

# Clinical Pearls for the Other Glaucomas

Eye Care Associates of Michigan

Dr Felise May Barte



# Glaucoma

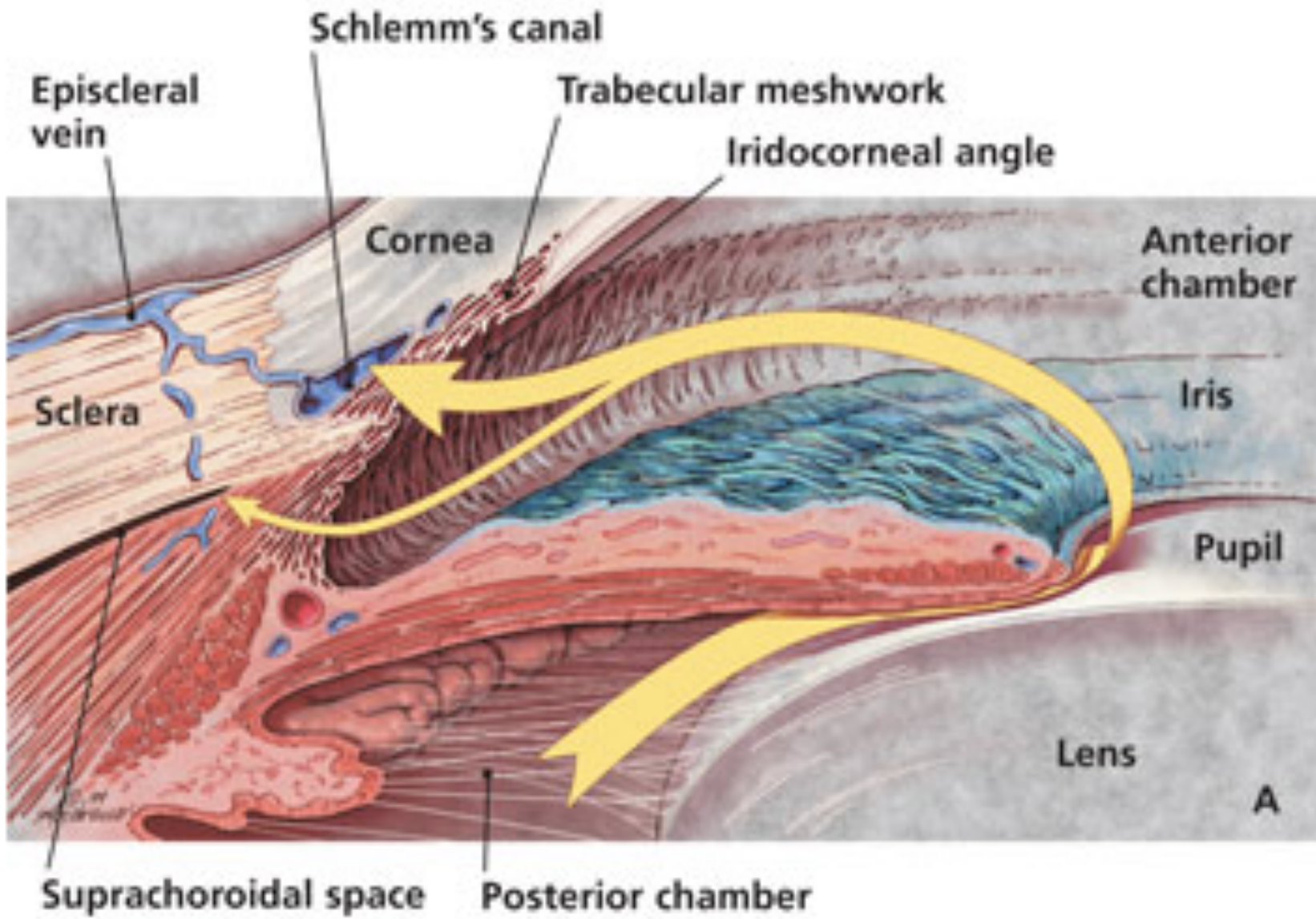
- Definition: characteristic optic neuropathy + visual function loss

# What about IOP??

- IOP NOT part of definition!!
- BUT..
- IOP and resistance of optic nerve axons to pressure damage causes glaucomatous optic nerve and visual field changes

# IOP

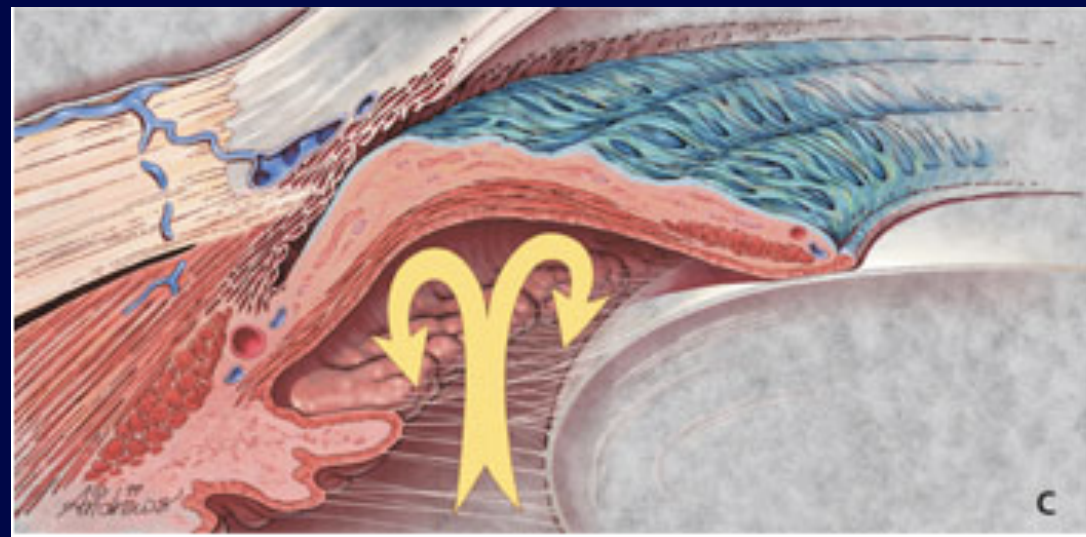
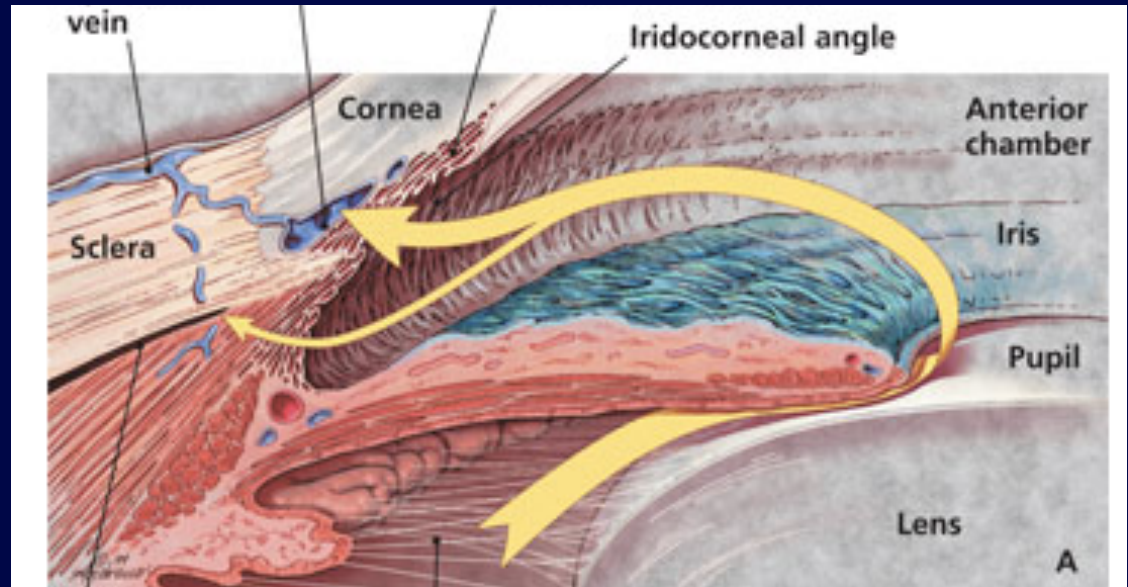
- 3 factors determine IOP
- 1) rate of aqueous humor by ciliary body (CB)
- 2) resistance to flow
- 3) episcleral venous pressure



# Obstruction to IOP flow



# the Angle



If Open...

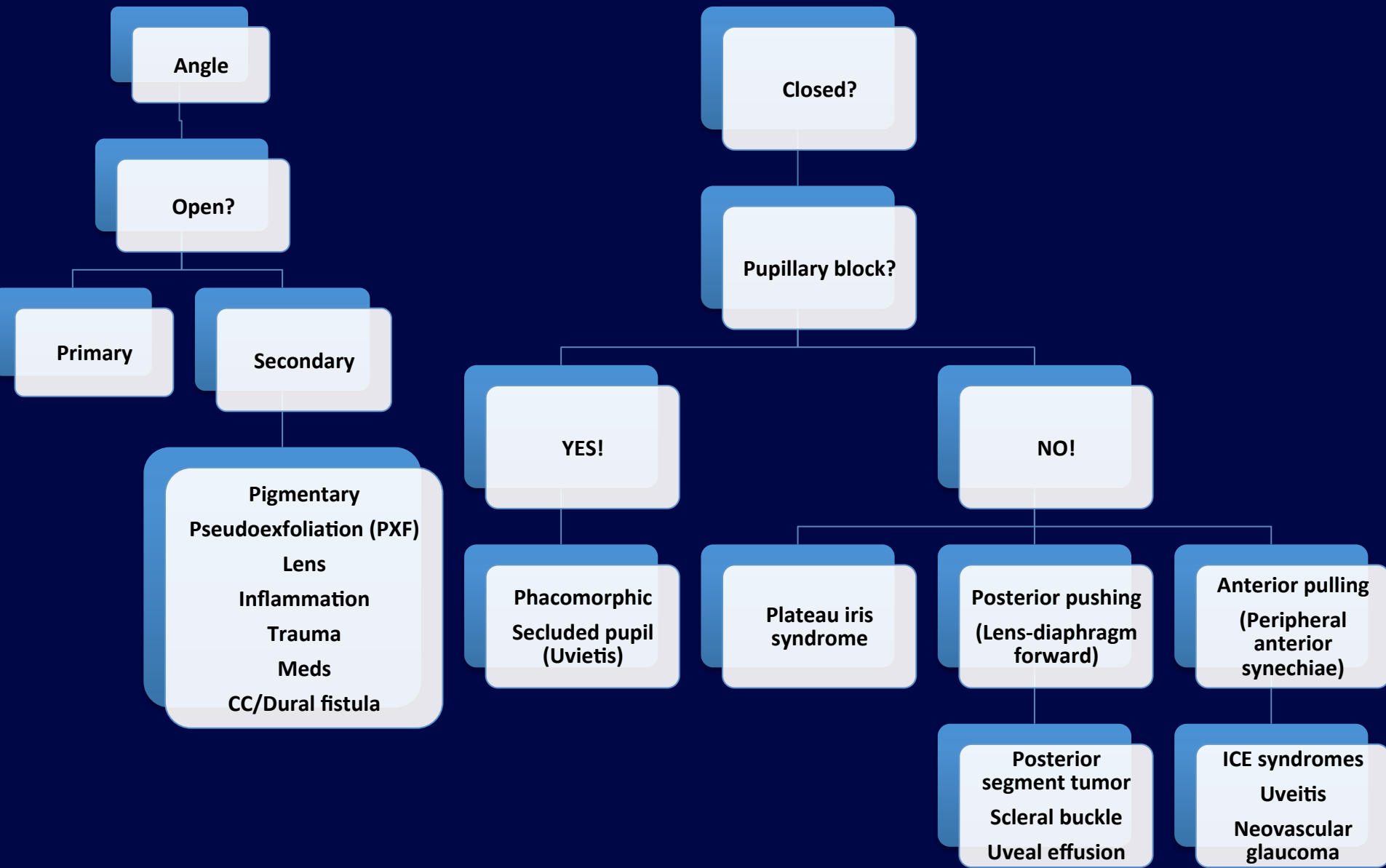
**EPISCLERAL VEIN  
TRABECULAR MESHWORK**



