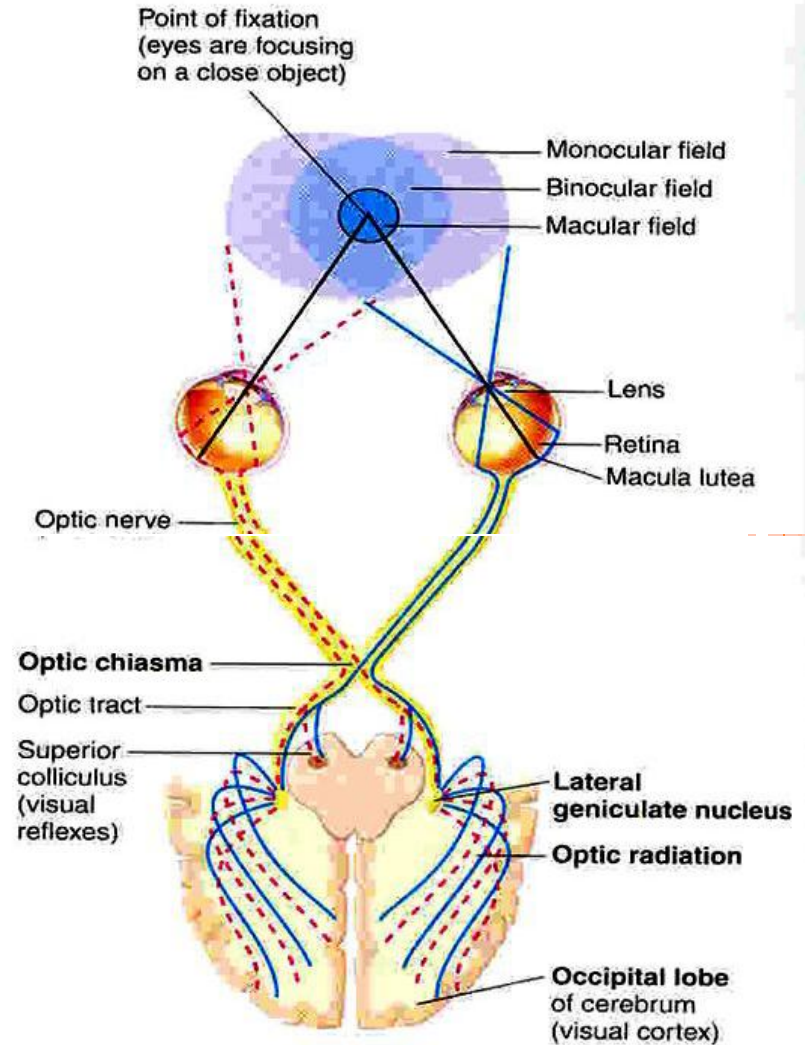
(( right field of the left eye & right field of the left eye )),

both form right half of visual field of both eyes.

