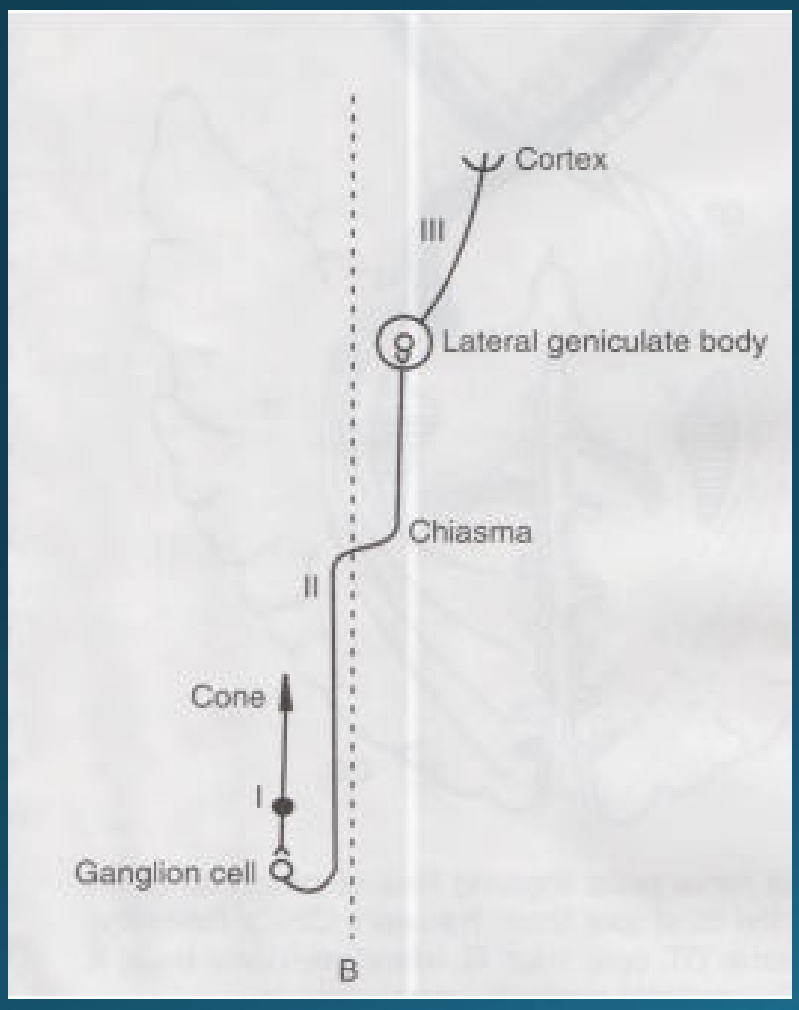
Visual Pathway: Lesions

Ophthalmology

VISUAL PATHWAY ANATOMY



Visual sensations

↓

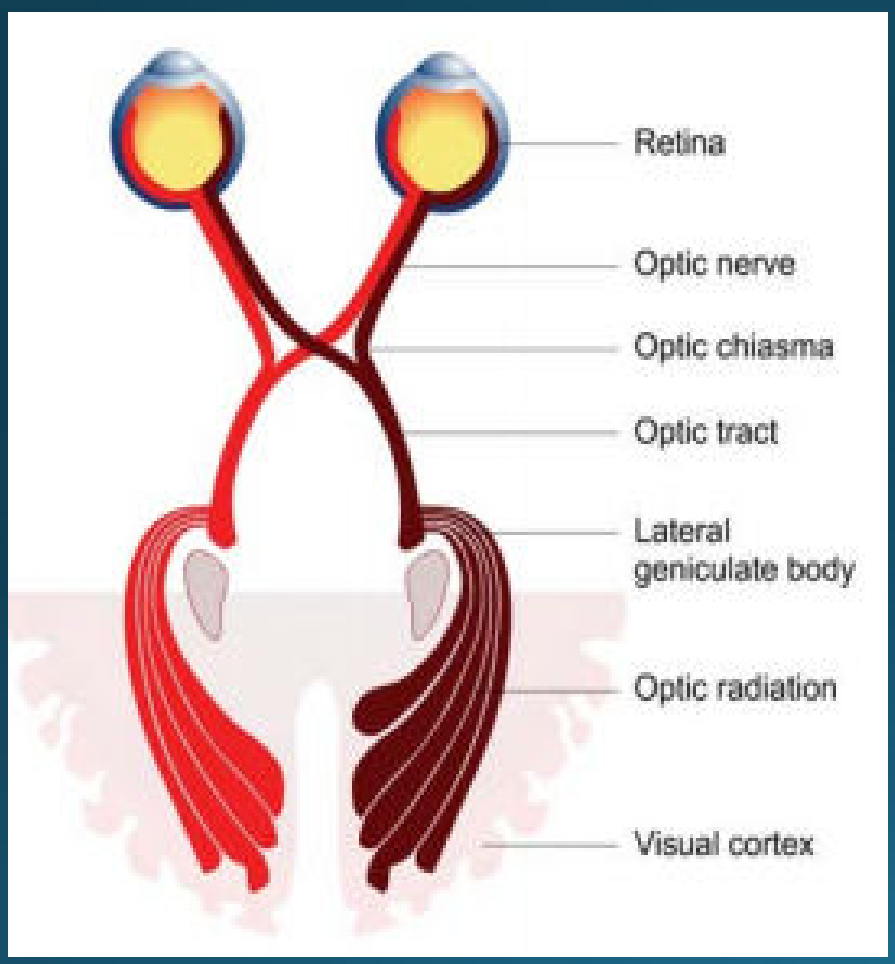
rods and cones

↓

visual cortex

