

431

CNS System
central Nervous

Block

Physiology Team

Female Side

Male side

Done By :

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Revised By:

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CNS System central Nervous

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Slide No.(1)

**Vision
Accomodation &
pupillary light reflex
By**

Dr/Faten zakareia



Team Notes :

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Slide No.(2)

VISUAL ACUITY

-Definition :- DEGREE TO WHICH DETAILS OF OBJECTS ARE PERCEIVED

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

2 lines can be seen as 2 if a visual angle of about 1 minute between them

-Snellen s chart to measure visual acuity

Normal acuity = ($d/D = \text{distance of Patient} / \text{distance of normal person} = 6/6$)

A person of // 12/6 has better vision than normal vision (not hyperope)

A person of // 6/12 has less vision than normal vision

Team Notes :

The image shows a Snellen Chart with various letters and their corresponding visual acuity values. The letters are arranged in rows, and the values are listed to the right of each row. The values are: 6/60, 6/36, 6/24, 6/18, 6/12, 6/9 (Approximate level acuity for driving), 6/6 (Normal distance vision at 6 metres), and 6/5. A blue callout box with a white border contains the text: "Example: Patient distance from chart is 6 meter. Normal people can see this line clearly at distance of 12 meters". An arrow points from the callout box to the 6/12 line on the chart.

Example:
Patient distance from chart is 6 meter.
Normal people can see this line clearly at distance of 12 meters

Snellen Chart

Block

Slide No.(3)

DUPLICITY THEORY OF VISION (2 kinds of vision under diff conditions)

Q. Differentiate between cones & rods vision.

1-PHOTOPIC VISION (bright light vision)

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

2-SCOTOPIC VISION (night vision, dimlight vision)

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

Team Notes :

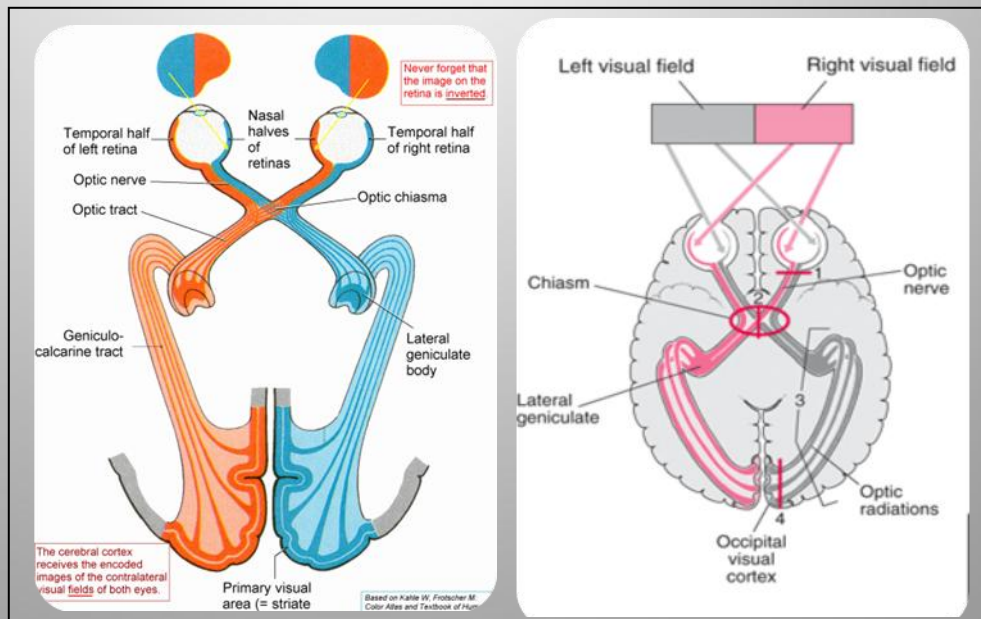
	Cones	Rods
Location	In the center of the retina, or the fovea centralis.	On the periphery
Light sensitivity	not very sensitive and needs bright light	very light-sensitive
Activation	High Threshold to be activated	Low threshold
Visual acuity	High visual acuity	Low visual Acuity
Color Sensitivity	See colors	Black and white and grey shades
Density	6 million	120 million

Slide No.(4)

VISUAL PATHWAY:-

- Cones & rods → bipolar cells → ganglion cells → optic nerve (axons of ganglion cells) → optic chiasma → optic tract → lateral geniculate body in thalamus → axons of cells form geniculocalcarine tract --- -- optic radiation → visual cortex in occipital cortex (Brodmann area 17 on sides of calcarine fissure)

