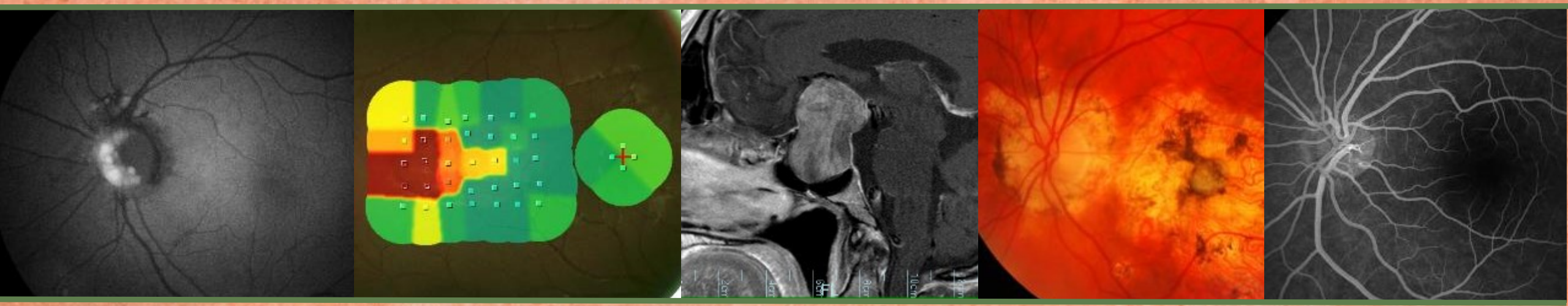
Grand Rounds

MULTIMODAL DIAGNOSTICS



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Multimodal Grand Rounds

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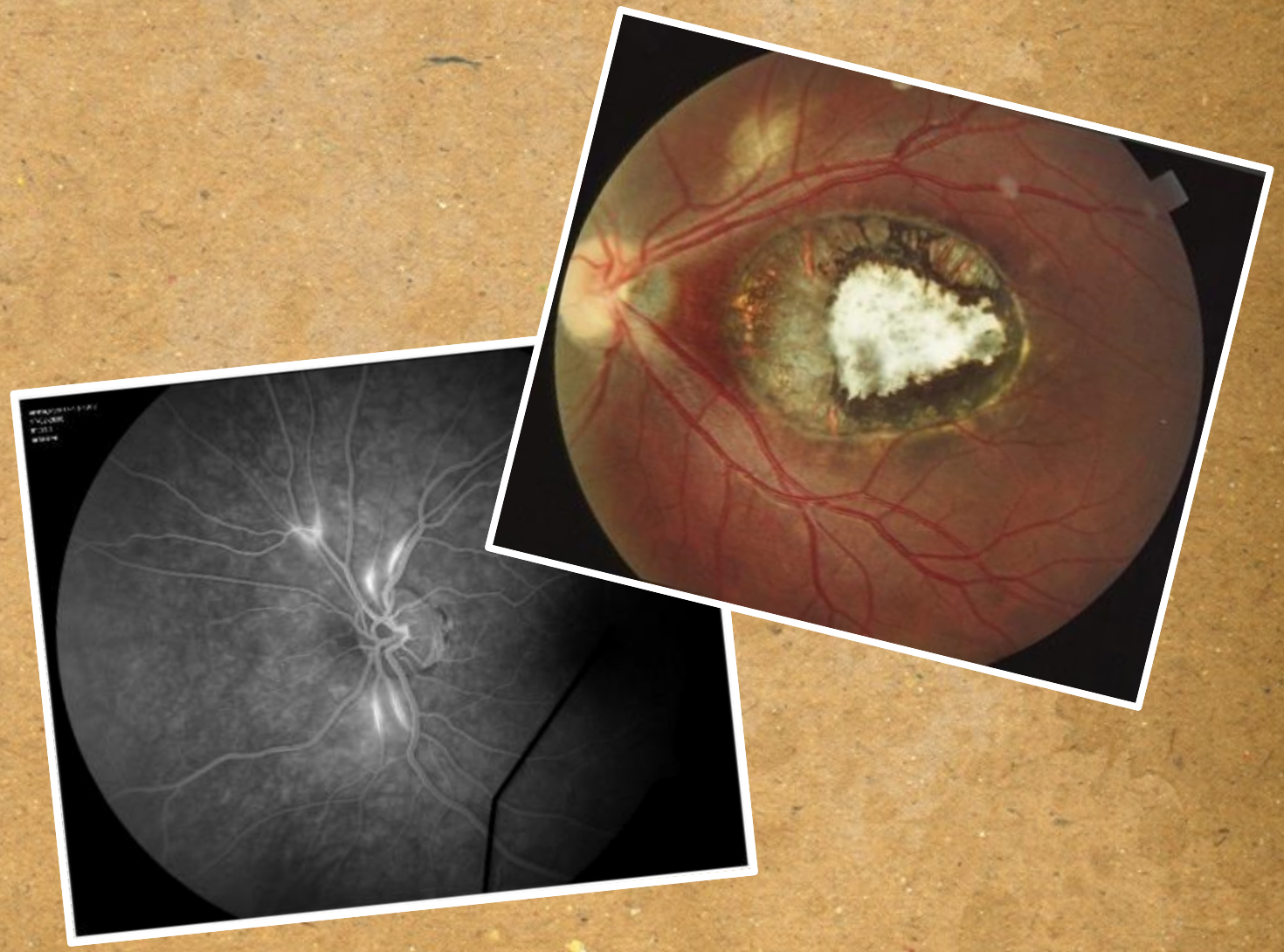
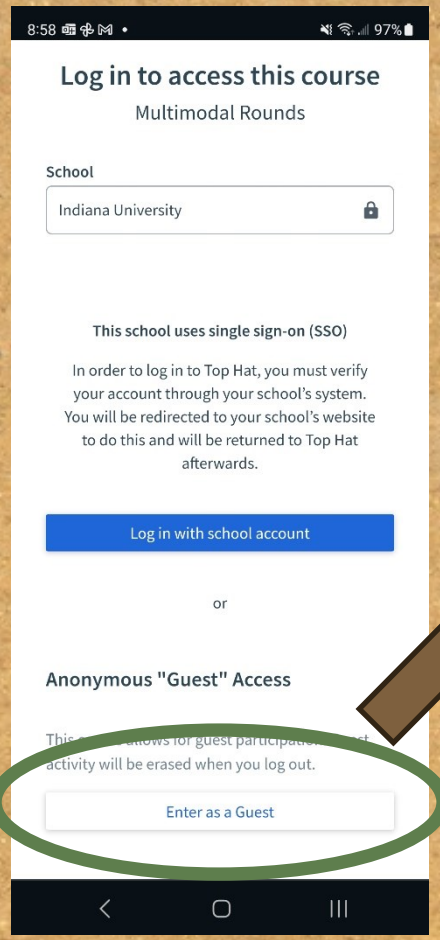
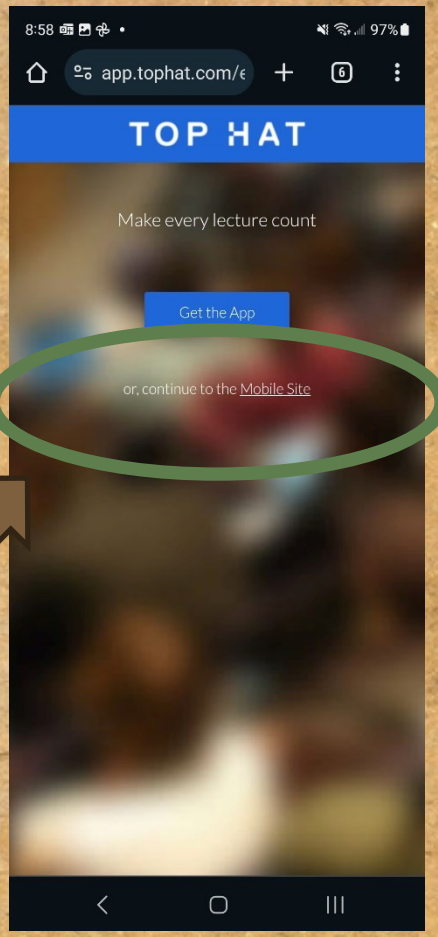
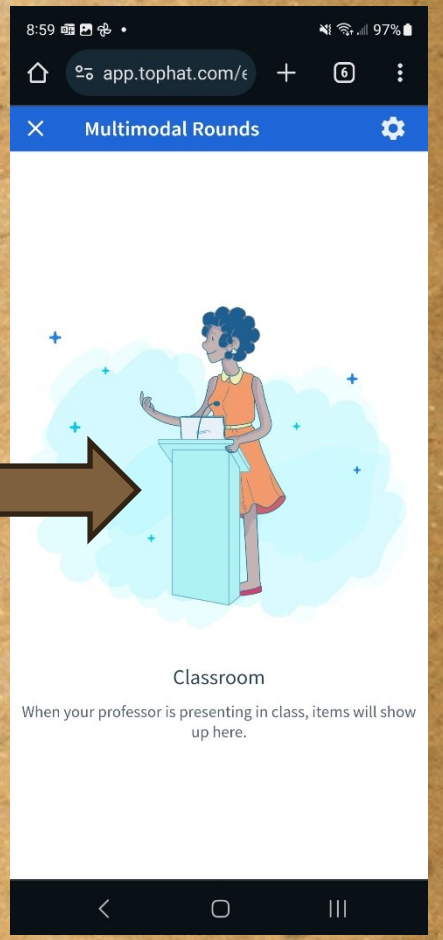
  - rctrevin@iu.edu
- **Disclosures**
  - None



Interactive Presentation







Battle of the Superheros!

https://app.tophat.com/e/777538

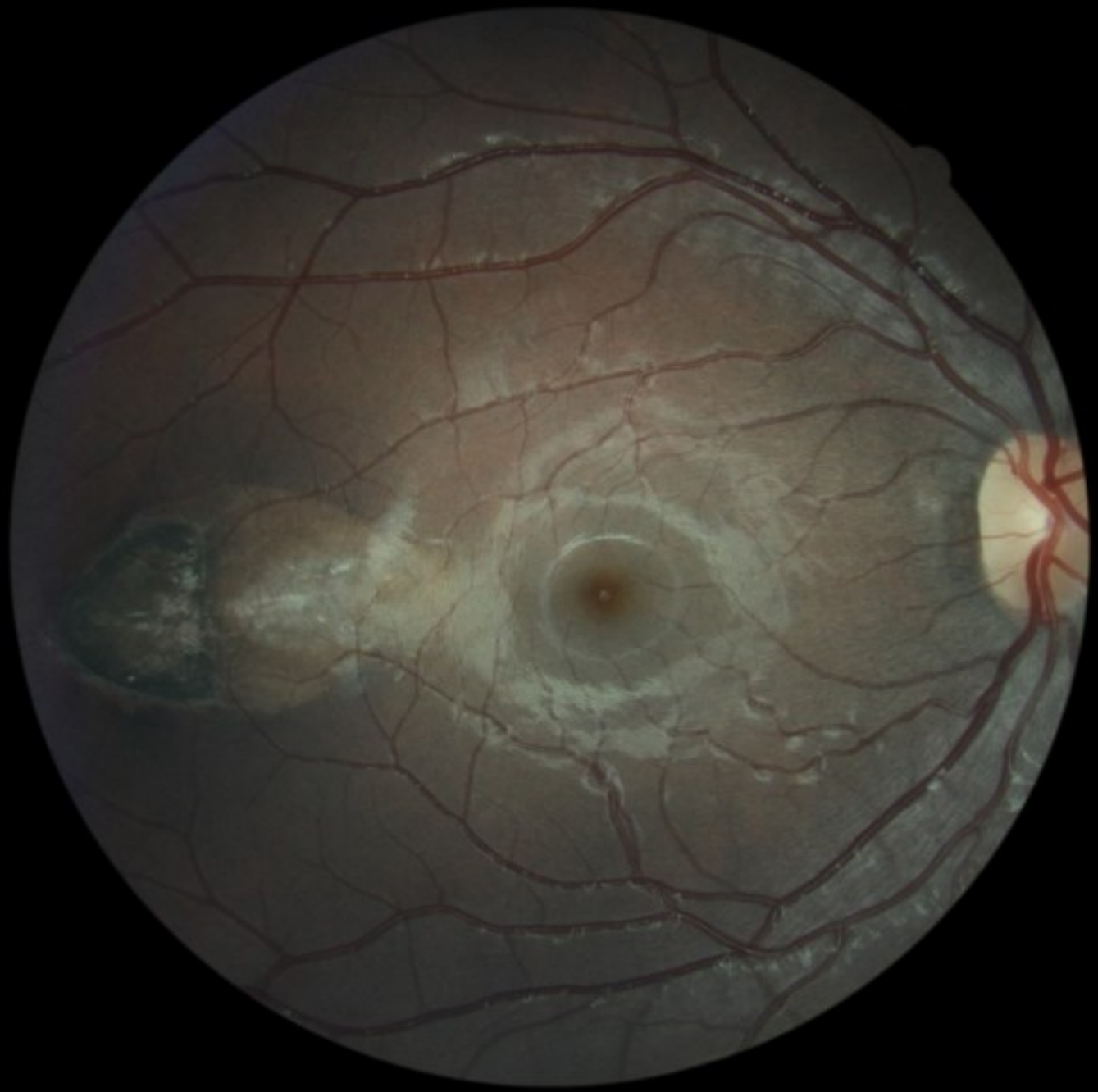
Superman	A
Batman	B
Captain America	C
Wonder Woman	D

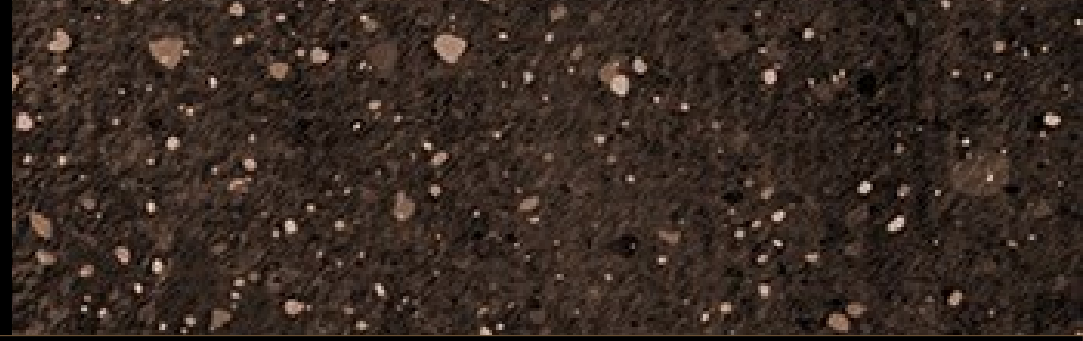
CASE #1

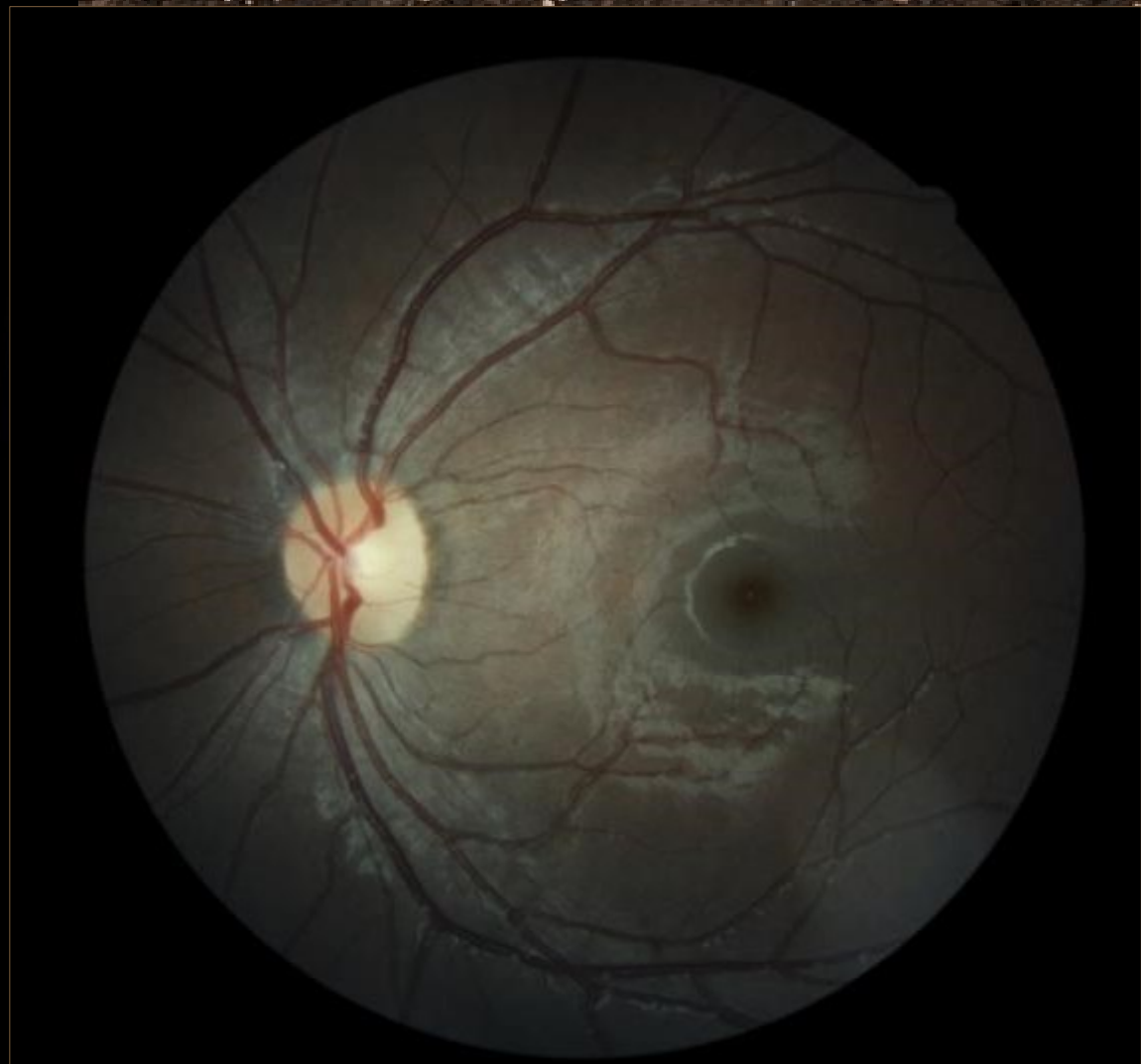
Don't sink my battleship!

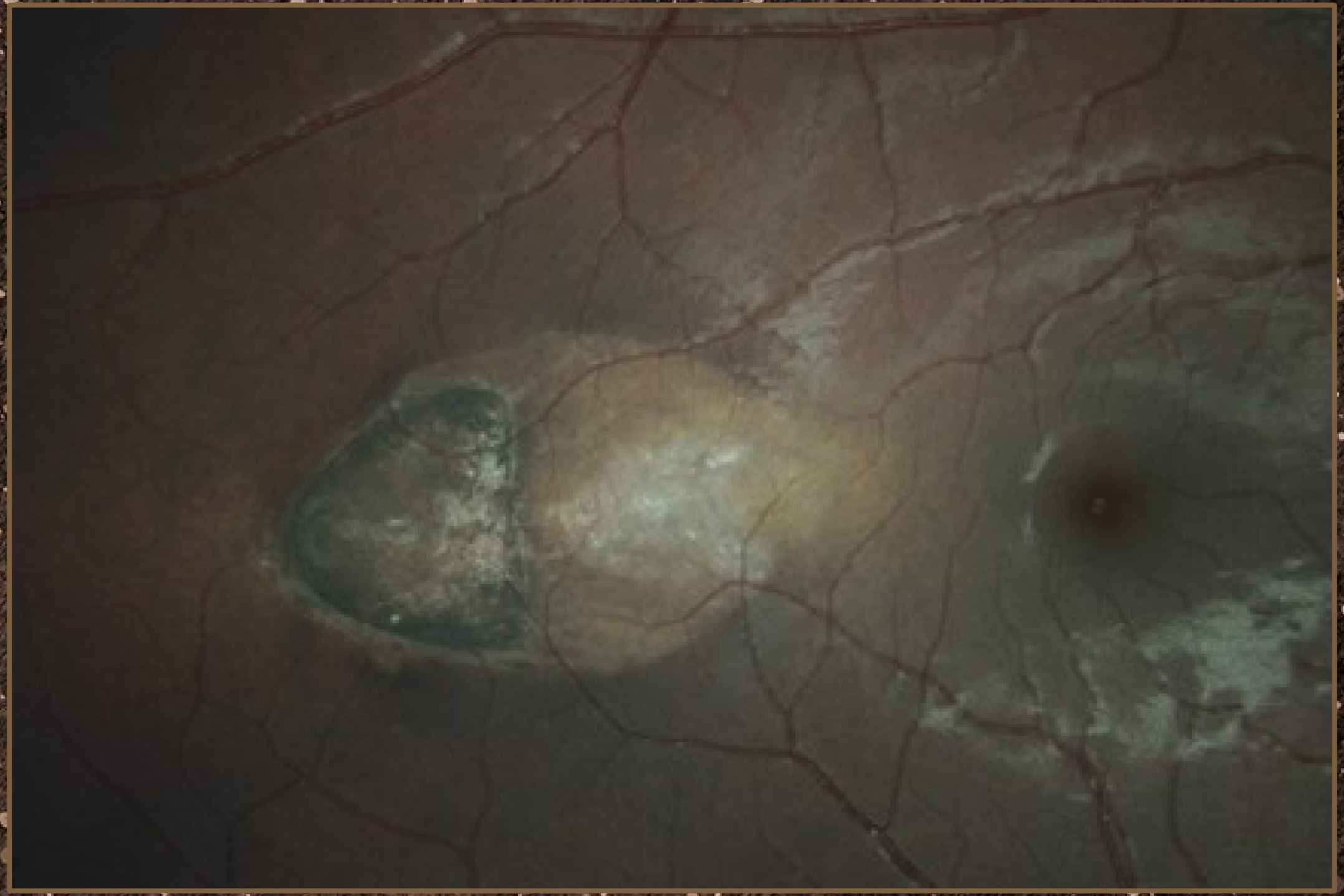
CASE #1

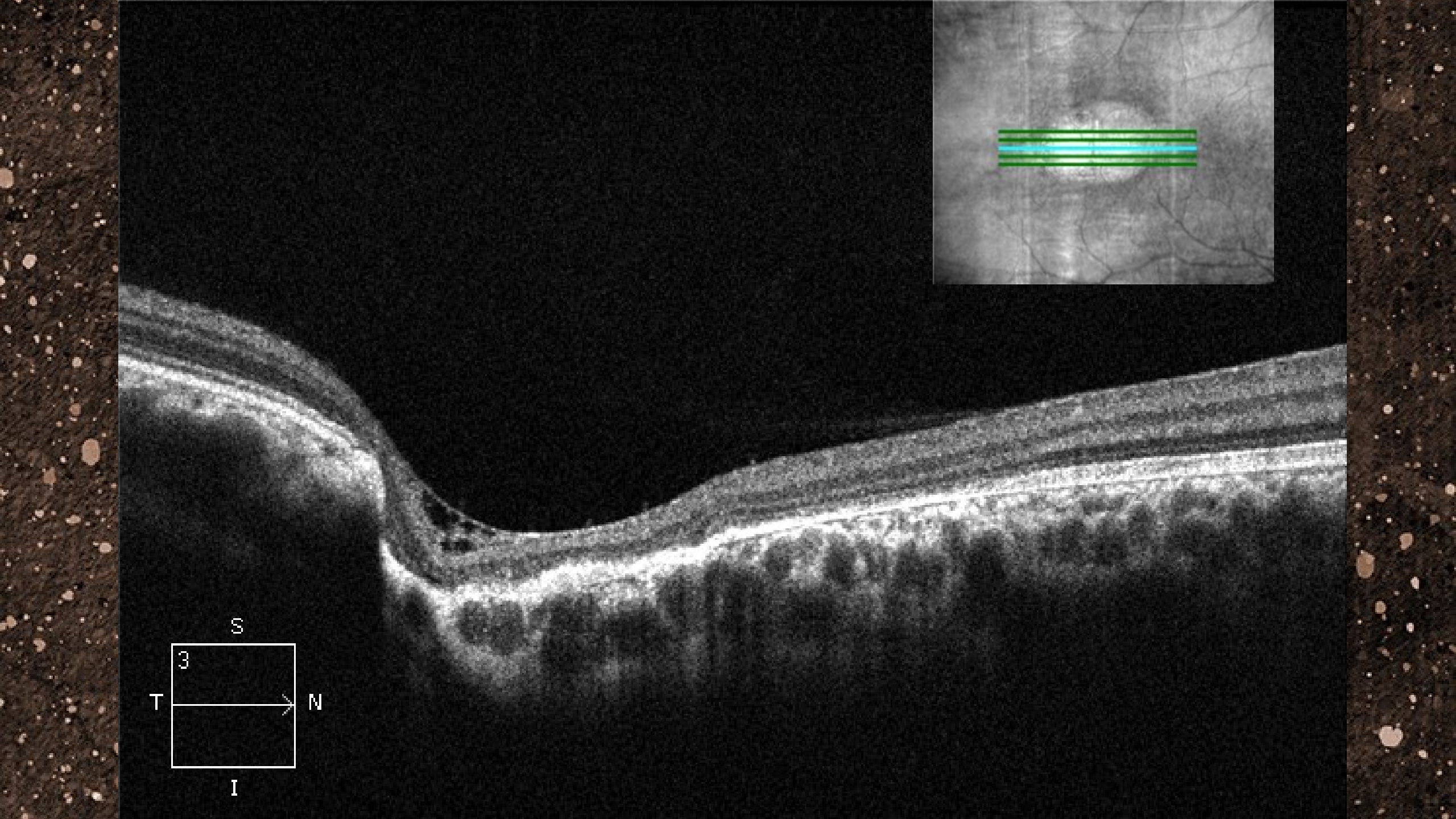
- 25yo East Indian woman presents without complaints for routine exam
- POH: Unremarkable. LEE: 1yr.
- MH: Good health. No medications
- Vision: 20/15 each eye without correction
- Entrance testing: Normal
- External exam: Normal OU
- Tonometry: 14/13 @11:00AM







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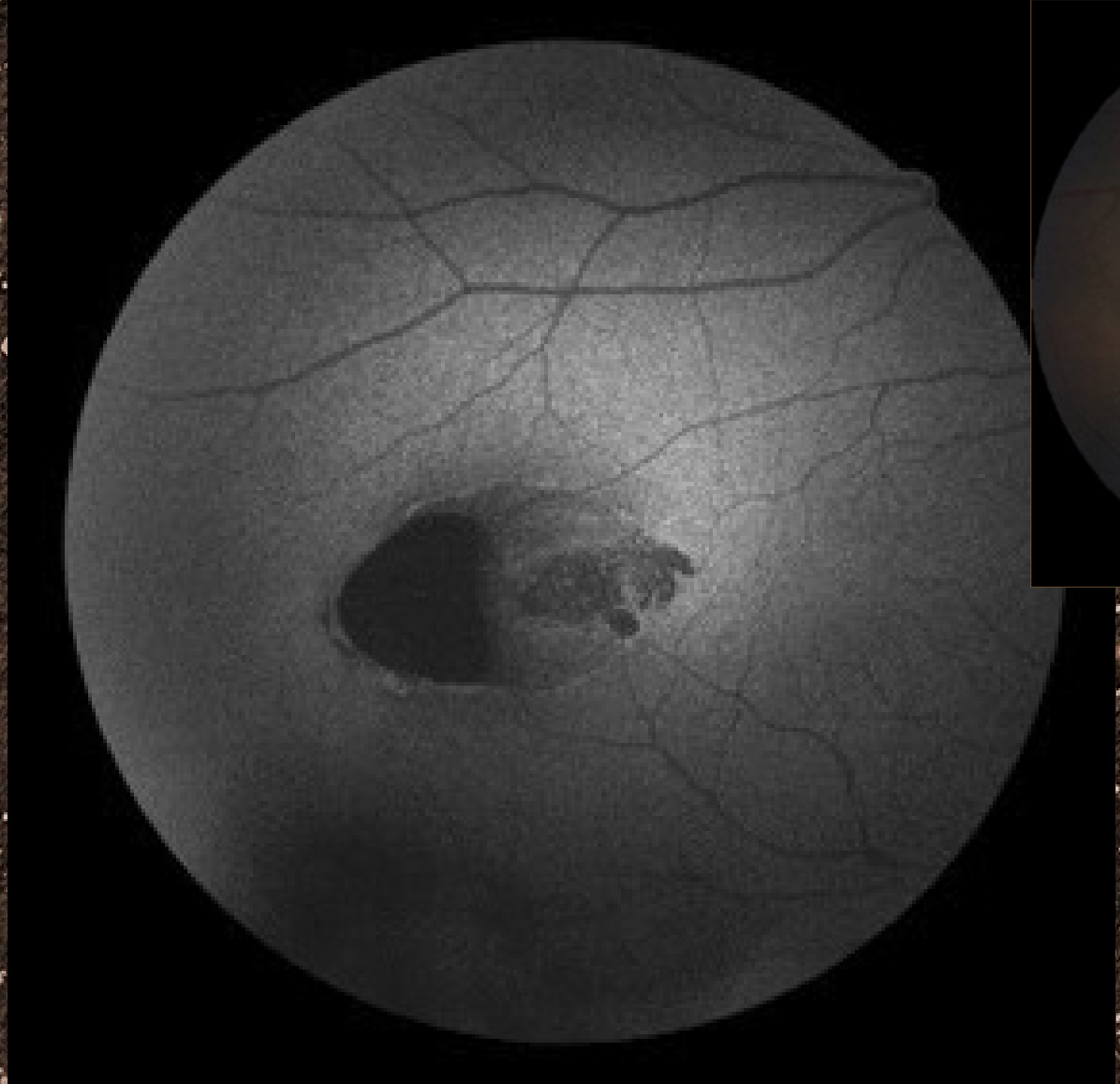
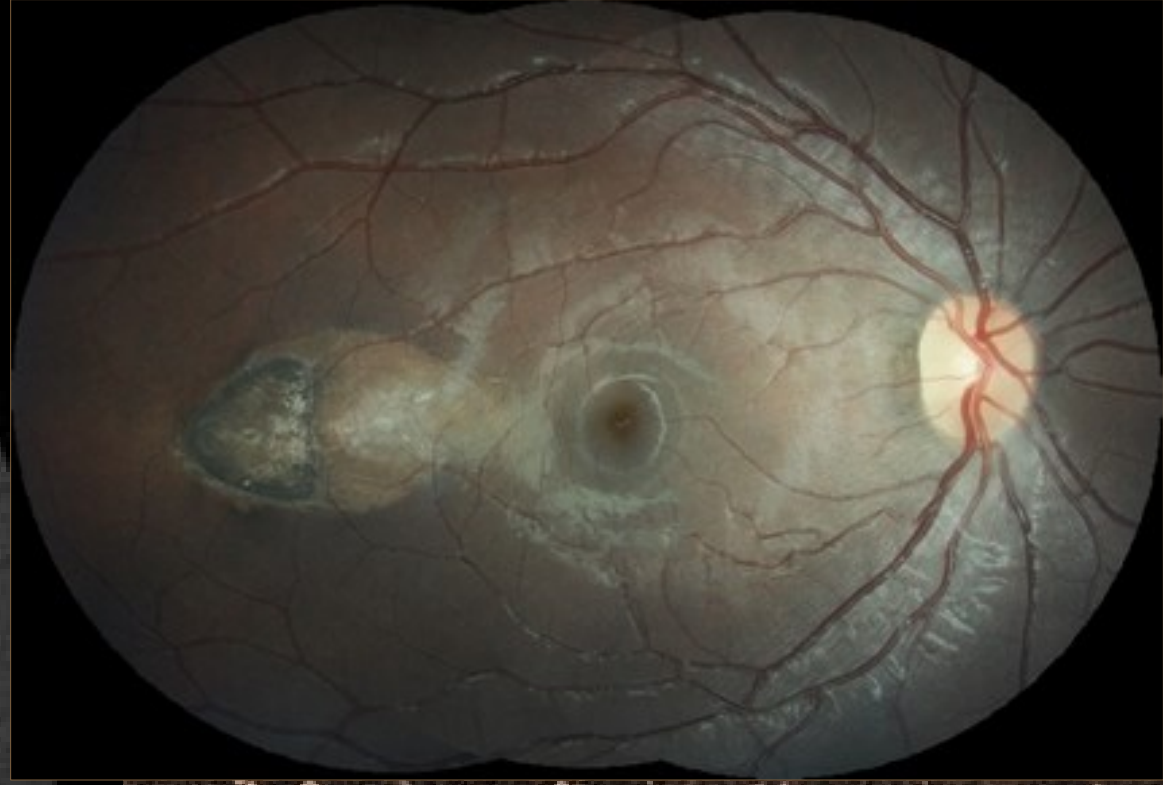
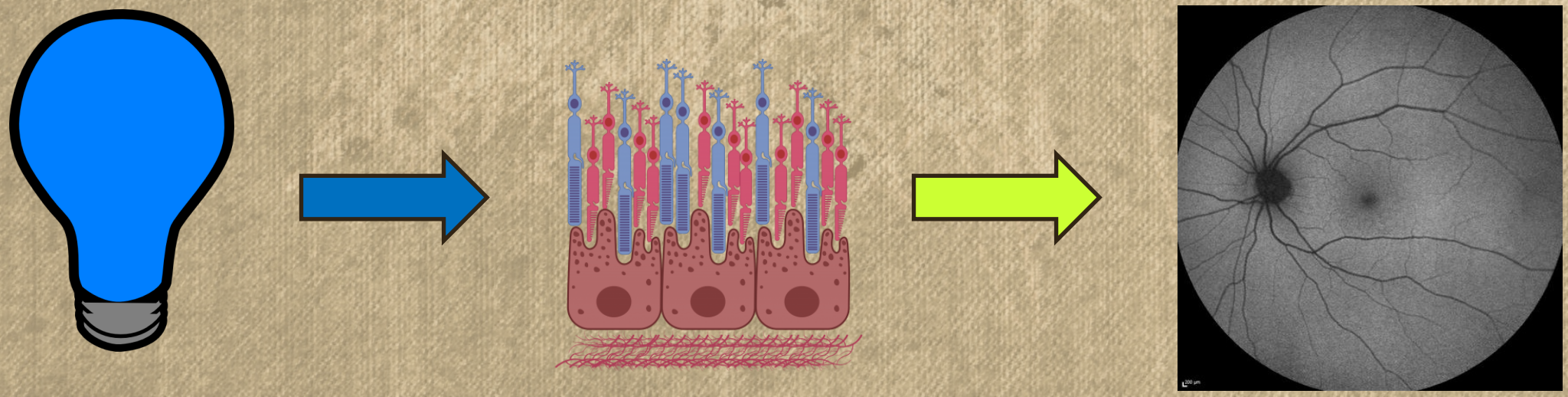


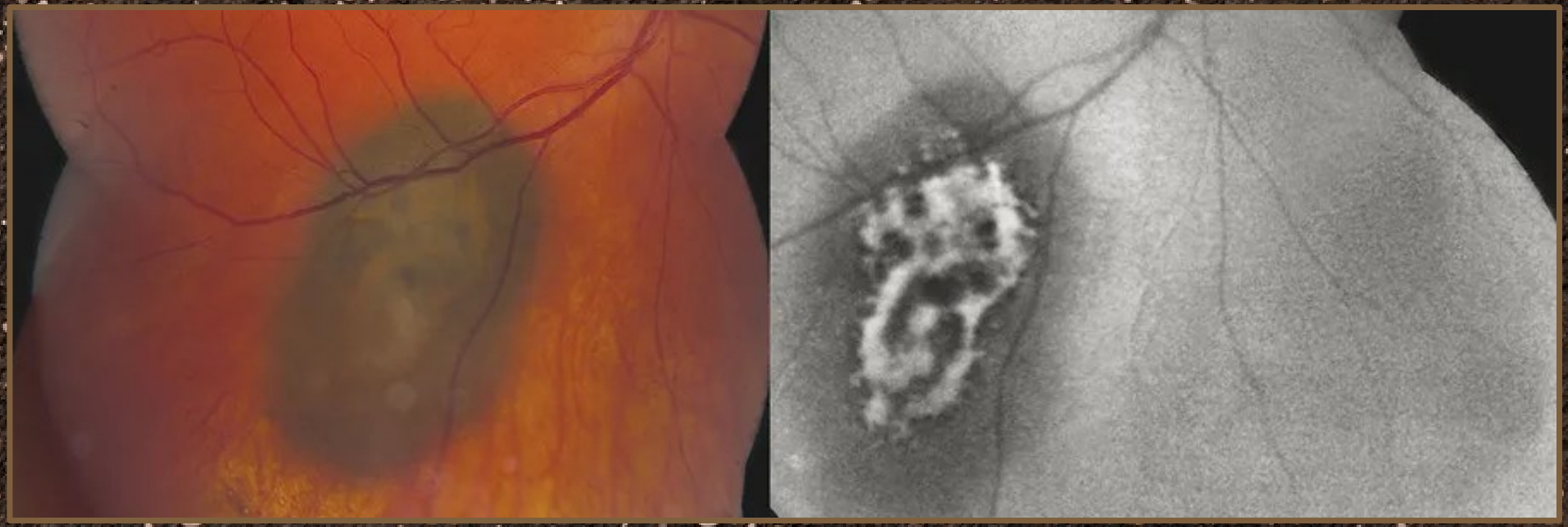


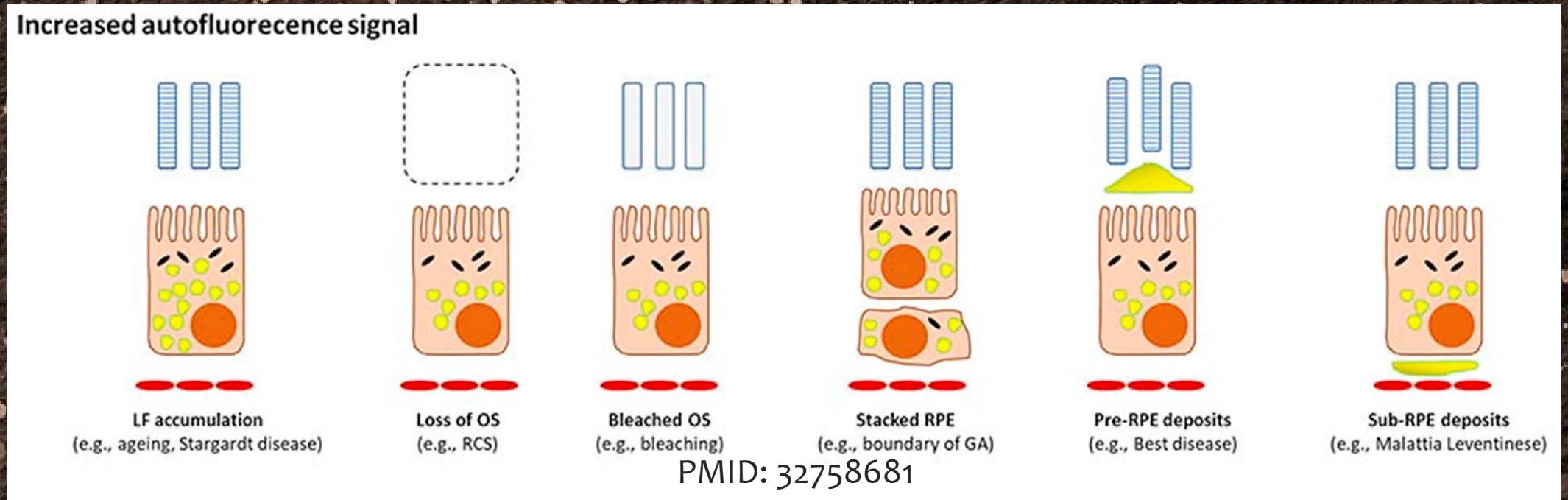
Fundus autofluorescence (FAF) uses blue light to stimulate lipofuscin in RPE cells to glow. Regions without viable RPE will appear dark.

About Fundus Autofluorescence

- Lipofuscin is a waste product of normal cell metabolism found throughout the body
- The RPE accumulates lipofuscin as it phagocytizes photoreceptor outer segments
- When stimulated by blue light, lipofuscin will glow







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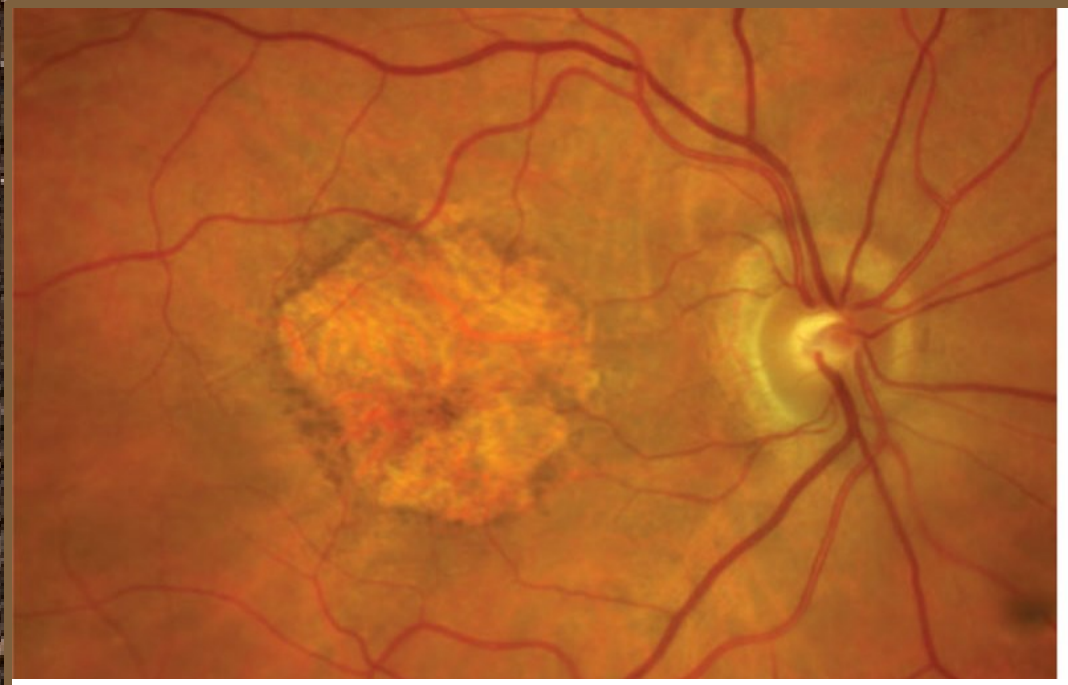

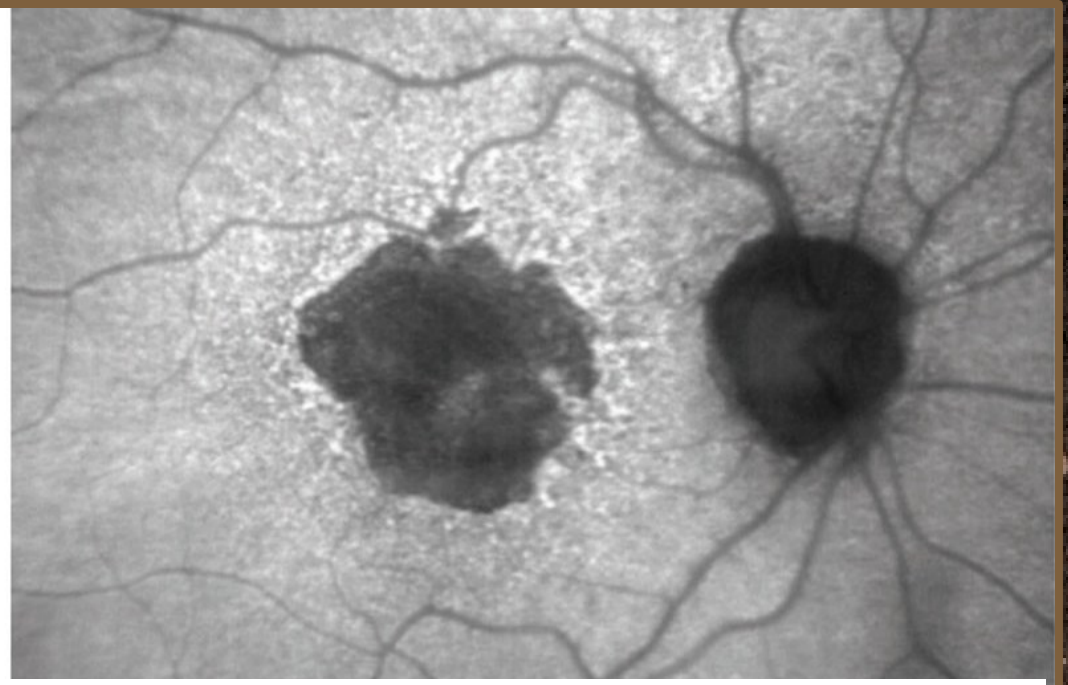

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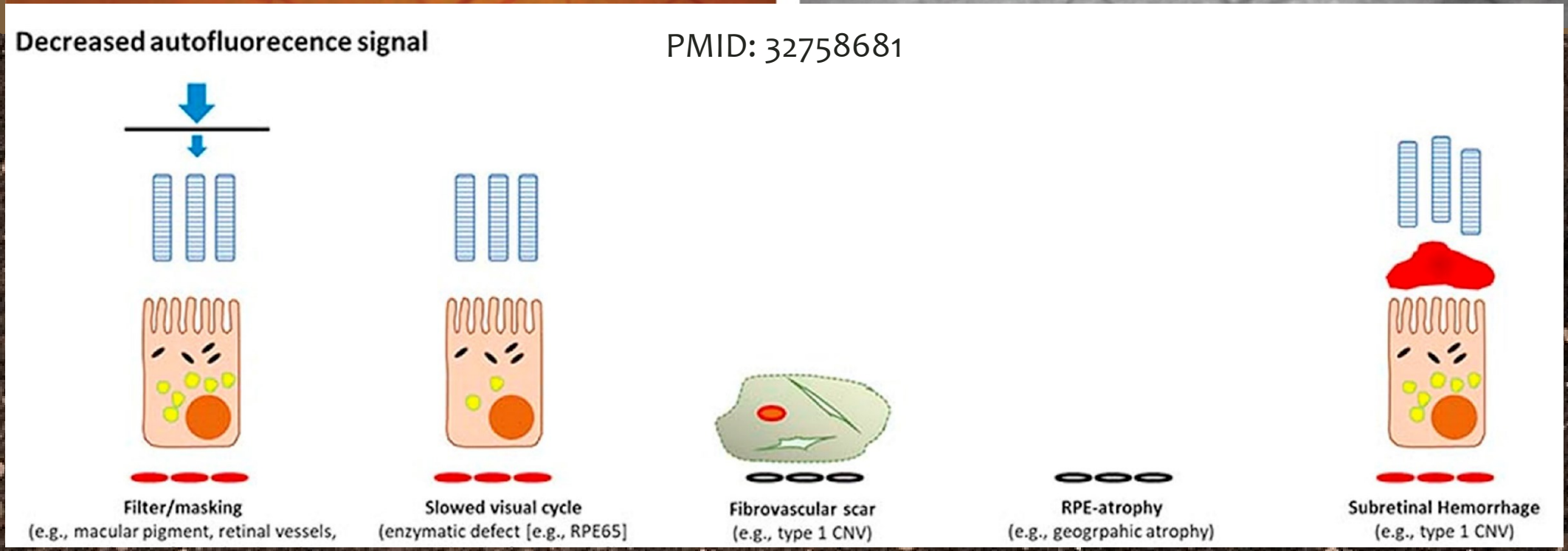
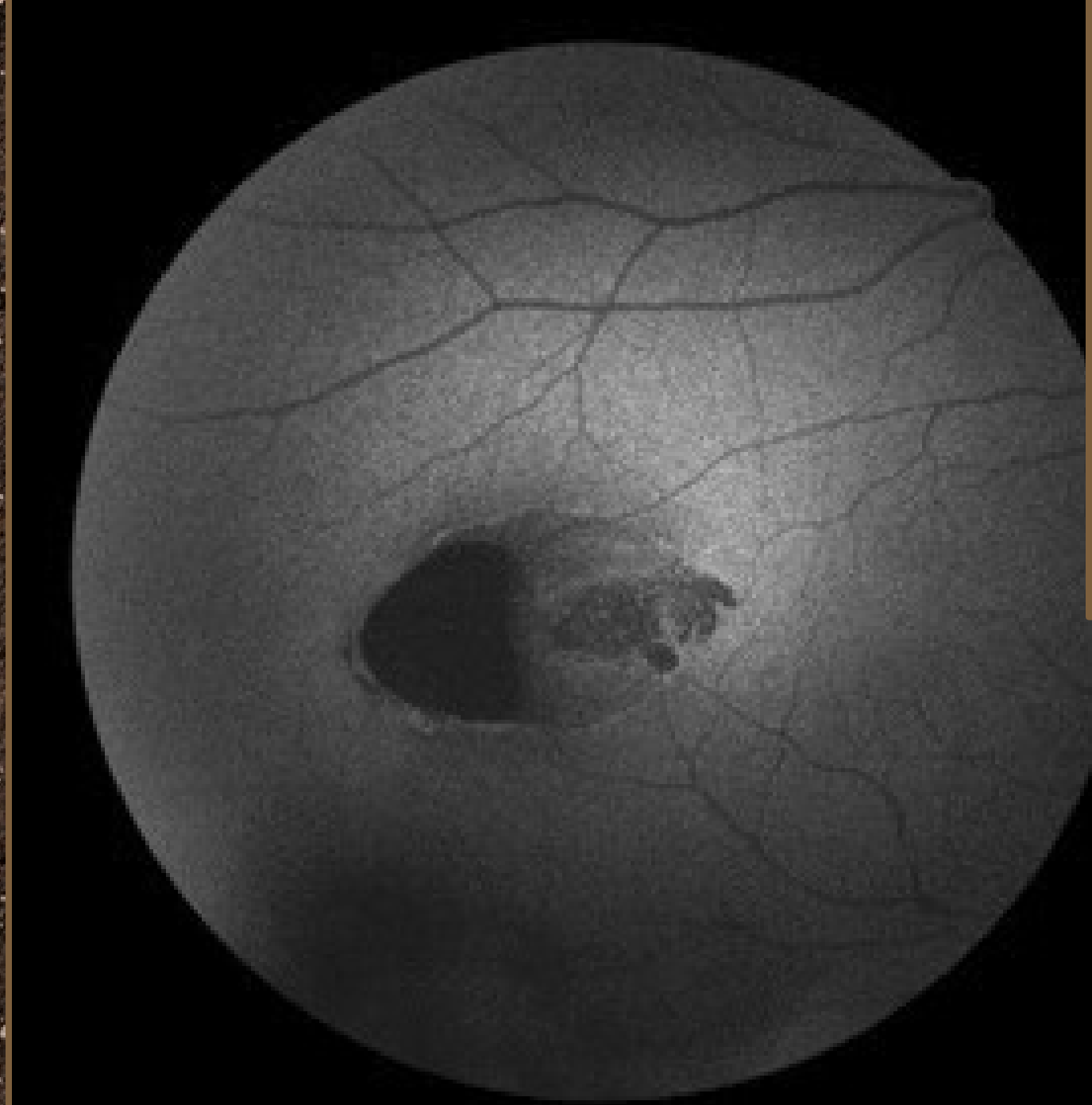
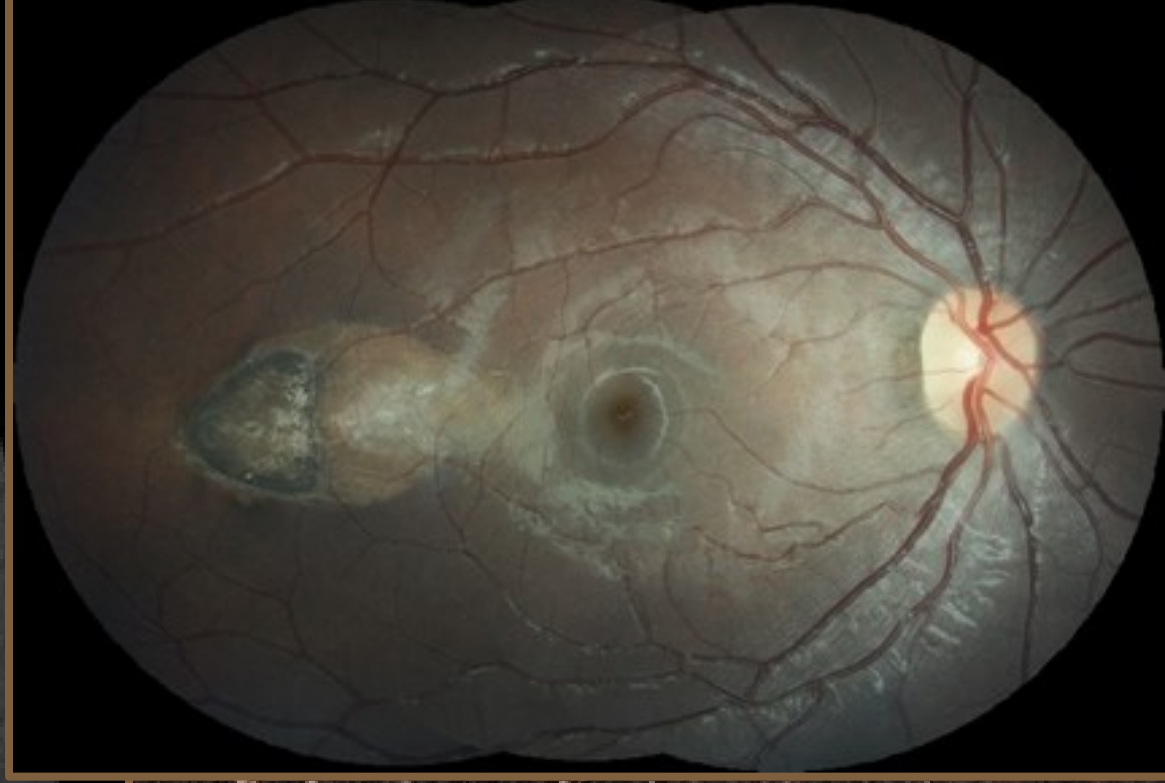
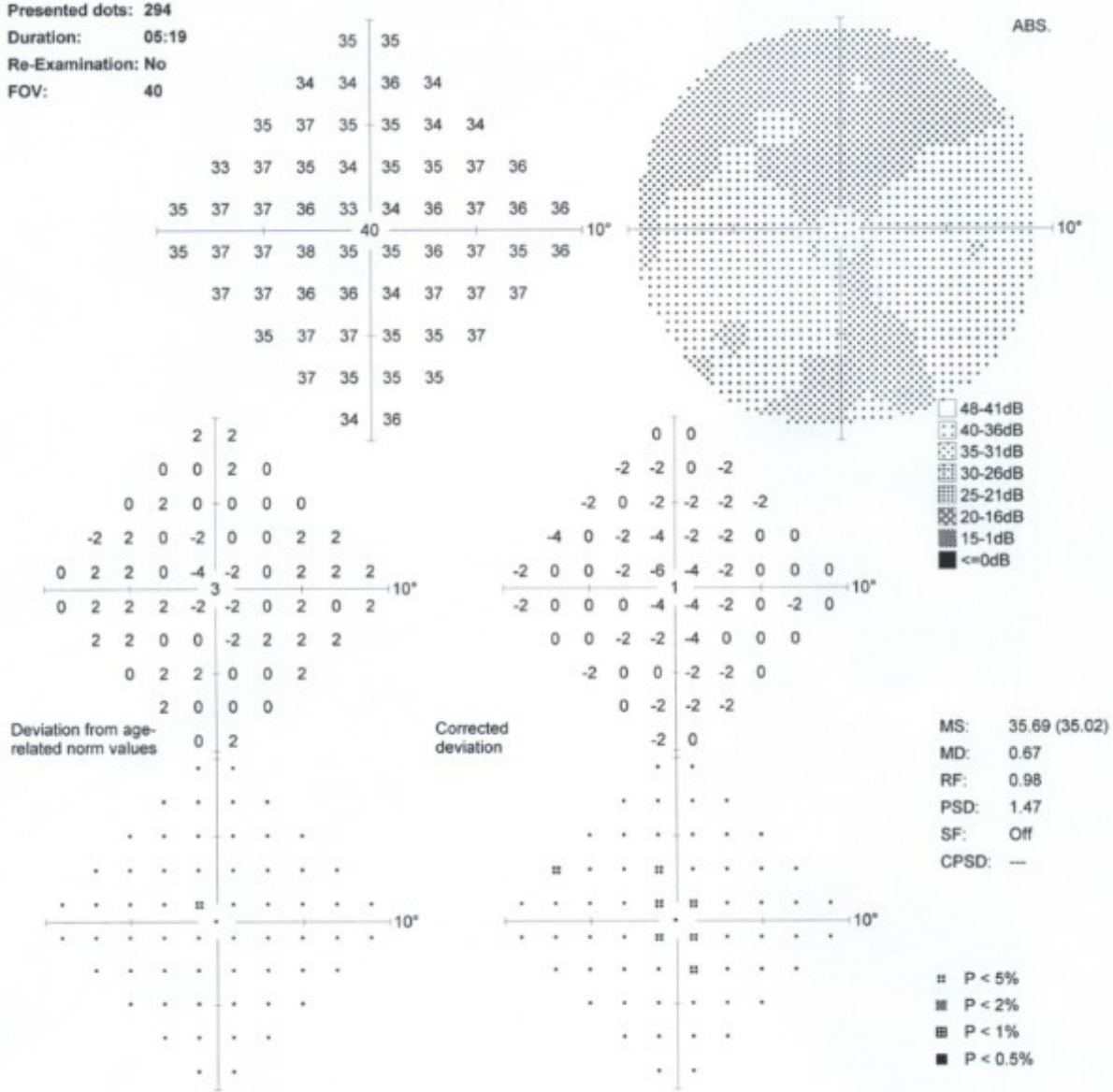




