University of Basrah
Al-Zahraa Medical College

Ministry of higher Education
and Scientific Research

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3rd year S 5/6

Nervous system

Central visual pathways and their pathologies

Session: 8

Lecture: 2

Date: 2nd of July 2020

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LO

Objectives

LO1 :Describe the visual pathway

LO2 :Understand the effect of different visual pathway lesions on the visual field

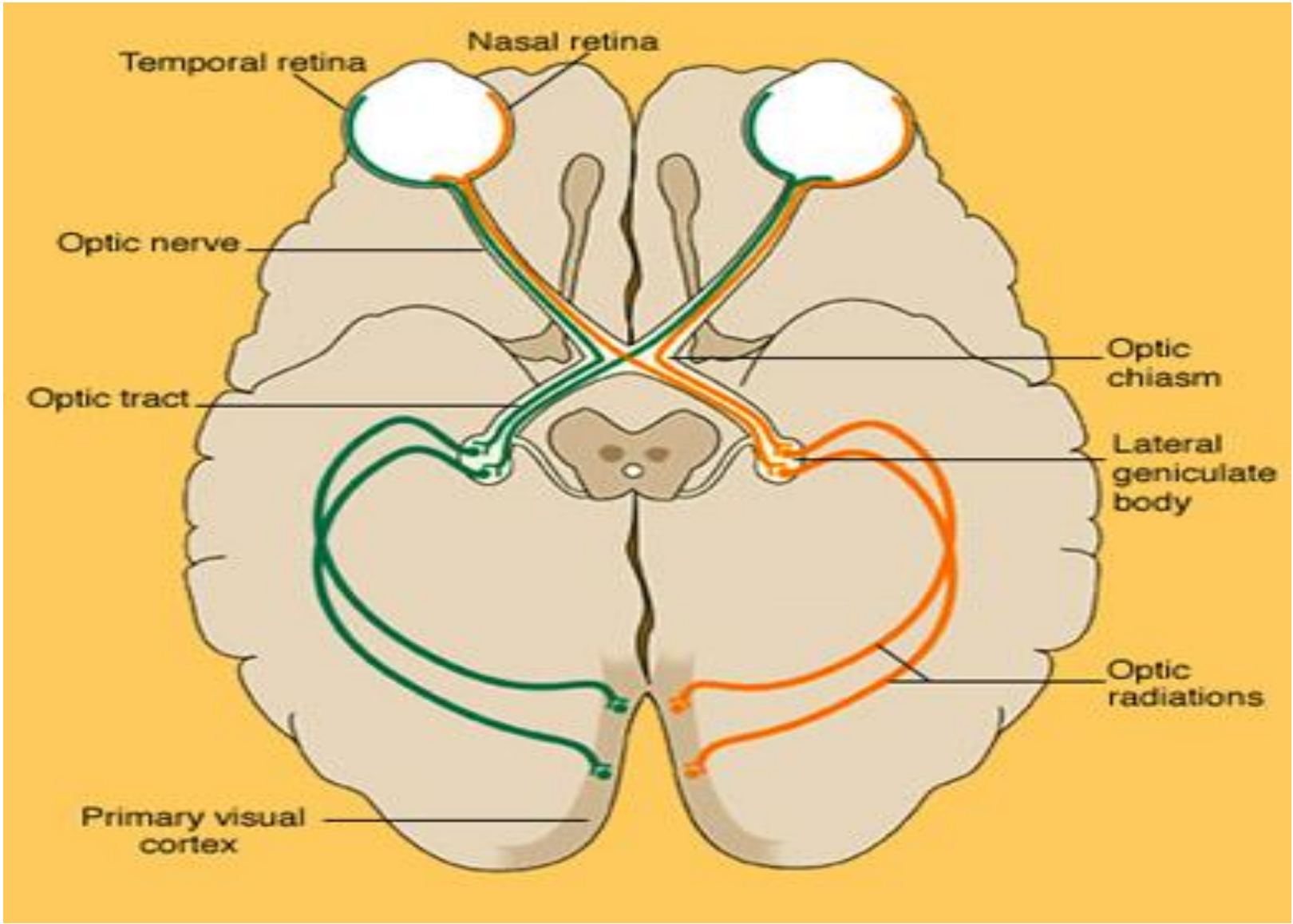
LO3 :Define the pupillary light reflex

LO4 :Differentiate between the rules of the two parts of the autonomic nervous system on the pupil

LO5 :Explain the rules of CNs III, IV and VI in controlling ocular motility

LO6 : Account for oculomotor problems

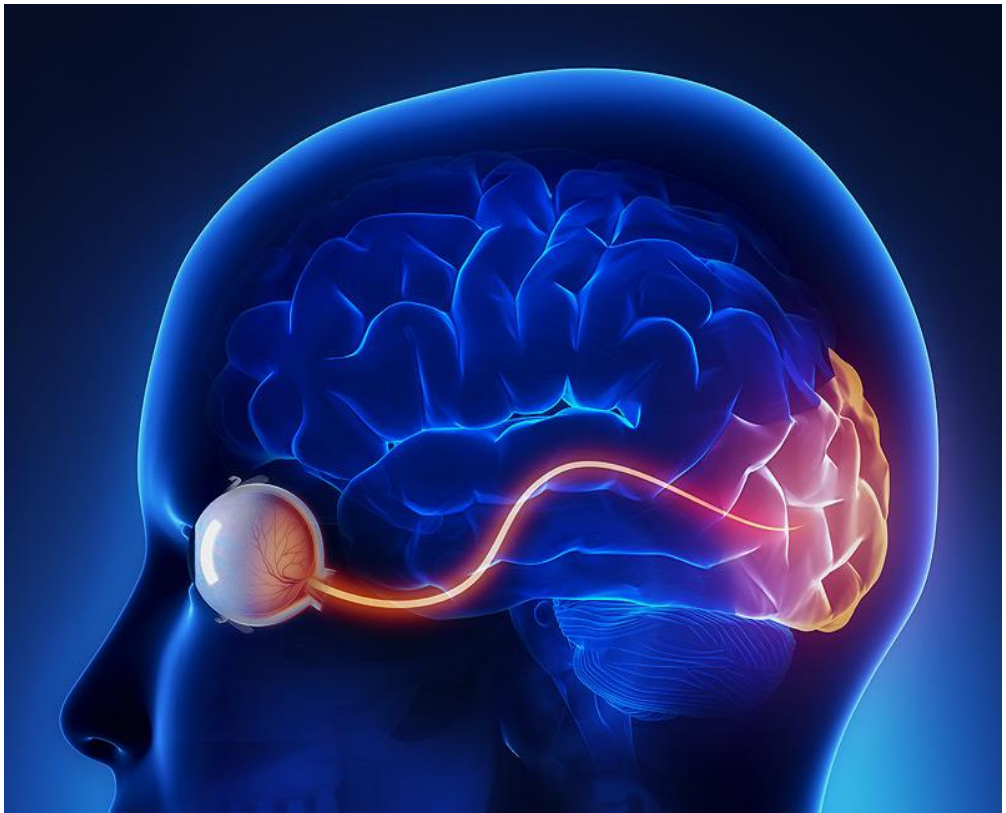
LO1


Temporal retina
Nasal retina
Optic nerve
Optic chiasm
Optic tract
Lateral geniculate body
Optic radiations
Primary visual cortex

LO1

The eye is an embryological outpost of the brain

The visual information gathering by firstly transducing electromagnetic radiation into electrical energy and in turn, conducting this energy and feeding it appropriately in the various centers of the brain.



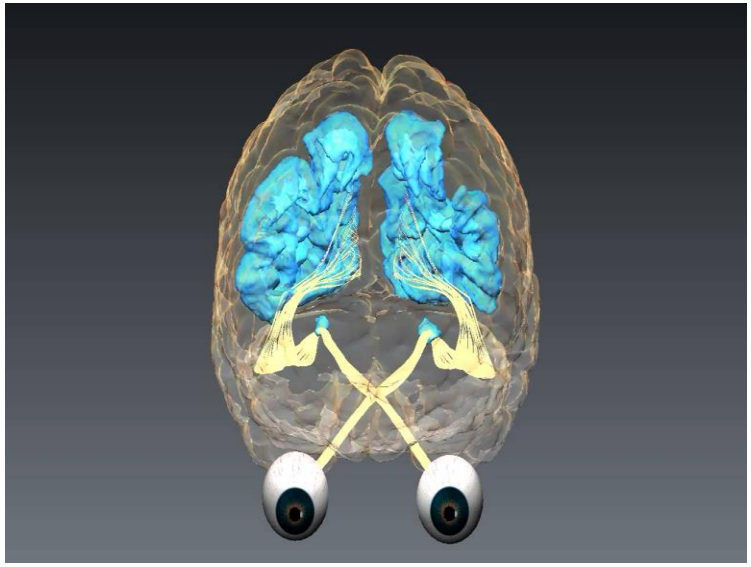
LO1

The optic nerve

the second cranial nerve, is thus part of the central nervous system and not part of the peripheral nervous system .It is a brain tract and not a peripheral nerve.

It is covered by the meninges of the brain.