Team Notes :



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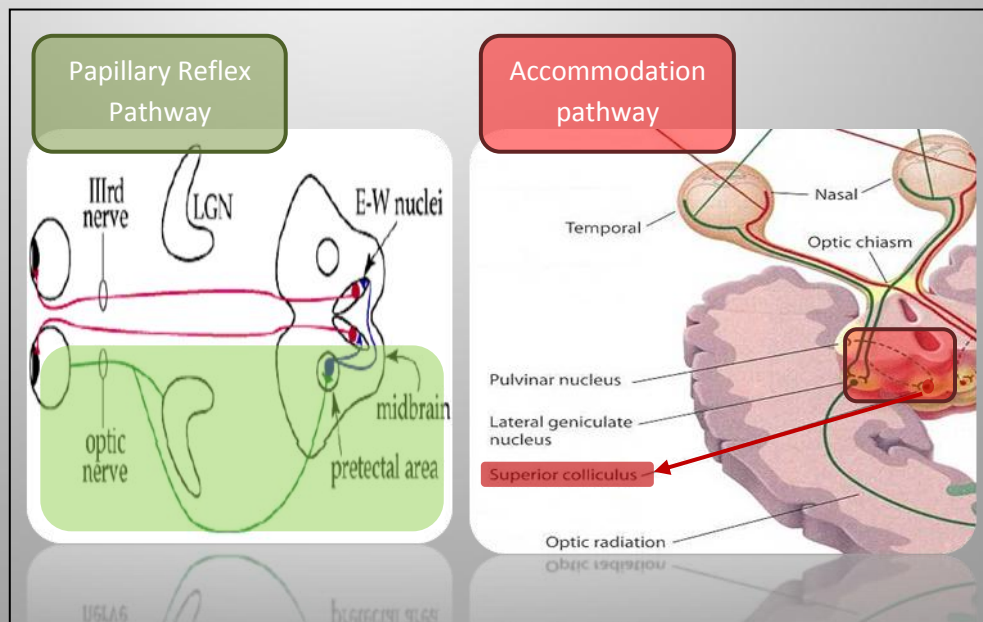
Slide No.(5)

* 1- some ganglion cells axons pass from optic tract to **pretectal region of midbrain** for pupillary reflexes & eye movement

* 2- Some axons of ganglion cells from optic chiasma pass directly to **hypothalamus** for circadian rhythm (light-dark cycle)

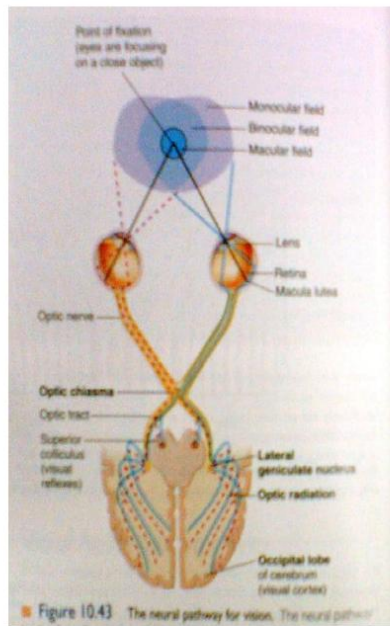
*3-Some axons from lateral geniculate body in thalamus to **superior colliculus** in midbrain for accomodation. R & its miosis component

Team Notes :



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Slide No.(6)



Team Notes :

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Slide No.(7)

-VISUAL PATHWAY & FIELD :-

- The nasal fibers (medial) cross to opposite side •
- The temporal fibers (lateral) do not cross •