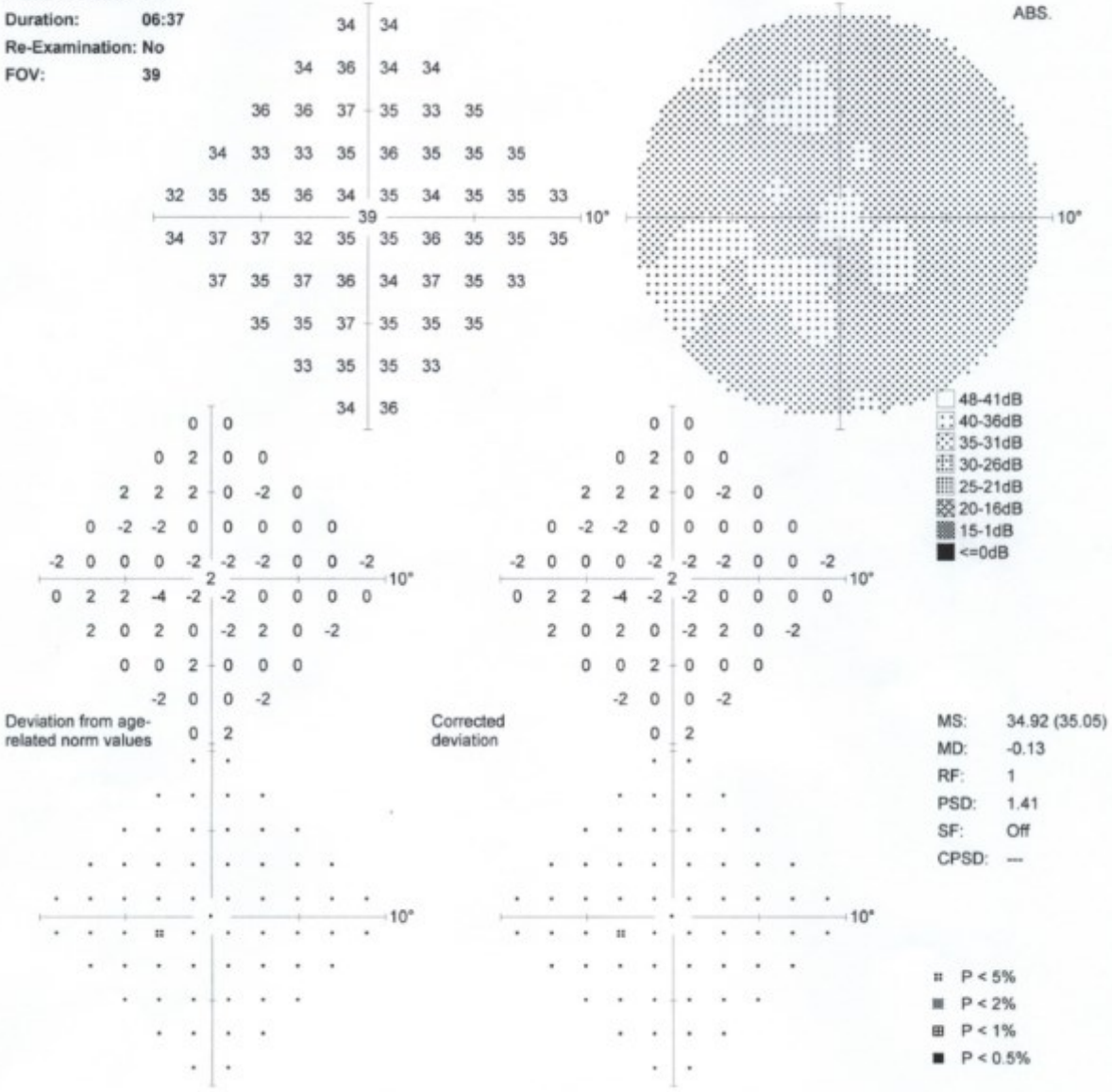


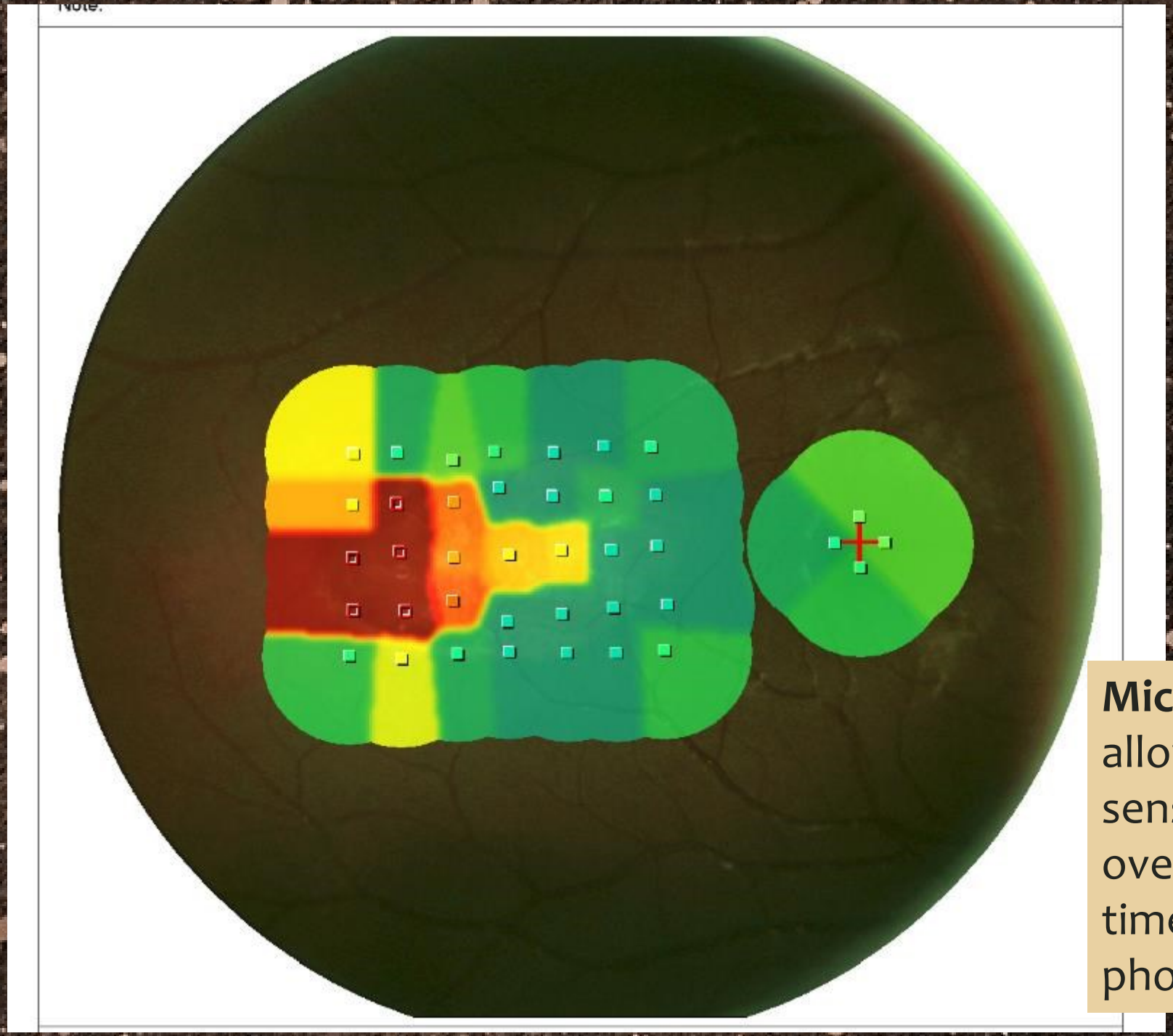
Fundus autofluorescence (FAF) uses blue light to stimulate lipofuscin in RPE cells to glow. Regions without viable RPE will appear dark.

Program:	Macula screening	Stimulus:	III, white	Pupil:	---	Date of exam.:	07/23/2012
Area:	10-2	Background:	10 cd/m² (31.8 asb)	Presentation time:	0.2 sec	Time:	11:31:07
Strategy:	Threshold	Correction:	No	Interval time:	0.6 sec	Age:	25
Fixation:	Central	0 dB:	3180 cd/m² (simulated)			Abs.loss:	0
Fixationcheck:	0/10 (0% Losses)					Rel.loss:	0
False positive:	1/26 (4% Error)						
Presented dots:	294						
Duration:	05:19						
Re-Examination:	No						
FOV:	40						



Program:	Macula screening	Stimulus:	III, white	Pupil:	---	Date of exam.:	07/23/2012
Area:	10-2	Background:	10 cd/m² (31.8 asb)	Presentation time:	0.2 sec	Time:	11:40:27
Strategy:	Threshold	Correction:	No	Interval time:	0.6 sec	Age:	25
Fixation:	Central	0 dB:	3180 cd/m² (simulated)			Abs.loss:	0
Fixationcheck:	0/11 (0% Losses)					Rel.loss:	0
False positive:	0/28 (0% Error)						
Presented dots:	310						
Duration:	06:37						
Re-Examination:	No						
FOV:	39						

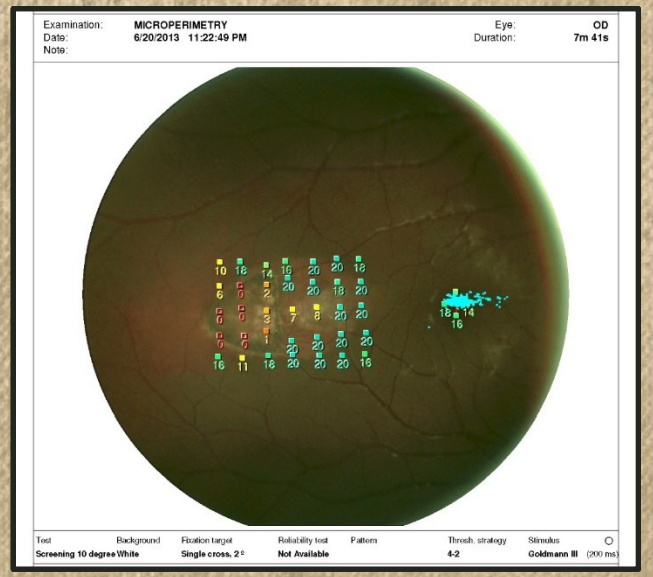




Microperimetry allows a retinal sensitivity map to be overlaid on a real-time fundus photograph

About Microperimetry

- A visual field test that simultaneously performs perimetry and retinal imaging
- Stimuli can be placed at specific points on the retina
- Why use it?
  - Enables correlation of visual function (perimetry) with anatomy (retinal imaging)
  - Train eccentric viewing in low vision pts with central scotoma



What is going on here?

https://app.tophat.com/e/777538

Macular coloboma	A
Macular dystrophy	B
Congenital toxoplasmosis	C
Amelanotic choroidal nevus	D
Torpedo maculopathy	E

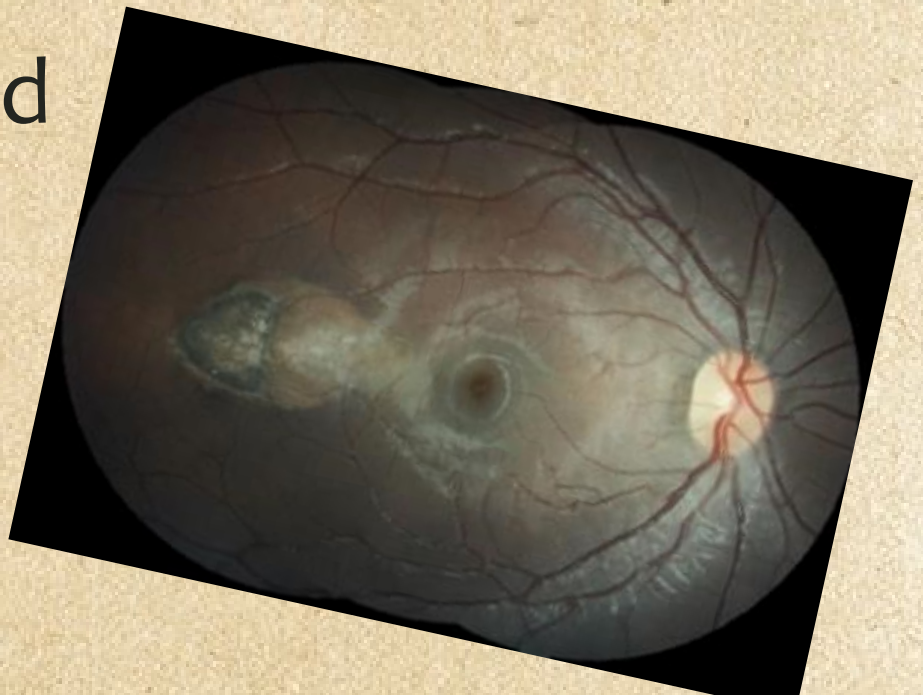
Macular coloboma (macular dysplasia)	A heterogenous group of developmental abnormalities. Often familial, frequently **bilateral**, systemic abnormalities not uncommon.
Macular dystrophy	Widespread retinal dysfunction, **bilateral** macular lesions, inheritance pattern, may be associated with features of Leber's amaurosis or RP. Electrophysiologic abnormalities common
Macular scars	Intrauterine infection with Toxoplasma gondii resulting in congenital toxoplasmic chorioretinitis.
Amelanotic choroidal nevus	Shares all the features of a typical choroidal nevus minus the melanin. Choroidal nevi are flat or slightly elevated – never excavated
Torpedo maculopathy	**Unilateral** congenital abnormality, characteristic "torpedo" shape, always located temporal to the fovea

Assessment

- Torpedo maculopathy OD

Management

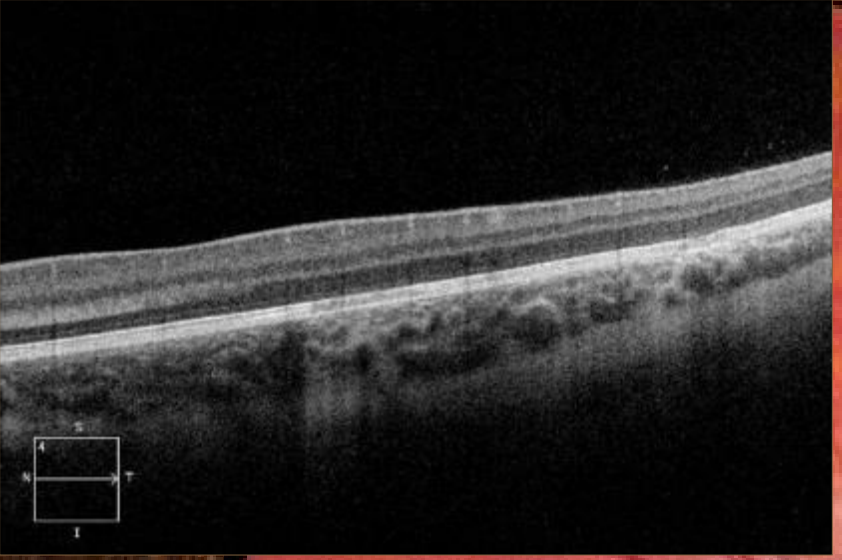
- No specific treatment indicated
- Patient education/Amsler
- Routine eye care



Torpedo Maculopathy

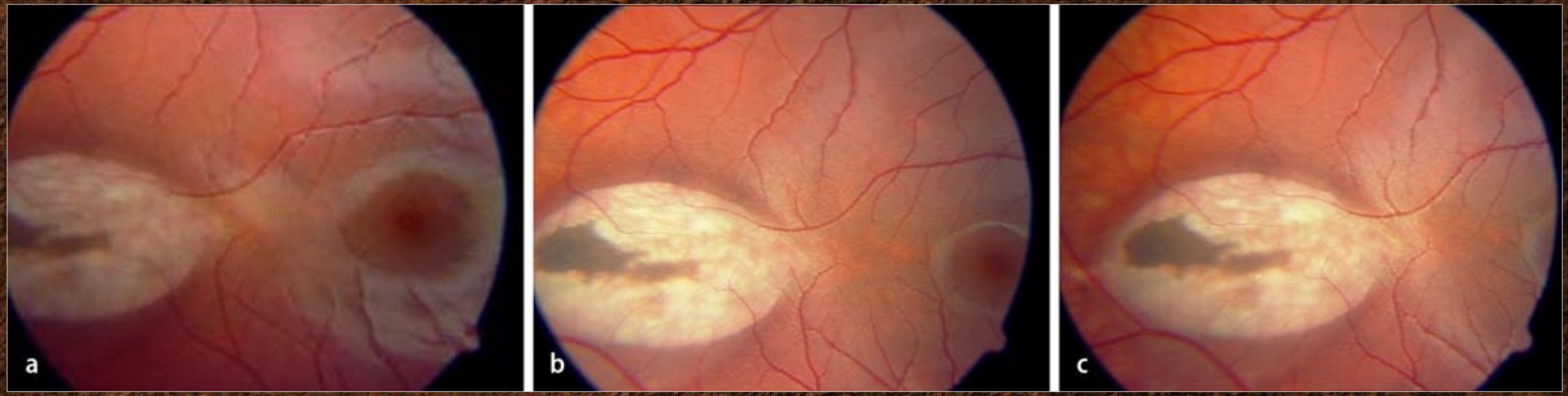
- Congenital, hypopigmented torpedo-shaped lesion in the temporal macula along the horizontal raphe
- Developmental defect of unknown etiology
- May encroach upon fovea, but rarely causes significant loss of vision
- Diagnosis based upon characteristic appearance and nonrandom location
- No treatment is required for this stable congenital lesion

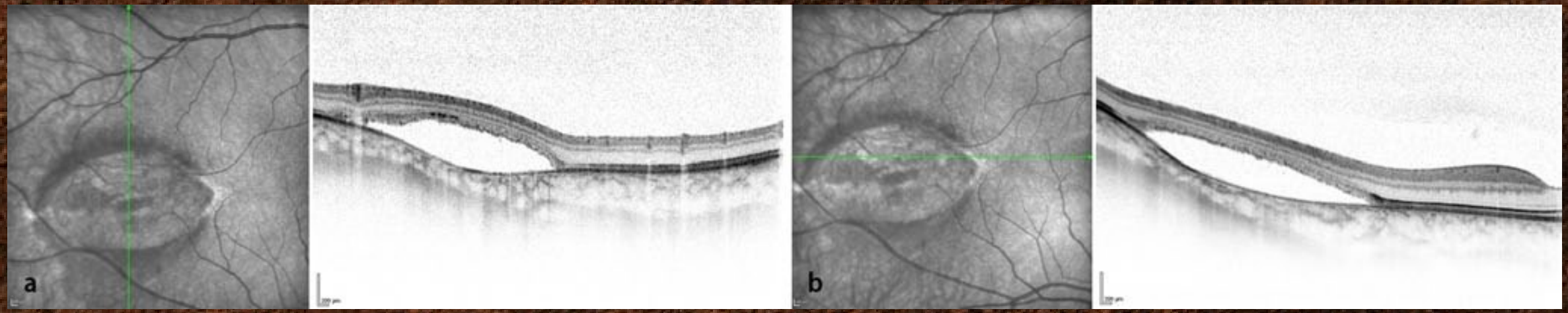
Examples of torpedo maculopathy



West Coast Retina, 2010

Examples of torpedo maculopathy





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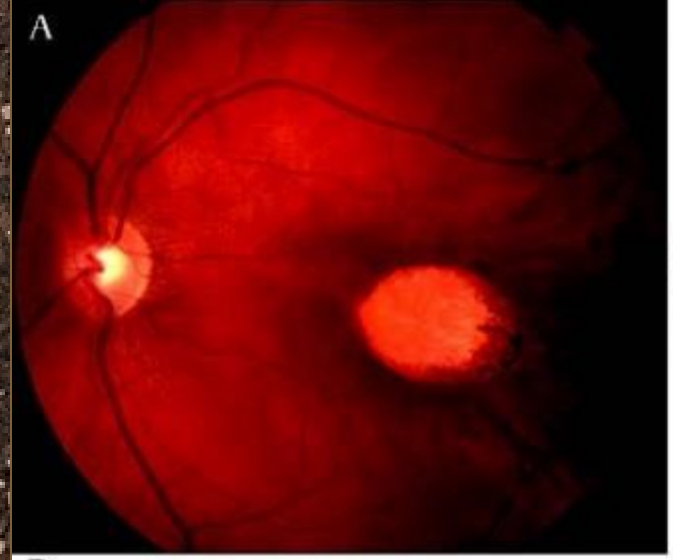

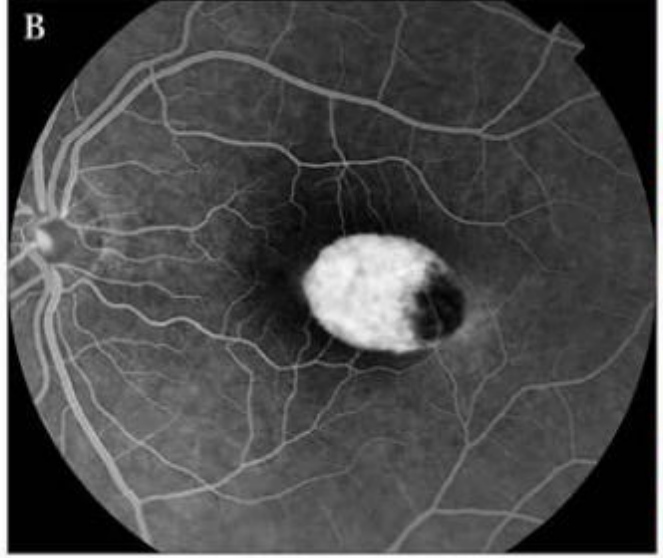

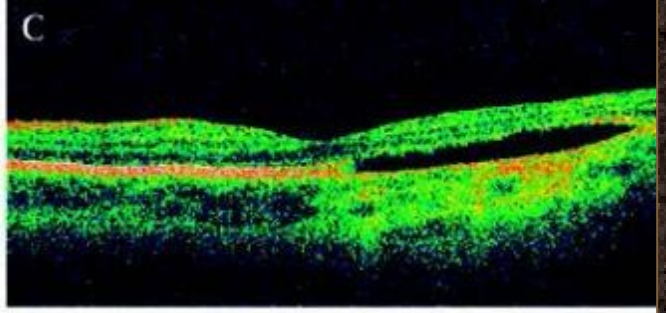

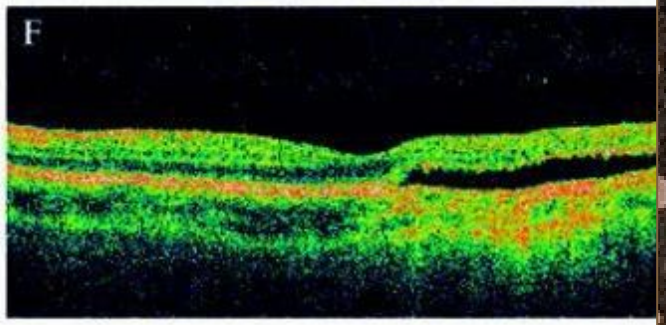

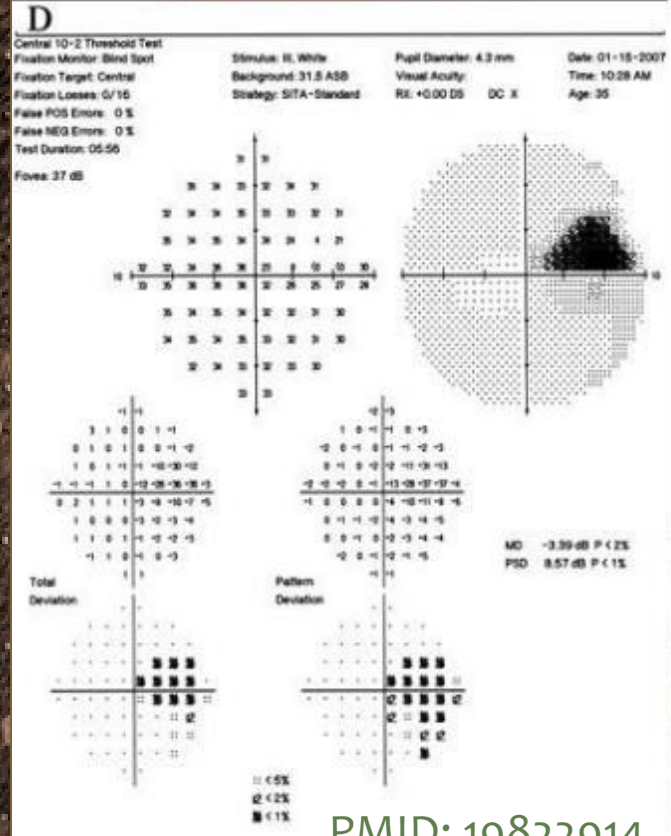

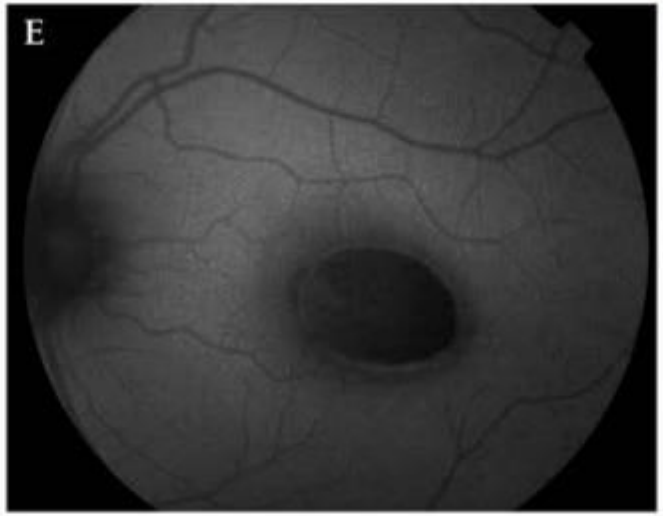

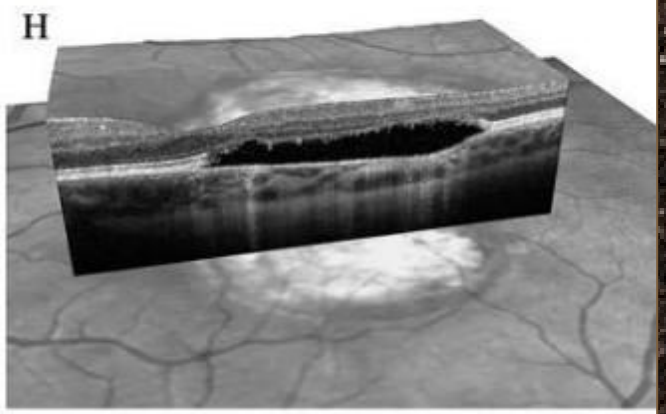

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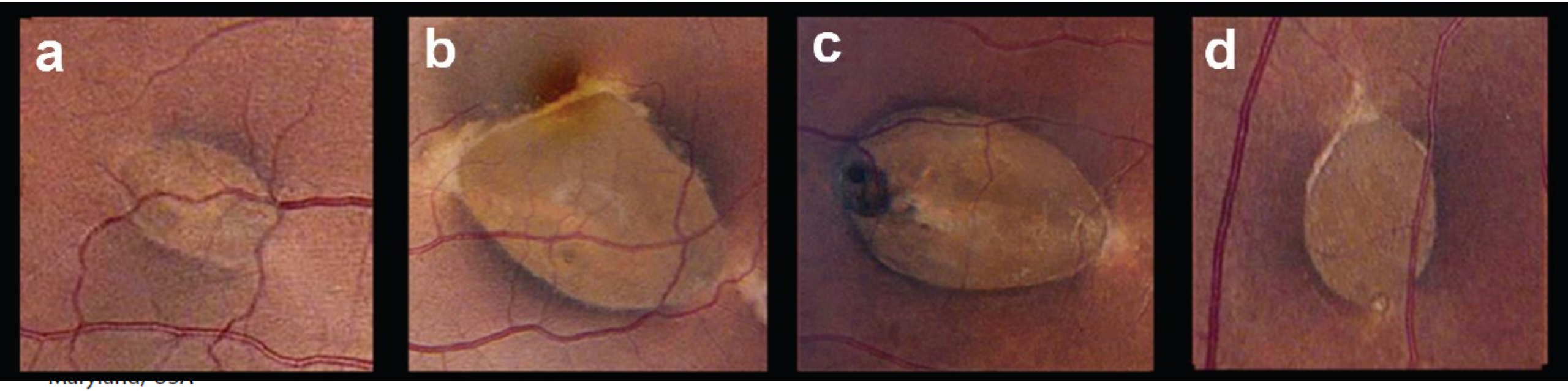


Is torpedo maculopathy a subclinical form of Gardner Syndrome?

(1)Genetic testing for Familial Adenomatous Polyposis

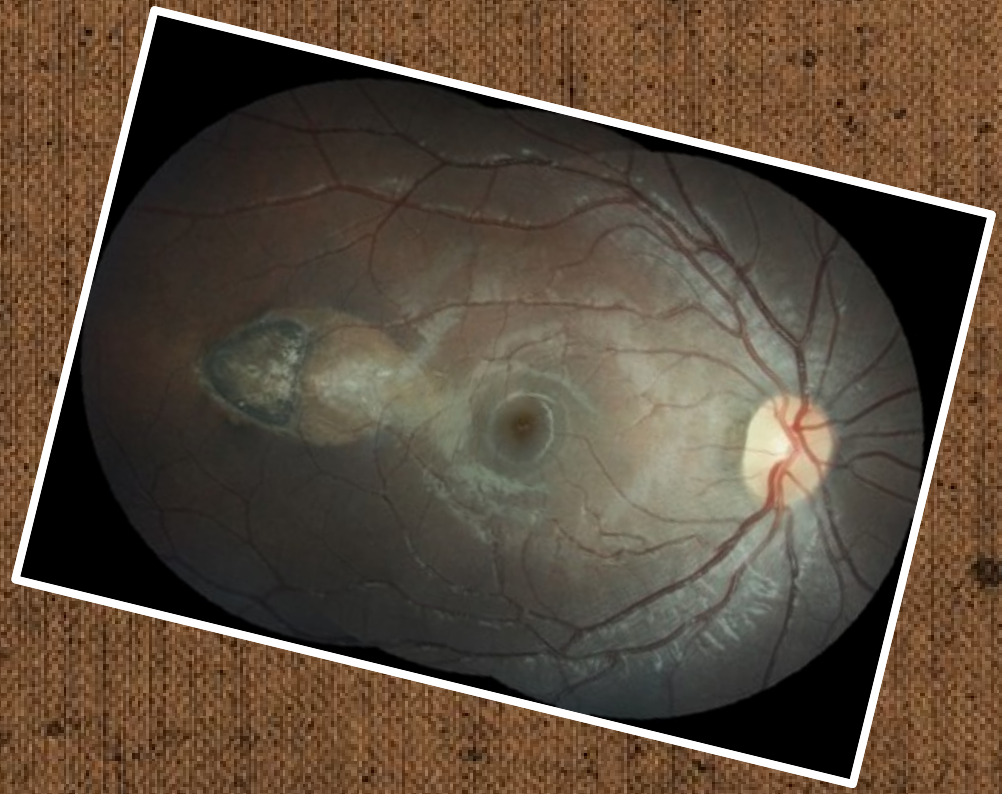
(2)Colonoscopy for intestinal polyps

(3)Eye exam of relatives for signs of Gardner syndrome.

PMID: 34014136

Take Home Message

- Torpedo maculopathy
  - Congenital perimacular lesion
  - Distinctive appearance
  - Usually asymptomatic
  - Rule out Gardner Syndrome



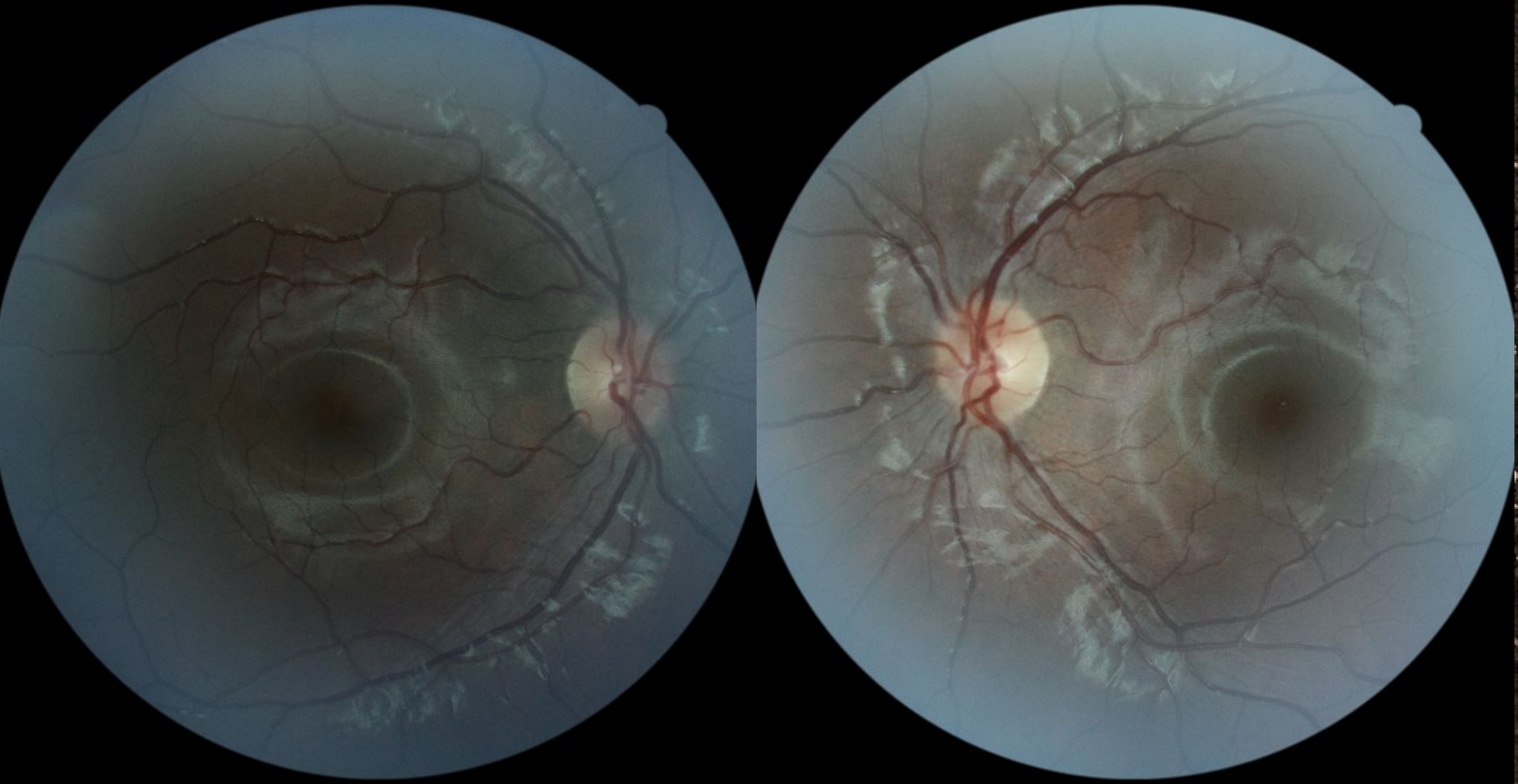
CASE #2

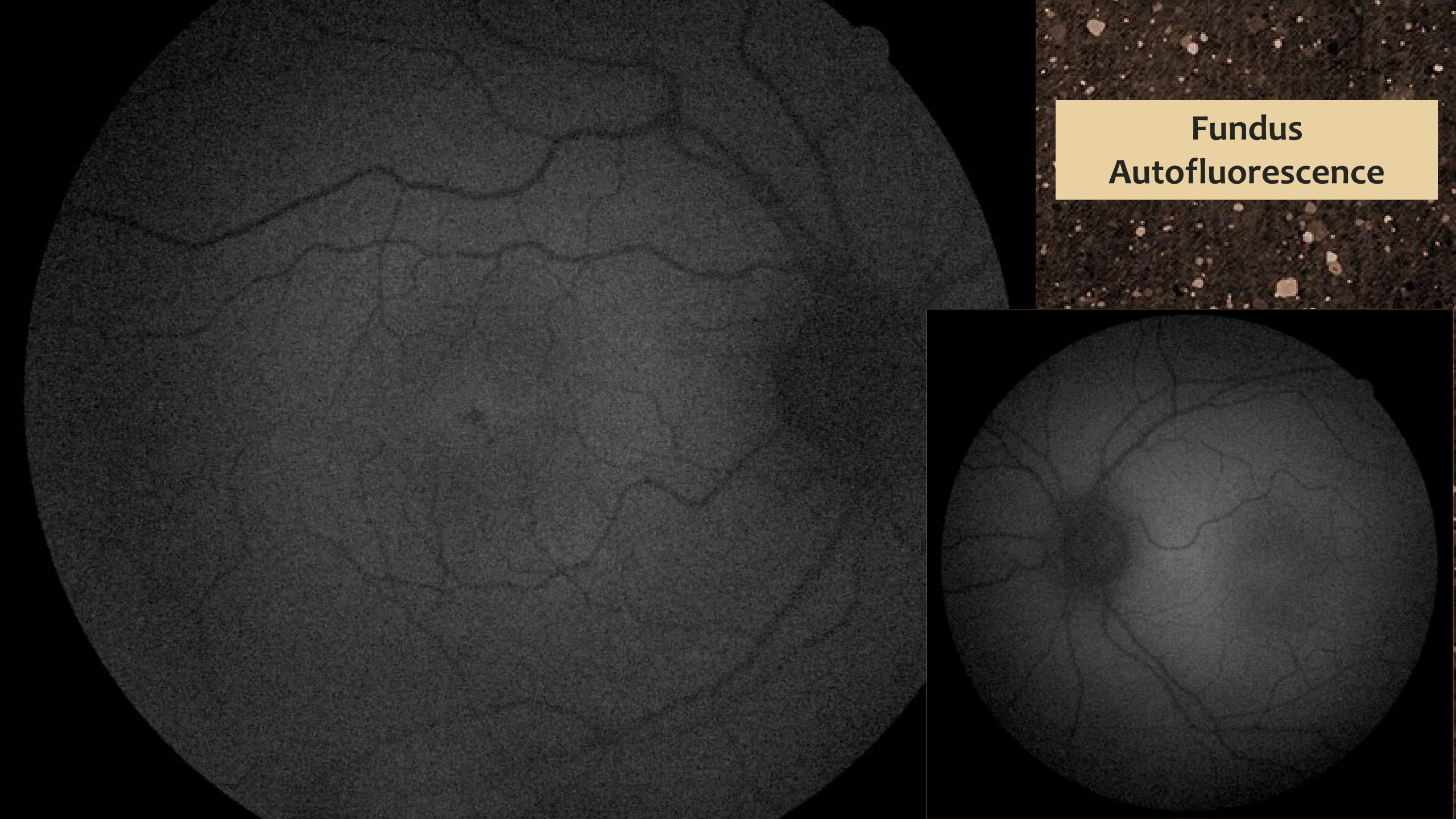
Here comes the sun. . .

CASE #2A

- 13yo Asian male referred for abnormal appearance of right macula on OCT
- POH: Refractive amblyopia OS
- PMH: Good health. No meds

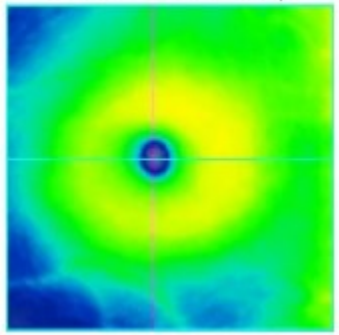
- BCVA: 20/20 OD, 20/40 OS
- Ta: 12/13 @ 4PM; PERRL, No APD
- SLE: W&Q OU



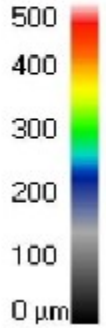

Fundus
Autofluorescence

Macula Thickness OU: Macular Cube 512x128 — OD ● | ● OS

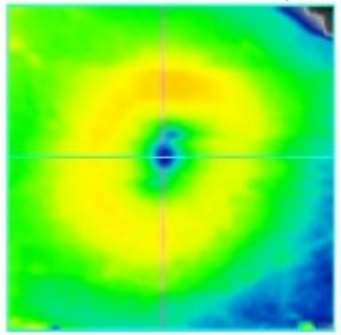
OD ILM-RPE Thickness Map



Fovea: 232, 61



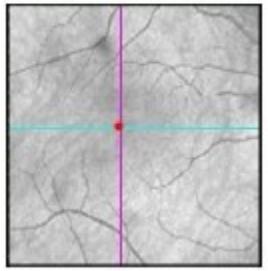
OS ILM-RPE Thickness Map



Fovea: 246, 60

Normative data is not available. Patient age < 18.

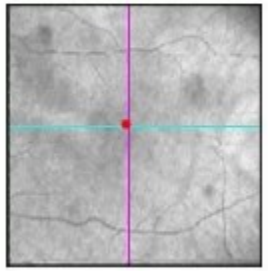
OD OCT Fundus



OD ILM-RPE Thickness

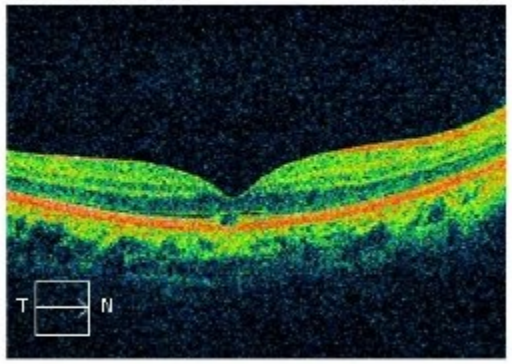
OS ILM-RPE Thickness

OS OCT Fundus

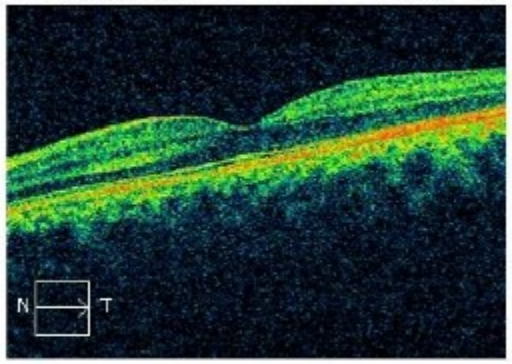


ILM - RPE	OD	OS
Thickness Central Subfield (µm)	252	274
Volume Cube (mm³)	10.6	11.1
Thickness Avg Cube (µm)	294	309

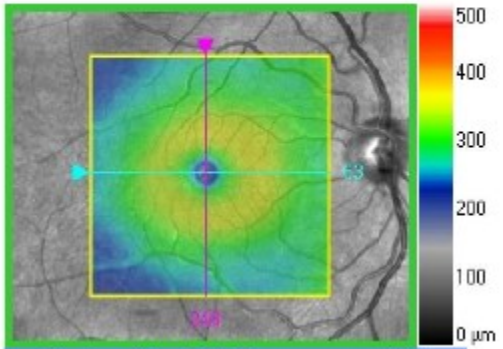
OD Horizontal B-Scan **BScan:** 61



OS Horizontal B-Scan **BScan:** 60

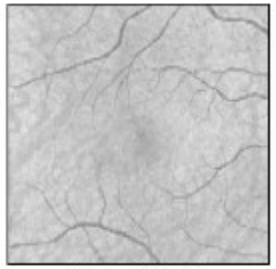


Macula Thickness : Macular Cube 512x128 — OD ● | ○ OS

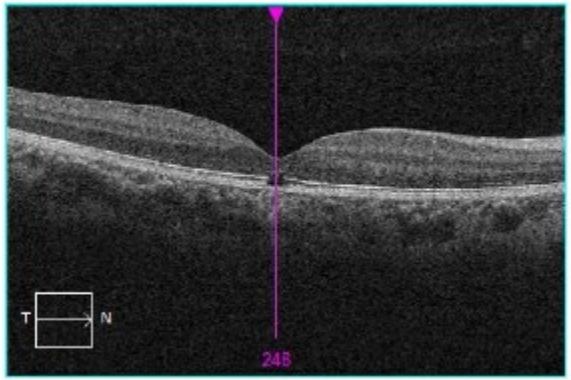


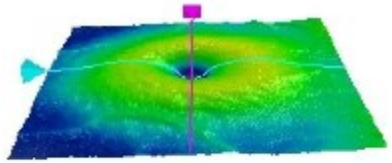
Overlay: ILM - RPE Transparency: 50 %

ILM-RPE Thickness (µm)

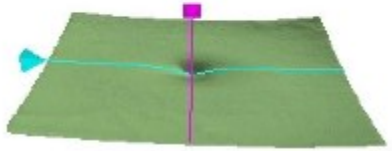


Fovea: 248, 64

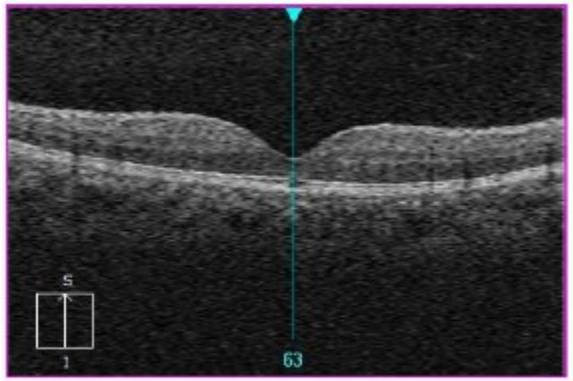




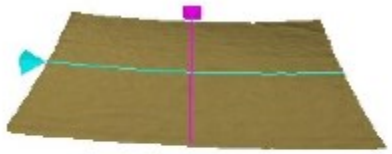
ILM - RPE



ILM



Normative data is not available. Patient age < 18.