Within these meninges we found cerebrospinal fluid that is continuous with that of the ventricular system of the brain



LO1

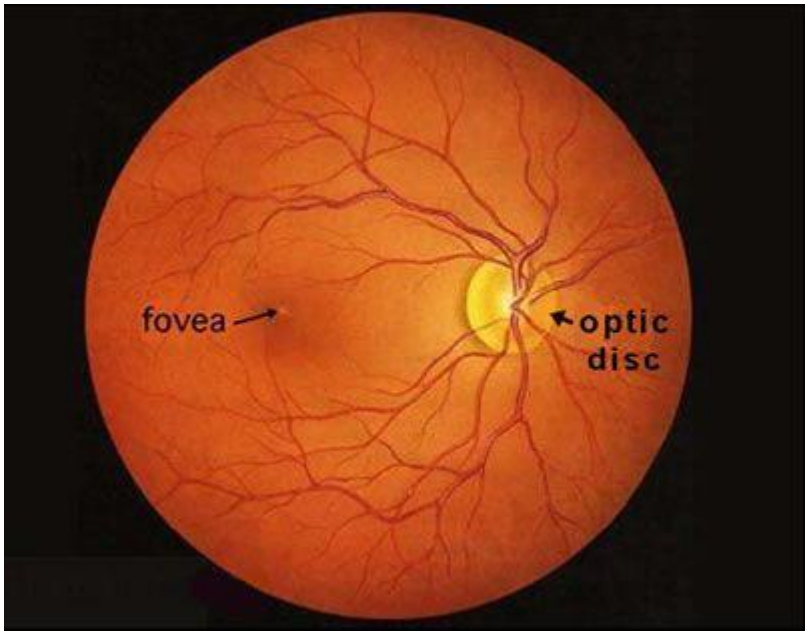
The blood vessels found within the optic nerve are also direct continuations of vessels of the brain.

The point of origin of the optic nerve within the retina known as the **optic disc** or blind spot.

The axons of the ganglion cells, collect together at the optic disc before passing out of the eye as optic n. through the orbital bones and into the brain

LO1

Optic disc examination is important in the diagnosis of life threatening conditions such as meningitis and raised intracranial pressure before they cause irreparable damage to the brain



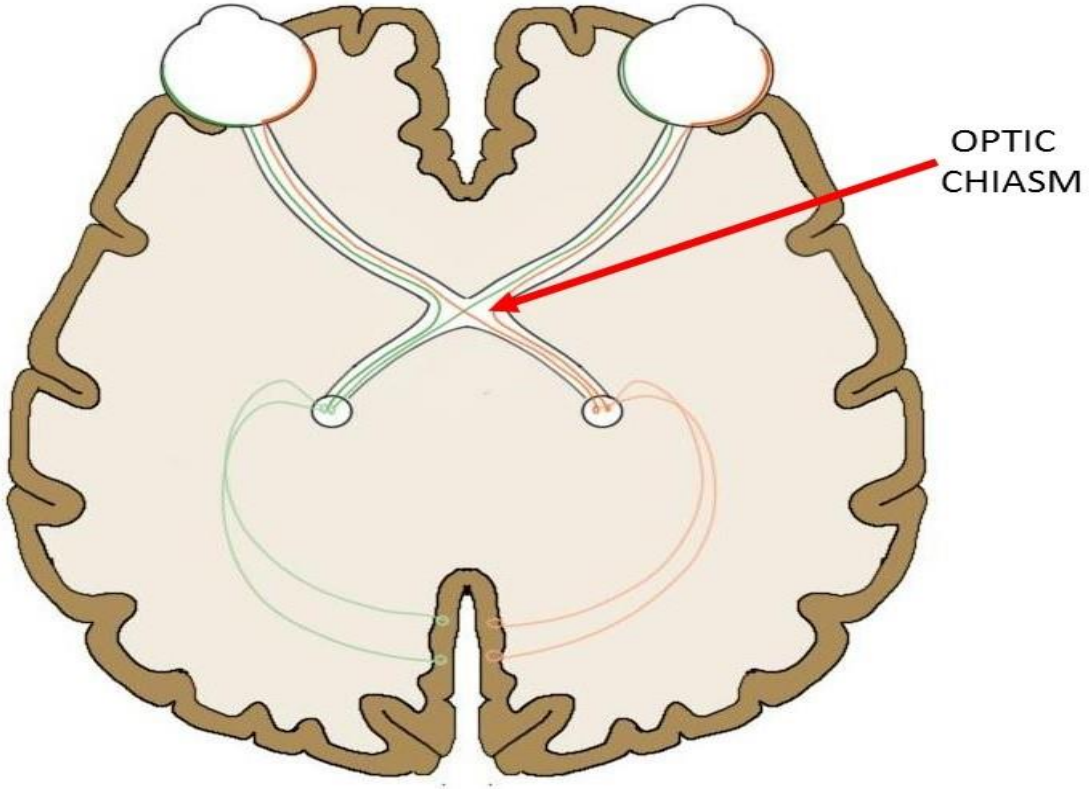
NORMAL

ABNORMAL

LO1

Optic Chiasm

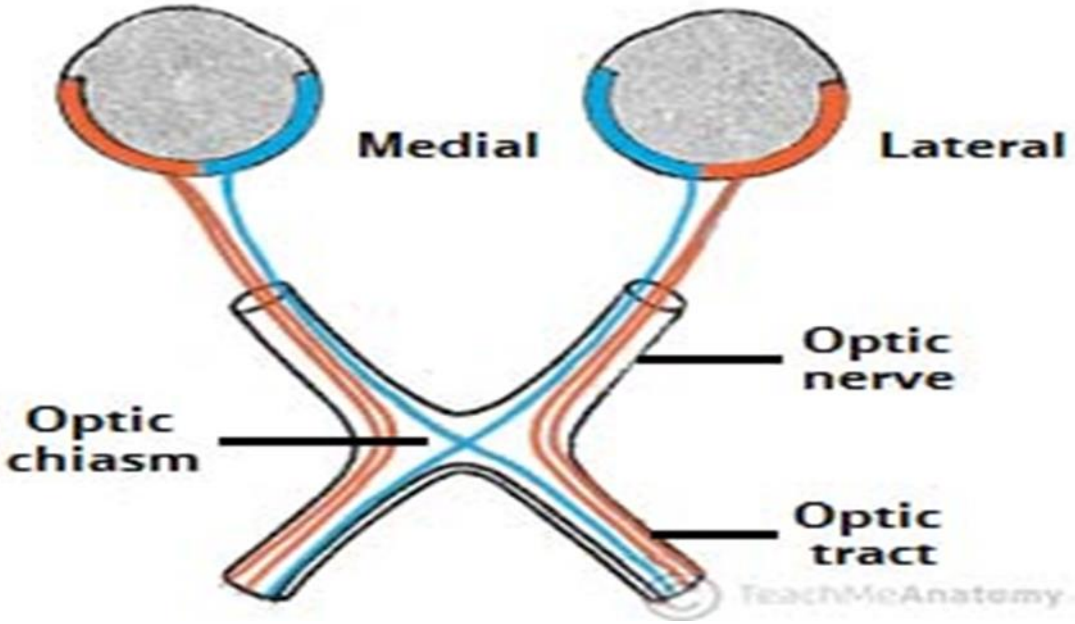
is the part of the brain where the nasal fibers of optic nerves cross to contralateral side. It is located at the bottom of the brain immediately inferior to the hypothalamus



LO1

optic tract

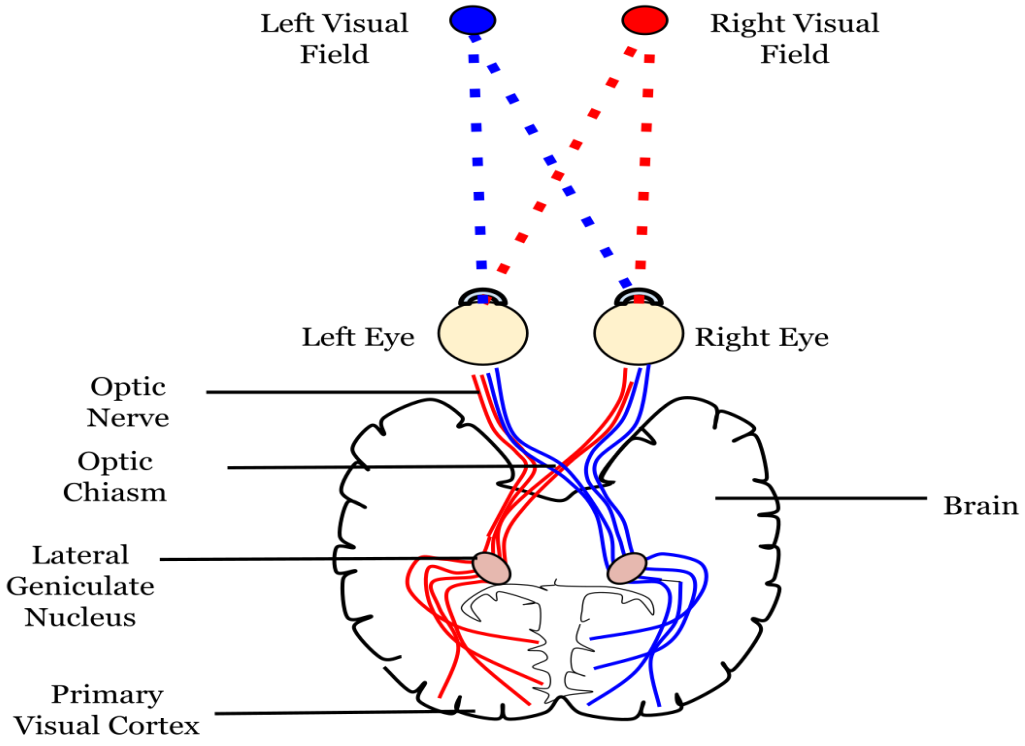
It is a continuation of the optic nerve that relays information from the optic chiasm to the ipsilateral lateral geniculate nucleus, pretectal nuclei, and superior colliculus of midbrain. It consists of ipsilateral temporal and contralateral nasal nerves fibers