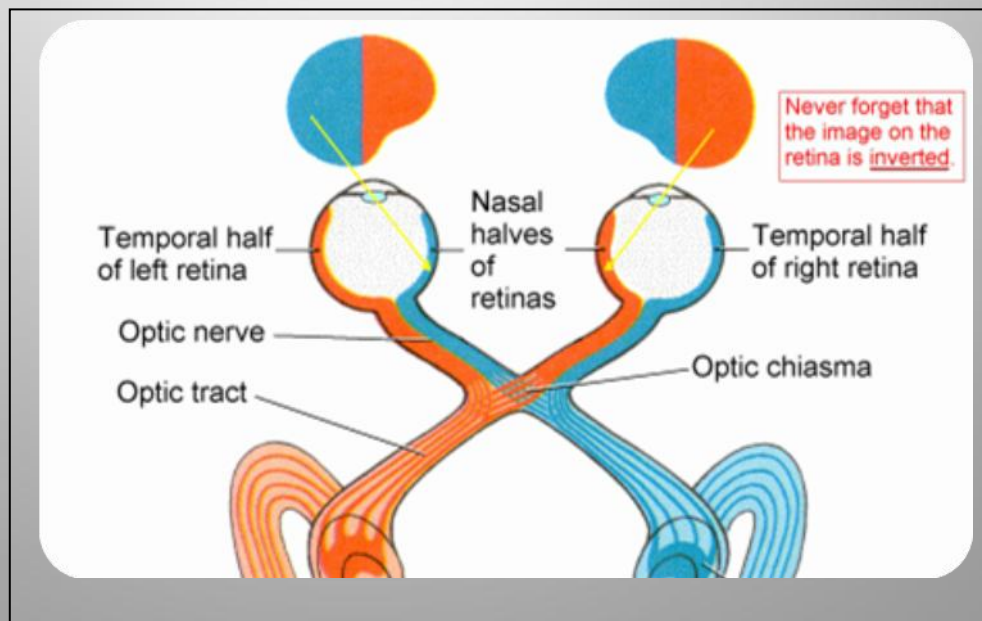
-Nasal fibers conveys temporal field (outer)of vision •

-Temporal fibers conveys nasal field (inner)of vision •

OPTIC TRACT :- •

- includes temporal fibers of the same side i.e nasal •
- field of same eye (inner)+ nasal fibers of the •
- opposite side i.e temporal field of other eye(outer)

Team Notes :





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Slide No.(8)

exp//LEFT OPTIC TRACT:-

Conveys temporal fibers of the left eye
+ nasal fibers of the right eye
=(left nasal visual field(right half of visual field of left eye)+ right temporal visual field(right half of visual field of right eye), both form right half of visual field of both eyes.

N.B

- The left optic tract corresponds to the right $\frac{1}{2}$ of the visual field
- The right optic tract corresponds to the left $\frac{1}{2}$ of the visual field

Team Notes :

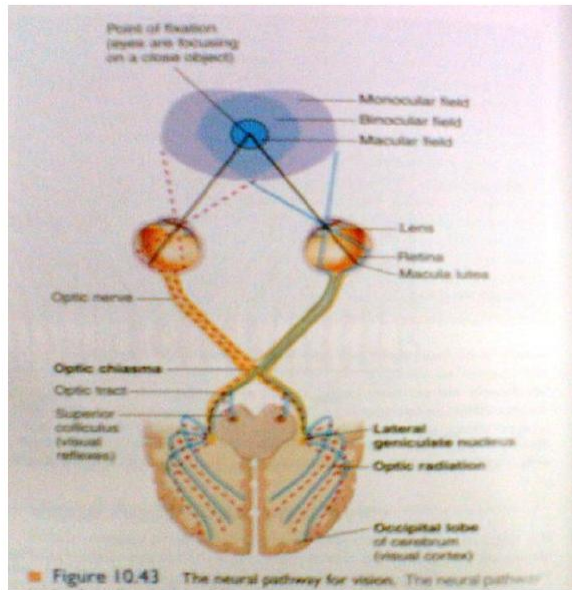
Nothing else was mentioned about this slide.

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Slide No.(9)



Team Notes :

Slide No.(10)