- ***1st order neurons***
- ***2nd order neurons***
- ***3rd order neurons***

COMPONENTS OF VISUAL PATHWAY



NEUROEPITHELIAL LAYER OF RETINA

↓

OPTIC NERVE

↓

OPTIC CHIASMA

↓

OPTIC TRACT

↓

LATERAL GENICULATE BODY

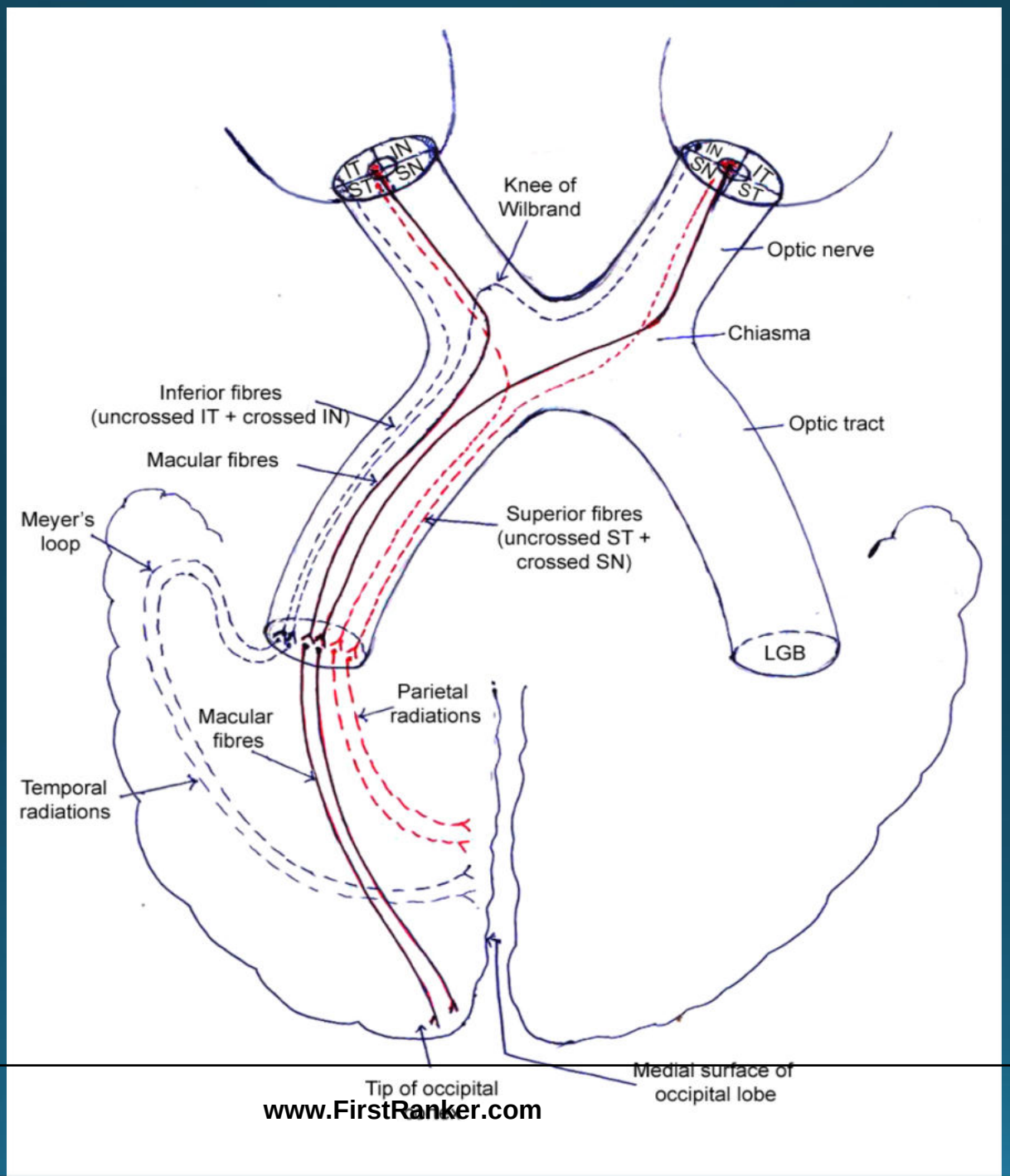
↓

OPTIC RADIATION

↓

OCCIPITAL CORTEX

VISUAL PATHWAY

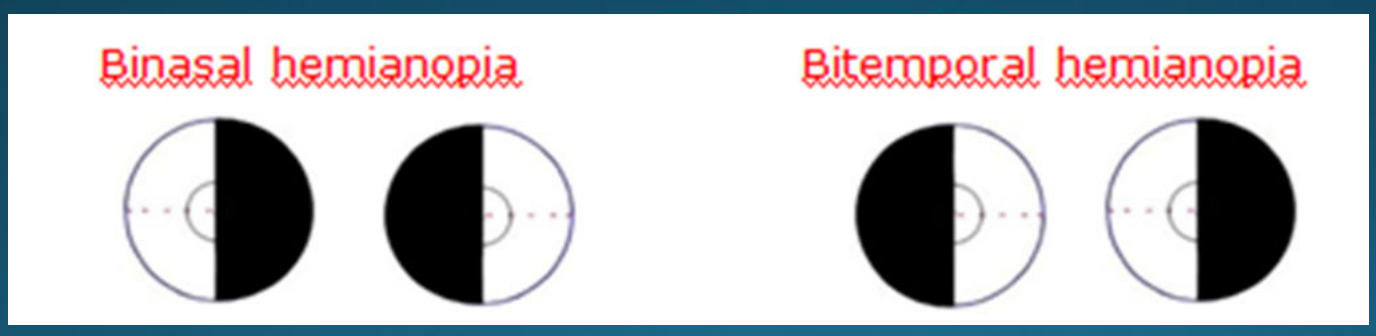


Anopia

Loss of vision in one visual field

(Right anopia)

