



Vision
Accomodation &
pupillary light reflex
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Objectives:

- Describe visual acuity**
- Contrast photopic and scotopic vision**
- To know visual pathway and field of vision**
- Describe the process of accommodation reflex and its pathway, contrasting the refraction of light by the lens in near vision and in far vision**
- Identify and describe pupillary light reflex and its pathway and -relate these to clinical situations as argyl Robertson pupil**
- Identify the lateral geniculate body and visual cortex**

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 to measure visual acuity

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

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

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

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)**

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- * 1- some ganglion cells axons pass 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 to superior colliculus in midbrain for accommodation. R & its miosis component

Point of fixation
(eyes are focusing
on a close object)

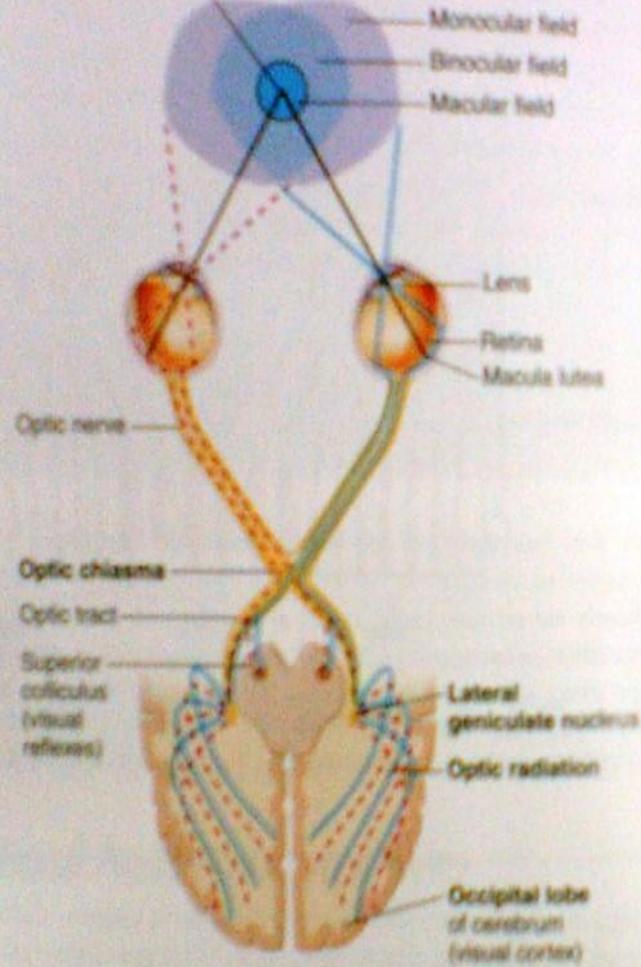


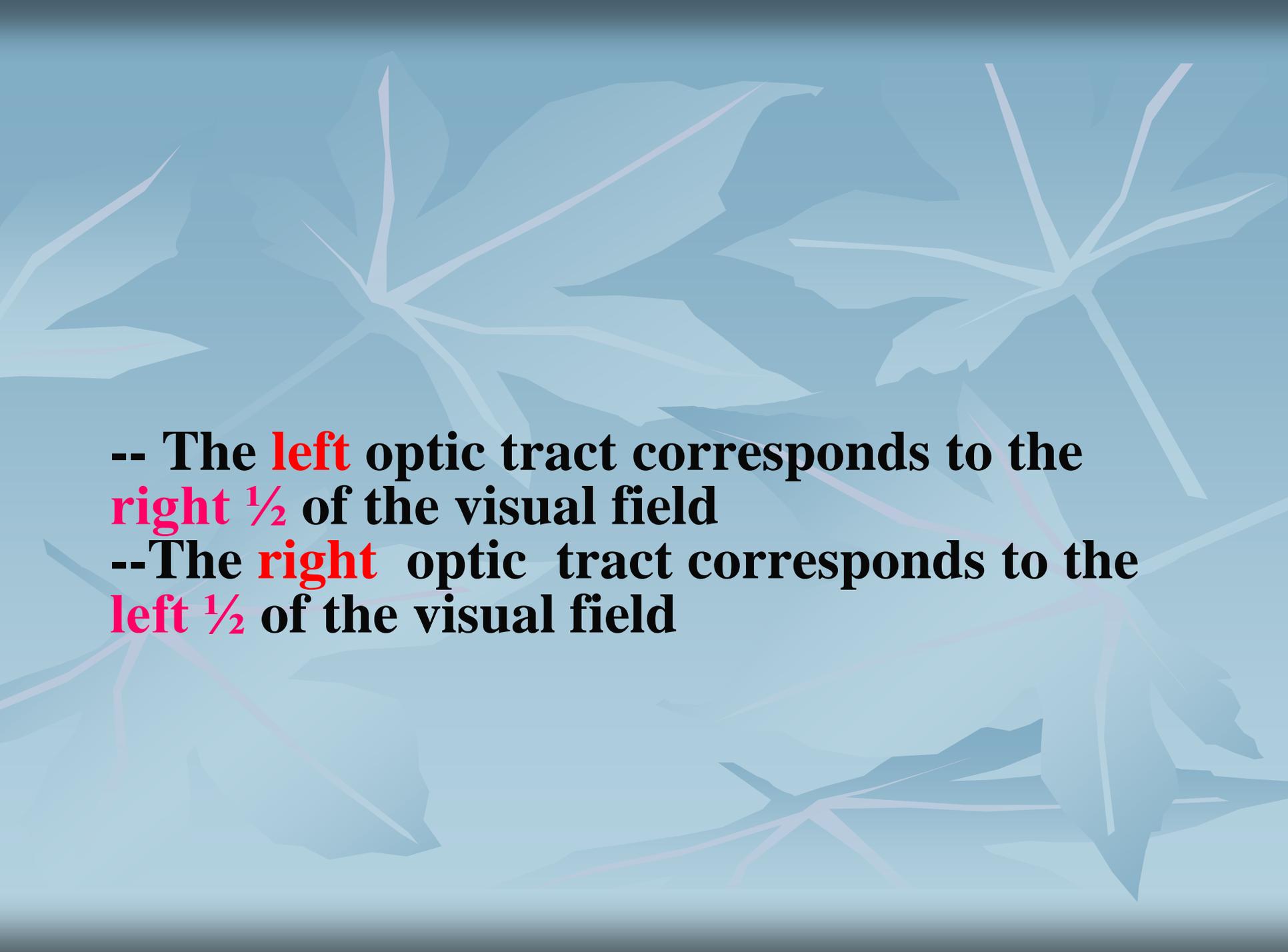
Figure 10.43 The neural pathway for vision. The neural pathway