RPE

	Central Subfield Thickness (µm)	Cube Volume (mm³)	Cube Average Thickness (µm)
ILM - RPE	253	10.5	291

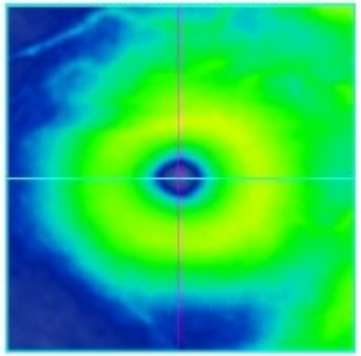
CASE #2B

- 12yo Asian F (sibling of Case 2A) C/O "color difference" between eyes, with vision of right eye appearing yellowish x 1 month
- POH: LEE 2yrs
- PMH: Good health, no meds

- BCVA: 20/25 OD, 20/20 OS
- Ta 15/15 @11AM; PERRL No APD
- SLE: W&Q OU

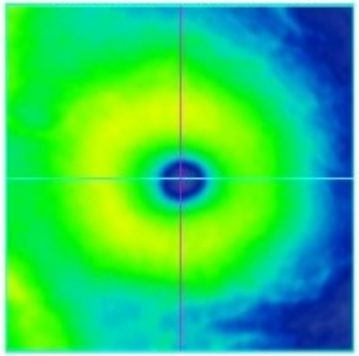
Macula Thickness OU: Macular Cube 512x128 — OD ● | ● OS

OD ILM-RPE Thickness Map



Fovea: 254, 65

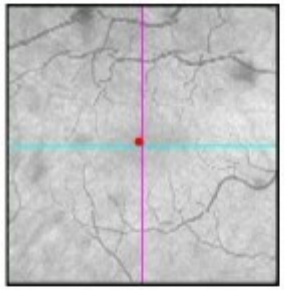
OS ILM-RPE Thickness Map



Fovea: 259, 65

Normative data is not available. Patient age < 18.

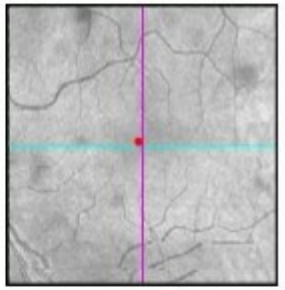
OD OCT Fundus



OD ILM-RPE Thickness

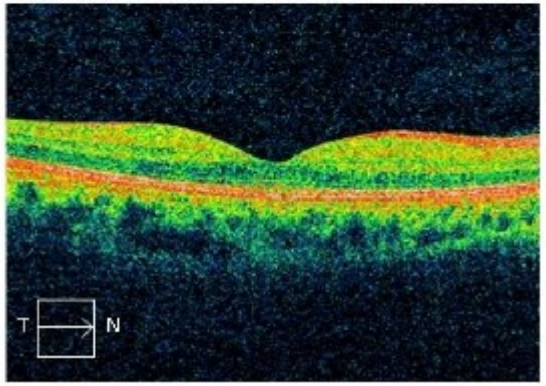
OS ILM-RPE Thickness

OS OCT Fundus

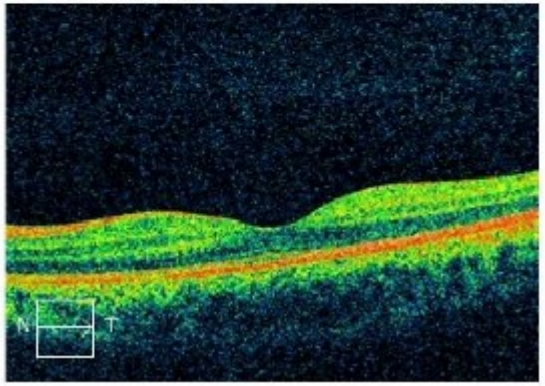


ILM - RPE	OD	OS
Thickness Central Subfield (µm)	237	238
Volume Cube (mm³)	9.9	10.1
Thickness Avg Cube (µm)	274	282

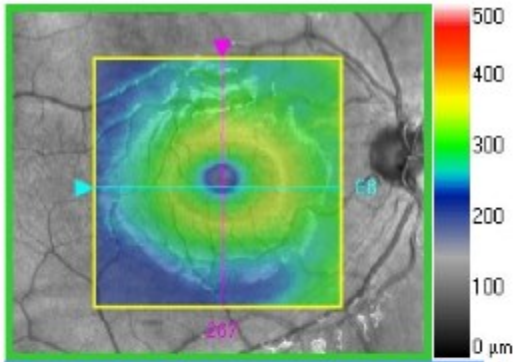
OD Horizontal B-Scan **BScan:** 65



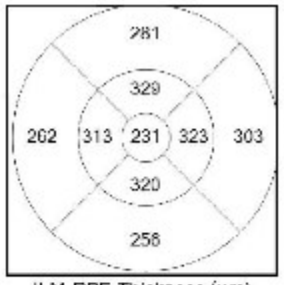
OS Horizontal B-Scan **BScan:** 65



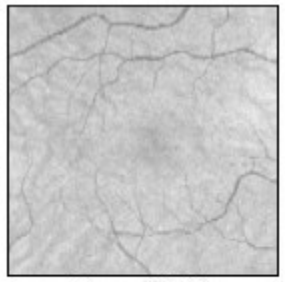
Macula Thickness : Macular Cube 512x128 — OD ● | ○ OS



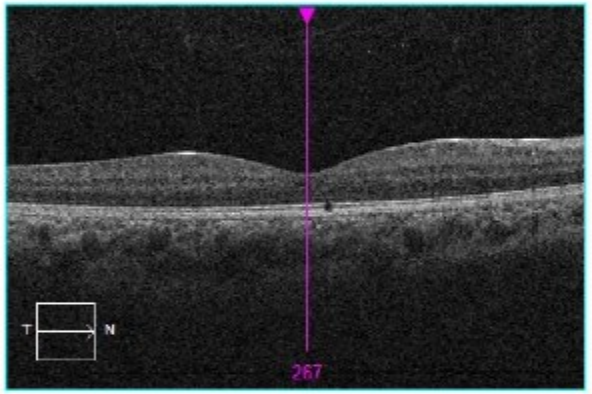
Overlay: **ILM - RPE** Transparency: 50 %

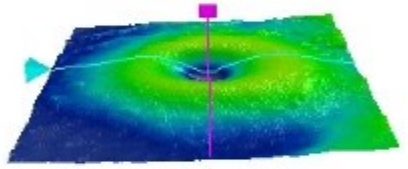


ILM-RPE Thickness (µm)

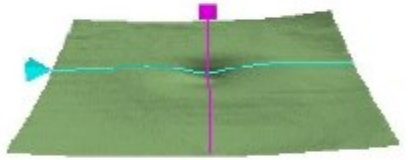


Fovea: 265, 63

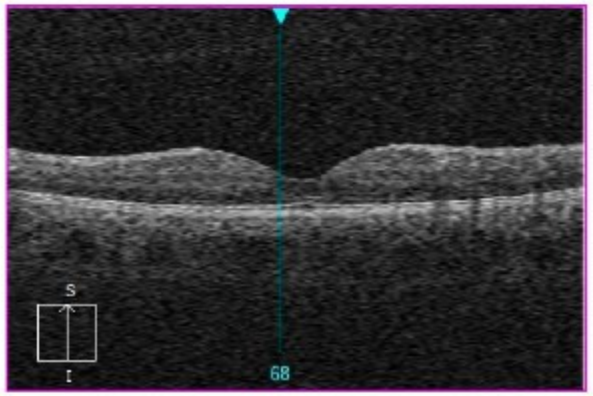


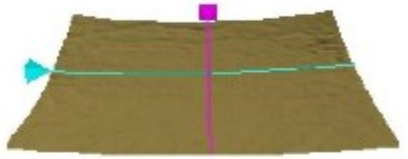


ILM - RPE



ILM





RPE

Normative data is not available. Patient age < 18.

	Central Subfield Thickness (µm)	Cube Volume (mm³)	Cube Average Thickness (µm)
ILM - RPE	231	10.0	277

Comments

Doctor's Signature

What is going on here?

https://app.tophat.com/e/777538

- Macular Coloboma
- Macular Dystrophy
- Macular Hole
- Solar Maculopathy
- Macular Edema

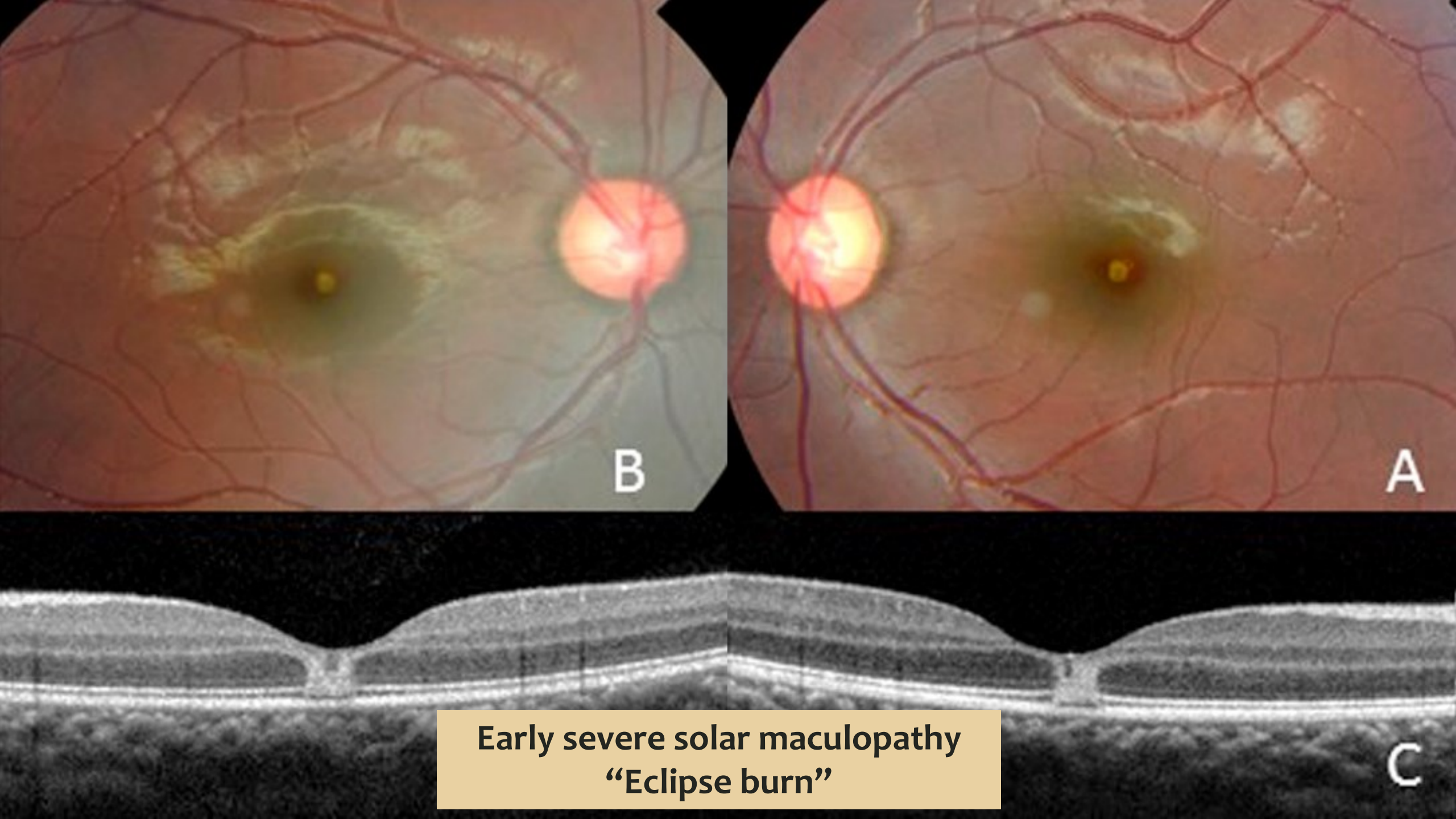
Macular coloboma (macular dysplasia)	A heterogenous group of developmental abnormalities. Often **familial**, frequently **bilateral**, systemic abnormalities not uncommon.
Macular dystrophy	Widespread retinal dysfunction, **bilateral** macular lesions, **inheritance pattern**, may be associated with features of Leber's amaurosis or RP. Electrophysiologic abnormalities common
Macular hole	**Full-thickness** retinal defect associated with major loss of visual acuity. Early stage or lamellar lesions associated with **inner retinal defects**
Solar maculopathy	Bilateral or unilateral (dominant eye) **outer retinal OCT defect** with history of sun gazing
Macular edema	Intraretinal fluid accumulation with a corresponding **increase in macular thickness** on OCT

Solar Maculopathy

- Thermal and photochemical damage to the RPE and photoreceptors
- **Solar maculopathy**: Prolonged direct sun gazing. Usually associated with eclipse viewing
- **Photic retinopathy**: Umbrella term that encompasses all retinal damage from light (laser, arc welding, solar)

Solar Maculopathy

- Clinical manifestations vary with severity of exposure
- Rapid VA decrease (20/30-20/100) following exposure
- Little or no ophthalmoscopic changes in mild cases (indistinct FLR, greyish macula) or a yellowish RPE lesion in more severe cases
- Vision gradually (months) returns to normal or near normal. There is less recovery in severe cases.
- An outer retinal cyst-like lesion develops and remains permanently (Ddx: MacTel, Tamoxifen)



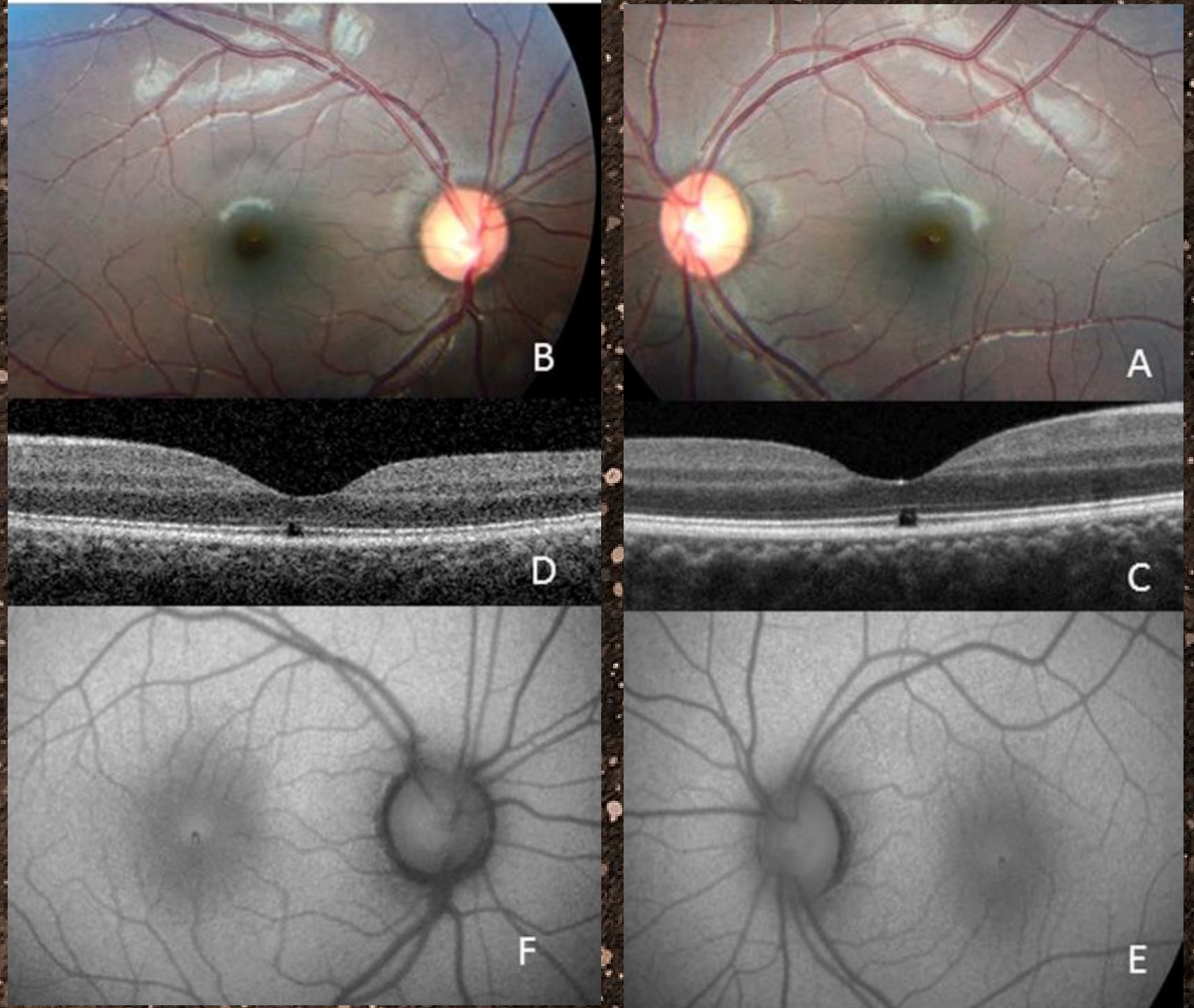
Early severe solar maculopathy
"Eclipse burn"

Same case at 30-days

TOP: Resolving yellow lesions

MIDDLE: Square-shaped foveal photoreceptor defect

BOTTOM: FAF hypofluorescent spot surrounded by hyperfluorescence

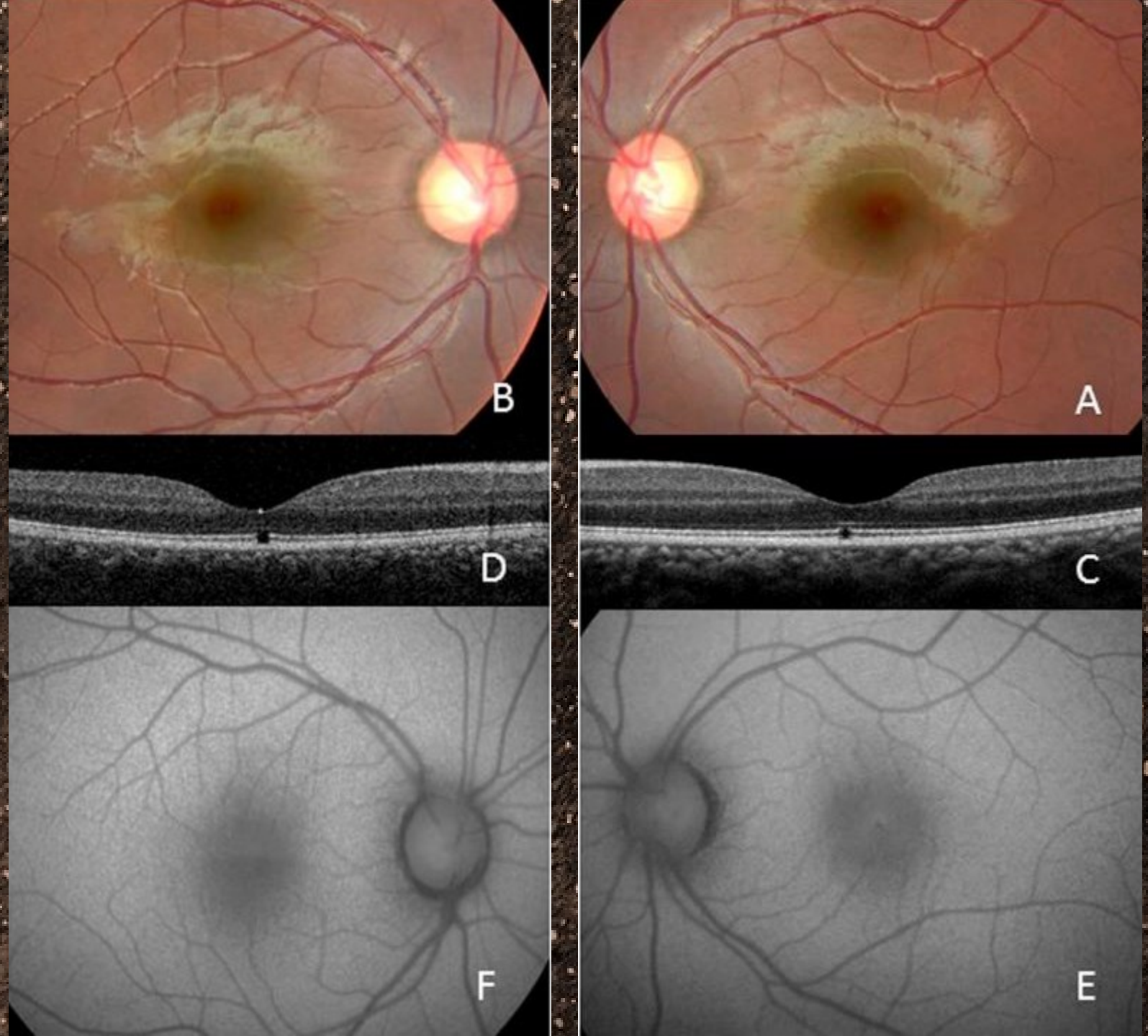


Same case at 1 year: late-stage

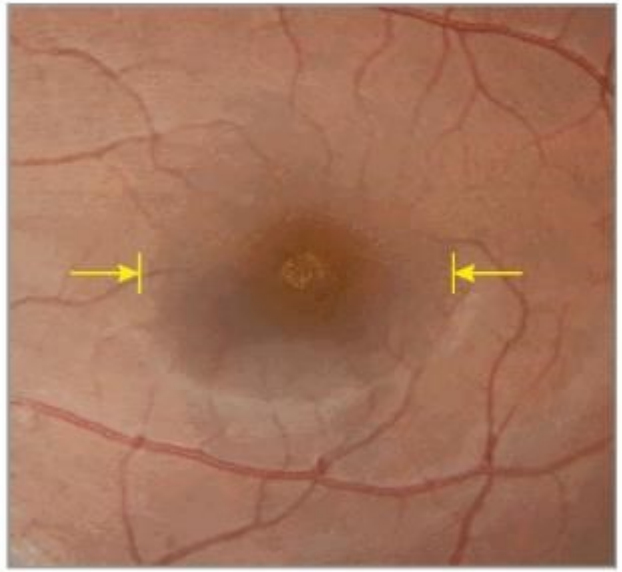
TOP: Essentially normal ophthalmoscopic appearance

MIDDLE: Rectangular photoreceptor defect in fovea on OCT

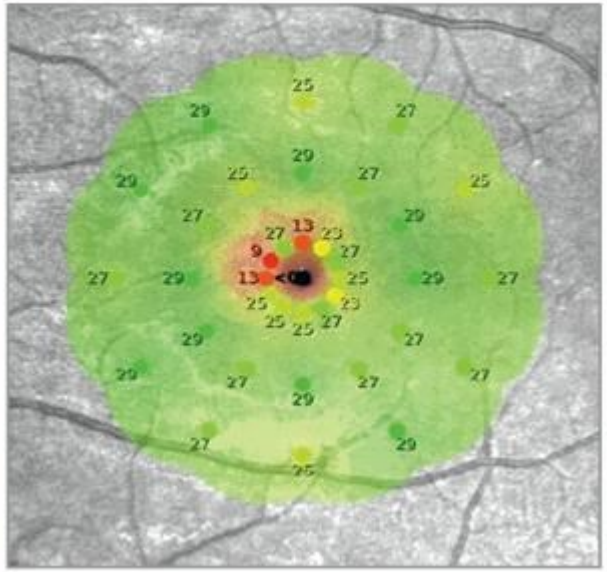
BOTTOM: FAF hypofluorescent spot corresponding to OCT photoreceptor defect



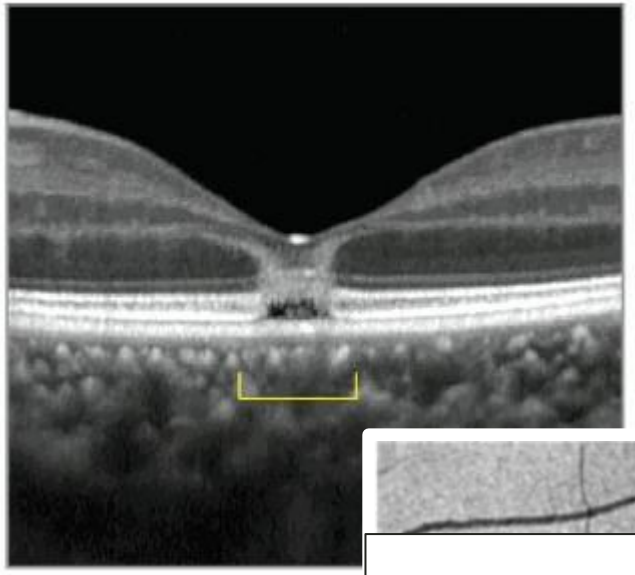
Fundus



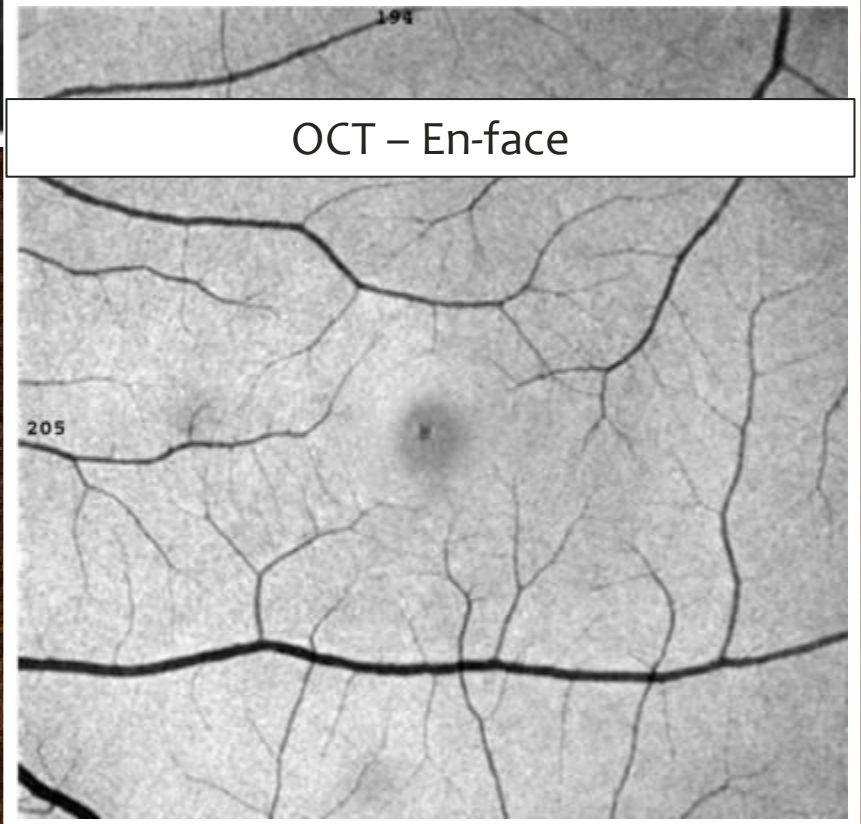
Microperimetry



OCT – B-scan



OCT – En-face



Microperimetry documents scotoma corresponding to OCT defect

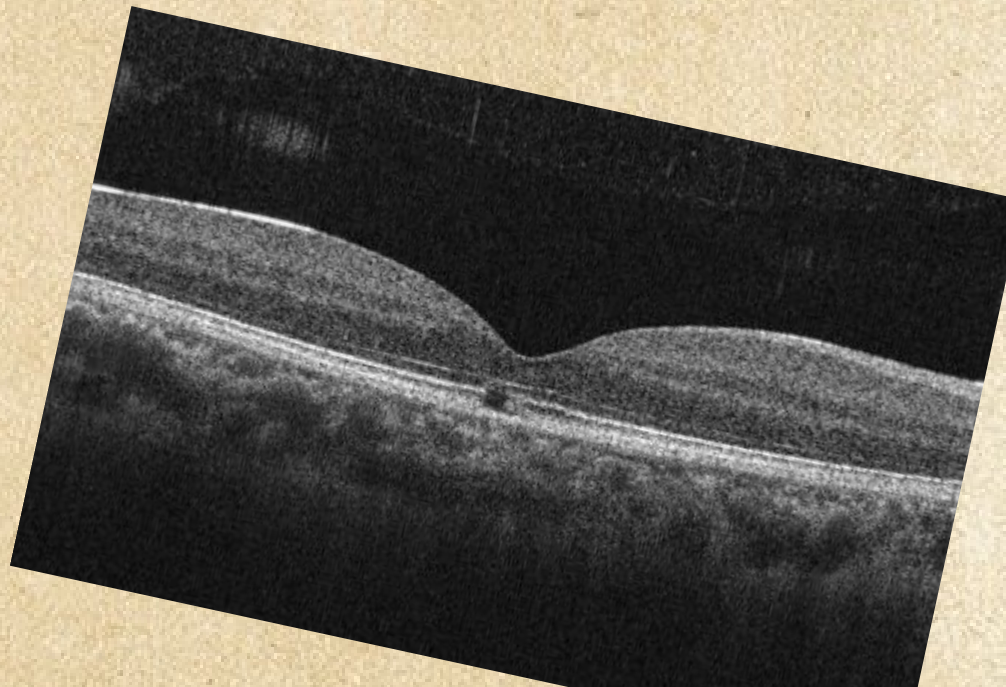
- **Visual acuity was 20/25**
- **En-face OCT** –perifoveal photoreceptor punched-out lesion

Assessment

- Solar maculopathy secondary to sun gazing

Management

- No specific treatment indicated
- Patient education
- Routine eye care




Sun...Moon...You!
ANNULAR SOLAR ECLIPSE
OCTOBER 14, 2023
APRIL 8, 2024
TOTAL SOLAR ECLIPSE
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Great American Eclipse

Eclipse viewing safety

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Safety

Please feel free to download maps, posters, fact sheet, safety bulletin and other materials for use in your communities and events. We appreciate it if you credit NASA.

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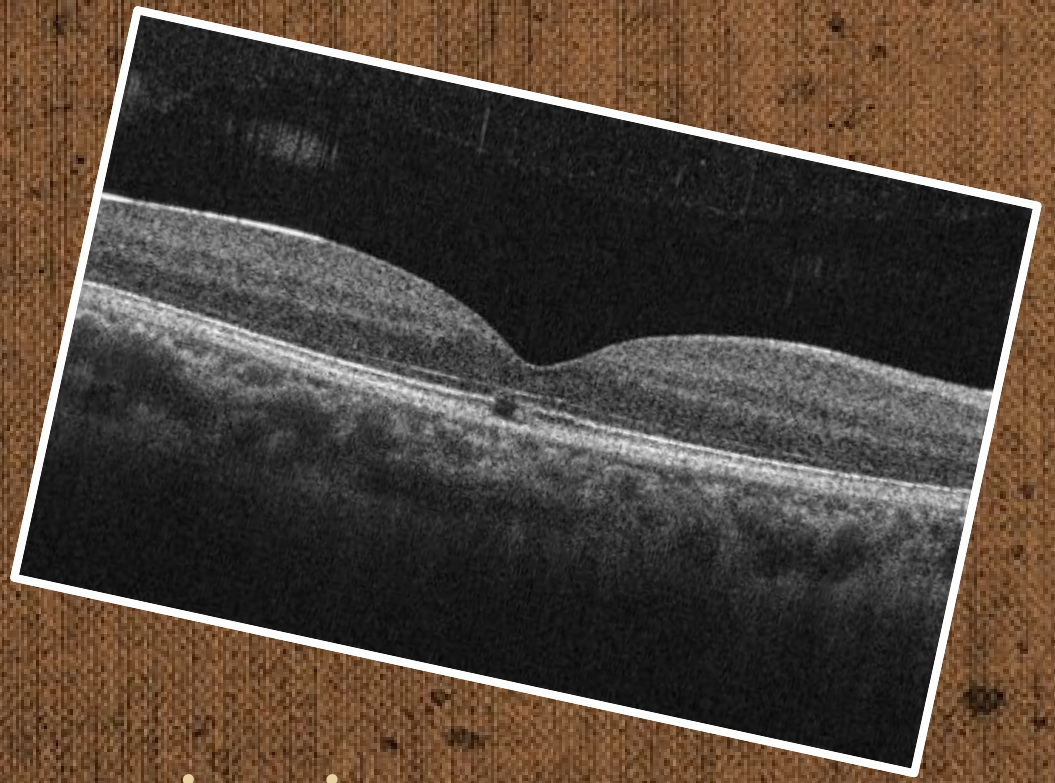
How to View the 2017 Solar Eclipse Safely

Looking directly at the sun is unsafe except during the brief total phase of a solar eclipse ("totality"), when the moon entirely blocks the sun's bright face, which will happen only within the narrow path of totality.

The only safe way to look directly at the uneclipsed or partially eclipsed sun is through special-purpose solar filters, such as "eclipse glasses" (example shown at left) or hand-held solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the sun; they transmit thousands of times too much sunlight. Refer to the American Astronomical Society (AAS) Reputable

Take Home Message

- **Solar Maculopathy**
  - Mild visual acuity loss
  - Outer retinal OCT defect
  - History of sun gazing
  - No specific treatment
  - Patient education regarding safe solar eclipse viewing



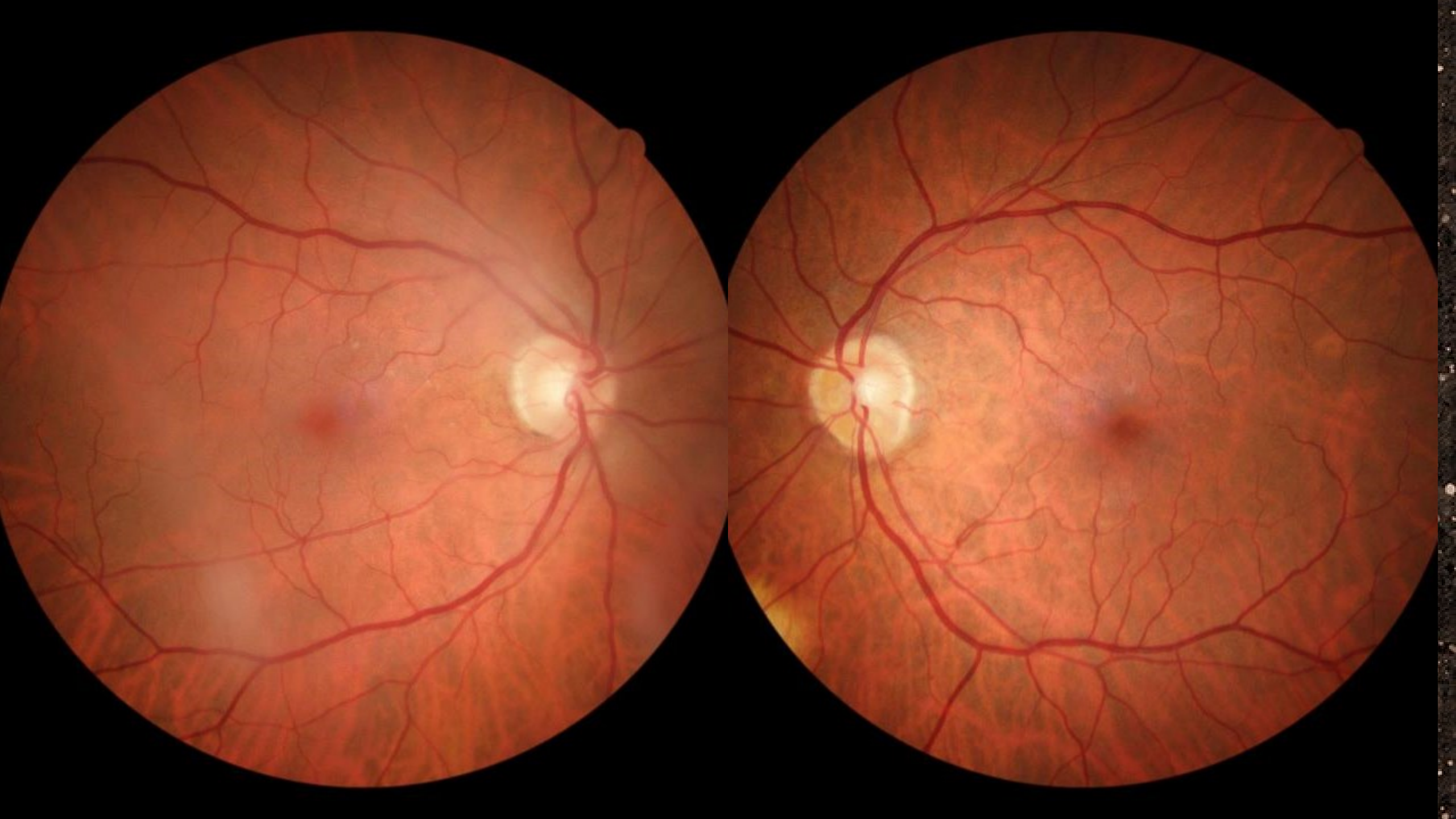
CASE #3

Bumps in the Night

CASE #3

- 66yo WM presents for routine exam
- POH: S/P localized RD OS (3yrs). S/P ECCE OU (5yrs)
  LEE: 3yr.
- MH: T2DM x 6yrs (HbA1c: 9.4), OSA, HTN

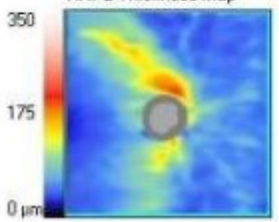
- Vision: 20/20 OD, 20/25 OS
- Ta: 14/22 @10:00AM; PERRL, No APD
- SLE: W&Q OU



			OD	OS
Name:				
ID:		Exam Date:	7/6/2018	7/6/2018
DOB:	2/18/1952	Exam Time:	11:32 AM	11:33 AM
Gender:	Unknown	Serial Number:	4000-6813	4000-6813
Technician:	Operator, Cirrus	Signal Strength:	10/10	10/10

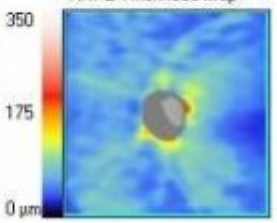
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 — OD ● | ● OS

RNFL Thickness Map

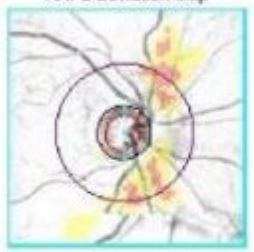


	OD	OS
Average RNFL Thickness	68 µm	69 µm
RNFL Symmetry	47%	
Rim Area	0.81 mm²	1.20 mm²
Disc Area	1.43 mm²	1.59 mm²
Average C/D Ratio	0.65	0.50
Vertical C/D Ratio	0.65	0.56
Cup Volume	0.232 mm³	0.127 mm³

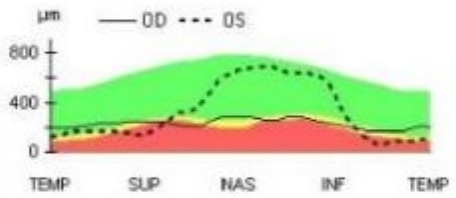
RNFL Thickness Map



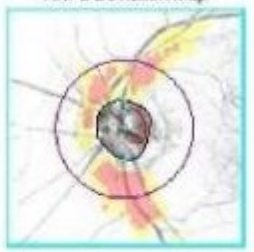
RNFL Deviation Map



Neuro-retinal Rim Thickness

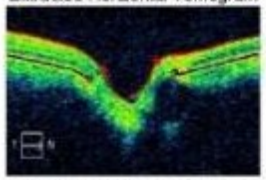


RNFL Deviation Map

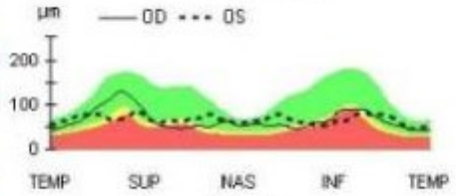


Disc Center(-0.09,-0.09)mm

Extracted Horizontal Tomogram

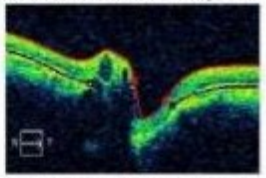


RNFL Thickness

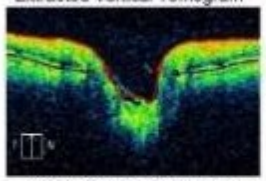


Disc Center(-0.06,0.00)mm

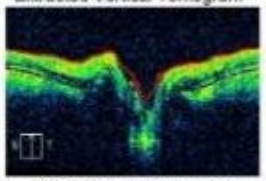
Extracted Horizontal Tomogram



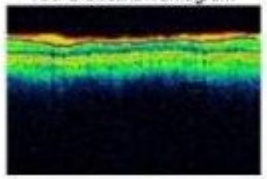
Extracted Vertical Tomogram

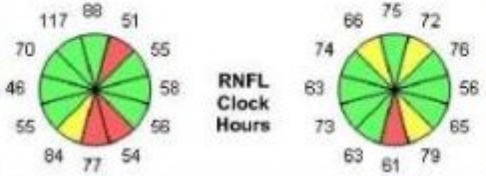


Extracted Vertical Tomogram

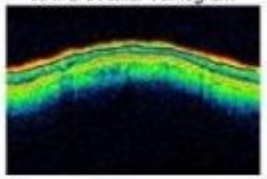


RNFL Circular Tomogram





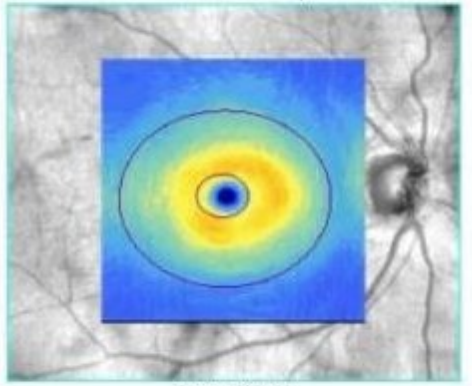
RNFL Circular Tomogram



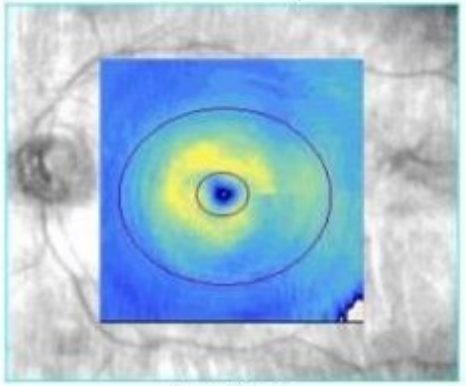
			OD	OS
Name:				
ID:		Exam Date:	4/25/2018	4/25/2018
DOB:	2/18/1952	Exam Time:	5:15 PM	5:15 PM
Gender:	Unknown	Serial Number:	4000-6813	4000-6813
Technician:	Operator, Cirrus	Signal Strength:	8/10	8/10

Ganglion Cell OU Analysis: Macular Cube 512x128 — OD ● | ● OS

OD Thickness Map



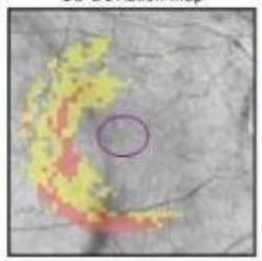
OS Thickness Map



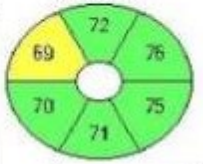
Fovea: 238, 67

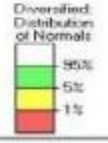
Fovea: 241, 66

OD Deviation Map

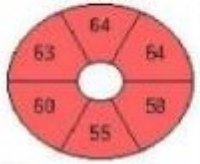


OD Sectors

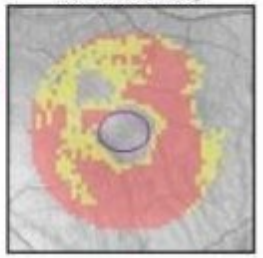




OS Sectors

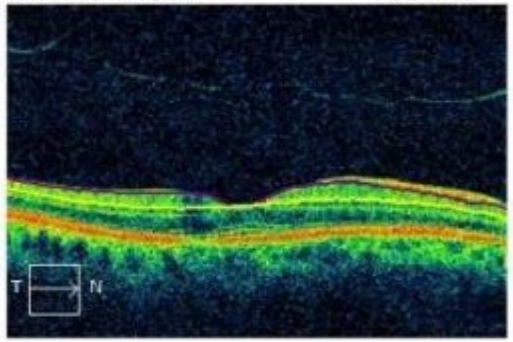


OS Deviation Map

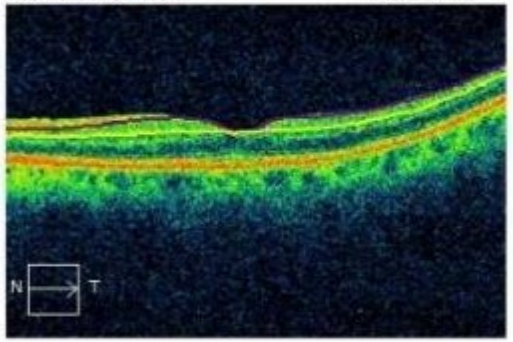


	OD µm	OS µm
Average GCL + IPL Thickness	72	61
Minimum GCL + IPL Thickness	72	56

OD Horizontal B-Scan — BScan: 67



OS Horizontal B-Scan — BScan: 66



Single Field Analysis

Eye: Right

DOB: 02-18-1952

Central 30-2 Threshold Test

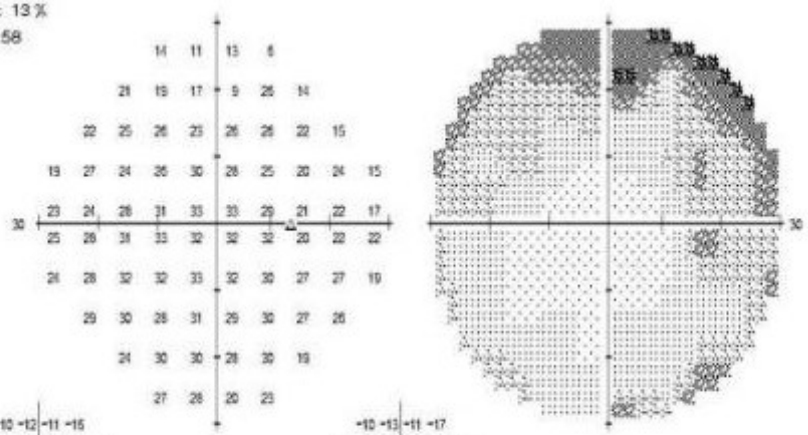
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 4/19 xx
False POS Errors: 14 %
False NEG Errors: 13 %
Test Duration: 09:58

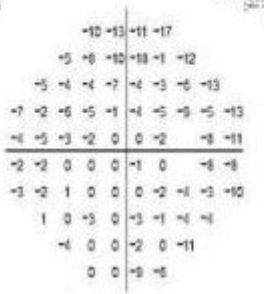
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

Pupil Diameter:
Visual Acuity:
RX: +3.00 DS DC X

Date: 07-06-2018
Time: 9:21 AM
Age: 66

Fovea: OFF





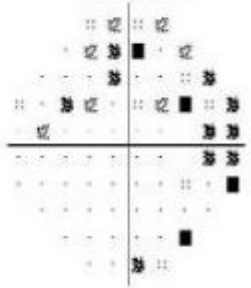
*** Low Test Reliability ***

GHT
Outside Normal Limits

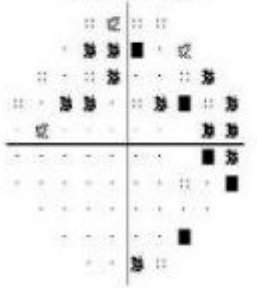
VFI 95%

MD -2.50 dB P < 5%
PSD 4.31 dB P < 0.5%

Total Deviation

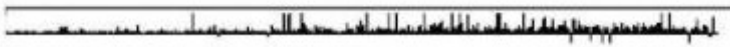


Pattern Deviation



:: < 5%
▨ < 2%
▩ < 1%
■ < 0.5%

BOWDEN EYE CARE



Single Field Analysis

Eye: Left

DOB: 02-18-1952

Central 30-2 Threshold Test

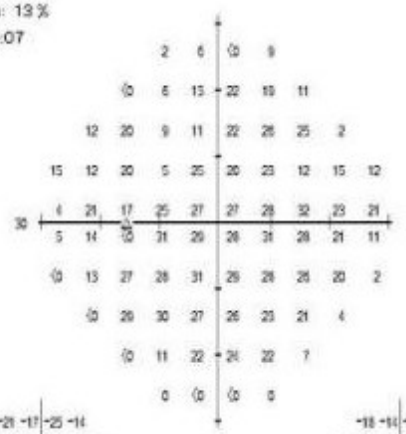
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 1/23
False POS Errors: 14 %
False NEG Errors: 13 %
Test Duration: 14:07

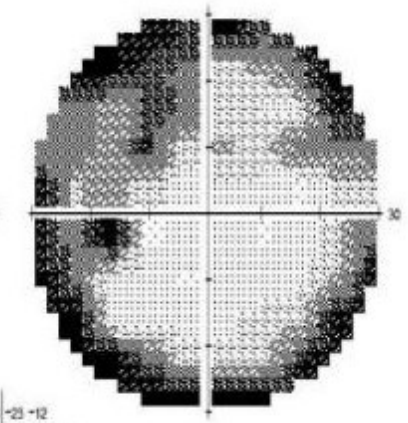
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

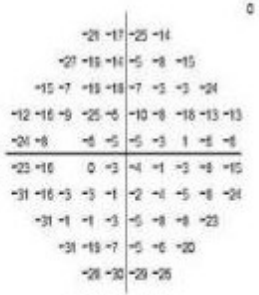
Pupil Diameter:
Visual Acuity:
RX: +1.50 DS DC X