- **Hemianopia:** Loss of vision in one half of visual field



Heteronymous hemianopia

Quadrantanopia

Loss of vision in a quadrant of visual field

Homonymous type

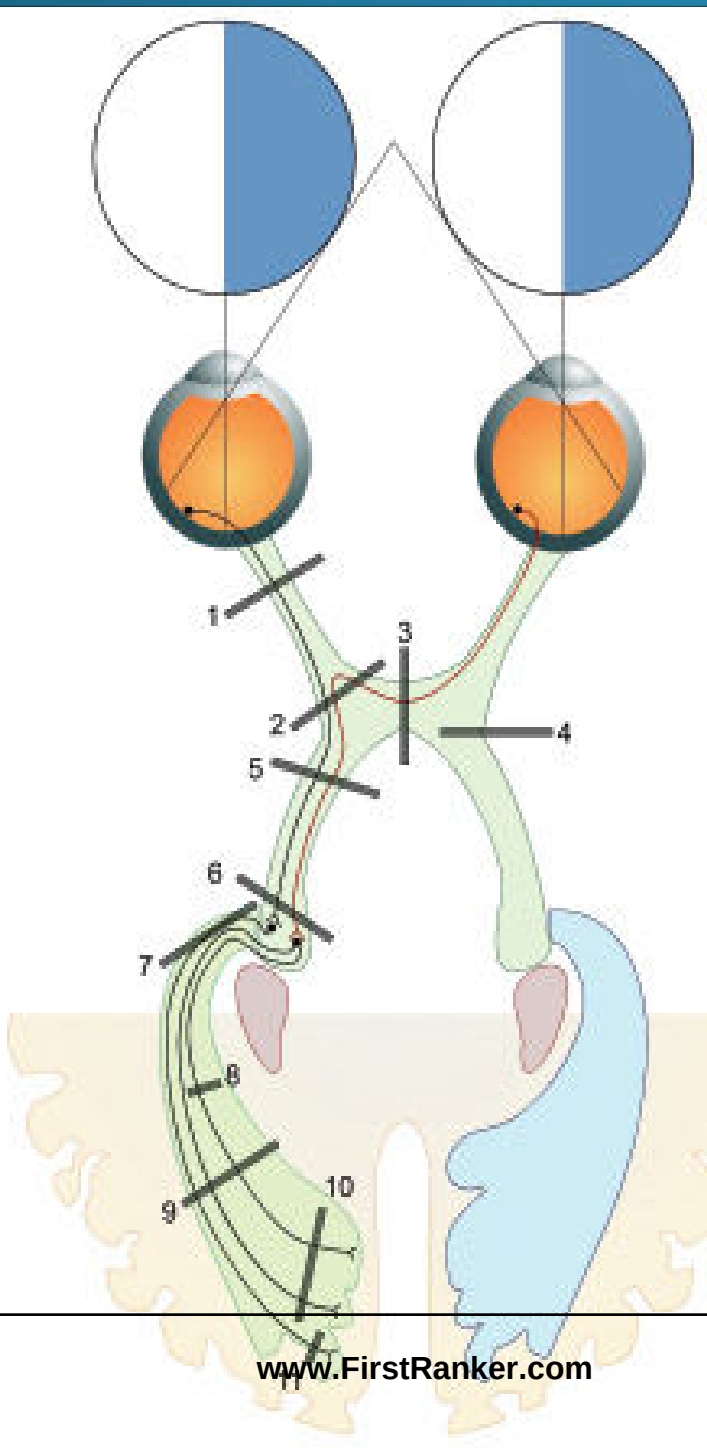
Homonynous hemianopia

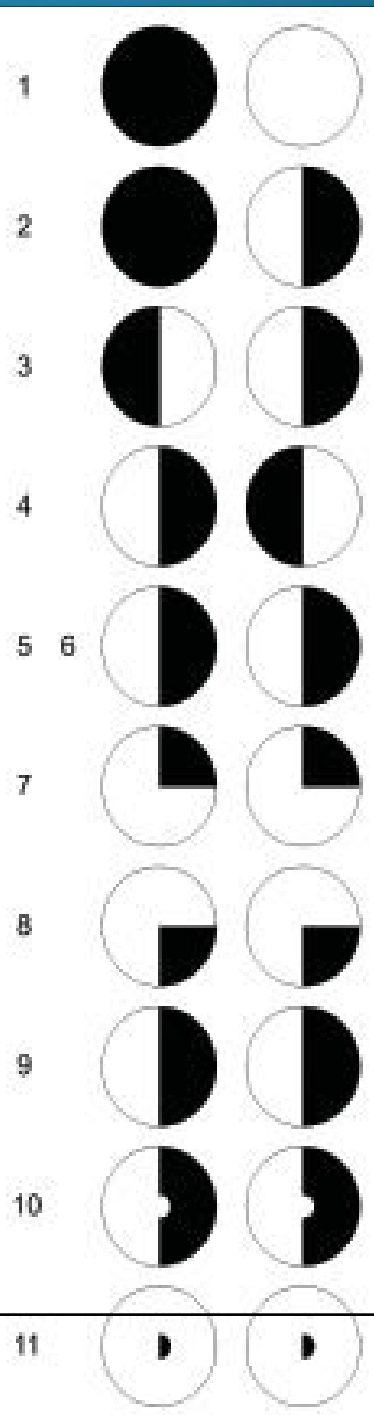
- **Incomplete**
  - **Congruous**
    Defects are identical in size,shape, location, slope of margins
    eg-Post optic radiation lesions
  - **Incongruous**
    Defects are dissimilar
    eg-Optic tract & LGB lesions
- **Complete**

Visual fields and retina have an inverted & reversed relationship

- Inferotemporal (**IT**) retina *projects superonasal field*
