# Sleep Disorders and the Eye

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# Introduction

- Obstructive sleep apnea
- Nocturnal lagophthalmos
- Circadian rhythm disorders in blindness

# Obstructive Sleep Apnea – associated eye diseases

- Repetitive episodes of upper airway occlusion during sleep combined with symptoms, most commonly excessive daytime sleepiness.
- Increased prevalence due to obesity, increased awareness
- Risk factor for HTN, CV disease
- Polysomnography necessary for diagnosis

# Obstructive Sleep Apnea – Symptoms and Signs

- Snoring
- Excessive daytime sleepiness or fatigue
- Witnessed apneas by a bed partner
- Morning headaches
- Waking up choking or short of breath
- Insomnia

- Obesity
- High Mallampati classification
- Large neck circumference (men, >17 in; women, >16 in)
- Tonsillar hypertrophy
- Retrognathia

# Associated Ophthalmic Conditions

- Floppy eyelid syndrome
- Primary open-angle glaucoma (POAG)
- Normal-tension glaucoma (NTG)
- Non-arteritic anterior ischemic optic neuropathy (NAION)
- Papilledema
- CPAP treatment-associated eye complications

# Floppy Eyelid Syndrome

- easily everted floppy eyelids and papillary conjunctivitis
- Symptoms : watering, stickiness, discomfort, blurred vision

# Floppy Eyelid Syndrome

- Signs :

- Rubbery, floppy, and easily everted eyelids

- Mild ptosis, downward pointing eyelashes, or inversion

- Corneal involvement

- Keratoconus

- Infectious keratitis have also been described

# Pathophysiology

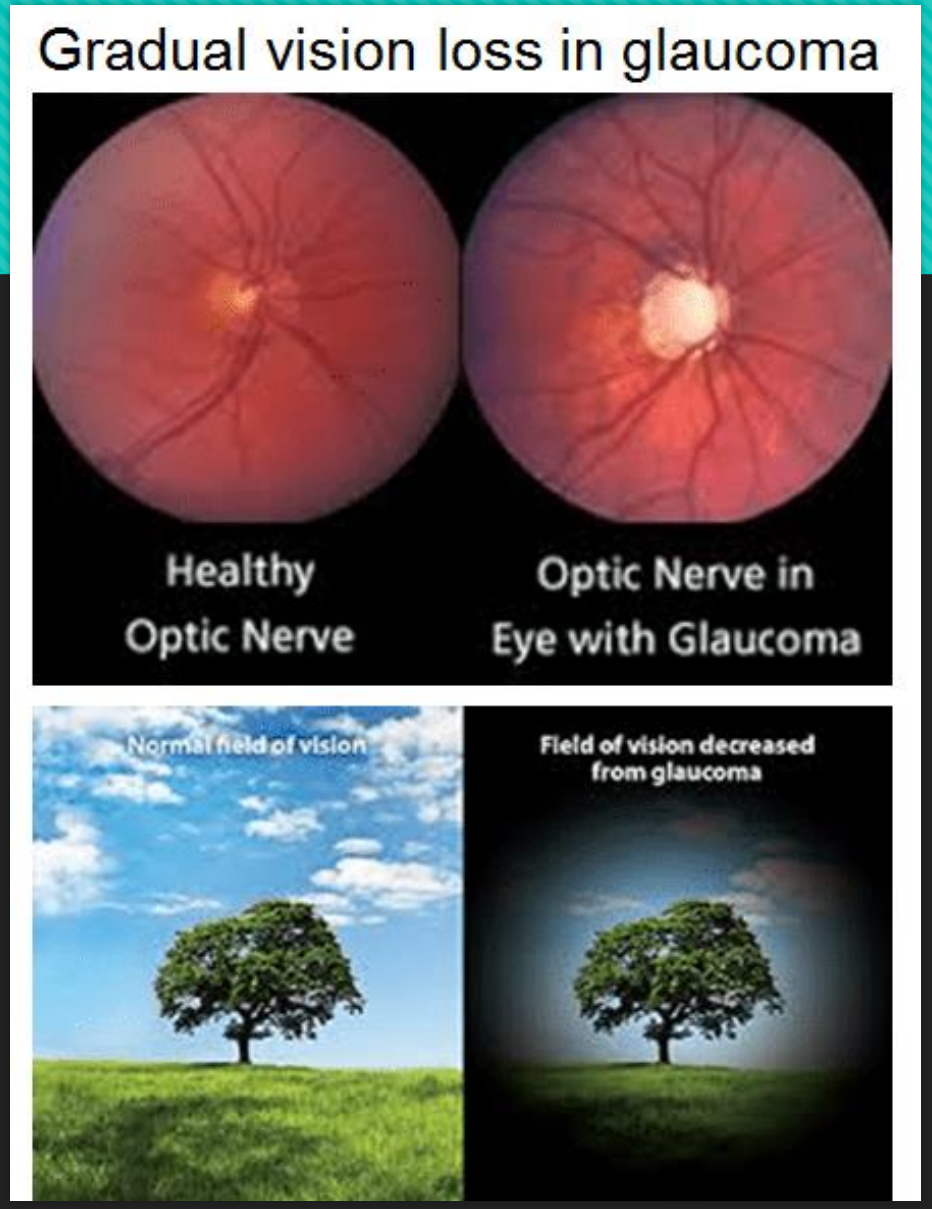
- Mechanical stress
- Tissue inflammation secondary to alternating  ischemia and reperfusion
- Increased blood leptin levels correlating with body mass index

