# Common Eye Diseases
# 白內障，青光眼及其他常見眼疾

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www.eyedoctor.com.hk

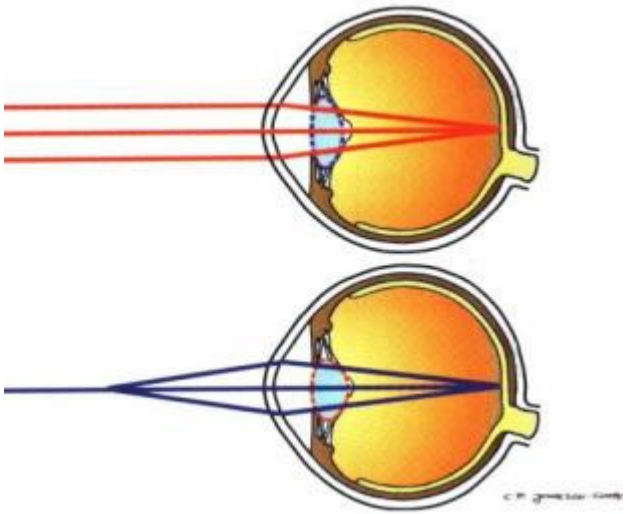
# Common Eye Diseases

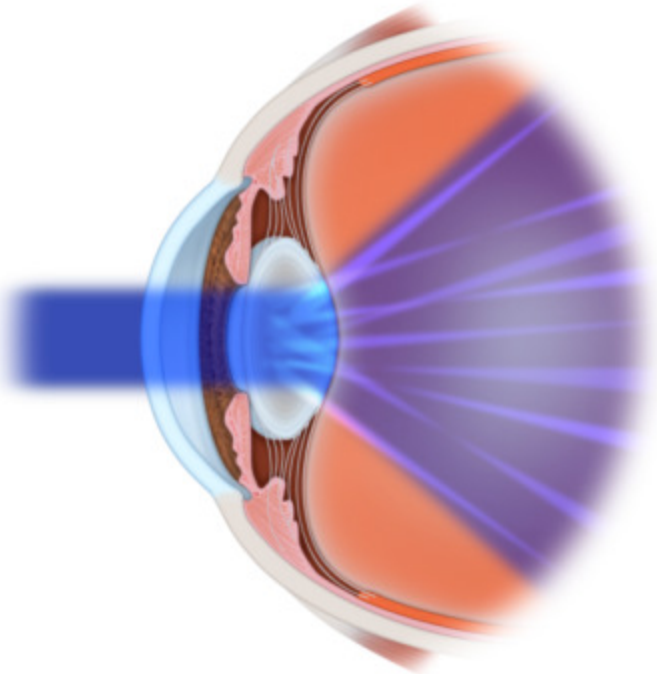
- Cataract
- Glaucoma

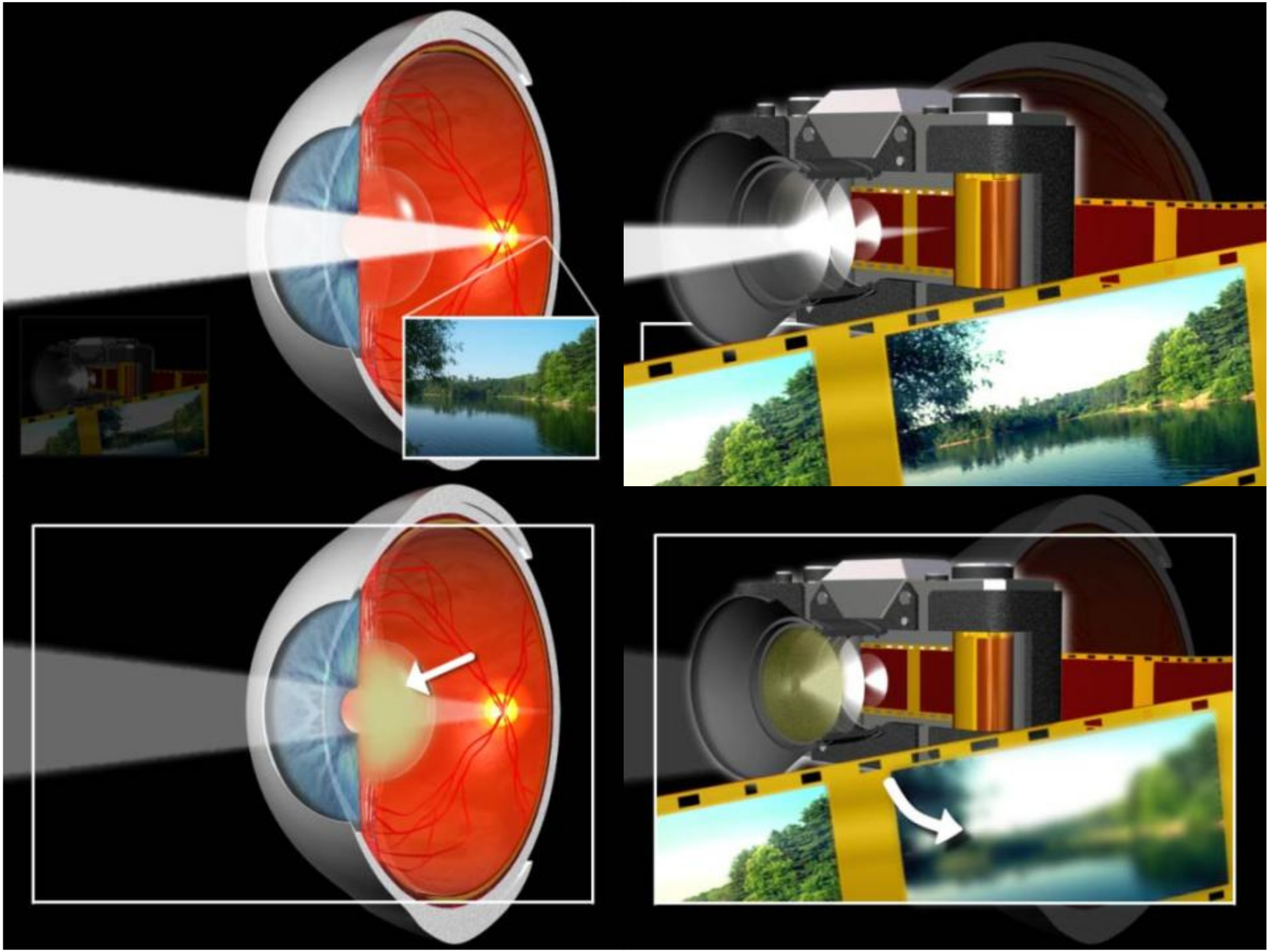
- Diabetic Retinopathy
- Age Related Macular Degeneration
  - Gradual Visual Loss WCS (4th Year SC)

# Why bother about the lens?

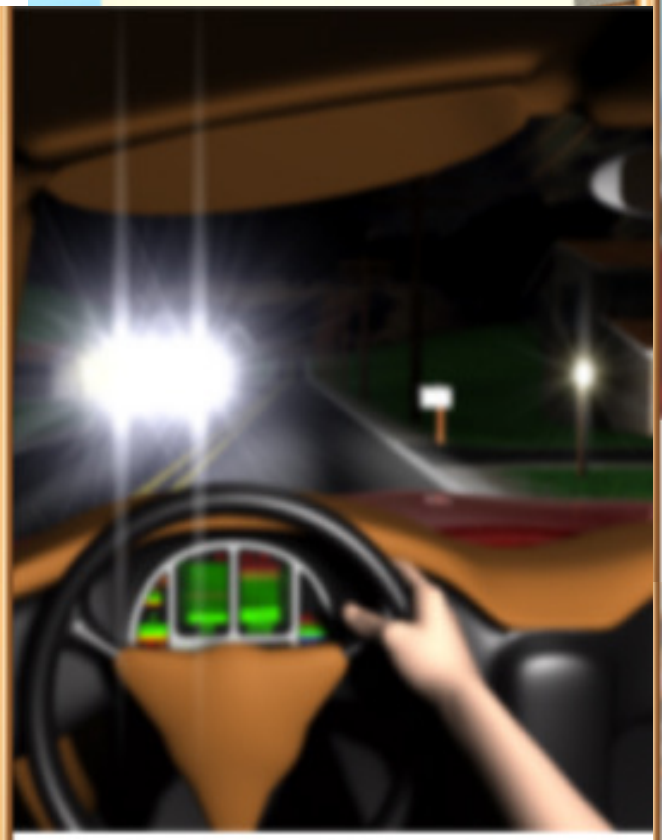
Allow clear image from various distances to focus onto the photoreceptors



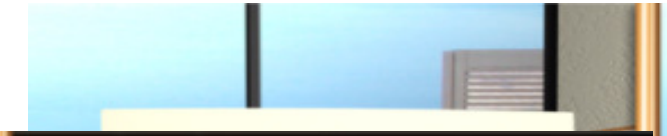




Normal Eye



Eye With Cataract



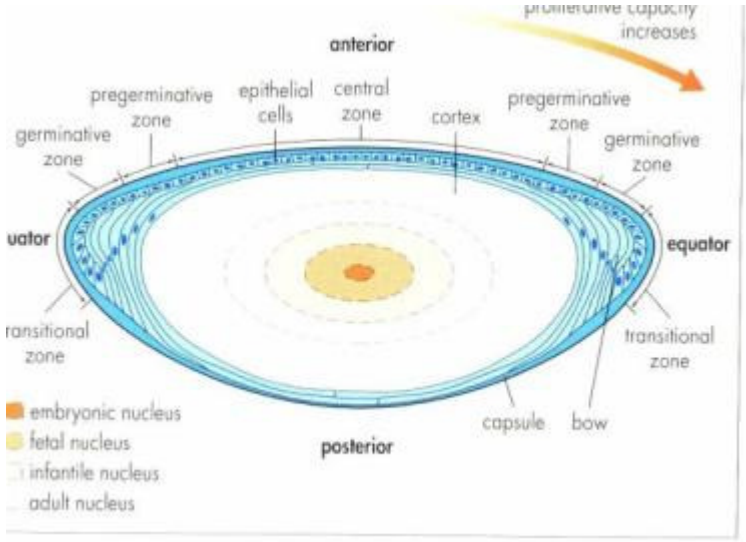
Normal Eye


Eye With Cataract

Eye With Cataract

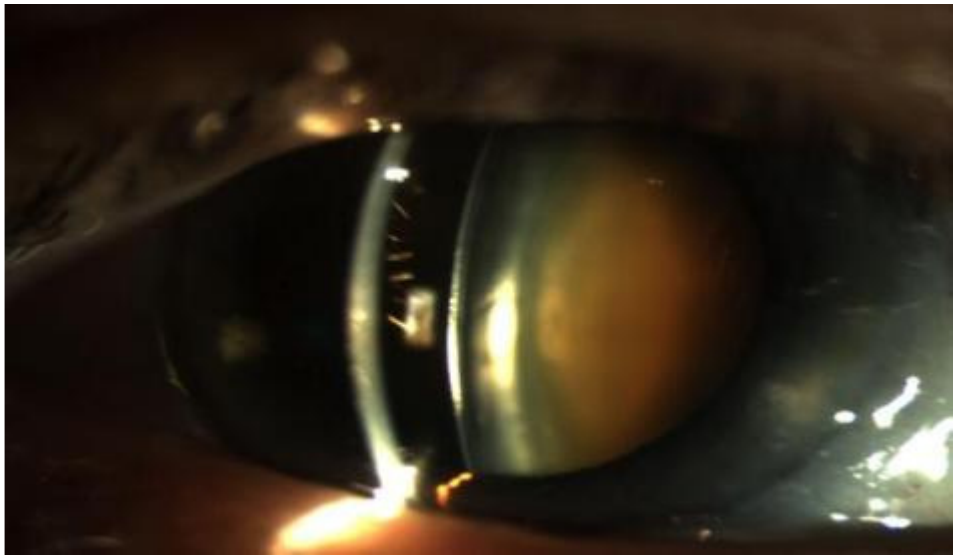
# Lens

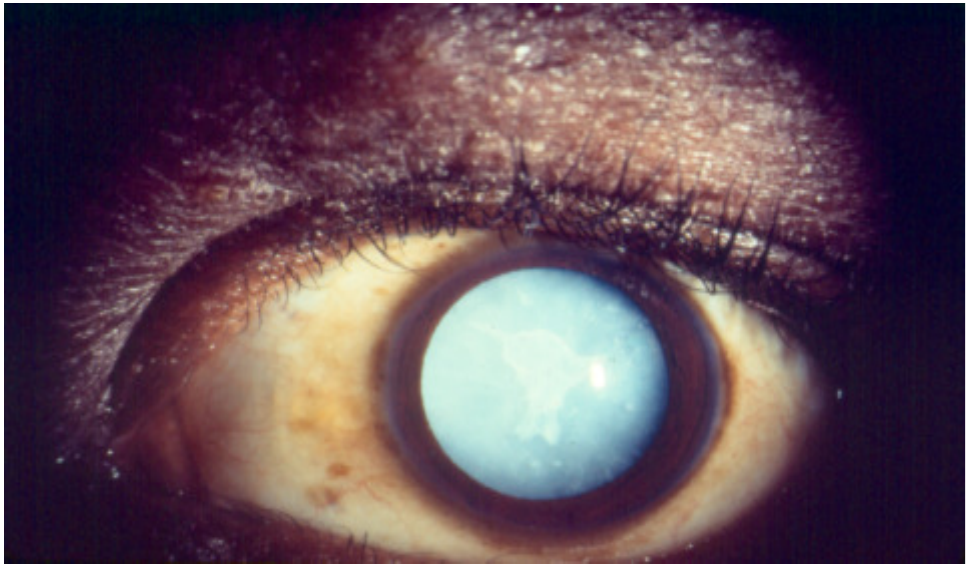
- biconvex, transparent
- 15D of refractive power
- refraction of light to produce clear retinal image
- enable accommodation



# Cataract

- Opacification of the natural crystalline lens
  - nuclear sclerosis with lens becoming yellow/brown
  - cortical
  - posterior subcapsular
- Gradual deterioration of vision
- Commonest cause of blindness worldwide





# Cataract - aetiology

- Age related i.e. >65 years (commonest)
- Secondary to ocular disease
  - e.g. post inflammatory - uveitis (posterior subcapsular cataract)
- Secondary to systemic disease
  - e.g. diabetes mellitus
- Traumatic - lens capsule disruption
- Drug induced
  - systemic steroids (posterior subcapsular cataract)
- Congenital

# Cataract - indications for treatment

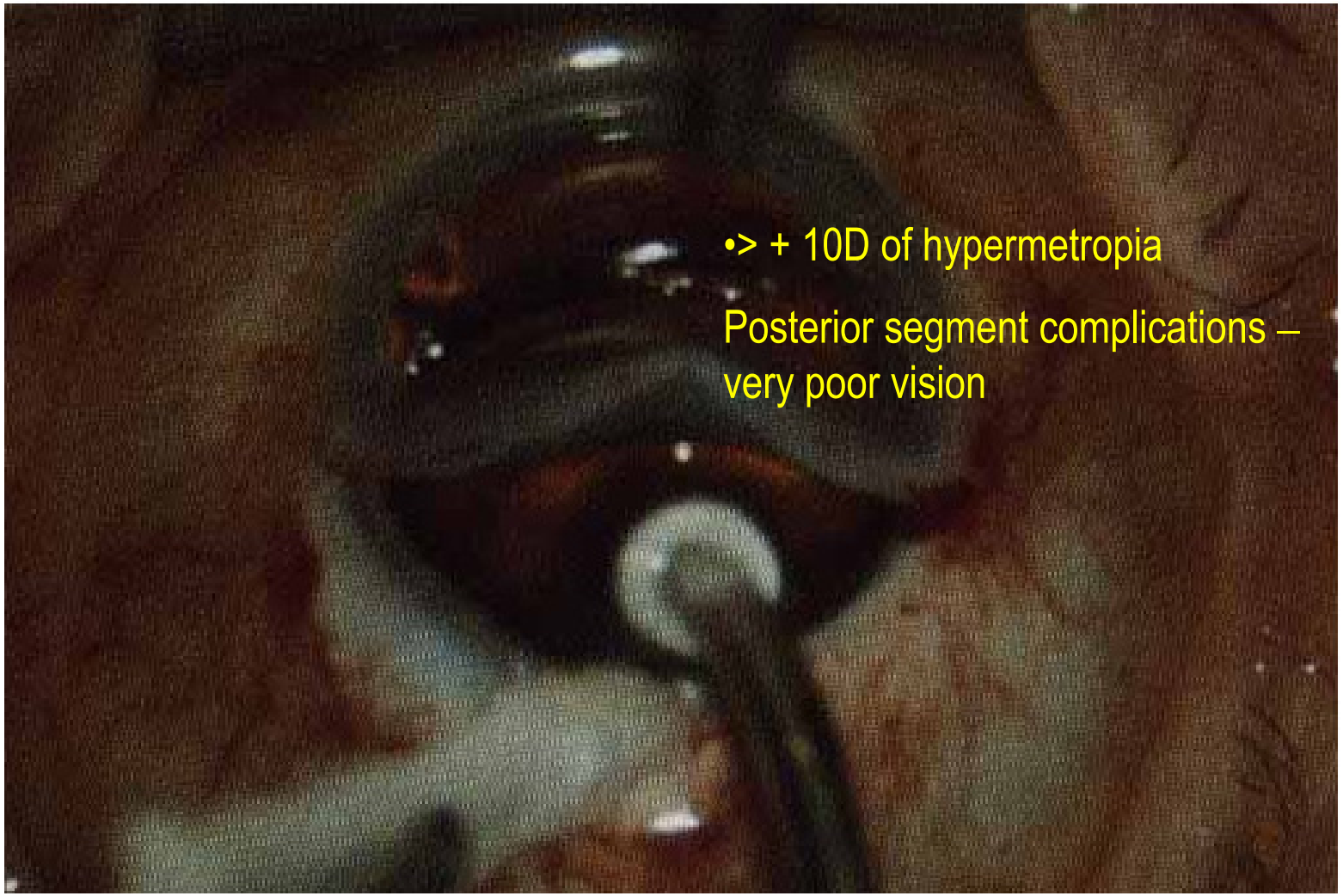
- When the level of vision restricts normal activity
- Patient factors
  - young driver may need cataract surgery sooner
  - ocular factors
    - diabetic cataracts have to be removed to allow fundal examination and treatment
    - certain types of cataract can induce glaucoma or uveitis and have to be removed

# Cataract - treatment

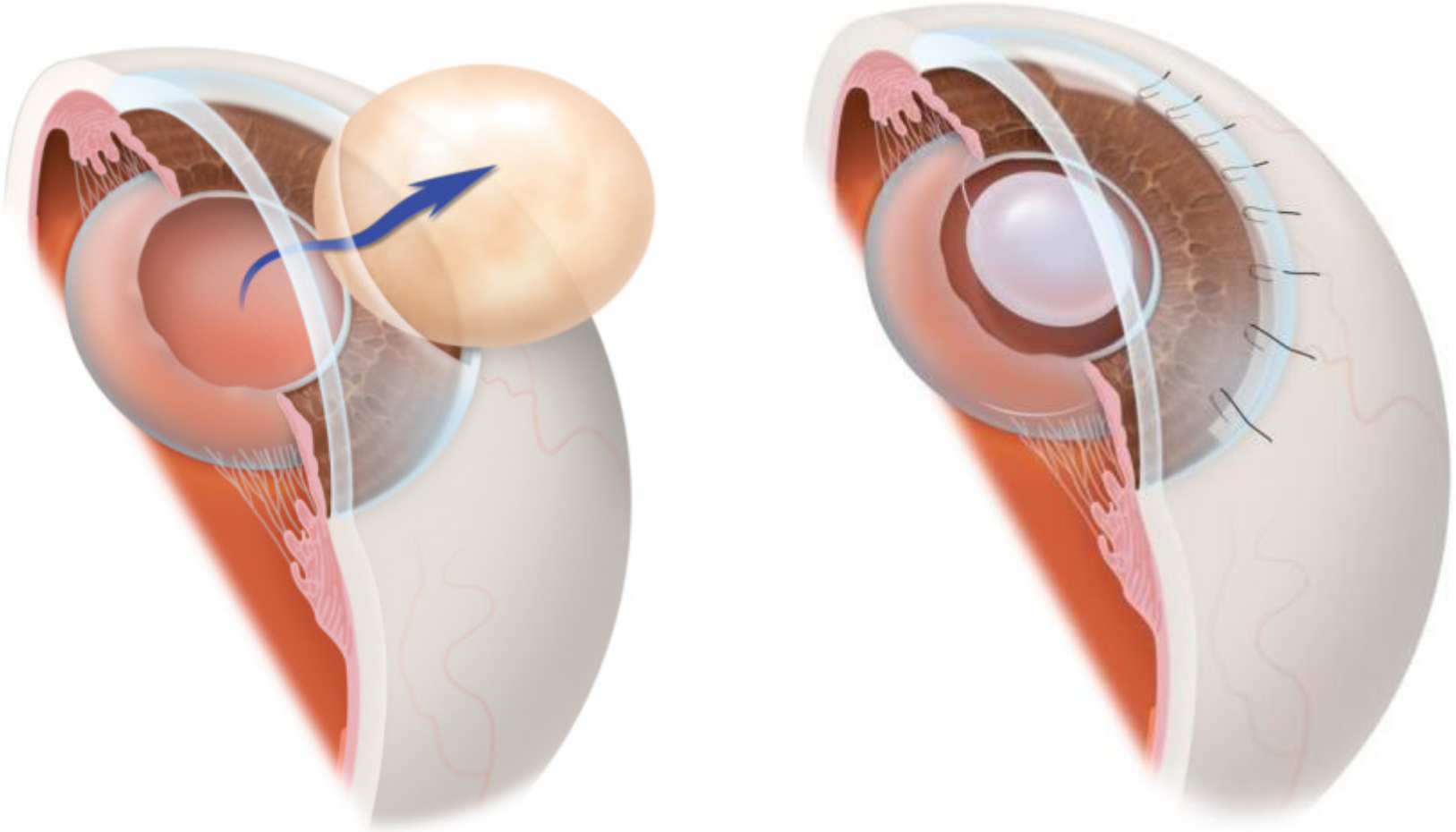
- Refraction
  - cataract alters lens refractive index
  - usually treatable with myopic spectacle lenses