LO1

Lateral geniculate body

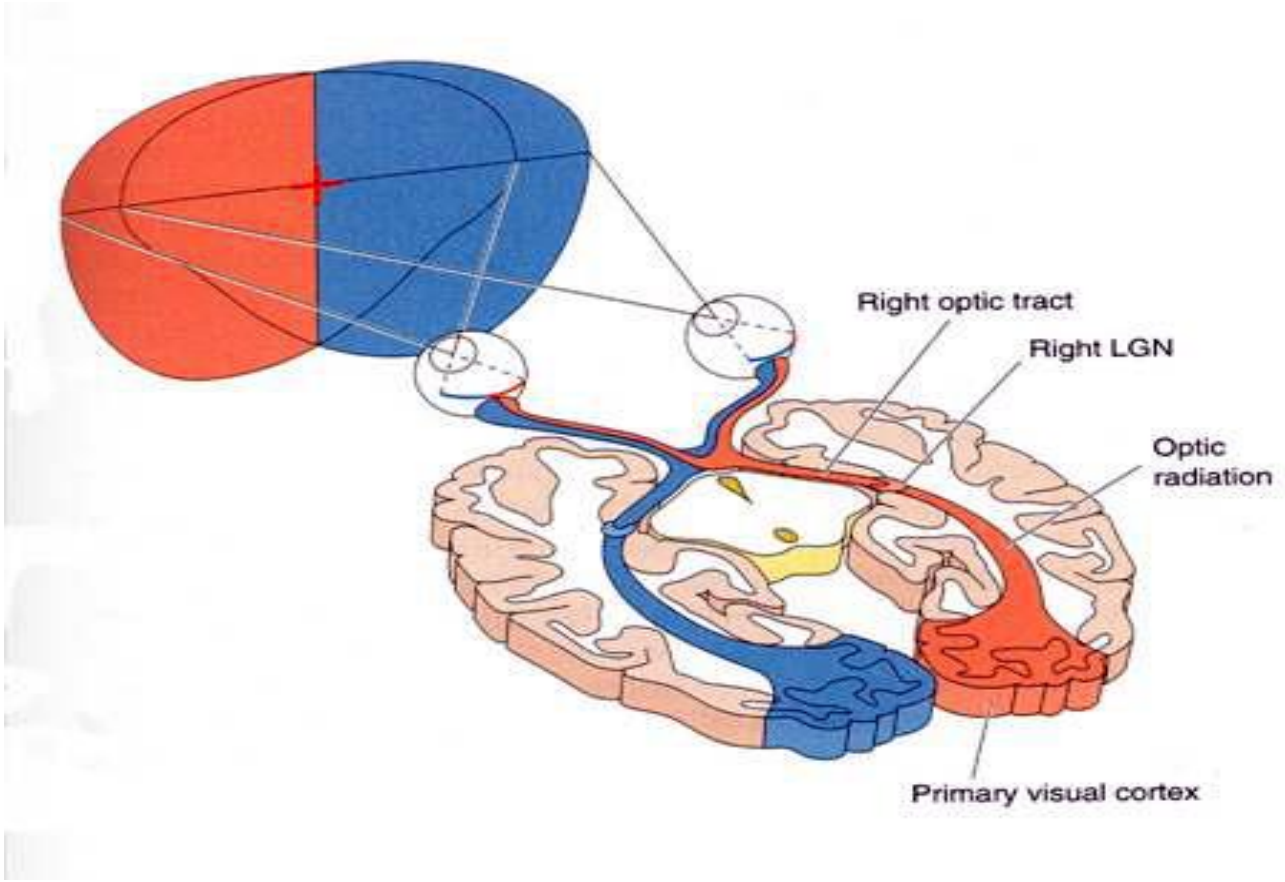
is a relay center in the thalamus for the visual pathway. The LGN is the main central connection for the optic nerve to the occipital lobe, particularly the primary visual cortex.



LO1

Optic radiation

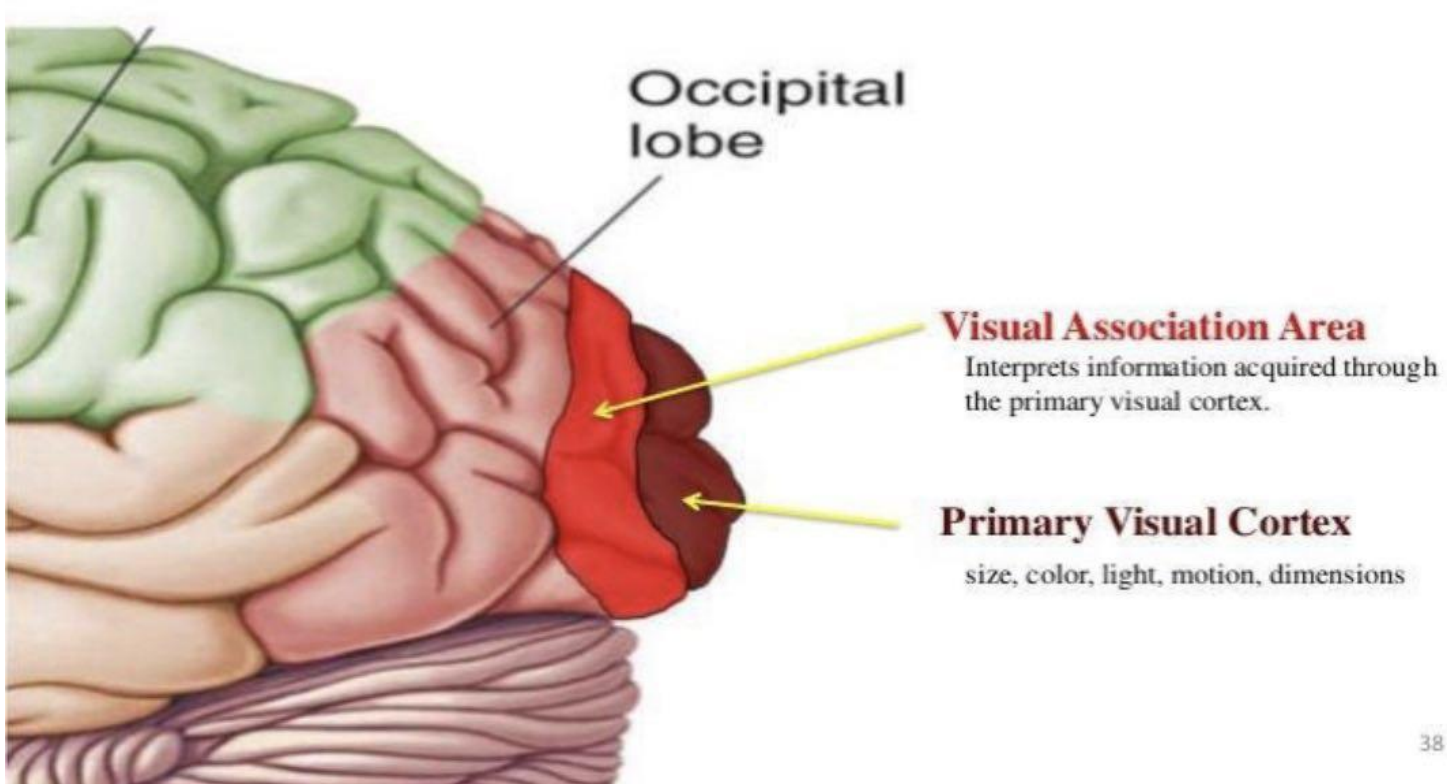
are axons from the neurons in the lateral geniculate nucleus to the primary visual cortex.



LO1

Primary visual Cortex

The visual cortex of the brain is that part of the cerebral cortex which processes visual information. It is located in the occipital lobe Brodman area 17,18.