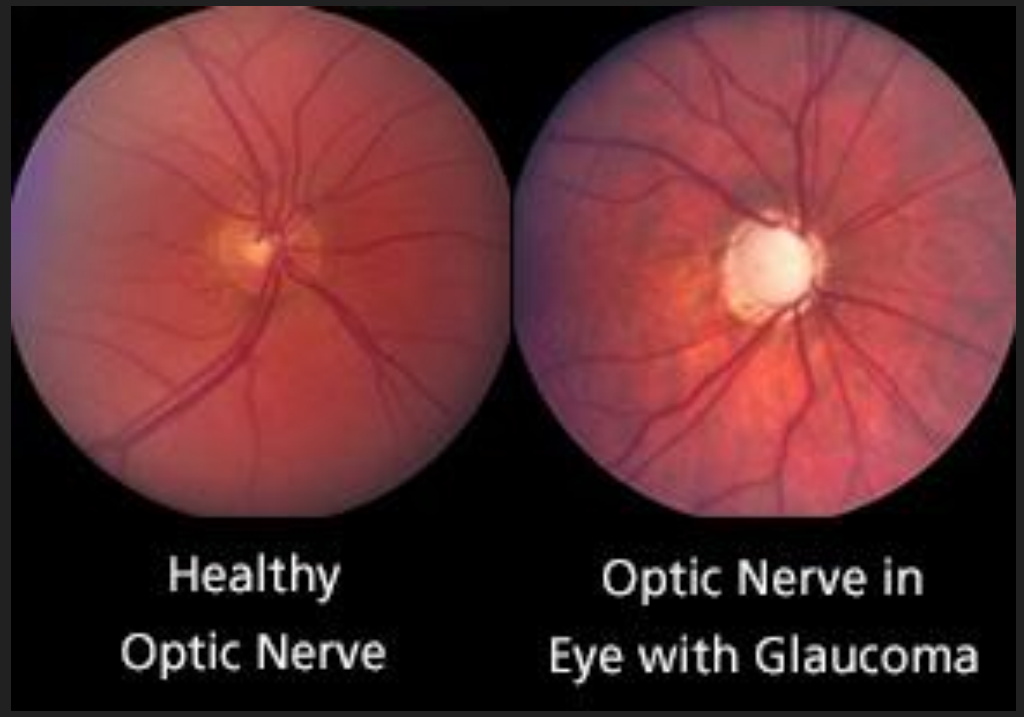
# Treatment

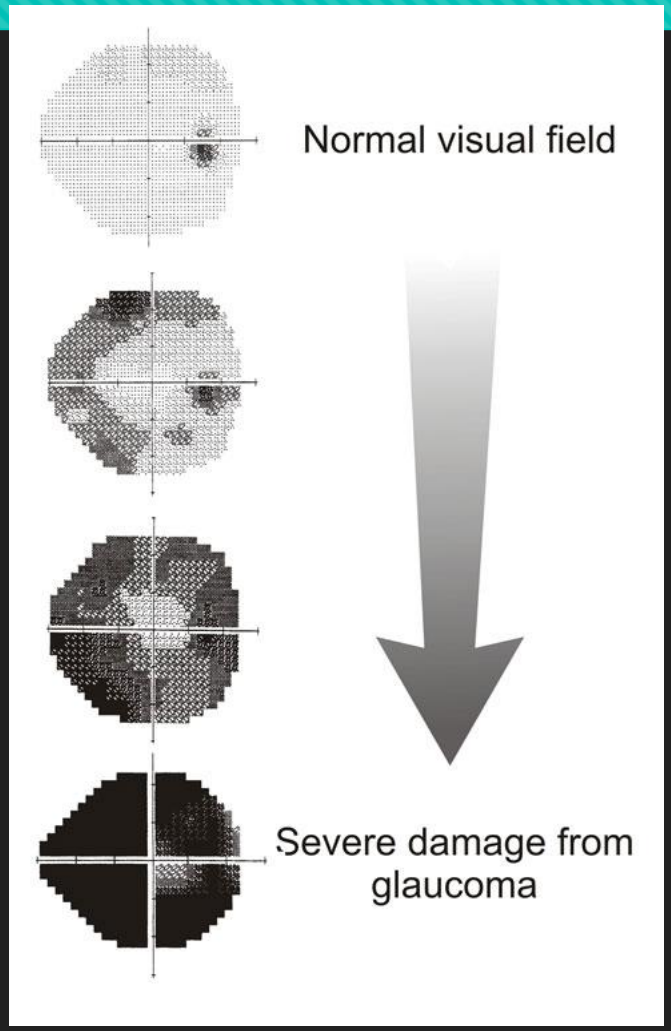
- Weight loss
- Treatment of OSA
- Eye shields , lubricants
- Surgical tightening of eyelids

# Glaucoma

- Progressive optic neuropathy
- Optic disc cupping with visual field loss
- OSA linked to Primary Open Angle Glaucoma