Date: 07-06-2018
Time: 9:34 AM
Age: 66

Fovea: OFF





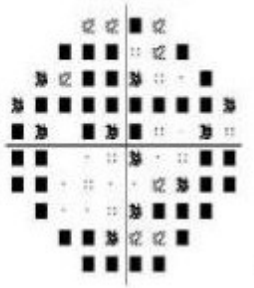


GHT
Outside Normal Limits

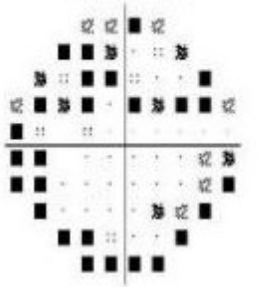
VFI 85%

MD -9.60 dB P < 0.5%
PSD 10.15 dB P < 0.5%

Total Deviation

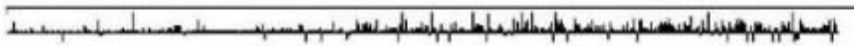


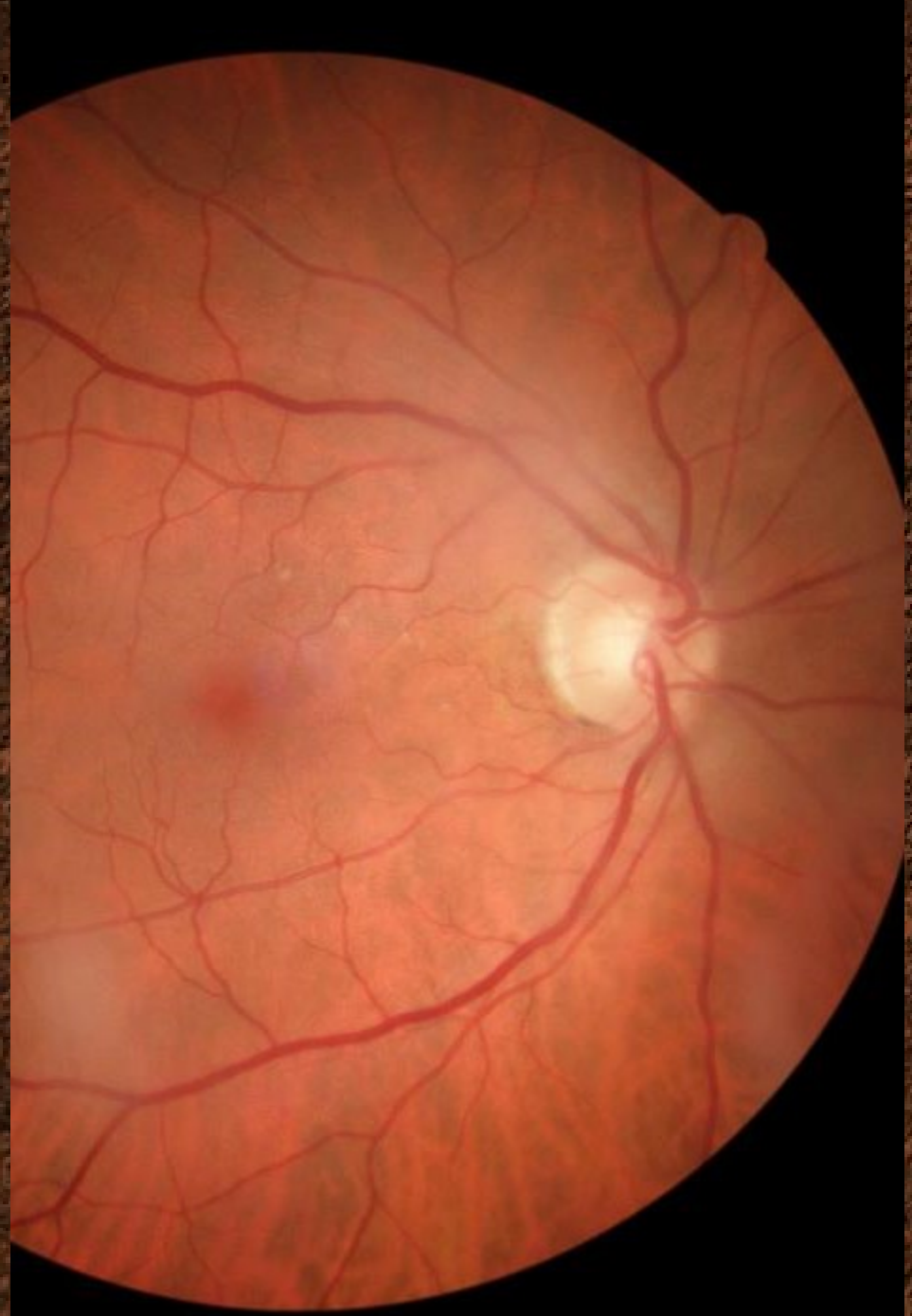
Pattern Deviation

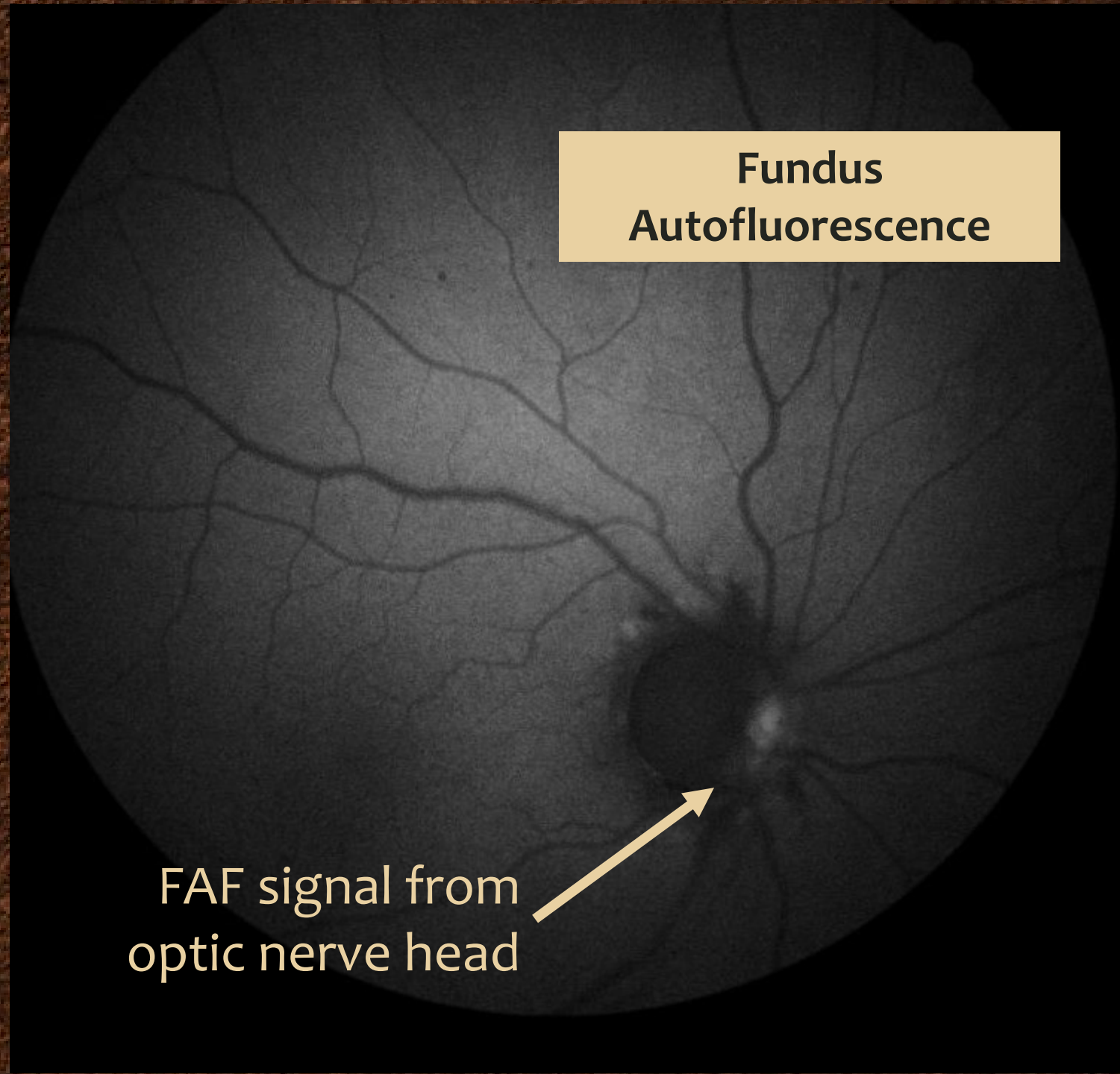


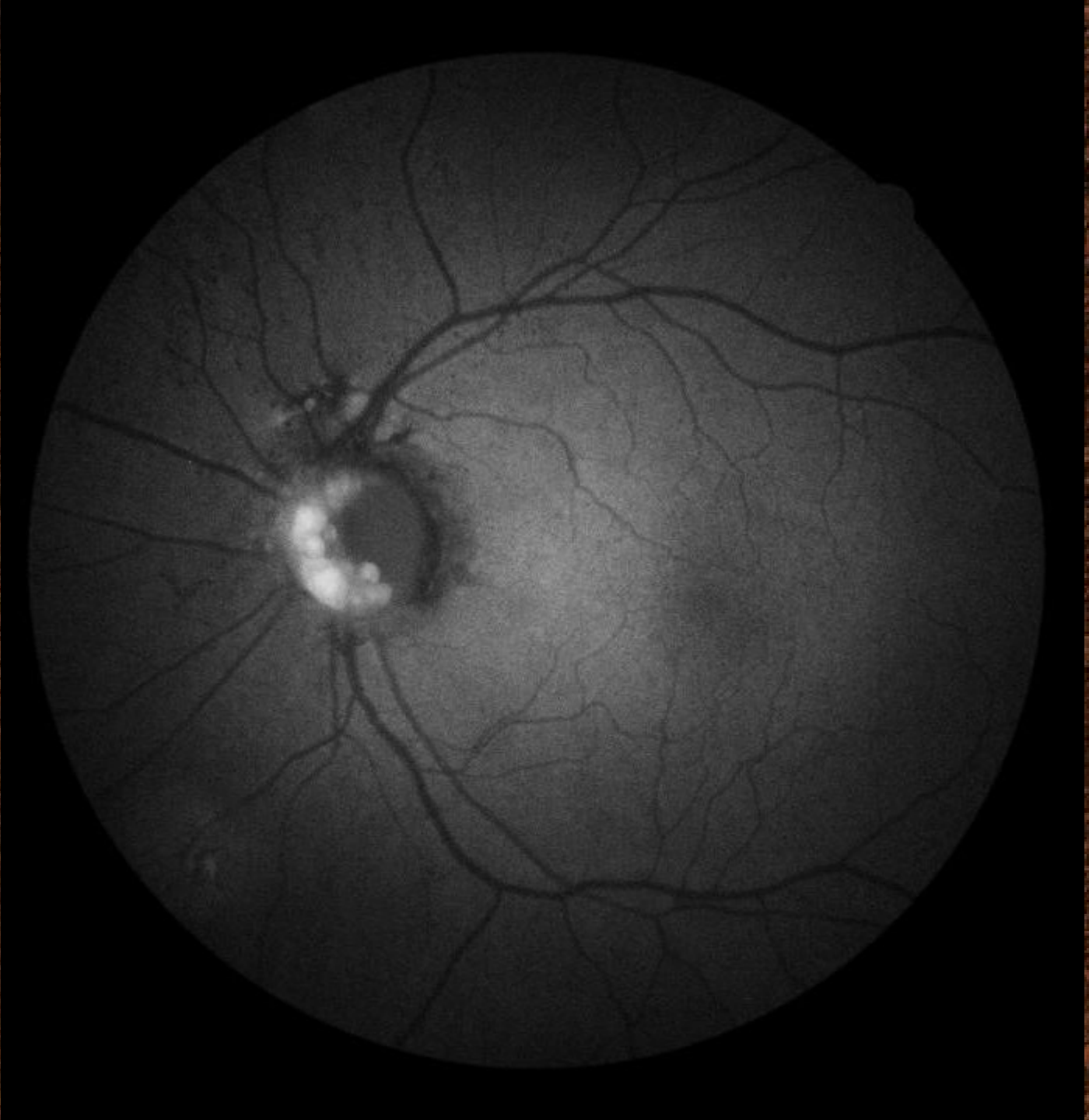
:: < 5%
▨ < 2%
▩ < 1%
■ < 0.5%

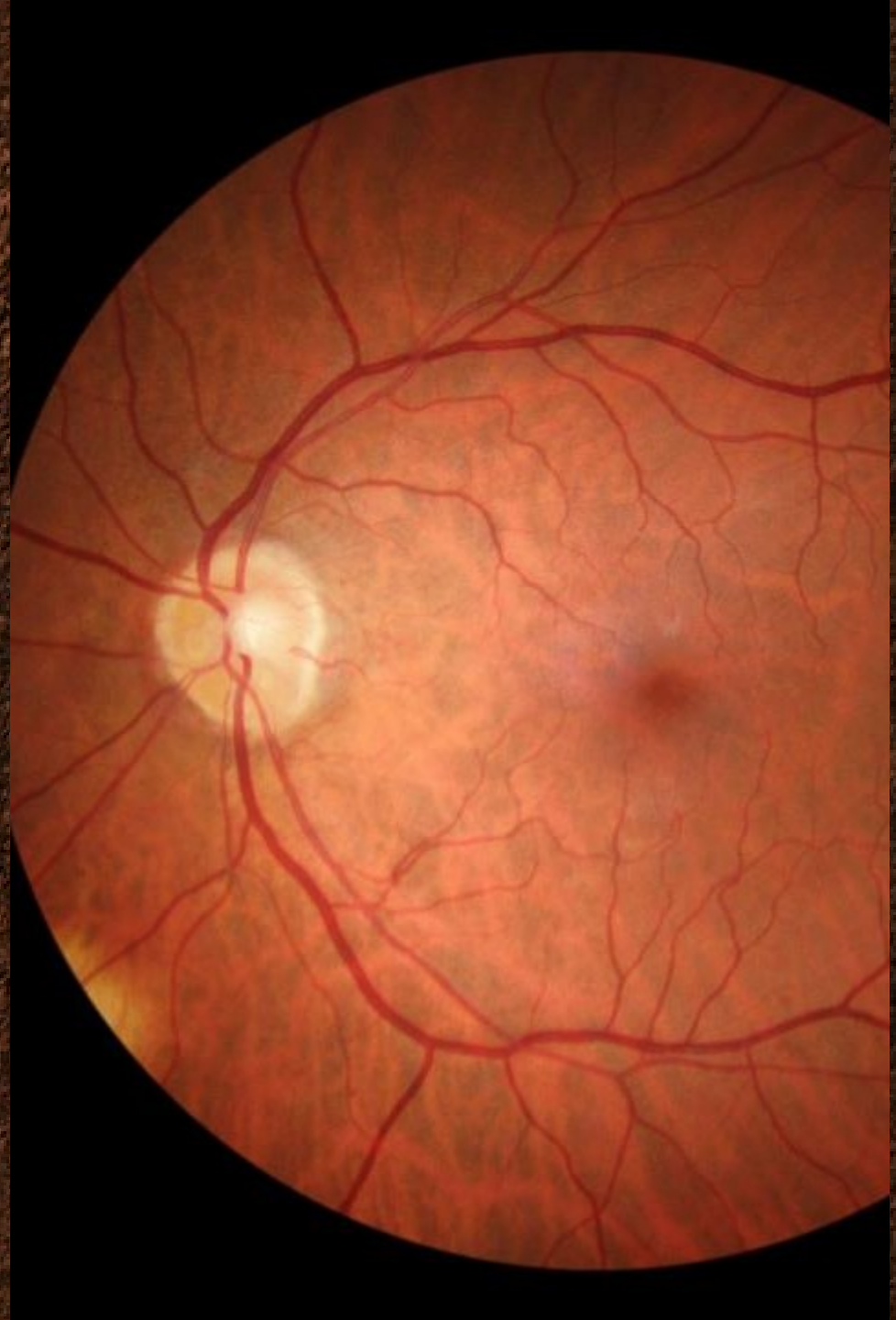
BOWDEN EYE CARE

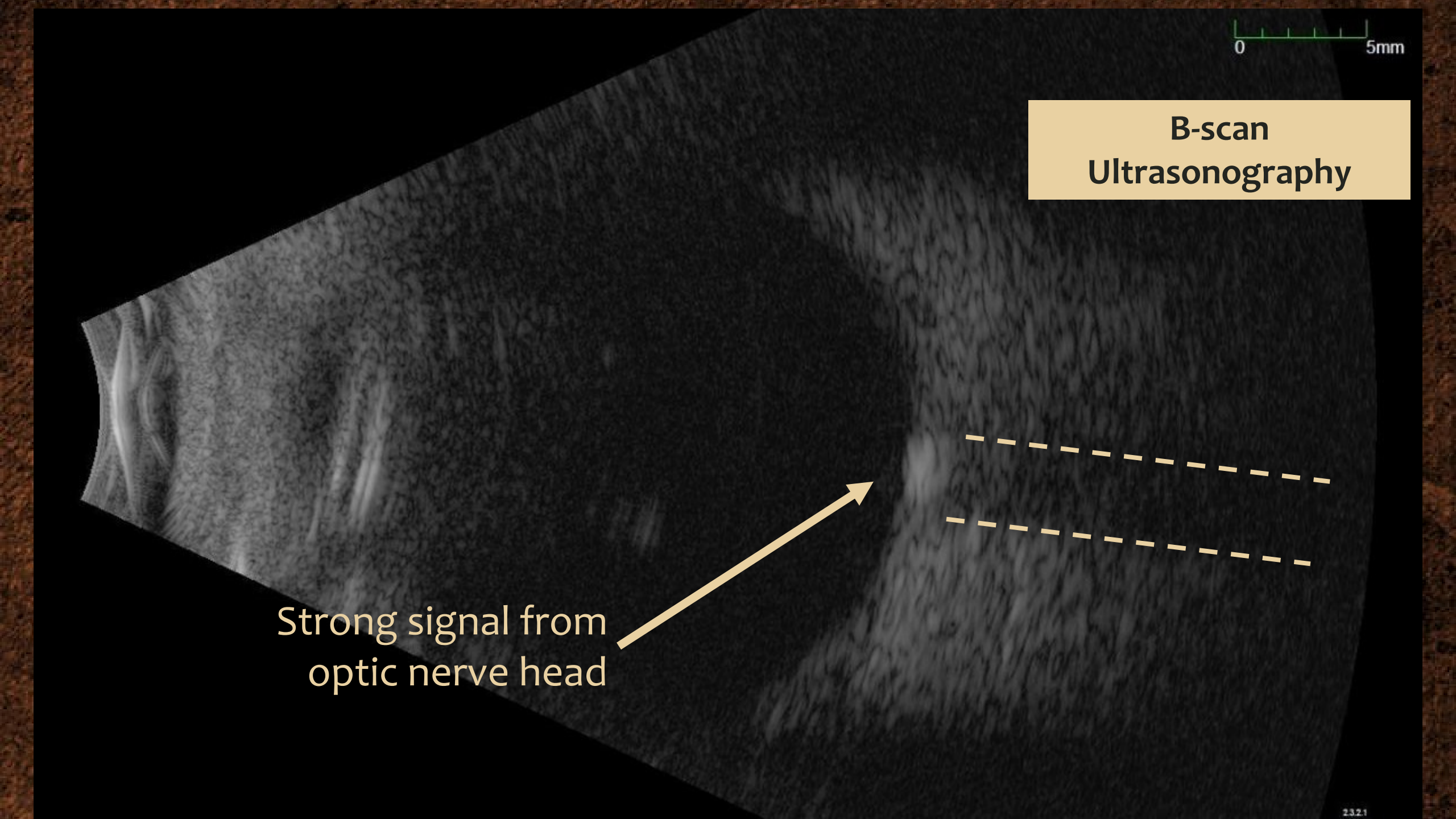





Fundus
Autofluorescence
FAF signal from
optic nerve head

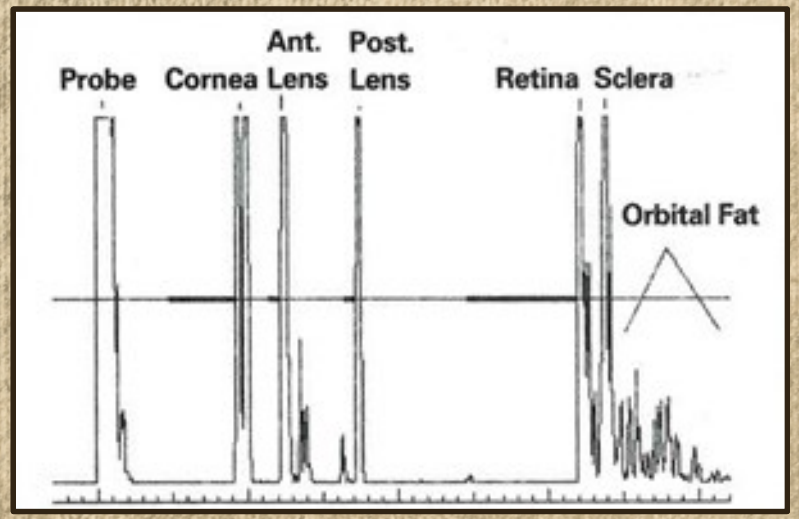


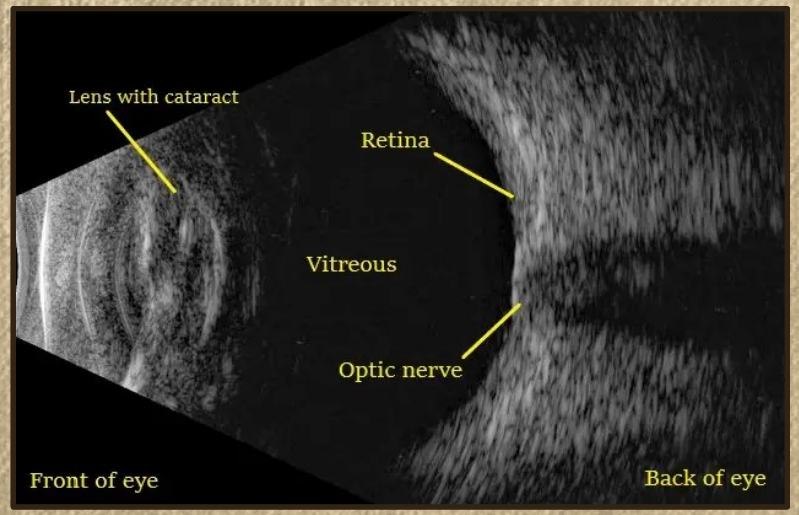



0
5mm
B-scan
Ultrasonography
Strong signal from
optic nerve head
2321

About B-scan Ultrasonography

- High frequency sound is passed through the tissue and echos are recorded
- A-scans: 1-dimensional data
- B-scans: 2-dimensional images
- Why use it?
  - Ability to penetrate opaque tissue

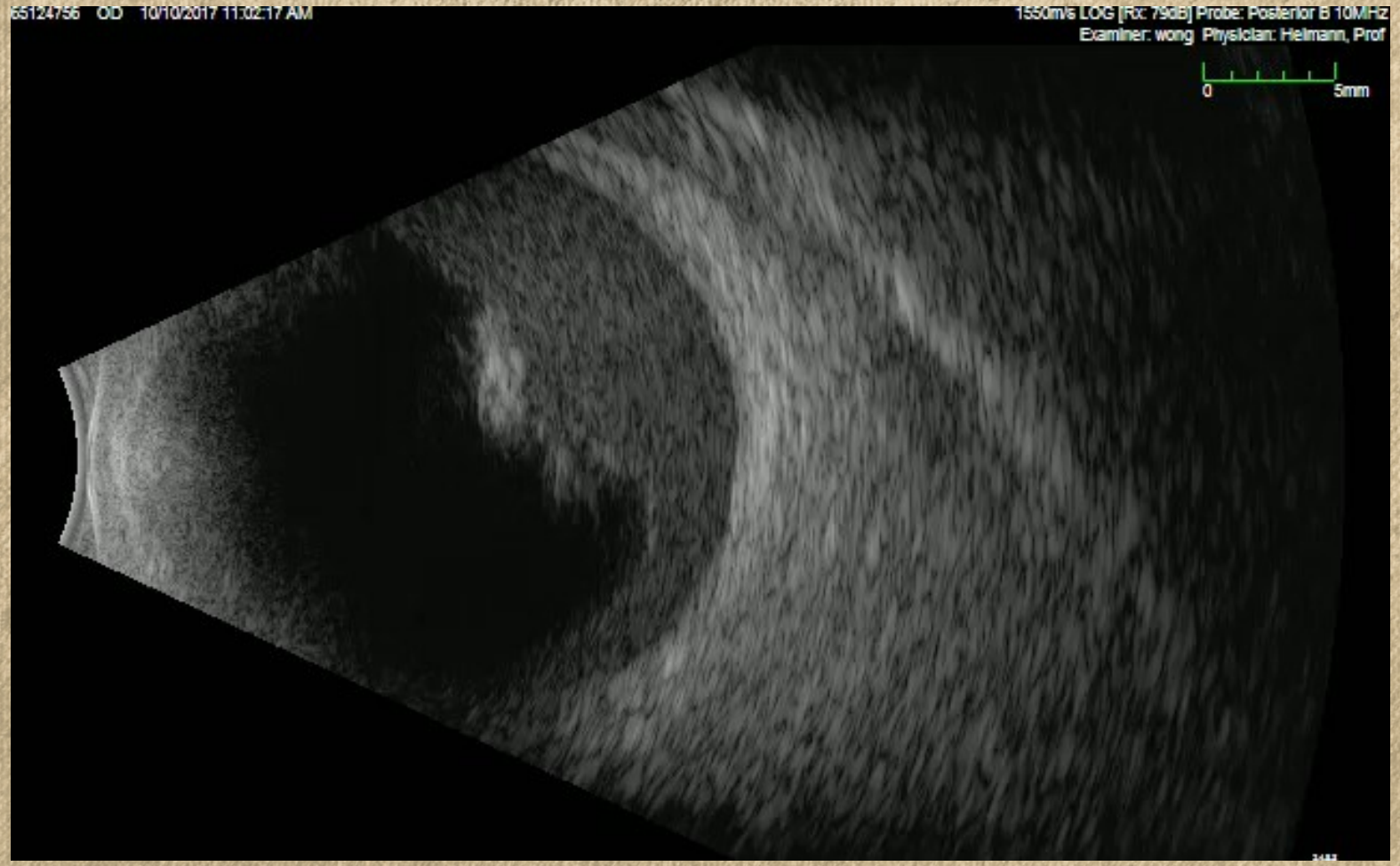




About B-scan Ultrasonography

Kinetic exam: Eye movement utilized in evaluating the patient's condition

- Retina: Tethered membrane
- Vitreous: Clothes dryer tumbling



What is going on here?

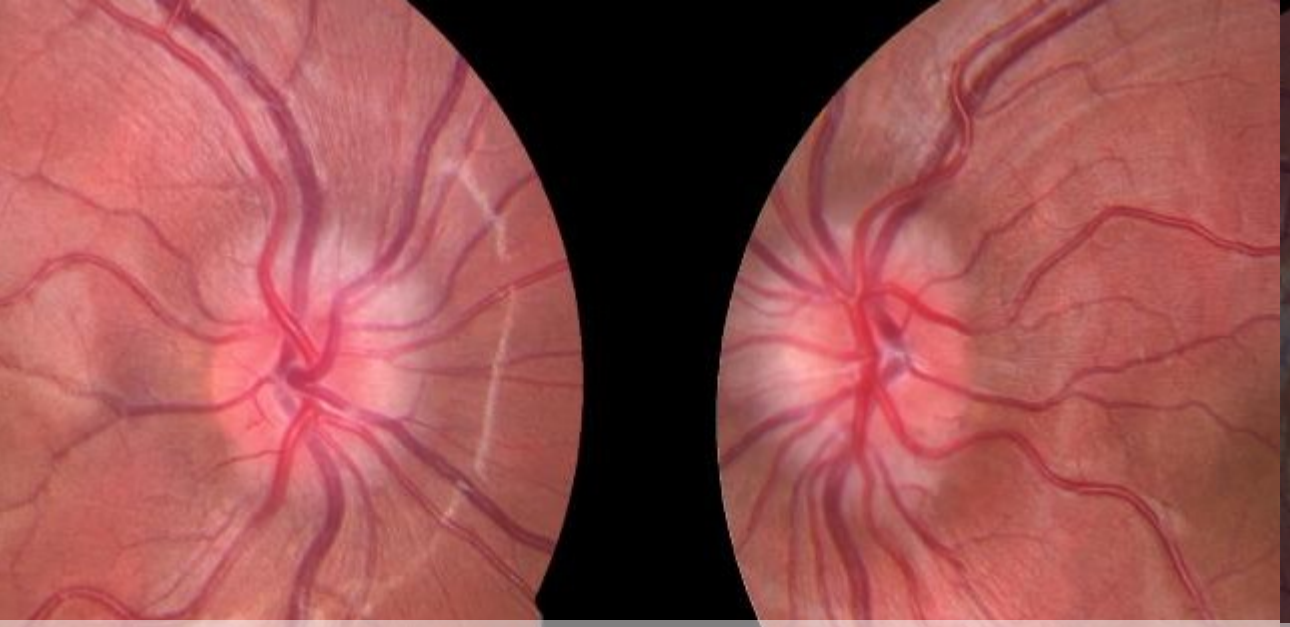
https://app.tophat.com/e/777538

- Glaucoma
- Papilledema
- Foster-Kennedy Syndrome
- Optic Nerve Head Drusen
- Ischemic Optic Neuropathy

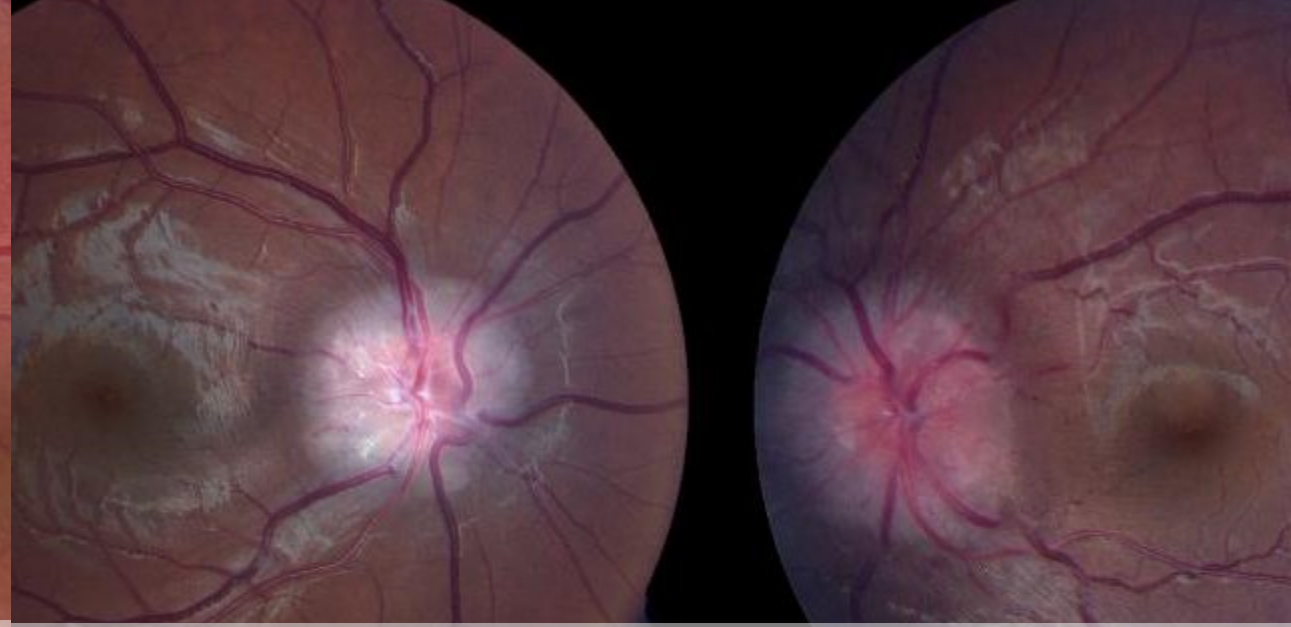
Glaucoma	Abnormal **IOP asymmetry** (14/22). Large optic cups with **rim area** < 1 mm^2. Characteristic **VF defects**
Papilledema	Bilateral **disc edema** secondary to increased intracranial pressure.
Foster-Kennedy Syndrome	**Unilateral papilledema** with optic atrophy in fellow eye. Associated with sphenoidal ridge meningiomas.
Optic Nerve Head Drusen	**Calcific deposits** in the prelaminar optic nerve head. Causes scalloping and obscuration of the disc margin without edema. Will **hyperfluoresce** on FAF
Ischemic Optic Neuropathy	Acute onset **pallor and edema** of ONH associated with APD, color vision loss, and nerve fiber bundle VF defects. **Disc-at-risk**. Systemic risk factors: **DM, OSA**

Optic Nerve Head Drusen

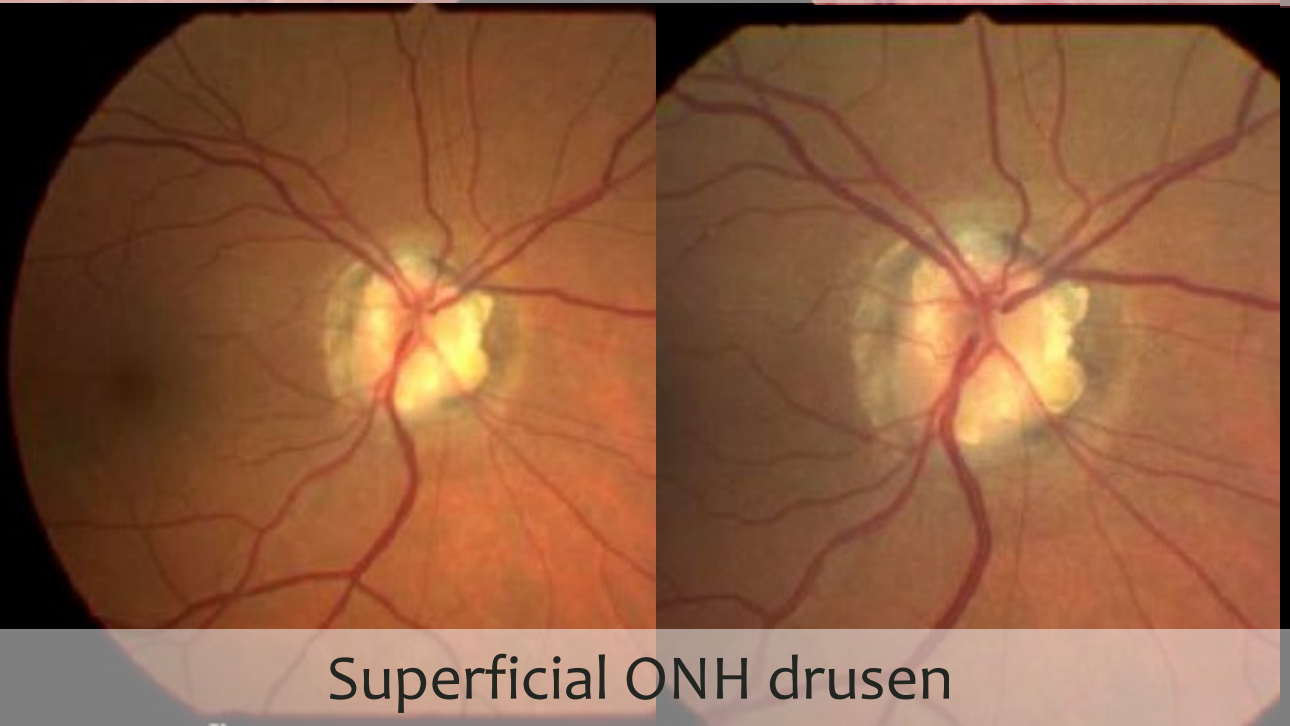
- Acellular calcific deposits of the ONH; 66%-80% bilateral
- Idiopathic; Familial clustering suggests genetic factors
- Early childhood onset of lesions deep in ONH ("buried drusen")
- Lesions usually increase in visibility and size over time
- 25%-75% of adults have VF defect (enlarged BS, arcuate)
- Visual acuity rarely affected



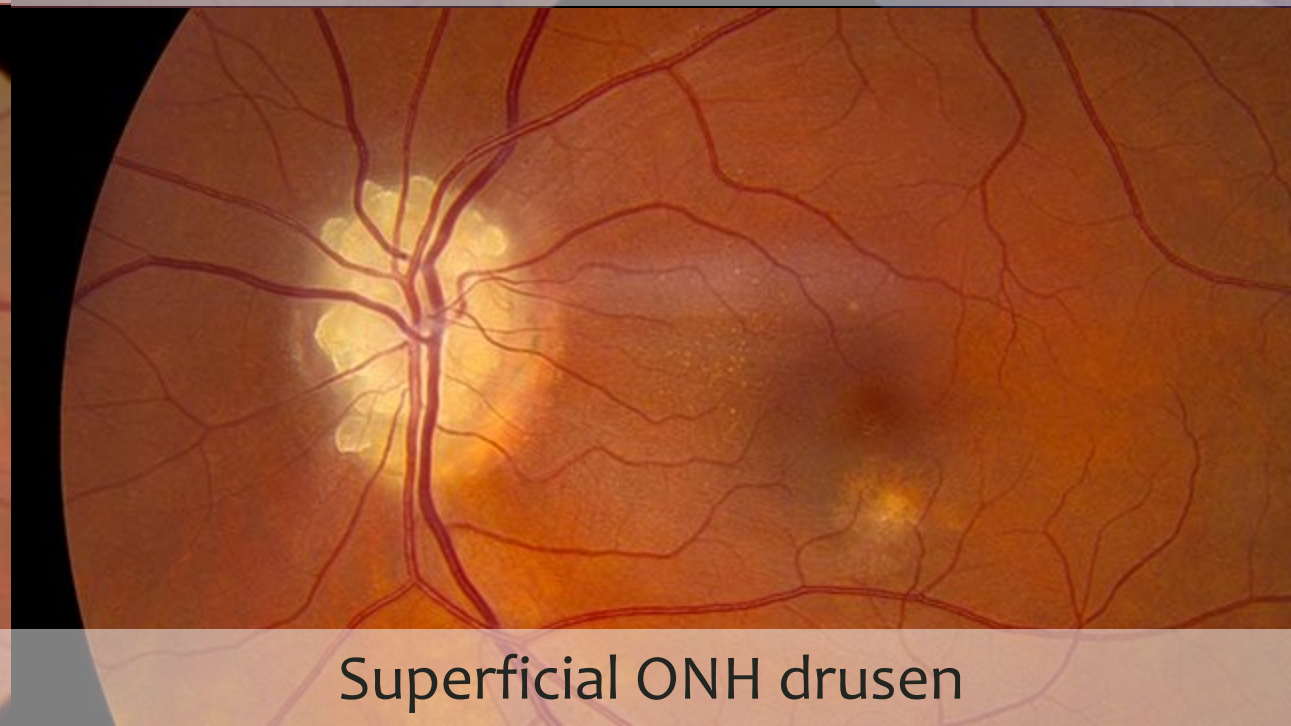
Buried drusen (10yo child)



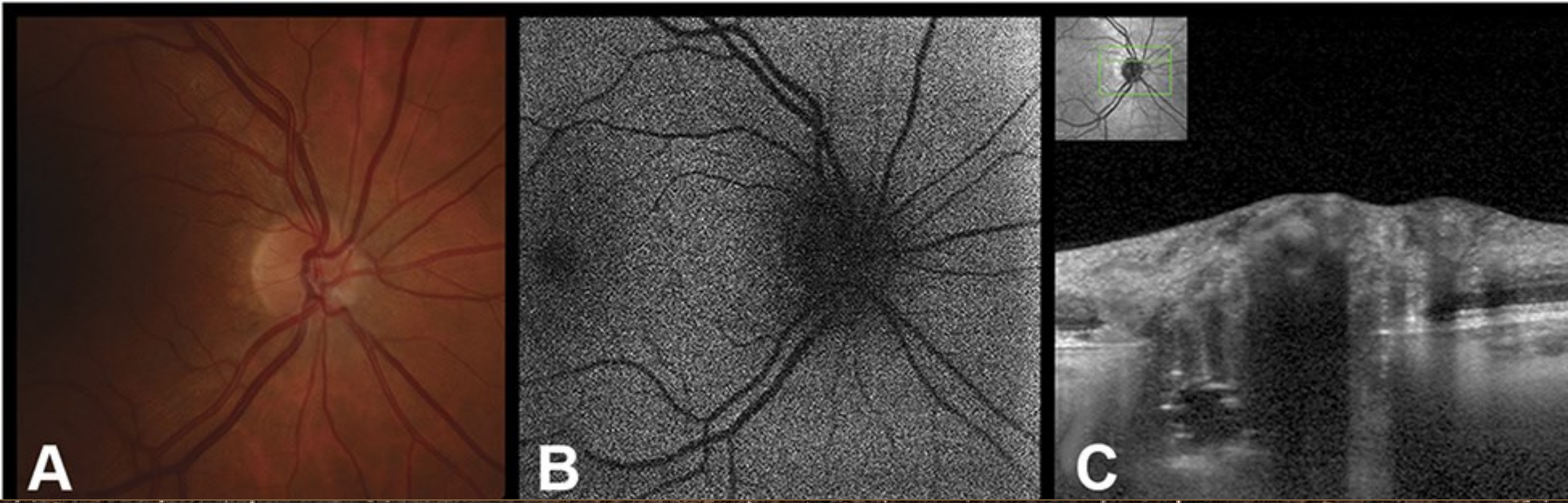
Partially exposed drusen (12yo child)



Superficial ONH drusen



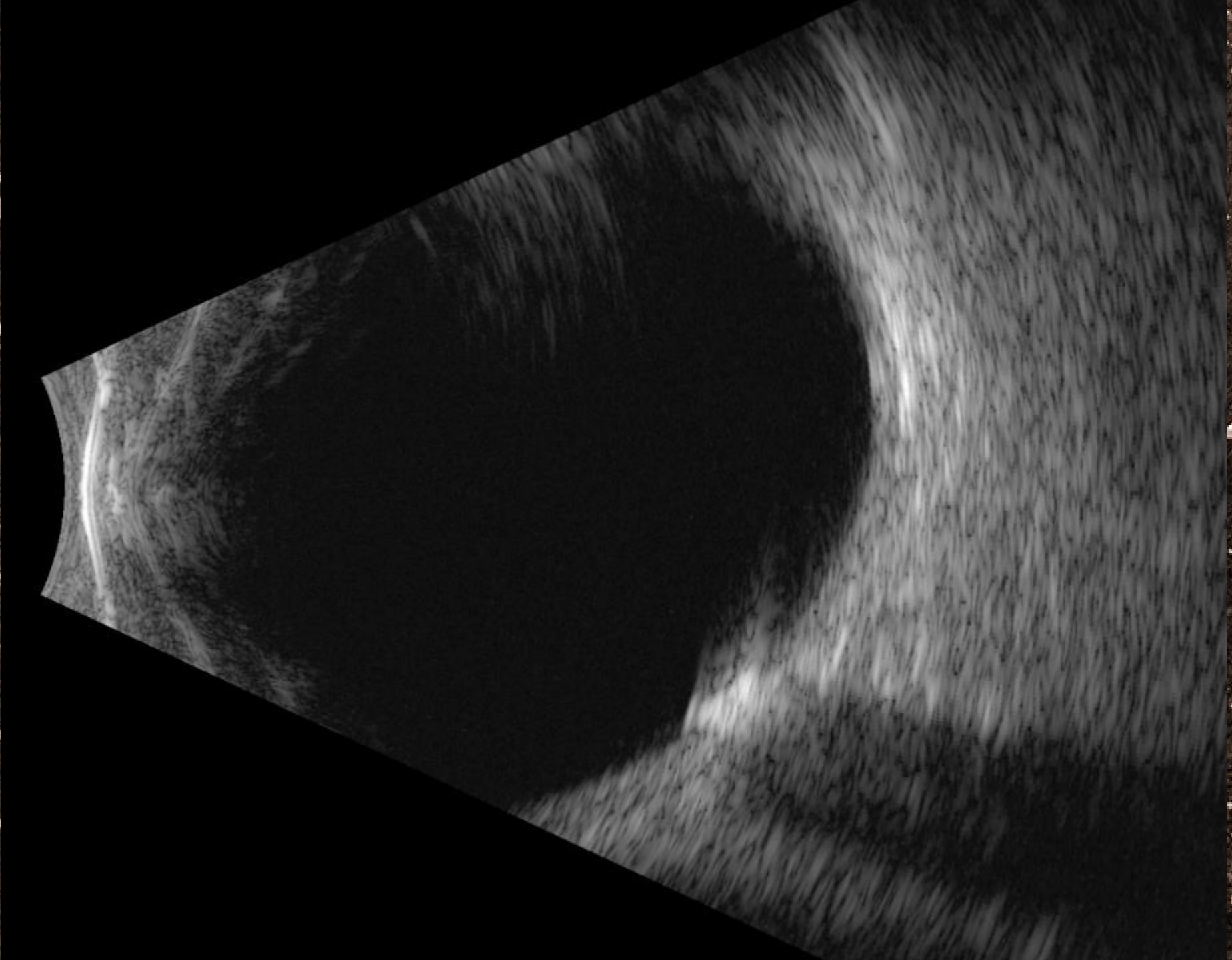
Superficial ONH drusen



Absence of FAF signal in a pt with deep buried ONH drusen

FAF is more likely to detect ONH drusen that are *larger and more superficial*

PMID: 29649006



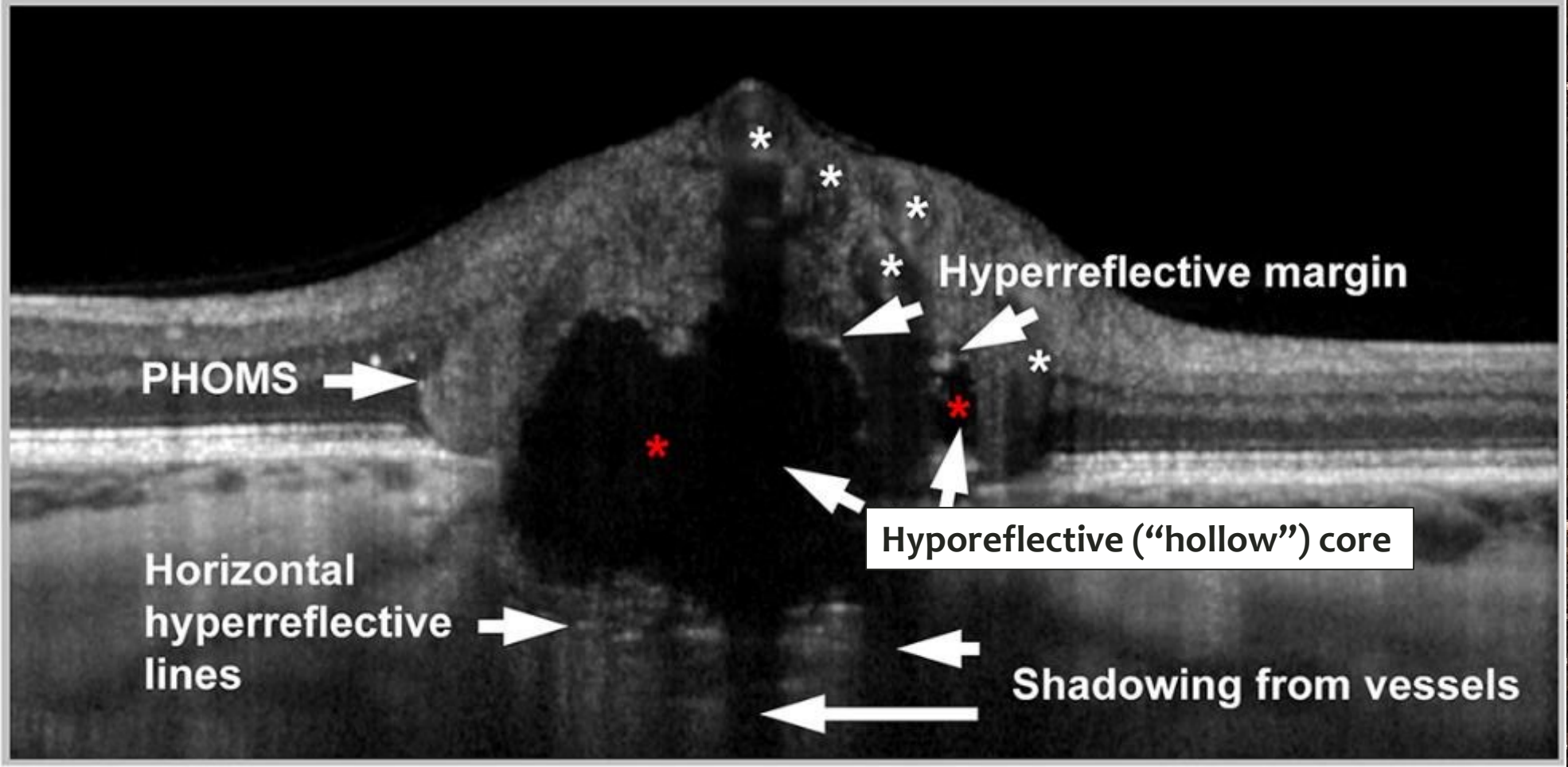
Ultrasonography has high sensitivity (90%) and specificity (80%) in diagnosis of ONH drusen

BUT…

The “gold standard” for diagnosing disc drusen is:

Enhanced Depth Imaging OCT

- ODD are **always** located above lamina cribrosa
- ODD **always** have a signal-poor core
- ODD are **often** seen with a hyperreflective margin, most prominent superiorly
- ODD are **sometimes** seen as conglomerates of smaller ODD with internal reflectivity within the signal-poor core
- Hyperreflective horizontal lines **might** represent early ODD but should **not** be diagnosed as ODD
- Peripapillary hyperreflective ovoid mass-like structures (PHOMS) should **not** be diagnosed as ODD



ODD on EDI-OCT

ODD are "hollow" structures with a hyperreflective margin ("capsule")

Hyperreflective horizontal lines might be early ODD

PHOMS circumscribe the disc and are not ODD.