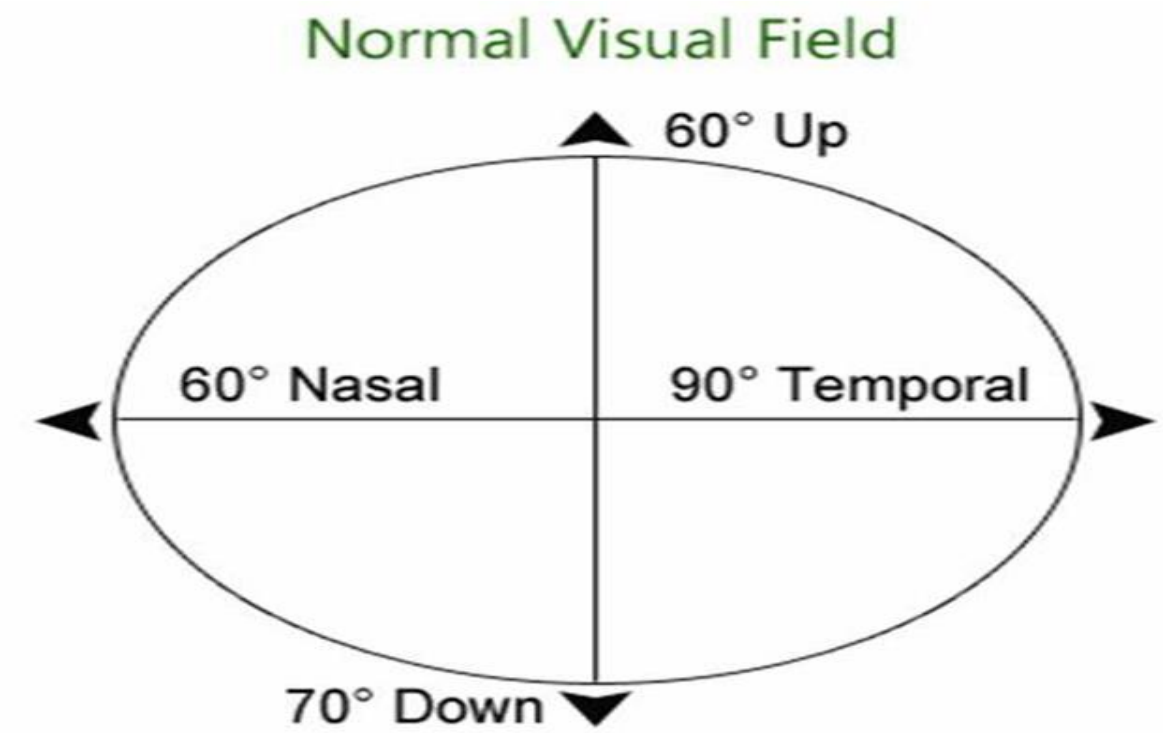
LO2

visual field

can be defined as the entire area that can be seen when an eye is fixed straight at a point.

LO2

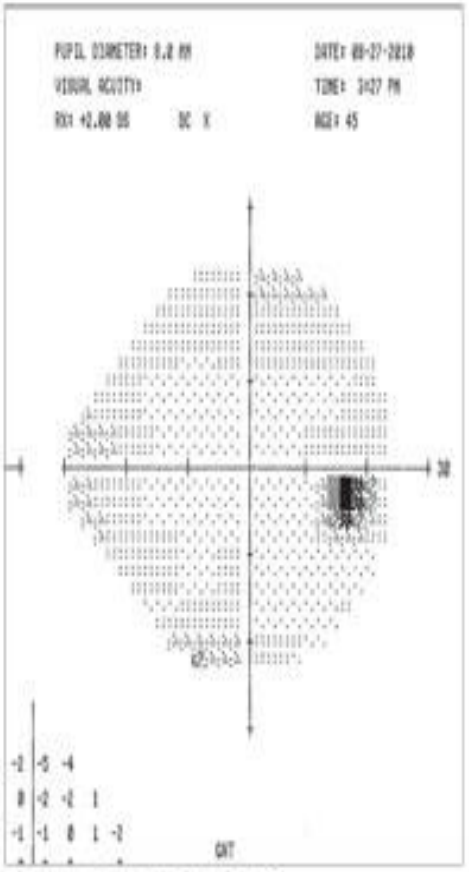
The limits of the normal field of vision are 60 degrees superiorly and nasally,70 degrees inferiorly and 90 degree temporally for each eye.



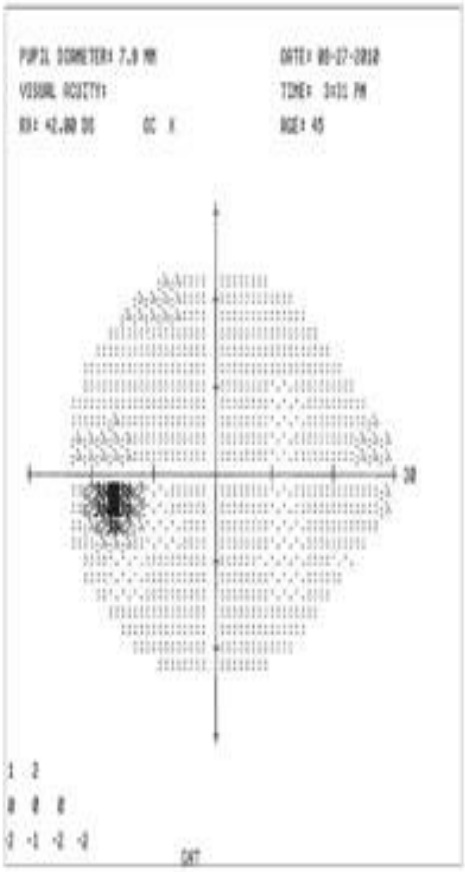
LO2

The examination of visual field is called perimetry

The machine is perimeter

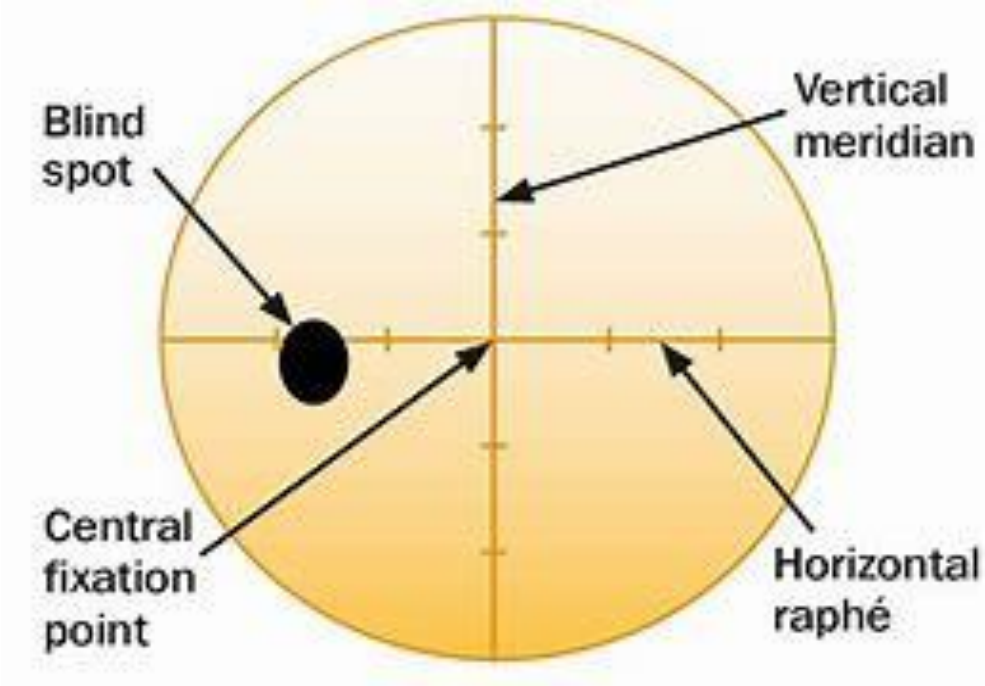


Figures 1 and 2, patient 1.