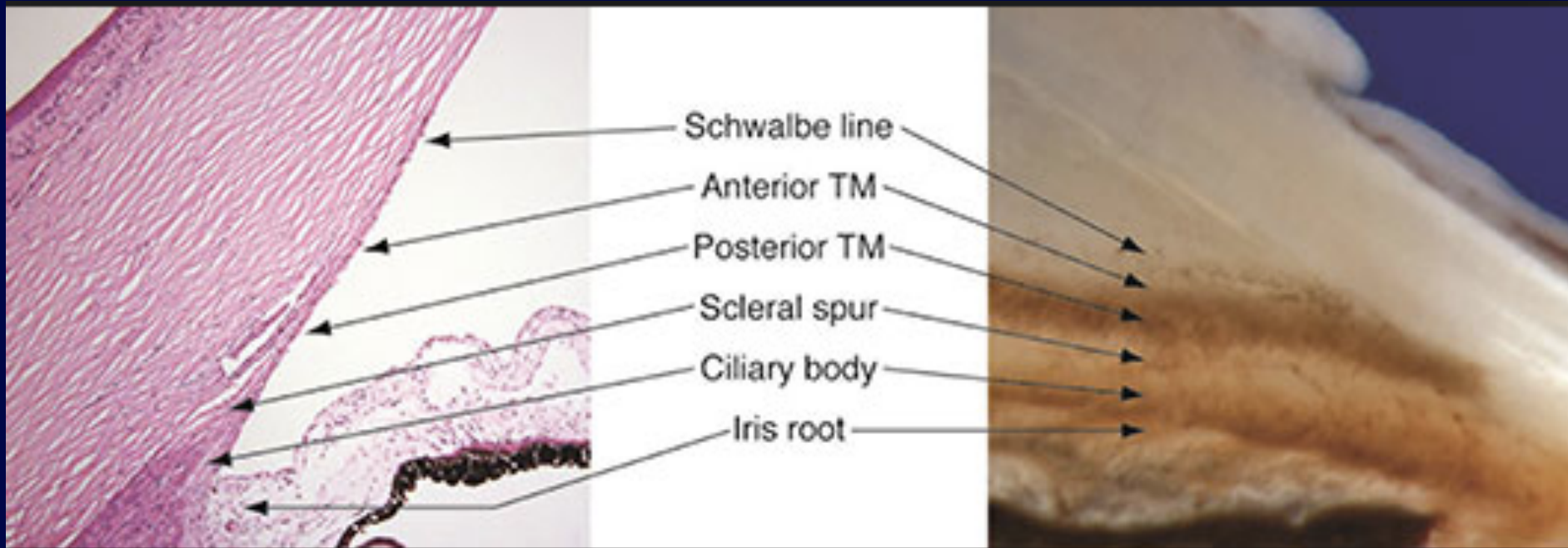


# If Closed...

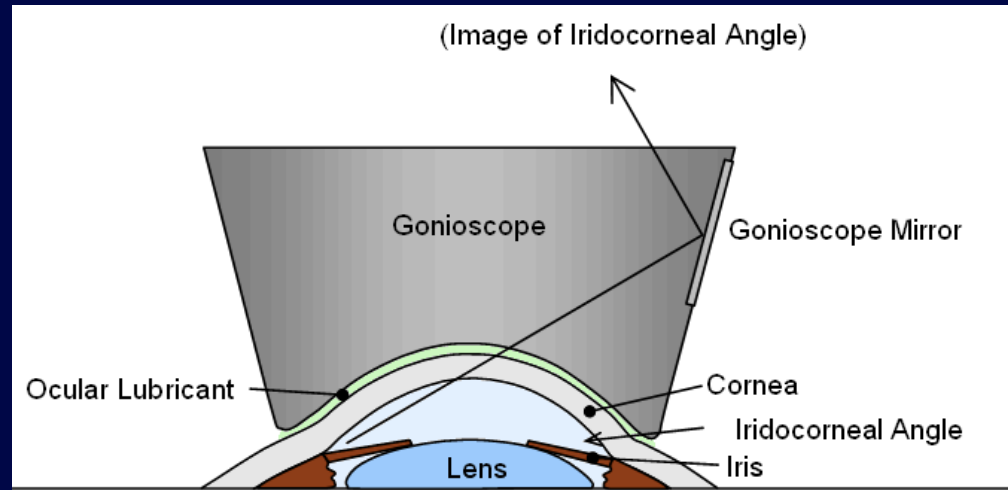


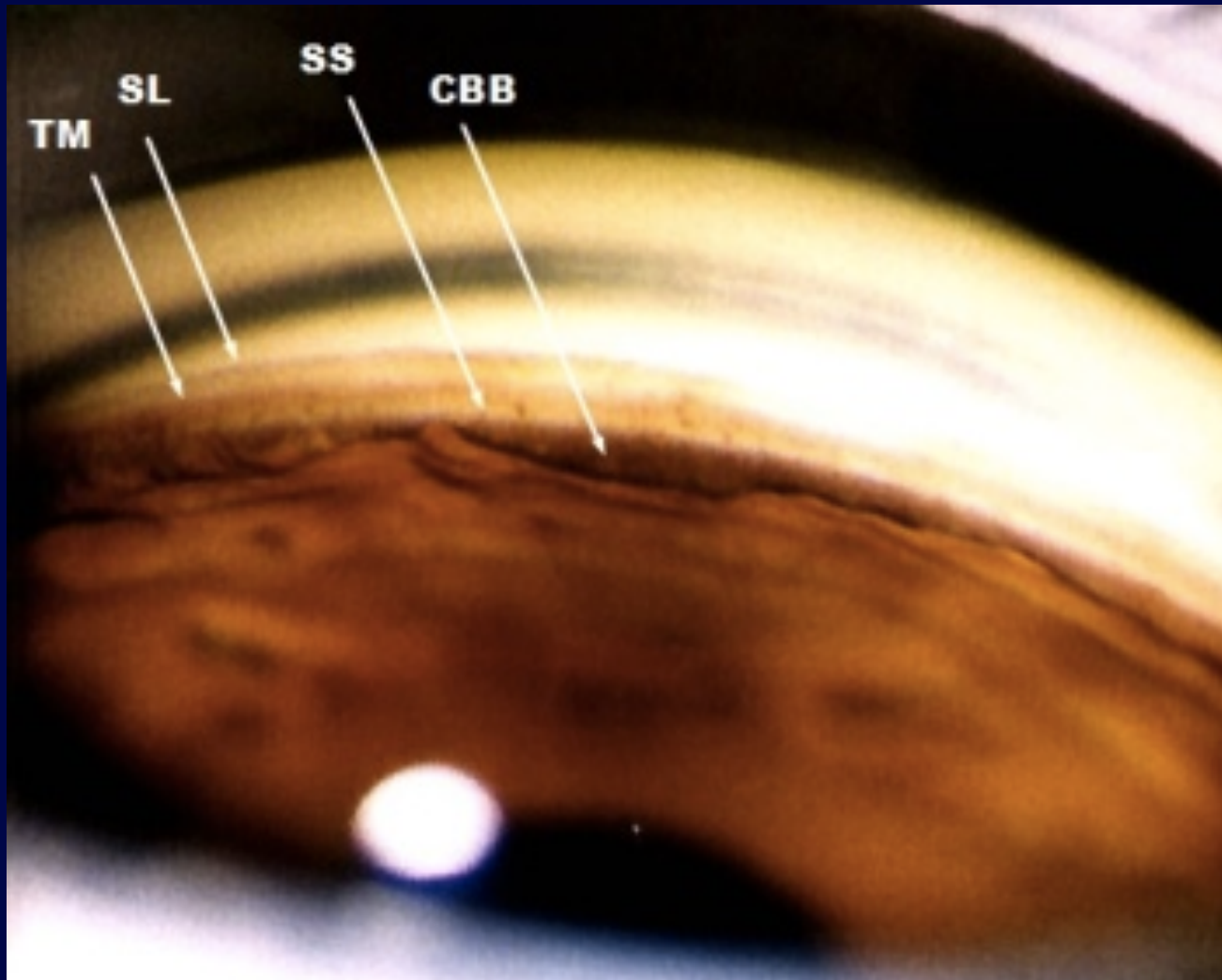


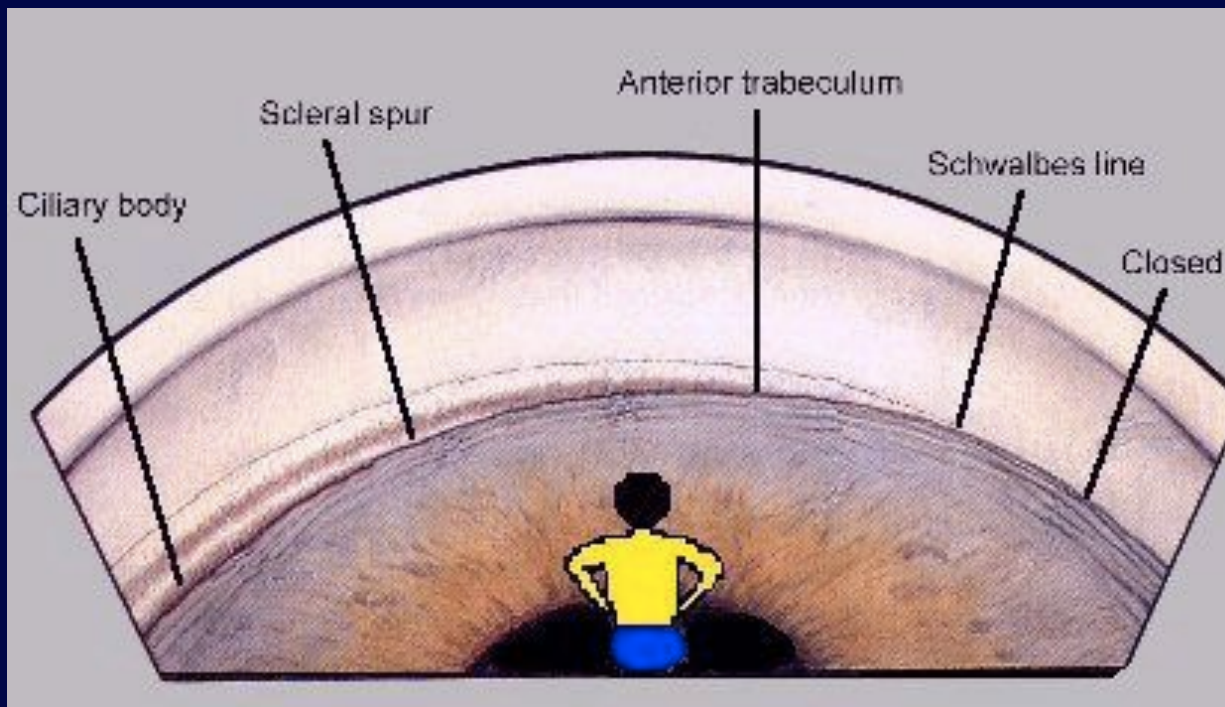
# The Angle



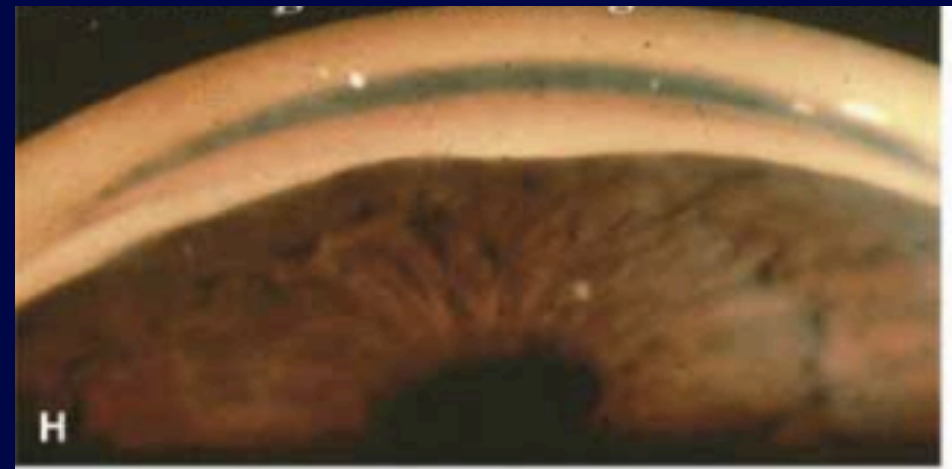
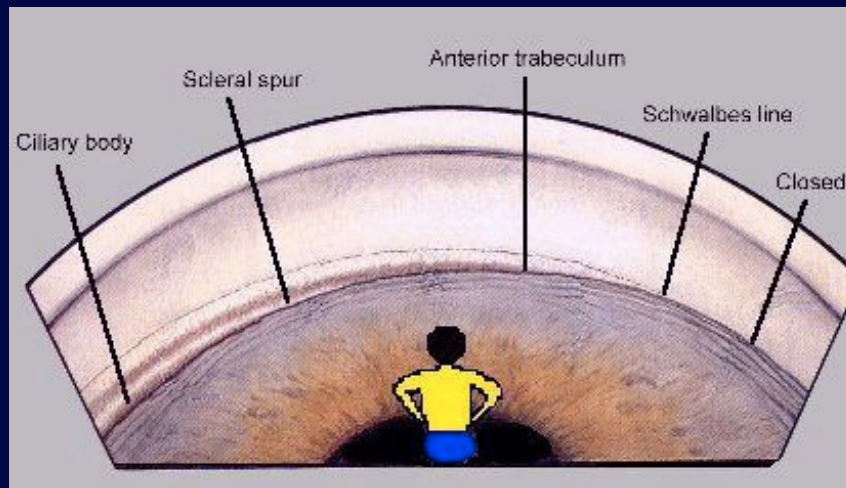
# Gonioscopy







Ciliary body band (CBB)	Width, regularity
Scleral spur	Iris processes, vessels
Trabecular meshwork (TM)	Pigment, peripheral anterior synechiae (PAS), neovascular membranes



# A few cases...



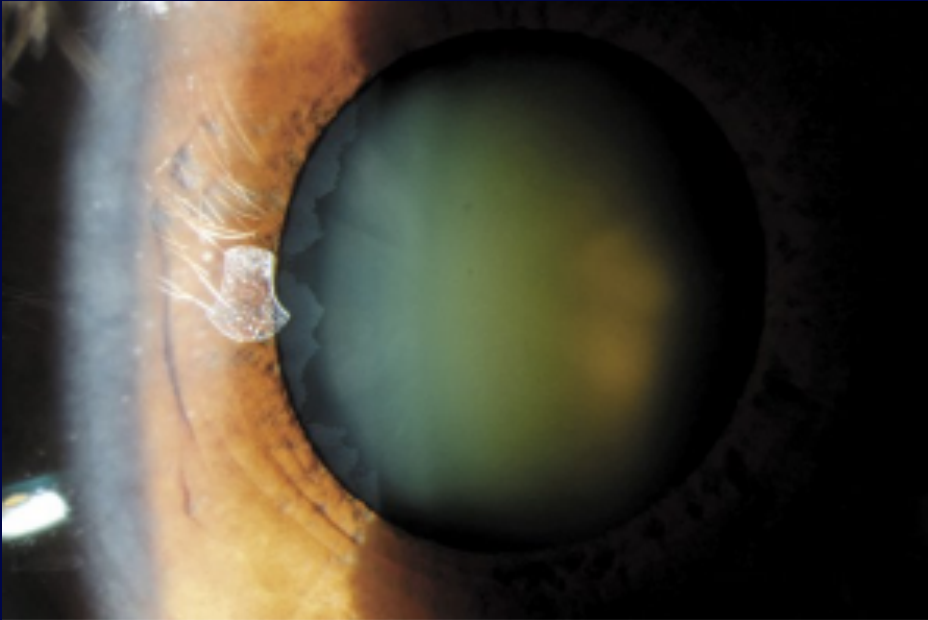
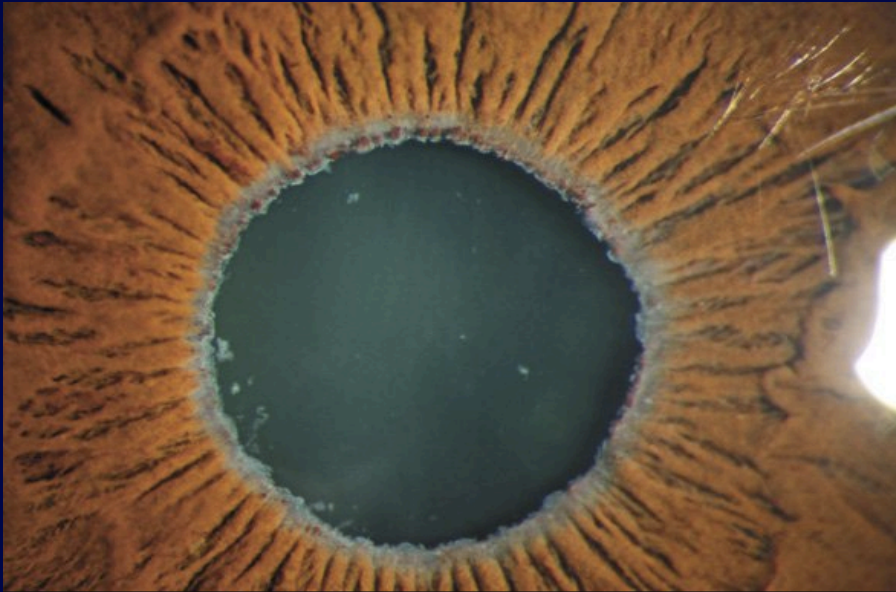