- Surgery
  - removal of cataract by phacoemulsification and implantation of an artificial intraocular lens

# Intracapsular cataract extraction (ICCE)



# Extracapsular cataract extraction (ECCE)

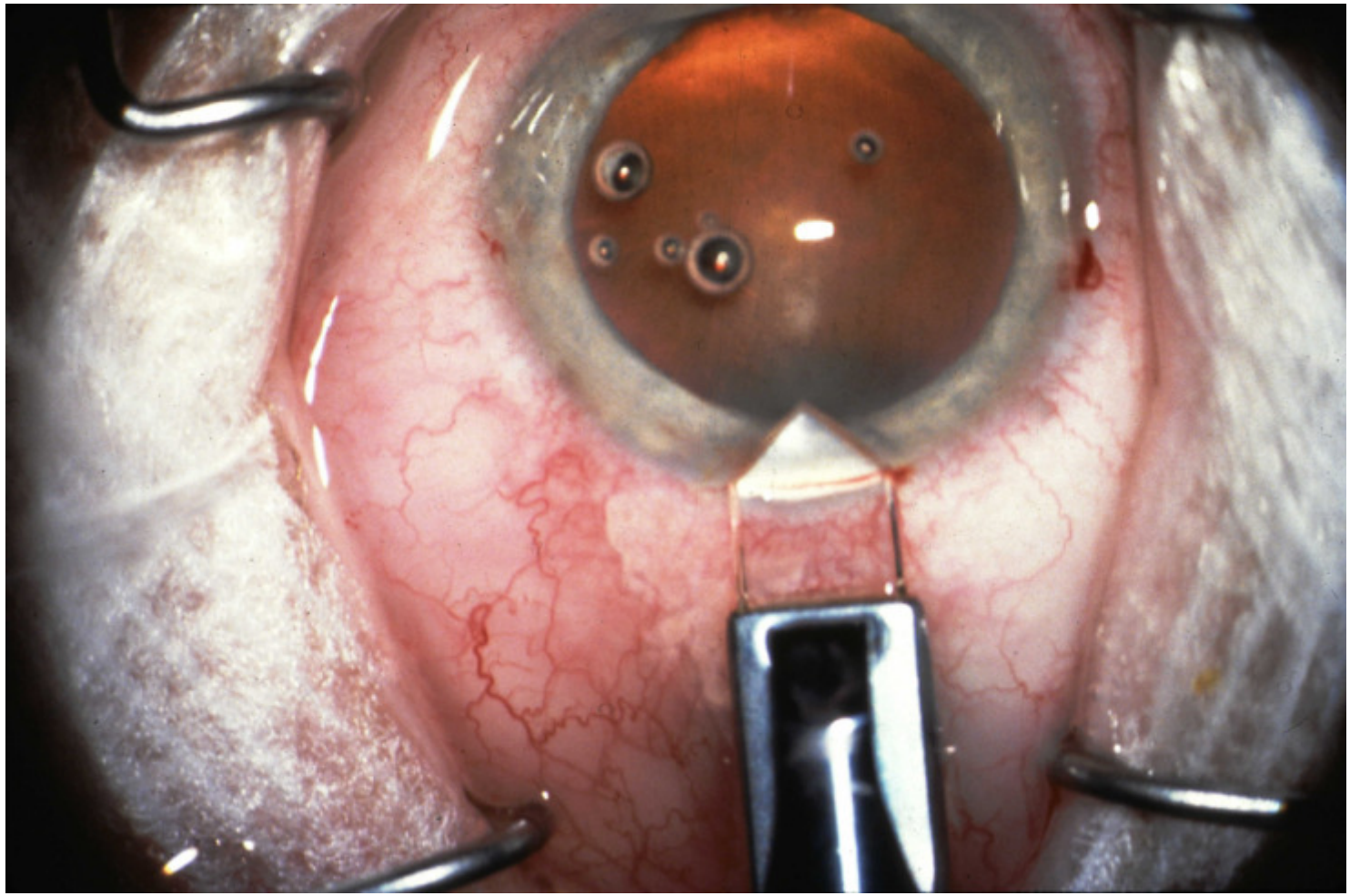


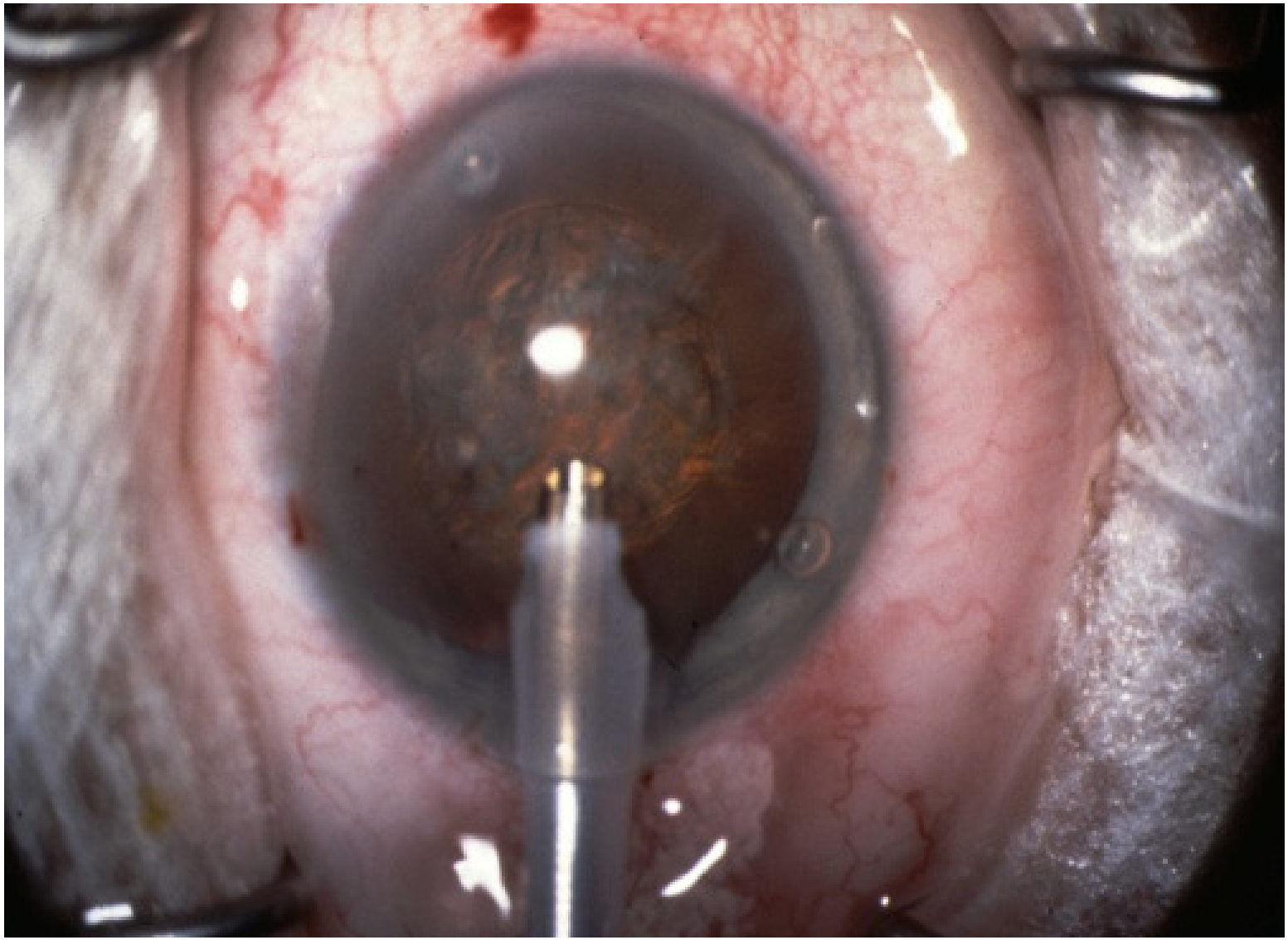
# Phacoemulsification (Phaco)

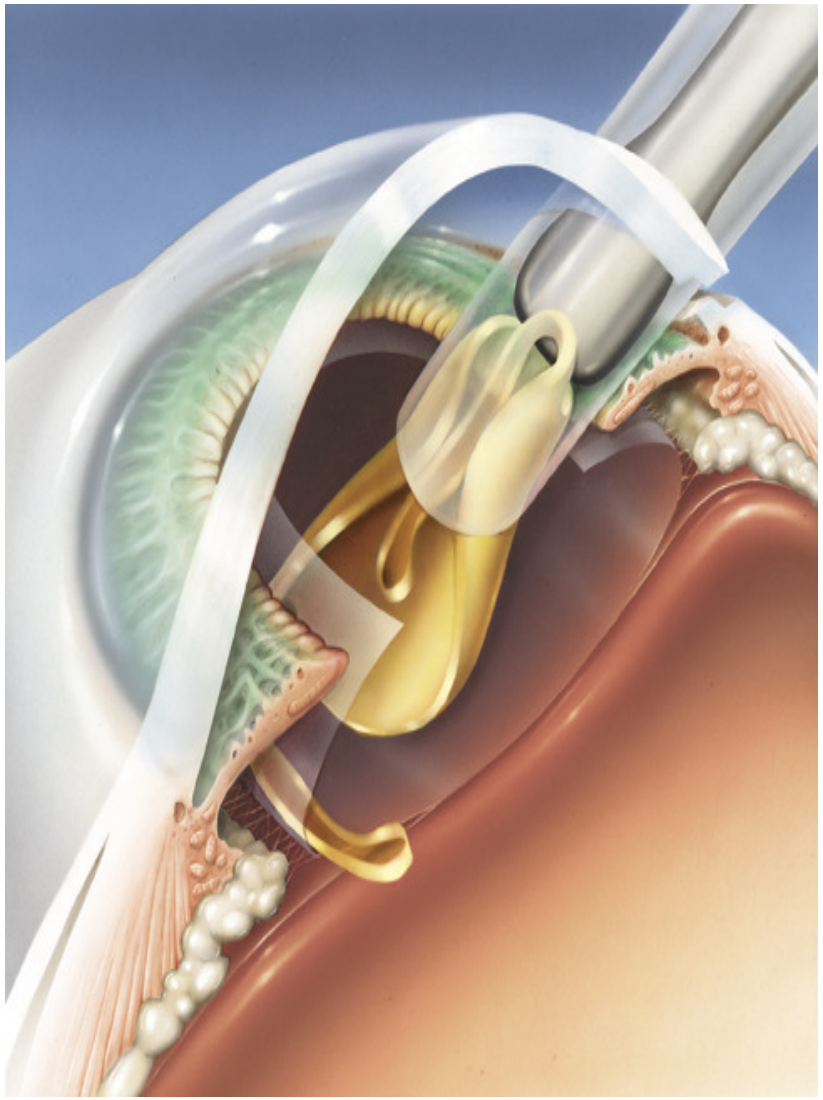
- The present **state of the art** technique
- Widely used **advanced** technique, especially in developed country

***Major advantage and superiority*** *over older technique with improved visual quality*

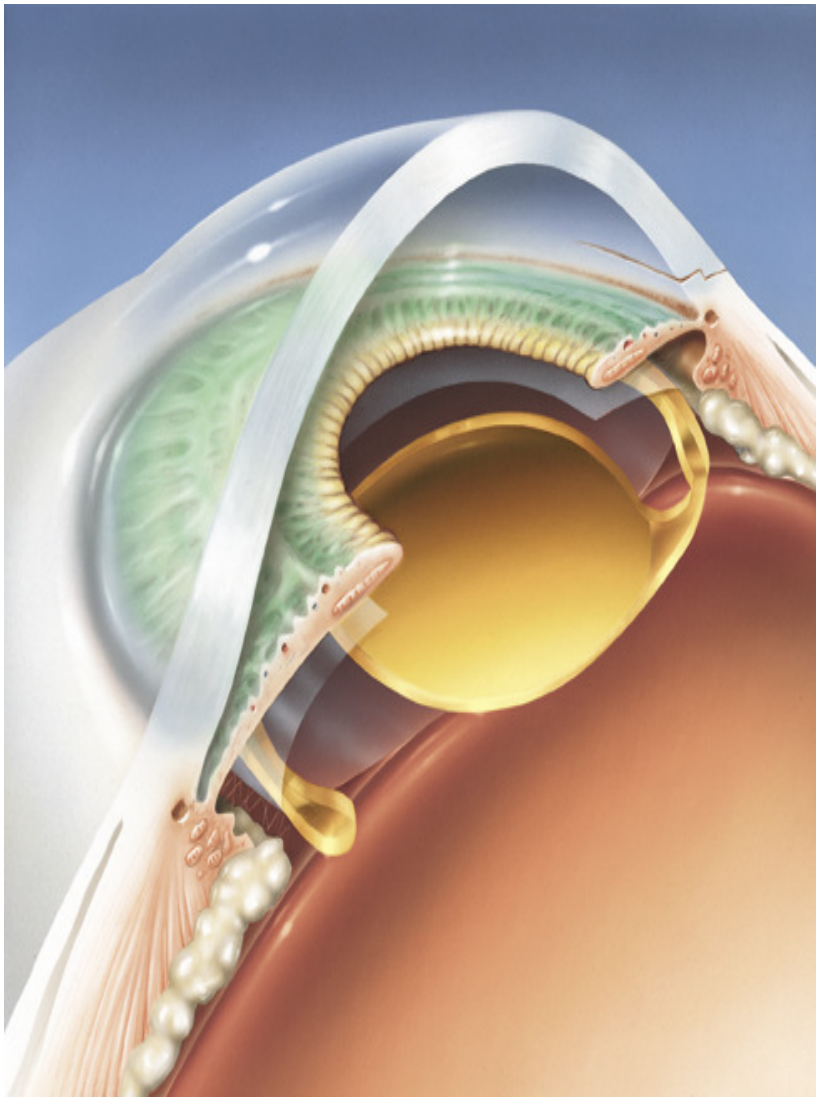
# Phaco – small incision



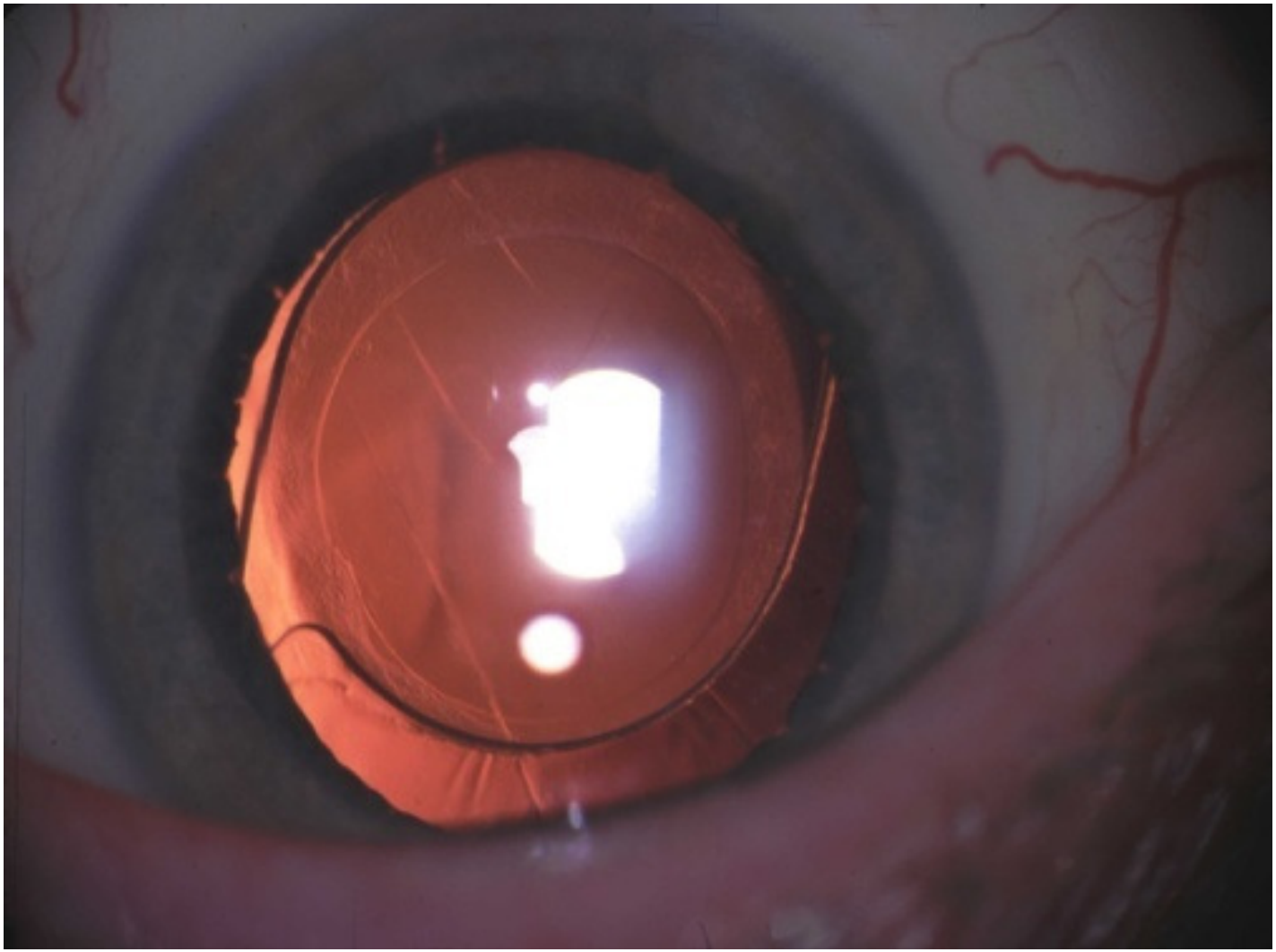


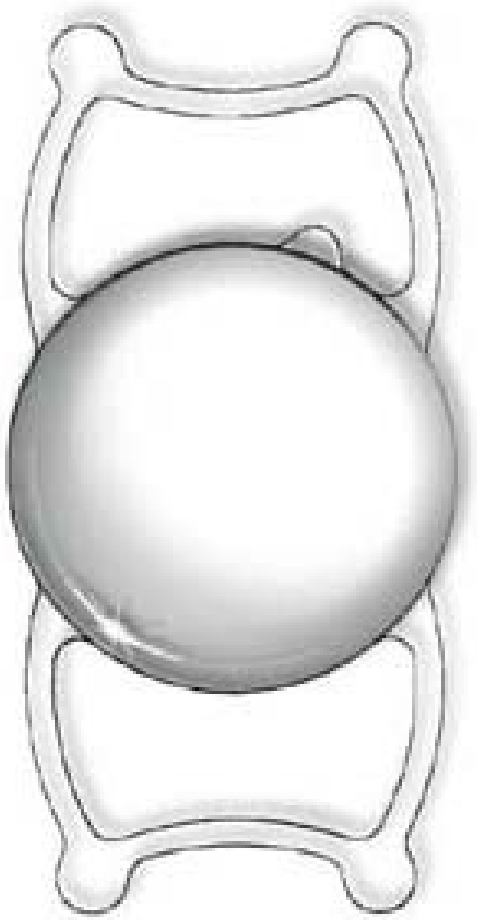


植入晶體



晶體已成功植入眼內





# Cataract *Phacoemulsification*

Advantage over the previous type of technique

- ***Rapid visual rehabilitation***
  - No blockade to the optic nerve
  - Rapid stabilization of the wound, least astigmatism
- ***More stable wound configuration***
  - Less wound rupture upon trauma
- ***Safer*** *in experienced hands*
- ***Faster***