LO2

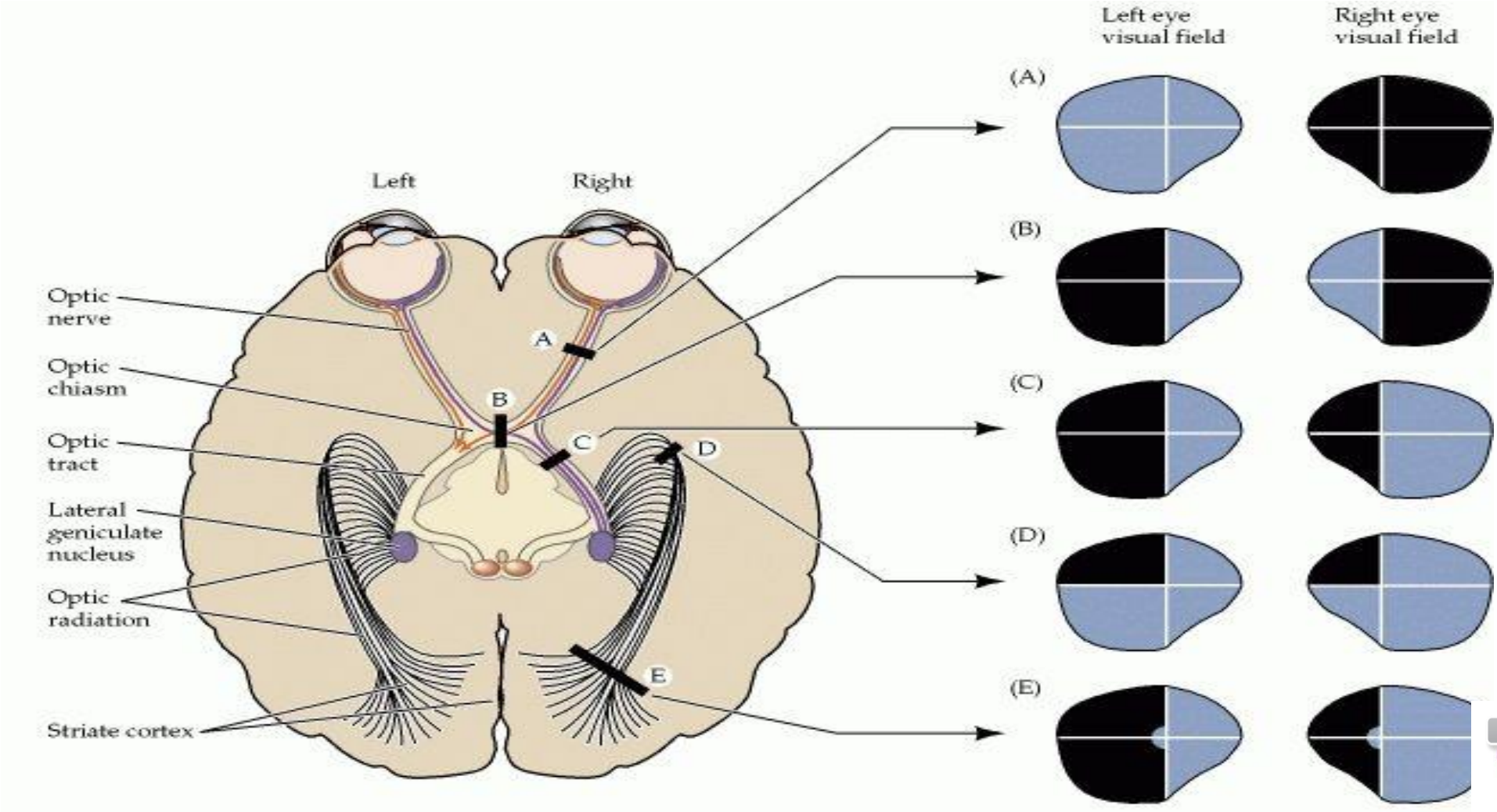
Blind spot represents the optic disc area where the axons of the ganglionic cells exit the eye and there are no photoreceptors