- Superotemporal (**ST**) retina *projects inferonasal field*
- Superonasal (**SN**) retina *projects inferotemporal field*
- Inferonasal (**IN**) retina *projects superotemporal field*

LESIONS OF VISUAL PATHWAY



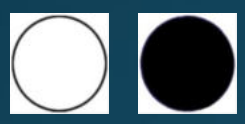


Field Defects in Lesions of Optic Nerve

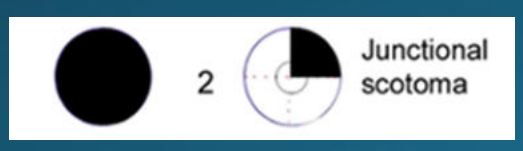
Anopia- loss of vision in full visual field

Right anopia → Loss of vision in right visual field

Left anopia → Loss of vision in left visual field



- Lesion of proximal (posterior) part of optic nerve near chiasma

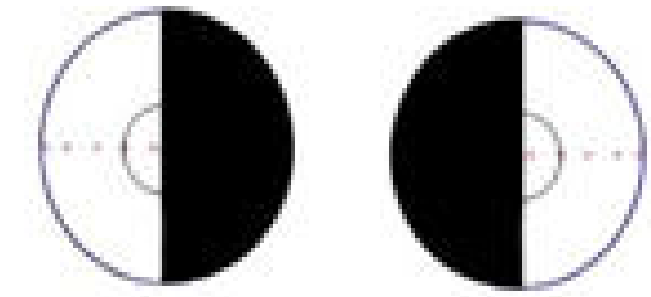


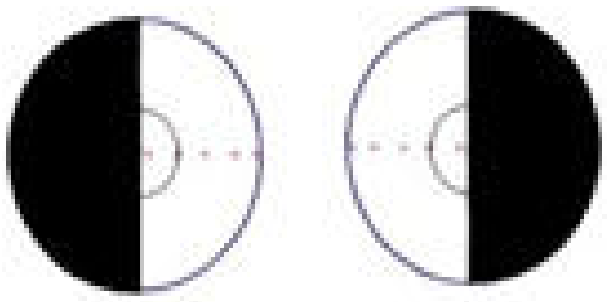
Cause:
traumatic avulsion or optic atrophy