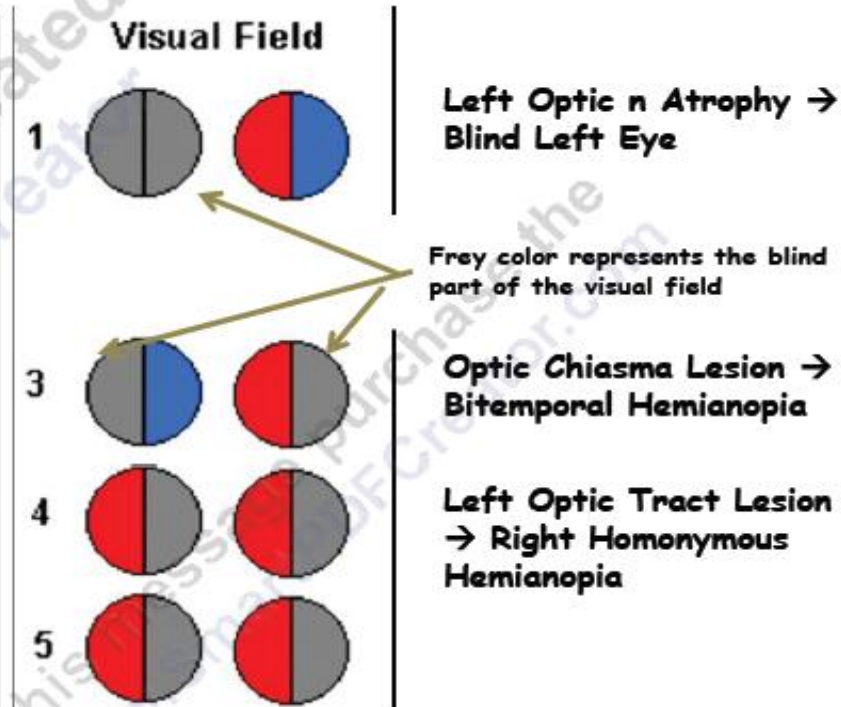
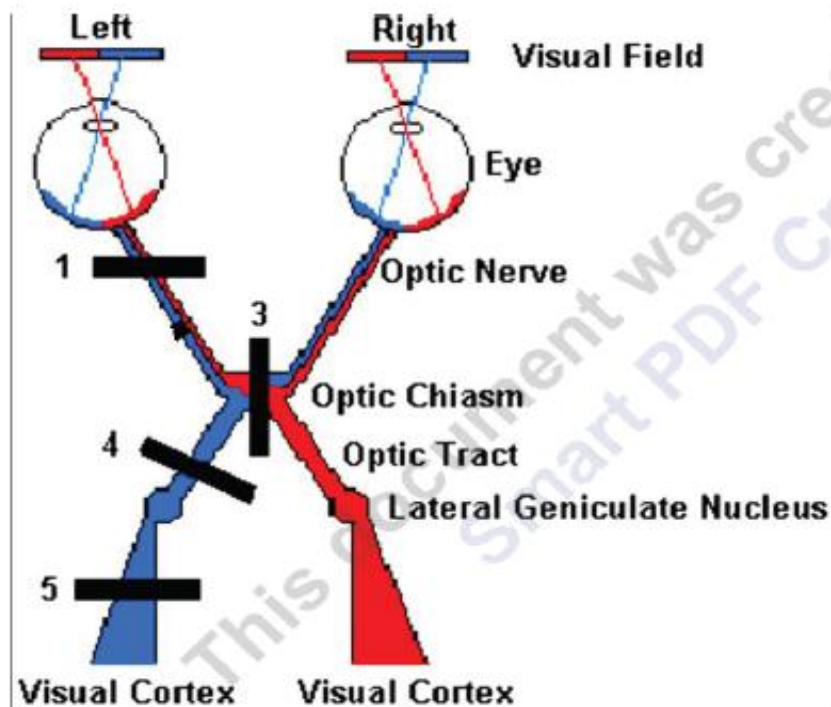
N.B

-- The **left** optic tract corresponds to the **right** ½ of the visual field

--The **right** optic tract corresponds to the **left** ½ of the visual field









## ○ Lateral geniculate body:-

It has 6 layers from ventral to dorsal:-

- 2,3,5 receive from ----- Temporal part of ipsilateral retina (( nasal part of visual field ))
- 1,4,6 receive from -----Nasal part of contralateral retina (( temporal part of contralateral field ))
- Thus **left LGB** (similar to left optic tract) has all layers receive from **RIGHT ½ of visual field**
- **Right LGB** (similar to right optic tract) has all layers receive from **LEFT ½ of visual field.**



## ○ FUNCTION OF LGB:-

- 1- Acts as a relay station for visual information from optic tract to cortex.
  - 2- It has point to point transmission ( spatial fidelity)
  - 3- Acts as a gate that controls signal transmission to visual cortex  
i.e control how much signals reach visual cortex (by signals from RF of midbrain& corticofugal fibers from cortex to turn off and limit number of signals pass to visual cortex)
  - 4- Color vision & detect shapes & texture
- NB/ it is rapidly conducting to visual cortex.



# DUPLICITY THEORY OF VISION

(2 kinds of vision under diff conditions)

**1-PHOTOPIC VISION** (bright light vision)

- served by cones
- high visual acuity= colors& details
- low sensitivity to light =high visual threshold

**2-SCOTOPIC VISION** (night vision, dimlight vision)

- served by rods
- low visual acuity =no colors or details
- great sensitivity to light =low visual threshold



## Eye Reflexes :

### 1- Pupillary reflexes & eye movement

some ganglion cell axons pass from optic tract to pretectal region of midbrain & superior colliculus

### 2- Circadian rhythm (light-dark cycle)

some axons of ganglion cells from optic chiasma pass directly to suprachiasmatic nucleus of hypothalamus

### 3- Accommodation reflex & its miosis component

some axons from lateral geniculate body in thalamus (away from pretectal N) to sup. colliculus in midbrain for



## Pupillary light reflex:-

\_ by applying light to one eye

### Respond:

- Direct → miosis (constriction) of this pupil
- Indirect → miosis of the other pupil

## Pathway of consensual Pupillary light reflex (indirect):-

Light on eye → retina → optic nerve → optic chiasma → optic tract → superior colliculus → pretectal nucleus → both oculomotor nerve nuclei (Edinger Westphal Nucleus) → both ciliary ganglia → both pupils by oculomotor nerves → miosis in both eyes.