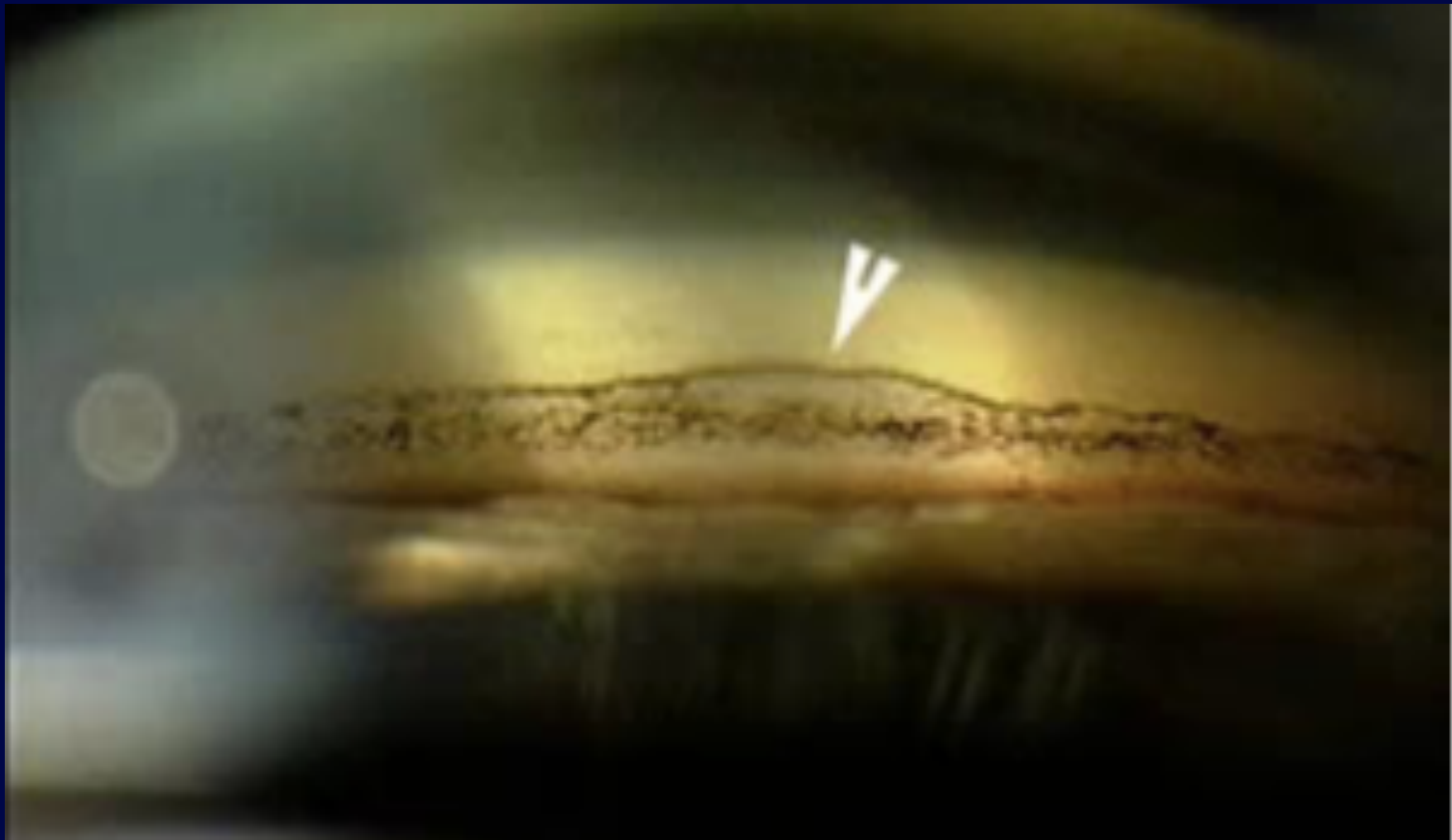
# Case AB

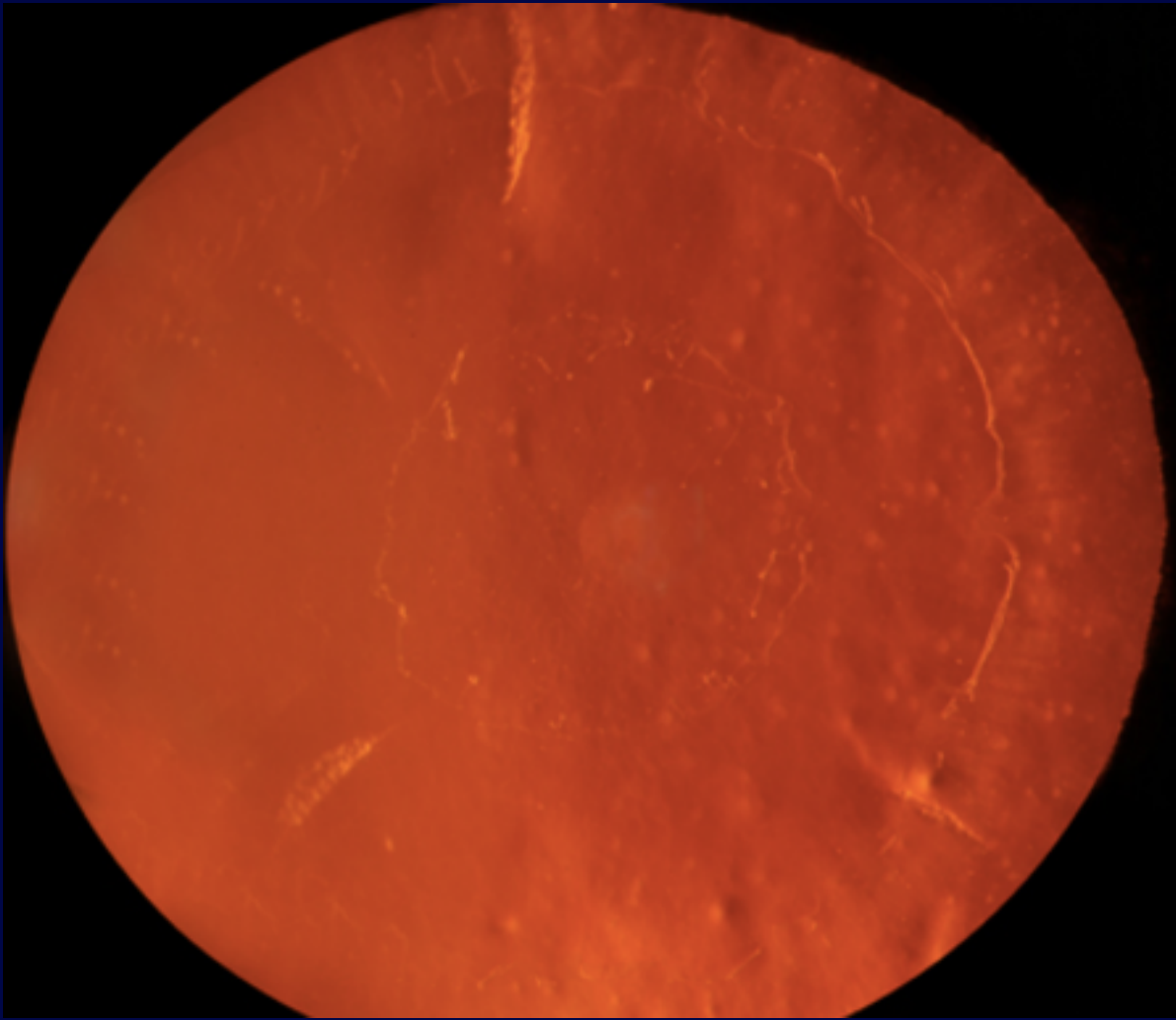
- CC: 72yo WF co painless, gradual loss of vision OS
- PMH: healthy, no medications, no FH glaucoma
- POH: none
- Meds: none

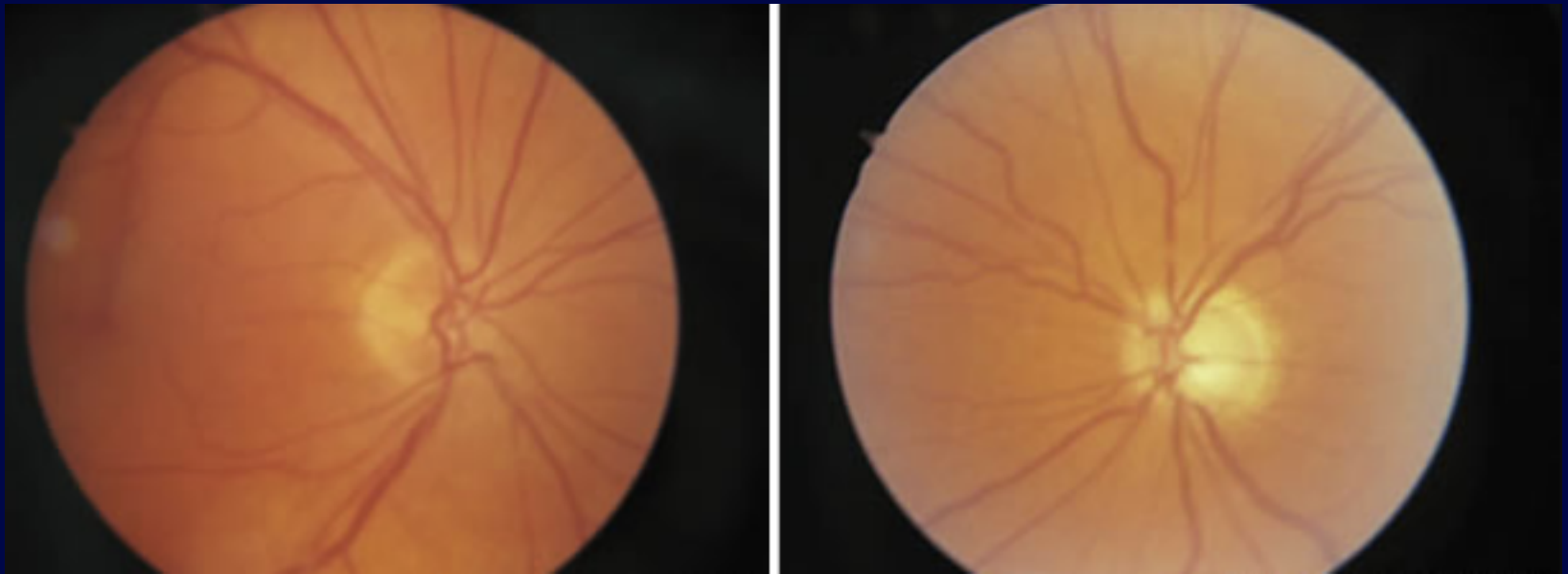
# Case : AB

- mRx: plano OU
- BcVa: 20/20 OD, 20/400 OS
- Pupils: ERRL
- EOM: full OU
- IOP: 16 mmHg OD, 56mm Hg OS



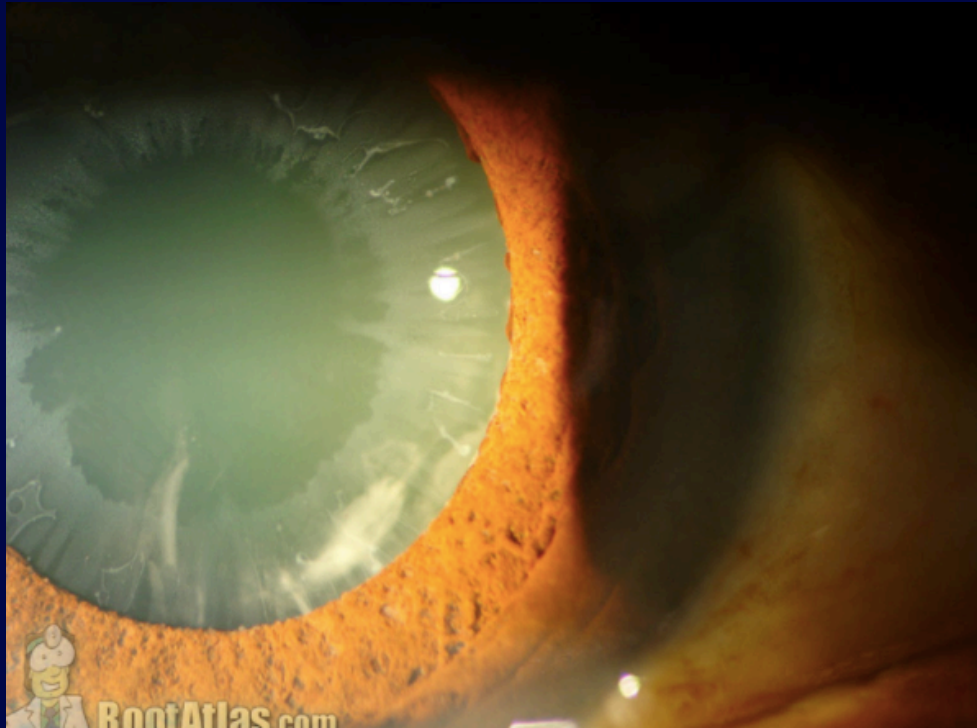


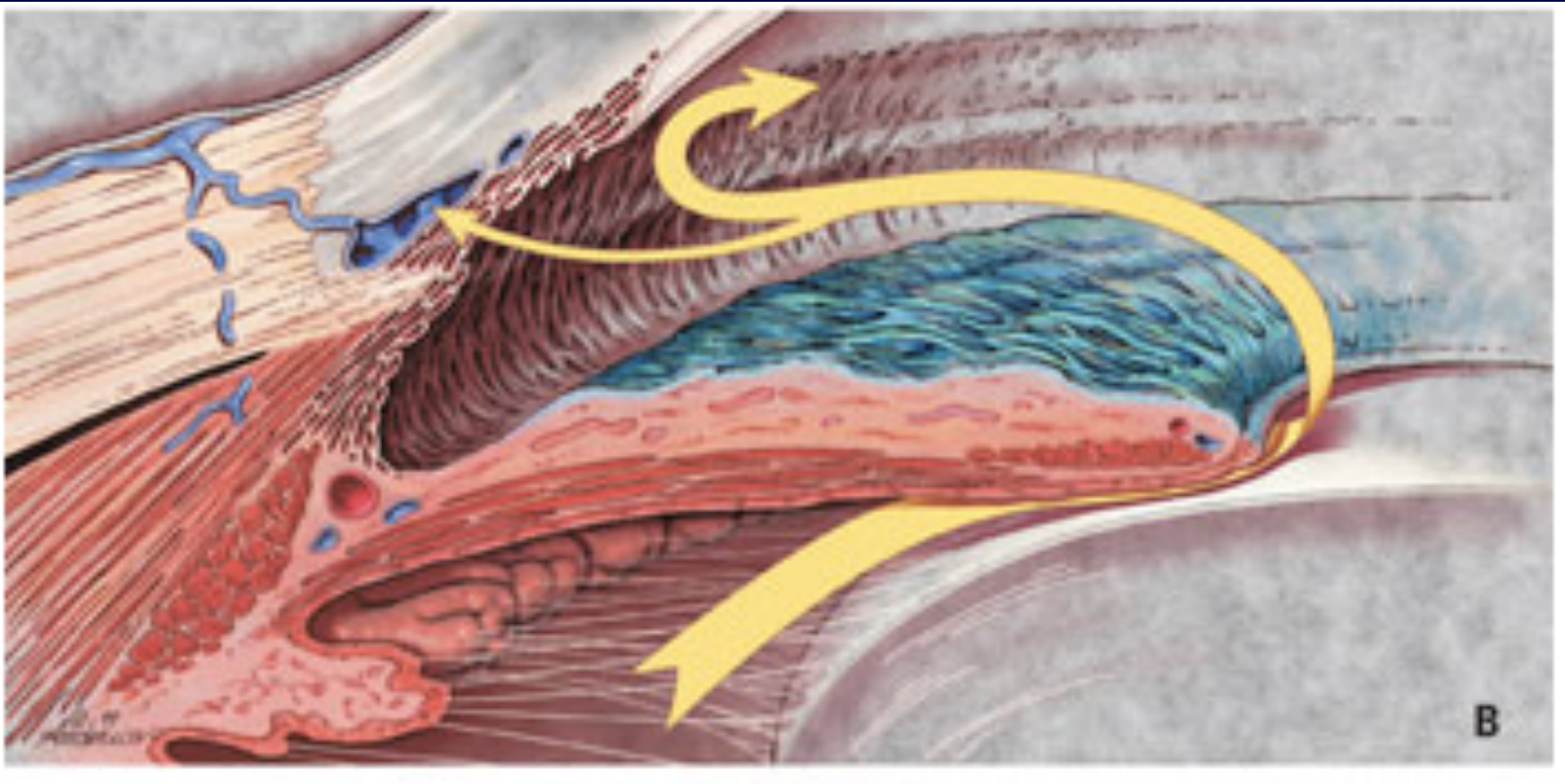
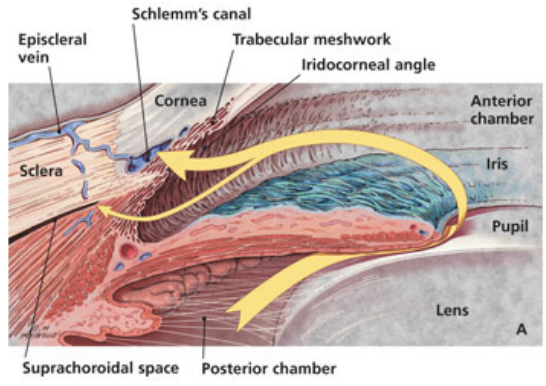