Clinical features:

- Ipsilateral anopia (loss of vision)
- Loss of direct pupillary reaction (same side)
- loss of consensual pupillary reaction (other side)
- Near or accommodation reflex is present

Field Defects in Lesions of Optic Chiasma

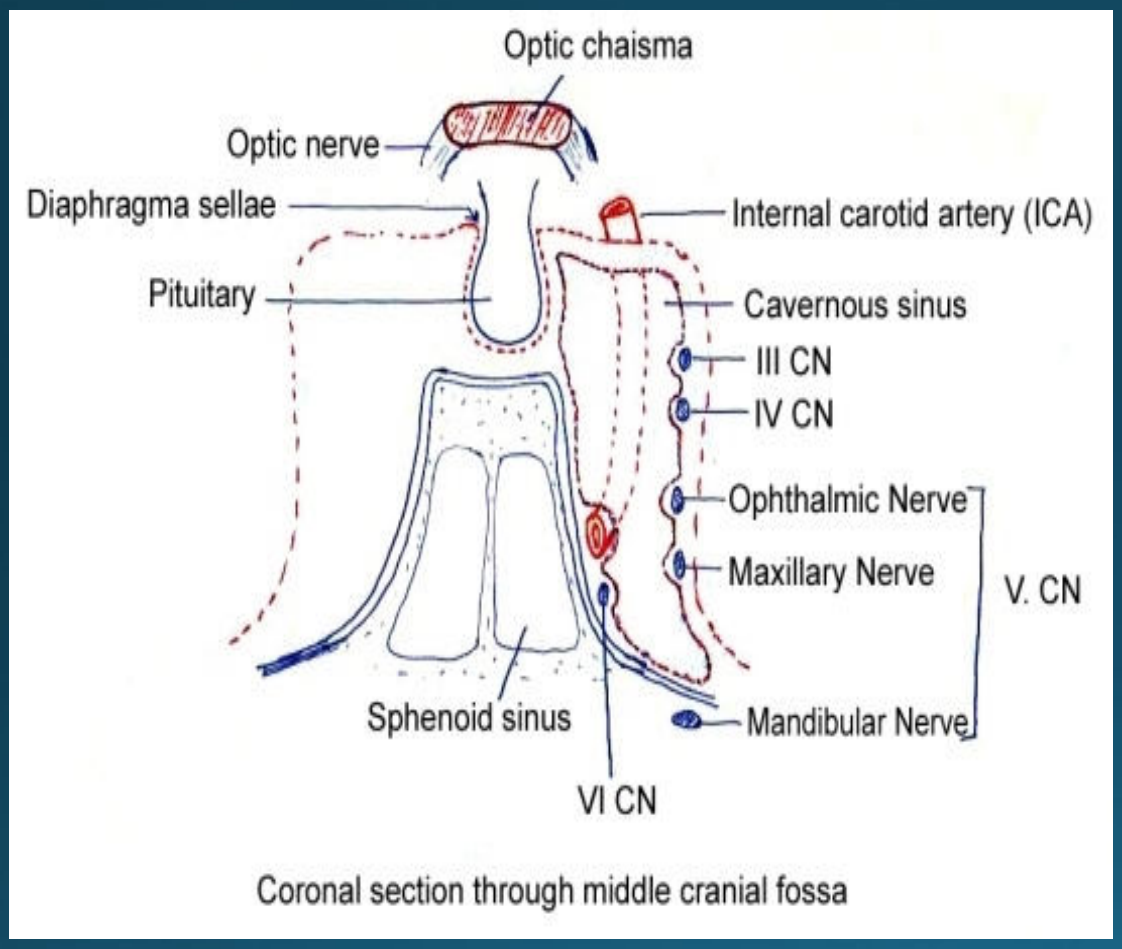




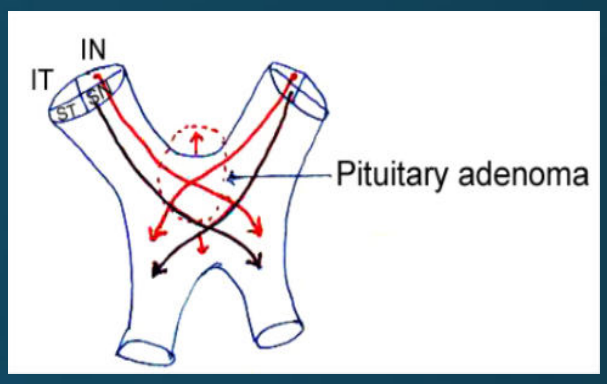
(Less common)

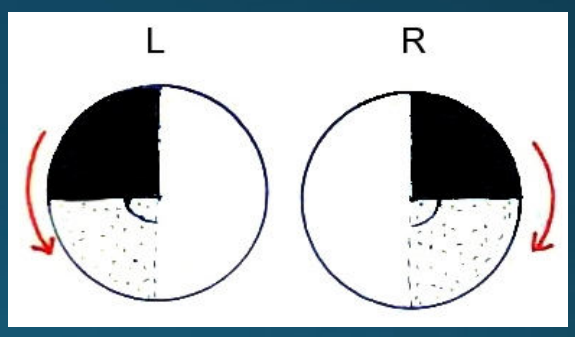