# Cataract - complications

- Intra-operative
  - rupture of the posterior capsule leading to vitreous loss - 3% (or dropping of nucleus into the vitreous)
- Post-operative (all infrequent)
  - endophthalmitis - an ophthalmic emergency as a delay in treatment may lead to blindness - 0.1%
  - haemorrhage, uveitis, glaucoma, macular oedema, retinal detachment
  - opacification of posterior lens capsule (usually late)
  - astigmatism - sutures too tight
  - iris prolapse
  - wound rupture

# Posterior capsule opacification

- Some patients develop opacification of the clear posterior capsule months or years following surgery
- If the vision is significantly reduced then laser treatment (Nd:YAG laser - an out patient procedure) is required to make a hole in the posterior capsule to clear the visual axis (laser rates less than 10% of all procedures)

# Glaucoma (青光眼)

**Definition**

**Optic neuropathy with characteristic optic nerve head and visual field changes**

**Raised IOP is a risk factor**

Commonest cause of permanent blindness

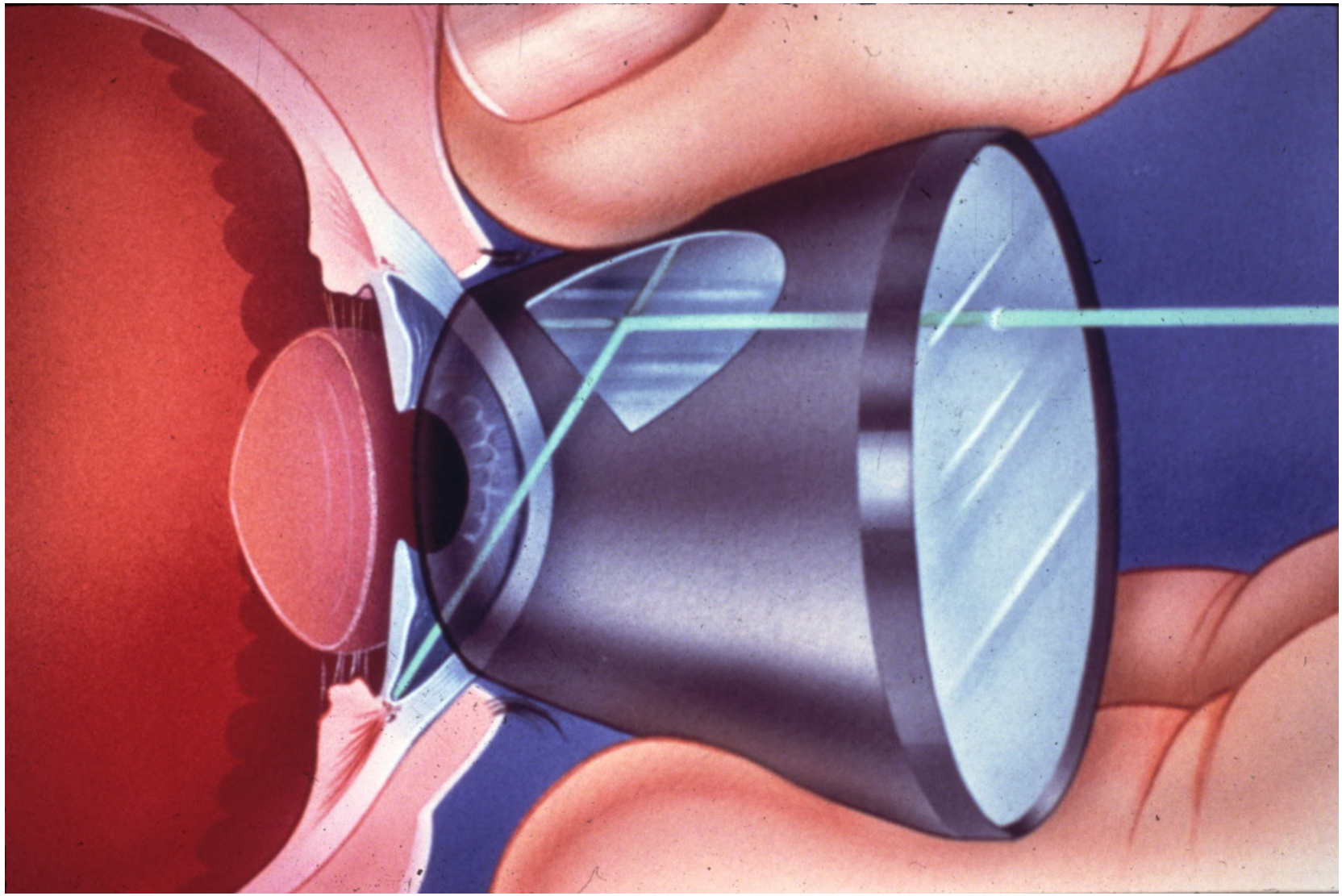
1 in 30

Age > 40

# Glaucoma

## Classification

- **Primary vs Secondary**
- **Acute vs Chronic**
- **Open angle vs Close angle (Gonioscopy)**
- **Congenital vs Juvenile-onset vs Adult-onset**



# Types of Glaucoma

- Primary Open Angle Glaucoma (POAG)
- Primary Acute Angle Closure Glaucoma
- Secondary Glaucoma
  - e.g. inflammatory, traumatic, neovascular
- Congenital Glaucoma

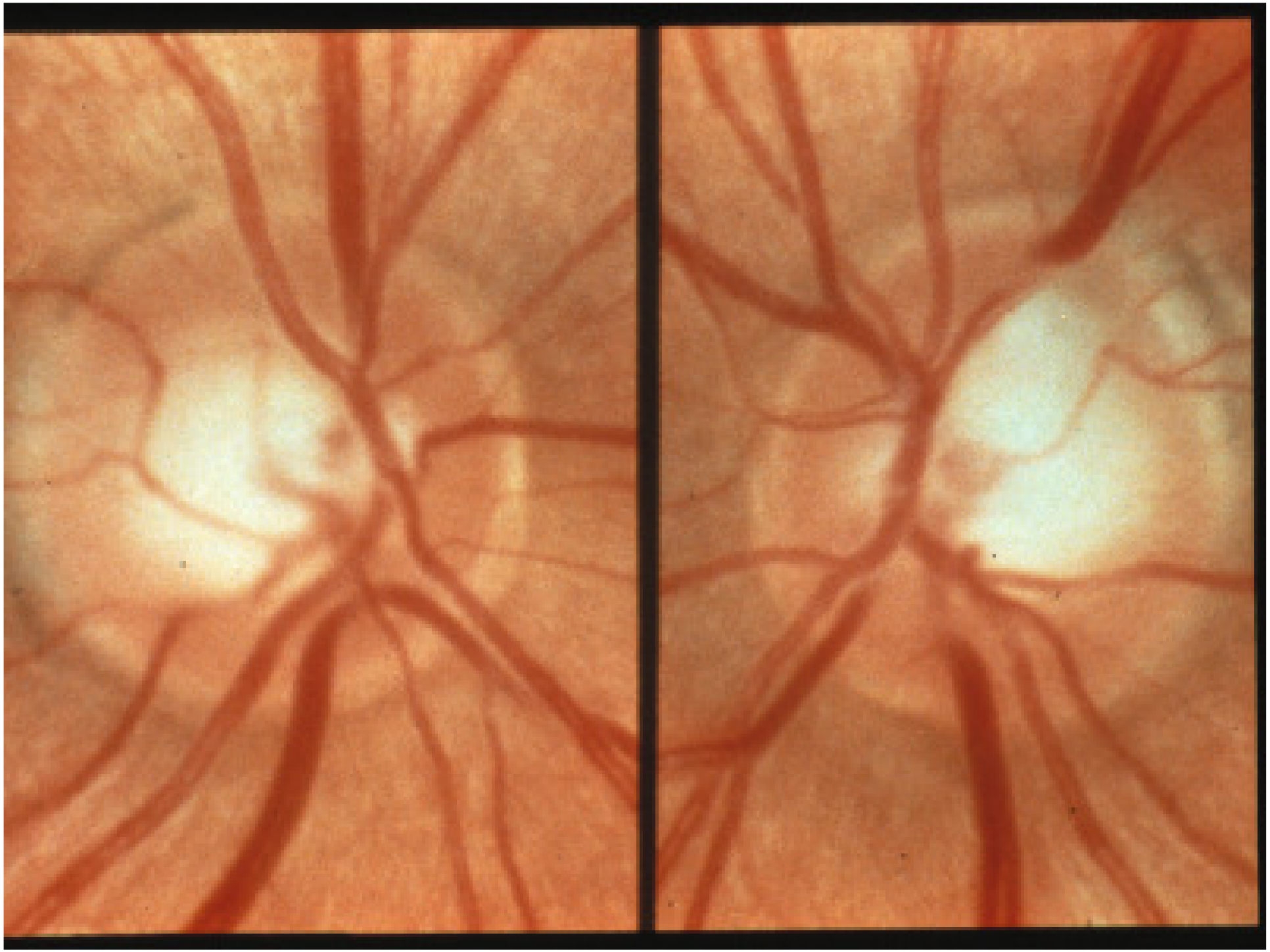
# Scenario 1

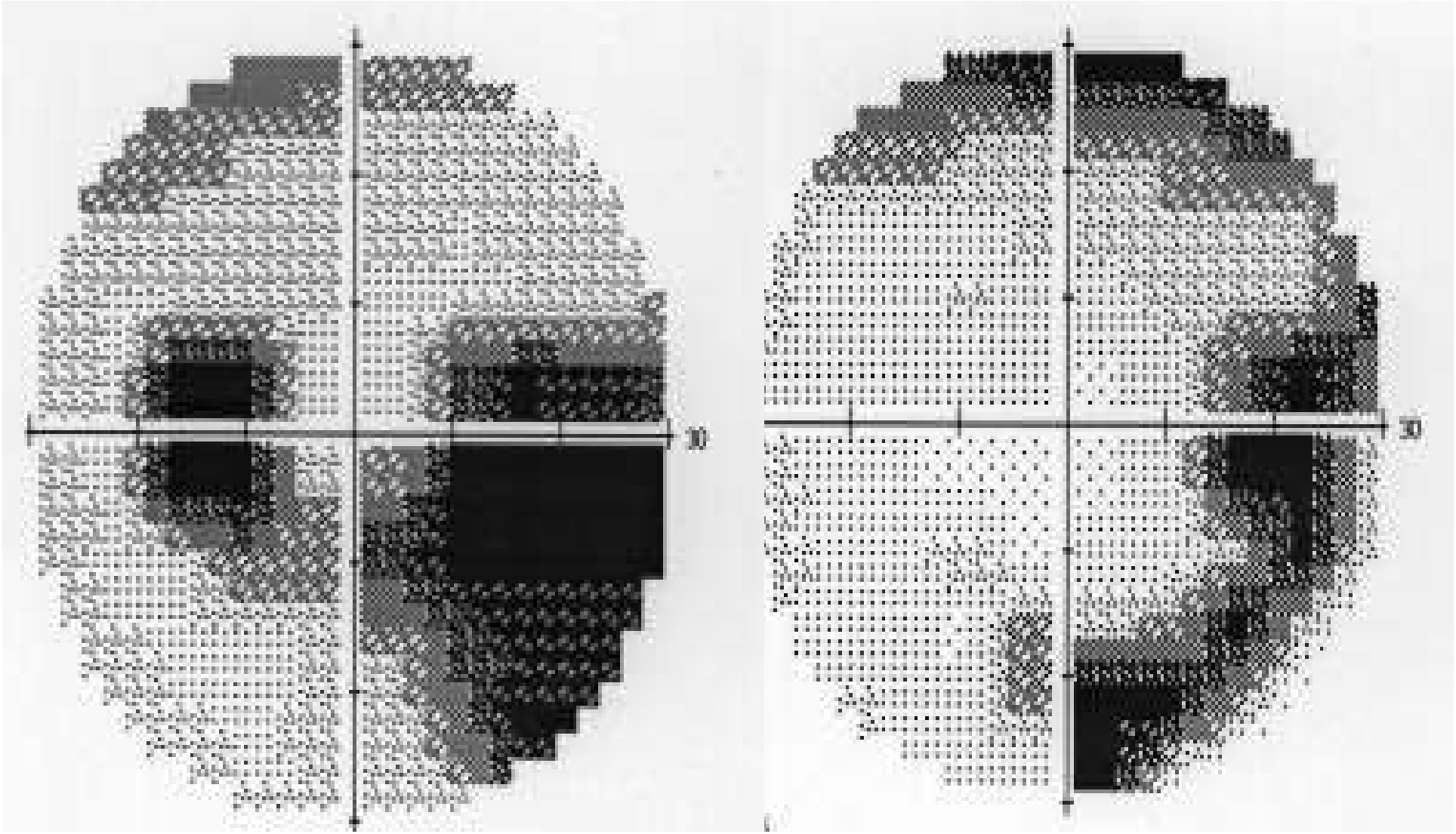
**38 year-old photographer**

- **Left eye visual field defect noted for a year while looking through the view-finder**
- **Uncle was blind at around age 40**

# Scenario 1

| | | |
|---|---|---|
| VA | *OD* 20/20 | *OS* 20/20 |
| IOP | *OD* 30 mmHg | *OS* 36 mmHg |




30
30

# Take Home Message Number 1

- **Patients with glaucoma are usually asymptomatic**
- **Optic nerve damage is irreversible**
- **Screening, early diagnosis and treatment are very important**

# Intraocular Pressure (IOP)

- To maintain the integrity of the eyeball
- To establish the flow of aqueous humour

# Intraocular Pressure (IOP)

- Balance between the formation and outflow of aqueous humour (房水)
- Mean IOP : 16 mmHg
  (SD 3 mmHg)
- “Normal” Range : 10-22 mmHg
- Target pressure : individualized

# Intraocular Pressure (IOP)

1. The higher the IOP, the higher the risk of developing glaucoma

2. The lower the IOP is being controlled, the slower the progression of glaucoma

# Intraocular Pressure (IOP)

3. The only proven modality for the control of glaucoma

4. Better communication with patients to achieve treatment compliance


Visual Field Loss
Intraocular Pressure
GLAUCOMA
Optic Nerve Damage

# Primary Open Angle Glaucoma (POAG)

# POAG

- POAG is a syndrome
  - raised IOP > 21 mmHg (IOP normal range 10-21 mmHg)
  - open aqueous drainage angle i.e. no macroscopic blockage of aqueous outflow
  - pathologically cupped optic disc
  - glaucomatous visual field loss

# POAG

## Groups at risk

- Elderly
- Blacks
- Family history
- IOP > 21 mmHg
- Others: high myopia, cardiovascular disease, DM

# POAG

## Assessment

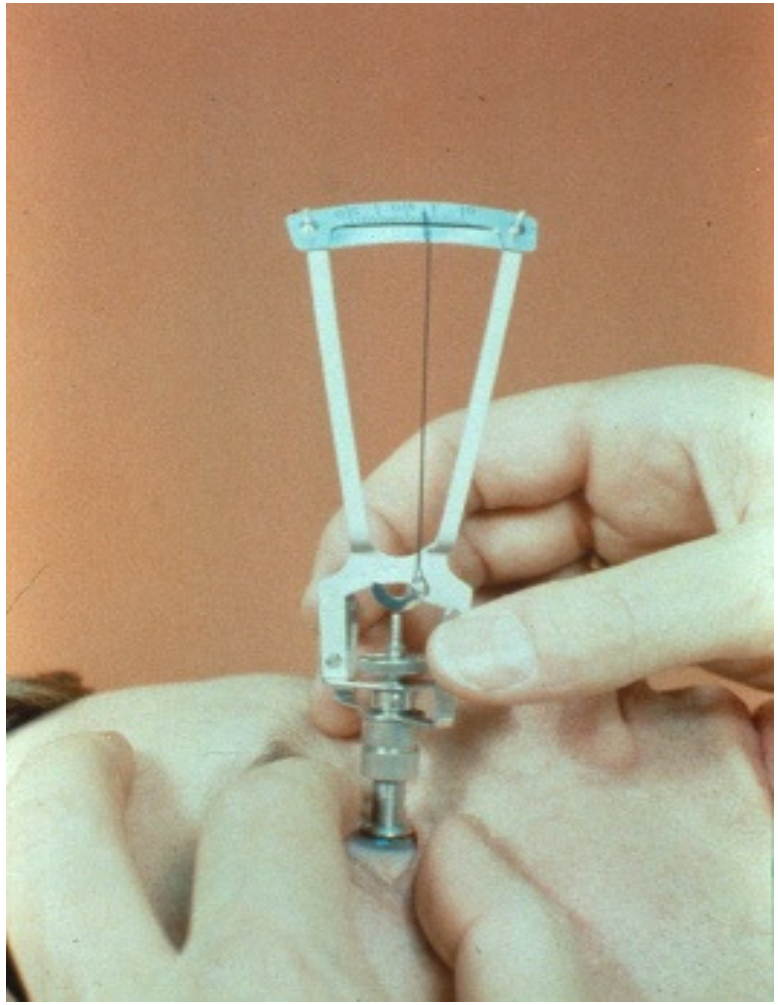
- Measure intraocular pressure (IOP)
- Evaluate optic disc
- Visual field analysis

# POAG

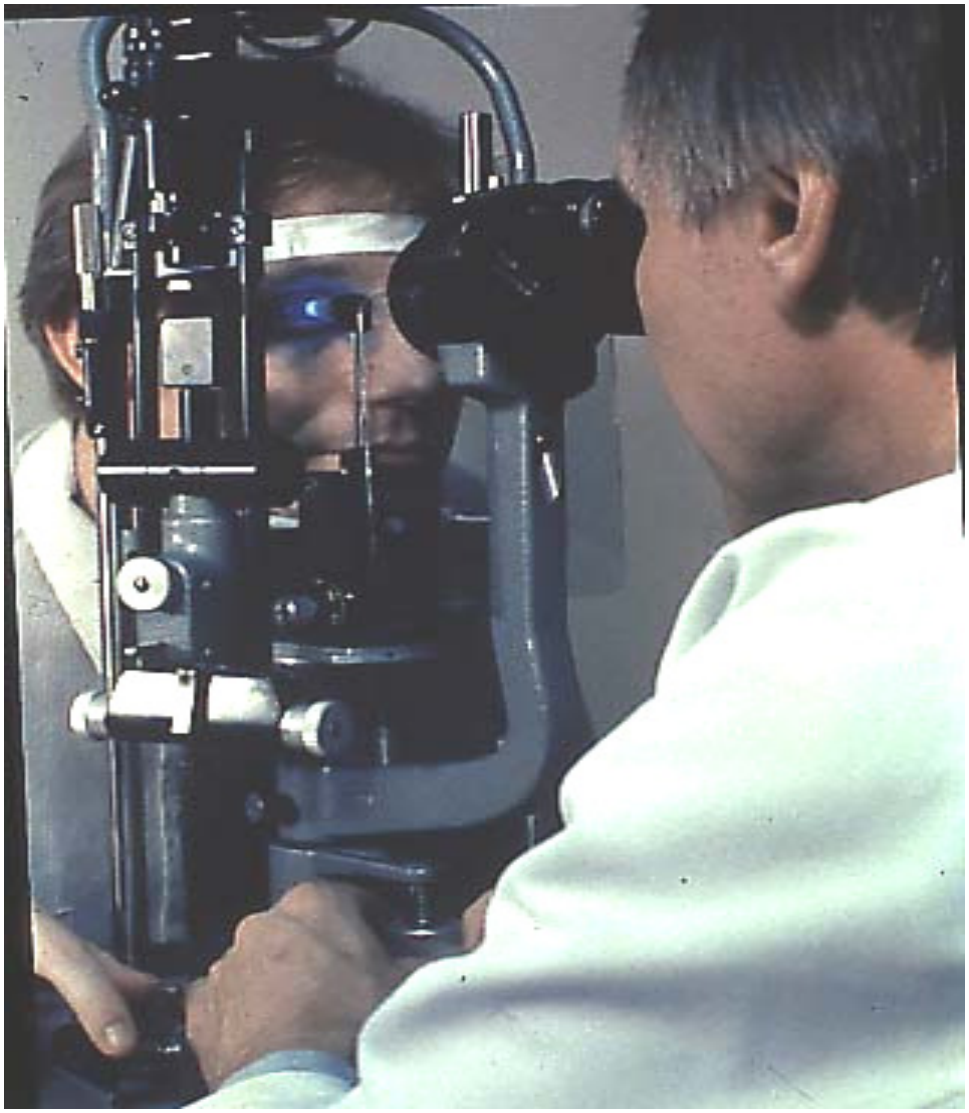
## IOP Measurement

- Digital palpation
- Schiotz Tonometry
- Goldmann Applanation Tonometry
- Electronic Tonopen
- Non-contact Tonometer (NCT)
- Pressure Phosphene Tonometer