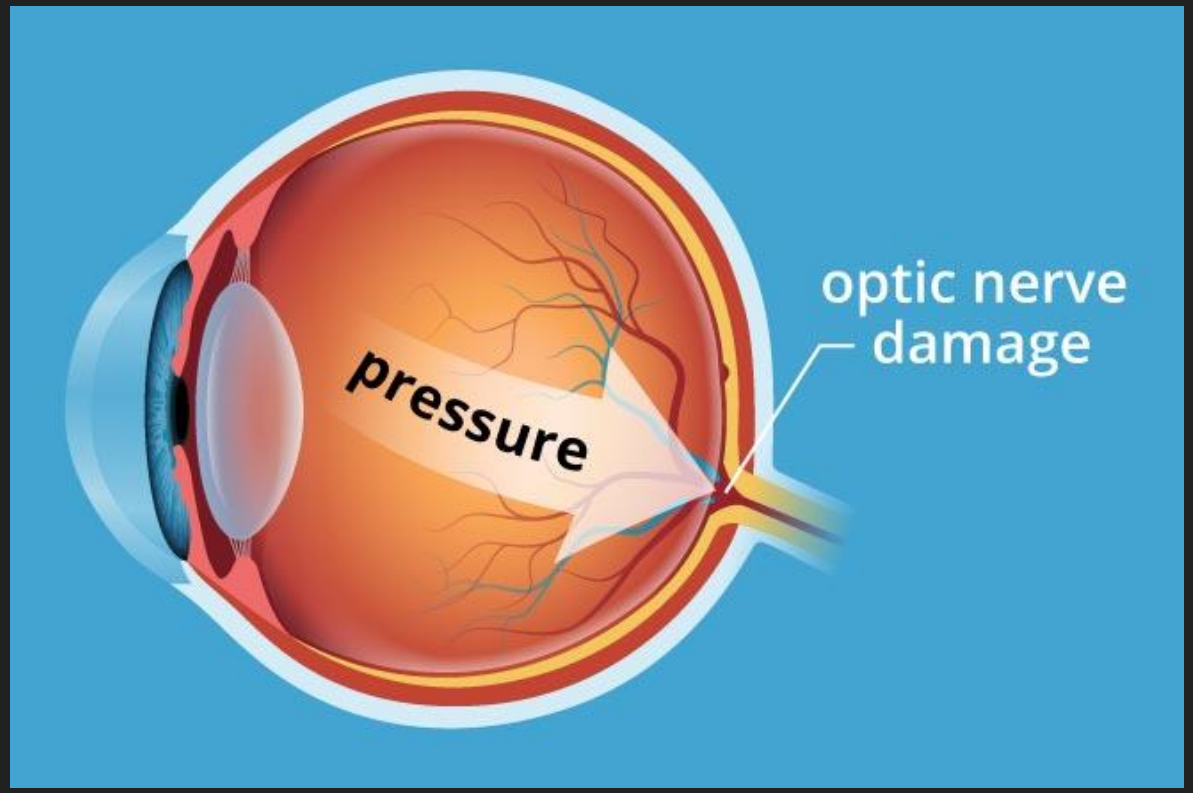



Healthy
Optic Nerve
Optic Nerve in
Eye with Glaucoma


Normal visual field
Severe damage from
glaucoma

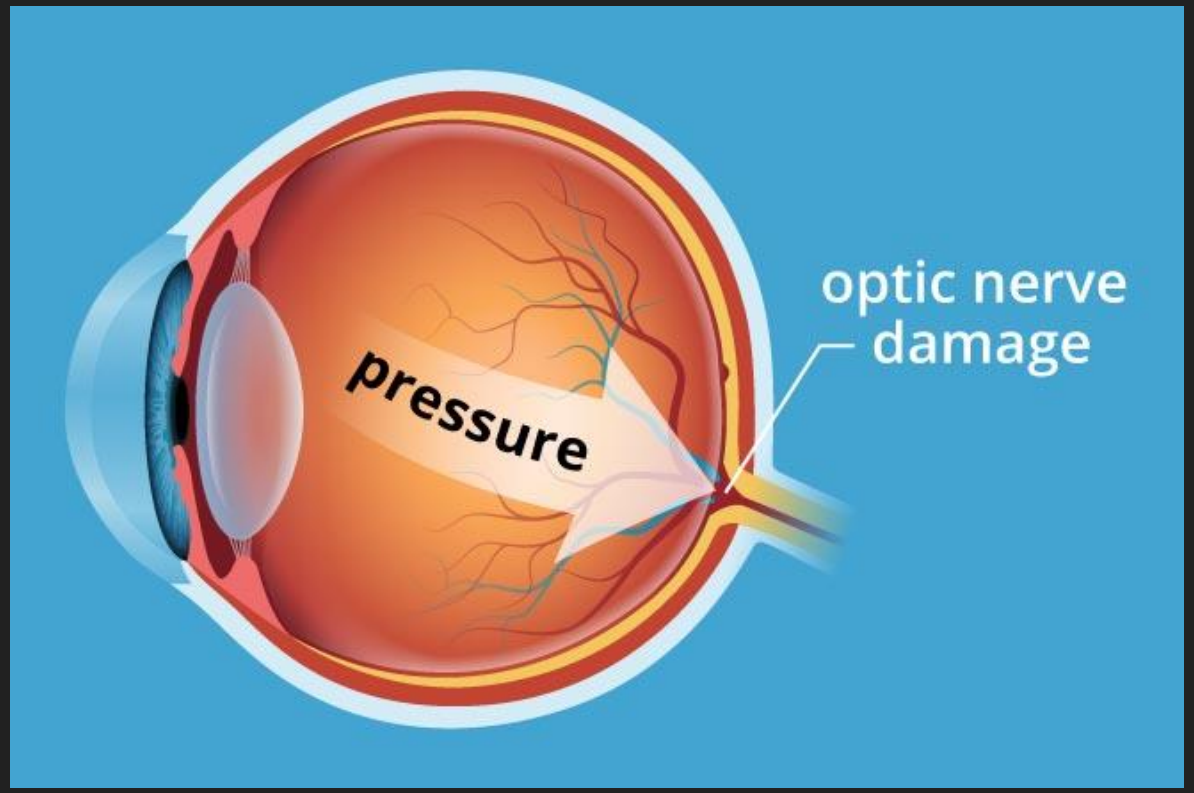
# Glaucoma

- Risk factors :
- Increased age
- FHx
- Thin cornea
- high intraocular pressure



# Pathophysiology

- Increase in IOP
- Ischemia



# Treatment

- Topical therapy
- Laser
- Surgery
- CPAP treatment in patients with OSA and POAG