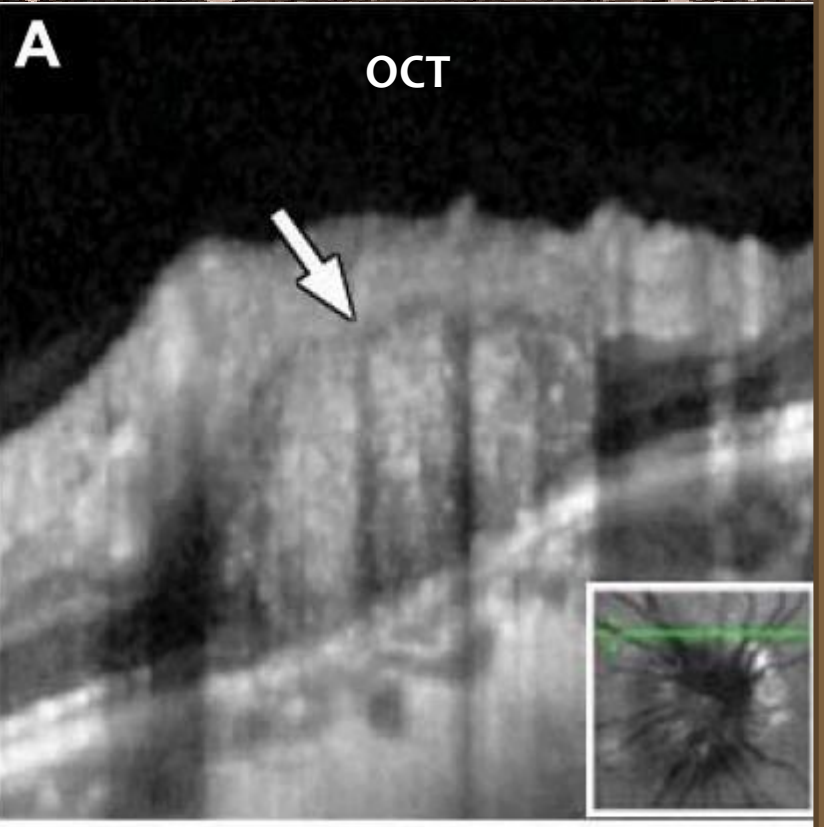
White asterisks: vessels.

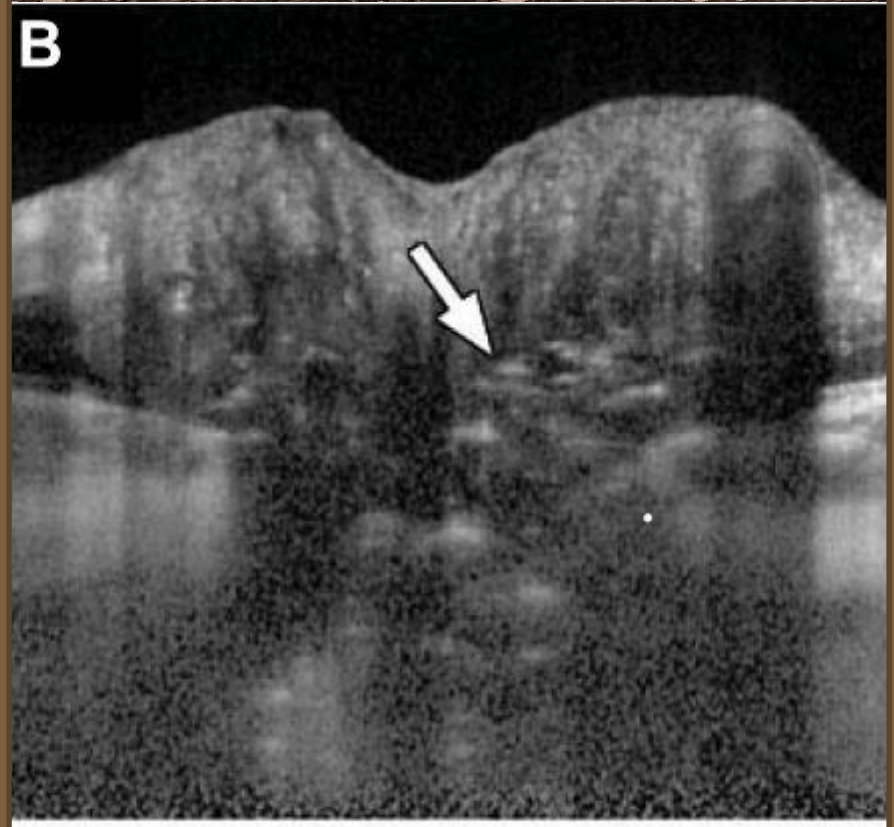
Red asterisks: ODD.

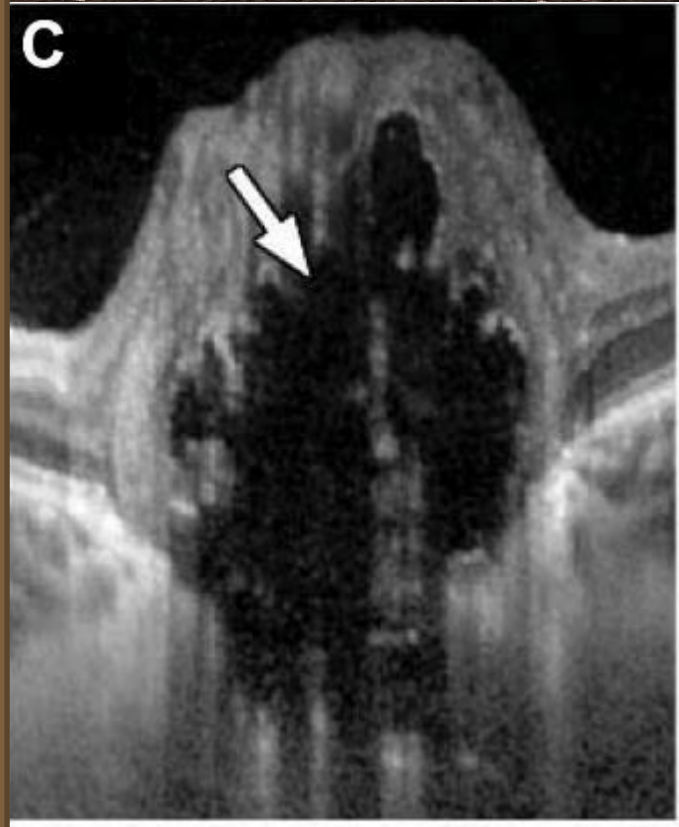
ODD: optic disc drusen

PHOMS: peripapillary hyperreflective ovoid mass-like structures.

Malmqvist, 2017

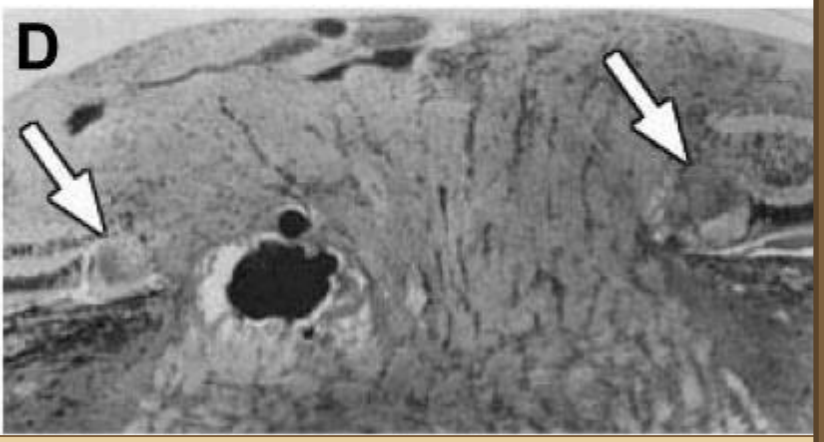


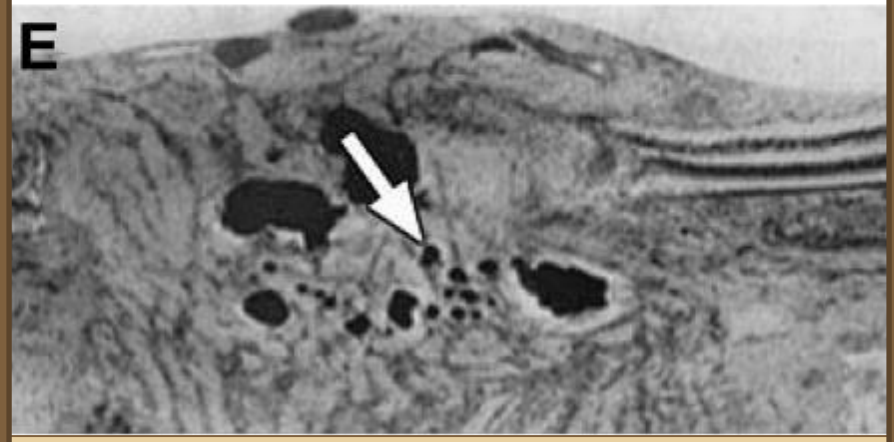


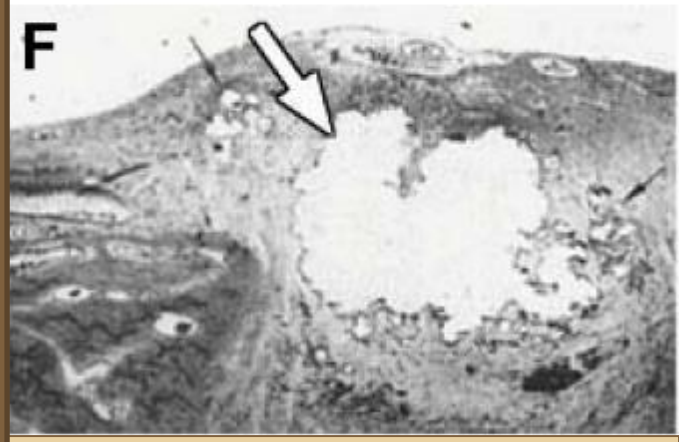


HISTOLOGY

PMID: 27817914







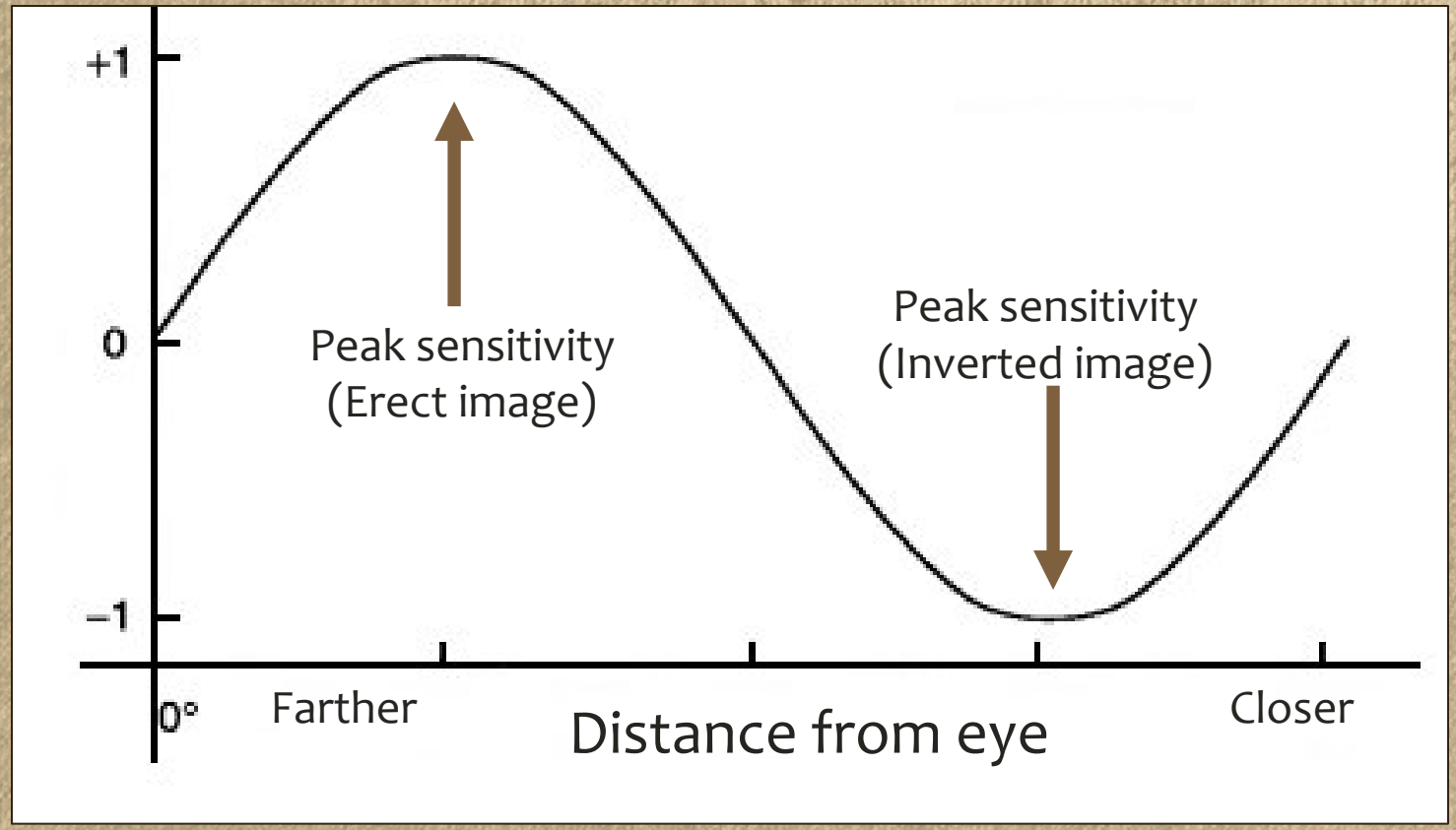
Peripapillary waste (not hollow)

Small drusen (horizontal lines)

Confluent drusen (septa)

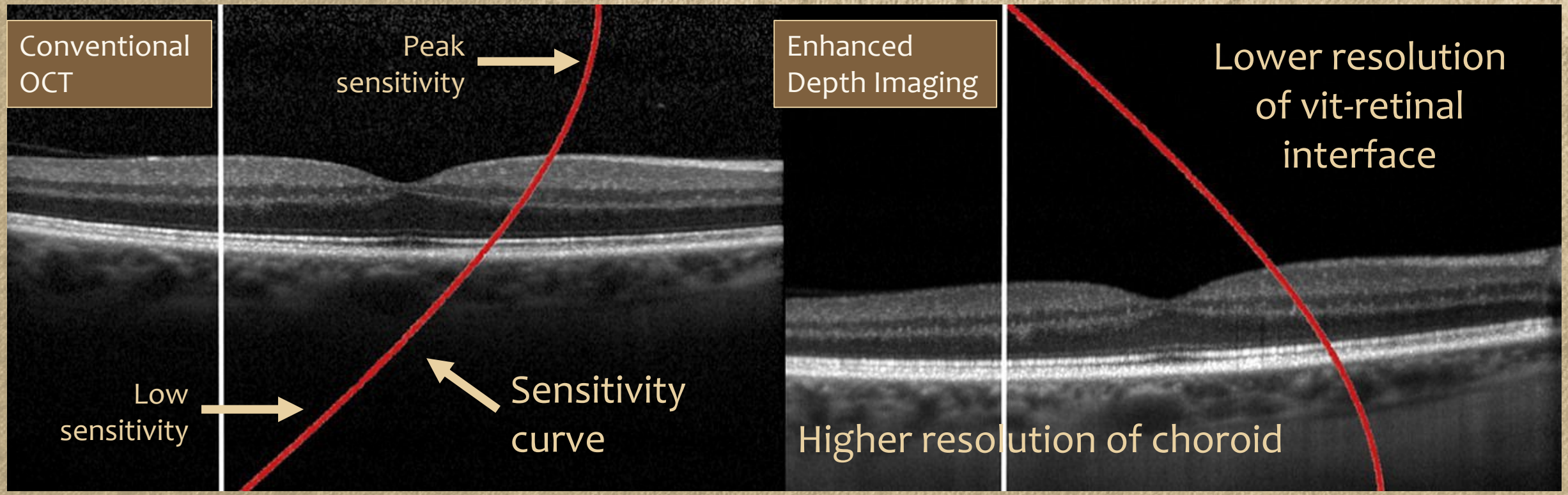
About Enhanced Depth Imaging OCT

OCT Sensitivity Curve



About Enhanced Depth Imaging OCT

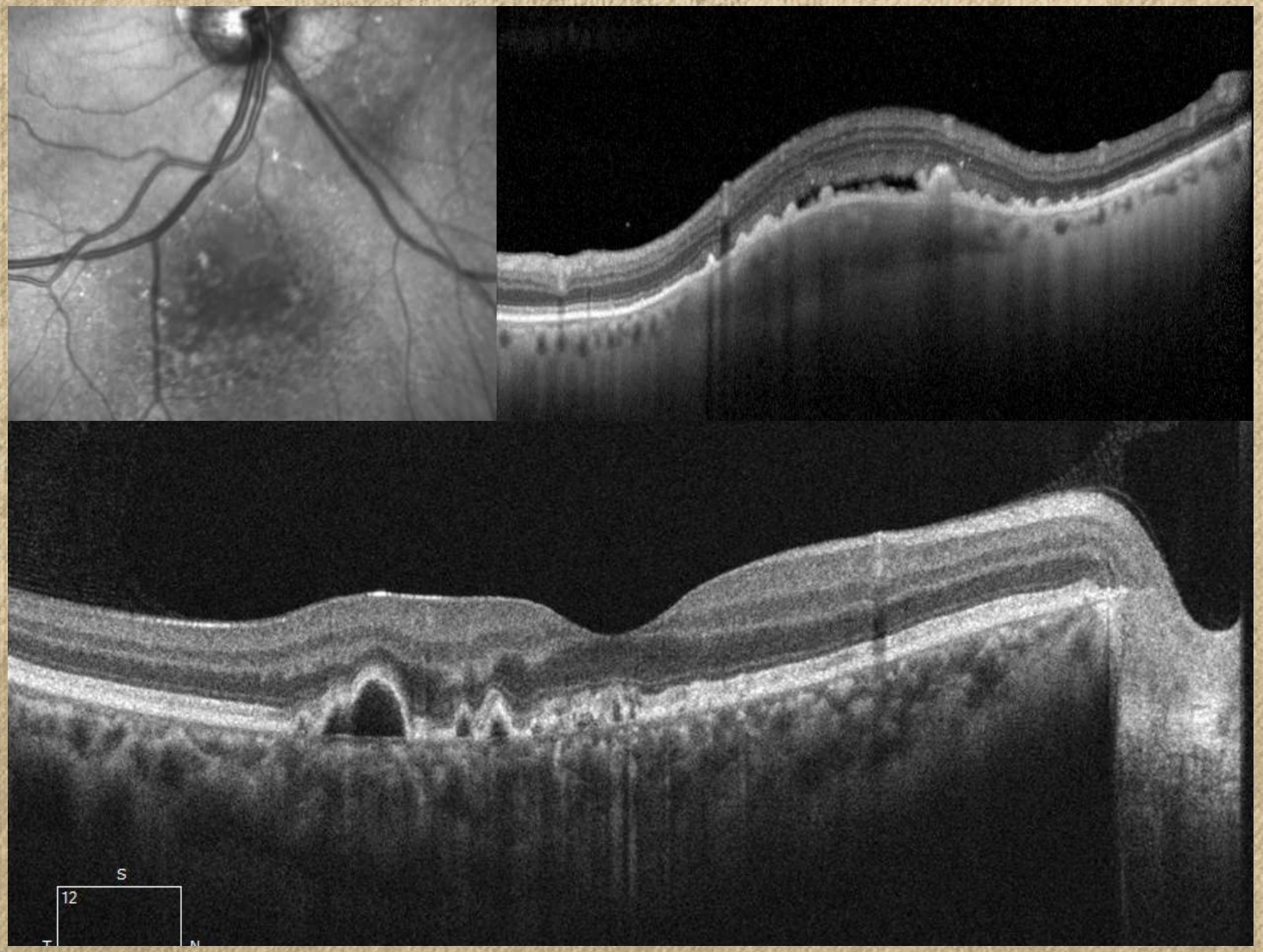
The OCT sensitivity curve is shifted deeper in the eye to more clearly image deeper structures at the cost of lower resolution of inner structures



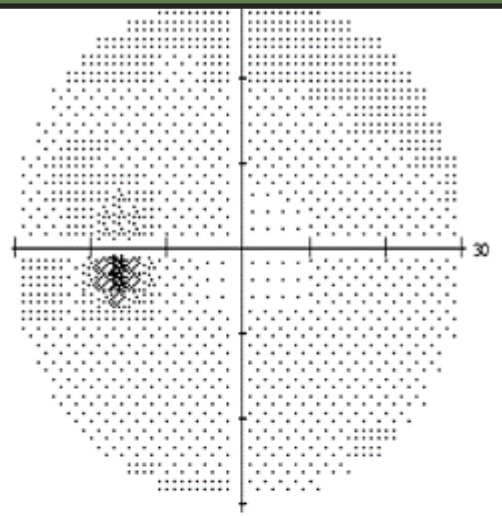
About Enhanced Depth Imaging OCT

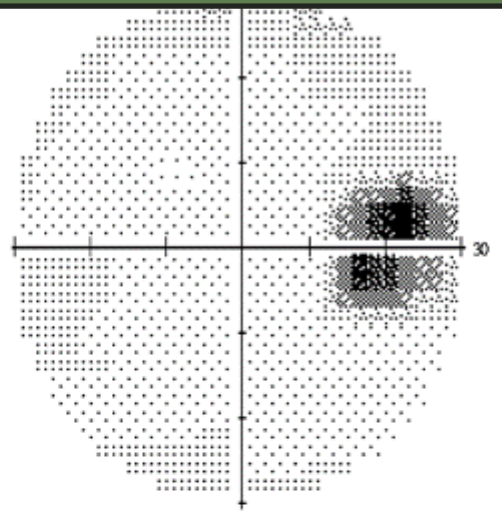
Why use it?

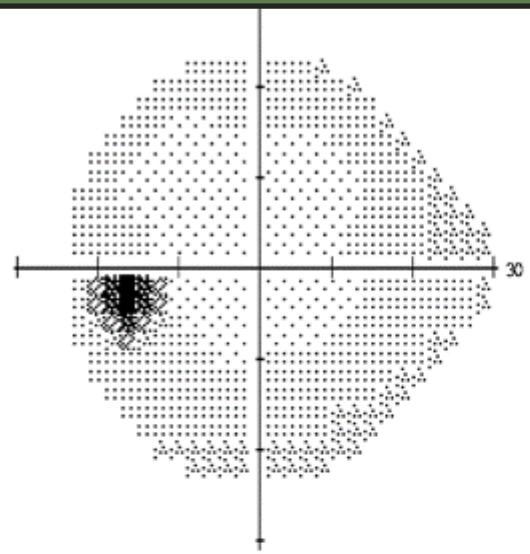
- Choroidal nevus
- Disc drusen
- Pachychoroid (Central serous)

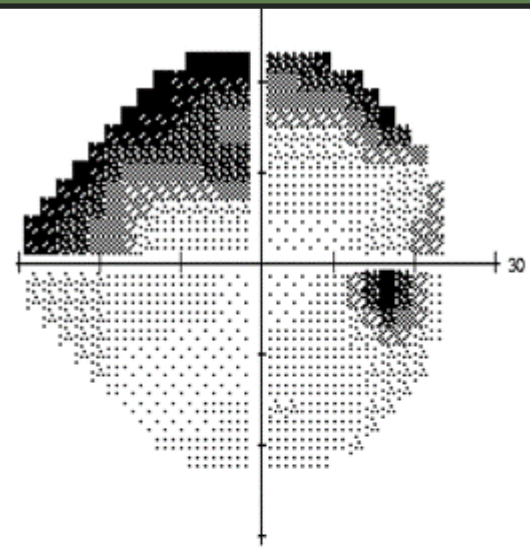


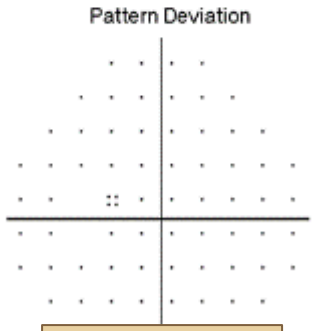
VF Defects with ONH Drusen



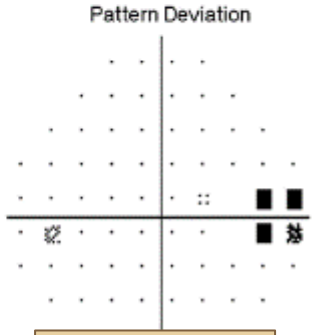




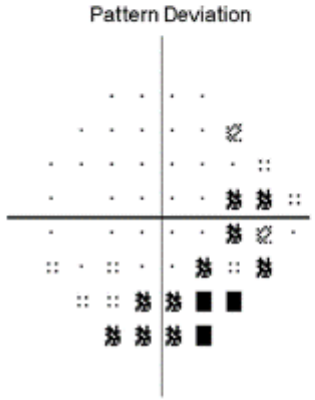




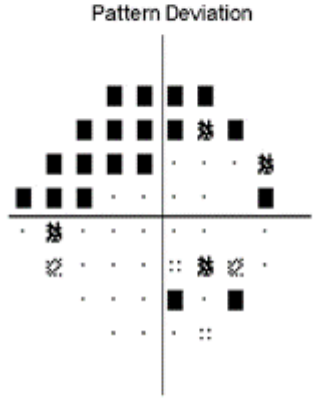
20% cases



50% cases



30% cases



Normal

Enlarged Blind Spot

Early Arcuate

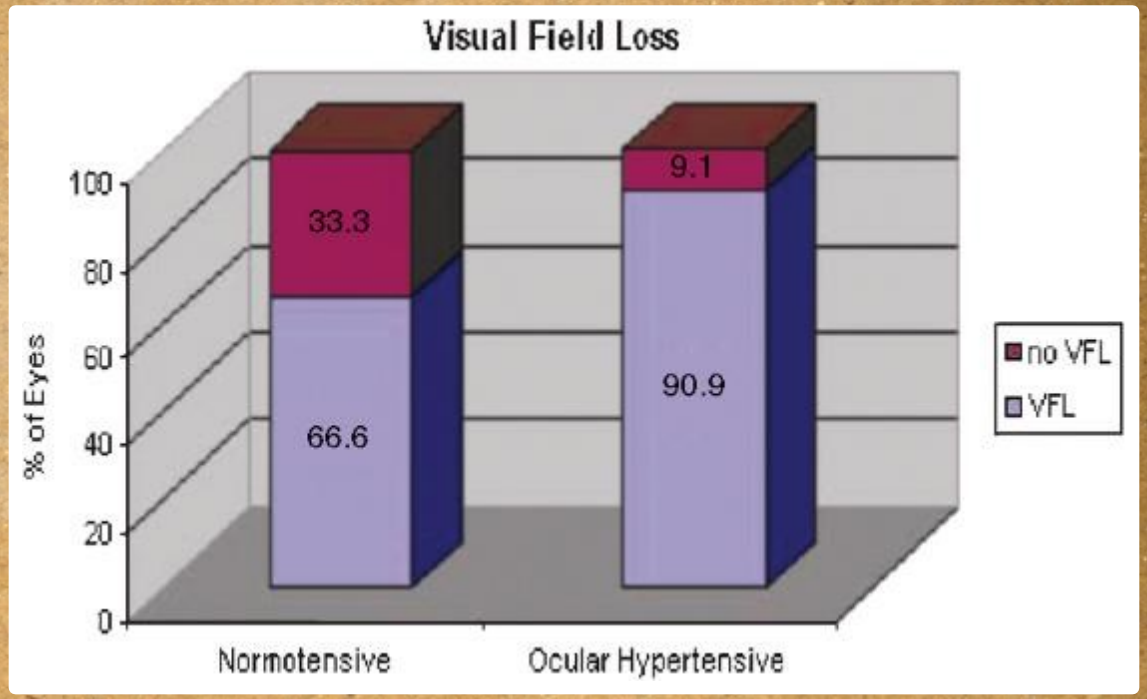
Adv. Arcuate

VF Defects with ONH Drusen

- Over 80% of adult cases will have VF defects
  - Most common: Enlarged BS, arcuate defects, constricted VF
- Greater damage with larger and more superficial drusen
- VF loss tends to progress slowly over time
- Arcuate VF defects have associated RNFL thinning
- Visual acuity usually remains normal
- No effective treatment for ONH drusen

ONH Drusen & Glaucoma

- Challenge of managing glaucoma in patients with concurrent ONH drusen
- Eyes with ONH drusen are more susceptible to glaucomatous VF loss
- **IOP-lowering treatment should be considered in all patients with ONH drusen and elevated IOP**



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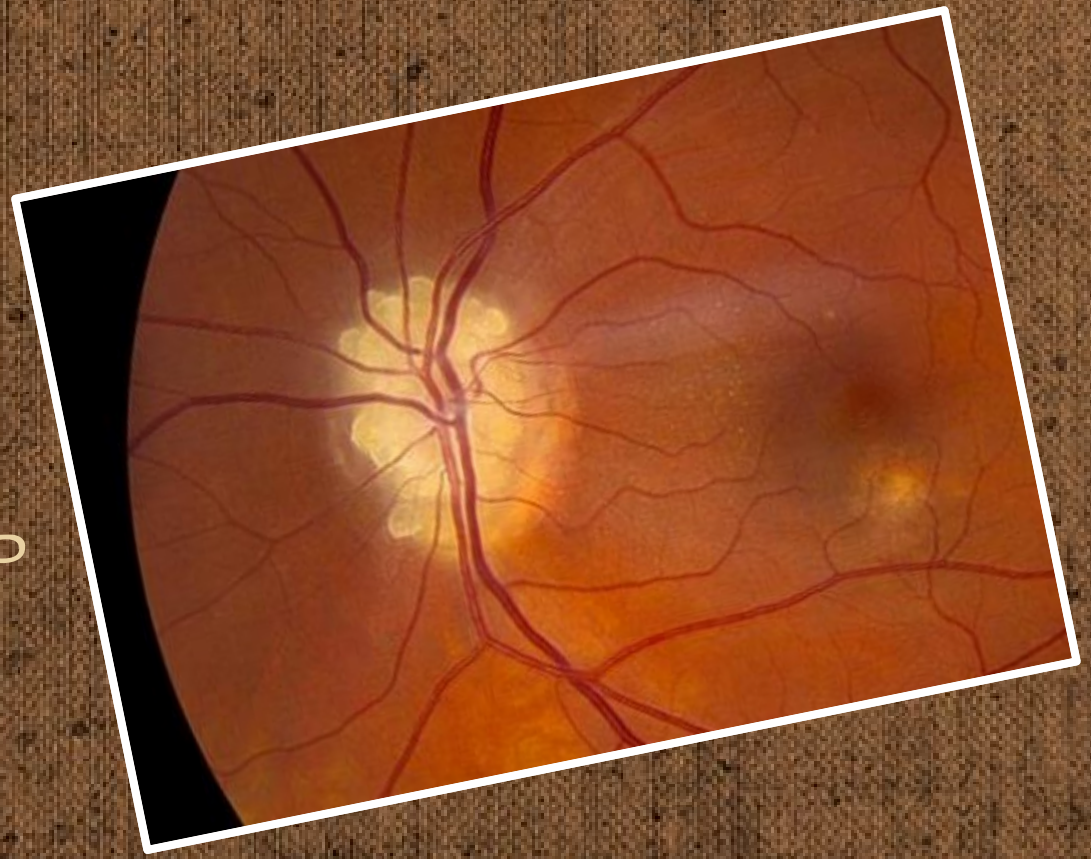
Take Home Message

Glaucoma with ONH Drusen

- Perform OCT and FAF to confirm presence of ONH drusen
- Obtain ultrasound in difficult cases
- VF loss is common and can mimic glaucomatous loss
- Patients with ONH drusen and elevated IOP are more susceptible to VF loss and may benefit from IOP lowering therapy

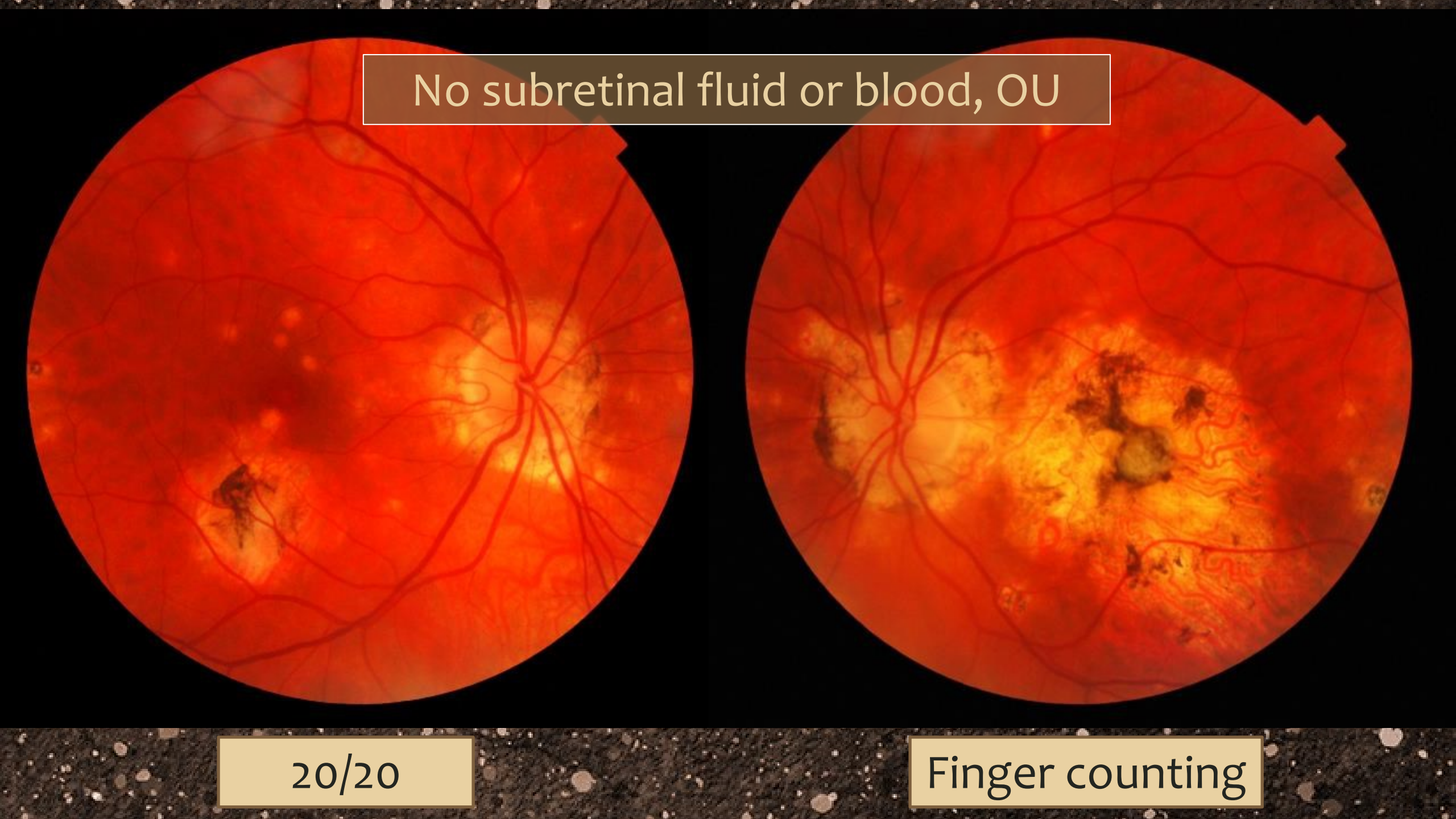


CASE #4

The birdman cometh

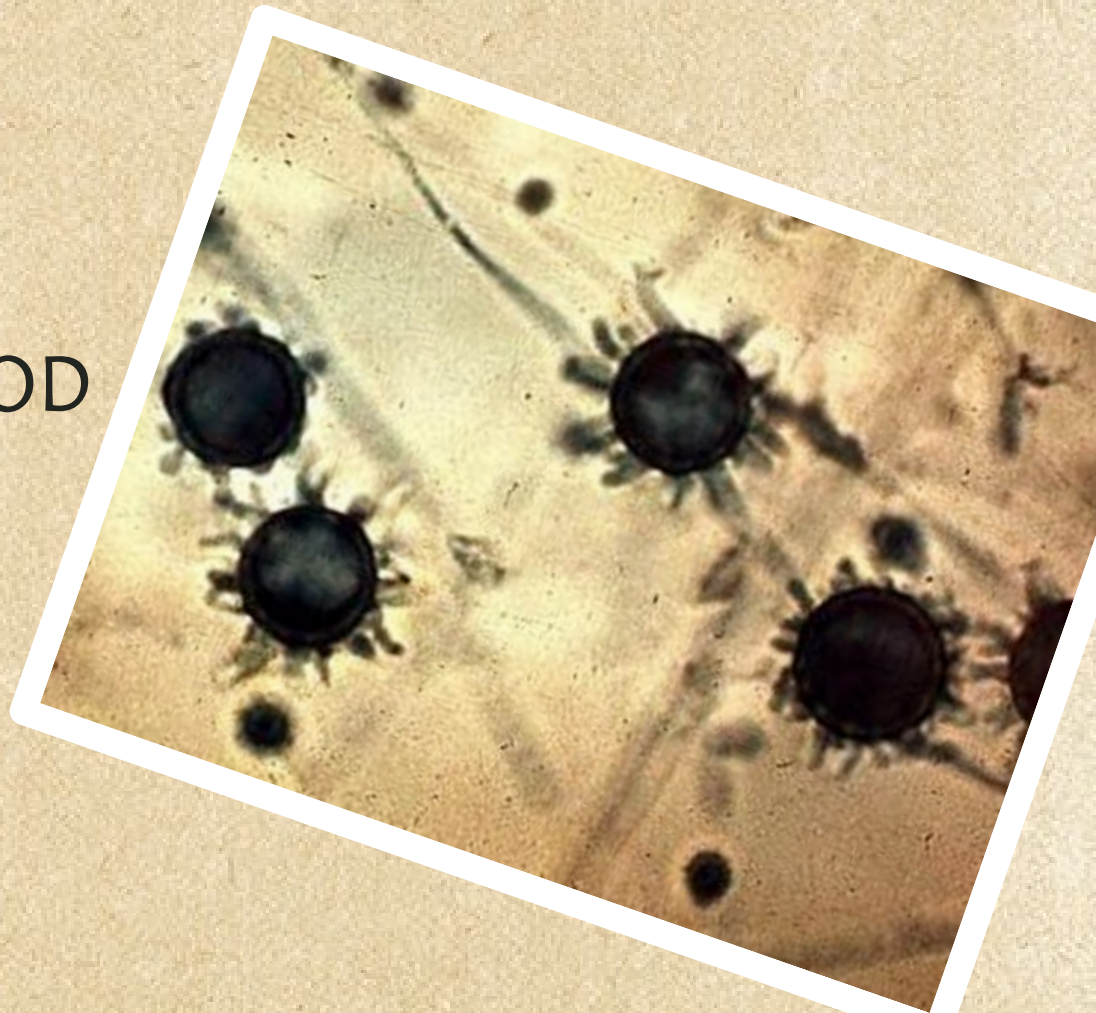
Case #4

- 56yo WM presents for routine eye exam
- Occupation: Maintenance man and farmer
- POH: H/O vision loss OS due to “bleeding” 5 years ago. Treated with laser
- MH: NIDDM x 4yrs (HbA1c: 6.5)
- BVA: 20/20 OD, FC @ 10ft OS
- Pupils and motility: Normal
- IOP: 14/16 mmHg @ 2pm
- External: Normal OU


No subretinal fluid or blood, OU
20/20
Finger counting

Assessment

- POHS OU – currently inactive
- Histoplasmic maculopathy OS with severe vision loss
- Evidence of prior reactivation OD
- No diabetic eye disease



What is the plan?

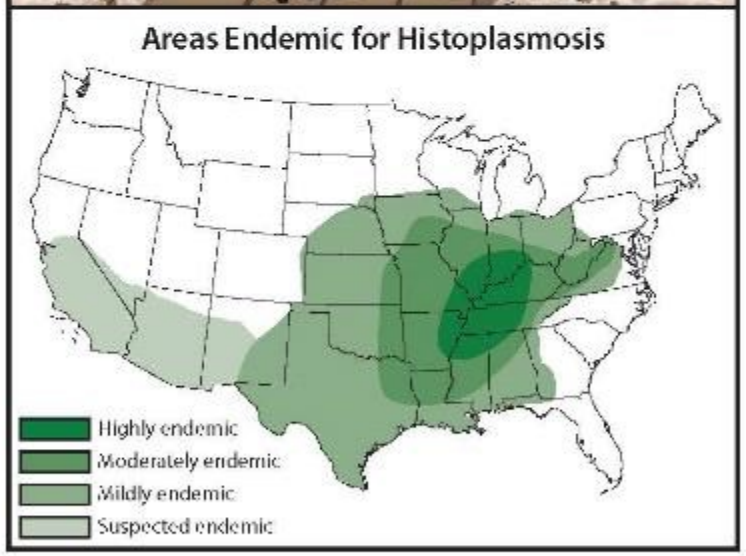
https://app.tophat.com/e/777538

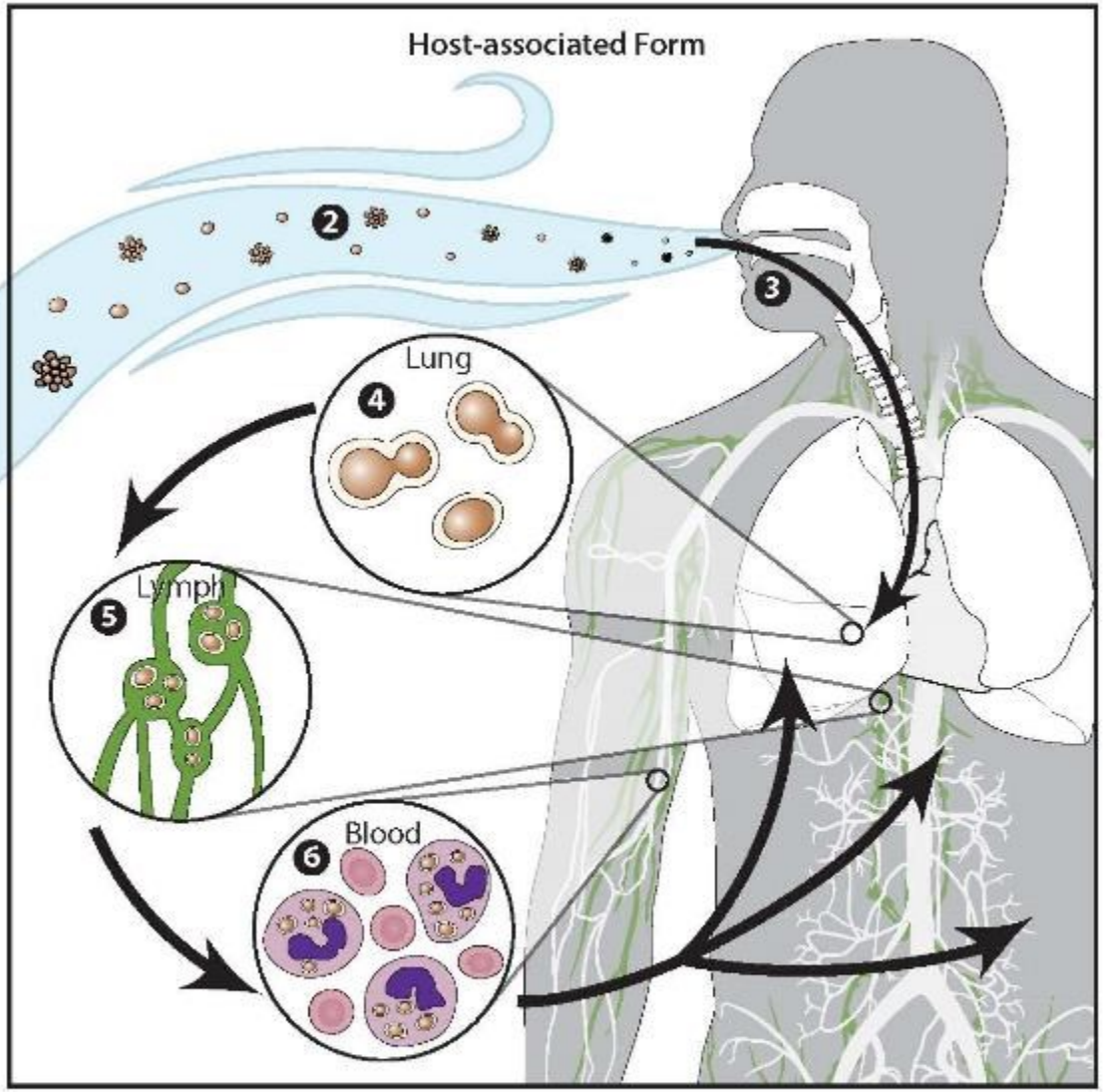
- Referral for laser photocoagulation
- Referral for Avastin injection
- Mask or ventilator use at work
- Referral for low vision care
- Routine annual eye exams

Management

- Recommend use of protective devices because pt is frequently exposed to soil and bird droppings as a farmer and maintenance man.
- Daily Amsler grid and environmental Amsler
- Safety issues for monocular patients
- Patient education diabetic eye disease.
- RTC 6 months, sooner PRN

Biology of Histoplasmosis





In the environment, *Histoplasm capsulatum* exists as a mold (1) with aerial hyphae. The hyphae produce macroconidia and microconidia (2) spores that are aerosolized and dispersed. Microconidia are inhaled into the lungs by a susceptible host (3). The warmer temperature inside the host signals a transformation to an oval, budding yeast (4). The yeast are phagocytized by immune cells and transported to regional lymph nodes (5). From there they travel in the blood to other parts of the body (6).