# Pseudoexfoliation glaucoma (PXG)

- Fibrillar material in anterior segment
- Generalized basement membrane disorder







# PXG

- Incidence: 2-200/100,000, increases with age
- Scandinavia
- Elderly
- Leading cause of unilateral glaucoma in elderly

# PXG

- Phacododonesis
- Iridodonesis
- Zonular weakness\*

# Treatment

- Topical anti-glaucoma medications
- Laser trabeculoplasty
- Trabeculectomy
- Valve surgery
- CB cycloablation

# PXG vs POAG

- IOP higher, unilateral
- Greater diurnal fluctuations
- Prognosis worse
- Increased ocular inflammation after ocular surgery

# Case CD

- CC: high IOP OD
- HPI: 56yo WM referred for high IOP OD despite topical glaucoma medications
- POH: eye trauma OD s/p uncomplicated CE/IOL at 25yo
- PMH: none
- Ocular meds: Lumigan, Simbrinza

# Case: CD

- mRx: -0.50 OD, -0.50 OS
- BcVa: 20/20 OD, 20/20 OS
- EOM: full OU
- IOP: 38 mmHg OD, 18 mmHg OS
- SLE: Unremarkable
- DFE: Unremarkable

# Gonioscopy

- Angle OPEN OU
- Lens cortex in inferior angle OD

# Lens particle glaucoma

- Lens particle obstruct TM
- Can occur weeks, months or years after surgery/trauma



# Lens particle glaucoma

- Treatment
  - Medical
    - Topical steroid
    - Decrease aqueous production
    - Mydriatics

# Case FG

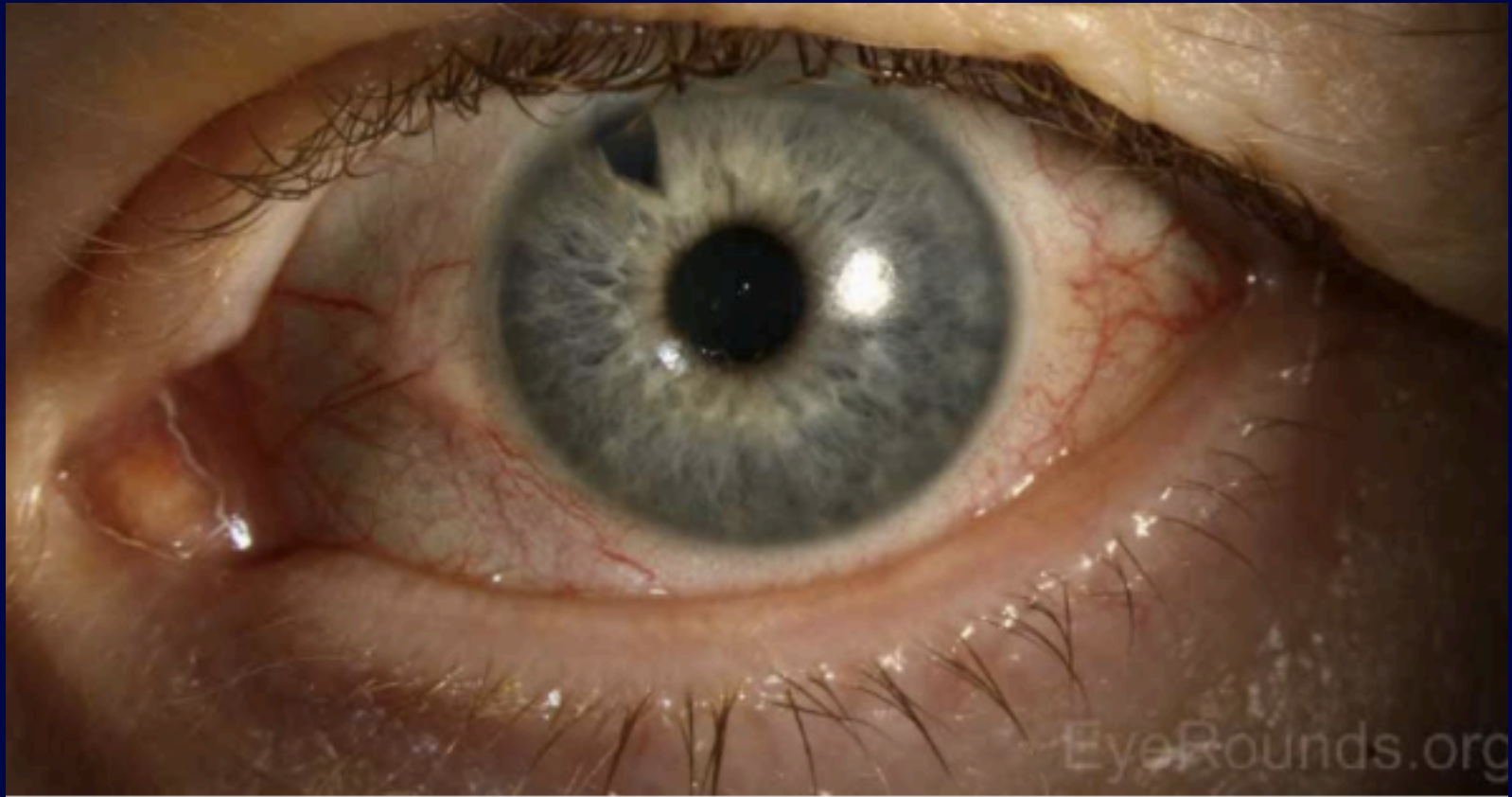
- CC: blurry vision
- HPI: 46yo WF co occasional haloes, blurred vision, pain 3/10 OD. Has had 3 similar episodes in past. Diagnosed with acute angle closure at initial presentation, underwent PI.
  - IOP spikes OD: 52mmHg (2012), 54 mmHg (2014)
  - IOP 11-15mmHg between episodes.
  - Denied ho cold sores, HSV, shingles, rash
- PMH: none
- POH: as above
- Ocular meds: Lumigan

# Case: FG

- BcVa: 20/50 OD, 20/20 OS
- Pupils: ERRL OU
- CVF: Full OU
- EOM: full OU
- IOP: 45 mmHg OD, 16 mmHg OS
- Pachys: 583 OD, 553 OS

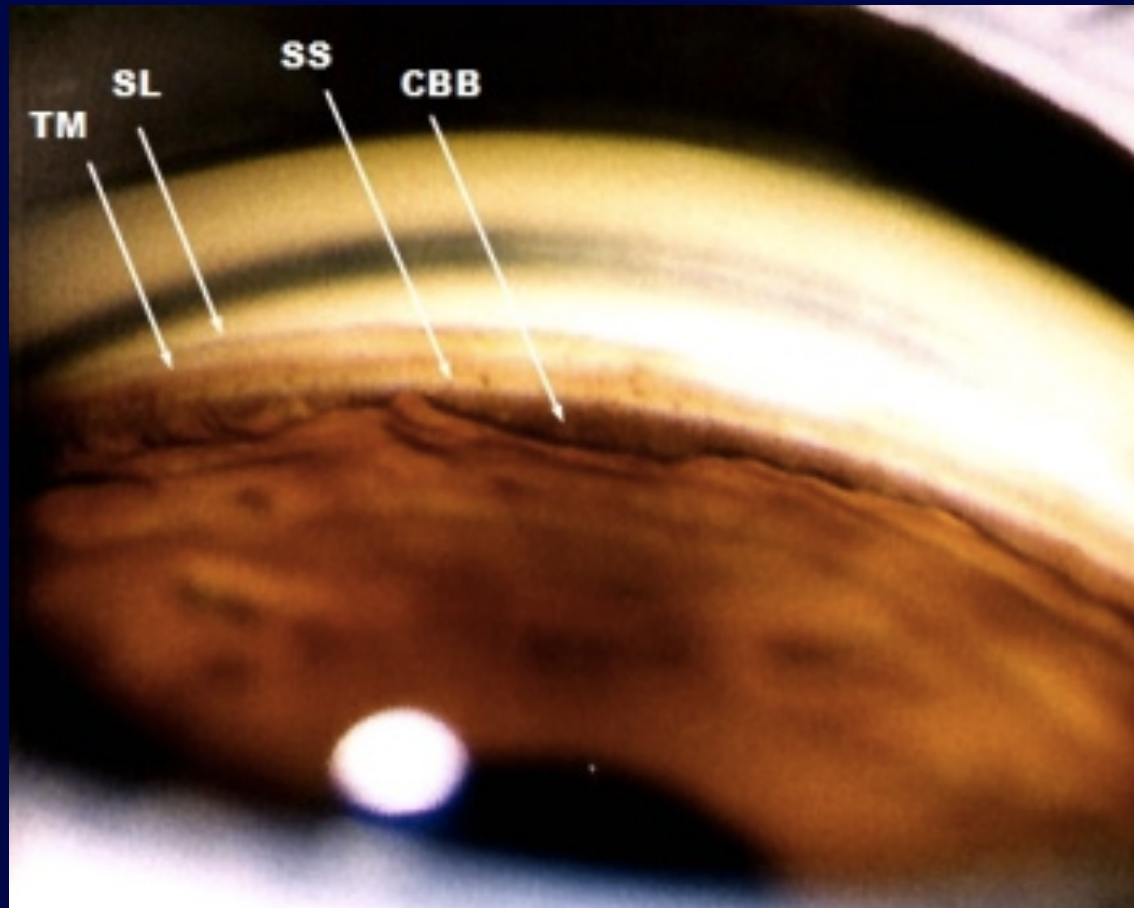
# SLE

	OD	OS
I/I		wnl
s/c		wnl
K		wnl
Iris	wnl	wnl
AC	Pl sup, trace c/f	wnl
Lens	Trace NS	Trace NS
Vit	wnl	wnl
ON	0.4	0.4
Macula	wnl	wnl
Vessels	wnl	wnl
Periphery	wnl	wnl





OU



# Clinical course

- Labs
  - RPR, FTA Antibodies
  - HLA-B27
  - ACE
  - PPD
- B-scan



# Differential DDx

- Uveitis
- HSV
- Fuchs' heterochromic iridocyclitis
- Posner-Schlossman syndrome

# Possner-Schlossman Syndrome (PSS)

- Aka Glaucomatocyclitic crisis
- Rare
- 20-60 yo
- Recurrent, unilateral, transient IOP elevations
- IOP = 40-50mmHg!
- IOP out of proportion to degree of pain and AC reaction
- Vision loss due to glaucomatous damage → accumulation of bouts of high IOP

# Posner-Schlossman Syndrome

- Sentinel KP
- AC minimal
- NO peripheral anterior synechiae

# Posner-Schlossman Syndrome

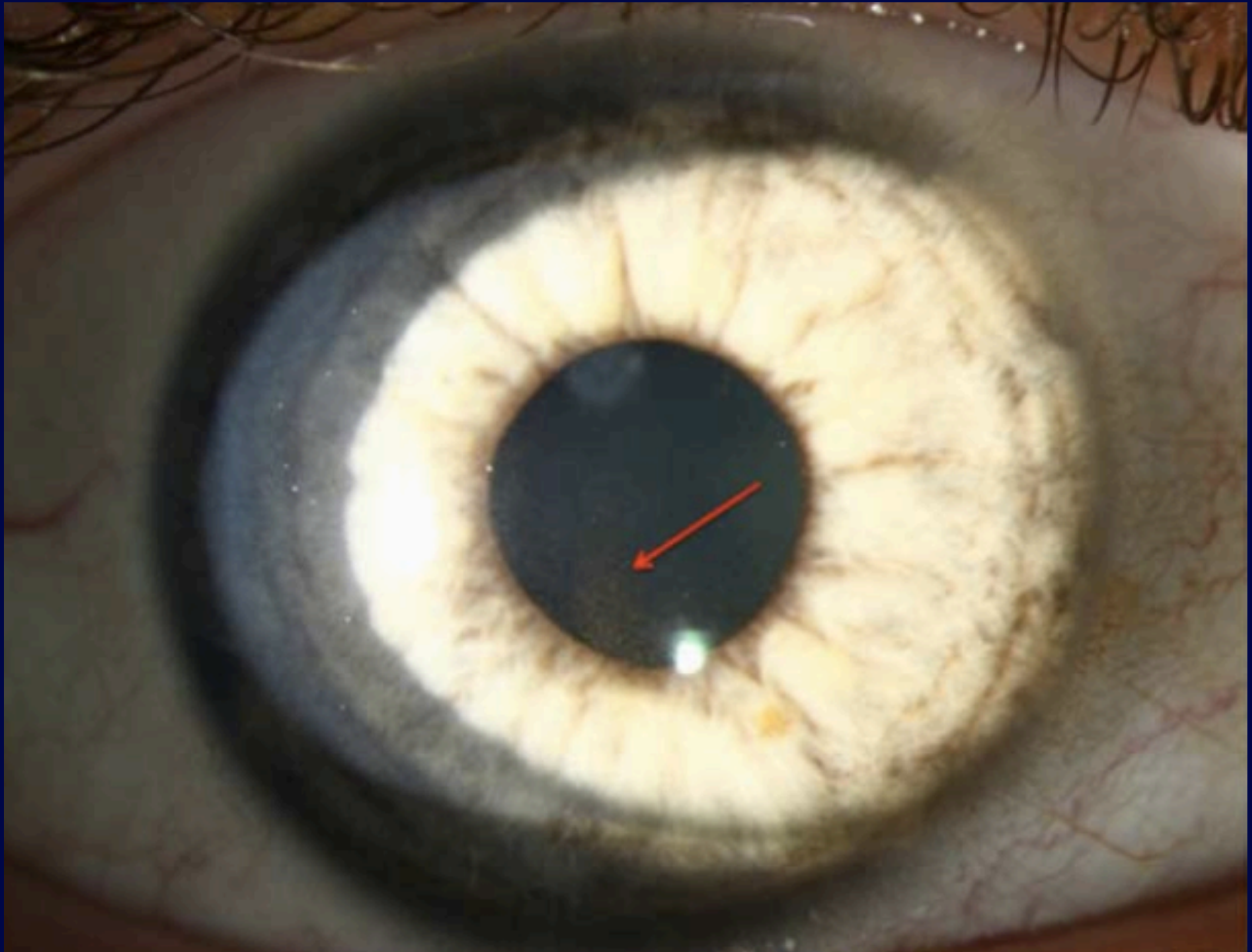
- Treatment
  - Acute attack
    - IOP lowering agents
    - Anti-inflammatory