# Nonarteritic Anterior Ischemic Optic Neuropathy

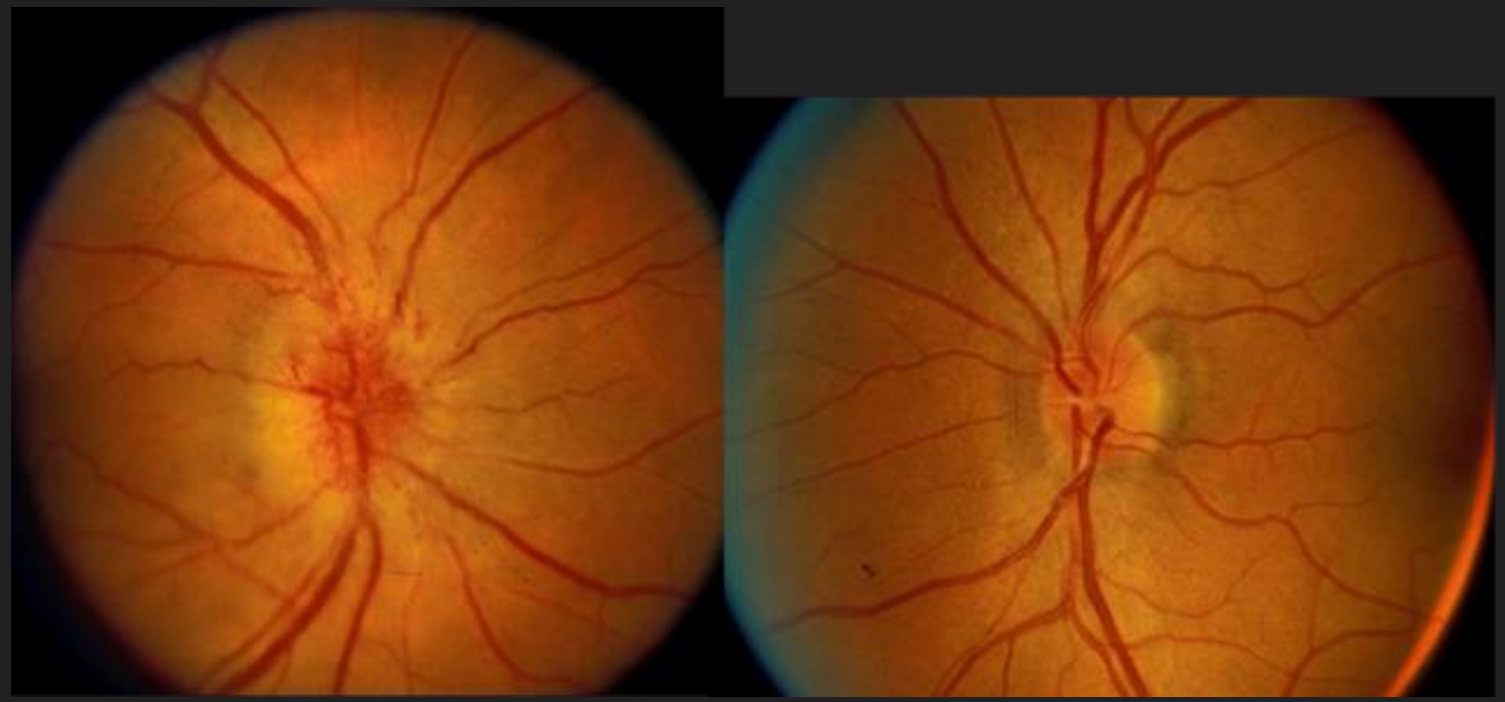
- Most common cause of acute optic neuropathy >50yrs
- Sudden painless onset of unilateral visual loss
- Usually noticed on awakening
- Irreversible