POHS and Vision Loss

- Vision loss occurs secondary to exudative maculopathy caused by CNV &/or inflammation
- Reactivation of histo spots in the macular region is believed to play a role in triggering maculopathy
- Patients with perimacular histo spots, especially near the fovea, are at risk for vision loss

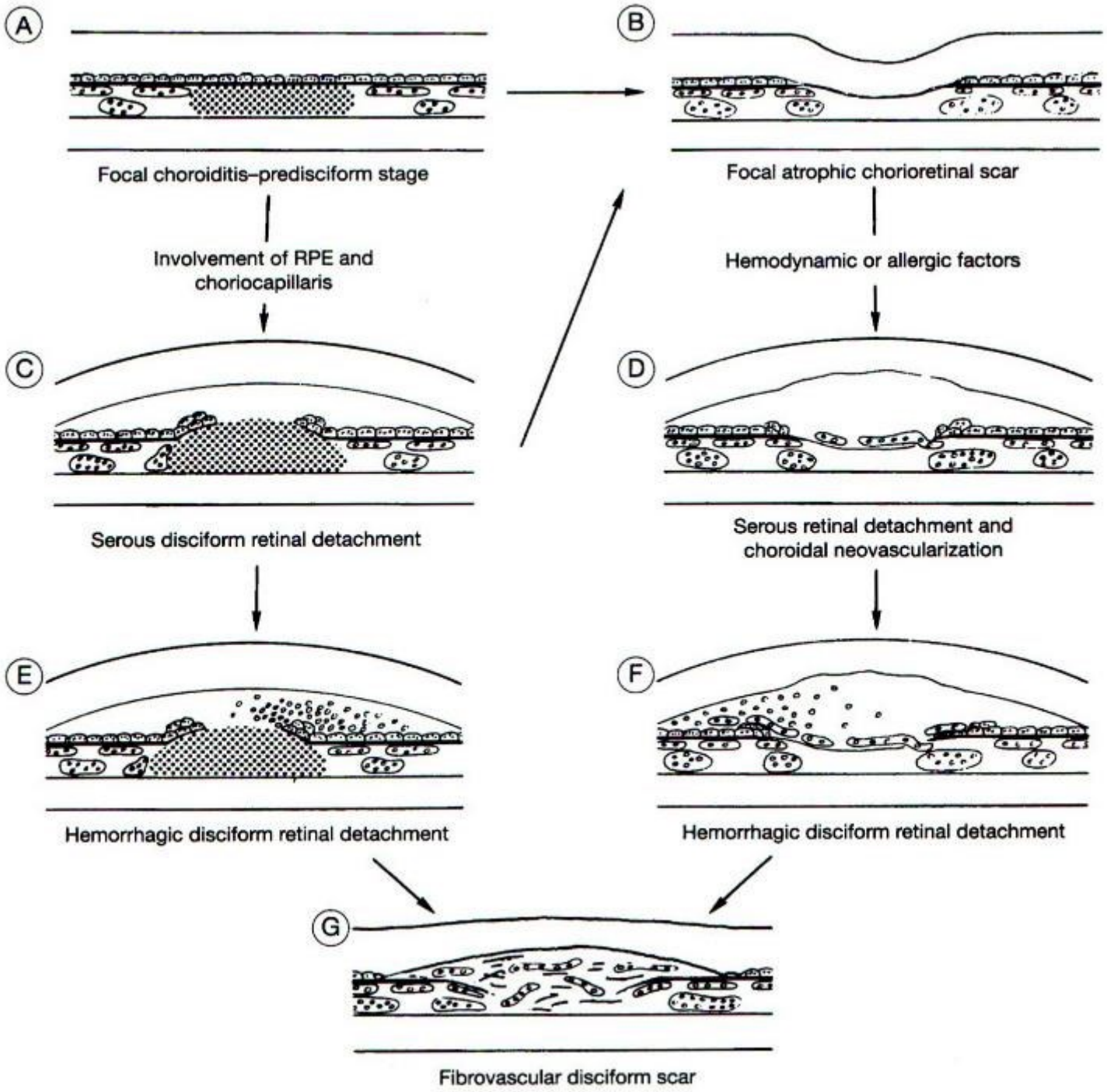
Inflammatory maculopathy pathway

Focal choroiditis

Serous detachment

Subretinal hemorrhage

Scar



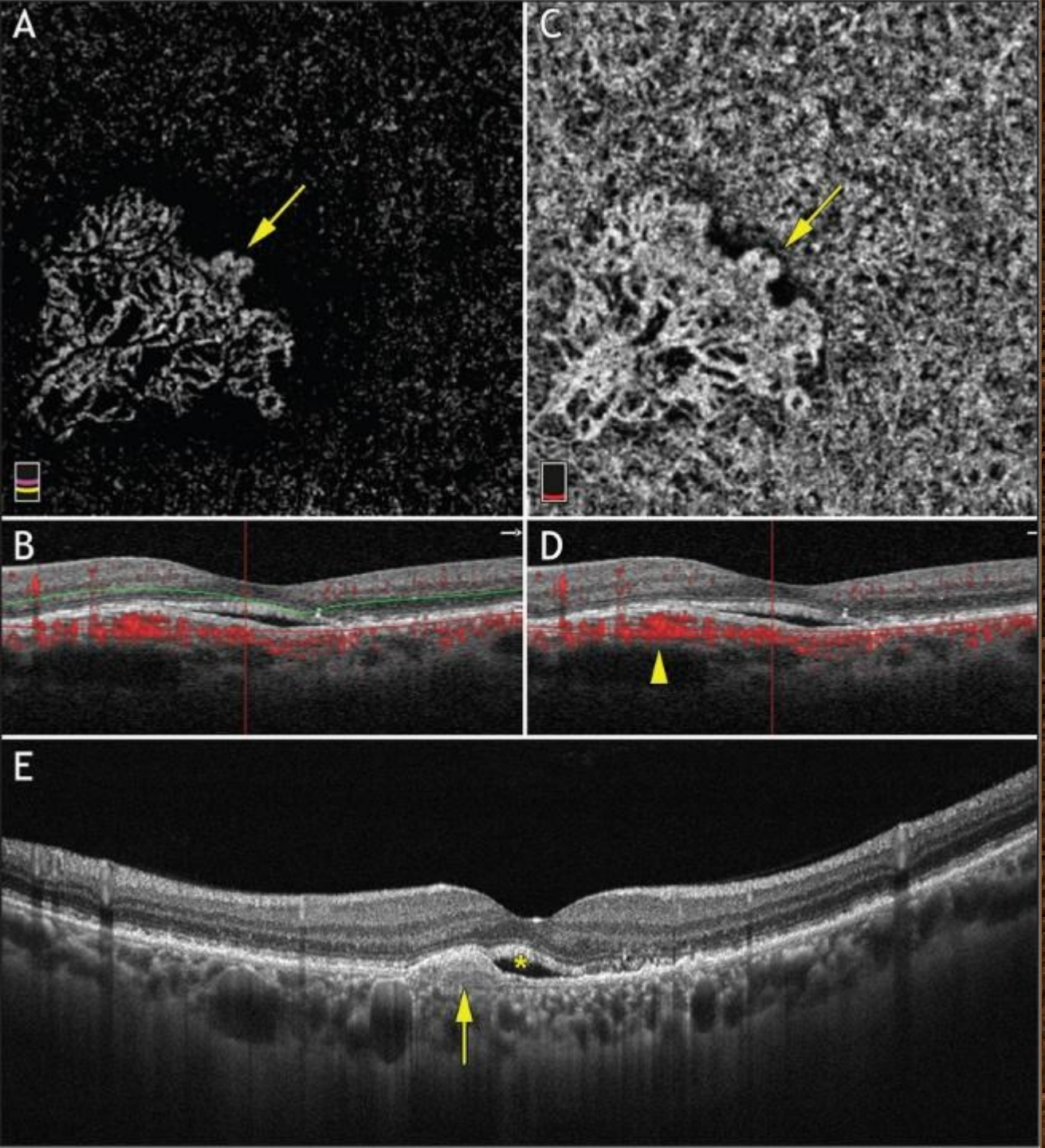
Neovascular maculopathy pathway

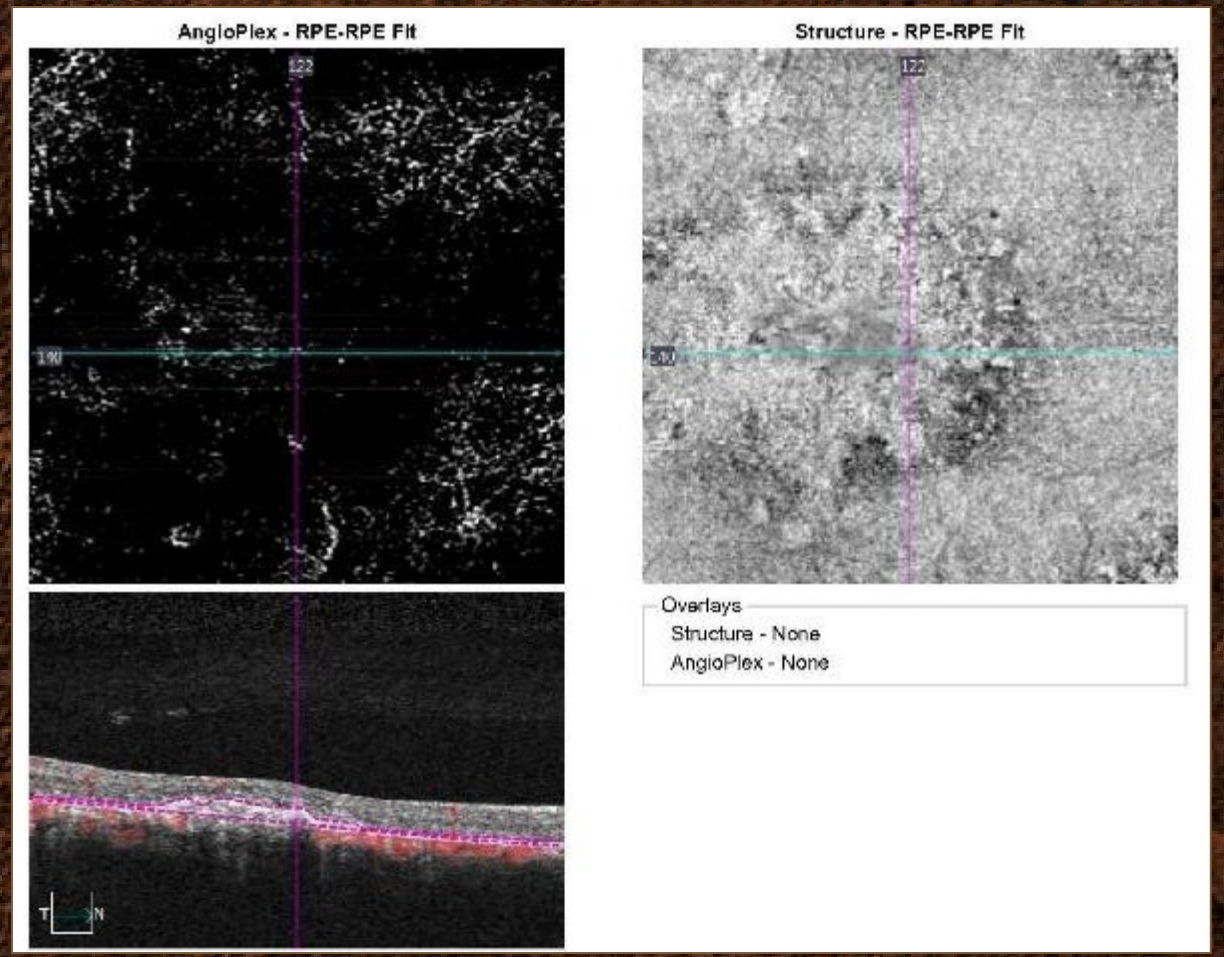
Histo spot

CNV

Subretinal hemorrhage

Scar





OCT angiography can differentiate neovascular from inflammatory maculopathy in patients with POHS

About OCT Angiography

- Within milliseconds, multiple sequential OCT scans are obtained and analyzed for change
  - All change is assumed to represent blood flow
- All the benefits of conventional OCT plus blood flow data
  - 3D volumetric data, high resolution, quantitative analysis
- Key disadvantages: Slow, leakage not visualized, artifacts
- Why use it?
  - Detect and monitor neovascularization (CNV, Diabetic, etc)

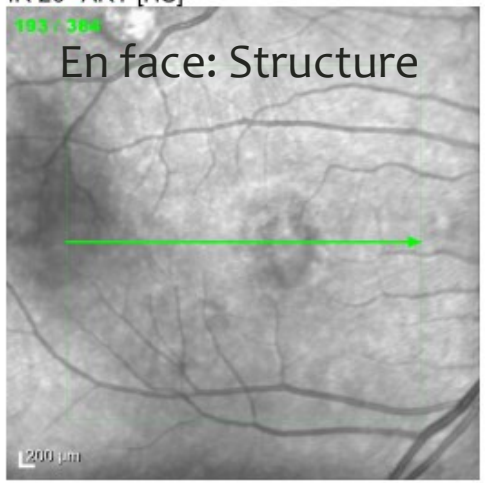
OCT Angiography Overview
SPECTRALIS® Tracking Laser Tomography

HEIDELBERG ENGINEERING

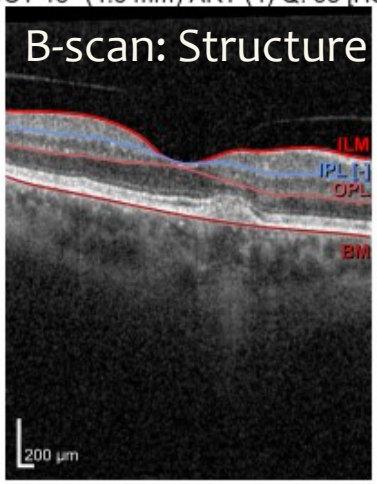
Patient:		**DOB:**	Apr/21/1962	**Sex:**	F
Patient ID:		**Exam.:**	Feb/19/2024		
Diagnosis:	---	**Comment:**	---		

OD

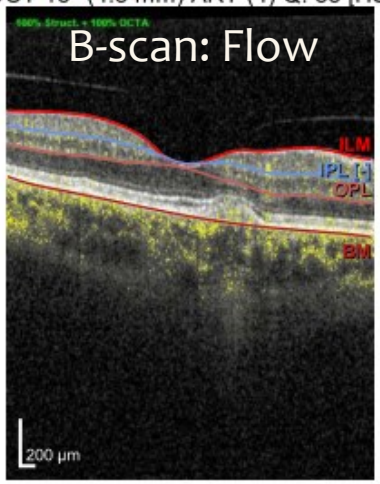
IR 20° ART [HS]

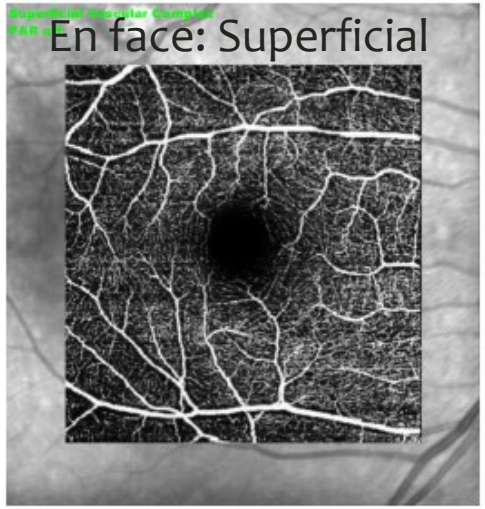


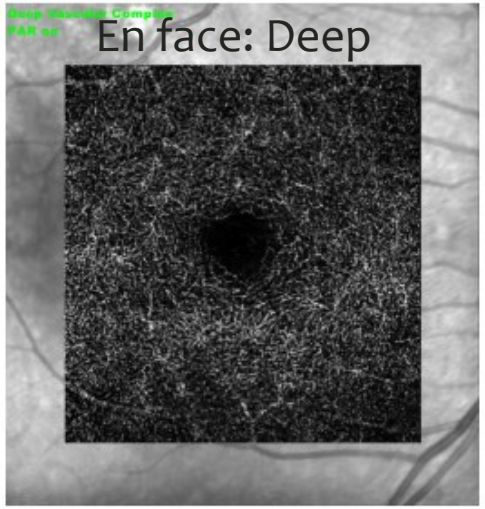
OCT 15° (4.3 mm) ART (4) Q: 33 [HS]

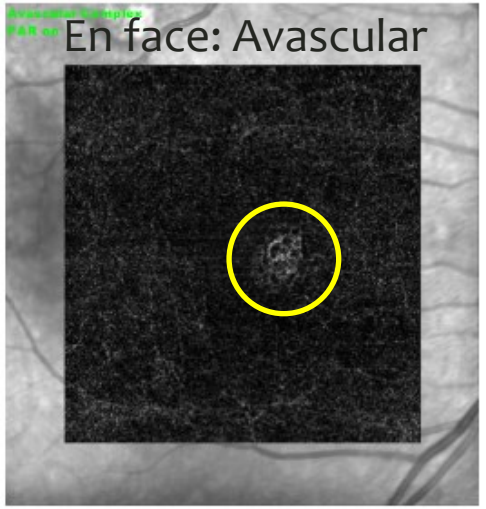


OCT 15° (4.3 mm) ART (4) Q: 33 [HS]









Notes:

Date: 2/19/2024 Signature:

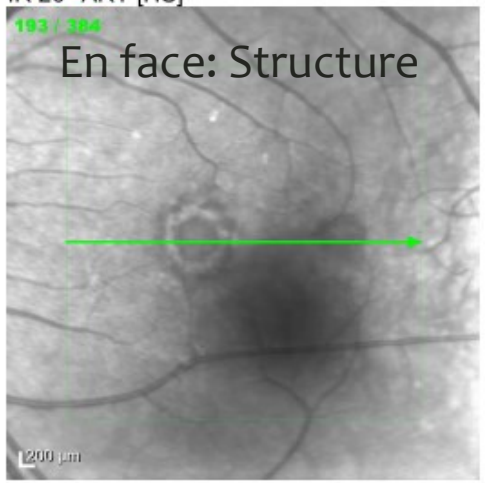
OCT Angiography Overview
SPECTRALIS® Tracking Laser Tomography

HEIDELBERG ENGINEERING

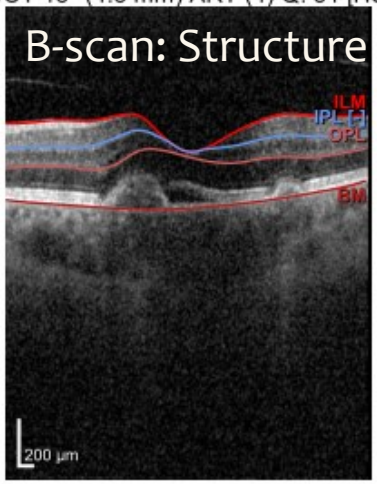
Patient:		**DOB:**	Apr/21/1962	**Sex:**	F
Patient ID:		**Exam.:**	Feb/19/2024		
Diagnosis:	---	**Comment:**	---		

OS

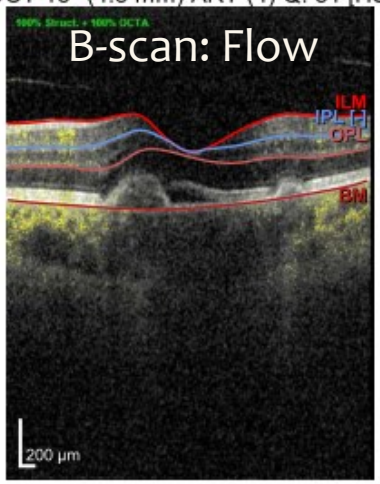
IR 20° ART [HS]

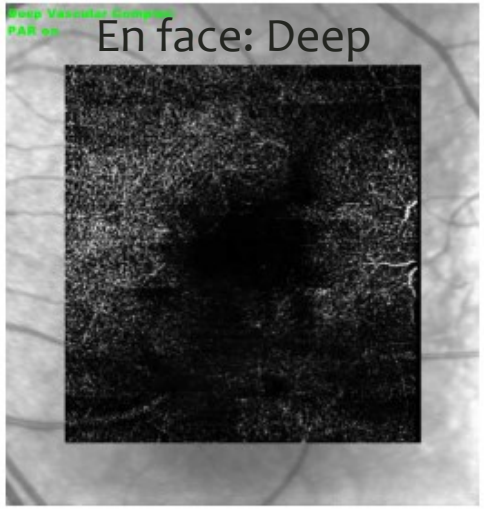


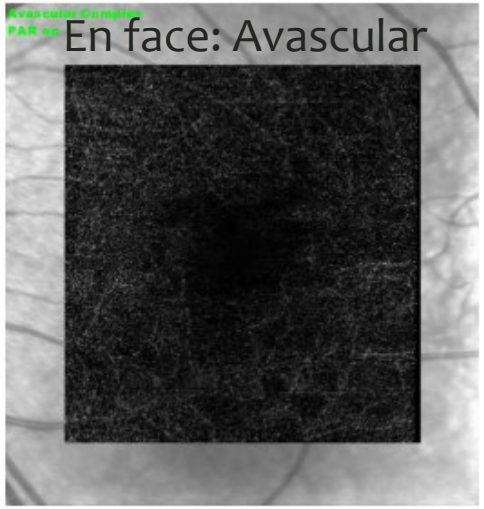
OCT 15° (4.3 mm) ART (4) Q: 31 [HS]



OCT 15° (4.3 mm) ART (4) Q: 31 [HS]







Notes:

Date: 2/19/2024 Signature:

Preventing Reactivation of POHS

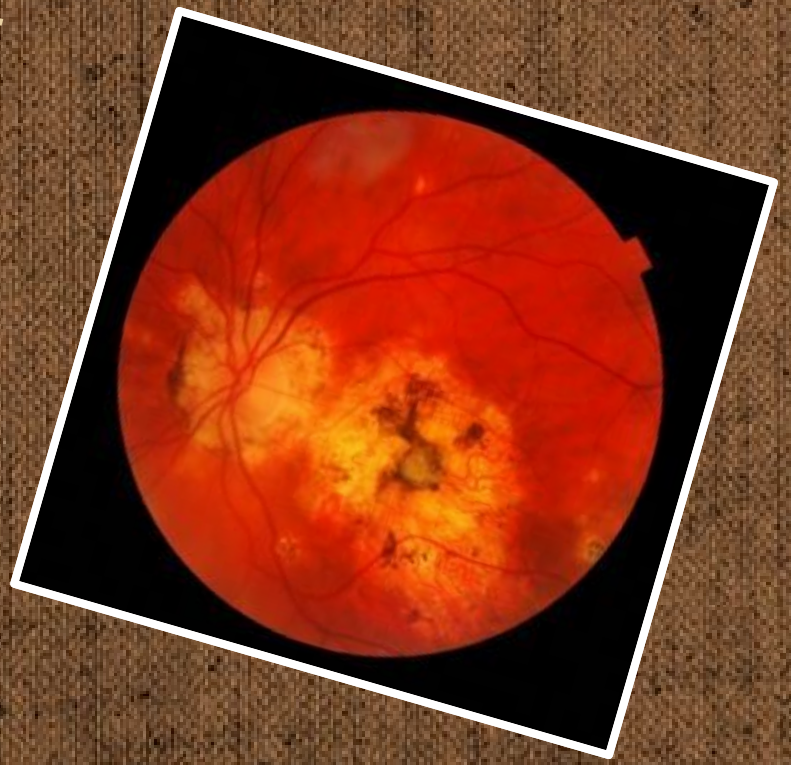
- Re-exposure to histoplasmosis may play a role in reactivating retinal lesions and promoting development of maculopathy
- Avoid high risk areas where histoplasmosis levels tend to be highest
  - Caves, chicken coops, dusty old buildings
- Protect yourself or avoid high risk activities
  - Construction and demolition, working with poultry, HVAC installation or service, farming, gardening

Preventing Reactivation of POHS

- Personal protective equipment
  - Masks and respirators
- Dust control
  - High efficiency air filters
  - Vacuum cleaning
  - Wetting contaminated soil
- Endogenous factors
  - Chronic fungal infections
  - LASIK

Take Home Message

- Patients with histo spots near the central macula are at risk for vision loss due to maculopathy
- OCTA can differentiate neovascular from inflammatory maculopathy
- Take steps to decrease the risk of histo spot reactivation in at-risk patients



CASE #5

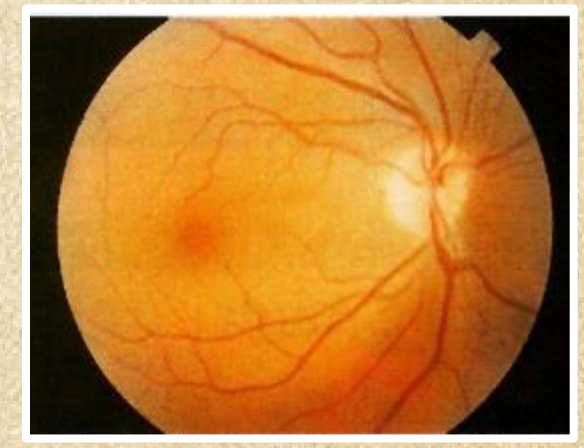
See no evil, hear no evil!

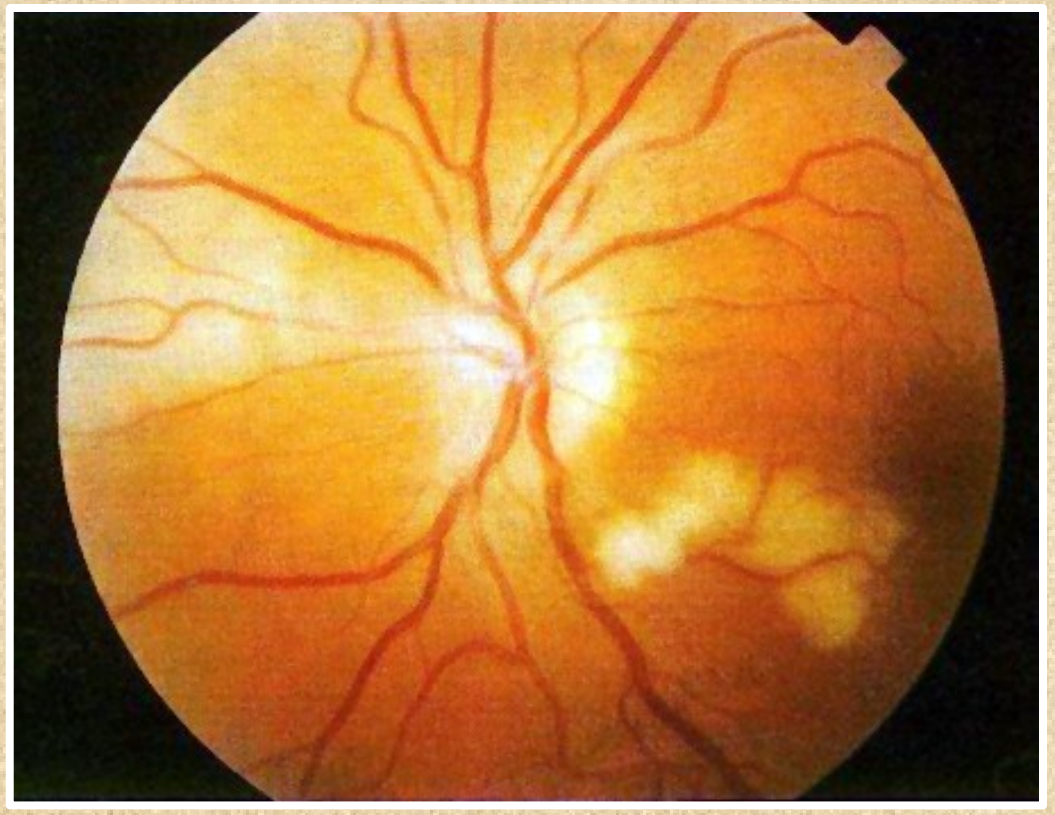
Visit 1 (1993)

- 36yo WF presents with c/o “gray haze” OS x 2 weeks
  - 1 week prior she experienced left-sided HA and photopsias OS that sent her to the ER. Exam was normal and Fiorinal with codeine was prescribed
- POH: Normal.
- MH: Head and neck aches and parestheias in her arms following MVA x 2yrs
- FOH: Father with glaucoma

Visit 1

- Vision 20/20 in each eye
- Pupils: Normal
- Motility: Normal
- IOP: 13 mmHg OU
- External: Normal





Assessment

- Acute BRAO OS
- Evidence of older resolving BRAO OS

Management

- Carotid duplex scan - Normal
- Echocardiography - Normal
- Labs: CBC, rheumatoid factor, RPR, fasting glucose, ANA – all normal
- Start daily low-dose ASA
- Retinal lesions resolved @ 1 month F/U visit

Visit 2 – 3yrs Later

- C/O constant “flash bulb glare” OS x 1 day
- Vision: 20/20 OD, 20/25 OS
- Pupils normal, Motility normal, IOP 14/12 mmHg
- External: Normal OU
- DFE: Normal OD, BRAO of superior-temporal artery OS
  - No visible embolus
  - Occlusion does not appear to occur at bifurcation

Assessment

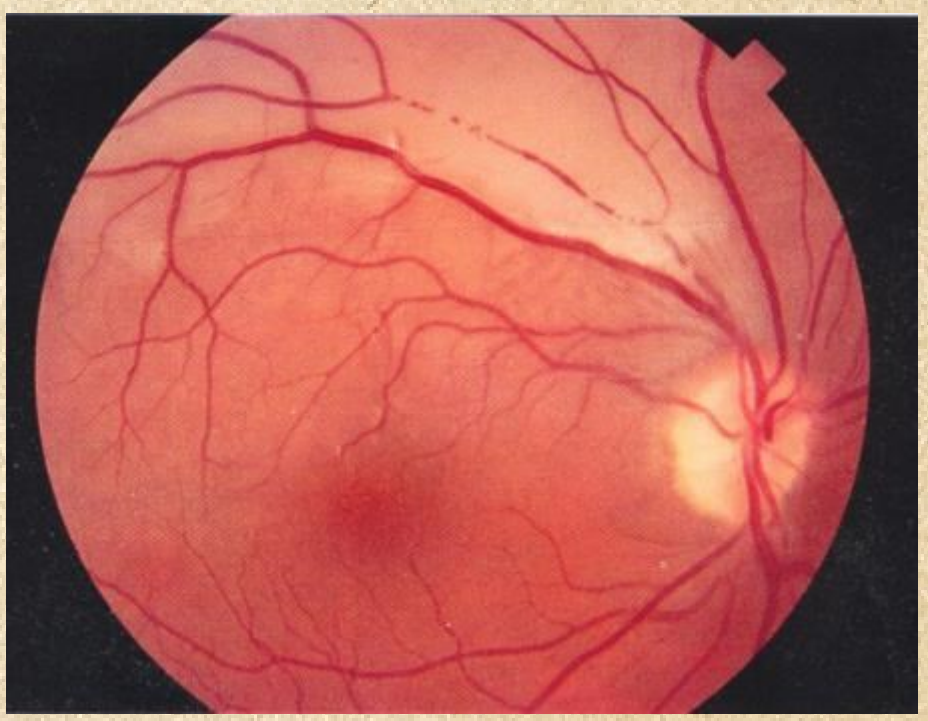
- BRAO OS

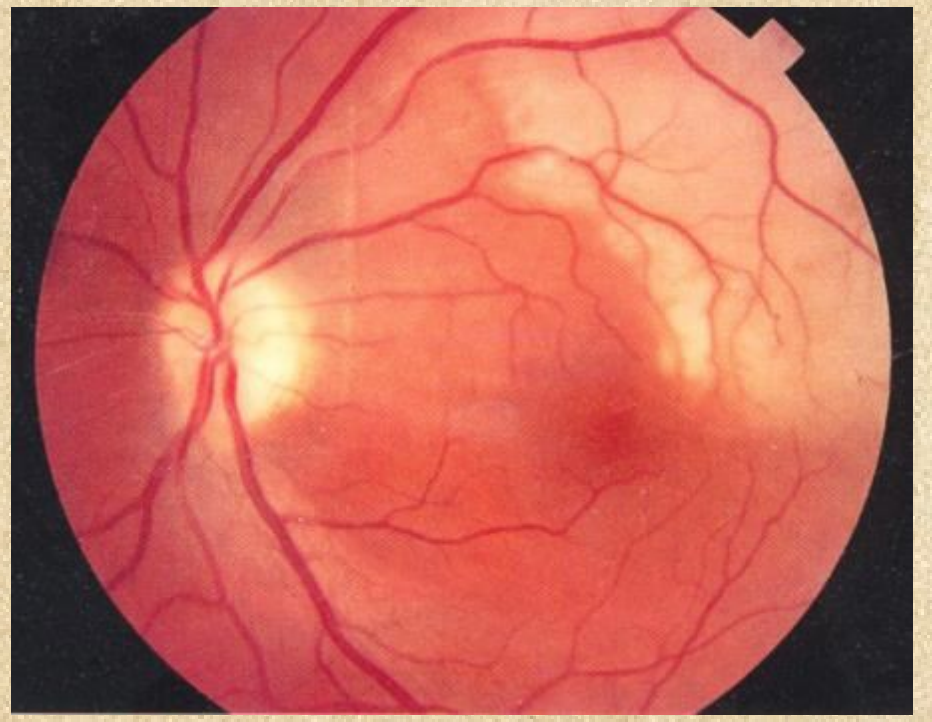
Management

- Retinal consult – Diagnosis of "**idiopathic recurrent BRAO.**" No known cause or tx for condition
- IM consult – Obese (238lbs) but otherwise in good health. No BCPs, no vasculitis, synovitis, diabetes, or HTN
- Continue ASA, start low fat diet

Visit 3

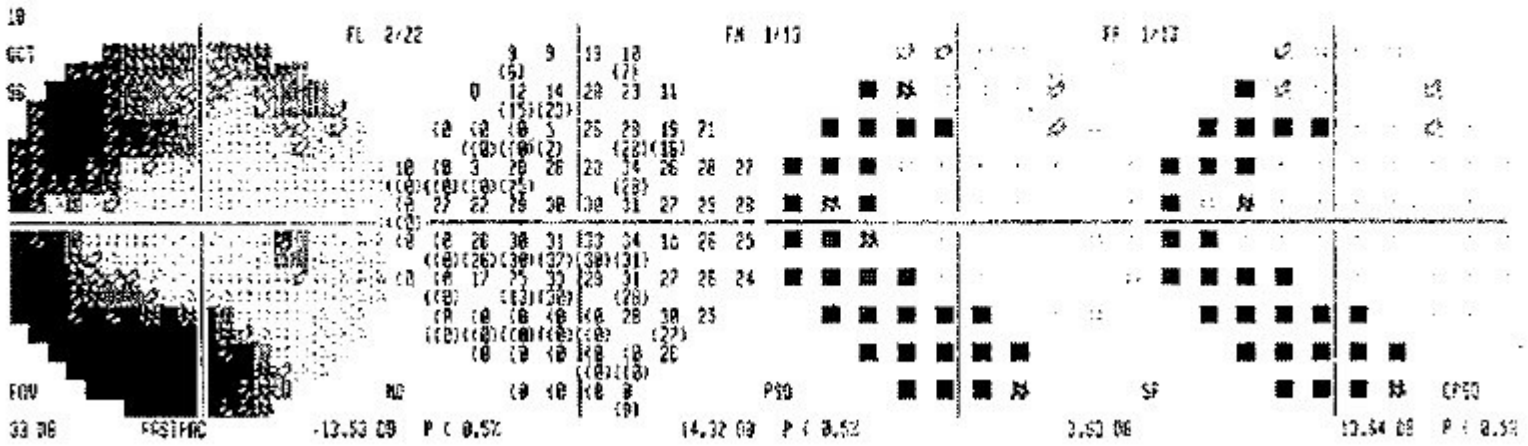
- Presented 2 weeks later with photopsia OD
- Examination was remarkable for the presence of new BRAO OD





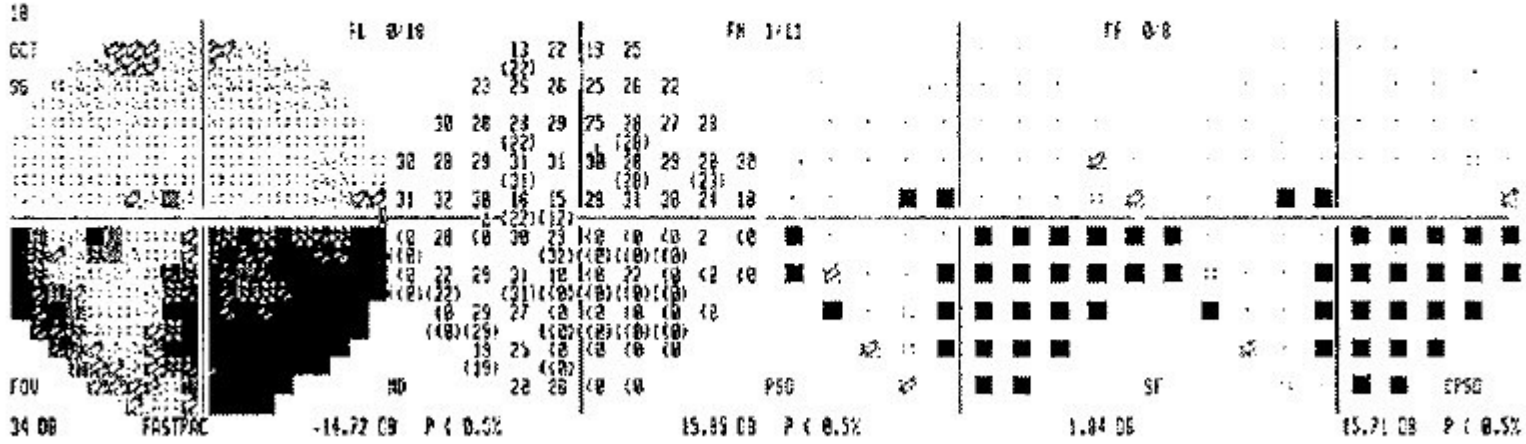
RIGHT C30-2

AGE 40 STRATEGY FULL THRESHOLD



LEFT

AGE 40 STRATEGY FULL THRESHOLD



Assessment

- Idiopathic recurrent BRAO, OU

Management

- IM consult: Negative evaluation except mildly elevated ESR (27 mm/h, normal: 0-20)
- Rheumatology consult: Negative evaluation. Normal temporal artery biopsy
- Audiometry and otolaryngology consult: moderately severe **sensorineural hearing loss**. Referred for hearing aid fitting

What is going on here?

https://app.tophat.com/e/777538

- Multiple sclerosis
- Systemic lupus erythematosis
- Sarcoid
- Susac's syndrome
- Lyme disease

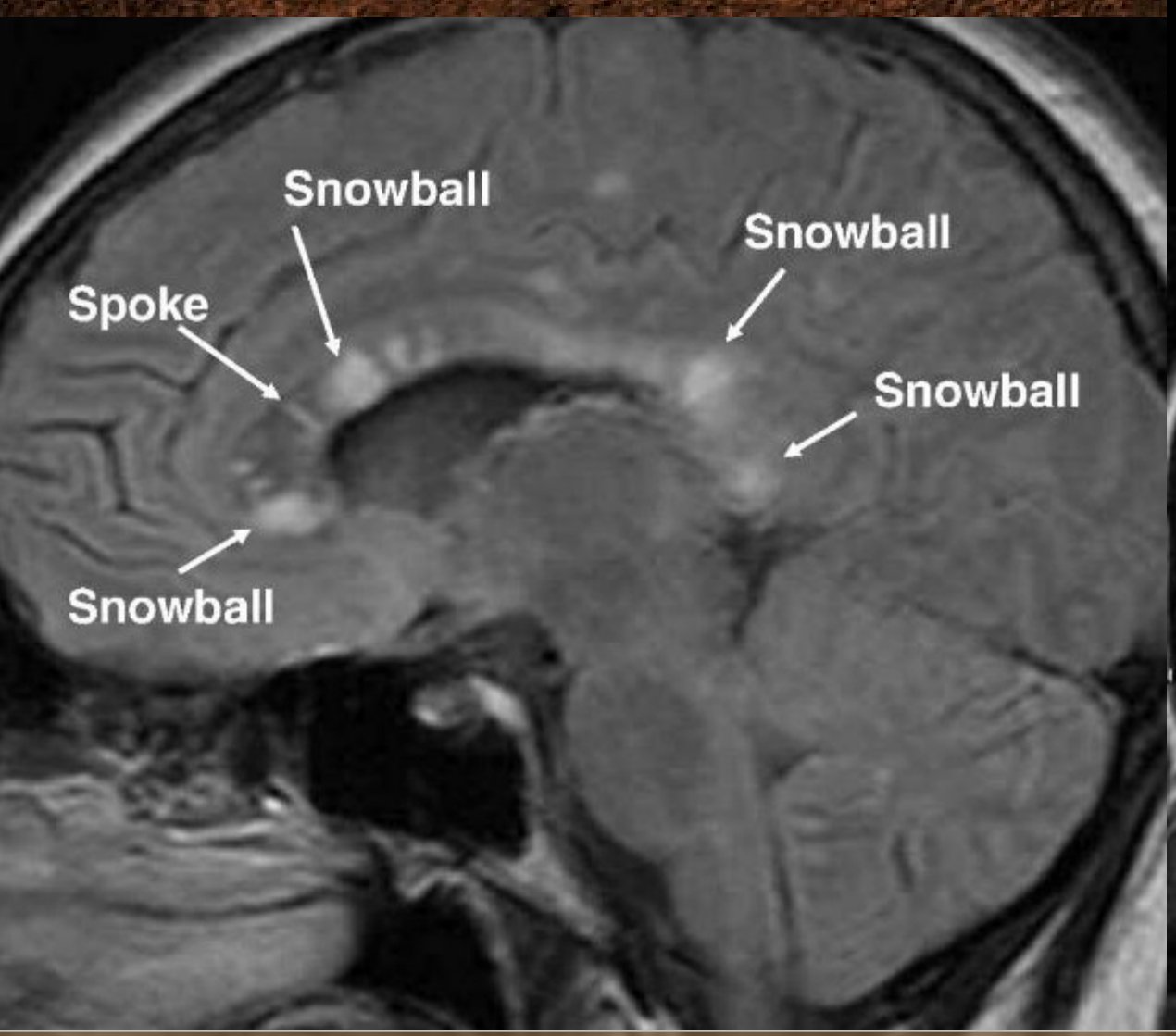
Multiple sclerosis	Uveitis and retinal phlebitis are common posterior segment manifestations of MS. **BRAO is not associated with MS**
Systemic lupus erythematosis	Retinopathy may include CWS, **BRAO**, neovascularization and VH. Diagnosis made on clinical and lab grounds.
Sarcoid	Antiphospholipid antibody syndrome may be associated with sarcoidosis and can lead to **retinal artery occlusion**
Susac's syndrome	Clinical triad of **encephalopathy, BRAO and hearing loss**
Lyme disease	**BRAO** has been reported as an uncommon complication of ocular Lyme borreliosis. Negative RPR test

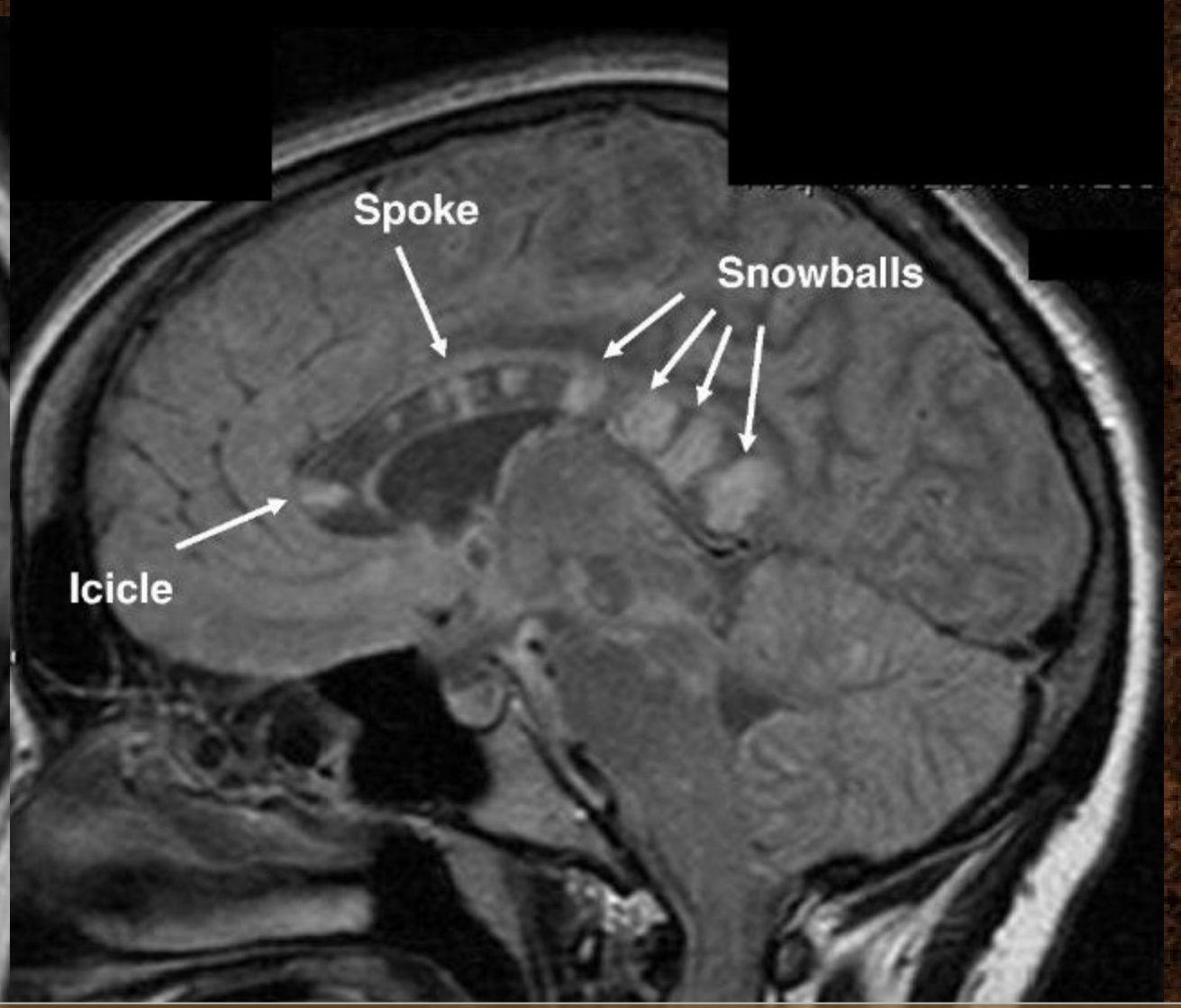
BRAO in the Young

Emboli	Cardiac disease, IV drug abuse
Thrombosis	Pregnancy, BCP use, Coagulopathy
Arteritis	Lupus, Lyme ***Susac's Syndrome***
Arterial spasm	Migraine, Drug abuse (cocaine, meth)
Vascular compromise	Orbital, optic nerve, retinal disease; Trauma

Susac's Syndrome

- Clinical triad of (1) encepholopathy, (2) BRAO, and (3) hearing loss that typically occurs in young adult women
- First described by Susac in 1994
- Immune mediated microangiopathy affecting blood vessels in the retina, chochlea and brain
- MRI findings of lesions in the corpus callosum
- Treatment with steroids and immune suppressants can slow progression of the disease





MRI findings in the corpus callosum of patients with Susac's syndrome

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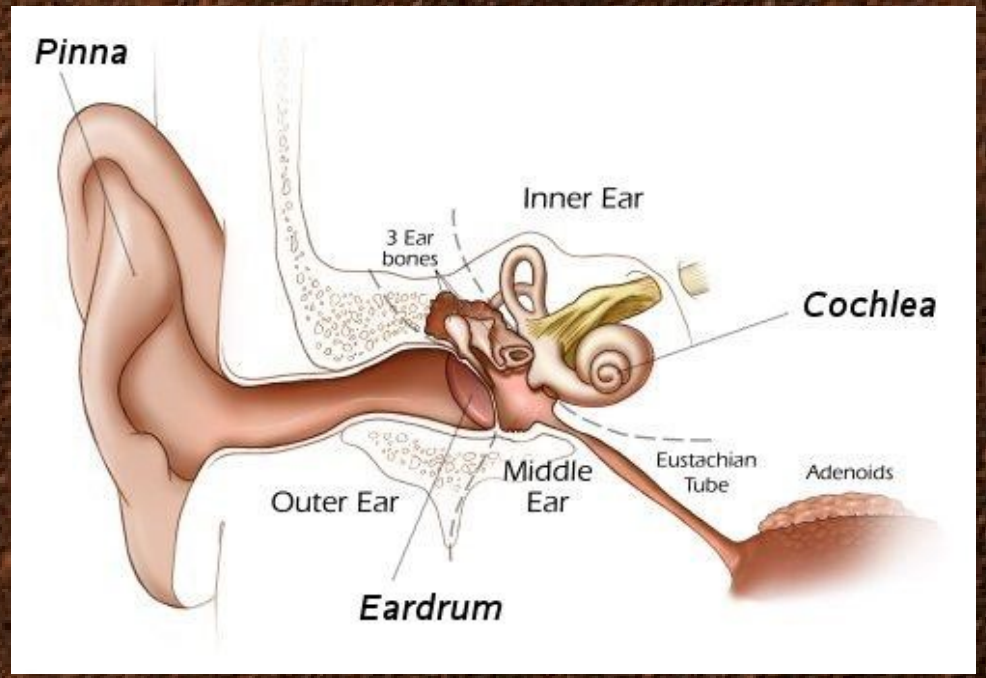

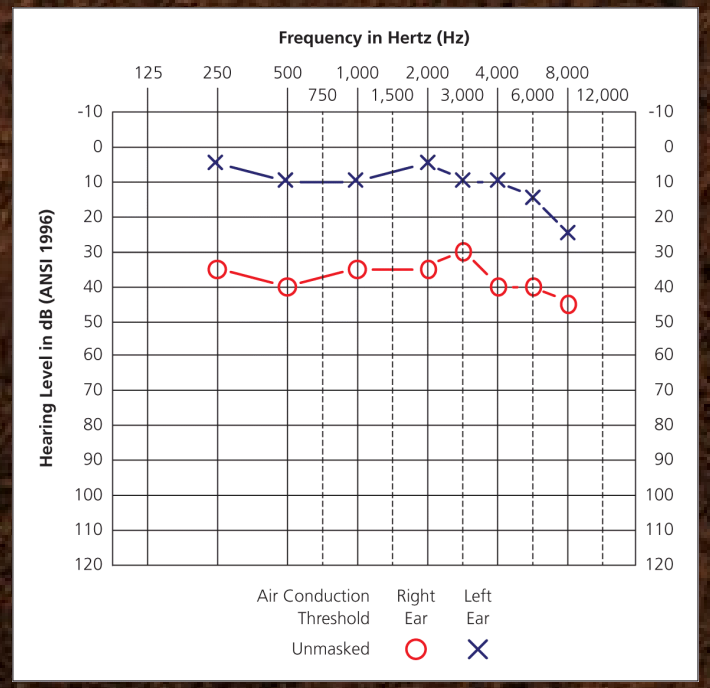

Damage to the cochlea (inner ear) results in sensorineural hearing loss, and is a key diagnostic finding in Susac's syndrome

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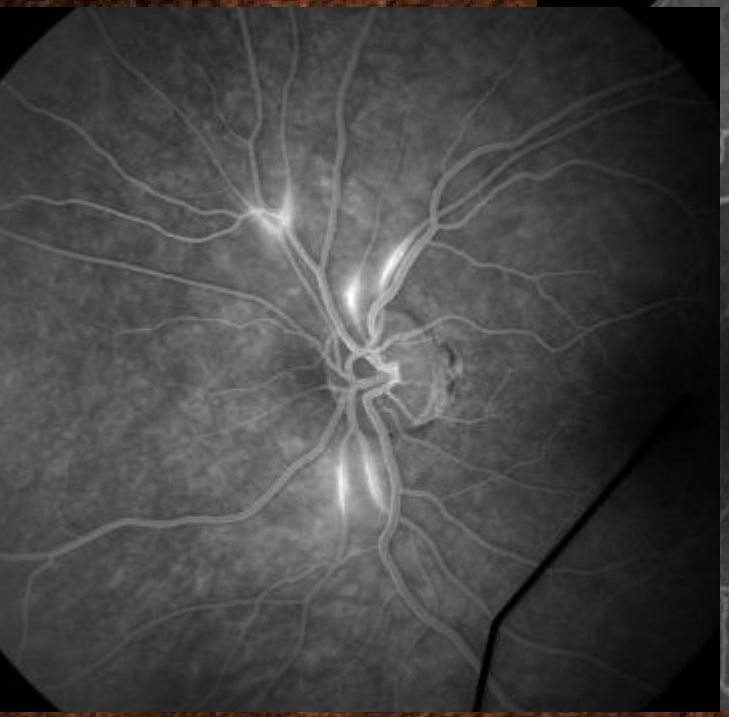
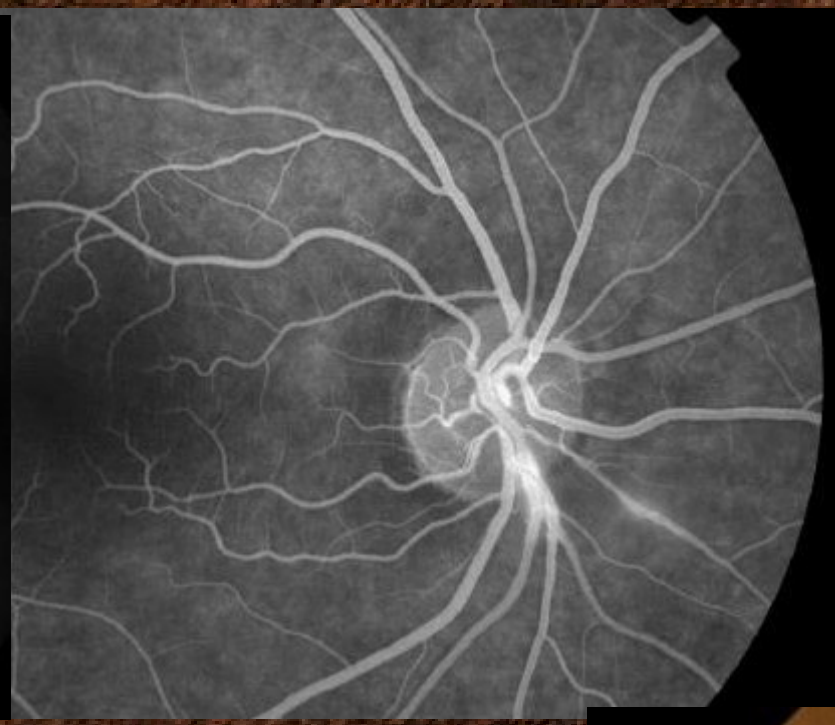
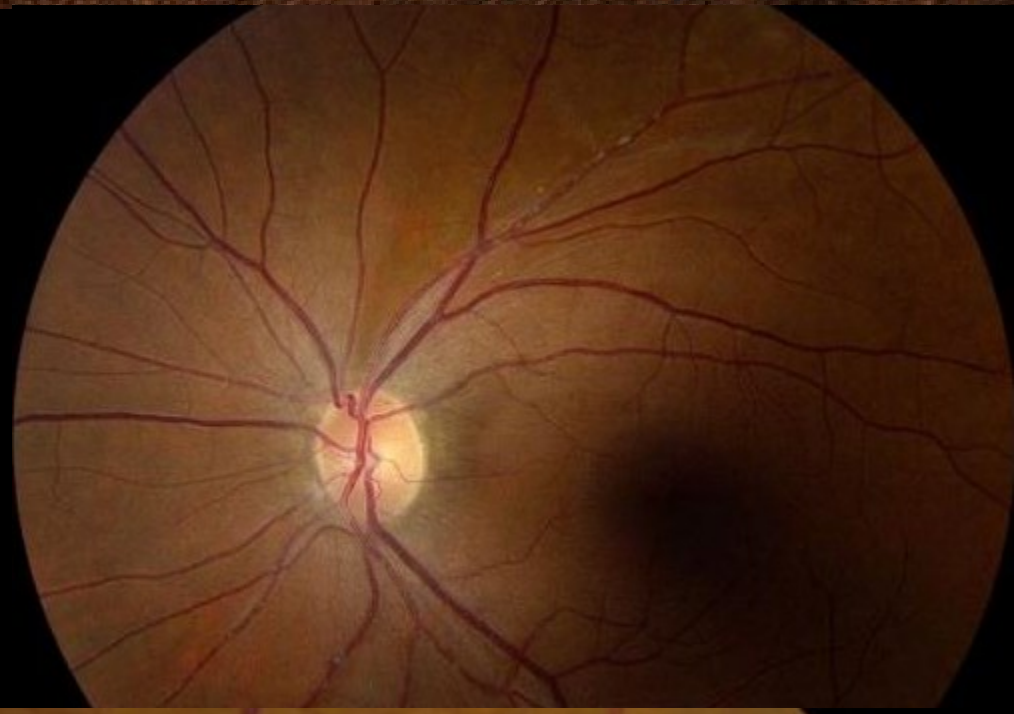
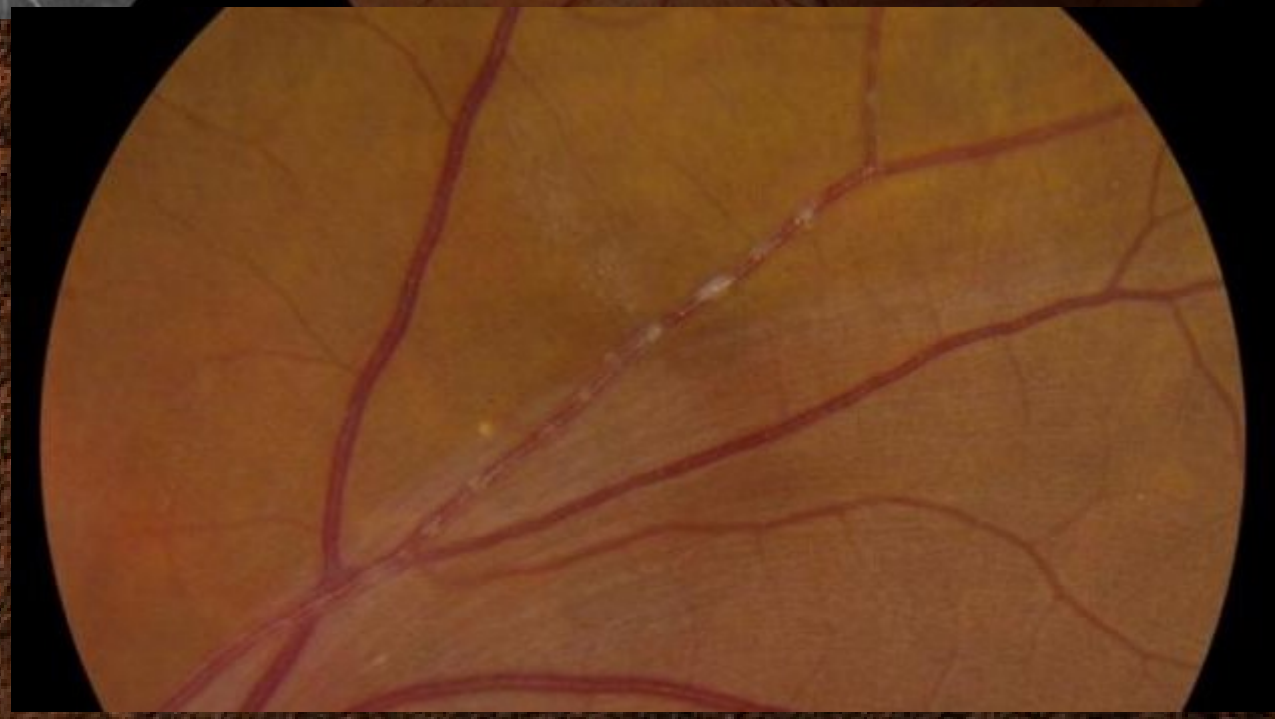