- IIIrd ventricle enlargement / dilatation
- Atheroma of carotids or posterior communicating arteries
- Pituitary adenoma or malignancy
- Craniopharyngioma
- Chronic chiasmal arachnoiditis
- Fracture of the base of skull

Pituitary Adenoma

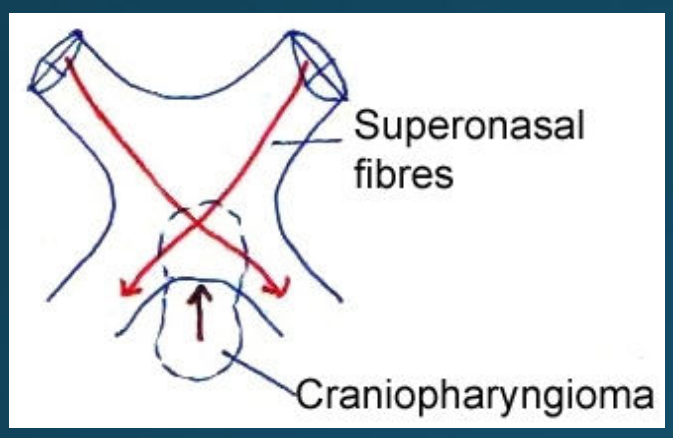


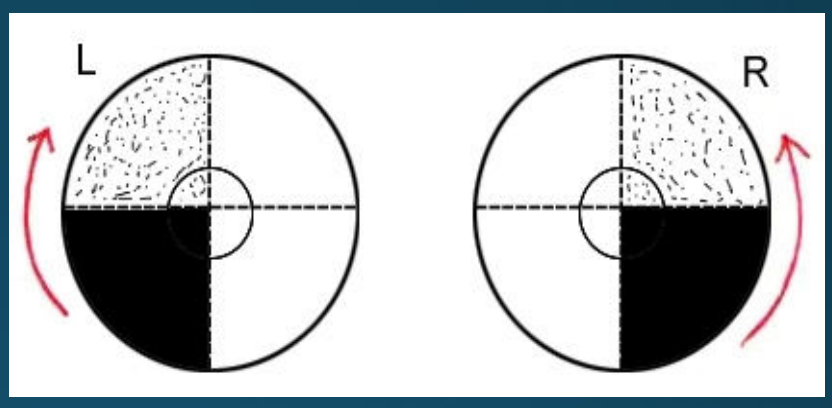
Coronal section through middle cranial fossa