# Signs

- RAPD
- Disc edema
- Altitudinal defect on visual field testing

# Risk factors

- >50 yrs
- Small cup to disc ratio
- HTN
- DM
- Hypercholesterolemia



# Risk Factors

# Pathogenesis

- Vasculopathic occlusion
- Decreased blood flow in the optic disc microvasculature
- Nocturnal hypotension and hypoxia

# Link to OSA

- Risk ratio was 4.9 in patients with OSA compared to the general population
- OSA was 2X more frequent than HTN or DM

# Proposed mechanisms

- Impaired ON head blood flow due to apneic episodes
- Apnea-induced blood pressure variations
- Imbalance between nitic oxide and endothelin
- Increased ICP causing direct compression or impaired circulation

# Treatment

- None
- Modification of risk factors

# Papilledema

- Bilateral optic disc swelling due to increased ICP
- Seen in space-occupying lesions, obstructive hydrocephalus
- Mechanical disruption of axoplasmic flow within optic nerve
- Symptoms : headache, nausea, pulsatile tinnitus, TVO's

# Papilledema and OSA

- Not a frequent sign in OSA
- ICP increases during sleep correlating with apneic events

# Treatment

- Rule out all other causes
- Acetazolamide
- Improvement with CPAP reported

# CPAP related eye complications

- Dry eye
- Bacterial conjunctivitis
- Corneal ulcers

- Pathophysiology :
- Air blowing into the eye
- Retrograde movement of air and mucus from the nasal passage through the NLD and into the eye

# Nocturnal Lagophthalmos

- Inability to fully close eyelids
- Symptoms :
  - Irritation
  - Dryness
  - Epiphoria
- Signs
  - Superficial  punctate corneal staining
  - Corneal scarring