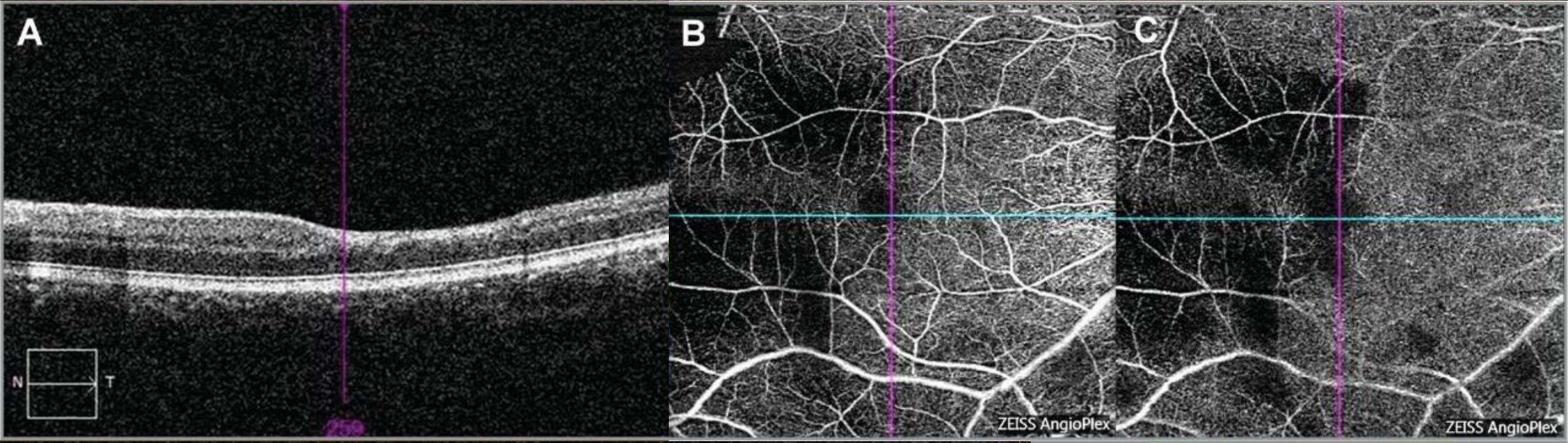


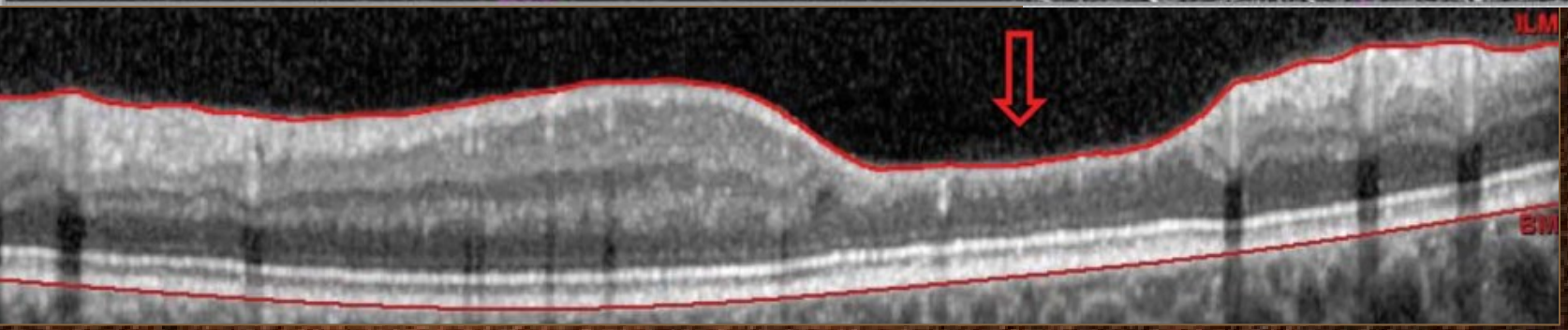


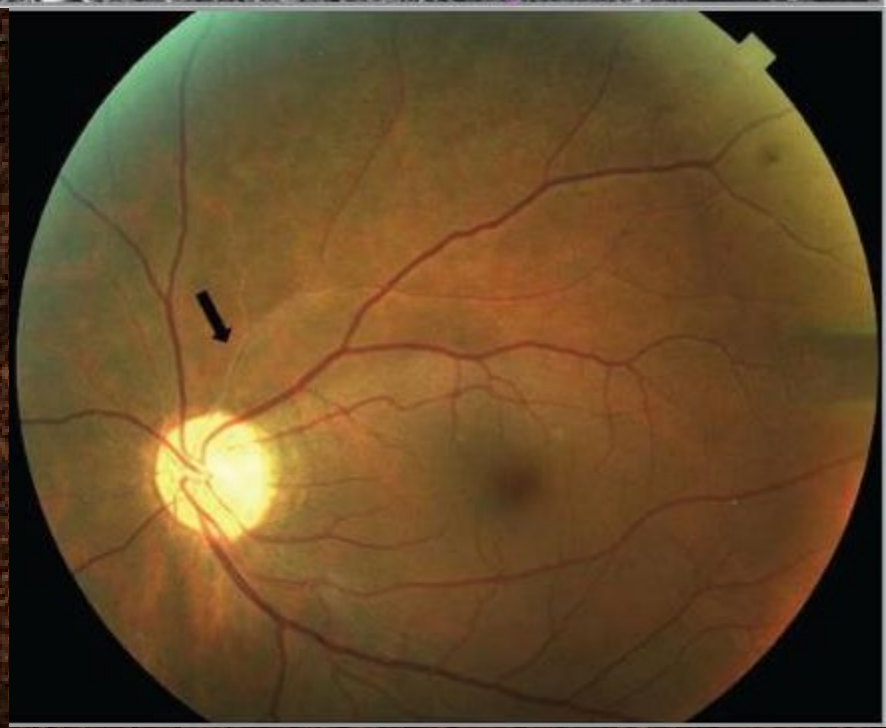


Acute retinal findings include arterial wall hyperfluorescence on FA and “Gass plaques” – yellow deposits believed to represent focal damage to the arterial wall

Egan RA. J Neurol Sci. 2010;299:97–100





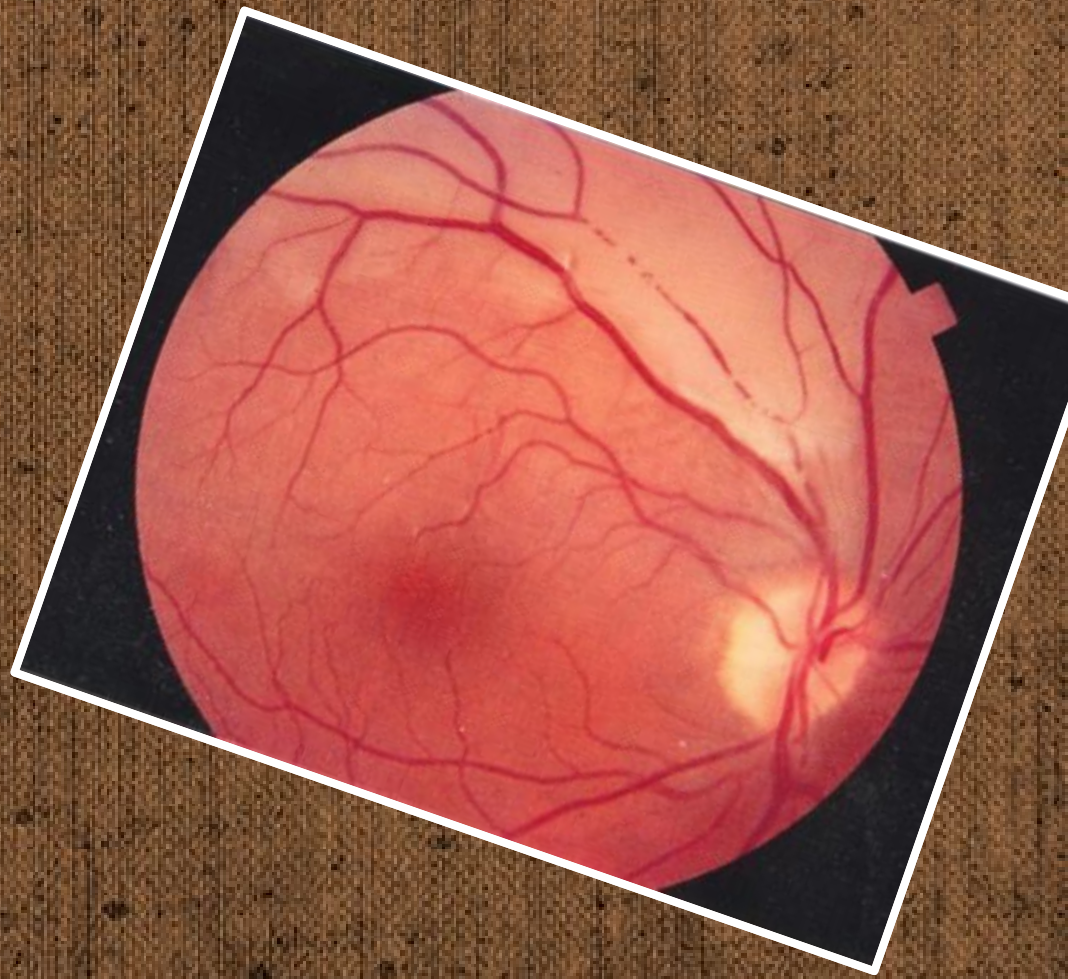


Late retinal findings include arterial attenuation, inner retinal atrophy and regions of nonperfusion

Egan RA. J Neurol Sci. 2010;299:97–100

Take Home Message

- BRAO in the young is less likely to be embolic
  - Look for coagulopathies and inflammatory disease
- Susac's syndrome is one cause of recurrent BRAO in the young
  - Check for hearing loss and MRI lesions



CASE #6

Glaucoma Plus!

CASE #6

- 57yo HM presents c/o distance blur x 2yrs
- POH: Diagnosed with glaucoma at age 20.
  - LEE: 10yrs ago
  - S/P unspecified glaucoma laser procedure 15yrs ago.
  - Glaucoma is not currently treated
- MH: HTN, Depression, Anxiety, OCD

CASE #6

Vcc

- OD: 20/40
- OS: 20/150

Ta 28/27 @ 2:00PM

PERRL, (-) APD

FCCF: Constricted OU

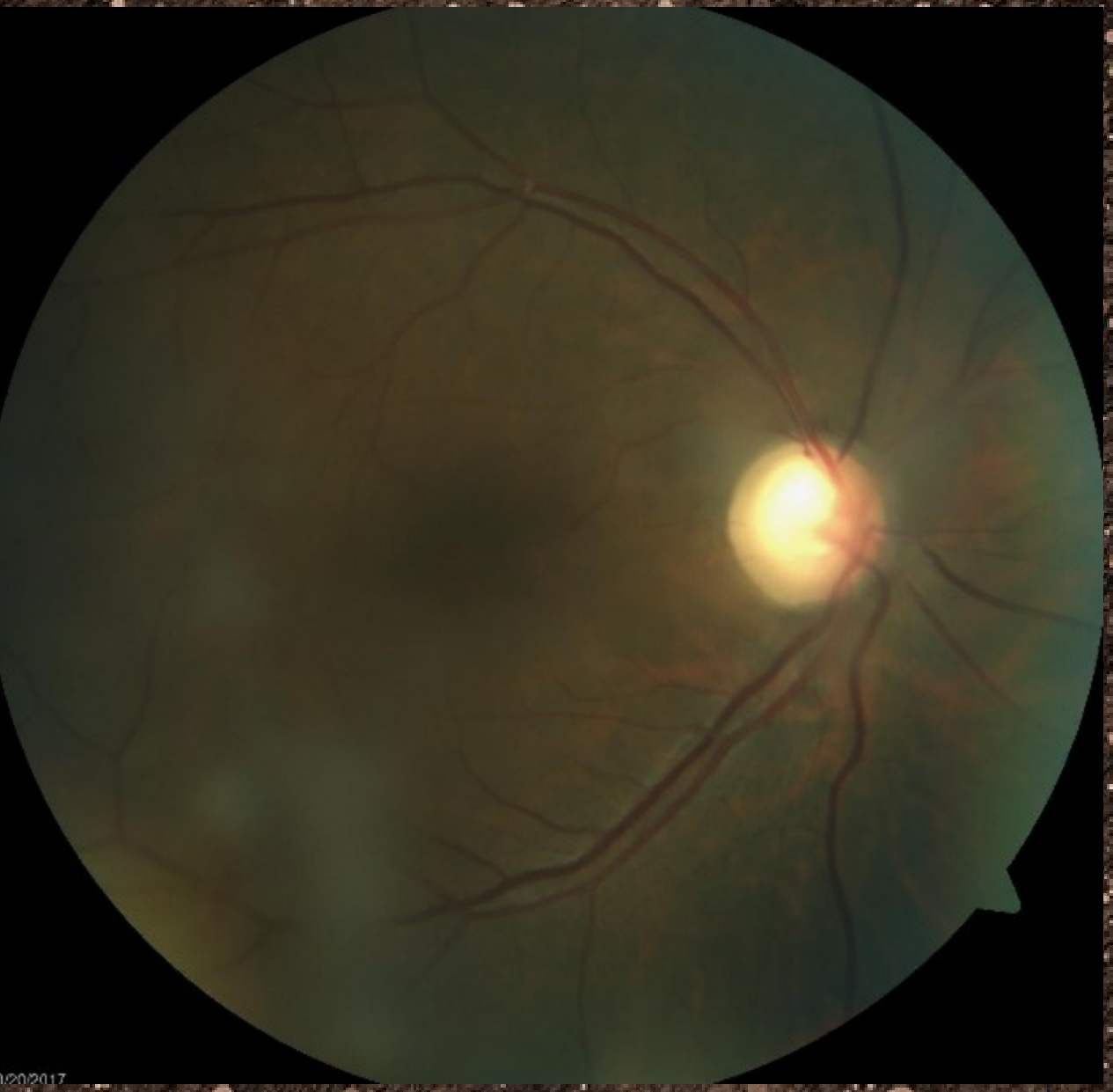
Color: 2/0 (HRR)

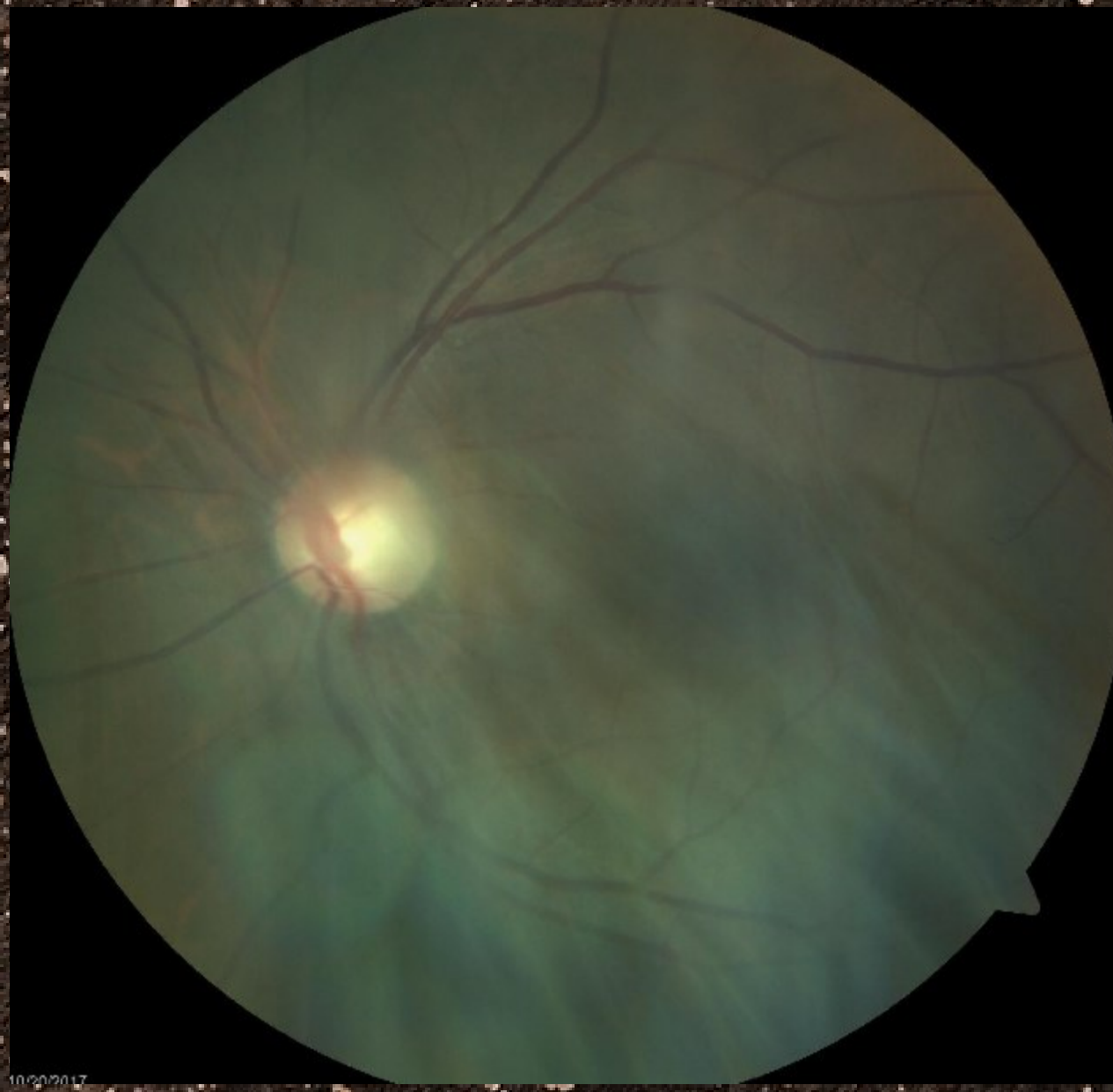
SLE

- W&Q OU
- Patent LPI OD
- Closed LPI OS

Gonio: D40r OU

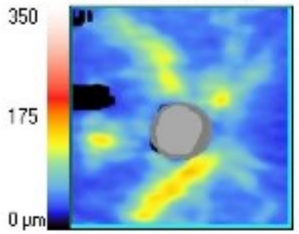
Pachs: 616/611





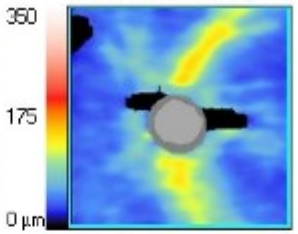
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD ● ● OS

RNFL Thickness Map

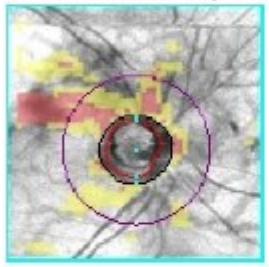


	OD	OS
Average RNFL Thickness	75 µm	70 µm
RNFL Symmetry	66%	
Rim Area	0.81 mm²	0.79 mm²
Disc Area	2.12 mm²	2.02 mm²
Average C/D Ratio	0.79	0.77
Vertical C/D Ratio	0.85	0.76
Cup Volume	0.774 mm³	0.623 mm³

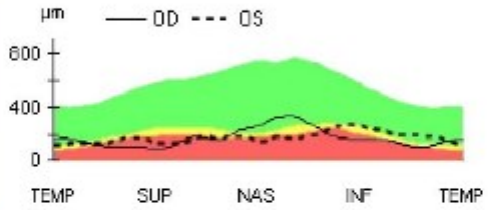
RNFL Thickness Map



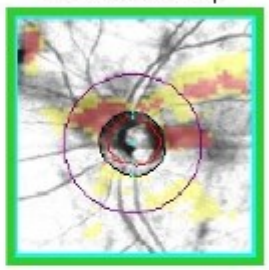
RNFL Deviation Map



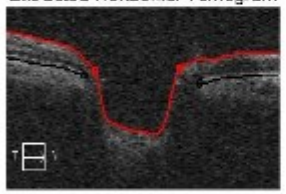
Neuro-retinal Rim Thickness



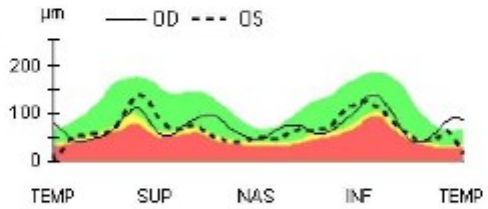
RNFL Deviation Map



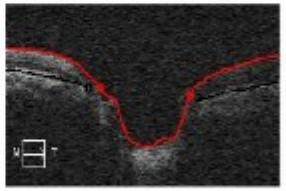
Disc Center(0.00,-0.36)mm
Extracted Horizontal Tomogram



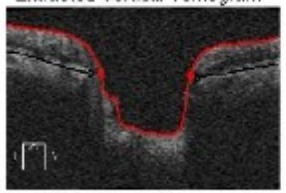
RNFL Thickness

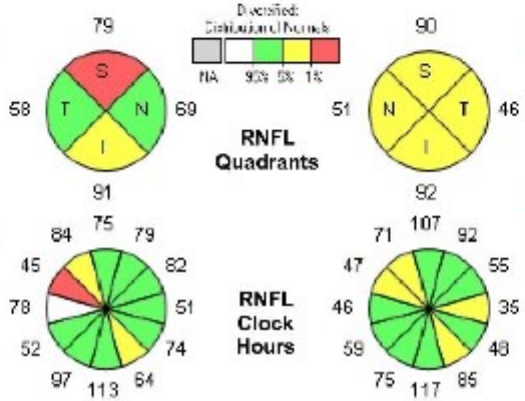


Disc Center(-0.09,-0.15)mm
Extracted Horizontal Tomogram

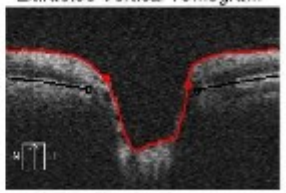


Extracted Vertical Tomogram

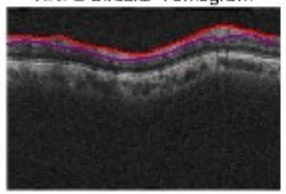




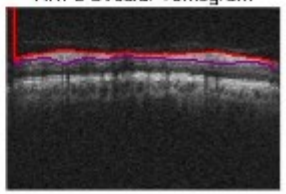
Extracted Vertical Tomogram



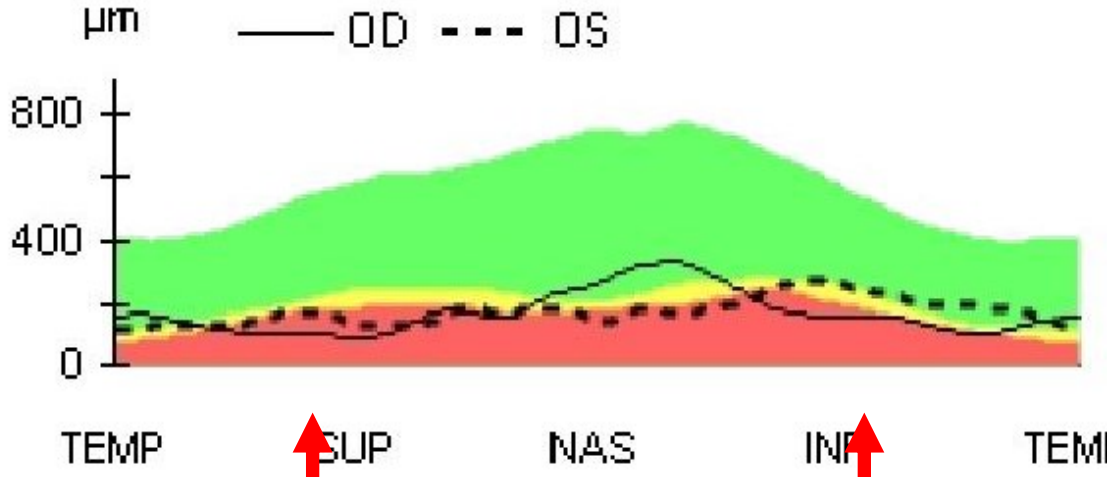
RNFL Circular Tomogram



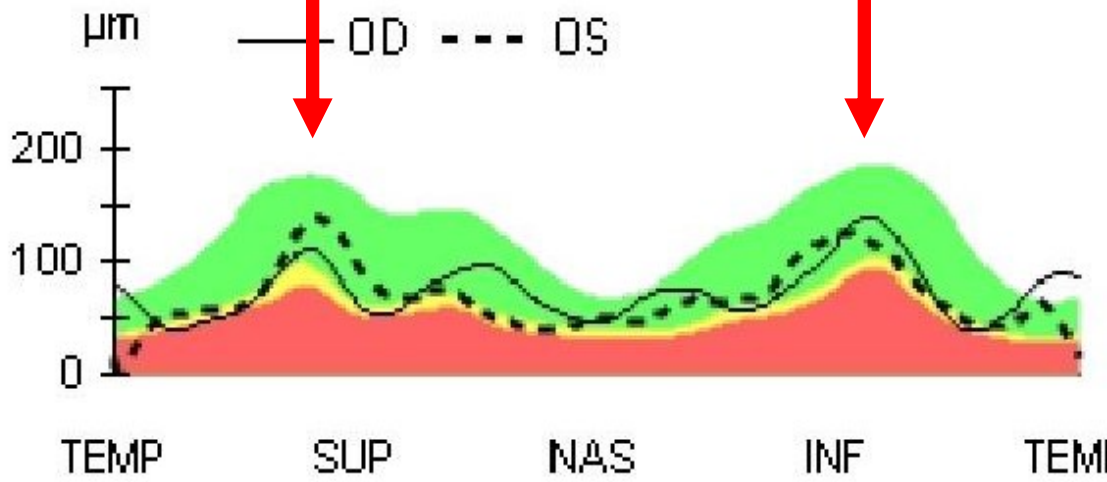
RNFL Circular Tomogram

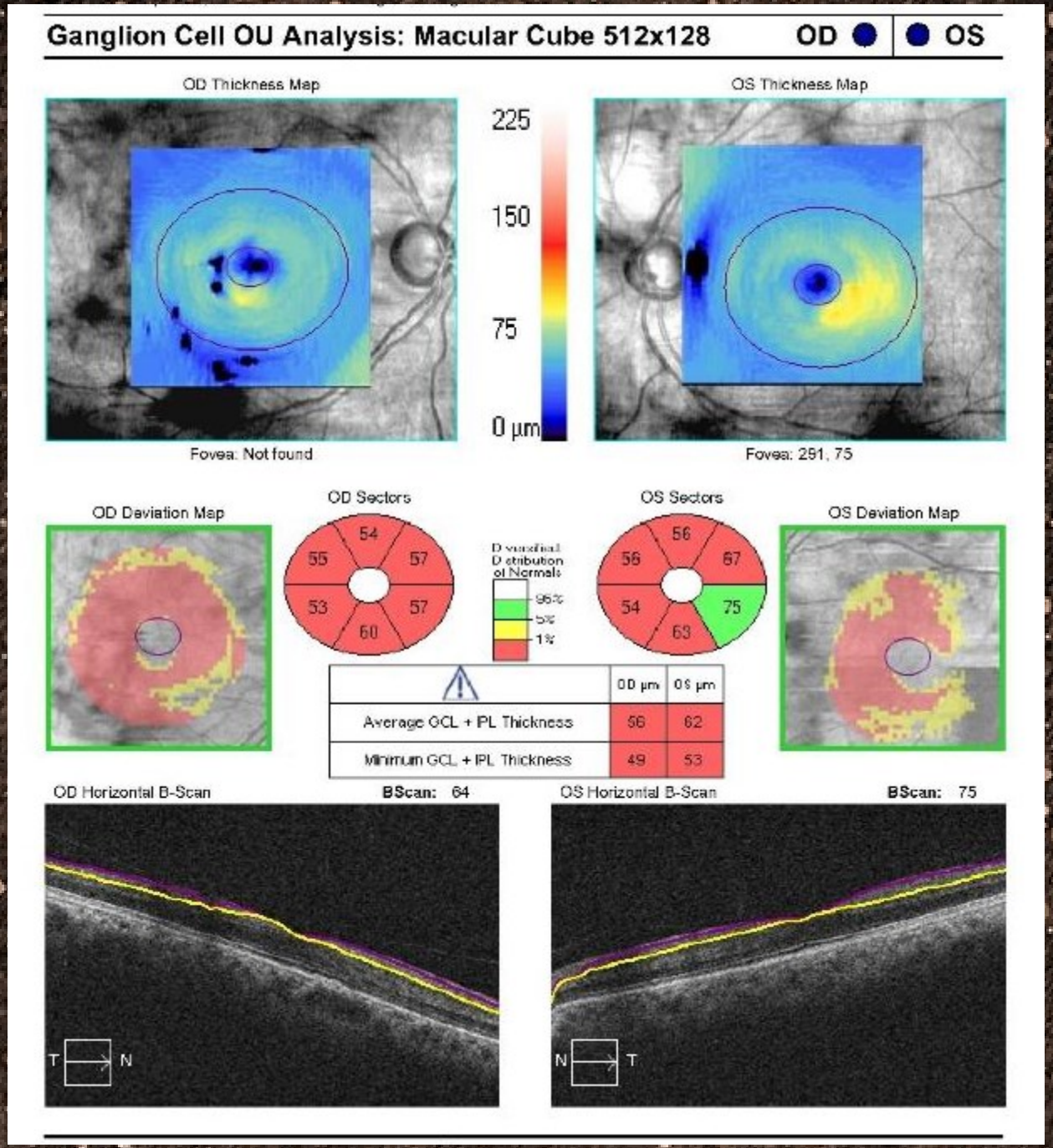


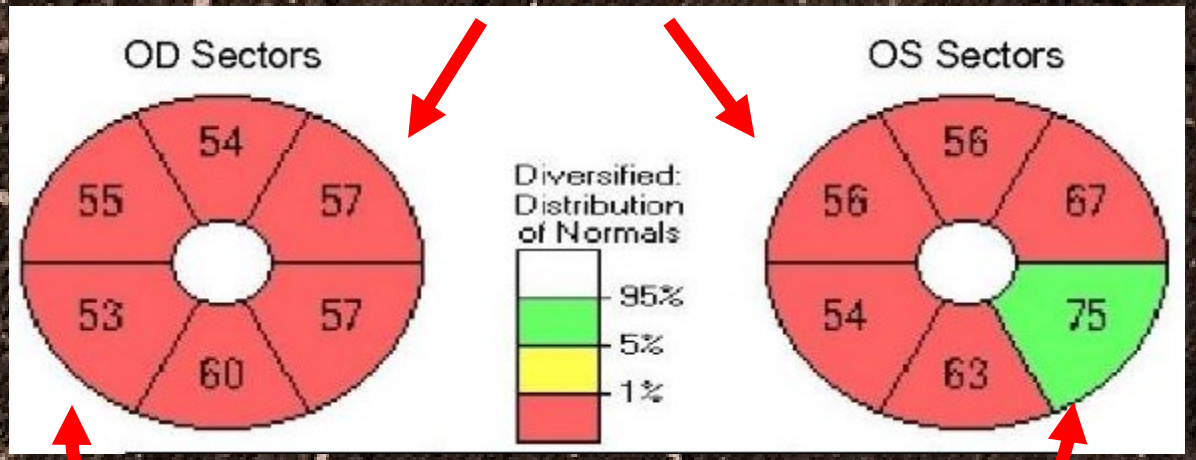
Neuro-retinal Rim Thickness

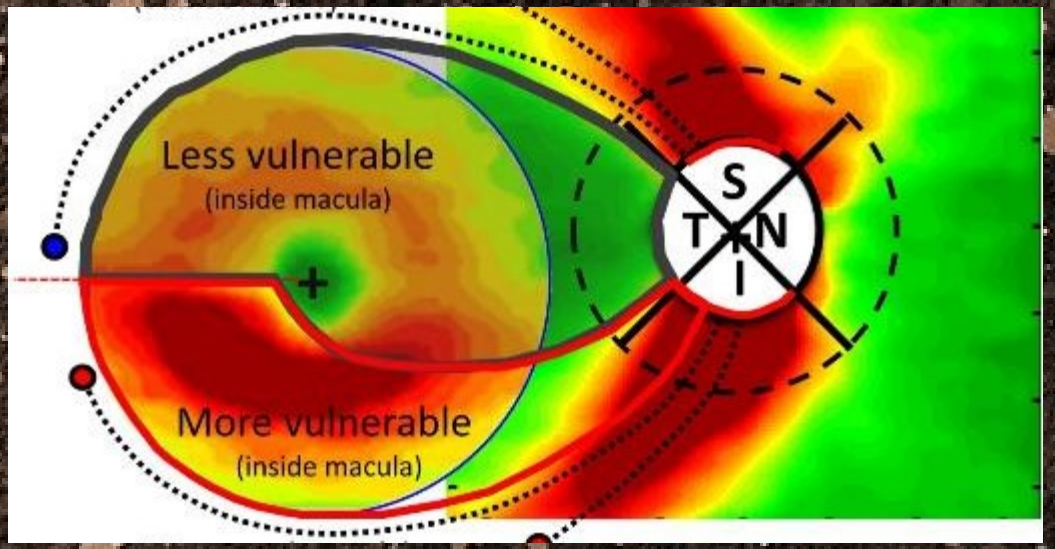


RNFL Thickness




Ganglion Cell OU Analysis: Macular Cube 512x128
OD
OS
OD Thickness Map
OS Thickness Map
225
150
75
0 µm
Fovea: Not found
Fovea: 291, 75
OD Deviation Map
OD Sectors
OS Sectors
OS Deviation Map
54
55
57
53
57
60
56
56
67
54
75
63
Diversified Distribution of Normals
95%
5%
1%
OD µm
OS µm
Average GCL + IPL Thickness
56
62
Minimum GCL + IPL Thickness
49
53
OD Horizontal B-Scan
BScan: 64
OS Horizontal B-Scan
BScan: 75
T
N
N
T


NASAL
OD Sectors
OS Sectors
54
55
57
53
57
60
Diversified: Distribution of Normals
95%
5%
1%
56
56
67
54
75
63
TEMPORAL


Less vulnerable
(inside macula)
More vulnerable
(inside macula)
S
T
N
I

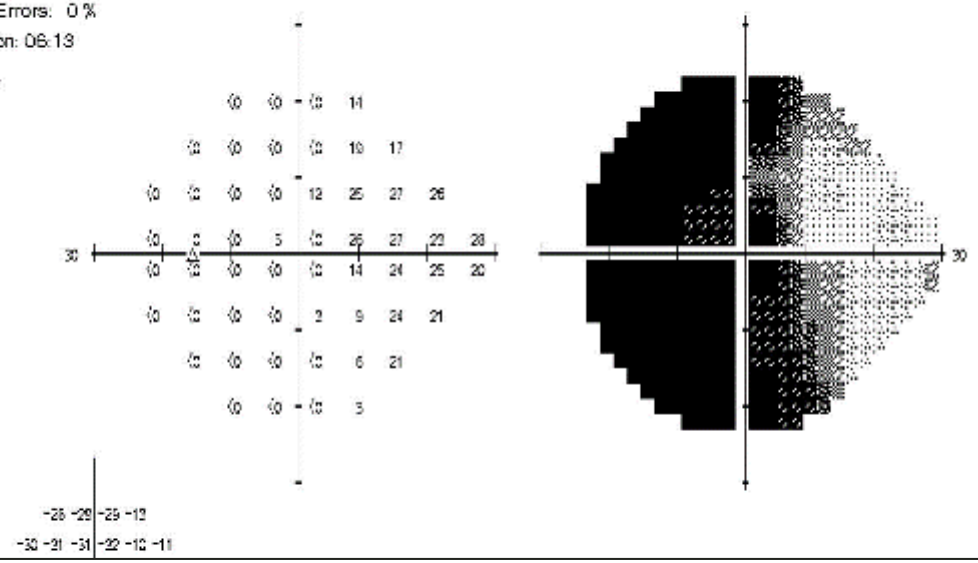
Fixation Monitor: Blind Spot
Fixation Target: Central
Fixation Losses: 1/14
False POS Errors: 3 %
False NEG Errors: 0 %
Test Duration: 06:13

Fovea: OFF

Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA - Standard

Pupil Diameter:
Visual Acuity:
RX: +1.75 DS DC X

Date: 10-20-2017
Time: 1:04 PM
Age: 57



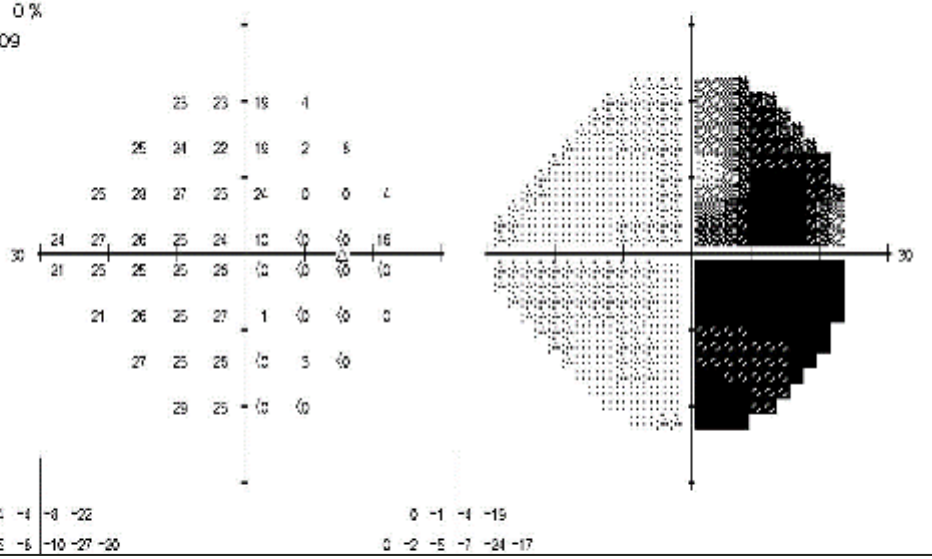
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 2/15
False POS Errors: 0 %
False NEG Errors: 0 %
Test Duration: 06:09

Fovea: OFF

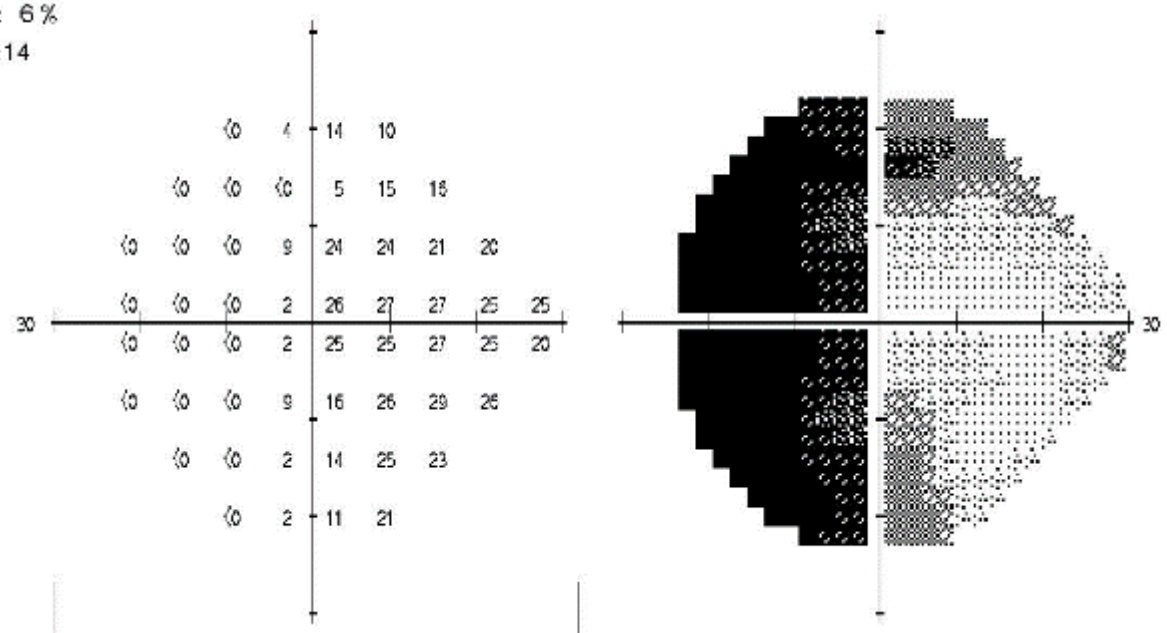
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA - Standard

Pupil Diameter:
Visual Acuity:
RX: +1.00 DS -1.25 DC X 50

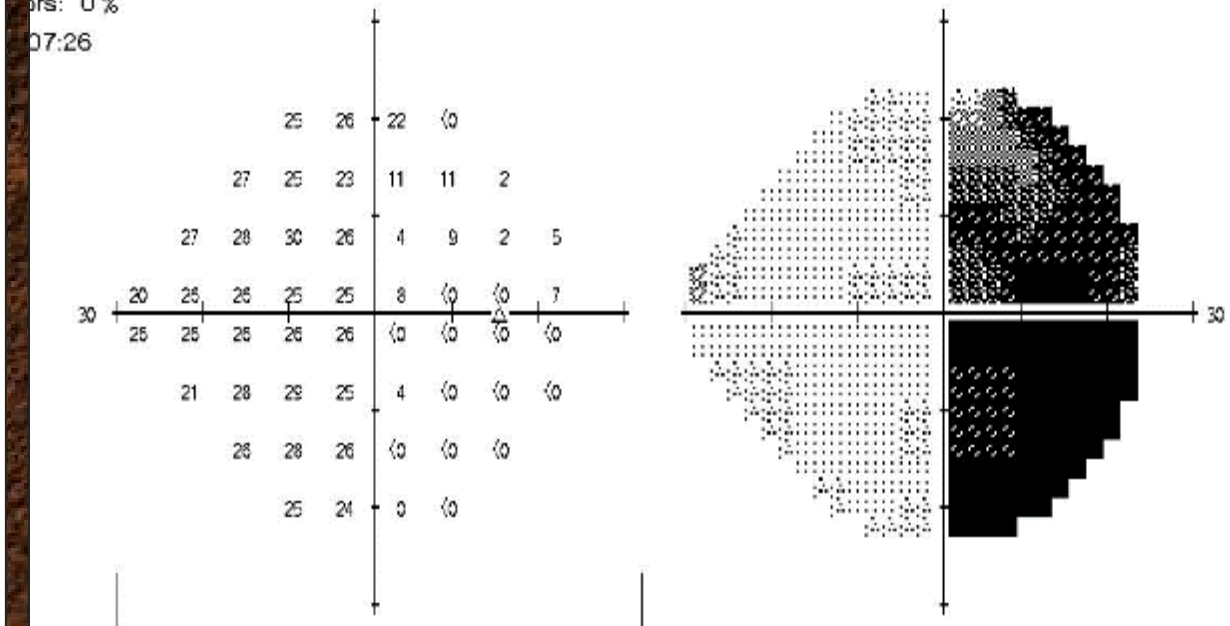
Date: 10-20-2017
Time: 12:56 PM
Age: 57



s: 6 %
7:14



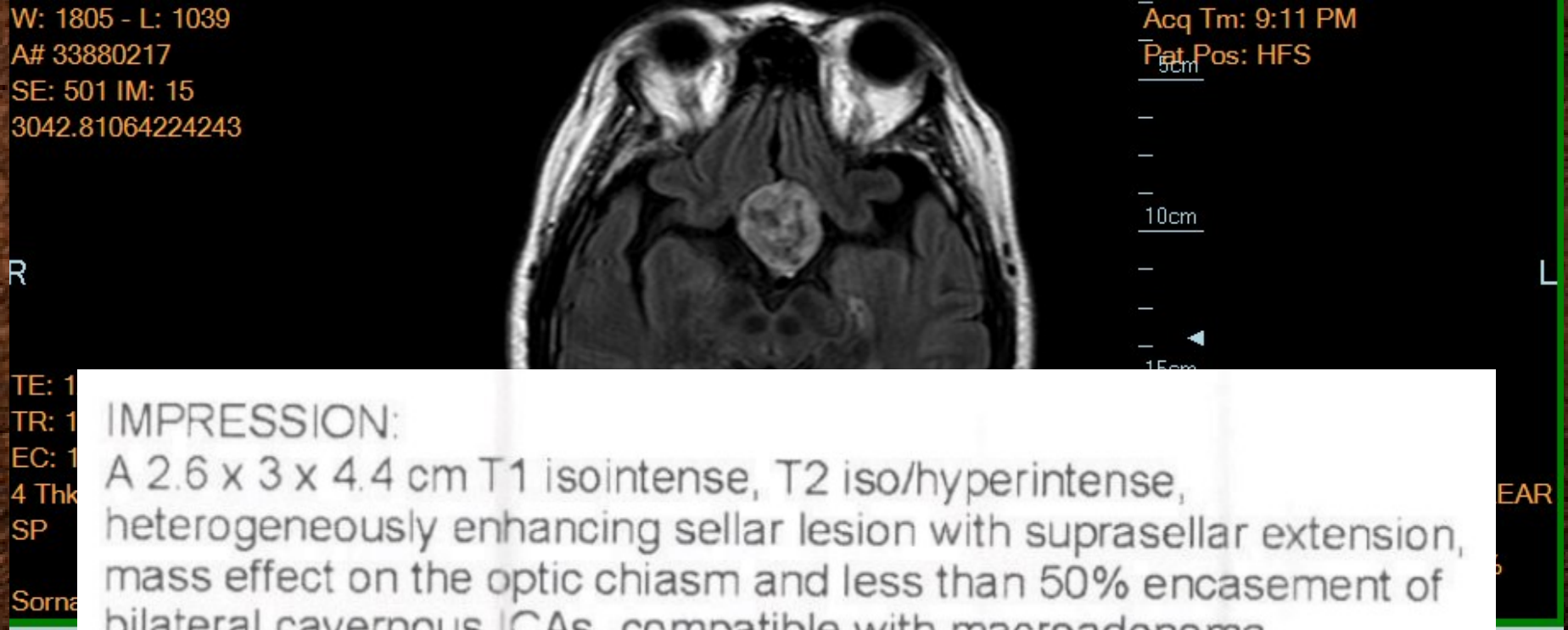
rs: 0 %
07:26



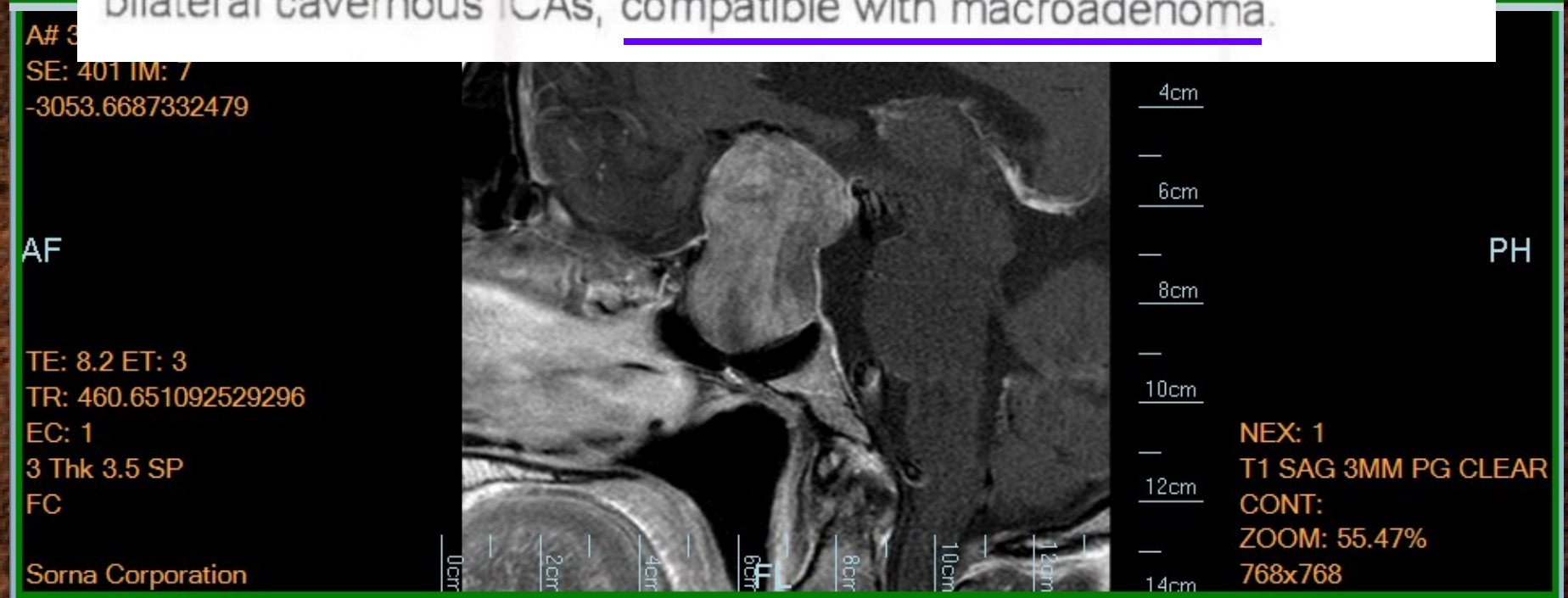
Now what?

https://app.tophat.com/e/777538

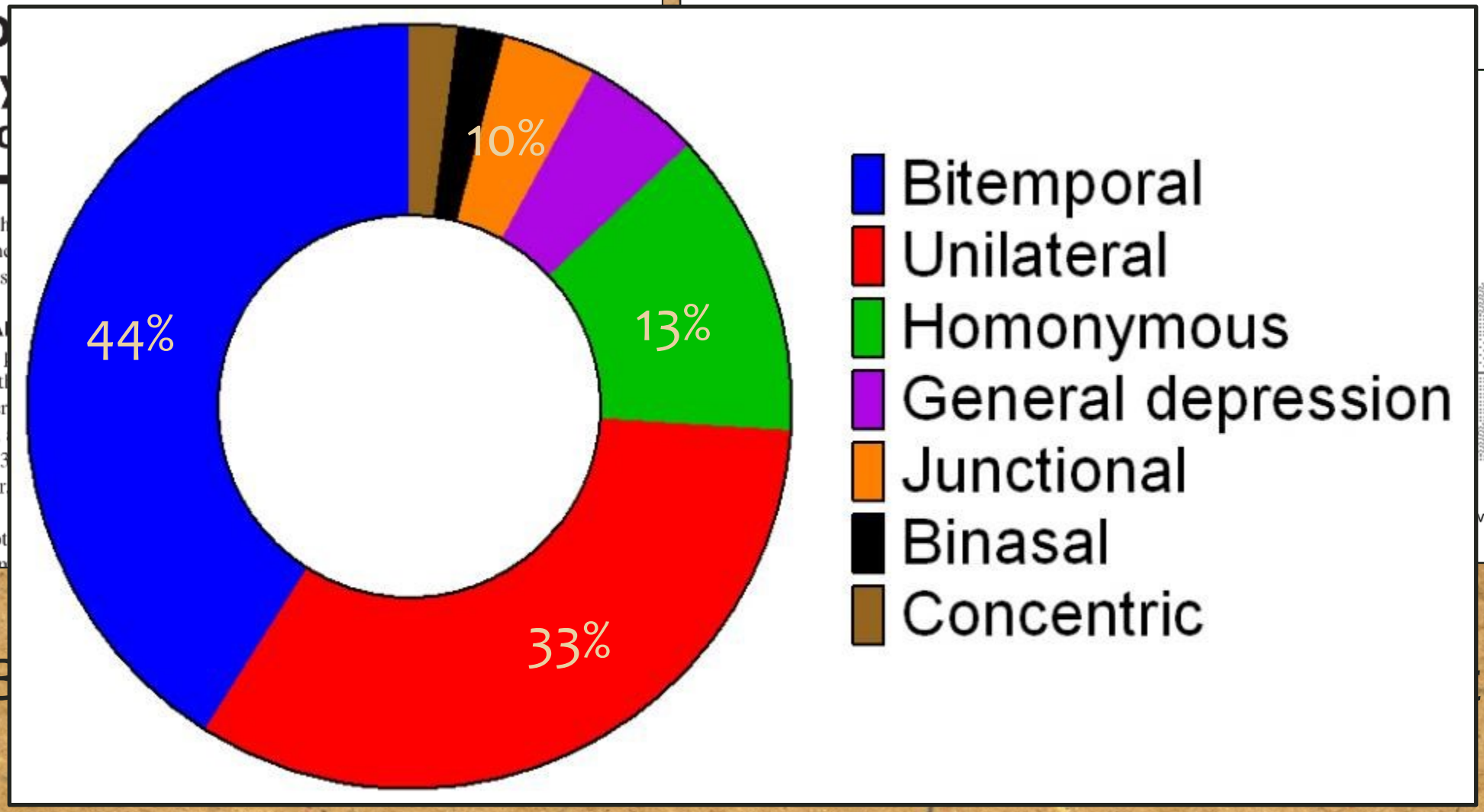
Send patient to ER stat	A
Refer patient to ophthalmology	B
Order MRI of head	C
Call patient's PCP	D
Prescribe PGA and RTC in 4 weeks	E



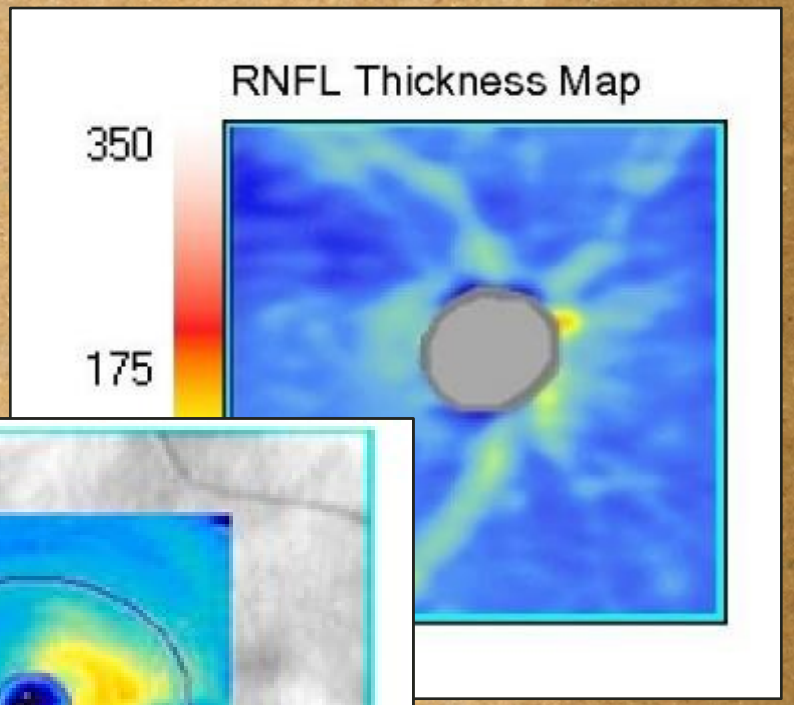
IMPRESSION:
A 2.6 x 3 x 4.4 cm T1 isointense, T2 iso/hyperintense, heterogeneously enhancing sellar lesion with suprasellar extension, mass effect on the optic chiasm and less than 50% encasement of bilateral cavernous ICAs, compatible with macroadenoma.