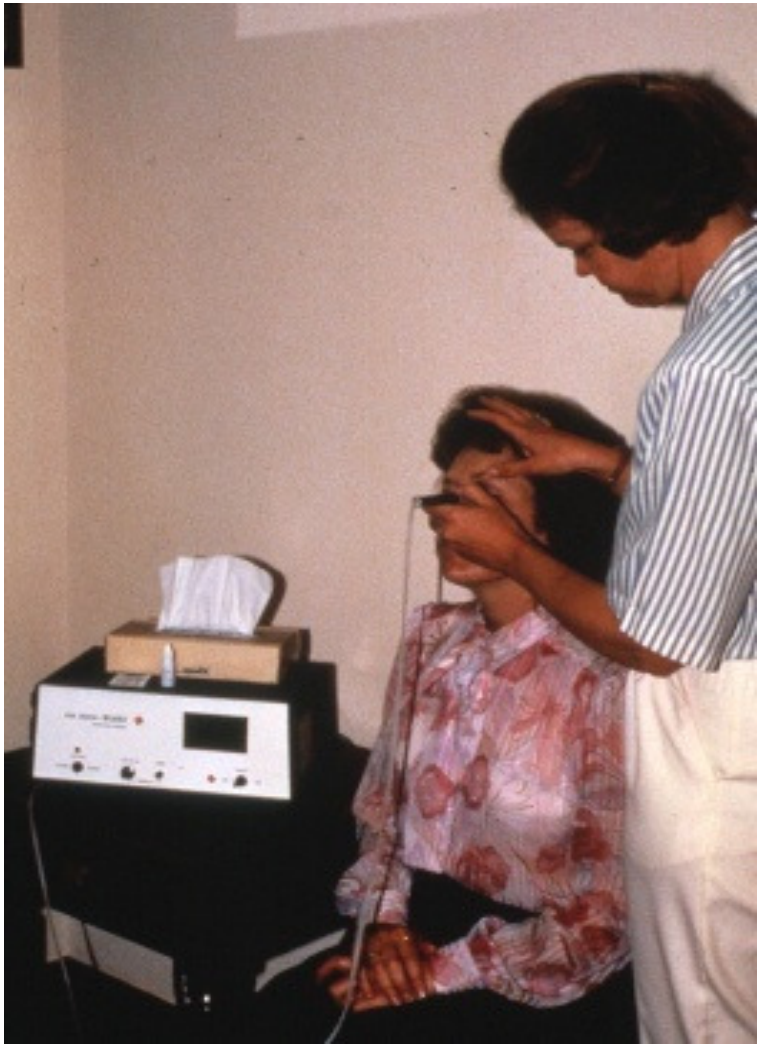
# Schiotz Tonometry



# Goldmann Applanation Tonometry



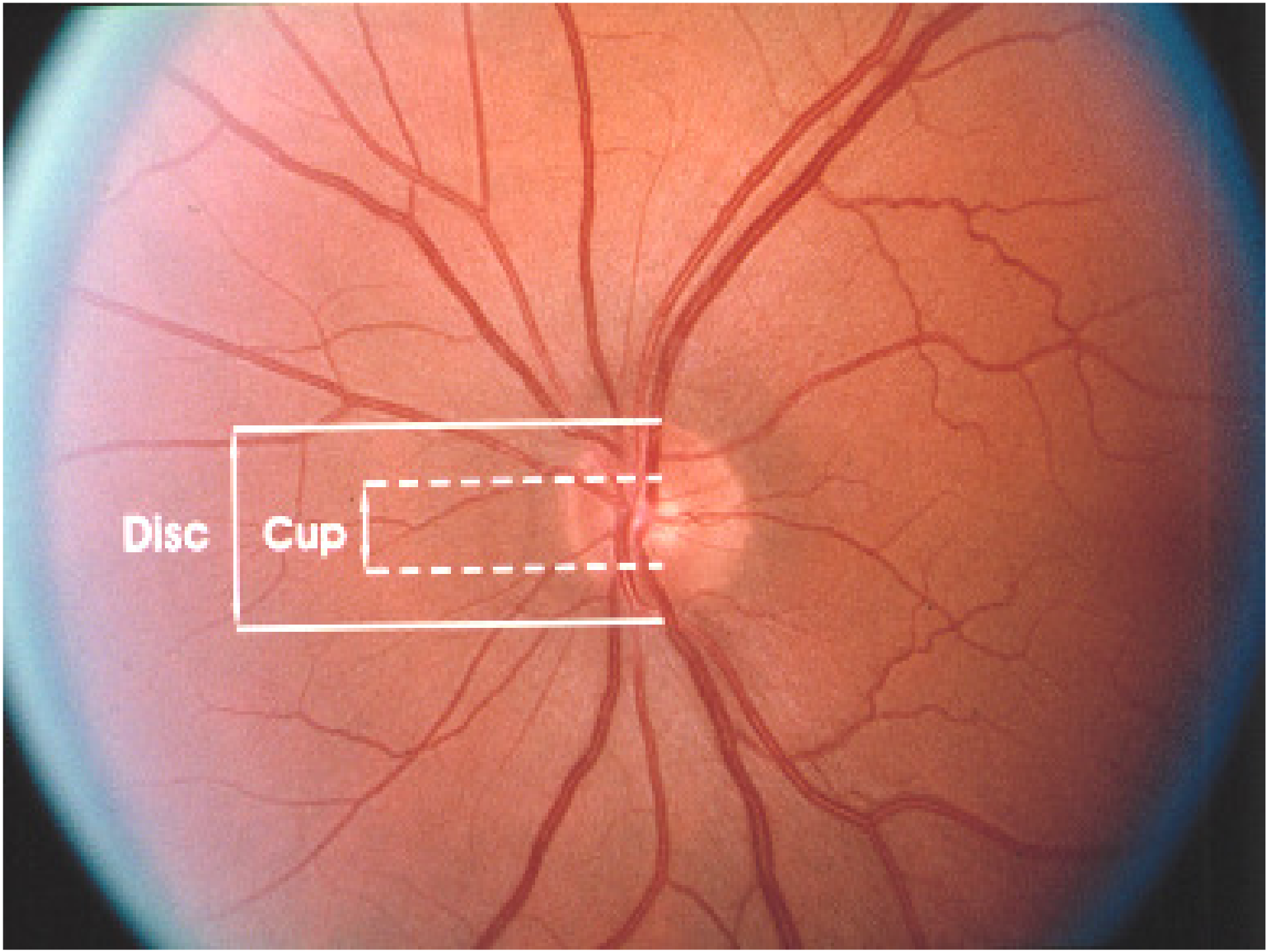
# Electronic Tonometry



# POAG

## Assessment

- Measure intraocular pressure (IOP)
- Evaluate optic disc
- Visual field analysis

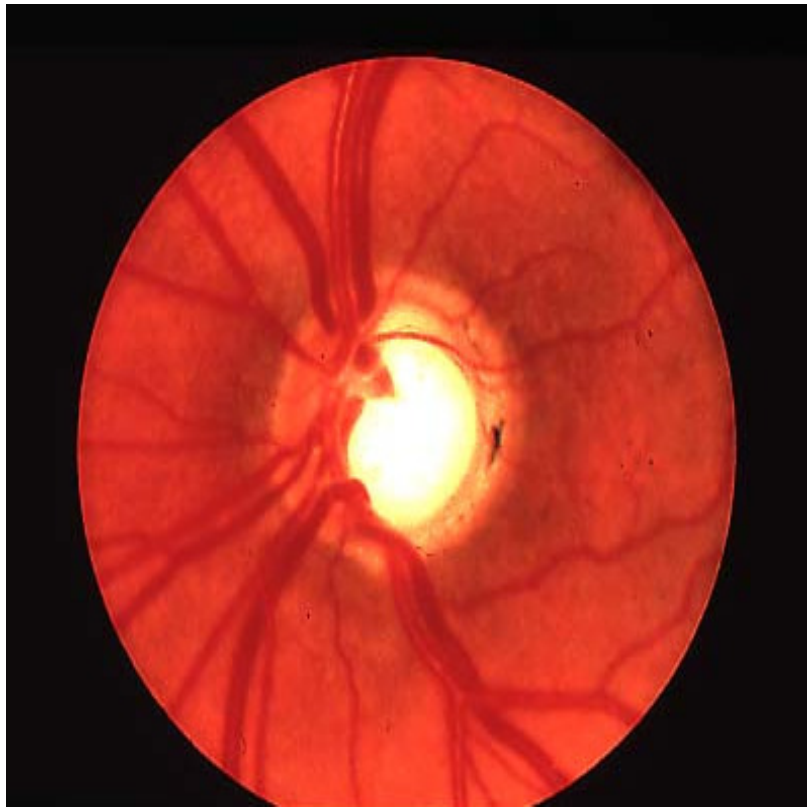

Disc
Cup

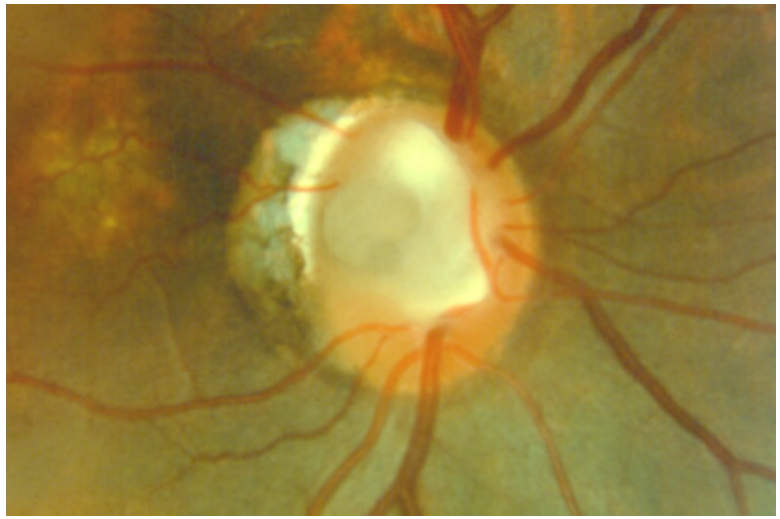
# POAG

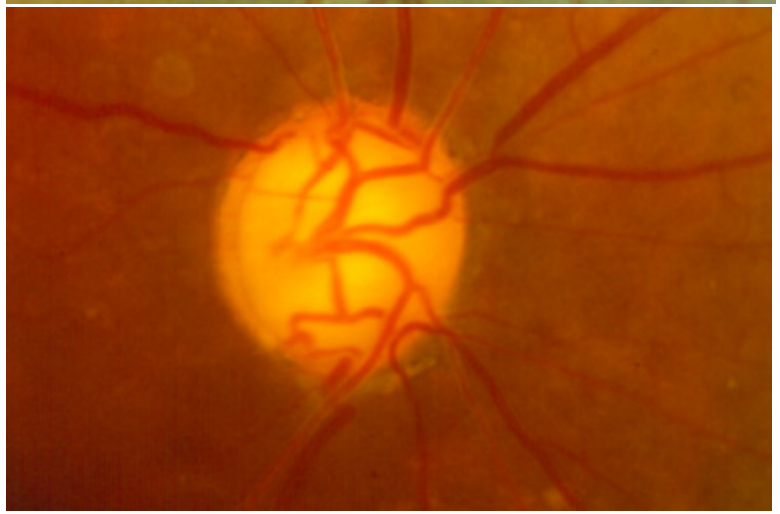
## Optic nerve head changes

- Increased size of the cup
- Progressive loss of neural rim tissue
- Disc hemorrhages
- Loss of nerve fibers

# Glaucomatous Optic Disc Changes





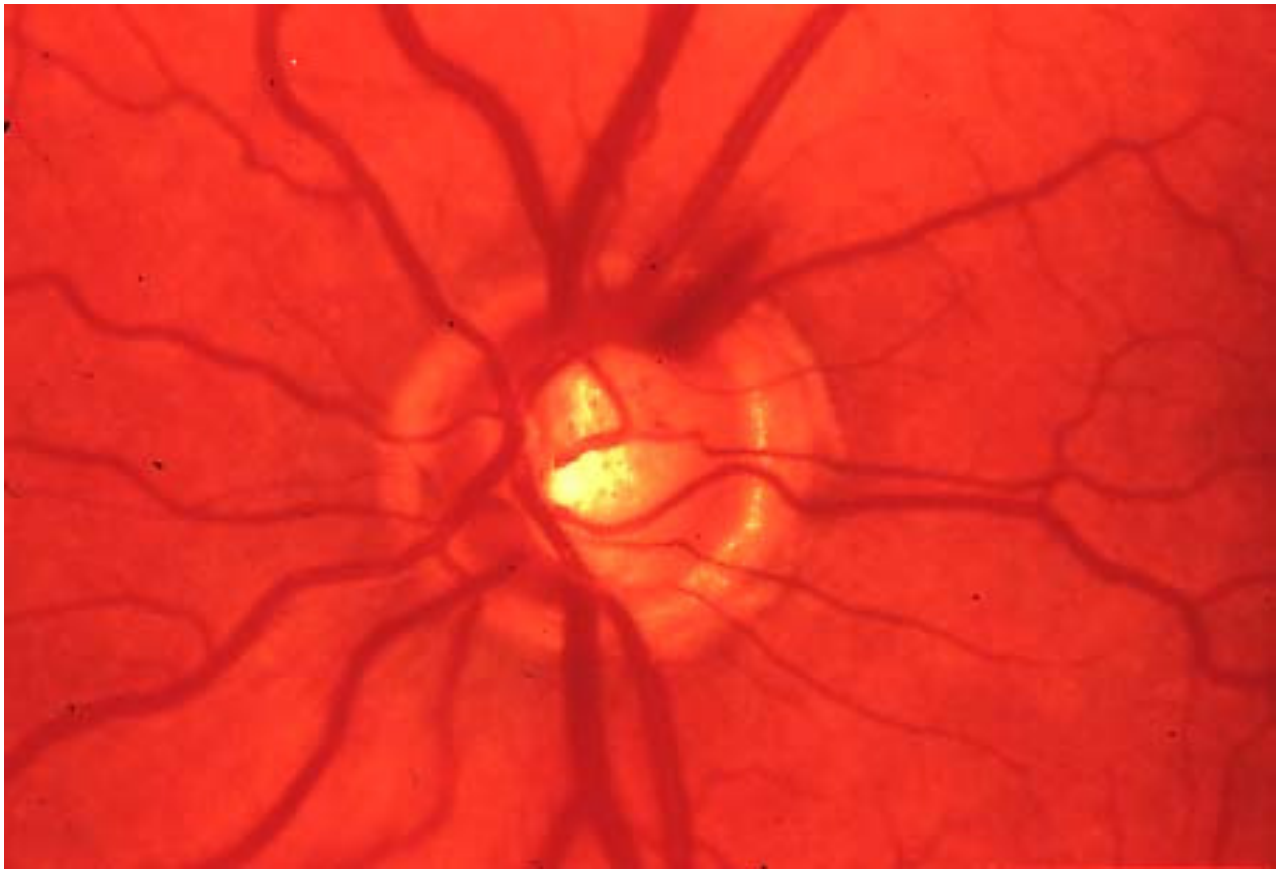


# POAG

## Optic nerve head changes

- Increased size of the cup
- Progressive loss of neural rim tissue
- Disc hemorrhages
- Loss of nerve fibers

# Disc Hemorrhage

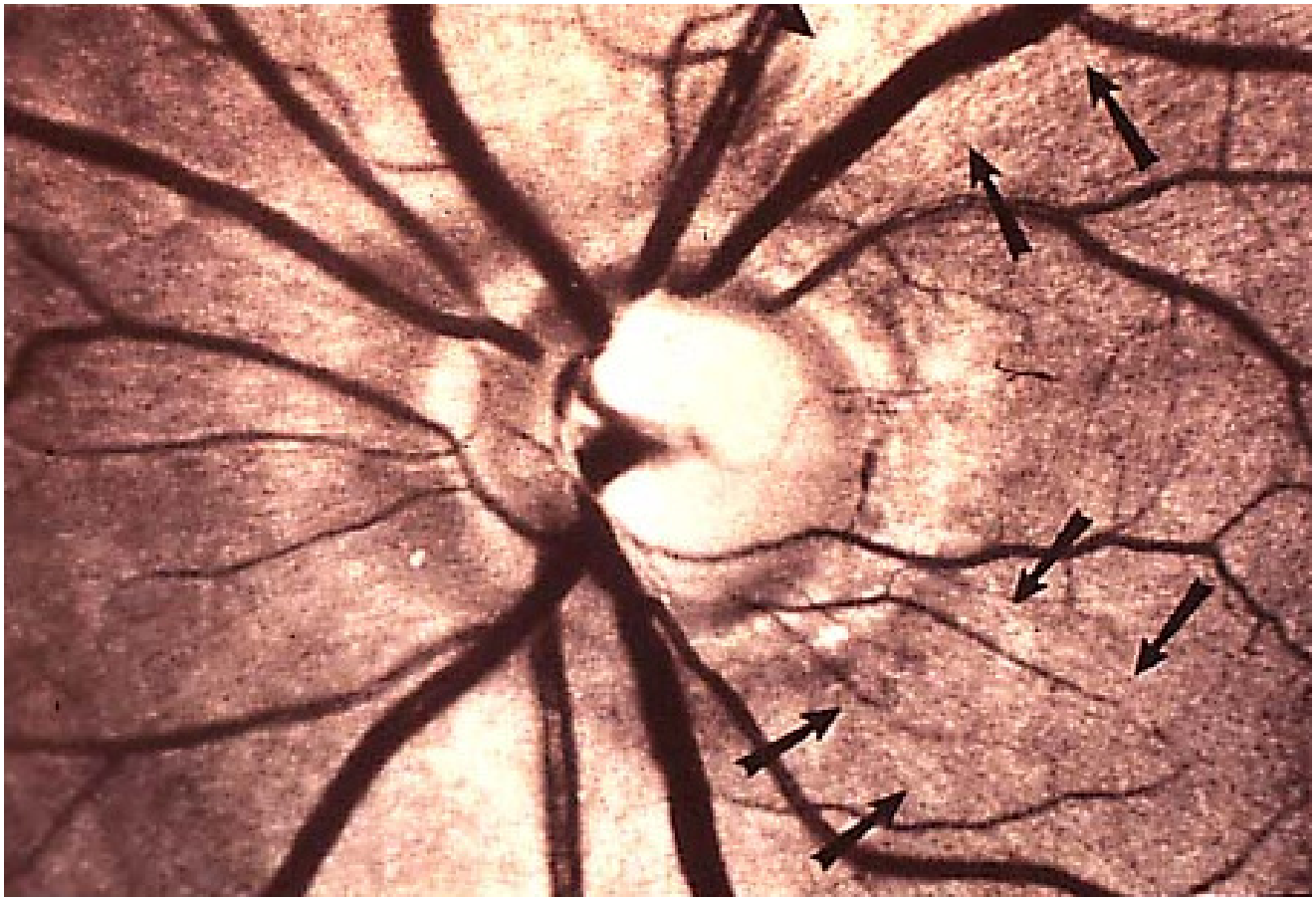


# POAG

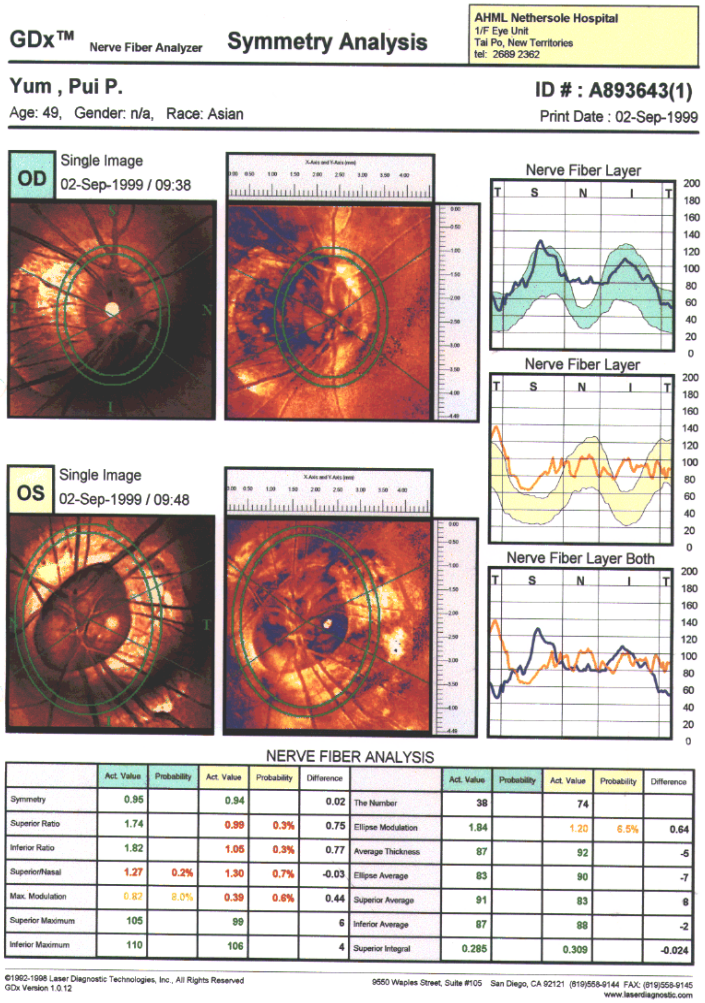
## Optic nerve head changes

- Increased size of the cup
- Progressive loss of neural rim tissue
- Disc hemorrhages
- Loss of nerve fibers