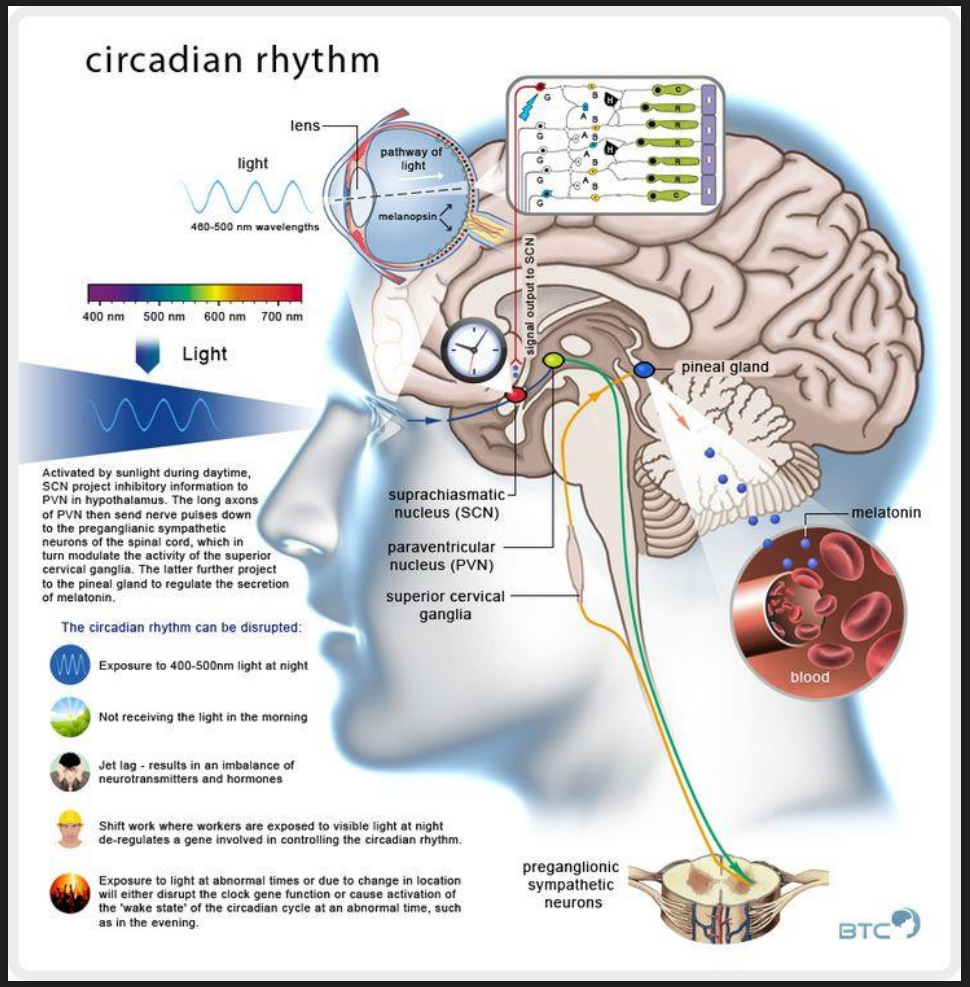
# Nocturnal Lagophthalmos

- Risk factors
  - Neurogenic conditions
  - TED
  - Myopathies
  - Botox
  - Excessive alcohol intake
- Treatment
  - ocular lubricants

# Circadian Rhythm Disorders of the Blind

- Sleep-wake cycle – most apparent circadian rhythm in humans
- Environmental cues :
  - Light
  - Melatonin
  - Physical activity
  - Meal times
  - Temperature

- Supra-chiasmatic nucleus : master circadian clock in the body
- Regulates the secretion of melatonin from the pineal gland
- Optic pathways exist from the retina to the SC nucleus