# Case BC

- CC: haloes around lights, blurry vision
- HPI: 26yo WM co occasional haloes, blurred vision, lasting 30-60 minutes. Usually occurs when playing tennis.
- PMH: none
- POH: none
- Meds: none

# Case: BC

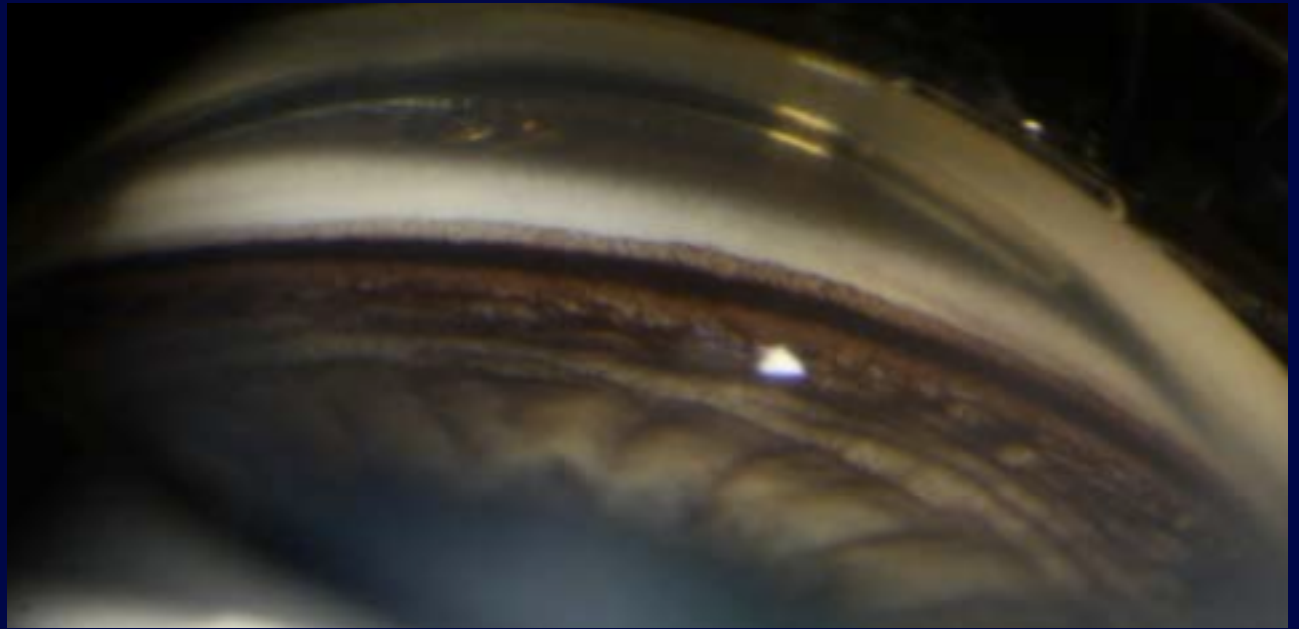
- mRx: -3.50 OD, -4.00 OS
- BcVa: 20/20 OD, 20/20 OS
- EOM: full OU
- IOP: 35 mmHg OD, 30 mmHg OS



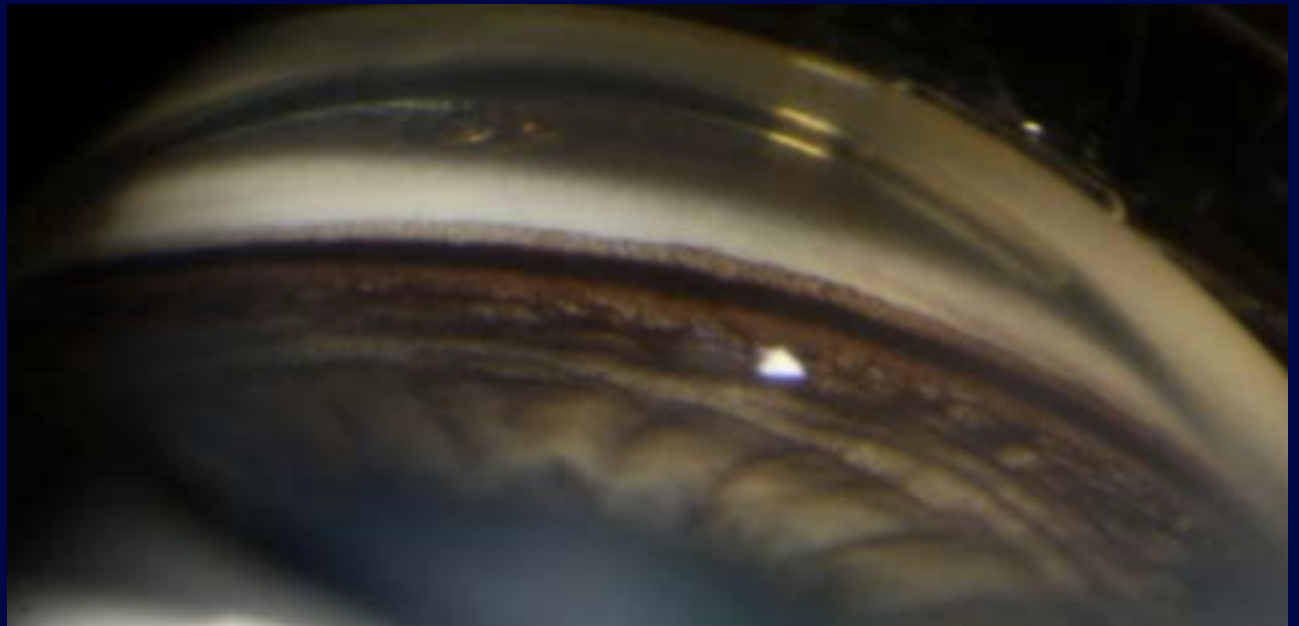


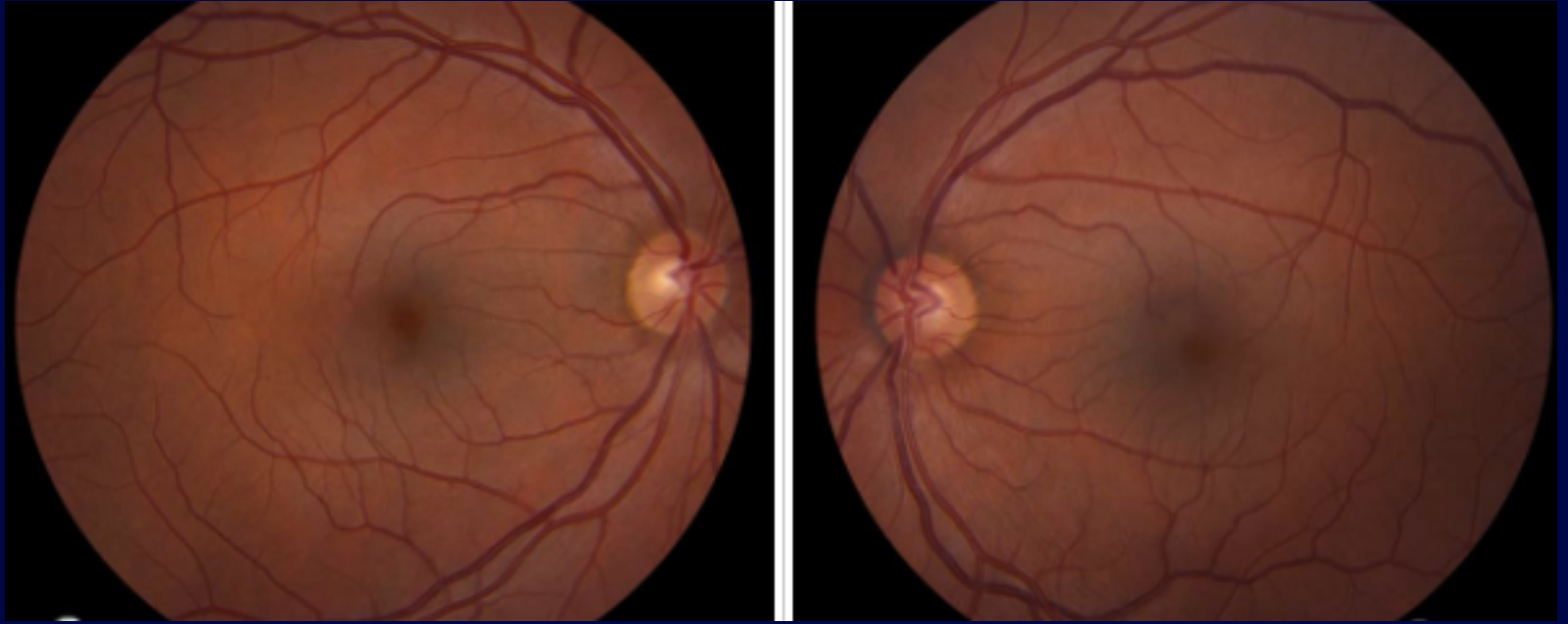


OD



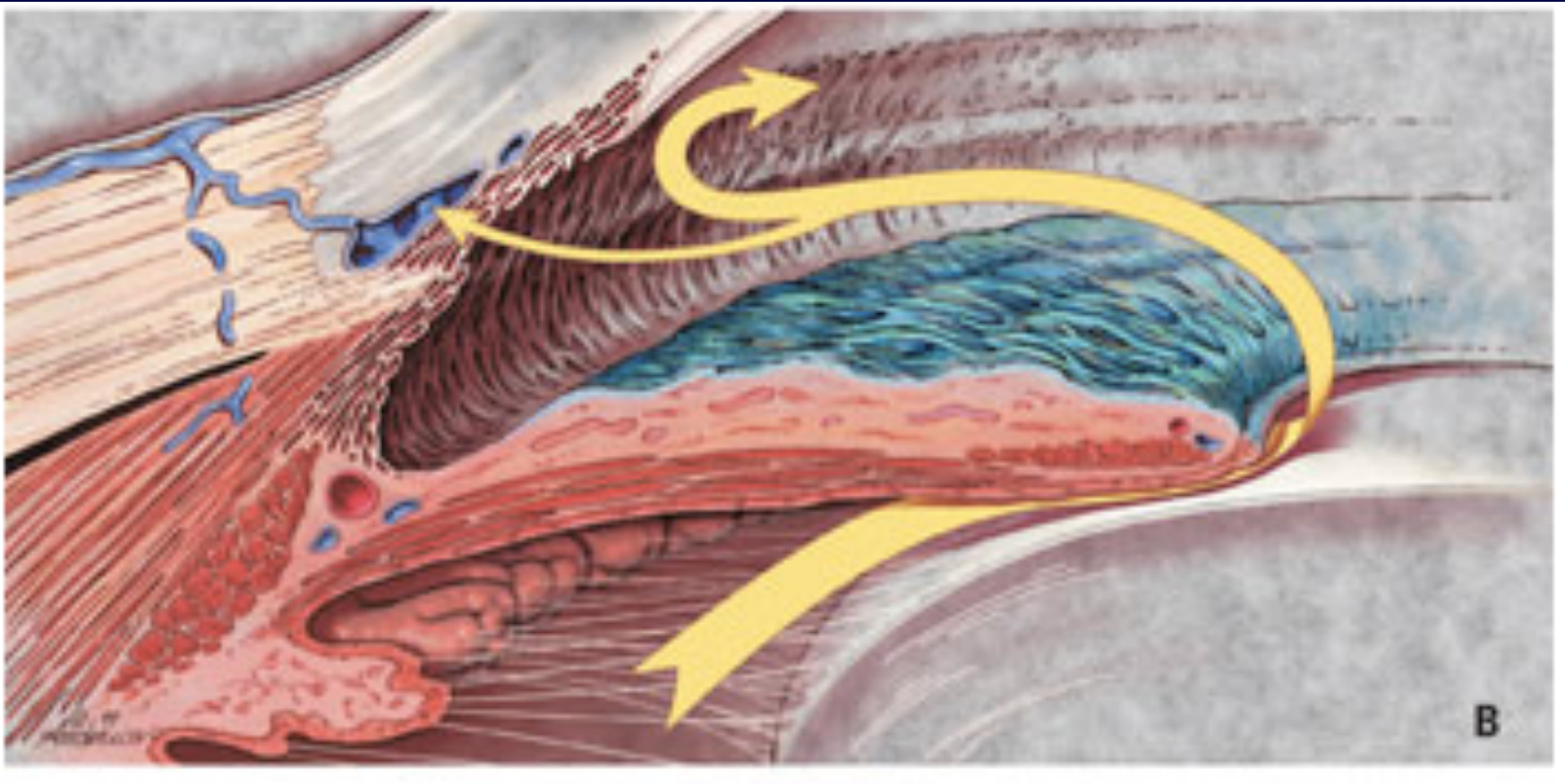
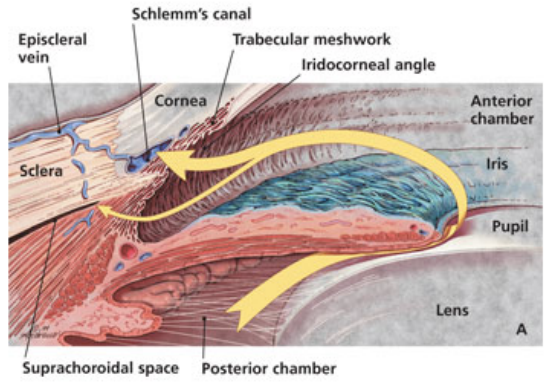
OS





# Pigmentary glaucoma (PG)

- Pigment dispersion from iris pigment epithelium rubbing against lens zonules
- Pigment on cornea endothelium, TM, lens periphery
- Exercise exacerbates release of pigment
- Wide IOP fluctuations