# Nerve Fiber Loss



# Nerve Fiber Analyzer (NFA)



GDx™ Nerve Fiber Analyzer **Symmetry Analysis**

AHML Nethersole Hospital
1/F Eye Unit
Tai Po, New Territories
tel: 2689 2362

**Yum , Pui P.**
Age: 49, Gender: n/a, Race: Asian

**ID # : A893643(1)**
Print Date : 02-Sep-1999

OD Single Image
02-Sep-1999 / 09:38

OS Single Image
02-Sep-1999 / 09:48

Nerve Fiber Layer

Nerve Fiber Layer

Nerve Fiber Layer Both

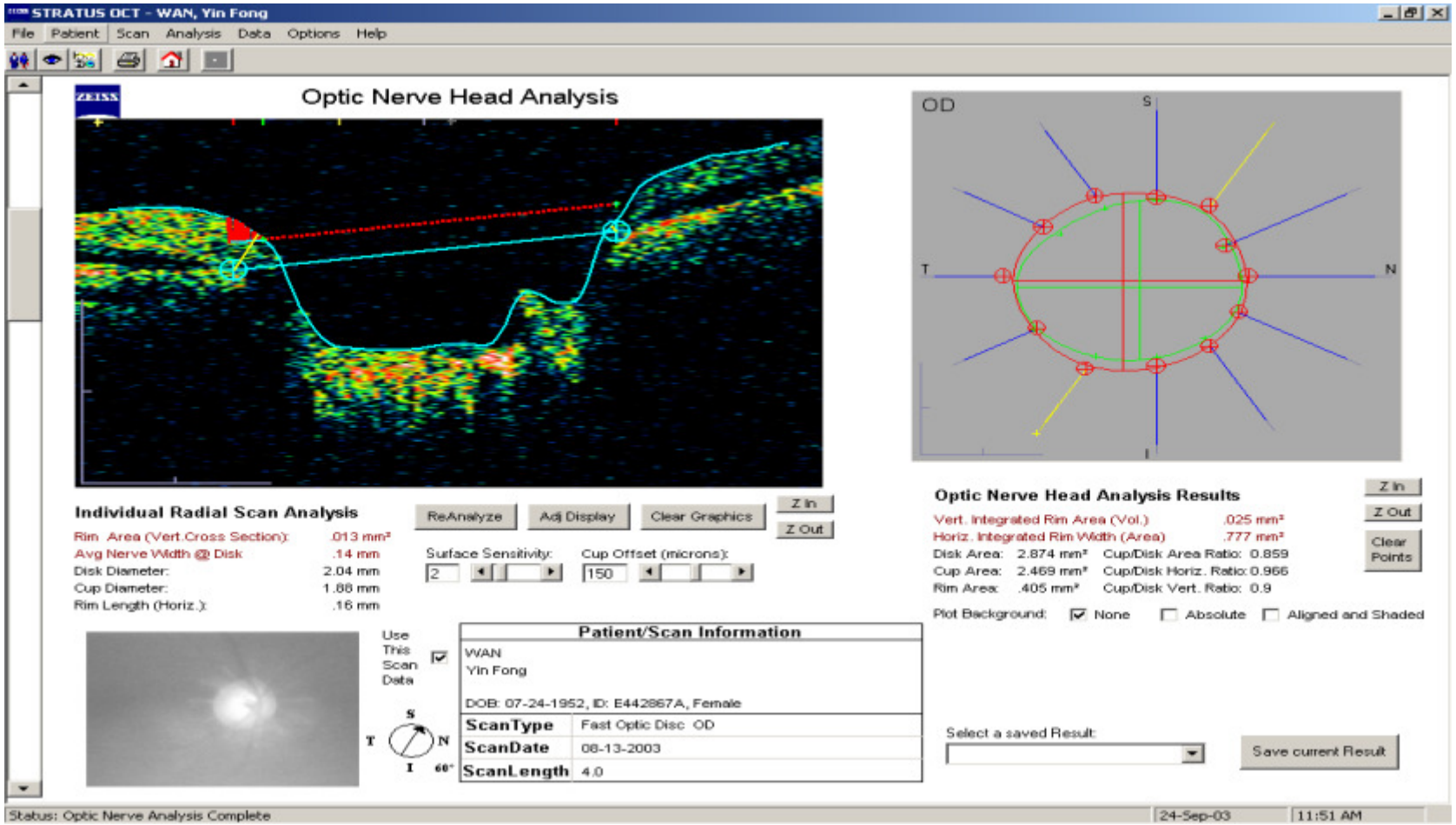
NERVE FIBER ANALYSIS

| | Act. Value | Probability | Act. Value | Probability | Difference | | Act. Value | Probability | Act. Value | Probability | Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Symmetry | 0.95 | | 0.94 | | 0.02 | The Number | 38 | | 74 | | |
| Superior Ratio | 1.74 | | 0.99 | 0.3% | 0.75 | Ellipse Modulation | 1.84 | | 1.20 | 6.5% | 0.64 |
| Inferior Ratio | 1.82 | | 1.05 | 0.3% | 0.77 | Average Thickness | 87 | | 92 | | -5 |
| Superior/Nasal | 1.27 | 0.2% | 1.30 | 0.7% | -0.03 | Ellipse Average | 83 | | 90 | | -7 |
| Max. Modulation | 0.82 | 8.0% | 0.39 | 0.6% | 0.44 | Superior Average | 91 | | 83 | | 8 |
| Superior Maximum | 105 | | 99 | | 6 | Inferior Average | 87 | | 88 | | -2 |
| Inferior Maximum | 110 | | 106 | | 4 | Superior Integral | 0.285 | | 0.309 | | -0.024 |


GDx Version 1.0.12

9550 Waples Street, Suite #105 San Diego, CA 92121 (619)558-9144 FAX: (619)558-9145
www.laserdiagnostic.com

# Optical Coherence Tomography (OCT)



# POAG

## Assessment

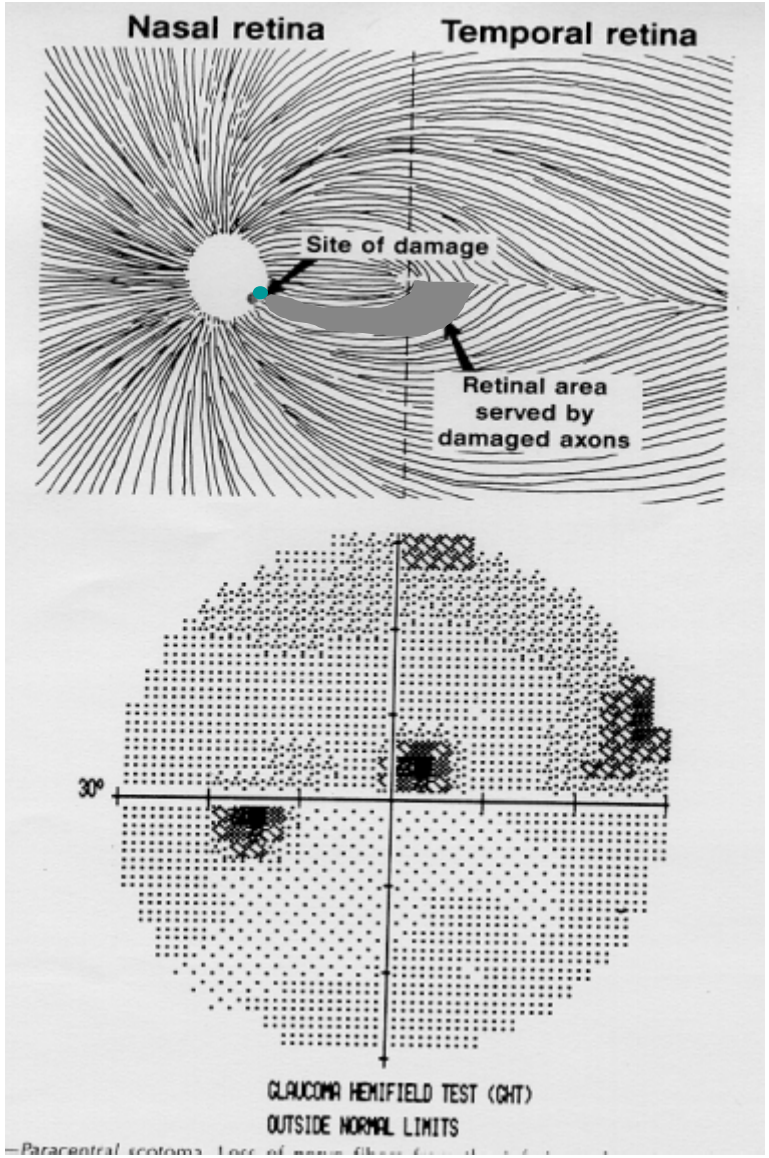
- Measure intraocular pressure (IOP)
- Evaluate optic disc
- Visual field analysis

# POAG

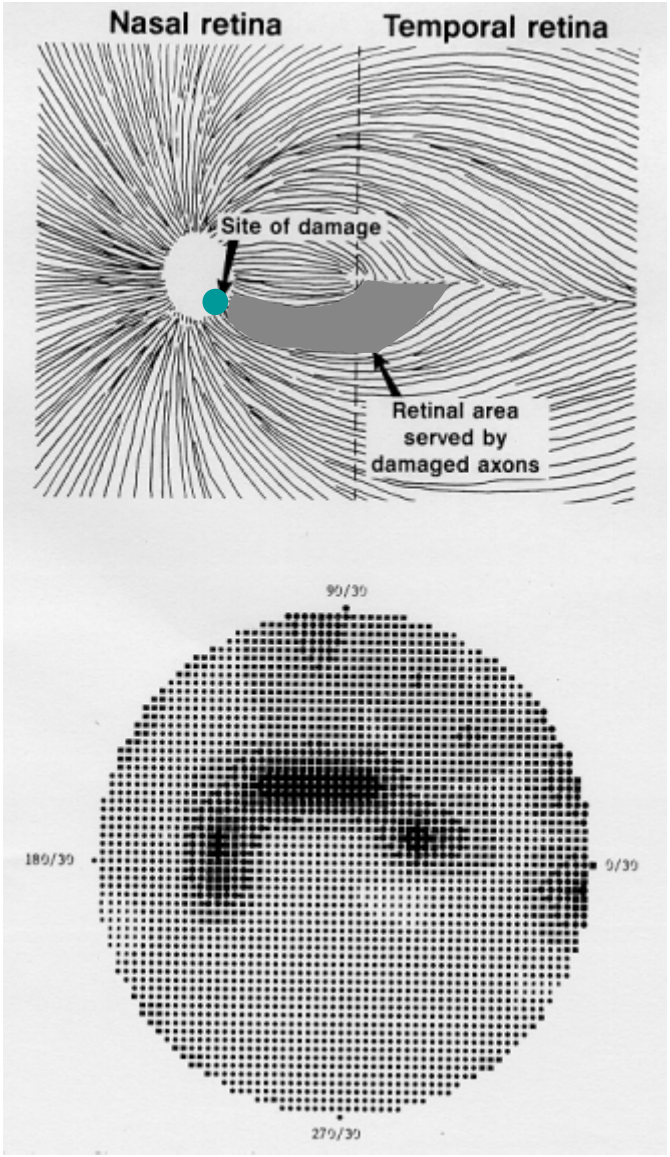
## Visual field changes

- Paracentral scotoma
- Arcuate scotoma
- Nasal step
- Temporal wedge
- Constricted field

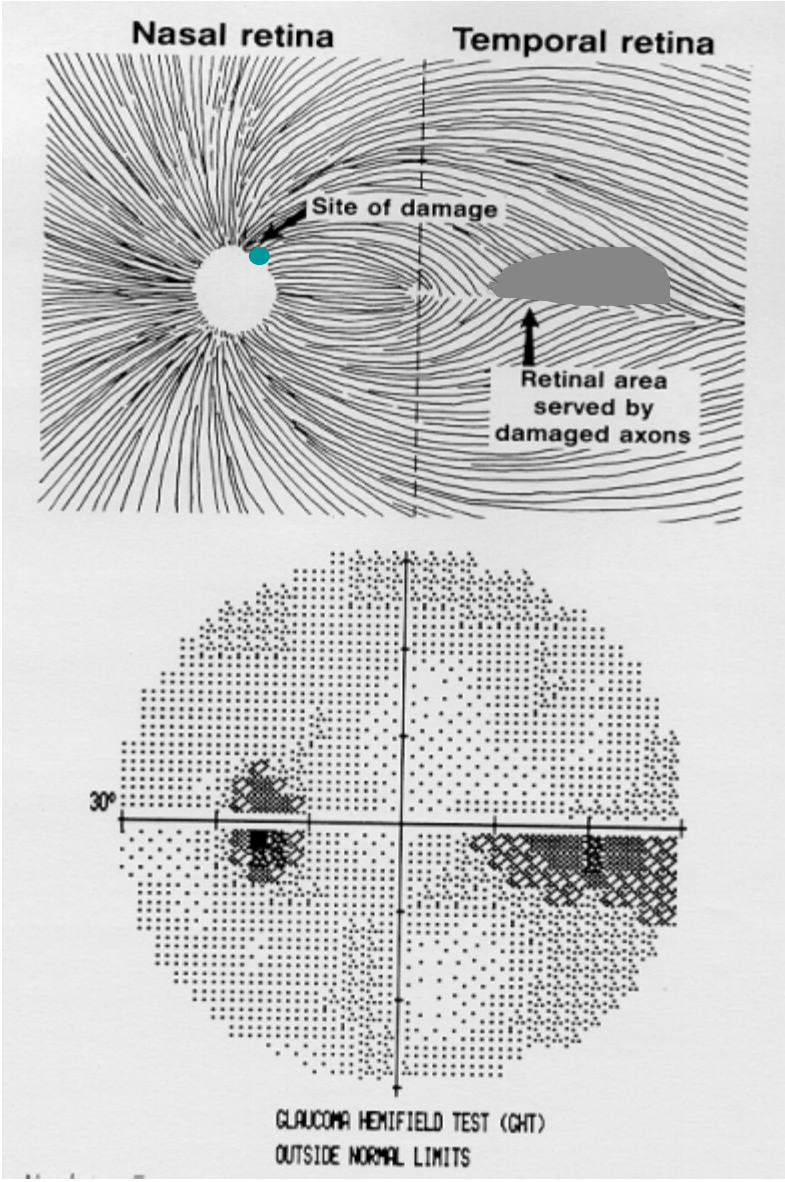
# Paracentral Scotoma



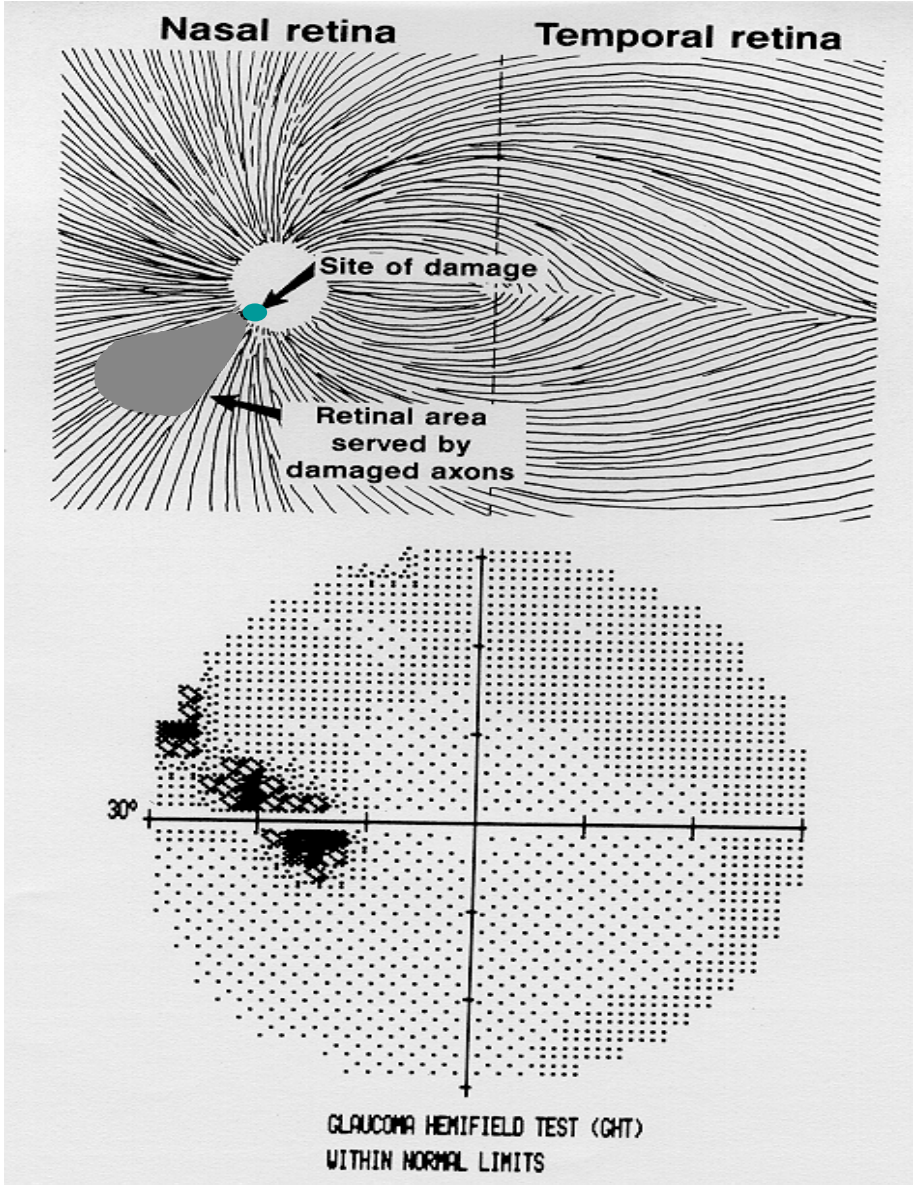
# Arcuate Bjerrum Scotoma



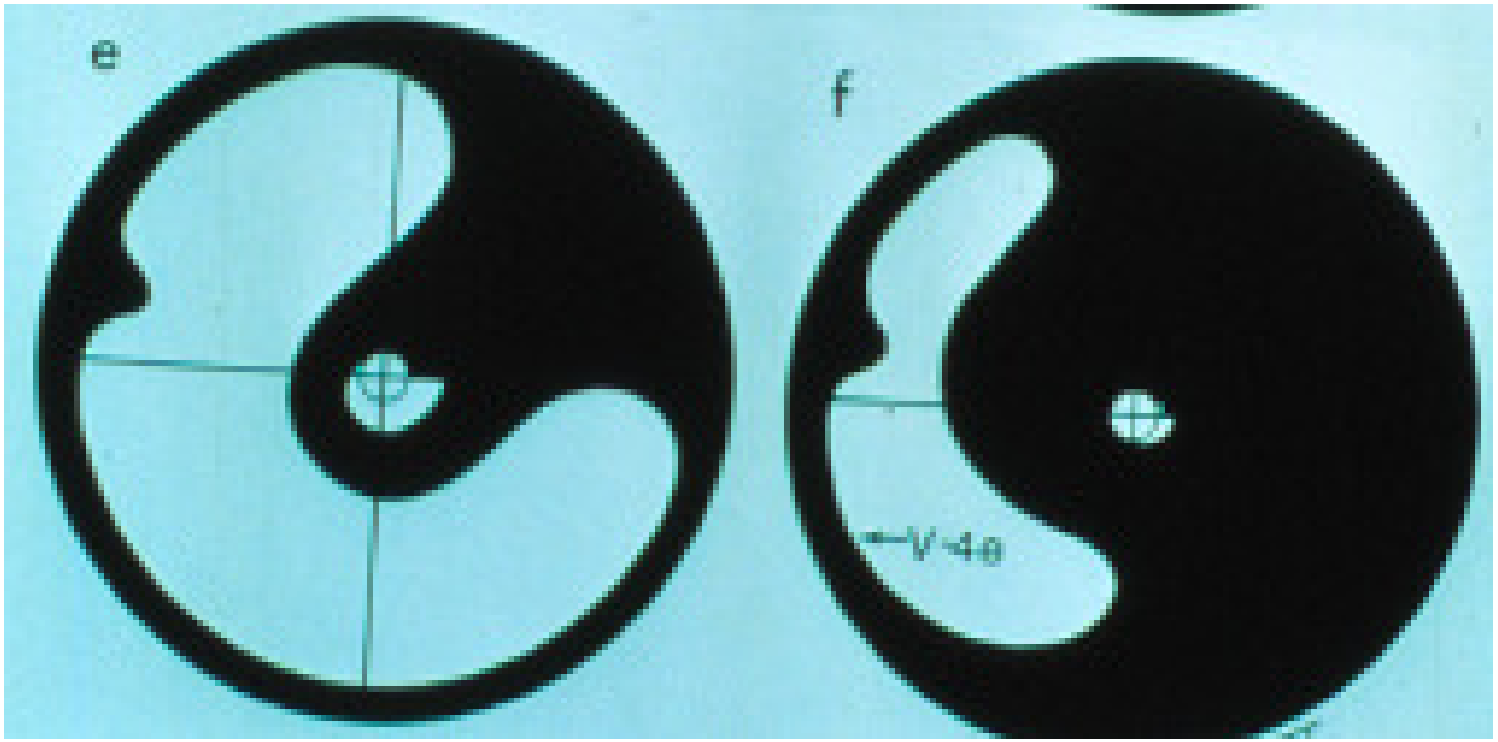
# Nasal Step


Nasal retina
Temporal retina
Site of damage
Retinal area
served by
damaged axons
30°
GLAUCOMA HEMIFIELD TEST (GHT)
OUTSIDE NORMAL LIMITS