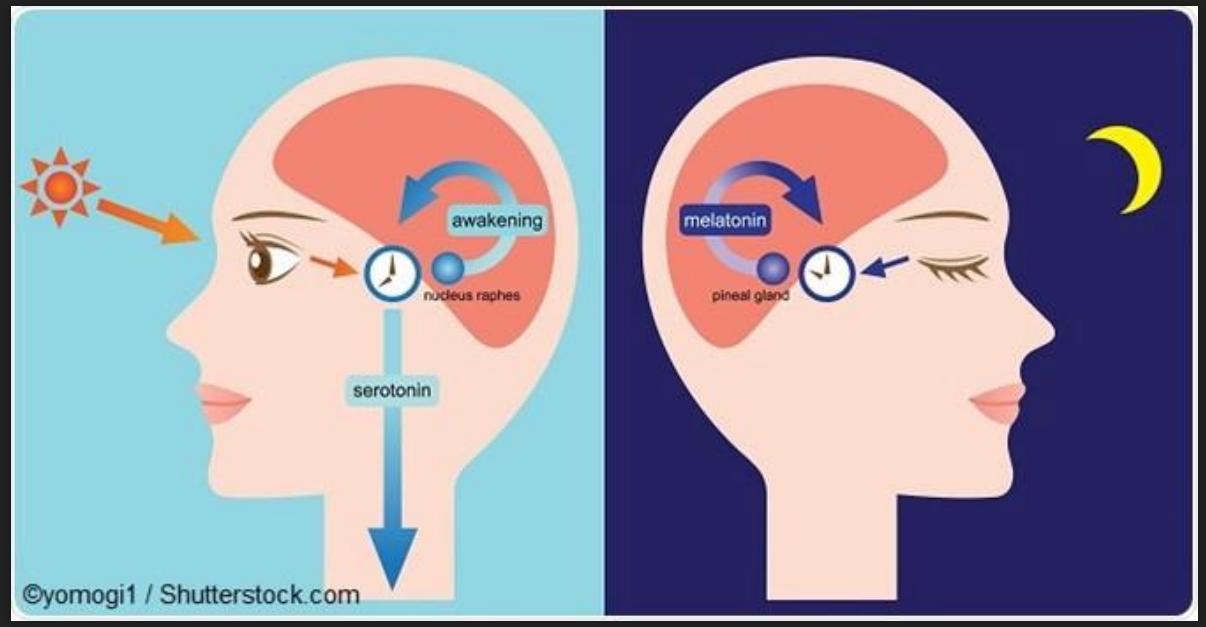


- Blindness : irregular circadian rhythm due to absence of light synchronization
- Consequences :

- Sleep disturbances ( insomnia ; daytime sleepiness )

- Treatment :

- Timed melatonin



# Conclusion

- Important to recognize associations
- Routine eye exam for patients with OSA to rule out glaucoma
- Consider OSA in patients with floppy eyelid syndrome, NAION and papilledema if no other apparent cause
- Take a sleep history in blind patients and refer as necessary for management

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# Thank you !