# PG

- Incidence: 1.4 per 100,000
- Caucasians
- Young, before 40yo
- Myopia
- Familial predisposition

# Treatment

- Topical anti-glaucoma medications
- Laser trabeculoplasty
  - Lower energy
- Trabeculectomy
  - Risk of hyptony maculopathy
- Valve surgery

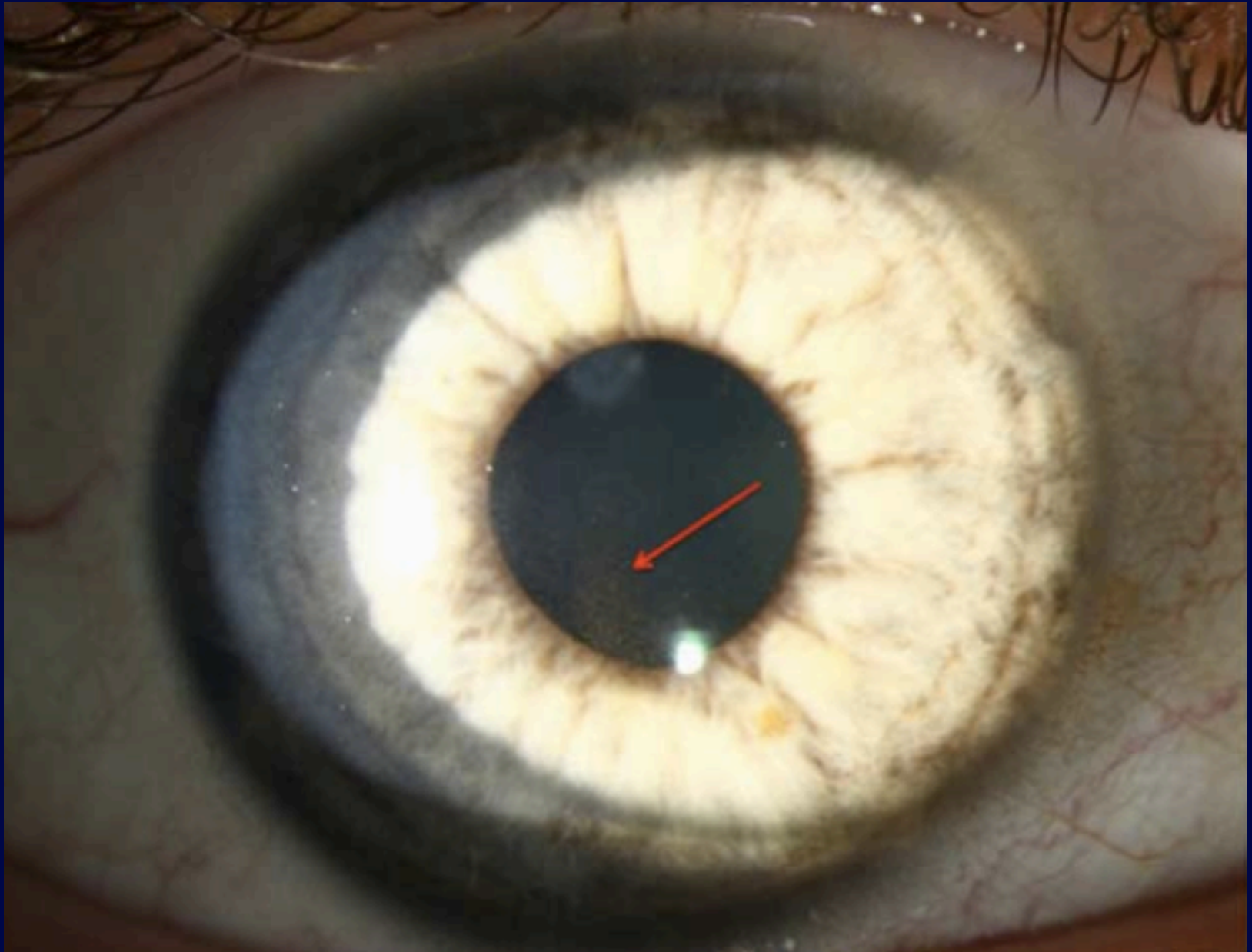
# Case LM

- CC: blurry vision OS
- HPI: 57yo WM, ho advanced pigmentary glaucoma OS > OD, co decreased vision OS for 3 months.
- PMH: HTN, GERD
- POH: PG
- Ocular meds: Lumigan, Combigan, Acetazolamide

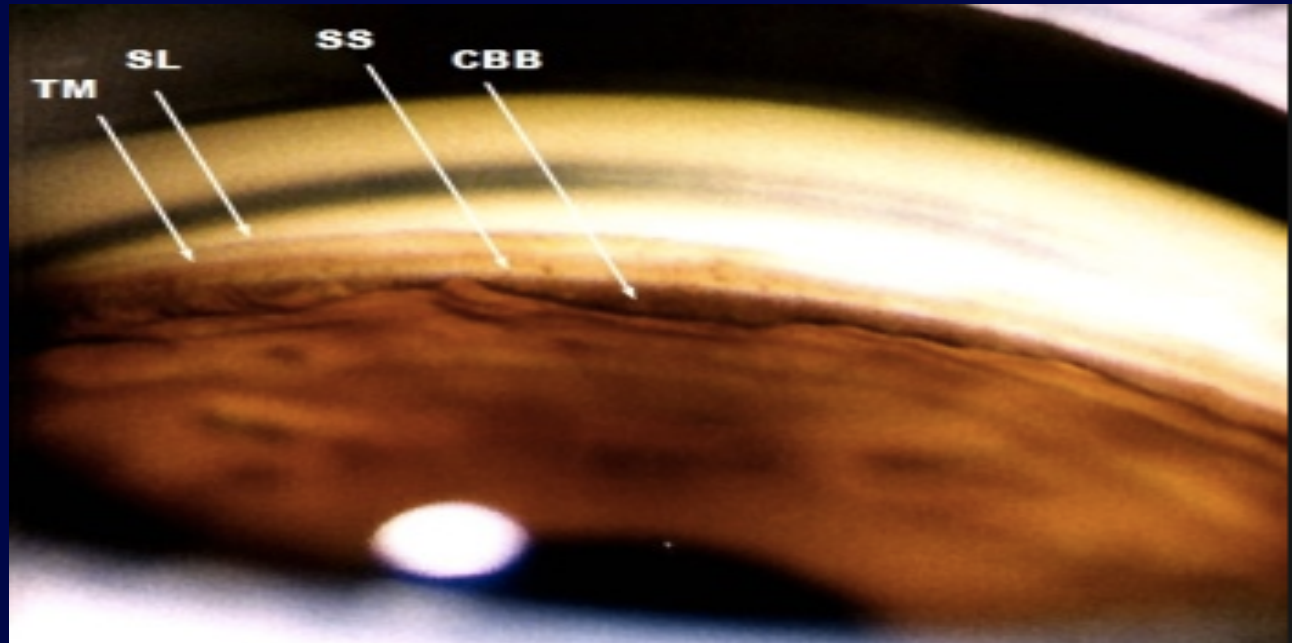
# Case: LM

- BcVa: 20/20 OD, 20/100 OS
- Pupils: ERRL OU
- CVF: Full OU
- EOM: full OU
- IOP: 15 mmHg OD, 36 mmHg OS
- Pachs: 553 OD, 553 OS

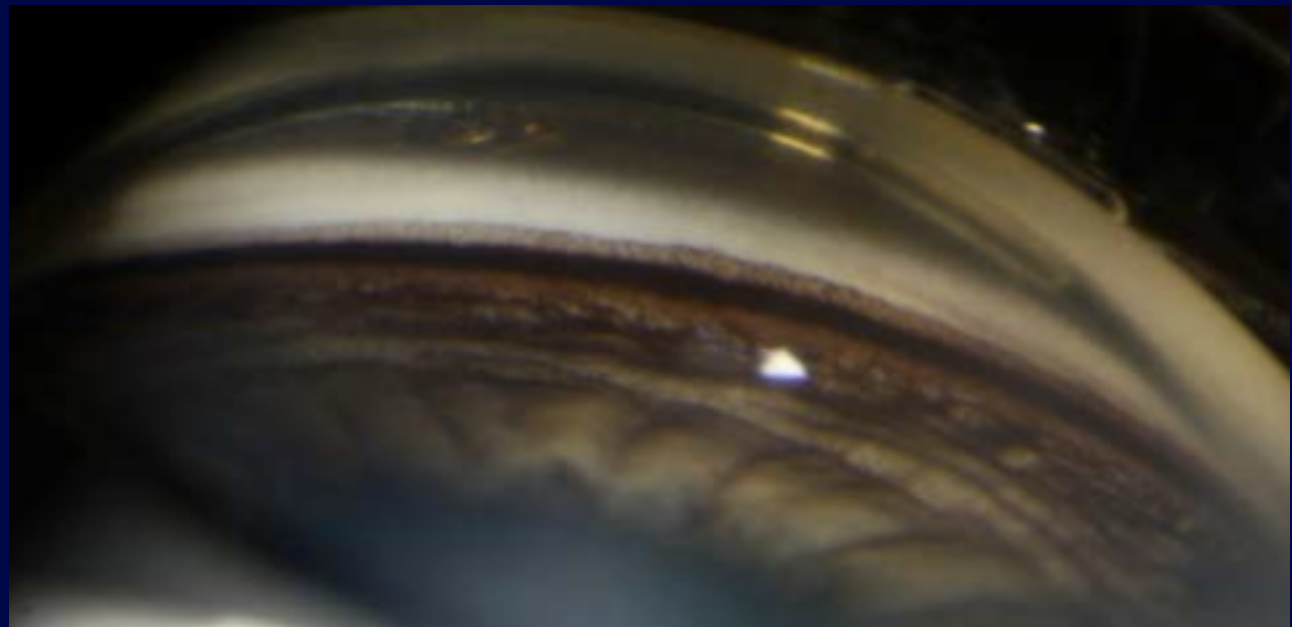


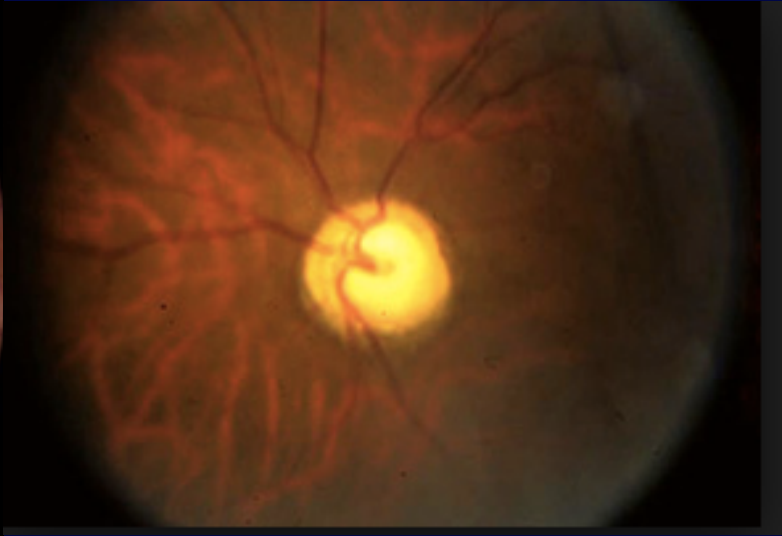
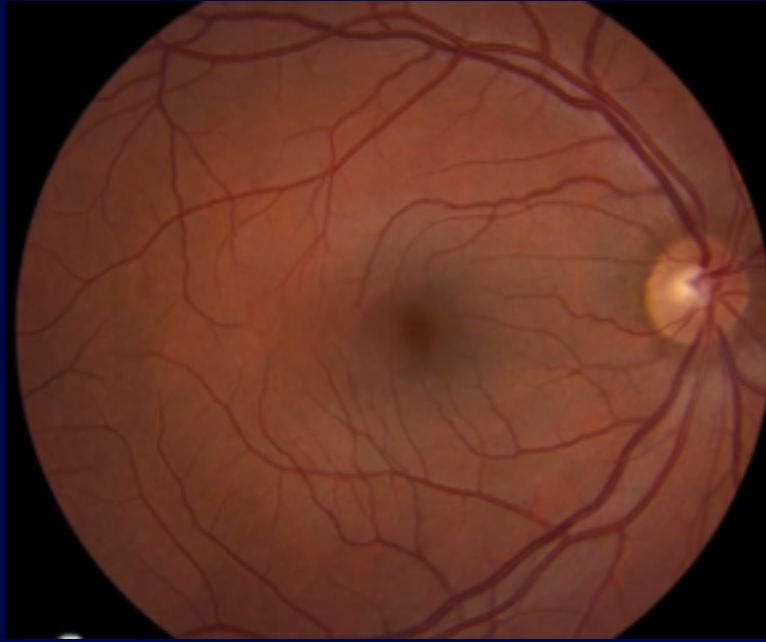


OD



OS

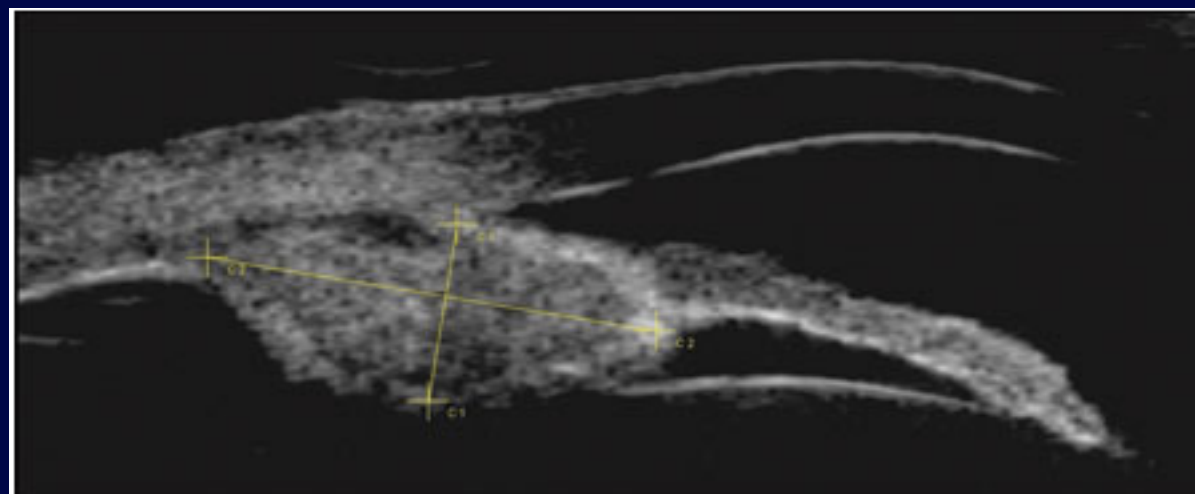
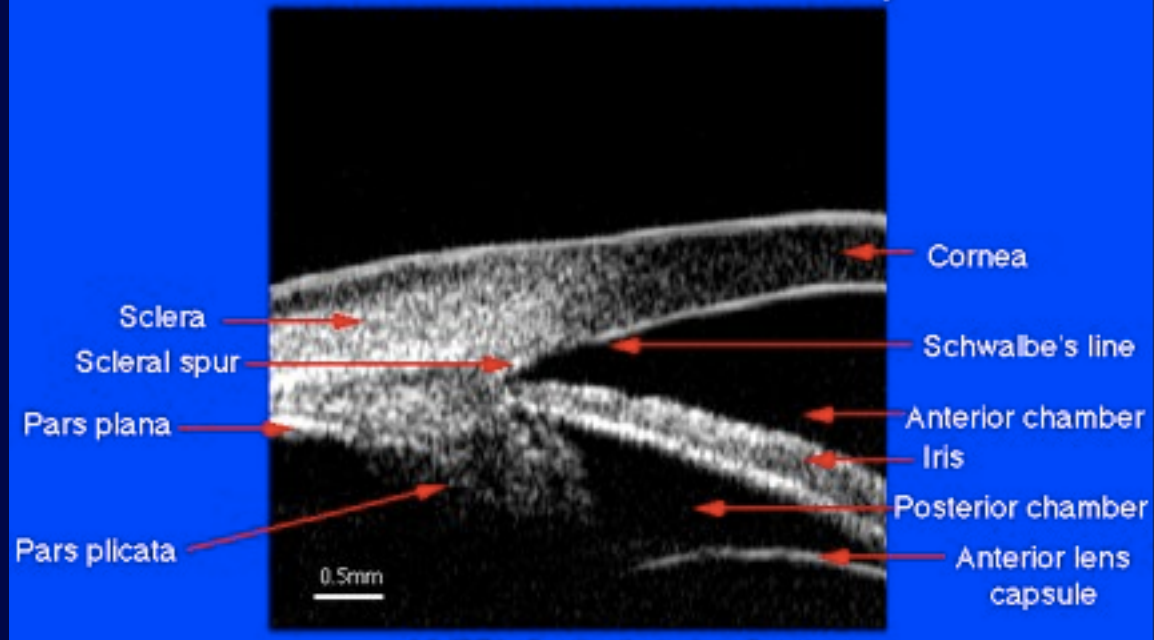