# Temporal Wedge



# Tunnel Vision



# POAG

## Aim of treatment

- Stop further visual loss
- Stop further optic nerve damage

# POAG

## Mechanism of action

- Improve aqueous outflow
- Decrease aqueous production

# POAG

## Medical therapy

- Topical vs Systemic
- Proper technique
- Long-term therapy and cost
- Importance of compliance and patient education

# POAG

- Beta antagonists: timolol, betaxolol
- Alpha agonists: apraclonidine, brimonidine, dipivefrin
- Cholinergic agonists: pilocarpine
- Carbonic anhydrase inhibitors: brinzolamide, dorzolamide
- Prostaglandin analogs: latanoprost

# POAG

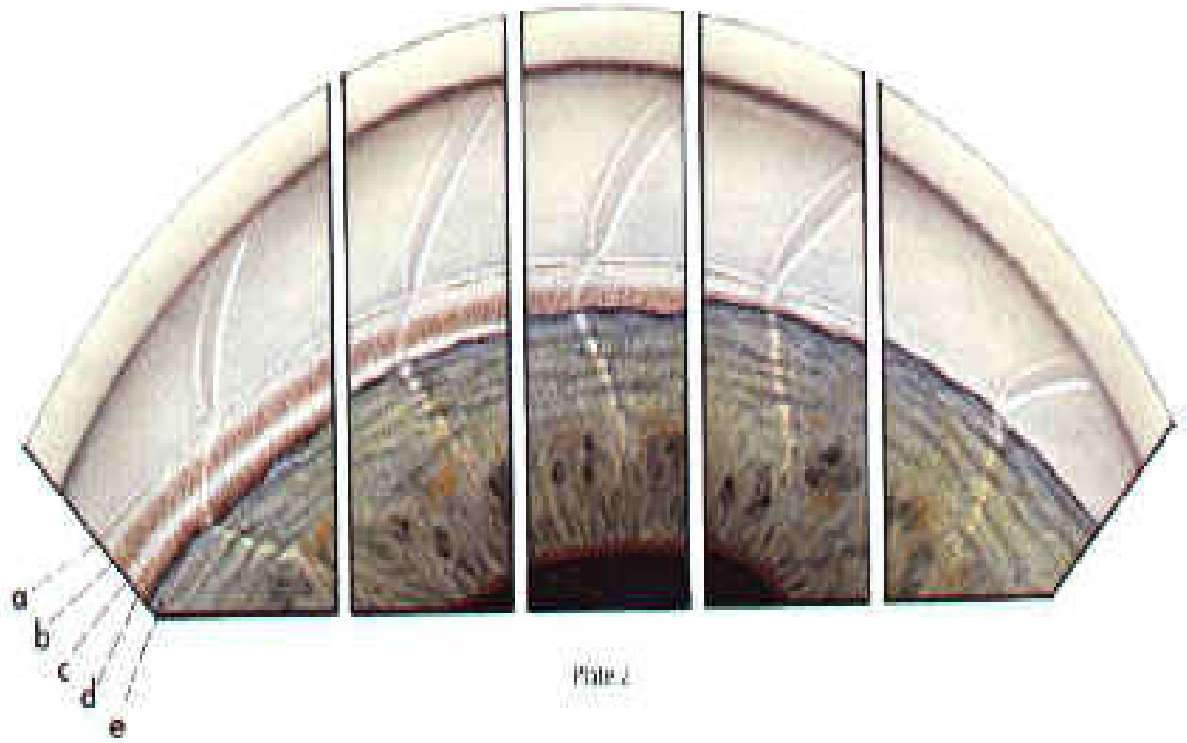
## Surgical therapy

- Laser surgery
- Filtering surgery
- Drainage device surgery
- Cyclodestructive surgery

# Laser Treatment

# Argon Laser Trabeculoplasty

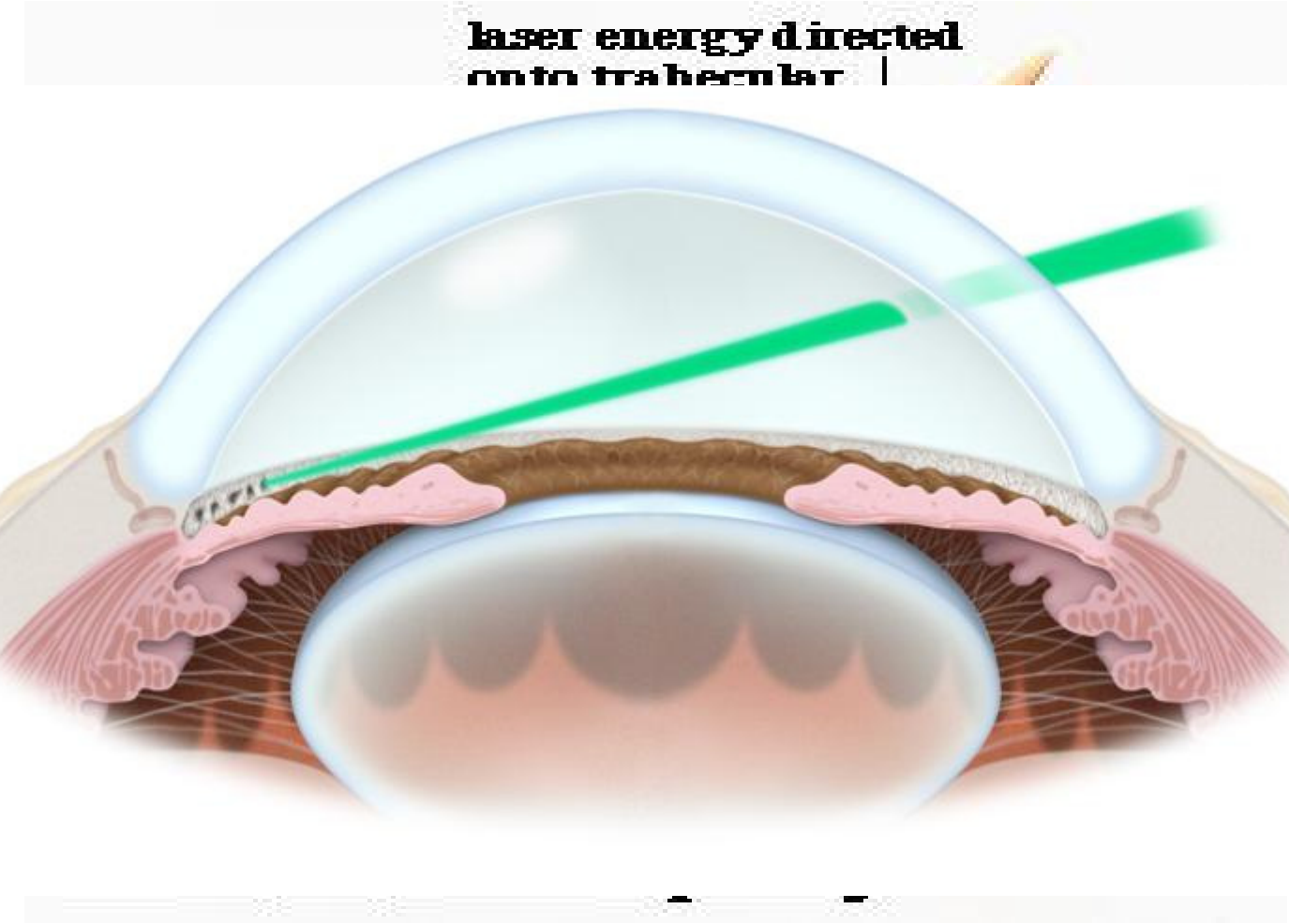
The angle



# Argon Laser Trabeculoplasty

The lens

# Argon Laser Trabeculoplasty

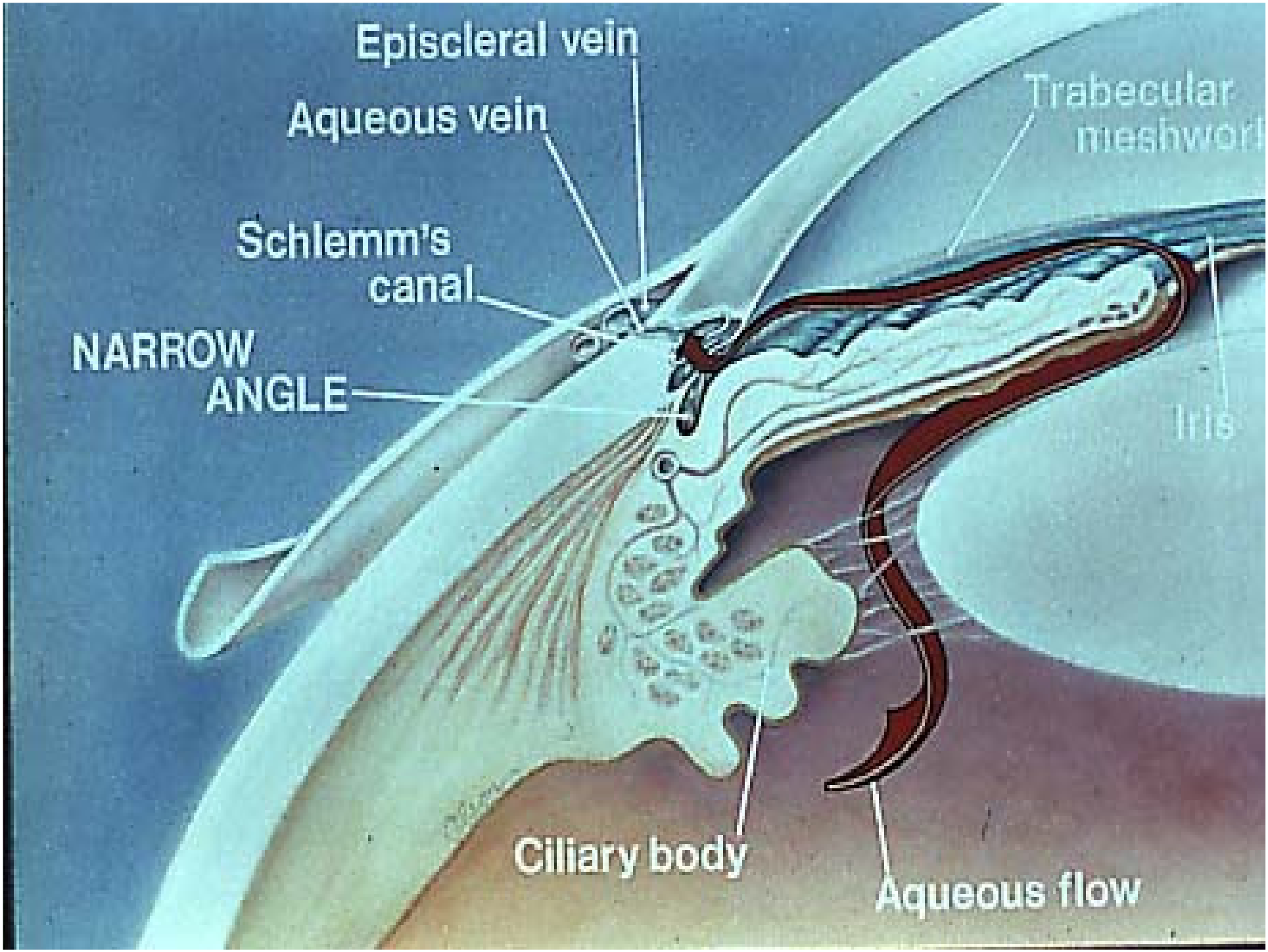


# POAG

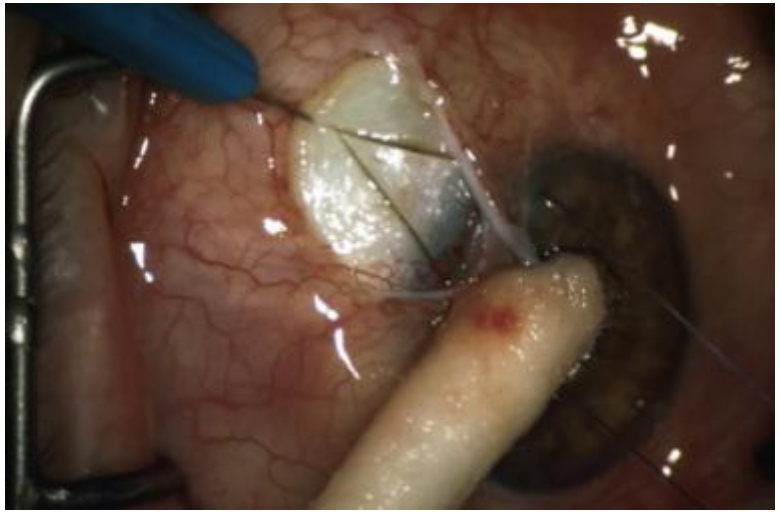
## Surgical therapy

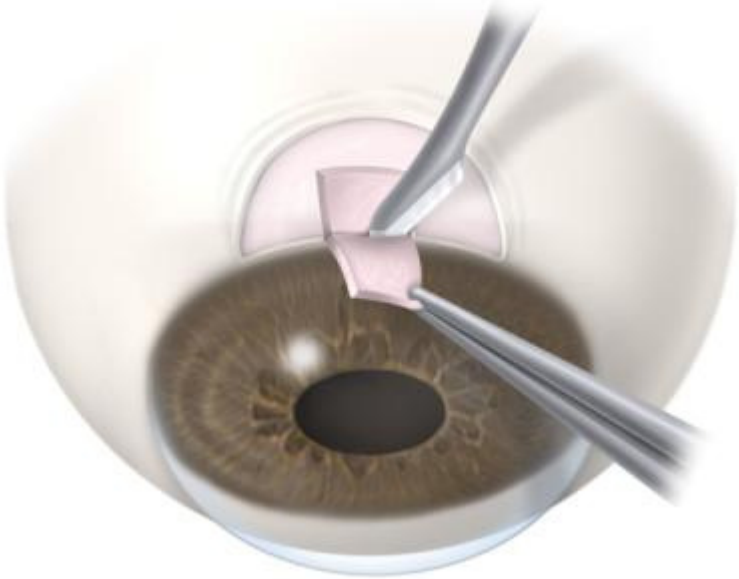
- Laser surgery
- Filtering surgery
- Drainage device surgery
- Cyclodestructive surgery

# Surgical Treatment


Episcleral vein
Aqueous vein
Trabecular meshwork
Schlemm's canal
NARROW ANGLE
Iris
Ciliary body
Aqueous flow

# Trabeculectomy



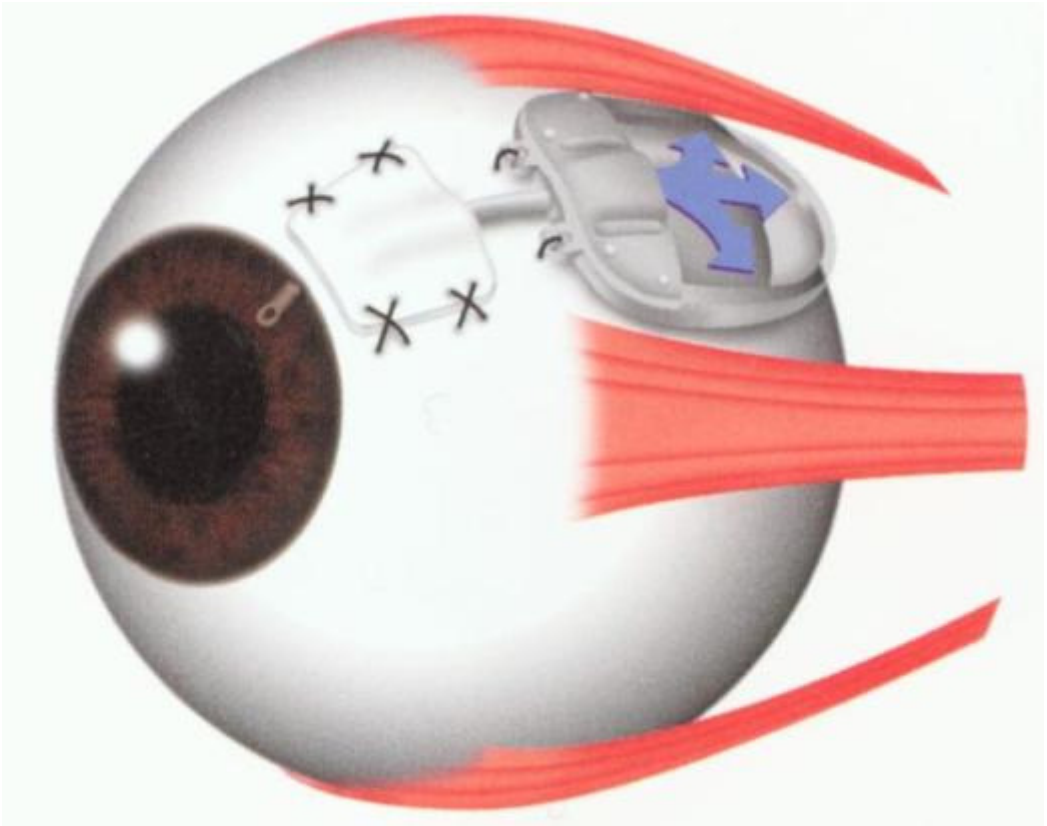


# POAG

## Surgical therapy

- Laser surgery
- Filtering surgery
- Drainage device surgery
- Cyclodestructive surgery

# Glaucoma Drainage Device
# (青光眼導管植入手術)



# POAG

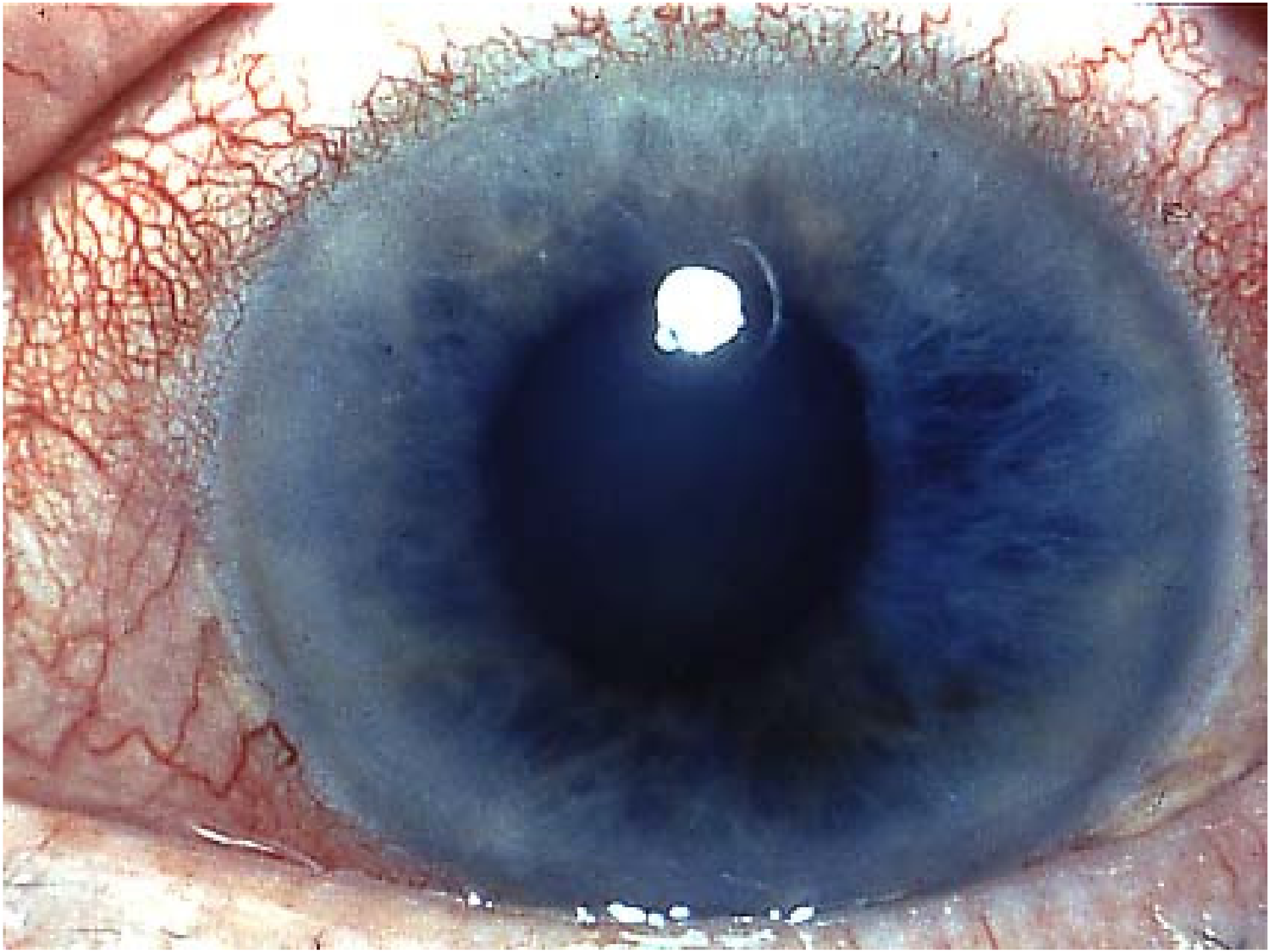
## Surgical therapy

- Laser surgery
- Filtering surgery
- Drainage device surgery
- Cyclodestructive surgery