Accommodation:-

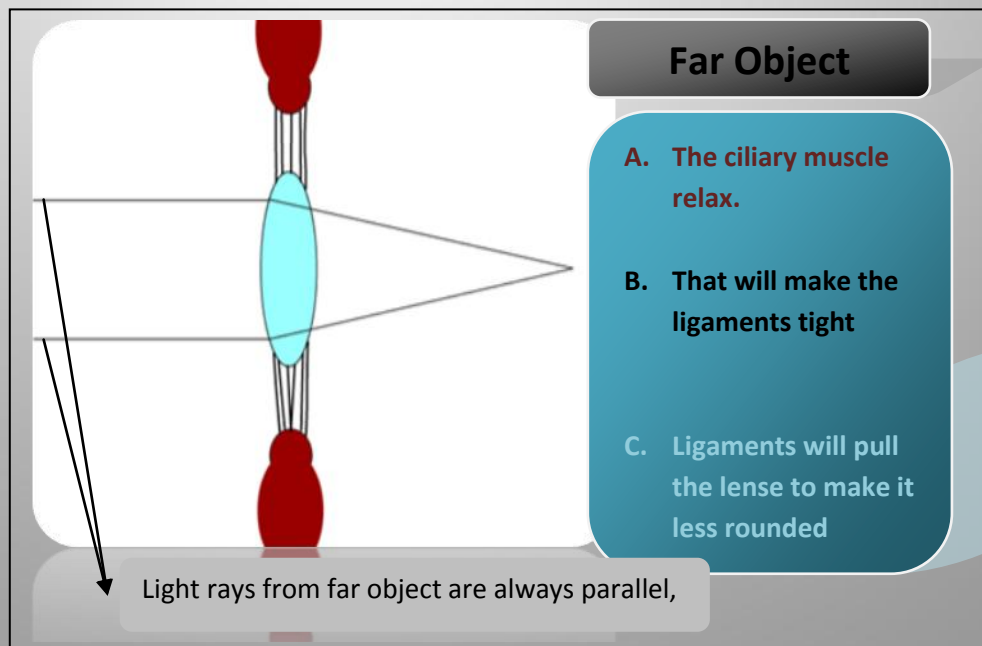
At rest (looking at far objects):- -

Ciliary muscles are **relaxed + taut (tense)** -
ligaments + **flat** lens

- looking at near objects:- from near (close) •
objects parallel rays focus behind retina(if
ciliary muscles remain
relaxed)>>>>>>>blurred vision

Solution is to increase curvature & refractive •
power of lens by accommodation to bring
focus on retina.

Team Notes :



Slide No.(11)

Accommodation reflex:- •

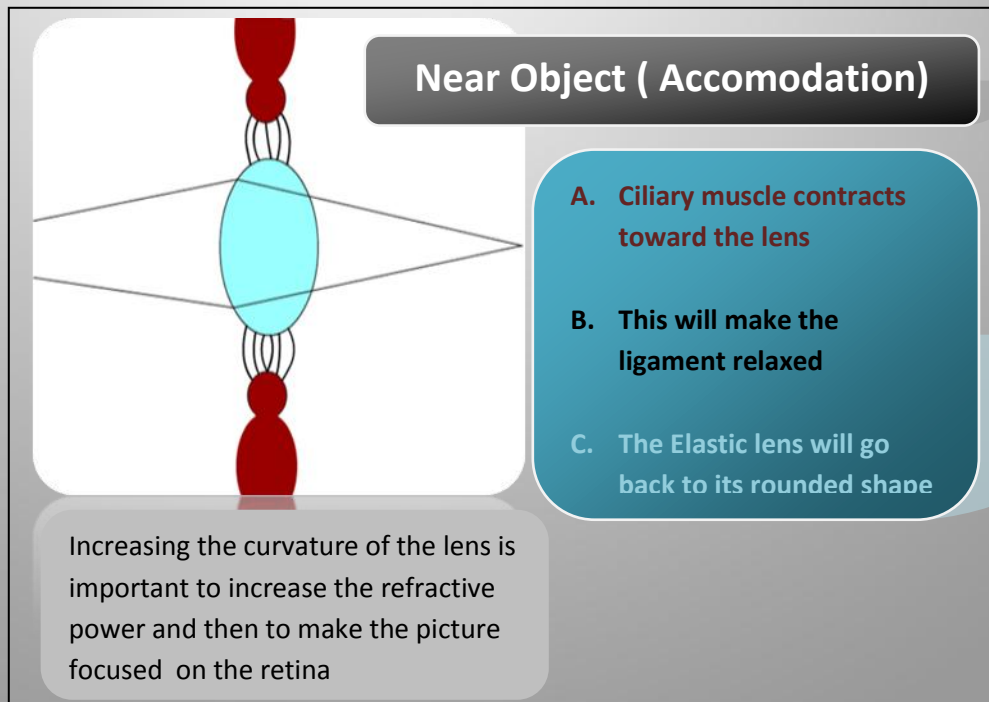
•
- Focusing at near object(**increased** anterior surface curvature of lens by ciliary muscles **contraction** , **slack = relaxed** ligaments, **increased** anterior surface curvature of lens . why?