# Unilateral glaucoma

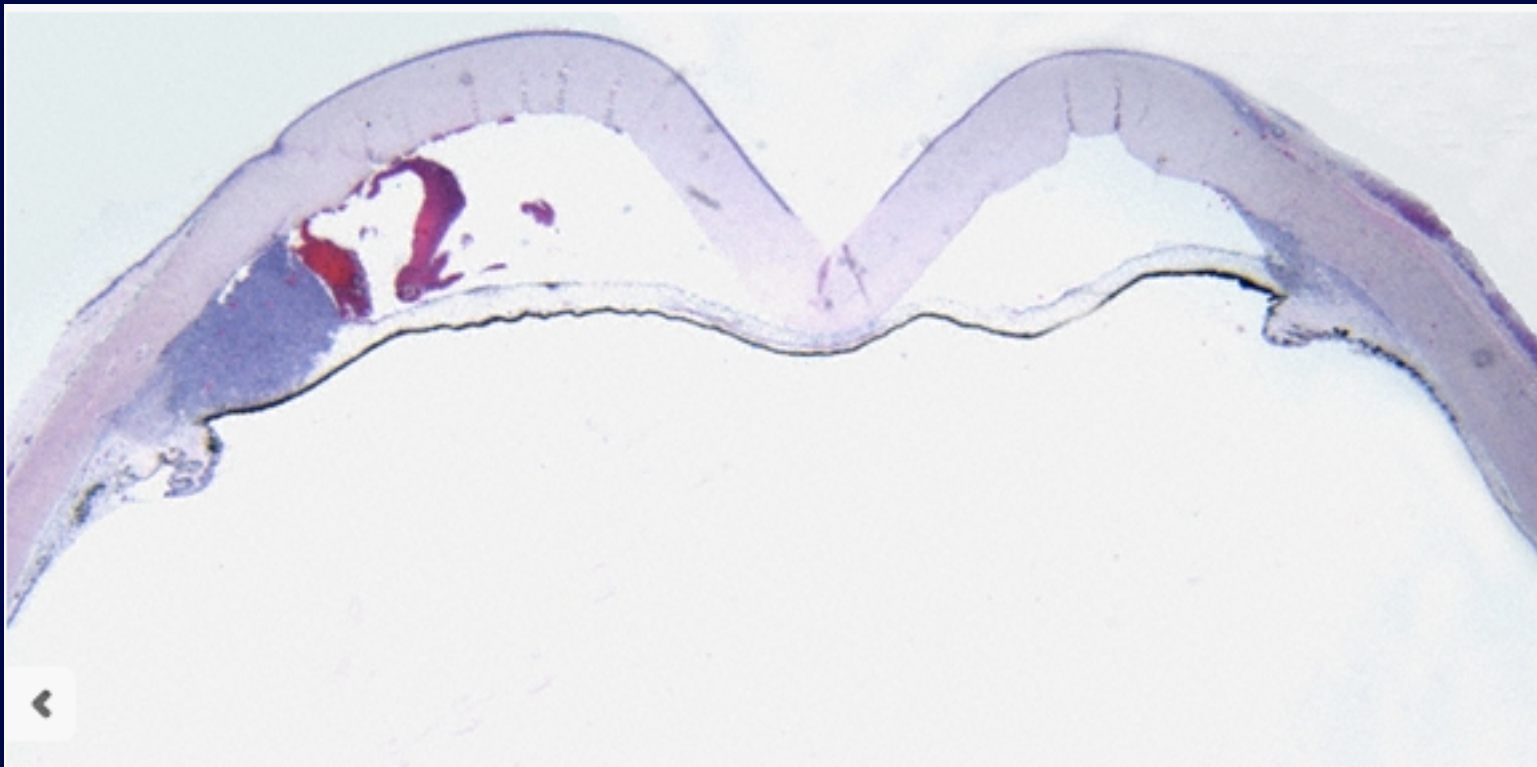
- Unilateral pigment
- Asymmetric cupping

# Normal Anterior Chamber Anatomy



# Ring melanoma

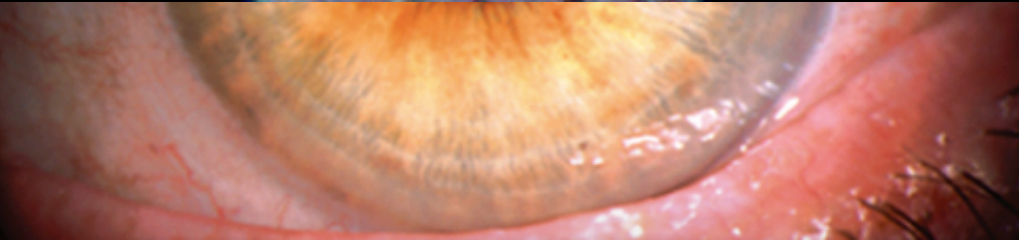
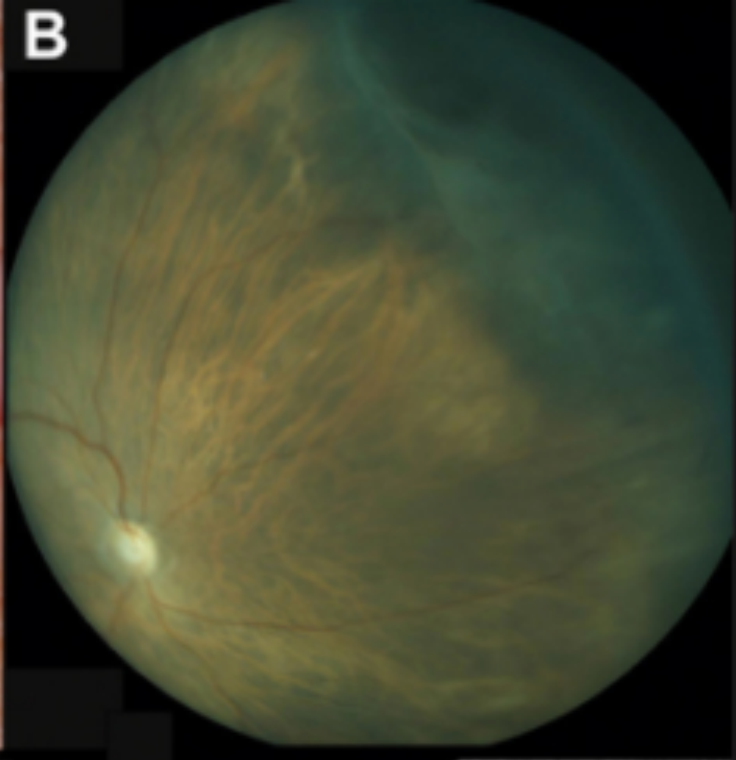
- Rare
- Origin: Anterior CB, iris, angle

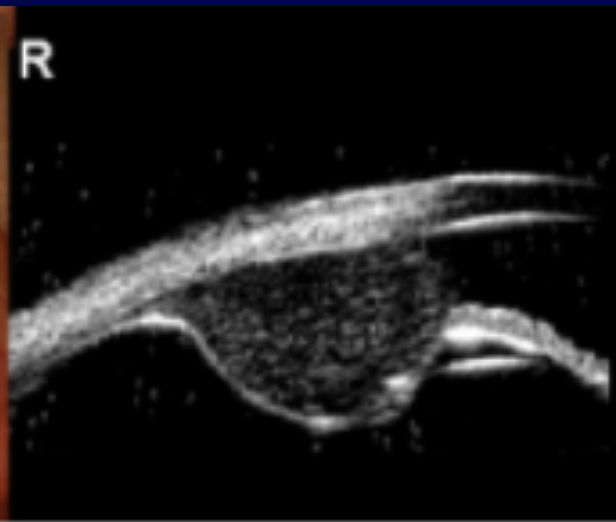
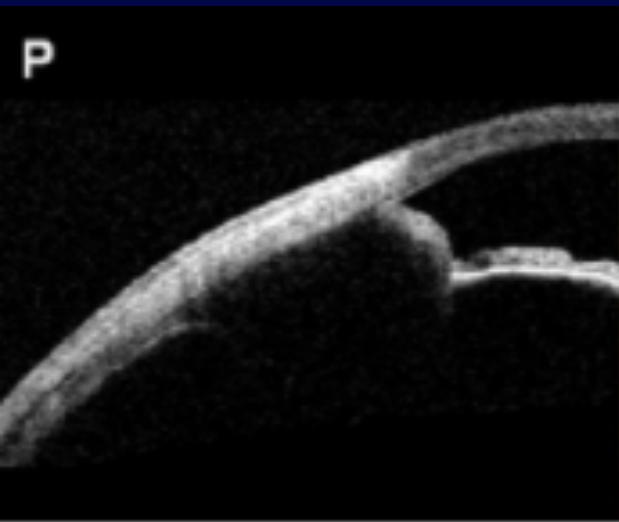


A

A

B









# PHARMACOLOGY

doesn't have  
to suck



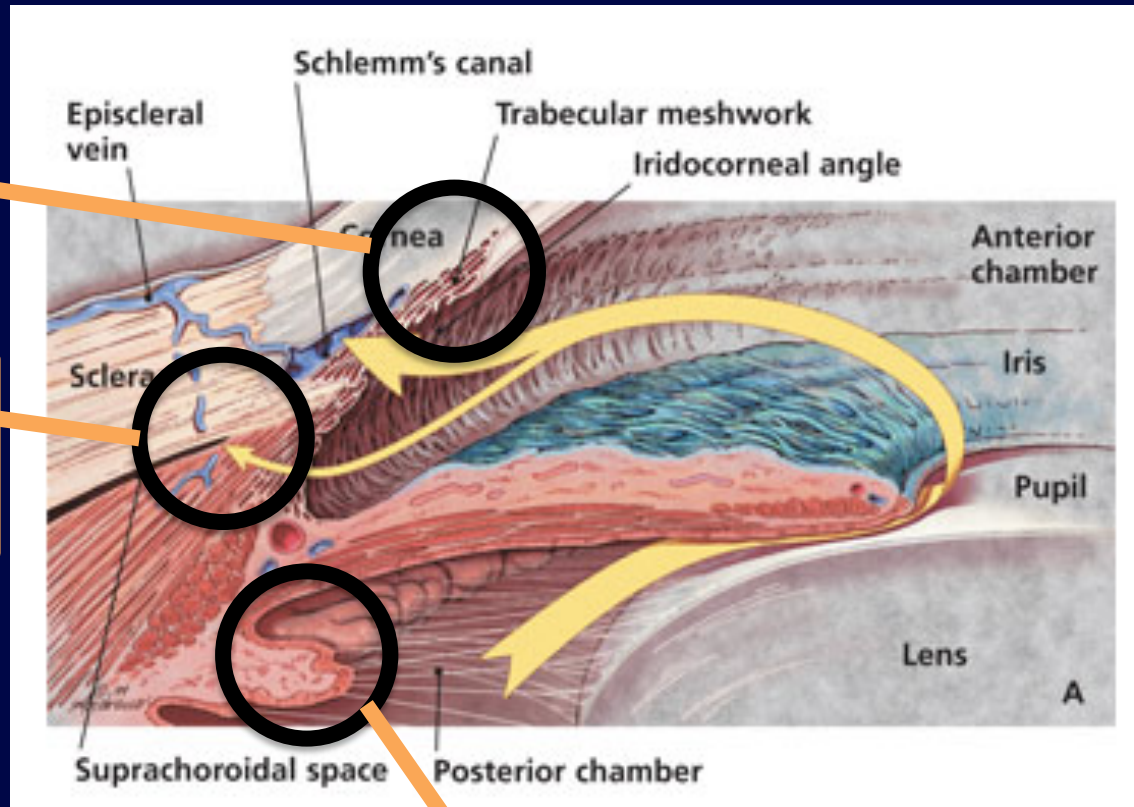


↑ **Trabecular outflow**  
- Miotics

↑ **Uveoscleral outflow**  
- Prostaglandin analogs

$\alpha_2$ -agonists

↓ **Aqueous humor production**  
- B-blockers  
- Carbonic anhydrase inhibitors



# Prostaglandin analogs (PGA)

Company	Brand name	Generic name
Alcon, Inc	Travatan Z	Travaprost 0.004%
Allergan, Inc	Lumigan	Bimatoprost 0.01%, 0.03%
Merck & Co	Zioptan	Tafluprost 0.0015%
Pfizer, Inc	Xalatan	Latanoprost 0.005%

IOP decrease	Peak	Washout
25-30%	10-14 hours	4-6 weeks

# PGA Side effects (SE)

## Ocular

Hypertrichosis

Increased skin, lash, iris  
pigmentation

Conjunctival hyperemia

Periorbital fat atrophy

Keratitis

Anterior uveitis

Reactivation of HSV

Cystoid macular edema (CME)