# Scenario 2

**A 72 Year old lady c/o**

- **Excruciating left eye pain**
- **Headache**
- **Nausea and vomiting**
- **Redness**
- **Impaired vision**
- **Haloes around lights**



# Signs

- Conjunctival injection
- Corneal edema
- Fixed and mid-dilated pupil
- High IOP
- Glaukomflecken

# Acute Angle Closure Glaucoma

Ocular Emergency

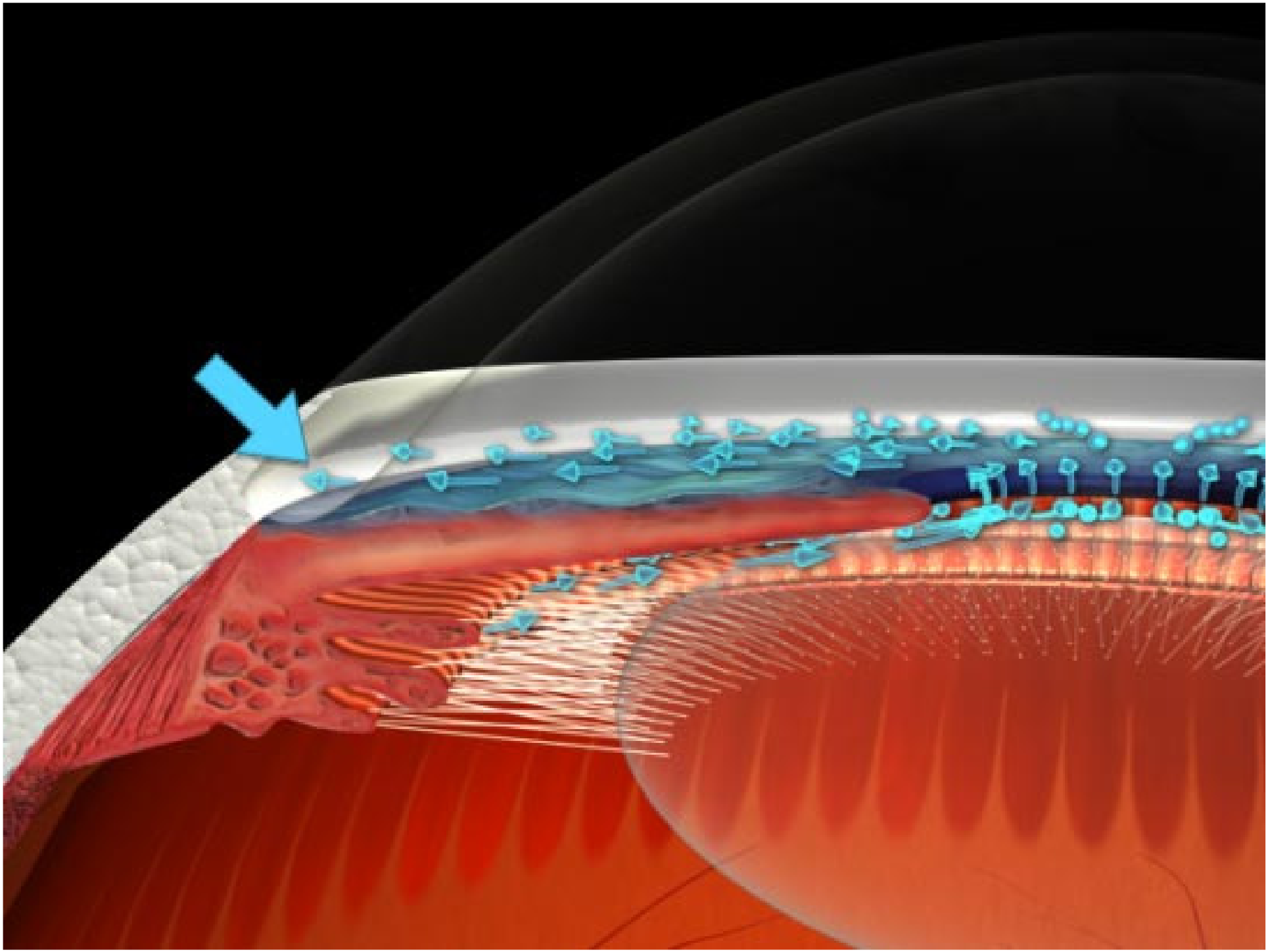
# **Acute Angle-closure Glaucoma**

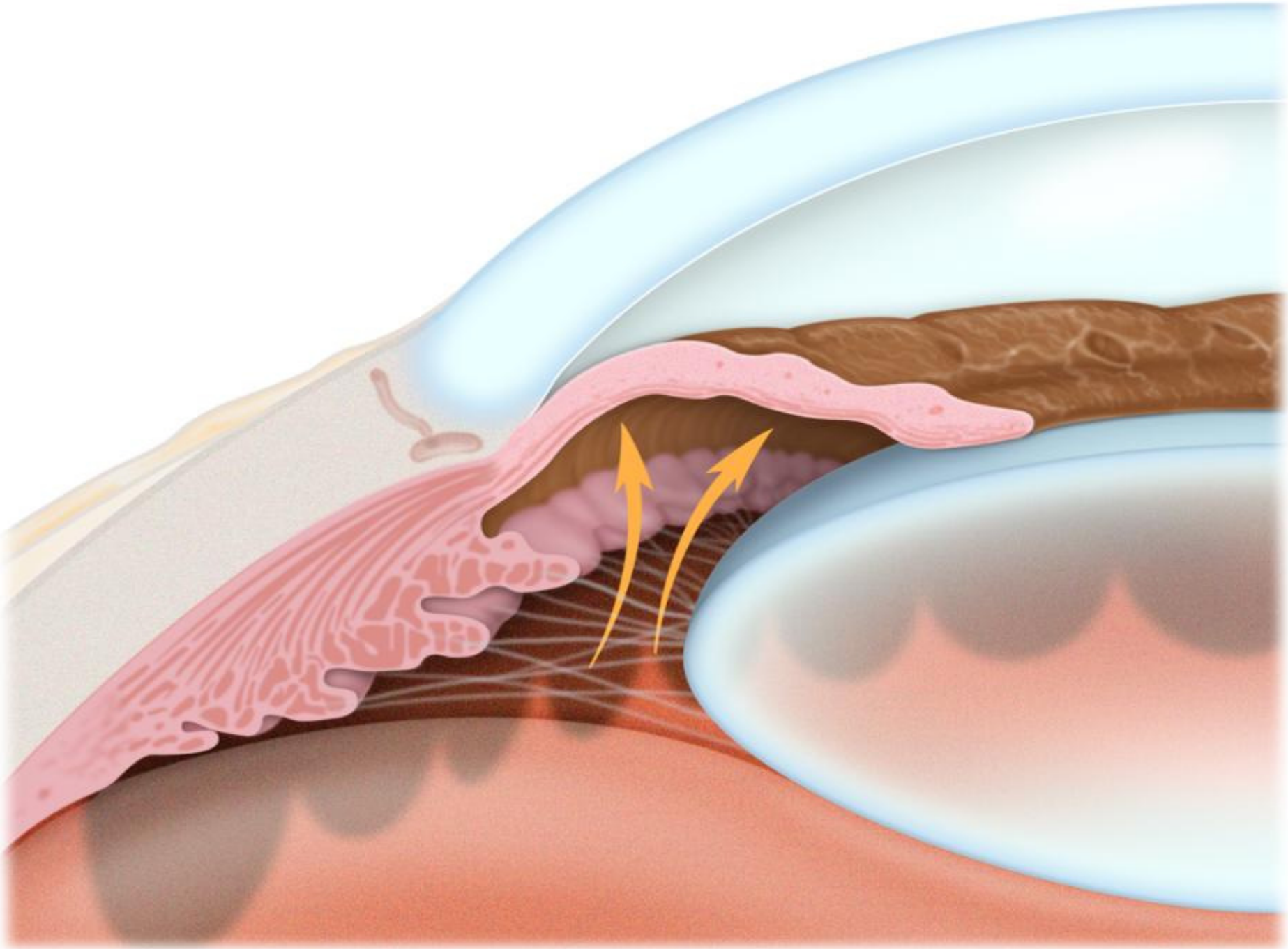
high risk groups

- Elderly
- Asians/Eskimos
- Females
- Hyperopia
- Family history

# Ocular Emergency

- Irreversible visual loss within a very short period of time
- Distressing symptoms

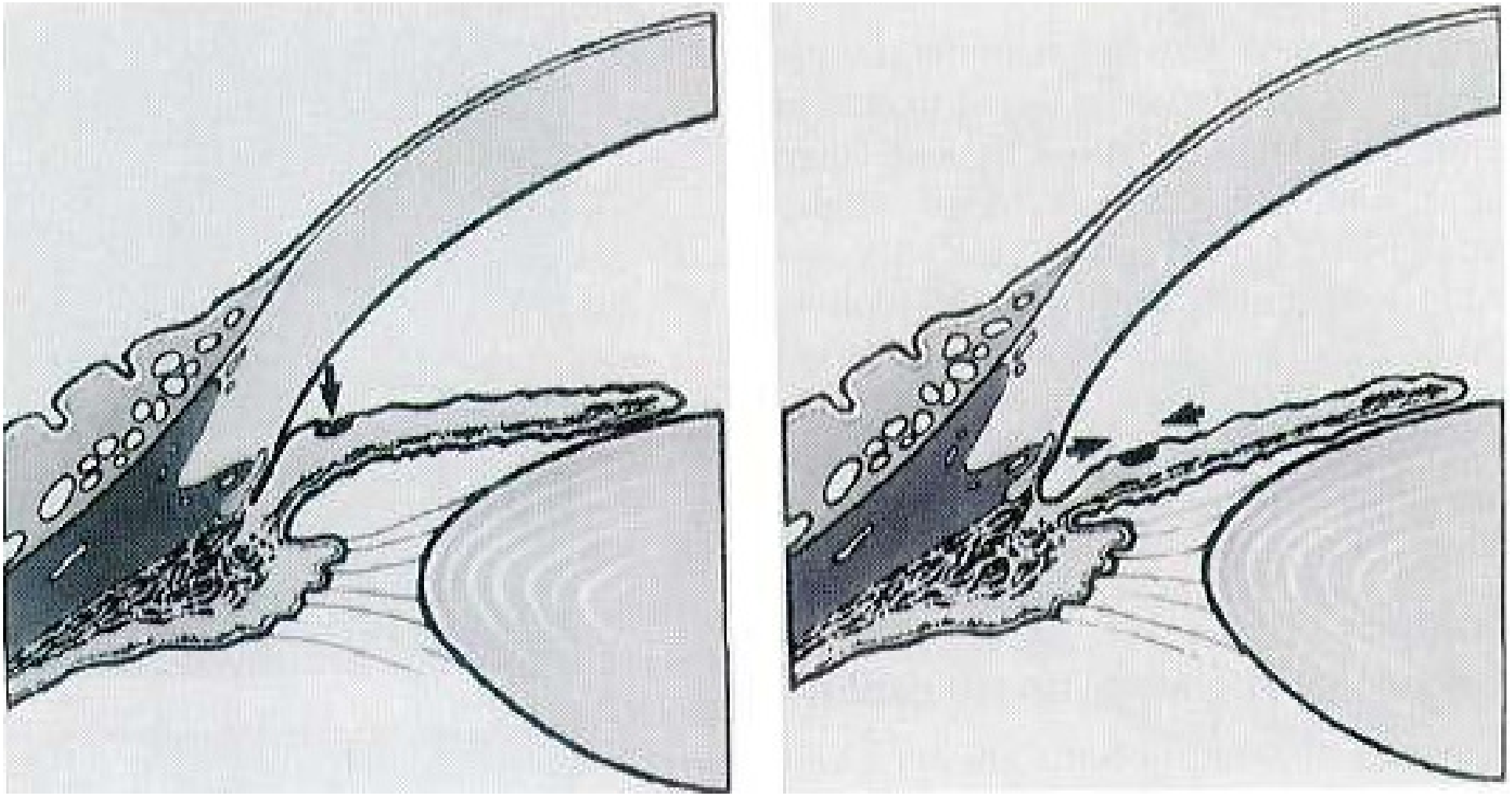


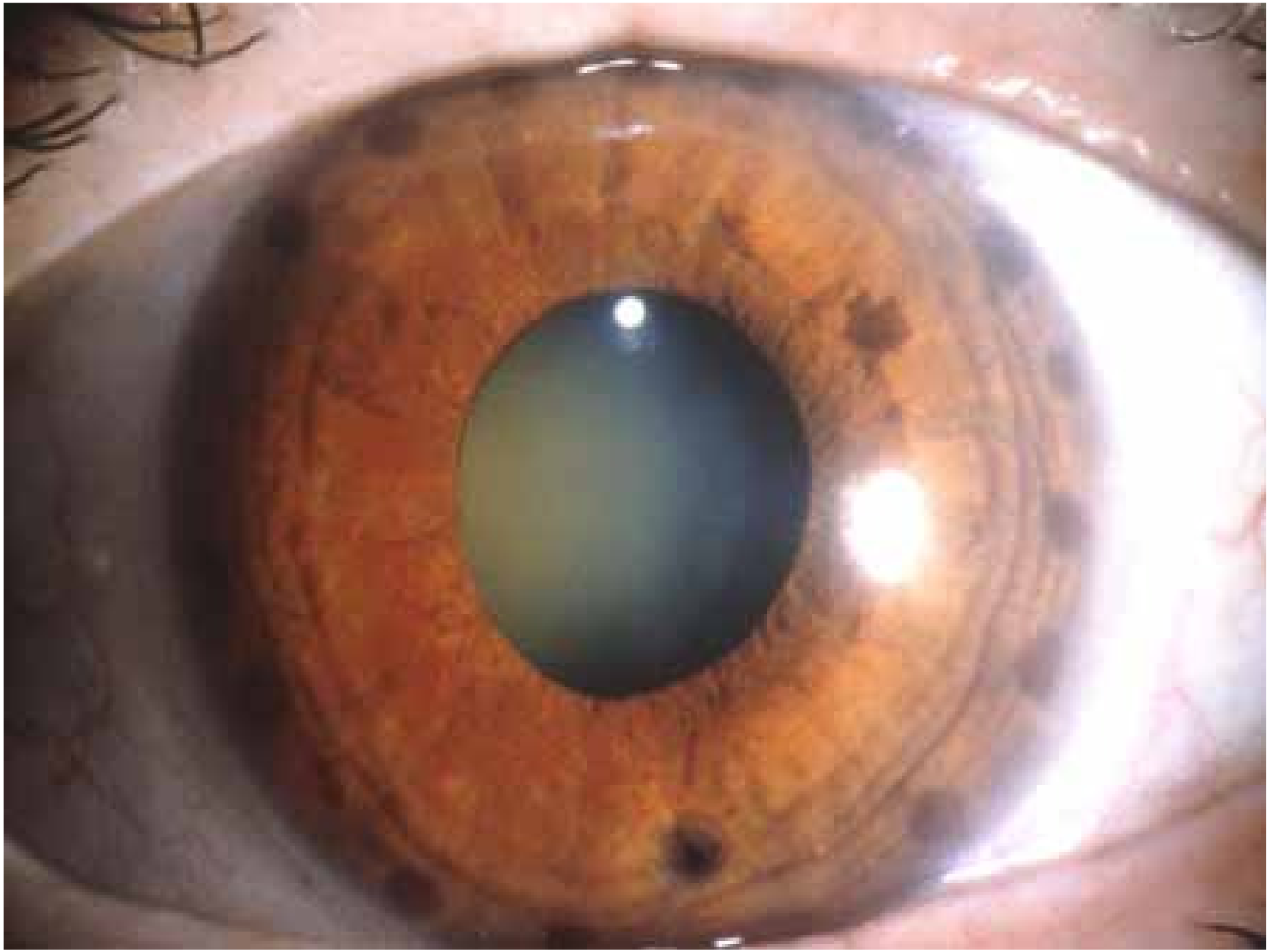


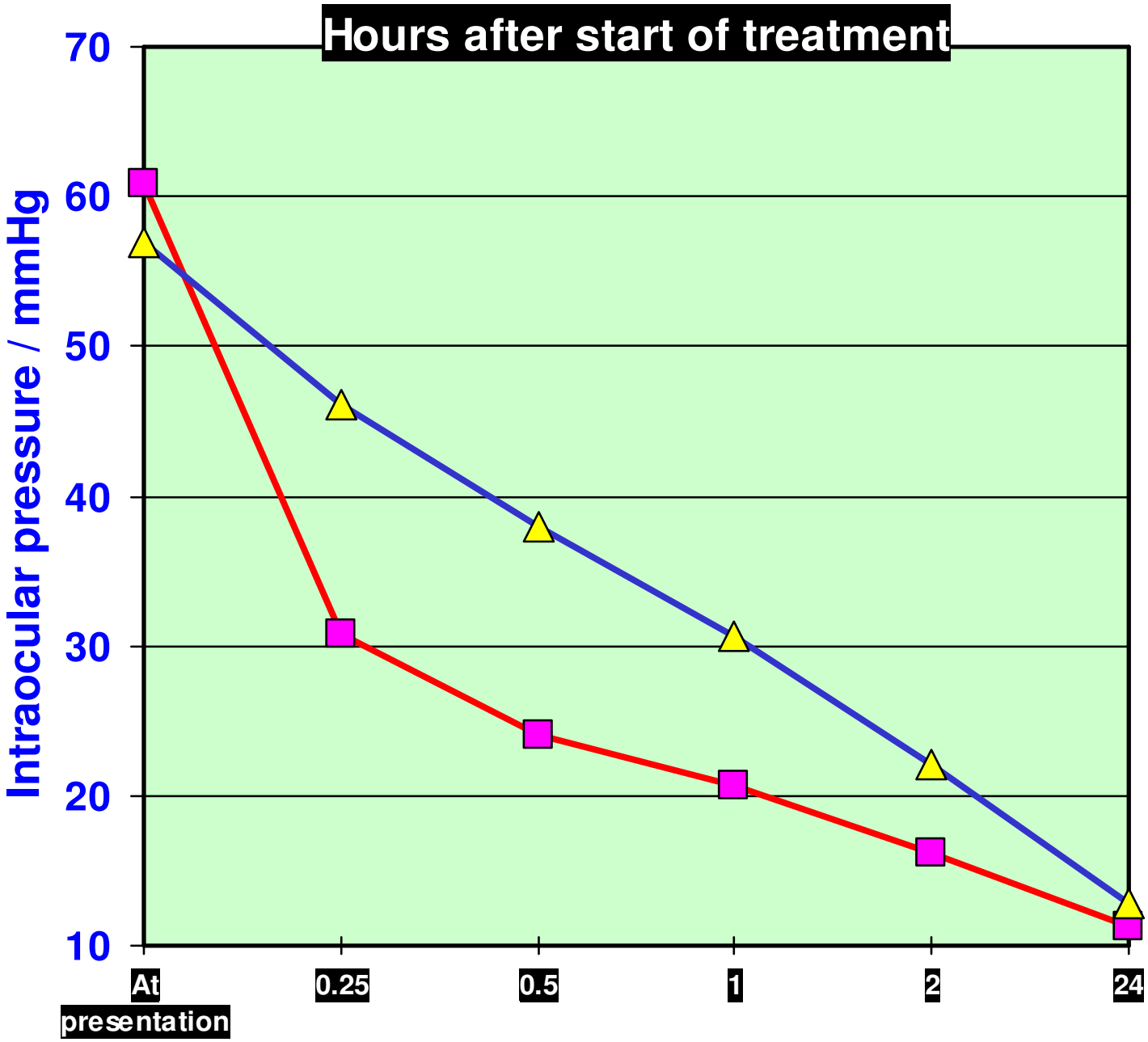

Diamox®
Acetazolamide
Sequels®
500 mg
Sustained Release Capsules
100 CAPSULES
PILOCAR®
4%
Pilopine
TIMOPTIC