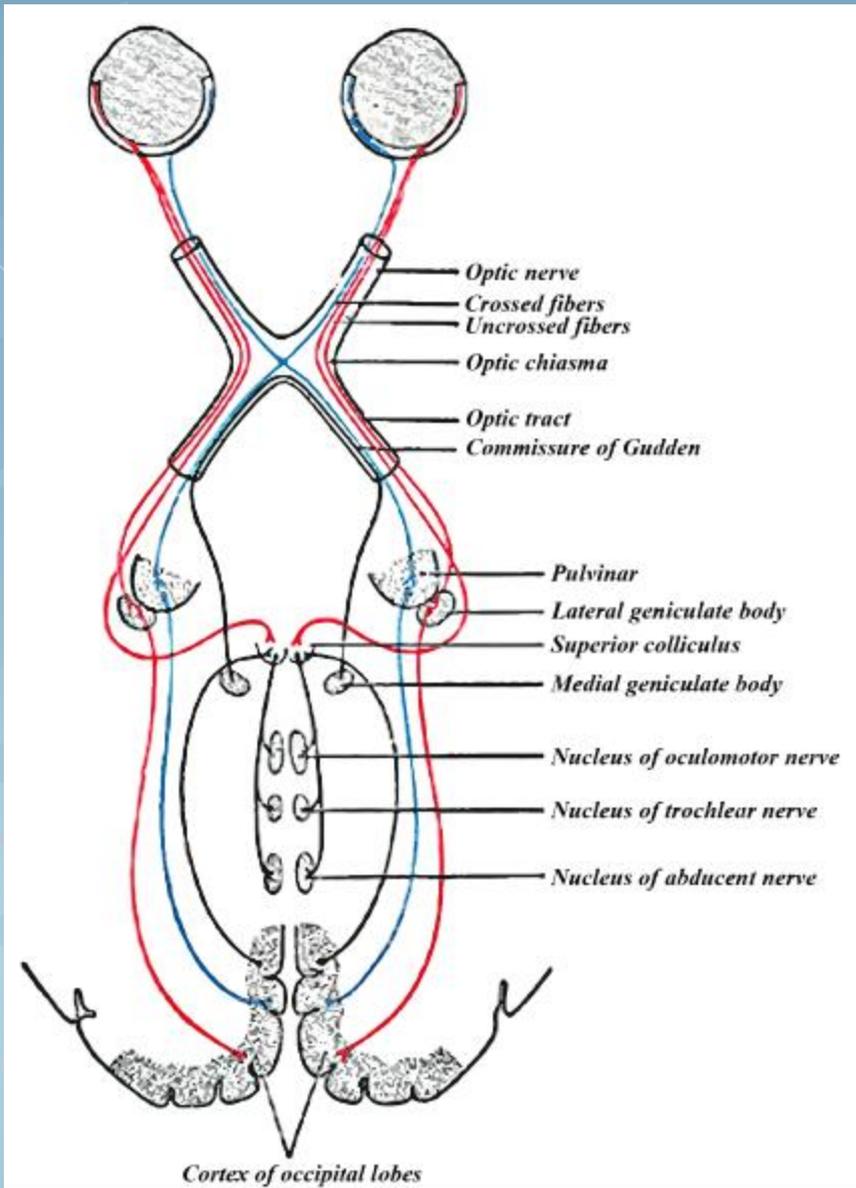
-VISUAL PATHWAY & FIELD :-

- -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)

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- 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



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 by accommodation
to bring focus on retina.

- **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 how much to refractive power of lens?
- -ciliary muscles contract >>>>ciliary muscles edges come close to each other to **increase** anterior surface curvature of lens.
- **Test//sanson purkinje image**

- 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.
- -WHY?
- -(**presbyopia:-((triade)**)
- 1-loss of accomodation 2-loss of lens elasticity
- 3- near point reced
- -correction byWHAT?

■ Pathway of accomodation:-

- Light on eye>>>>>retina >>>>>optic nerve >>>>>optic chiasma>>>> optic tract->>>> lateral geniculate body in thalamus & to superior colliculus in midbrain for->>>>EWN>>>>> cilliary ganglion to oculomotor N>>>>>>cilliary body

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>>>>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

Q. Argyll Robertson pupil?

**In syphilis tabes dorsalis which destroy
pretectal nucleus**

-light .R is lost & accommodation .R remains

- Lateral geniculate body (6 layers):-
- 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 gate controls signal transmission to visual cortex i.e control how much signals reach visual cortex
- 4-color vision & detect shapes & texture

- visual cortex has 6 layers

1-Primary visual cortex(braodmann area

17):- percieve sensation of vision (movement + shapes+ stereoscopic vision + brightness) &has blobs for color detection

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

interpretation of visual stimuli