Craniopharyngioma





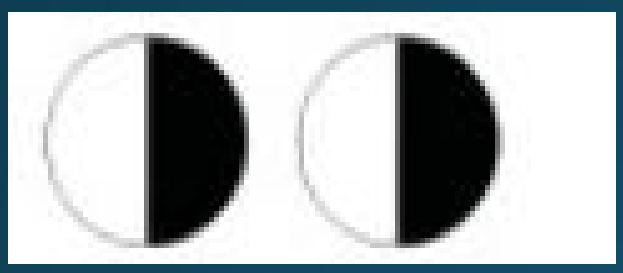
Field Defects in Lesions of Optic Tract

- Left optic tract lesion due to Involvement of left cerebra, leads to Right homonymous hemianopia
- Afferent pupillary conduction defect present
- *Association with right hemiplegia and left 3rd nerve paralysis indicates a left optic tract lesion involving left cerebral peduncle and left 3rd nerve.*

Causes of optic tract lesion

- Syphilitic meningitis
- Tuberculous meningitis
- Tentorial meningioma
- Temporal lobe glioma
- Aneurysm of superior cerebellar or posterior cerebral arteries.

Field Defects in Lesions of Lateral geniculate Body (LGB)



(These are extremely rare)

- The lesions of LGB produce incongruous homonymous hemianopia with sparing of pupillary reflexes

Lesion of optic radiations

Anterior temporal lobe

Parietal lobe

Posterior part of Internal capsule (Ant occipital cortex)

Pie in the sky

Pie on the floor

Common causes of lesions of optic radiations

- Vascular occlusions
- Cerebral tumours
- Injury by fall on the back of head

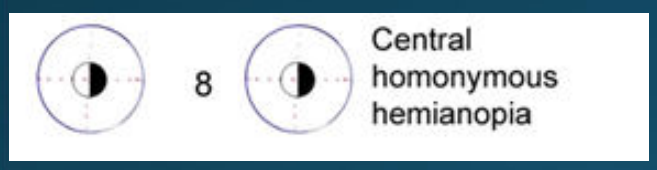
lesions of optic radiations-Clinical presentation

- Do not produce optic atrophy(3rd order neurons)
- Congruous
- Pupillary reactions are normal

Field Defects in Lesions of Visual Cortex

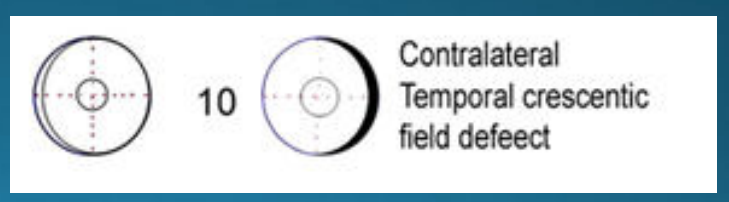
- LESIONS IN VISUAL CORTEX

TIP OF OCCIPITAL CORTEX



ANTERIOR VISUAL CORTEX

ANTERIOR MOST PART OF VISUAL CORTEX



Common causes of lesions of Visual Cortex

- Vascular lesions in territory of PCA
- Trauma- fall on the back of head or gunshot injury
- Cerebral Tumours- Primary or metastatic.

Clinical presentation in Visual Cortex Lesions (Cortical blindness)

- Denial of blindness [Anton syndrome]
- Appreciation of motion in the blind field [Riddoch phenomenon]
- Word blindness [Alexia] if left angulate gyrus is involved

It is therefore mandatory to examine reading ability in context of a right hemianopia

(i.e. in left occipital lesion).

Differences between occipital lobe and optic tract lesions

	Clinical Features	Occipital lobe lesion	Optic tract lesion
	Pupillary reaction	Normal	Abnormal
	Field defect	Congruous	Incongruous
	Macular involvement	Sparing	Involved
	Optic atrophy	-	+