500 ml
20%
Mannitol
I.V.
MANNITOL INJECTION,
USP

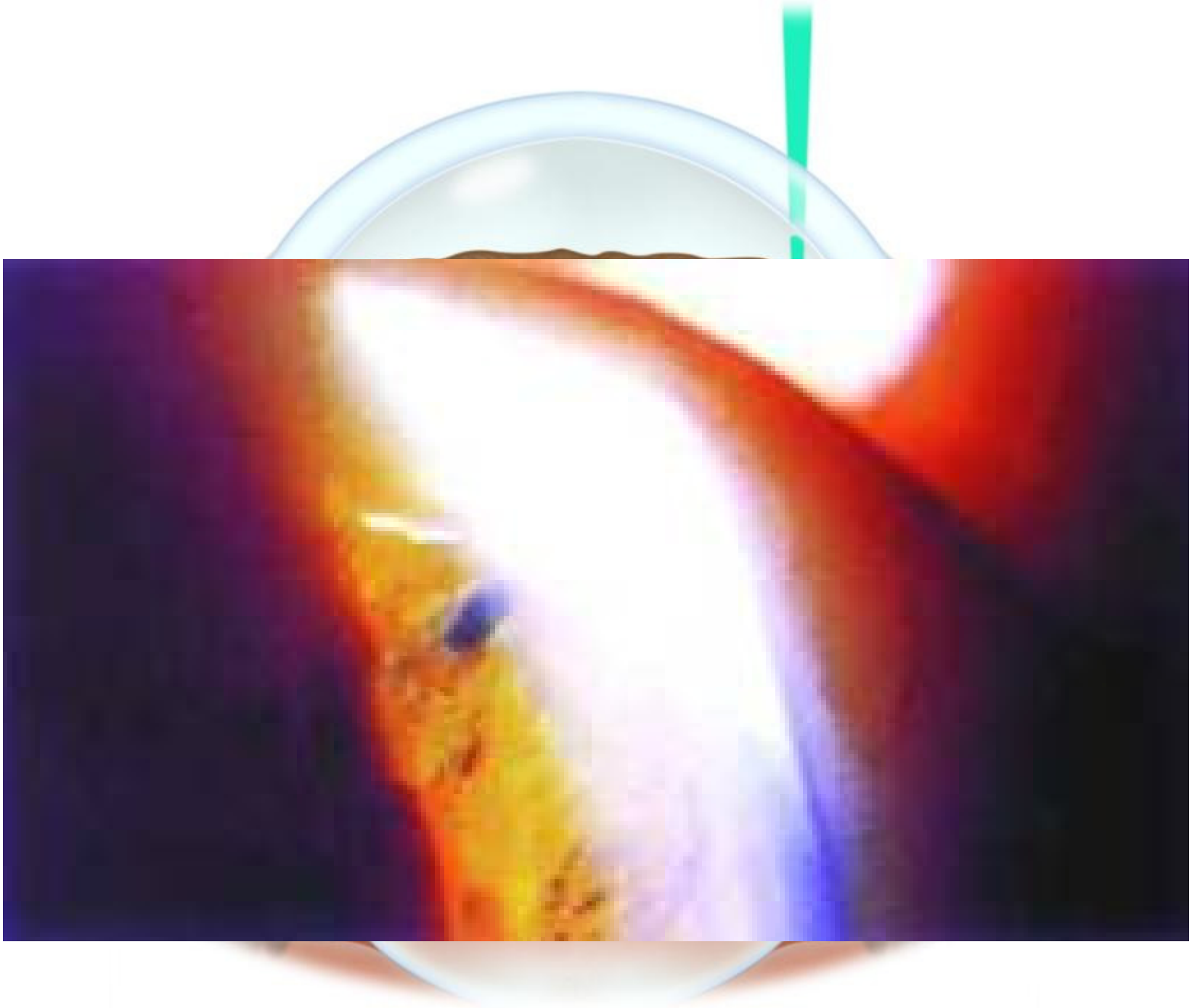
# Argon Laser Peripheral Iridoplasty






Hours after start of treatment
Intraocular pressure / mmHg
70
60
50
40
30
20
10
At presentation
0.25
0.5
1
2
24

# Definitive Treatment



# Acute Angle-closure Glaucoma

**Prophylactic therapy for**

**fellow eye**

- **50% chance of development of AACG in 5 years**

**Laser Iridotomy**

**Surgical Iridectomy**

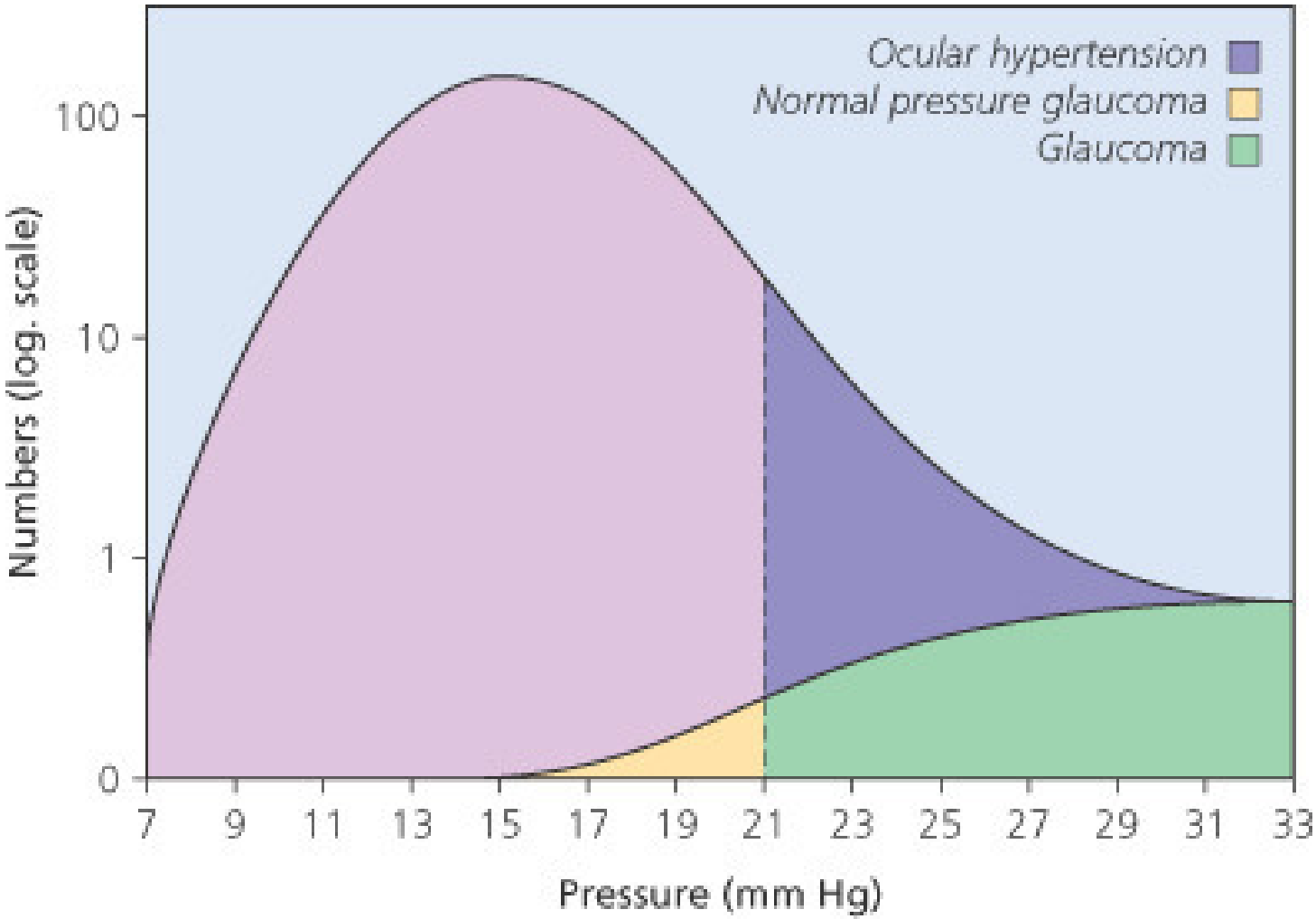
# Acute Angle-closure Glaucoma

- 

# Take Home Message Number 2

- **Acute angle closure glaucoma is an ocular emergency**

# Intraocular Pressure



# Normal Tension Glaucoma (NTG)

# 低眼壓性青光眼

# Ocular Hypertension

# 高眼壓症

# Secondary Glaucoma

## Common causes

- Trauma
- Uveitis
- Steroid-induced
- Neovascularization: PDMR, CRVO
- Tumor

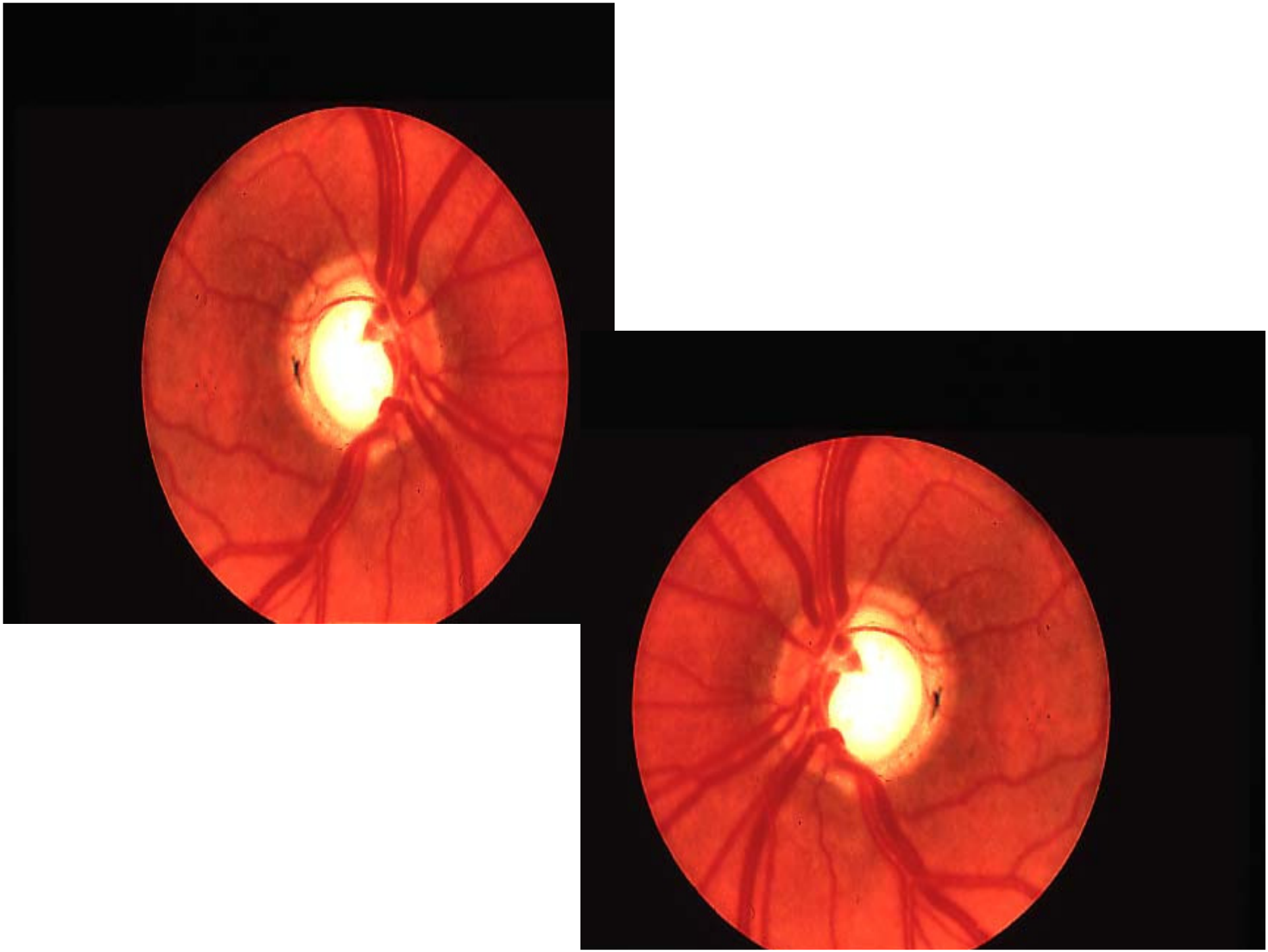
# Scenario 2

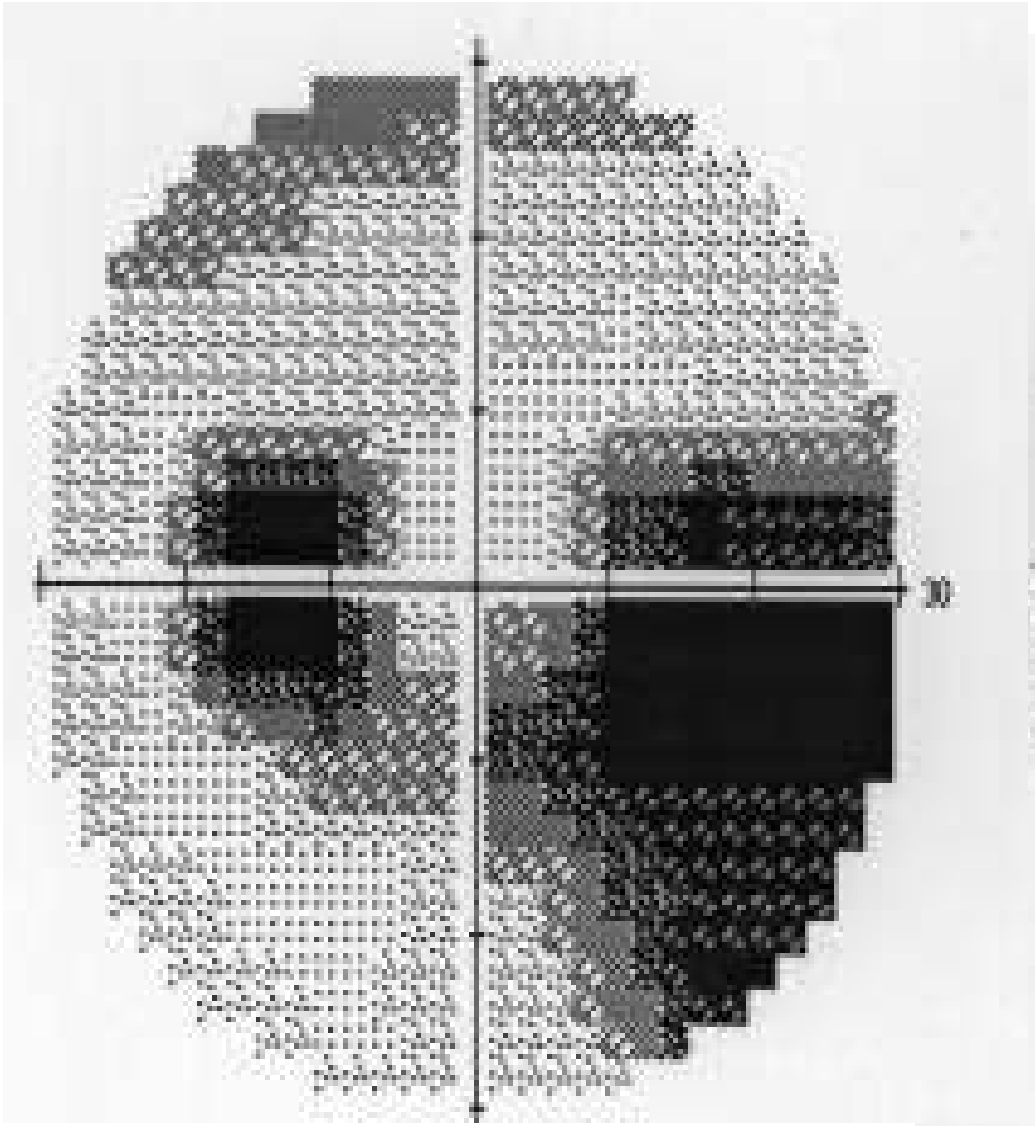
**28 year-old nurse**

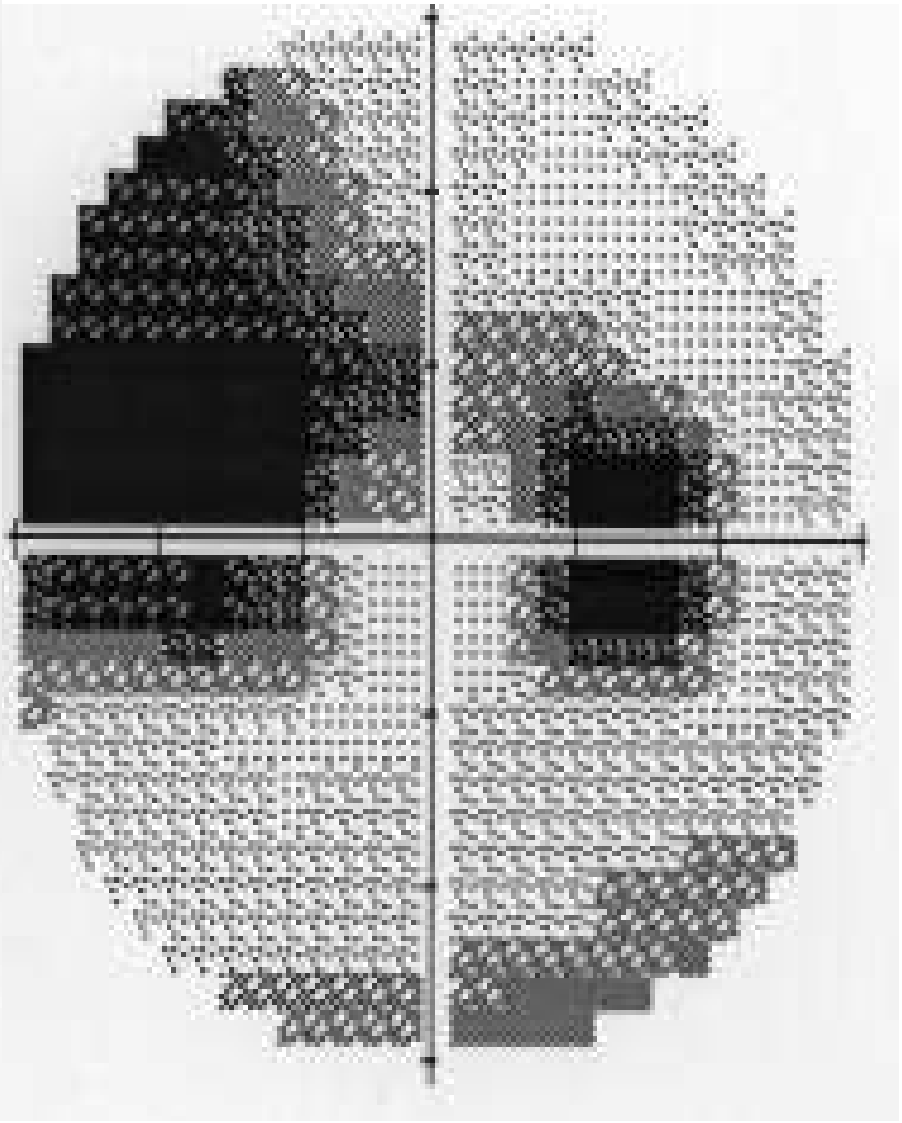
- **Blurring of vision both eyes noted for 3 months**
- **History of itchy red eyes with prn eyedrops for 5 years**

# Scenario 2

| | | | | |
|---|---|---|---|---|
| **VA** | ***OD*** | **20/50** | ***OS*** | **20/30** |
| **IOP** | ***OD*** | **36 mmHg** | ***OS*** | **38 mmHg** |




30




1% Pred Fo

# Take Home Message Number 3

- **Some of the causes for secondary glaucoma are preventable especially steroid-induced glaucoma**