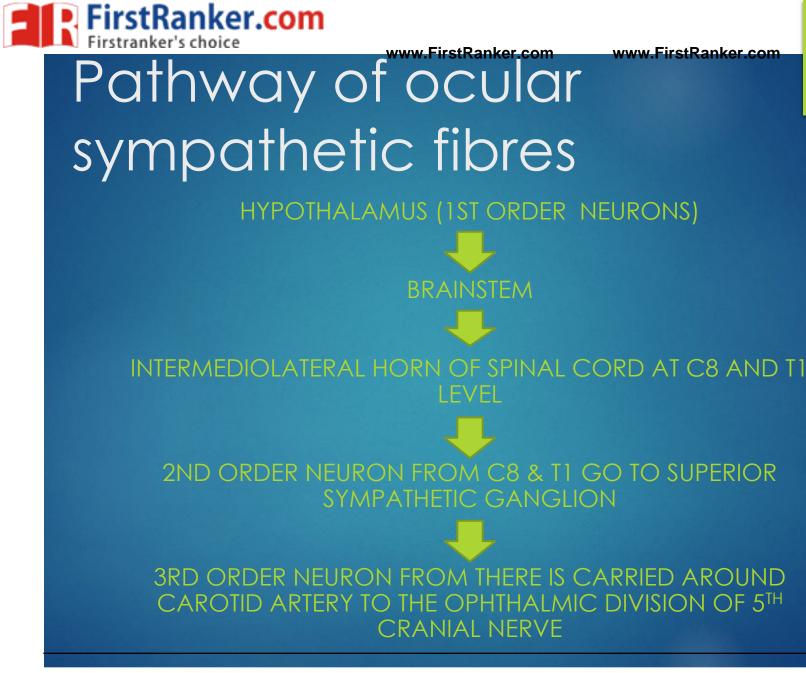


# Normal pupil

- Normal pupil is round, regular, centered in the iris and 3-5mm in size. In old age the size is <3mm.</p>
- In bright light, the pupil constricts to a minimum diameter of 2 mm and in dark, it dilates to about 8mm.
- Pupils are examined for any difference in their size under normal illumination.

Size of the pupil changes due to the action of 2 muscles, the circumferential sphinter pupillae which is innervated by parasympathetic nervous system and radial dilator pupillae which has alpha adrenergic sympathetic receptors which respond to changes in sympathetic tonus and changes in the blood level of circulating catacholamines.





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NASOCILIARY NERVE

LONG CILIARY NERVE

#### **OCULOPUPILLARY FIBRES**

### SUPPLY DILATOR PUPILLAE AND MULLER'S MUSCLE OF UPPER EYELID





If pupillary size is <3mm, it is called miosis.</p>





## Causes of unilateral miosis

- 1. Irritation of parasympathetic
- 2. Horner's syndrome (due to oculosympathetic paresis)

Central horners syndrome (1st order neuron). Hypothalamic lesion, tumor, hemorrhage, brainstem stroke, lateral medullary syndrome, syringomyelia

Bronchogenic carcinoma - pancoast's tumor (tumor of pulmonary apex) in advanced stages can compress cervical sympathetic (2nd order neuron).



Metastatic carcinoma of neck - Rowland Payne syndrome (Disrupting the oculosympathetic nerve, vagus nerve and phrenic nerve).

### T1 radiculopathy

Post ganglionic - carotid artery disease (aneurysm) at cavernous sinus.

Readers paratrigeminal syndrome (painful Horner's syndrome) - due to compression of 5th cranial nerve by ICA aneurysm.

Parkinson's syndrome - 6th nerve lesion + Horners syndrome



## Causes for bilateral miosis

- Old age
- Argyll Robertson pupil (lesions like neurosyphillis in the region of tectum.)
- Pontine haemorrhage
- Iritis
- Organophosphorus or alcohol poisoning
- Application of pharmacological miotics like pilocarpine.
- Overdose of neostigmine.



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# Pin point pupil

#### PUPILLARY SIZE 1MM OR LESS IS KNOWN AS PIN POINT PUPIL.





# Causes for pin point pupil

- PONTINE HAEMORRHAGE
- ORGANOPHOSPHORUS OR ALCOHOL POISONING
- CLONIDINE AND TETRAHYDRAZOLINE
- APPLICATION OF PILOCARPINE DROPS
- MORPHINE OR BARBITURATE
  POISONING
- HEAT STROKE



Pathway of ocular parasympathetic fibres

**AFFERENT:** FROM RETINA THROUGH OPTIC NERVE TO THE PRETECTAL NUCLEUS OF MIDBRAIN PRETECTAL NUCLEUS CONNECT WITH EDINGER WESTPHAL NUCLEUS OF BOTH SIDES.

EFFERENT: PARASYMPATHETIC FIBRES ARISES FROM THE EDINGER-WESTPHAL NULEUS IN THE MIDBRAIN ANDIRAV  $\mathcal{R}$ AI NFRVF THE RANI ()N(-)PREGANGLIONIC EIBRES ENTER THE INFERIOR D VIA THE NERVE TO IF THE (KRD) NFRVF AN **COLLE REA** ARY GANGLION ВI Y. POST GANGLIONIC FIBRES TRAVEL ONG THE SHORT CILIARY NERVES TO INNERVATE





▶ If size of the pupil is >5mm, it is known as mydriasis.





## Causes of unilateral mydriasis

## 3rd nerve palsy.

- Adie's pupil or myotonic pupil.(post ganglionic parasympathetic pupillomotor damage)
- Optic atrophy
- Acute congestive glaucoma.
- Head injury
- Tentorial herniation (same side)



## Causes of bilateral mydriasis

- Childhood, anxiety or fear
- Application of mydriatic (atropine)
- Datura poisoning
- Deep coma
- Severe raised intracranial tension.
- Cerebral anoxia
- Death



It is the alternating dilatation and constriction of pupil.

### Causes

- Autonomic imbalance
- recovering 3rd nerve lesion

Chorea



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Anisocoria (unequal pupils)

The eyes should be assessed to determine which is the abnormal pupil.

### Causes

commonest cause is the application of mydriatic to one eye.

Unilateral sympathetic paralysis or irritation

unilateral 3rd nerve lesion as in brain stem damage, transtentorial herniation

pressure effect on 3rd nerve in tumor or aneurysm

Blindness in one eye





### Encephalitis

Iritis

- severe head injury
- Holmes Adie pupil
- Meningioma
- migraine