- **Atropine drops:-** block parasympathetic supply-----mydriasis

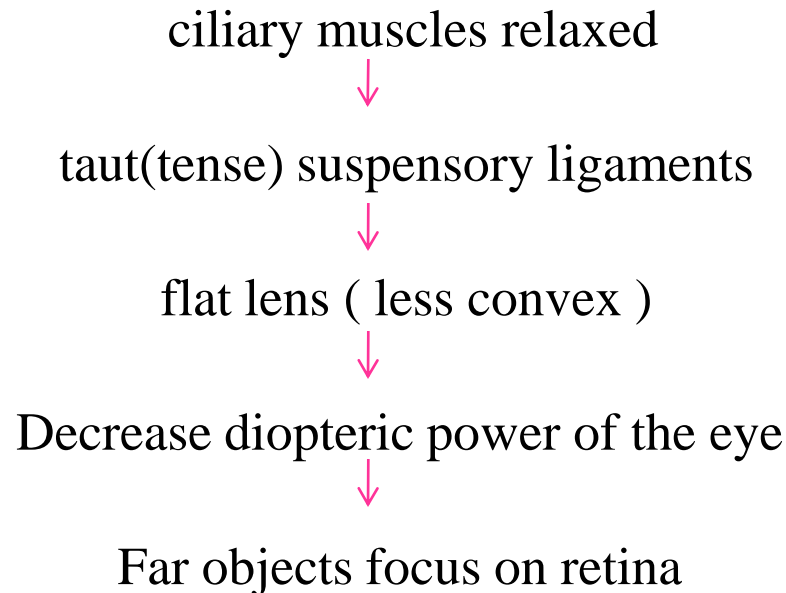
## ❖ Argyll Robertson pupil

- In syphilis tabes dorsalis which destroy pretectal nucleus
- light reflex is lost on the diseased side , but accommodation reflex remains
- pupil does not react to light , but constricts to near vision (accommodation reflex) → because the pathway of accommodation passes through LGB not the pretectal nucleus



## Accommodation :-

- Def: Modification of the refractive power of the eye to form sharp image of near and distant objects
- At rest (looking at far objects):





## ○ Near objects

if ciliary muscles remain relaxed → object focus behind retina → blurred vision

### Accommodation reflex:-

Ciliary muscle contraction



Relaxation of the suspensory ligament



increase anterior surface curvature of lens(Lens more convex )



Increase dioptric power of the lens (+12 D)



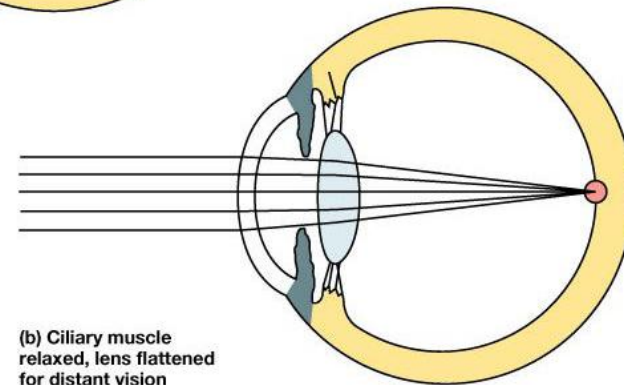
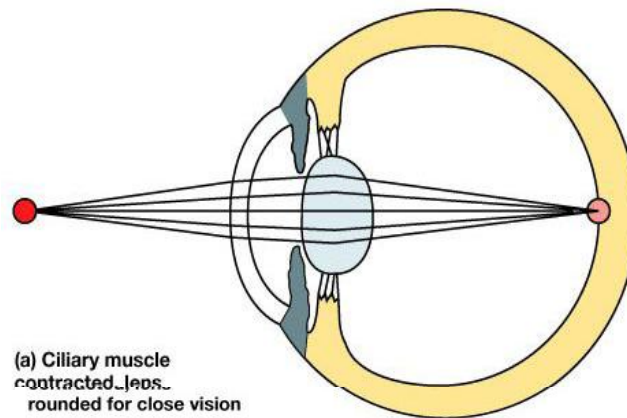
Near object focused on the retina

\* both circular & longitudinal ciliary muscles contract to pull ciliary muscle forwards&inwards----- ciliary muscles edges come close to each other.