-to add 12D to refractive power of lens. •

-both circular & longitudinal ciliary muscles • contract to pull ciliary muscle forwards & inwards>>>>ciliary muscles edges come close to each other to **increase** anterior surface curvature of lens.

Test//sanson purkinje image •

Team Notes :





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Slide No.(12)

looking at a close object (near response) •

- a- convergence. Why? •
- b- pupil constriction. Why? •
- c- Accomodation. Why? •

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 accomodation. •

-(presbyopia:-((triade)) •

- 1-loss of accomodation
- 2-loss of lens elasticity
- 3- near point receed •

-correction by **biconvex lens** •

Team Notes :

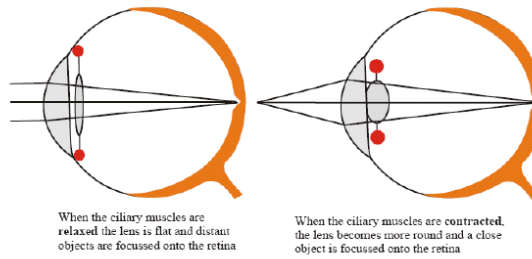
When we look to a near object, the **near response** happens . **which accommodation is part of this response.**

Near response consists of **3** parts:

- 1- **Convergence:** (inward movement of both eyes toward each other) **only eye movement that is not conjugate.**
Convergence is to properly focus an image on the retina.
- 2- **Pupil contraction:** to protect retina from Extra light.
- 3- **Accommodation:** to increase lens curvature>> increase refractive power of the lens >> to bring the picture on the retina.

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Slide No.(13)



Team Notes :

Nothing else was mentioned about this slide.



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Slide No.(14)

Pathway of accommodation:- •

Light on eye>>>>>retina >>>>>optic •
nerve >>>>>optic chiasma>>>> optic
tract->>>> lateral geniculate body in
thalamus & to superior colliculus in
midbrain for->>>>EWN>>>>> ciliary
ganglion to oculomotor N>>>>>ciliary
body contraction (accommodation. R) &
miosis of near response

- this pathway of near response is •
ventral to pupillary light reflex)

Team Notes :

Nothing else was mentioned about this slide.

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Slide No.(15)

Pupillary light reflex:-

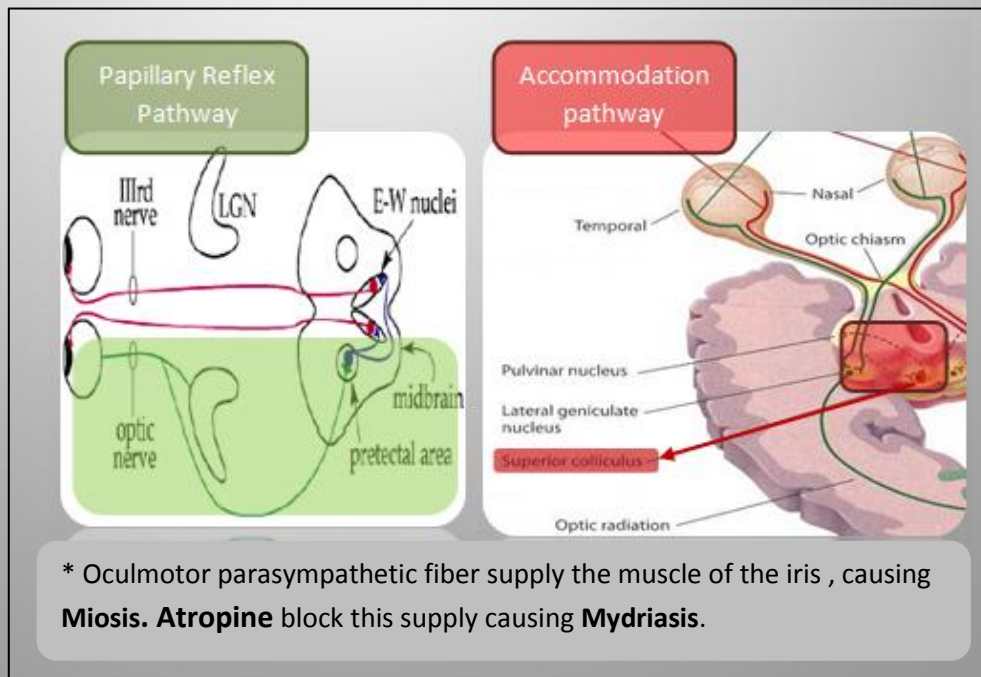
Light on one eye pupil>>>>>constiction of this pupil (direct)
& the other pupil (indirect)

Pathway of consensual Pupillary light reflex (indirect):-

Light on eye>>>>retina>>>optic nerve >>>optic chiasma>>>>optic tract>>>>pass through superior colliculus to end in **pretectal nucleus** >>>>both oculomotor nerve nuclei (EWN)>>>> both ciliary ganglia>>>>supply both eyes by oculomotor nerves>>>>>miosis in both eyes.