LO2

Visual Field defect

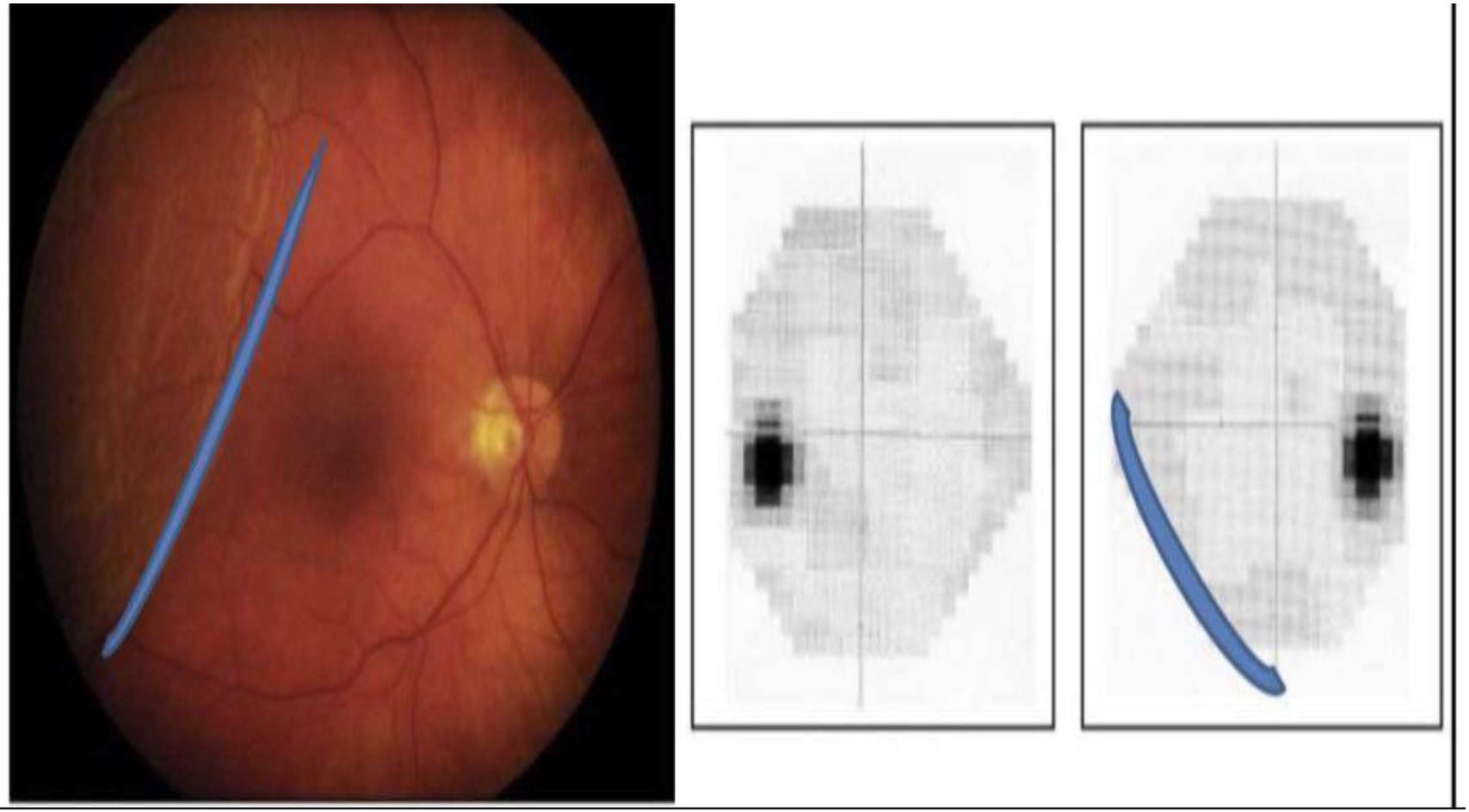
..... Scotoma



LO2

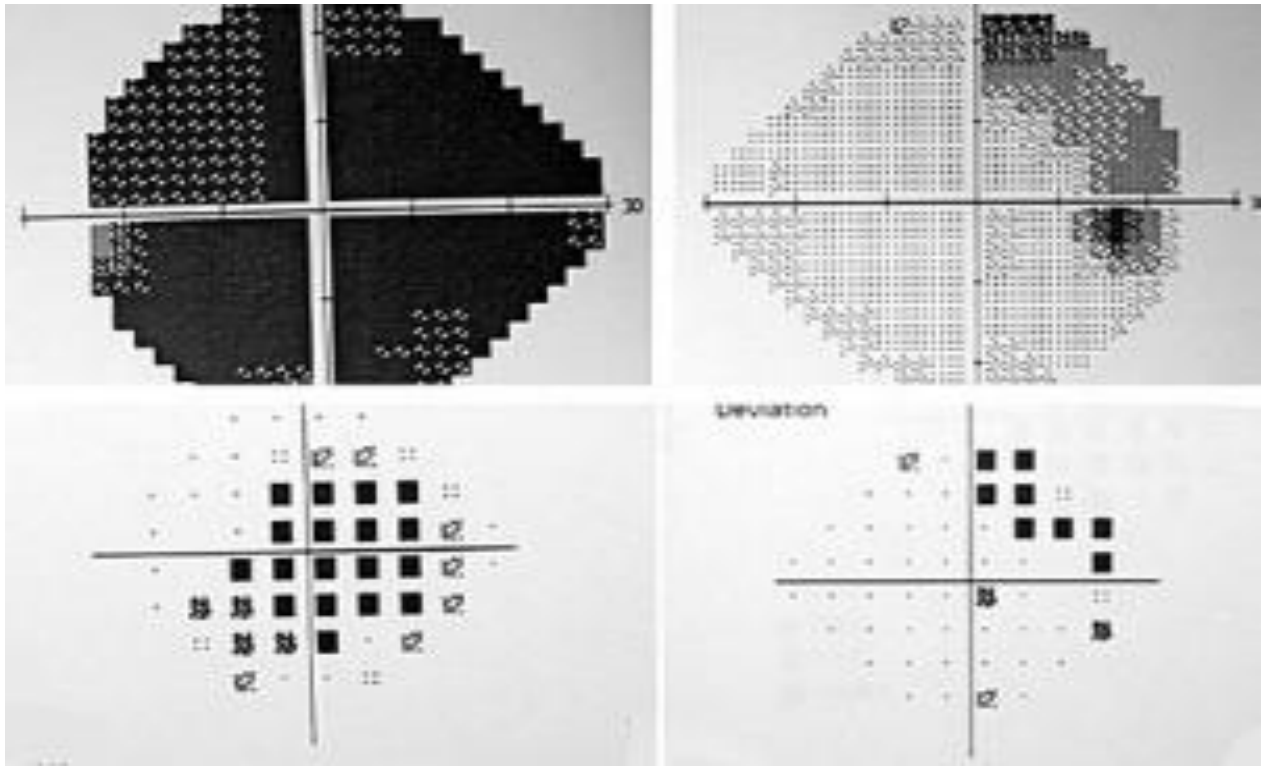
Visual Field Defects

1. Retinal lesion causes localized field defect



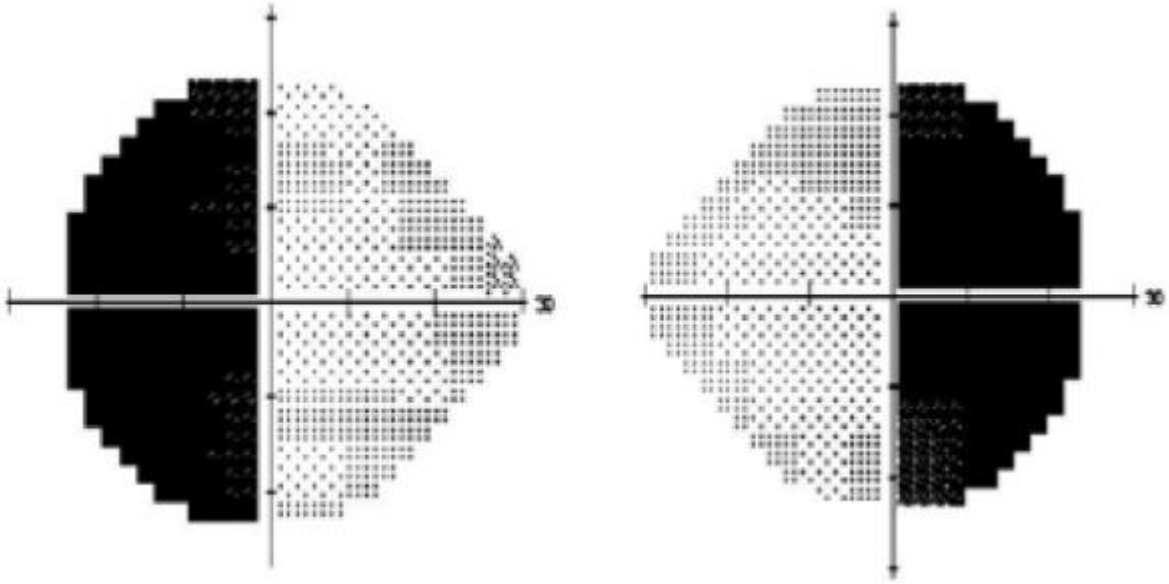
LO2

2. Optic n. lesion causes defect , may reach to blindness of involved side



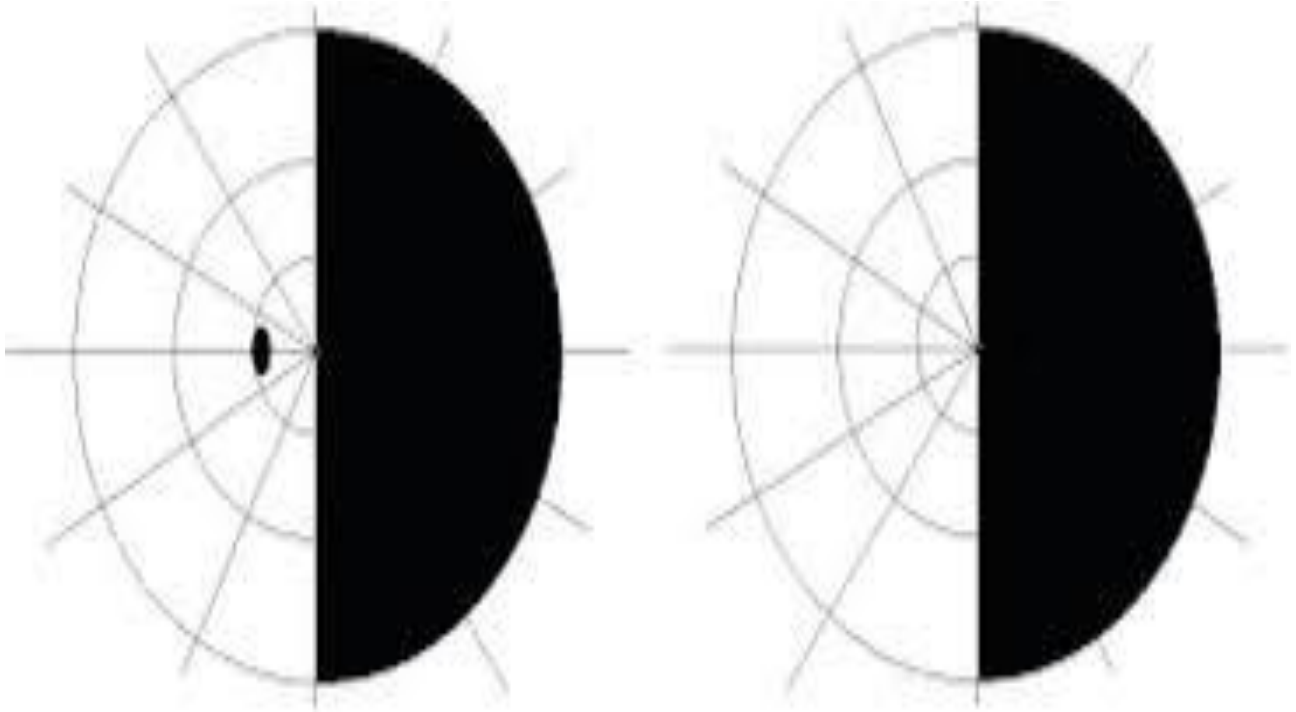
LO2

3.Chiasmal lesion causes bitemporal hemianopia

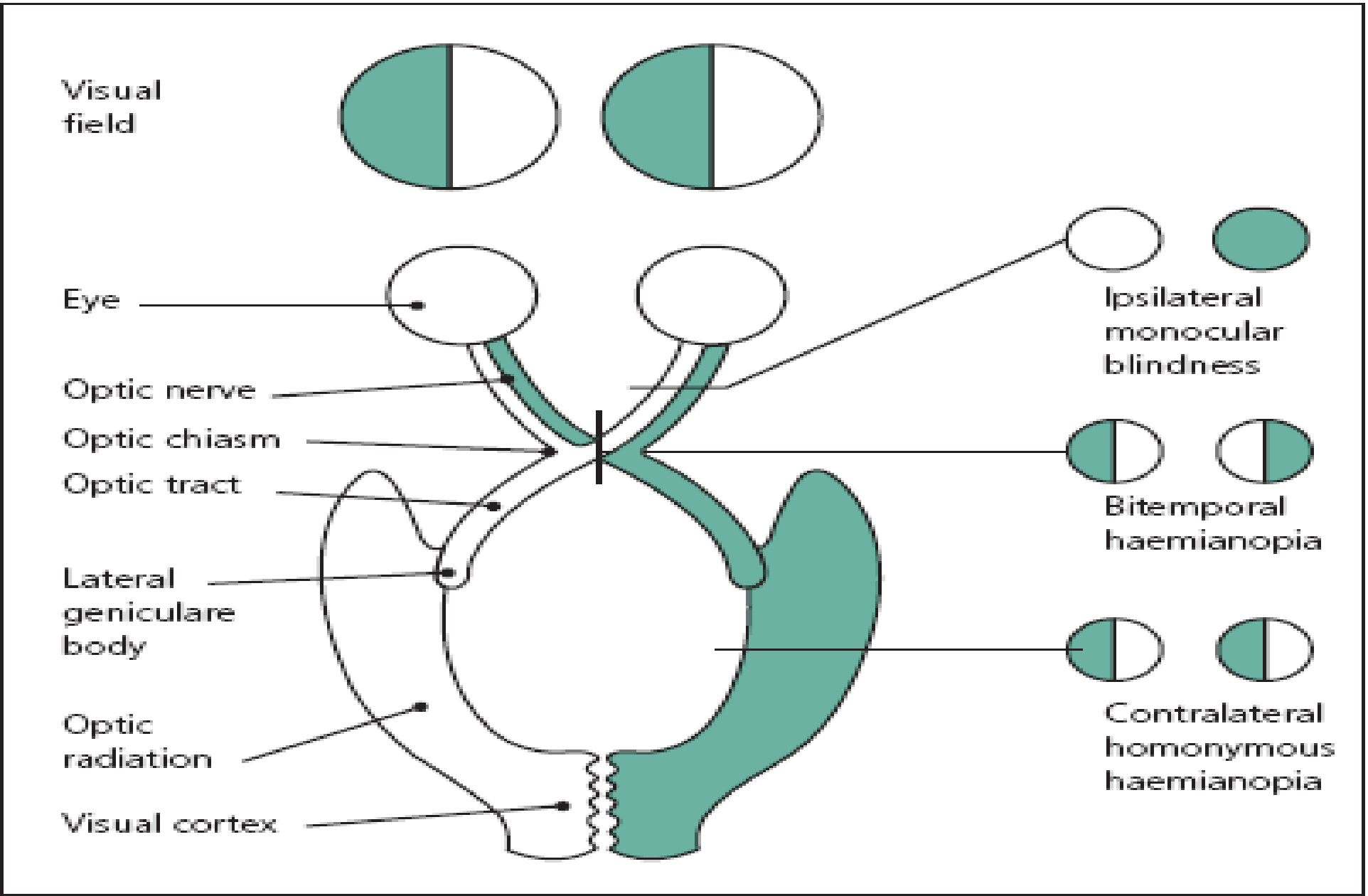


LO2

4. Retrechiasmal lesion causes contralateral homonymous hemianopia



LO2


Visual field
Eye
Optic nerve
Optic chiasm
Optic tract
Lateral geniculare body
Optic radiation
Visual cortex
Ipsilateral monocular blindness
Bitemporal haemianopia
Contralateral homonymous haemianopia