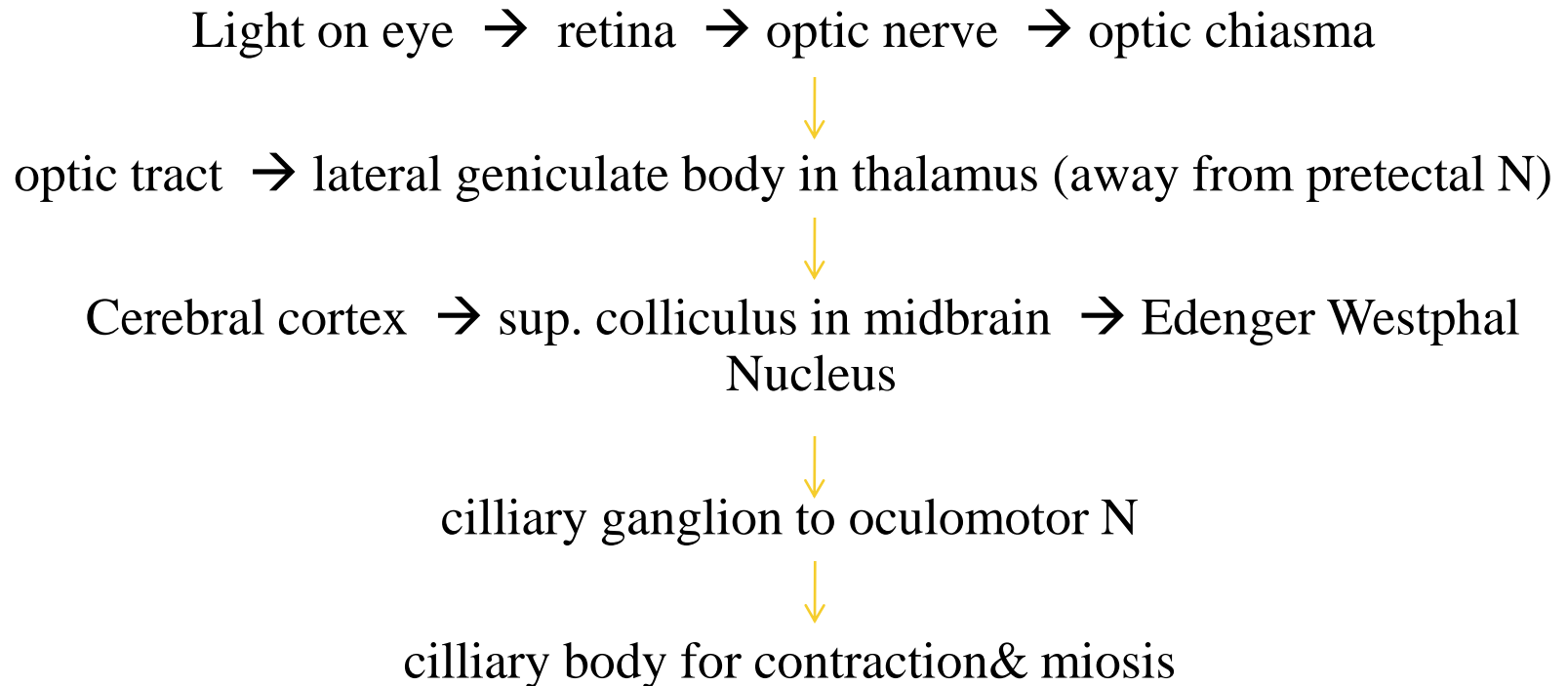


## Near response ( consist of )

- 1- Convergence → to bring focus on both retina the same
- 2- Pupil constriction ( miosis ) → to limit amount of light entering the eye
- 3- Increase lens thickness → to increase RP → to bring image on retina



# The accommodation pathway-



\* ( the pathway of accommodation is ventral to pupiulary light reflex)



## Near point:-

Nearest point to eye at which object can brought into focus on retina by ACCOMODATION

-10 years-----9 cm

-At 60 years-----80-100 cm

due to hardness of lens & loss of accommodation.

❖ **Presbyopia** ( loss of near point due to age )

causes :

- 1- loss of accommodation
- 2- loss of lens elasticity
- 3- near point recede

- **Correction** by biconvex lens