-Atropine drops:- block parasympathetic supply of oculomotor >>>>>>mydriasis

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Slide No.(16)

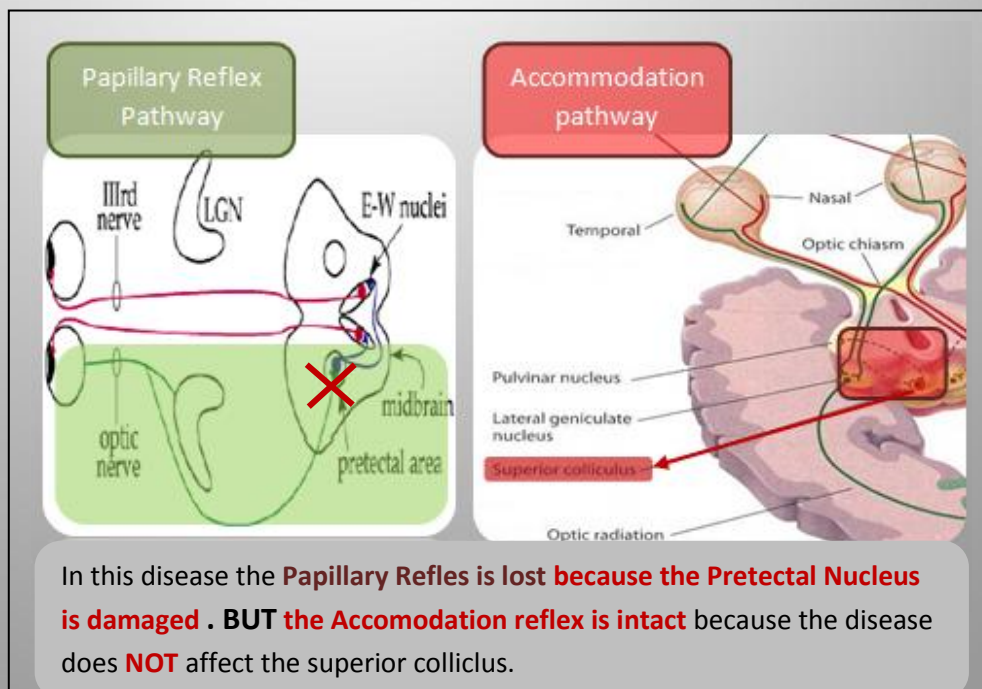
Q. Argyll Robertson pupil?

In syphilis tabes dorsalis which destroy pretecal nucleus

-light .R is lost & accomodation .R remains

because lesion is in pretecal nucleus only, away from superior colliculus & fibers of accomodation.

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Slide No.(17)

Lateral geniculate body:- •

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.**

Team Notes :

Nothing else was mentioned about this slide.

Block

Slide No.(18)

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 gate controls signal transmission •
to visual cortex i.e control how much signals
reach visual cortex

4-color vision & detect shapes & texture •

NB/ it is rapidly conducting to visual cortex. •

Team Notes :

Nothing else was mentioned about this slide.

Slide No.(19)

visual cortex has 6 layers •

1-Primary visual cortex(broadmann area 17):- perceive sensation of vision (movement + shapes+ stereoscopic vision + brightness) &has blobs for color detection

2-Association visual cortex(area 18&19):- interpretation of visual stimuli

Team Notes :

Nothing else was mentioned about this slide.

Questions:

1-In patient with syphilis, which reflex is lost?

- A- Accommodation Reflex
- B- Papillary Reflex
- C- Corneal Reflex

2- Which area of the visual cortex is responsible for color detection?

- D- 17
- E- 18
- F- 19

3- The center For Accomodation Reflex?

- G- Superior Colliculus.
- H- Inferior Colliculus
- I- Lateral Geniculate Body.

Answers:

- 1- B
- 2- A
- 3- A