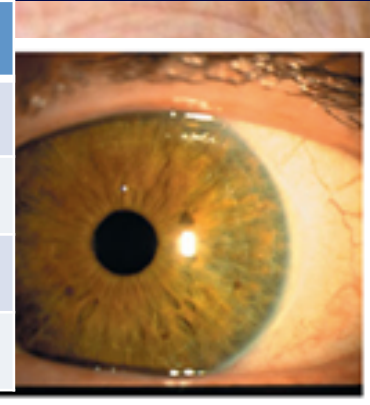
## Systemic

Flu-like symptoms

Joint, muscle pain

Headache

Easy bruising\*

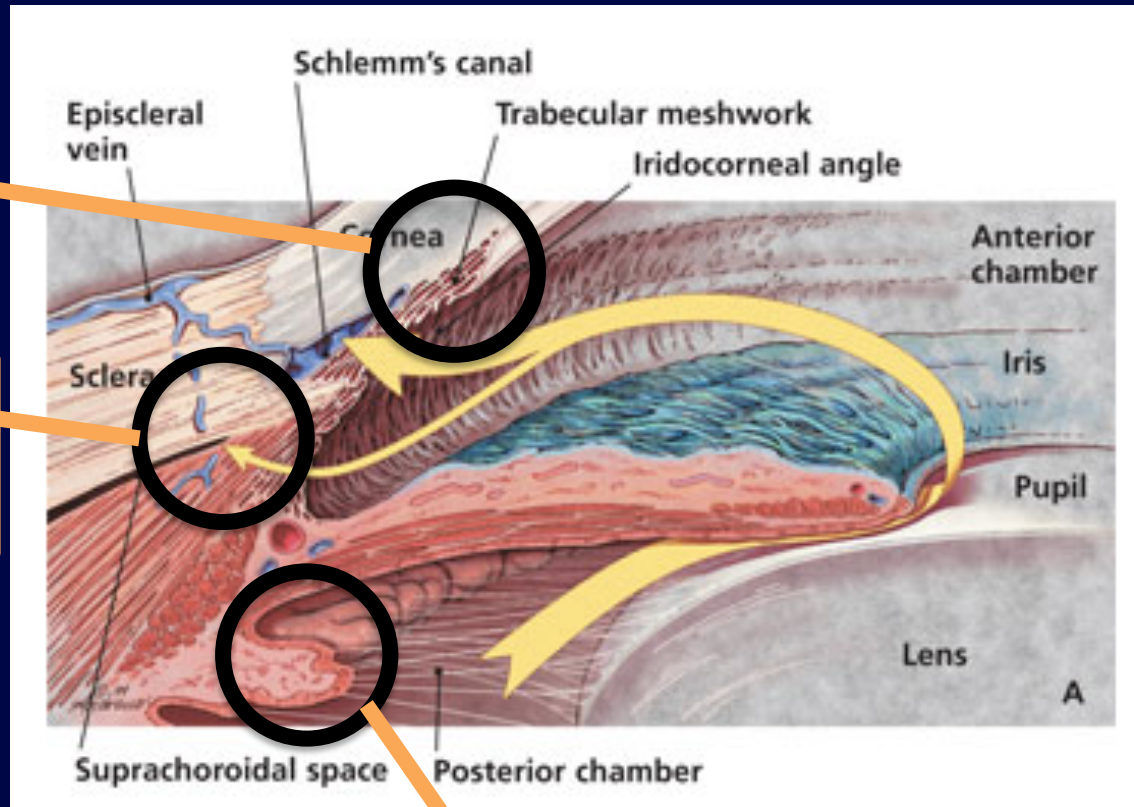


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$\alpha_2$ -agonists

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# B-blockers

Company	Brand name	Generic name
Akorn Ophthalmics	Timolol maleate USP	Timolol maleate 0.5%
ISTA Pharmaceuticals	Istalol	Timolol maleate ophthalmic solution 0.5%
Merck & Co, Inc	Timoptic XE	Timolol maleate ophthalmic gel forming solution 0.25%, 0.5%
VISTAKON, Inc	Betimol	Timolol hemihydrate 0.25%, 0.5%
Alcon, Inc	Betoptic S	*Betaxolol HCl 0.25%, 0.5%
Allergan, Inc	Betagan	Levobunolol HCl, 0.25%, 0.5%
Bausch & Lomb, Inc	OptiPranolol	Metipranolol 0.3%

IOP decrease	Peak	Washout
~ 20%	~ 2-3 hours	4 weeks



# B-blockers

- If a patient is on systemic B-blocker, topical B-blocker may be significantly less effective
  - Long-term drift
  - Short-term escape

# B-blockers SE

## Ocular

Blurred vision

Corneal anesthesia

SPK

Allergy



# B-blockers SE

## Systemic\*

Bronchospasm

Bradycardia

Heart block

Lower blood pressure

Decrease libido

CNS depression

Mood swings

Reduce exercise tolerance

Mask hypoglycemic signs in pt with diabetes

Exacerbate hyperthyroidism with abrupt withdrawal

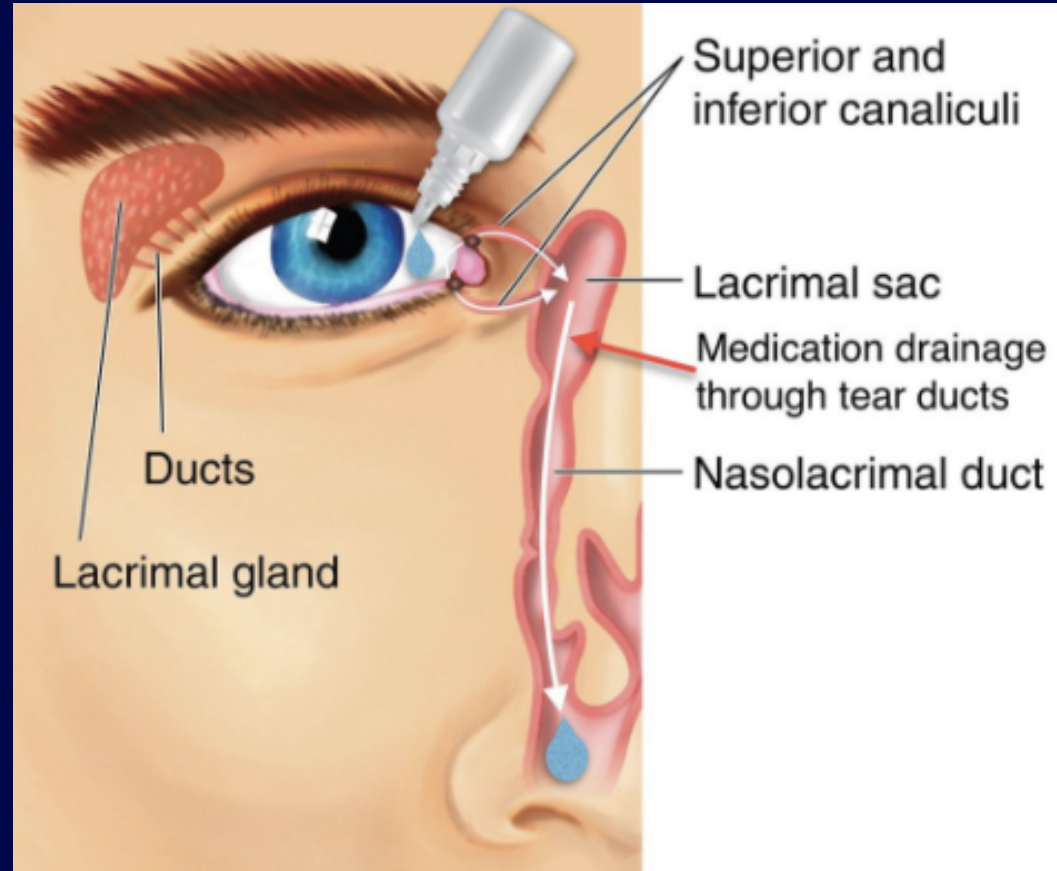
Aggravate myasthenia gravis

Alter serum lipids

# CAUTION

- Asthma
- Chronic obstructive pulmonary disease (COPD)
- 1st degree heart block
- Bradycardia
- Diabetes
- Myasthenia gravis
- Hyperthyroid

# Nasolacrimal occlusion!



# Carbonic anhydrase inhibitors (CAI)

Company	Brand name	Generic name
Alcon, Inc	Azopt	Brinzolamide ophthalmic suspension 1%
Merck & Co, Inc	Trusopt	Dorzolamide HCl 2%
Fera Pharmaceuticals	Neptazane	Methazolamide
Teva Pharmaceuticals	Diamox sequels	Acetazolamide

IOP decrease	Peak	Washout
15-20%	~ 2-3 hours	48 hours

# CAI SE

Ocular
Stinging
Blurred vision
Induced myopia
SPK
Dermatitis
Conjunctivitis

# PO, IV CAI

Generic	Brand	Dose	Onset	Peak	
<b>Acetazolamide</b> PO	Diamox 250mg	BID-QID	1 hour	2-4 hrs	<b>KIDNEY</b>
	Diamox Sequels 500mg			3-6 hrs	
IV	Diamox 500mg 5-10mg/kg		2 minutes	15min	
<b>Methazolamide</b> PO	Neptazane 25, 50, 100mg	BID, TID	1 hour	2-4 hrs	<b>LIVER</b>



# CAI SE

## Systemic\*

Metallic taste with carbonated beverages

Paresthesias

Malaise

Metabolic acidosis

Kidney stones

Hypokalemia

GI upset

Aplastic anemia

Stevens-Johnson syndrome

# CAUTION

- Sulfa allergy
- Renal failure
- Sickle cell disease
- Hepatic insufficiency
- Steven-Johnson syndrome

# CAUTION

- Hypertension
- Cardiac history
  - Digoxin
  - Thiazide diuretic

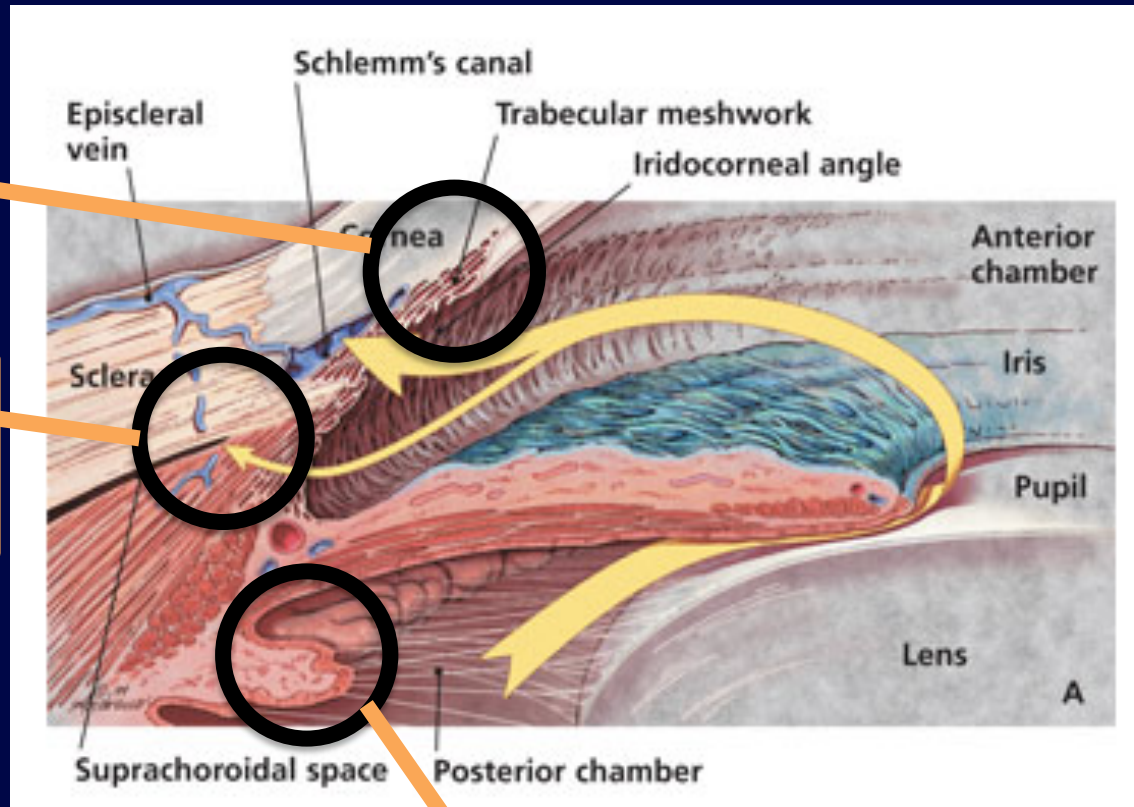
Thiazide diuretic Generic	Brand
Hydrochlorothiazide	Hydrodiuril
Methyclothiazide	Enduron
Indapamide	Lozol
Chlorthalidone	Hygroton
Metolazone	Zaroxlyn, Diulo, Myrox

↑ Trabecular outflow  
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$\alpha_2$ -agonists

↓ Aqueous humor production  
- B-blockers  
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# $\alpha_2$ -agonists

Company	Brand name	Generic name
Alcon, Inc	Iopidine	Apraclonidine HCl 0.5%, 1%
Allergan, Inc	Alphagan, Alphagan P	Brimonidine tartrate 0.1%, 0.15%

IOP decrease	Peak	Washout
20-30%	1-2 hours	7-14 days

# $\alpha_2$ -agonists SE

Ocular
Dermatitis
SPK
Follicular conjunctivitis
Eyelid retraction
Miosis

# $\alpha_2$ -agonists SE

## Systemic\*

Hypotension

Fatigue

Depression

Dry mouth,nose

Insomnia

# CAUTION

- Depression
- Psych patients

Tricyclic antidepressant Generic	Brand
Amitriptyline	Elavil
Imipramine	Tofranil
Doxepin	Sinequan
Desipramine	Norpramin
Nortriptyline	Pamelor



# CAUTION

- Depression
- Psych patients

Monoamine oxidase inhibitors (MAOI)	Brand
Phenelzine	Nardil
Selegiline	Emsam
Tranylcypromine	Parnate

$\alpha_2$ -agonists AVOID in infants, children

# Combinations

Company	Brand	Generic
Allergan, Inc	Combigan	Brimonidine + Timolol
Merck & Co, Inc	Cosopt	Dorzolamide + Timolol
Alcon	Simbrinza	Brinzolamide + Brimonidine

## NOT in USA

Brand	Generic
Xalcom	Timolol + Latanoprost
DuoTrav, Extravan	Timolol + Travoprost
Ganfort	Timolol + Bimatoprost

# Hyperosmotic agents

Name	Brand	Route	Strength	Dose
Mannitol	Osmitrol	IV	20%, 50% solution	2g/kg body weight
Glycerin		PO	50% solution	1-2g/kg

- Mechanism: dehydrate vitreous



# Hyperosmotic SE

Systemic*
Headache
Urinary retention
Congestive heart failure
Nausea
Vomiting
Renal failure

# CAUTION

- Heart failure
- Diabetes

# Pearls Summary for Glaucoma

- Primary open angle is diagnosis of exclusion
- Rule out other causes of high IOP
- Angle OPEN or CLOSED?
- Gonioscopy
- Side effects of glaucoma medications are REAL







# Eye Care Associates of Michigan

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Pine Brook Medical Offices. Btwn 7 & 8 Mile.

Dr Barte