LO2

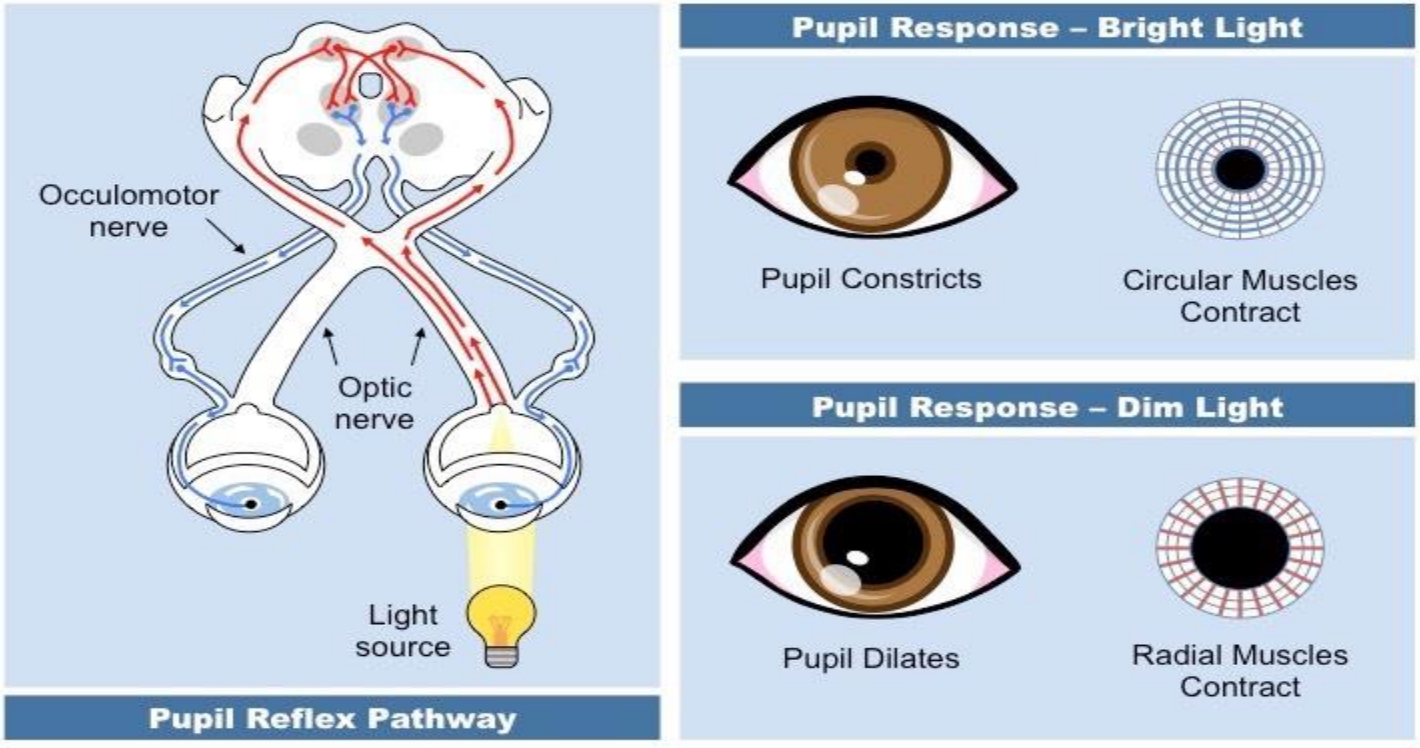
Summary of Visual Pathway Lesions

Site of lesion	VF defect	Possible origin
Optic nerve	Monocular blindness	Optic neuritis
Optic chiasm	Bitemporal hemianopia	Pituitary tumor
Optic tract	Homonymous hemianopia	Temporal lobe tumor
Temporal radiation	Homonymous superior quadrantic anopia	Temporal or occipital lobe tumor
Parietal radiation	Homonymous inferior quadrantic anopia	Parietal or occipital lobe tumor
Visual cortes	Homonymous hemianopia	Posterior cerebral artery dysfunction

The pupillary light reflex

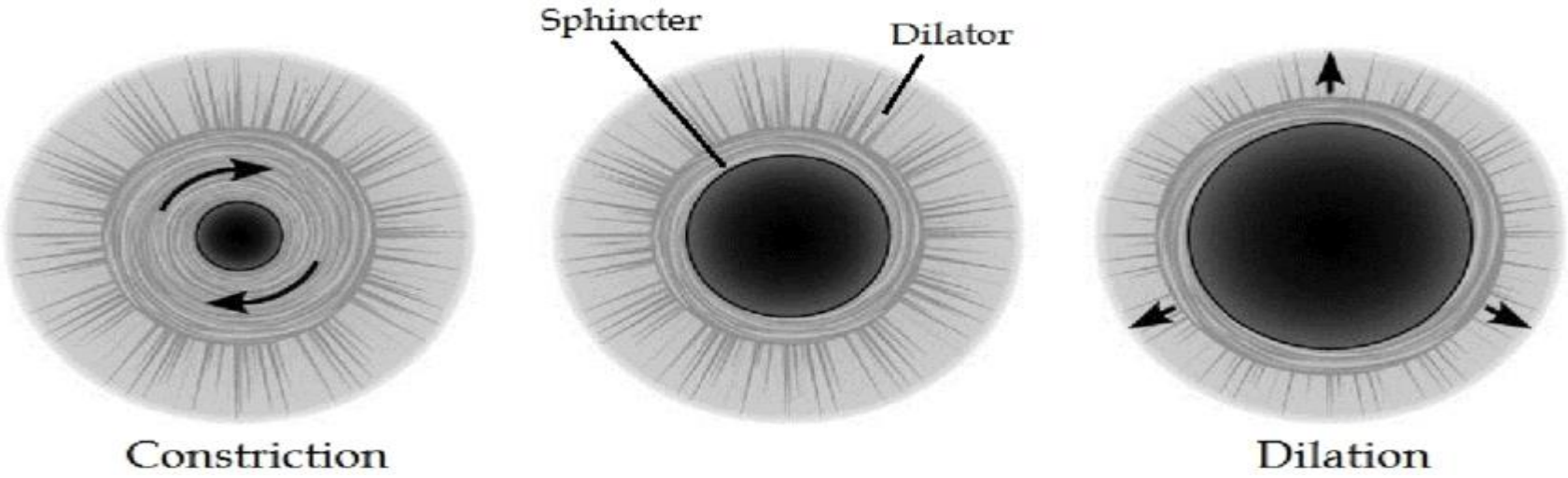
LO3,4

is a reflex that controls the diameter of the pupil in response to the intensity of light that falls on the retina , thereby assisting in adaptation of vision to various levels of lightness/darkness.



LO3,4

Constriction of pupil is called miosis due to contraction of iris constrictors pupillary muscles (circular m.) that are supplied by parasympathetic system



Dilatation of pupil is called mydriasis due to contraction of iris dilator pupillae muscles (radial m.) that are supplied by sympathetic system

pupillary light reflex pathway

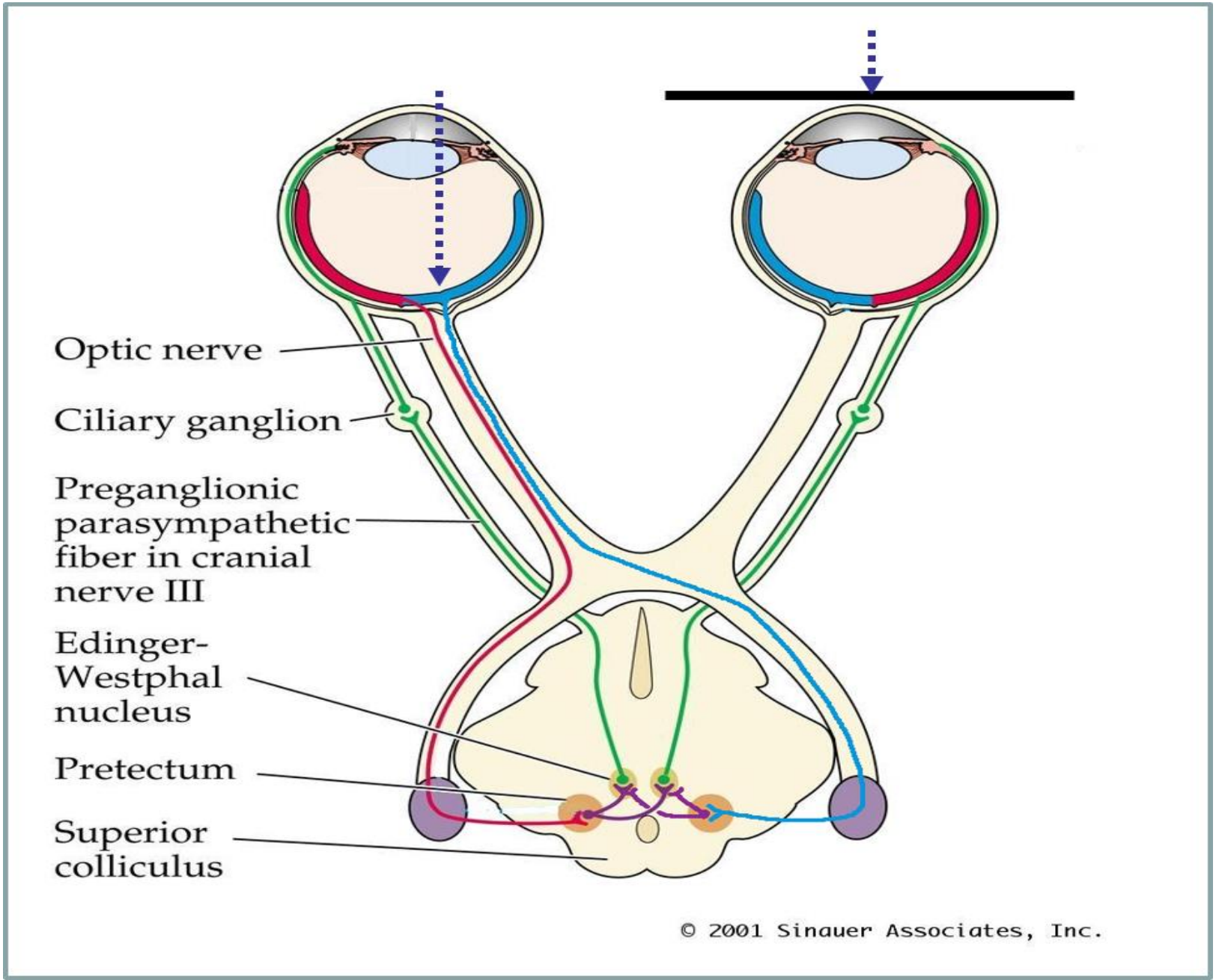
LO3,4

Afferent limb is through the optic nerve and the pupillary fibers bypass the lateral geniculate body to superior colliculus at the level of midbrain and then to Edinger Westphal nucleus.

Efferent limb is from Edinger Westphal nucleus through oculomotor nerve to Ciliary ganglion and finally to constrictor muscles (parasympathetic supply).

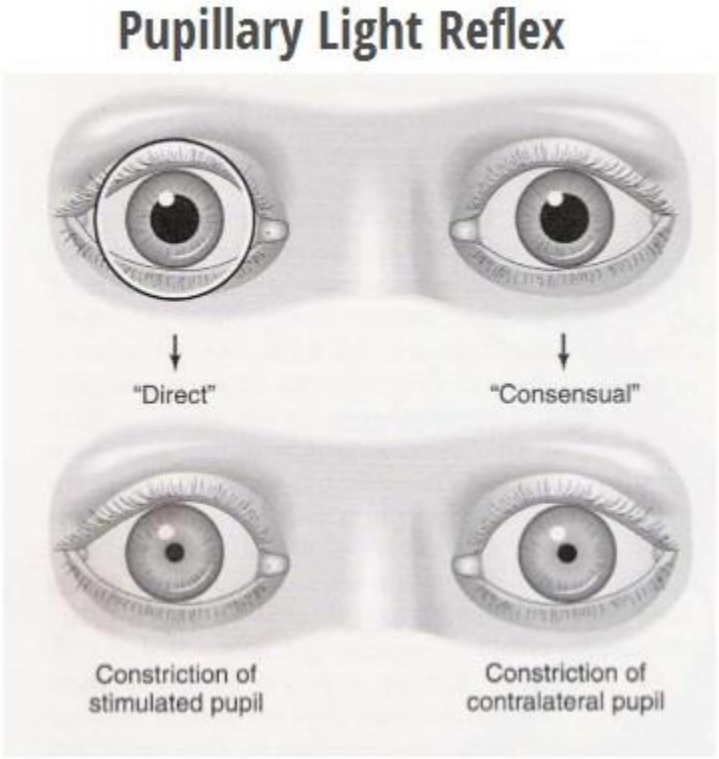
REFLEX PATHWAY

LO3,4



LO3,4

We have direct pupillary light reflex through shining of light to ipsilateral side
And indirect (consensual) due to stimulation of contralateral side

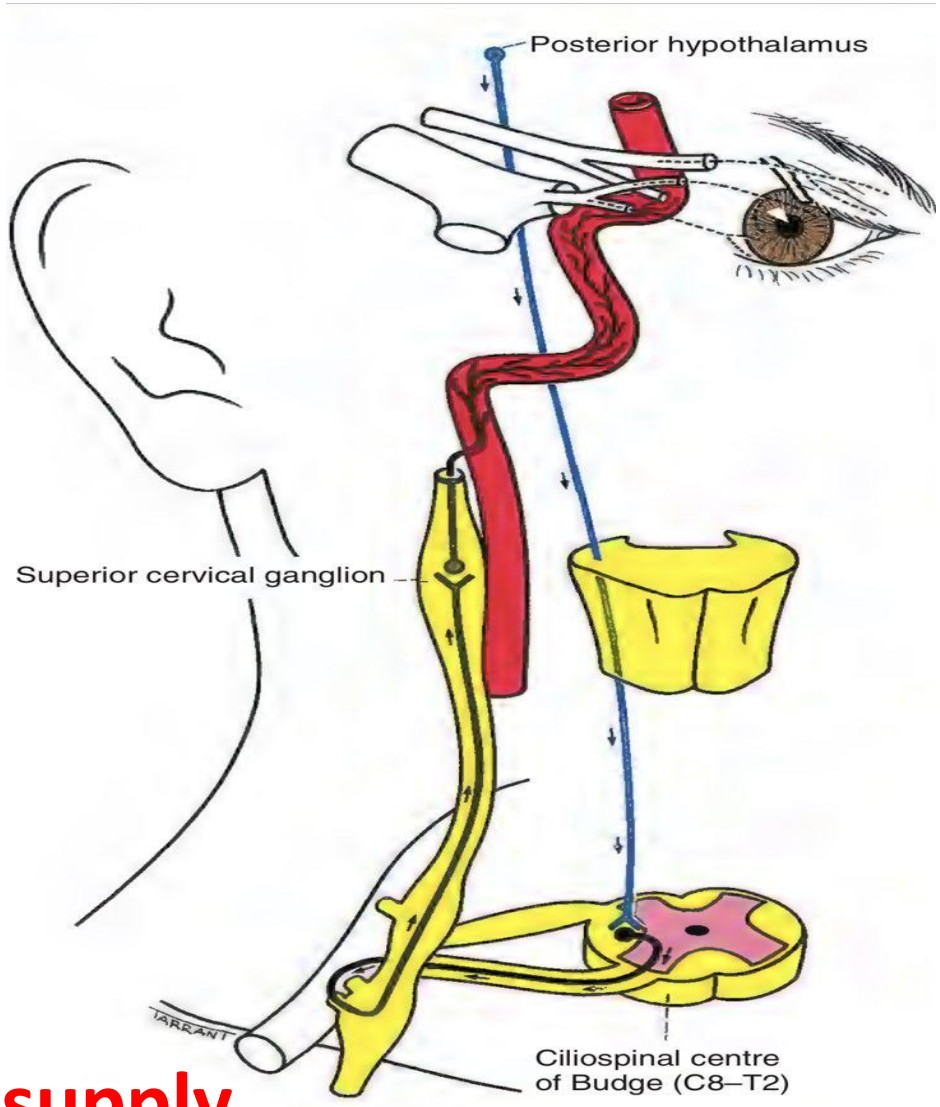


LO3,4

Sympathetic supply

From posterior hypothalamus to the ciliospinal center of Budge, located between C8 and T2, then to superior cervical ganglion and postganglionic fibers **ascend along internal carotid a. and finally joining the ophthalmic division of trigeminal n. in cavernous sinus which supply dilator pupillae m.**

LO3,4



Sympathetic supply

~~كورونا~~

فيروس

corona virus

تعـامل مع كل شخص على أنه مصاب،
وتصرف مع كل الناس على أنك مصاب.

هذي هي القاعدة الصينية للقضاء على فيروس كورونا!


THANK YOU