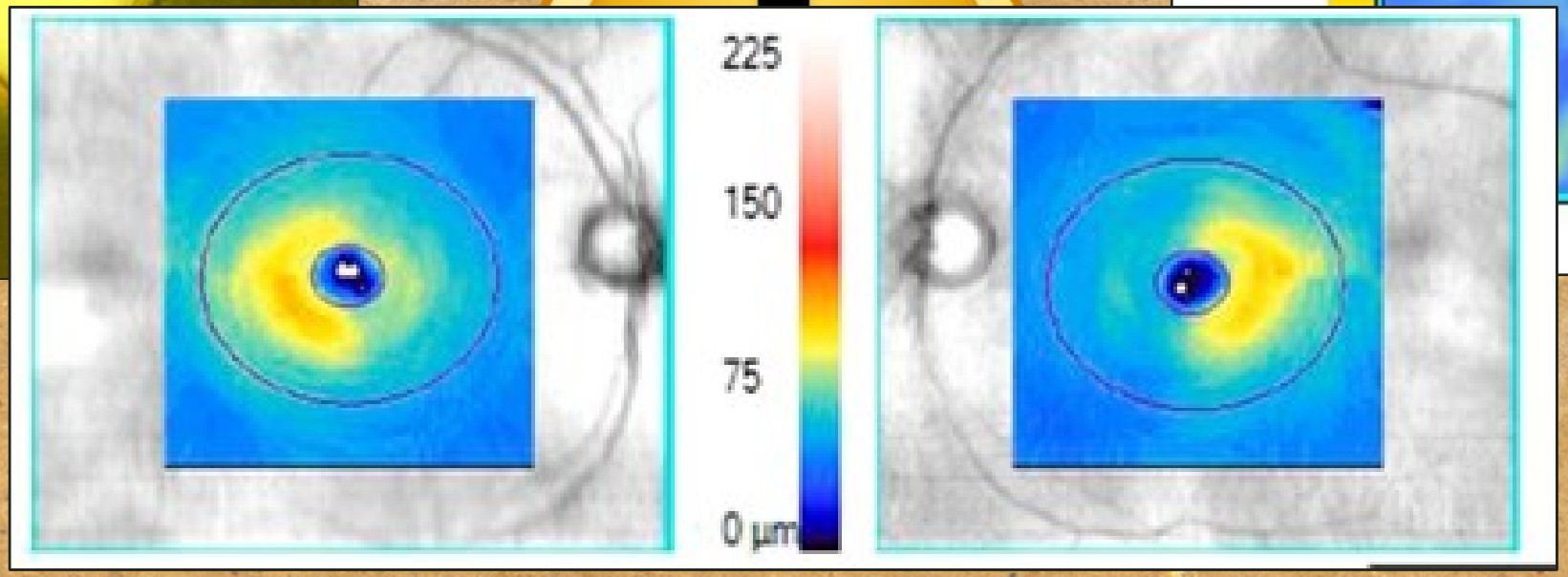


Pituitary Adenoma Visual Field Defects



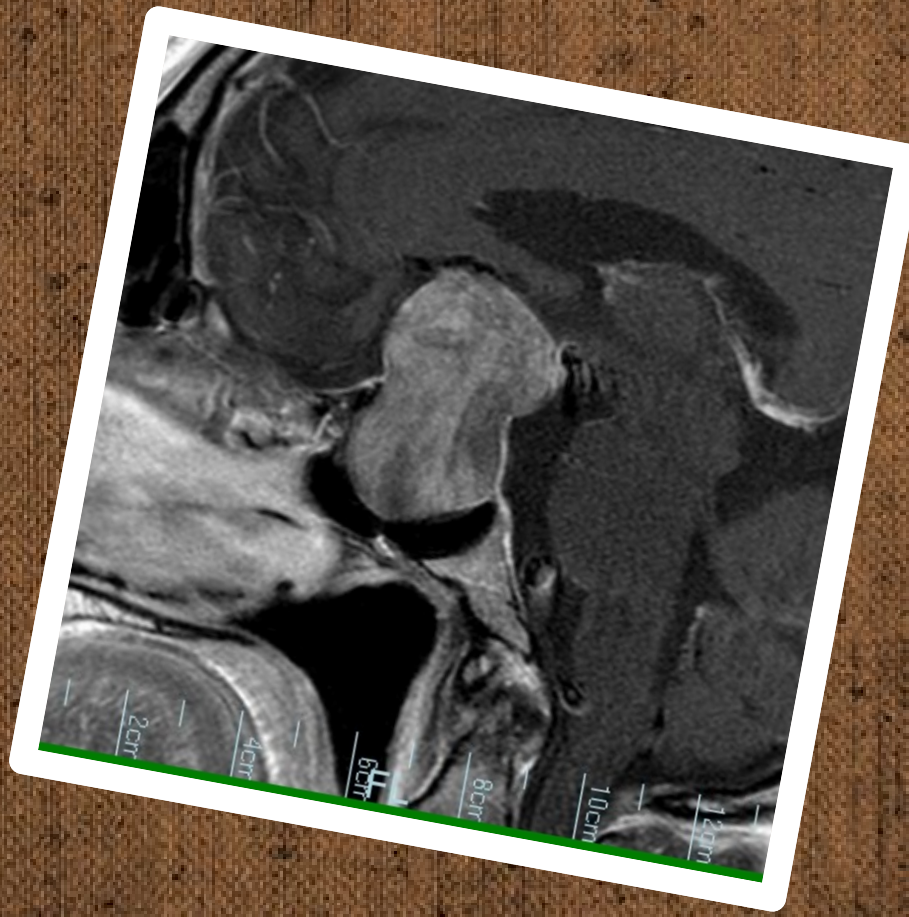
Pituitary Adenomas + Glaucoma





Take Home Message

- Glaucoma + Pituitary Adenoma
  - Chiasmal compression is an important cause of non-glaucomatous cupping
  - Binasal ganglion cell loss is a sensitive early indicator of chiasmal compression
  - Beware of glaucoma suspects with atypical findings
  - Patients can have more than one active disease process

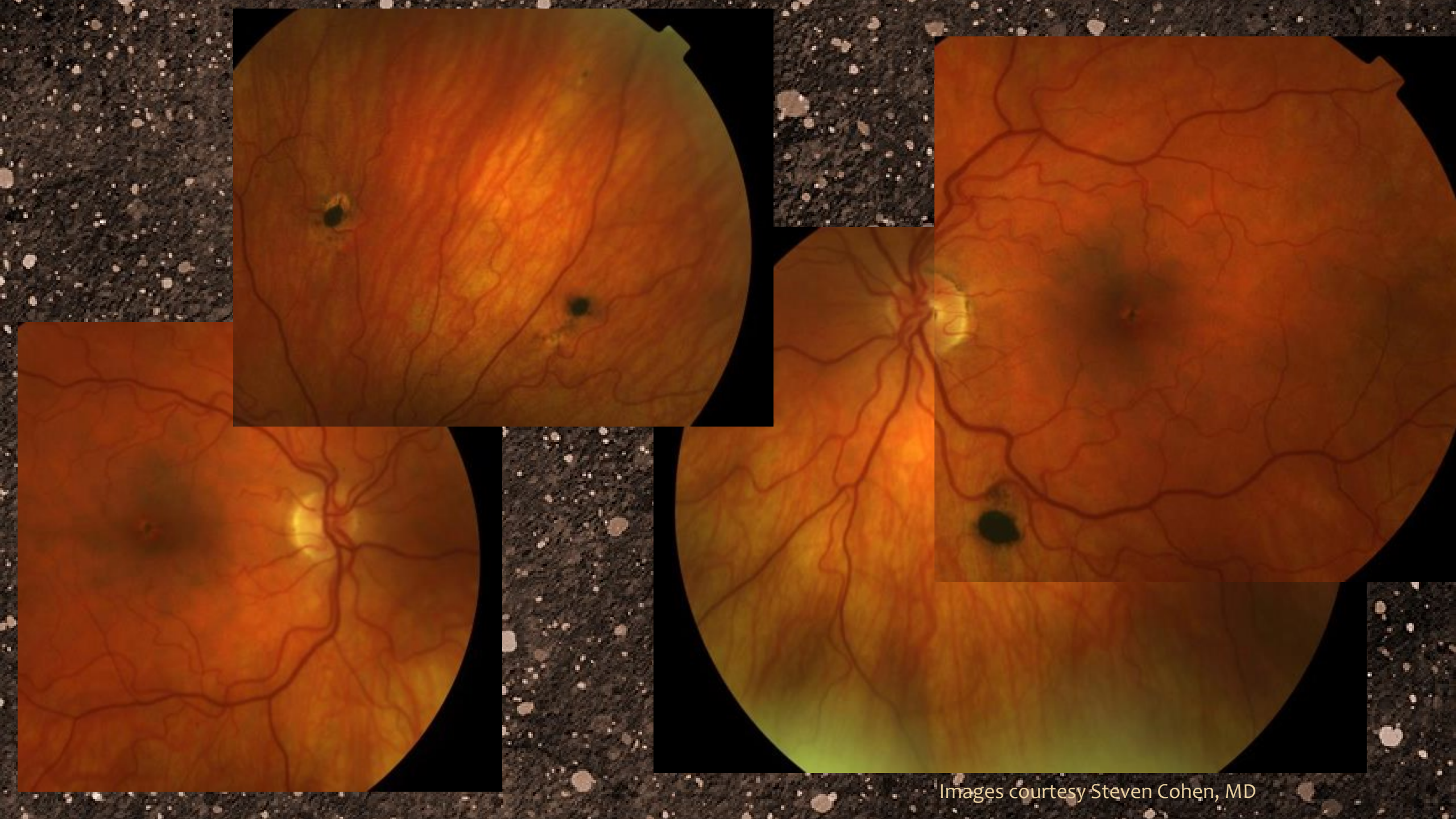


CASE #7

The spots are revealing!

Case #7

- Parents bring 7yo child in for his first eye exam. No complaints
- POH: No h/o any eye problems
- MH: Good health. No meds
- FOH: Unremarkable
- Vision: 20/20 each eye without correction
- Pupils and motility: Normal.
- IOP: 12/13 mmHg @ 9am
- External: Normal



Images courtesy Steven Cohen, MD

What is going on here?

https://app.tophat.com/e/777538

- Choroidal nevi
- Congenital hypertrophy of RPE
- Chorioretinal scars
- Gardner's Syndrome
- Retinoblastoma

Choroidal nevi	Slate gray mass with indistinct margins
Congenital hypertrophy of RPE	Flat jet-black retinal lesion with sharp margins. Multifocal CHRPE (“bear tracks”) are typically **unilateral** and clustered in a single quadrant
Chorioretinal scars	Composed of RPE hyperplasia (black) and fibrosis (white), sharp margins, often irregular in shape
Gardner’s syndrome	Familial adenomatous polyposis with CHRPE-like lesions. Retinal lesions are bilateral & may appear in >1 quadrant
Retinoblastoma	Yellow-white retinal mass frequently associated with subretinal and vitreous seeding

Assessment

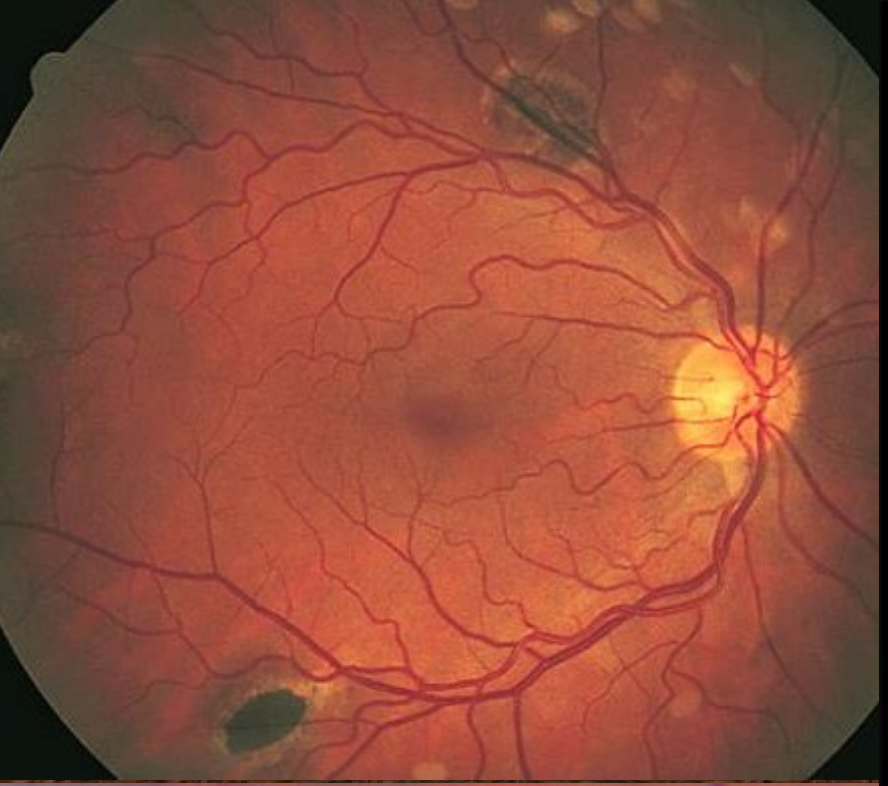
- Multiple, bilateral CHRPE-like lesions
- Suspect familial adenomatous polyposis

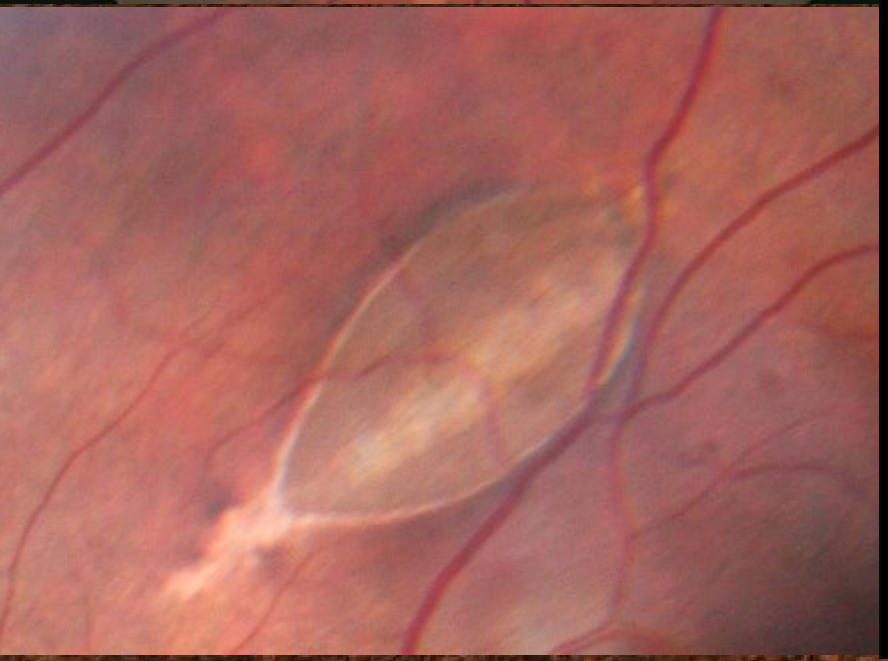
Management

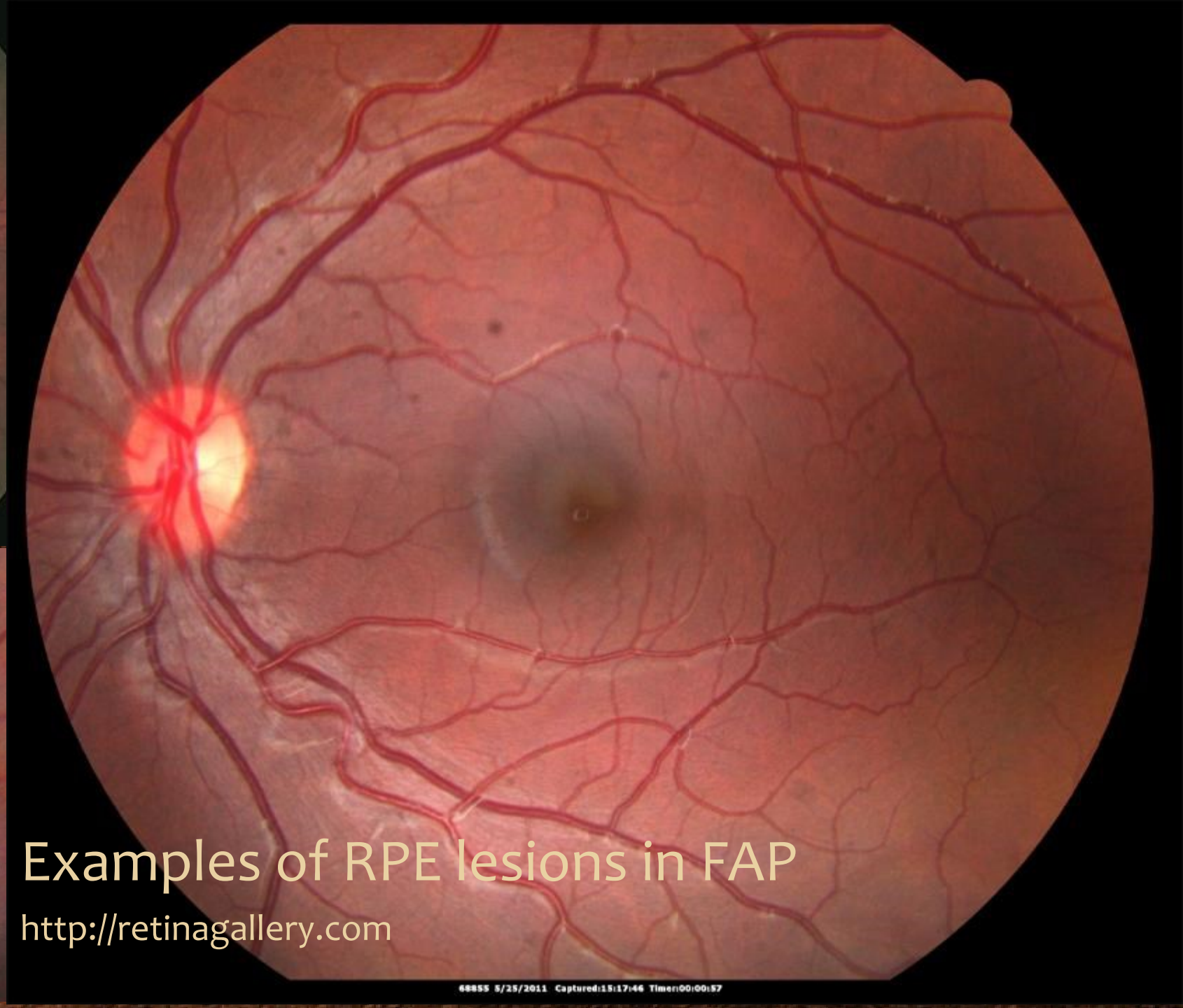
- Gastroenterology consult – negative colonoscopy of child and parents
- Genetic testing offered – declined by parents
- Medical surveillance for onset of polyposis

Familial Adenomatous Polyposis

- An uncommon hereditary form of colon cancer (autosomal dominant)
  - About 1% of all colon cancer in US annually
- 20% of cases have no FH of FAP, suggesting a spontaneous mutation
- Some FAP patients have congenital CHRPE-like retinal lesions (hamartomas = benign RPE tumors)
  - Retinal lesions are a reliable clinical marker for FAP in these patients

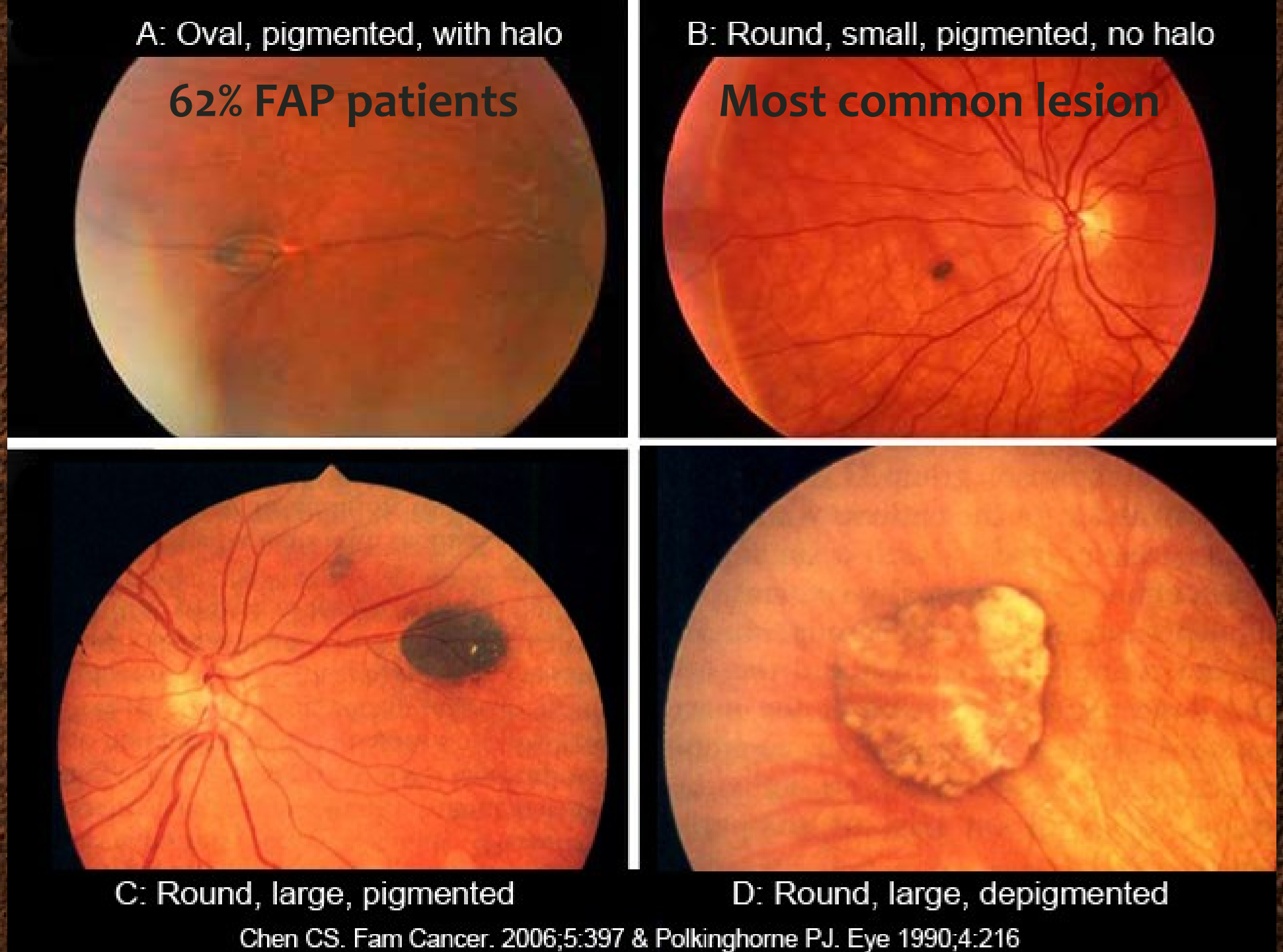






Examples of RPE lesions in FAP

http://retinagallery.com

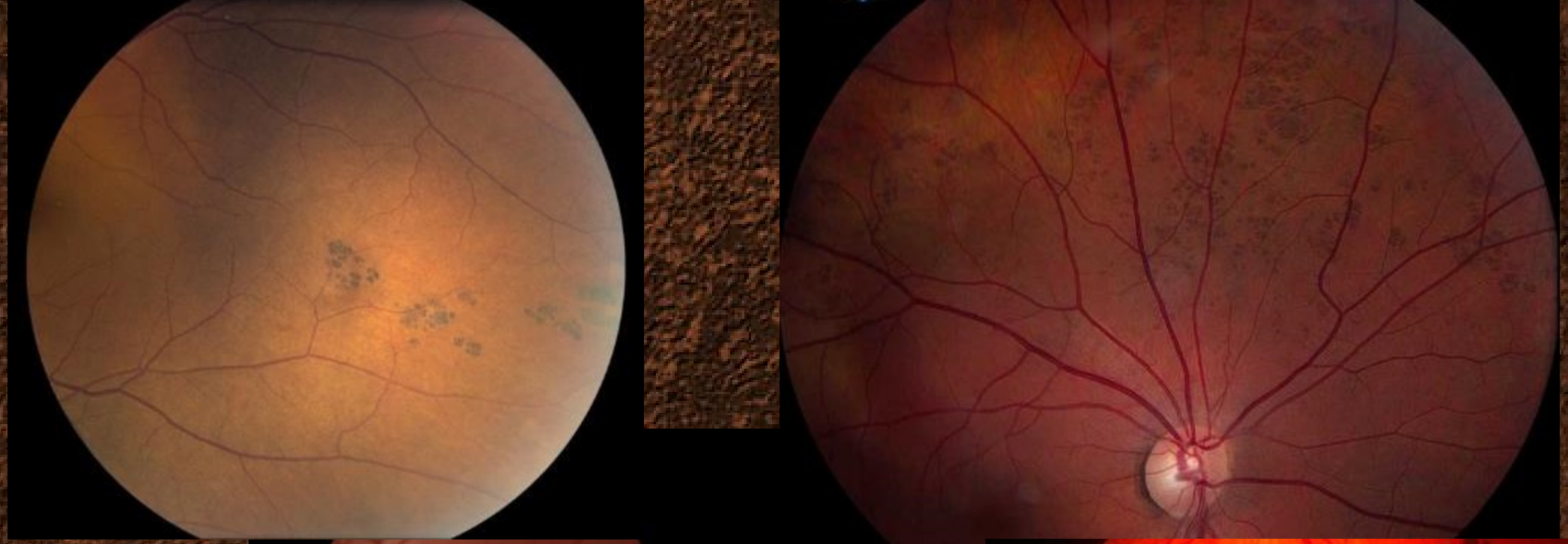


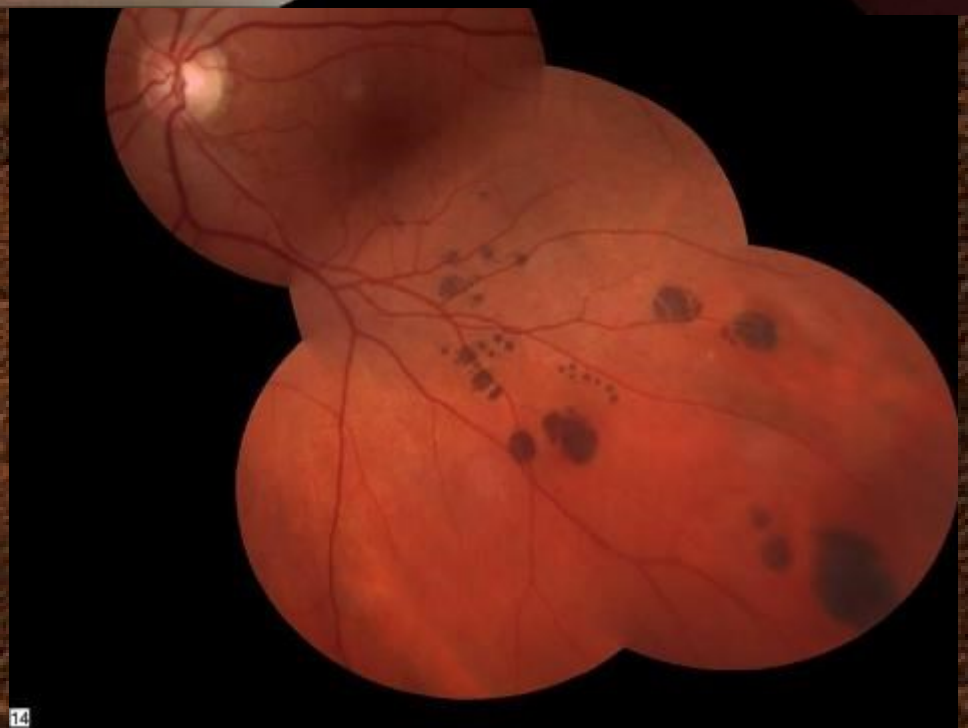
Chen CS. Fam Cancer. 2006;5:397 & Polkinghorne PJ. Eye 1990;4:216

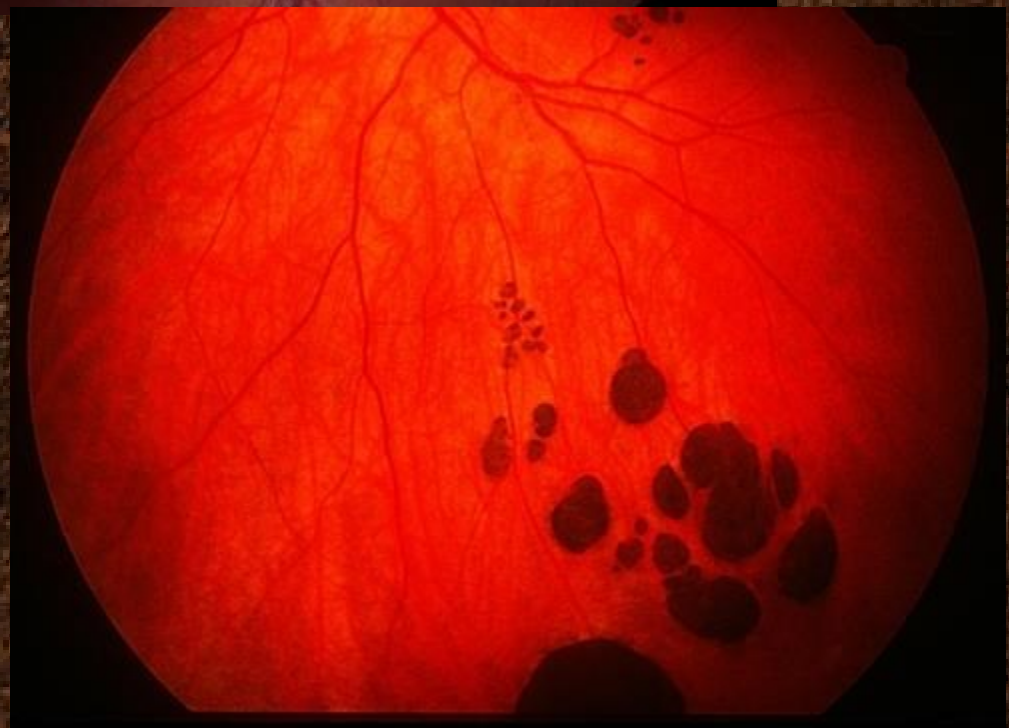
CHRPE-like Lesions in FAP

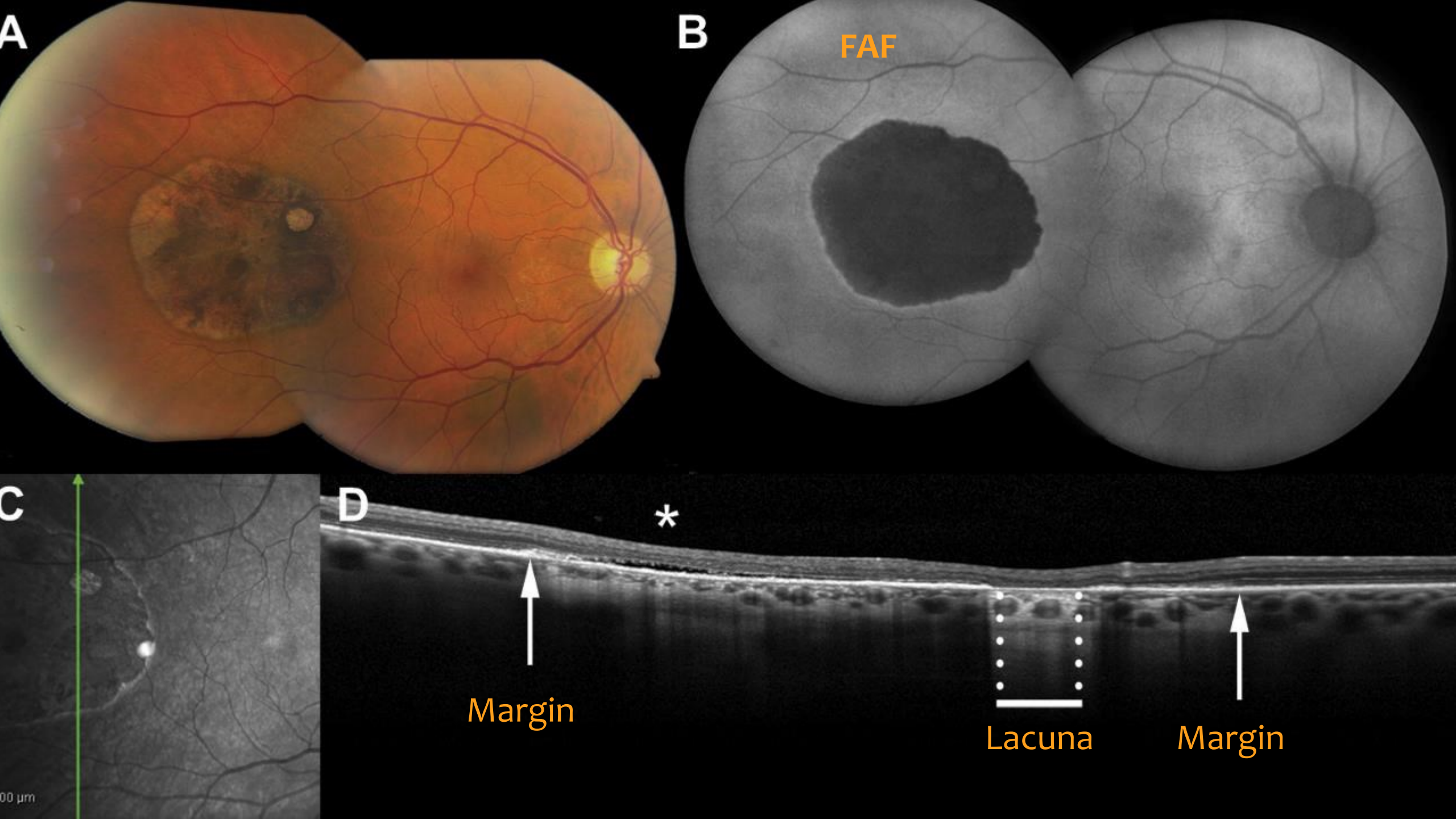
	Gardner's Syndrome	CHRPE
Appearance	Small: Identical to CHRPE Large: Oval with tail	Flat, round-oval, jet black
Bilaterality	Common (86% cases)	Very rare (5% cases)
Multiple quadrants	Common	Rare

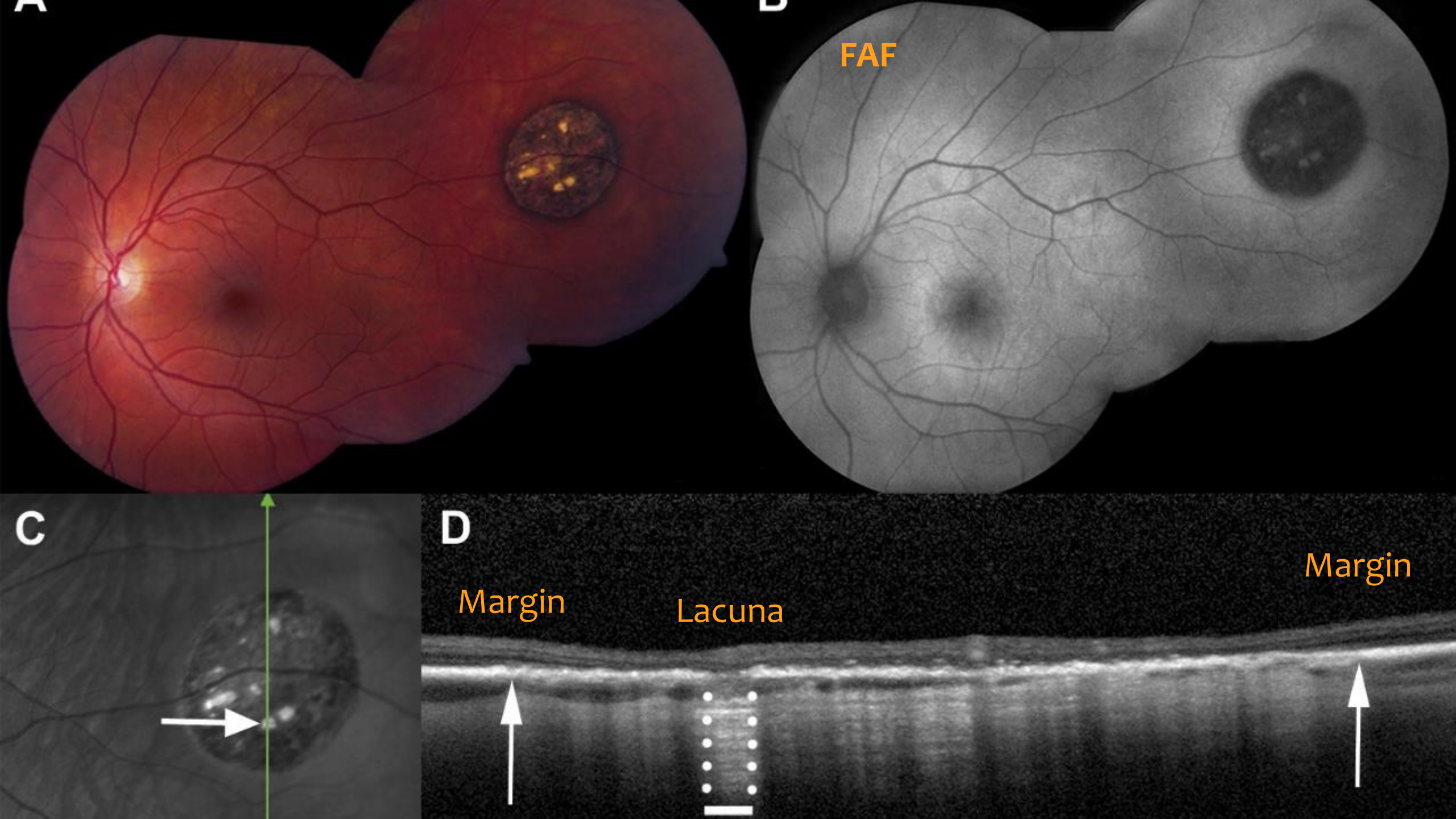
Examples of “Bear Tracks”








A
B
FAF
C
D
*
Margin
Lacuna
Margin

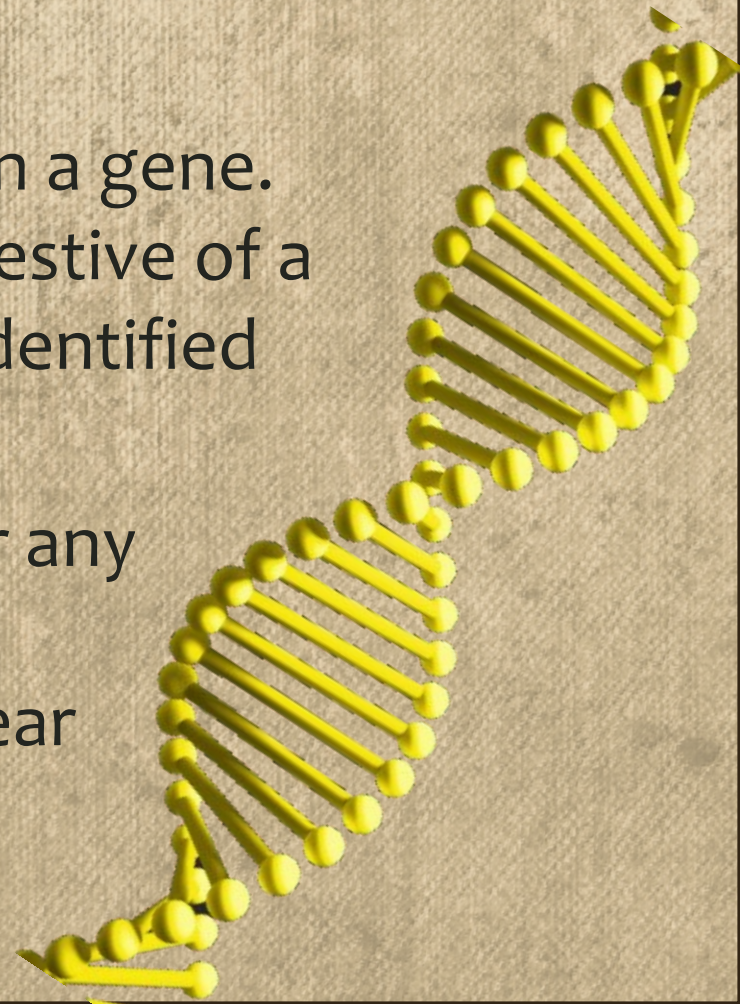

A
B
FAF
C
D
Margin
Lacuna
Margin

Retinal Lesions as a Genetic Marker

- Retinal lesions are a sensitive and specific marker for FAP mutation carrier status
- Congenital retinal lesions may serve as an early marker for those patients destined to develop polyposis later in life
  - Onset of retinal lesions: Birth
  - Onset of polyposis: Age 25 yrs

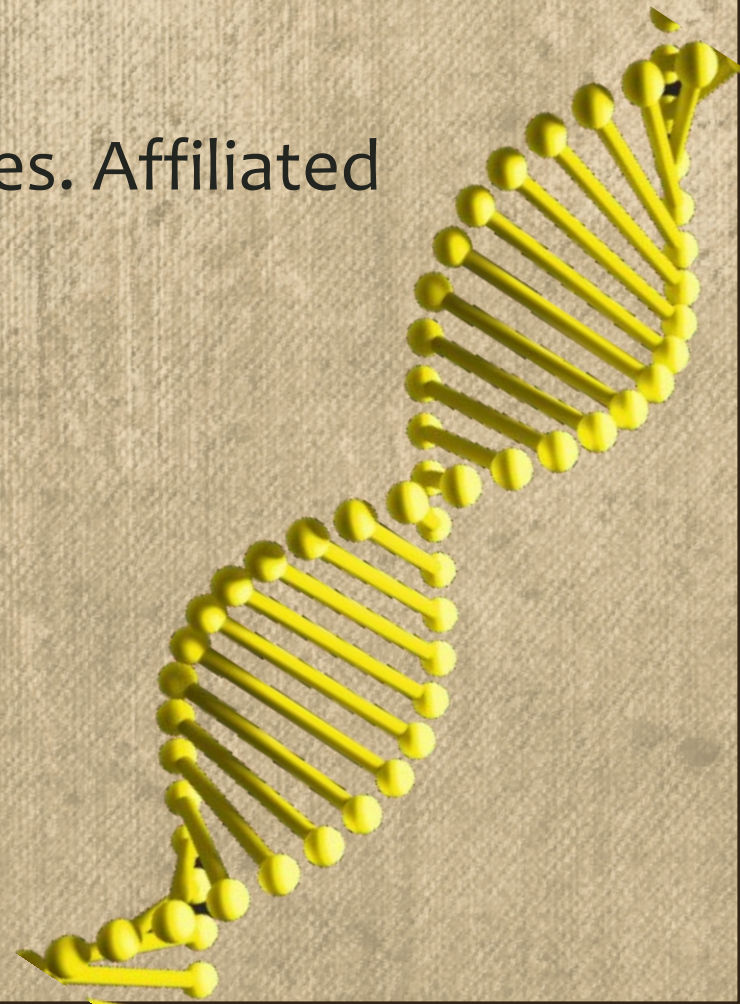
About Genetic Testing

- Two basic modes of testing
  - Targeted testing: Look for a specific variant in a gene. Helpful in patients with clinical findings suggestive of a disorder whose causative genes have been identified (e.g. dystrophies)
  - Full gene sequencing: Genes are analyzed for any variation from normal. Useful when the suspected condition or genetic cause is unclear



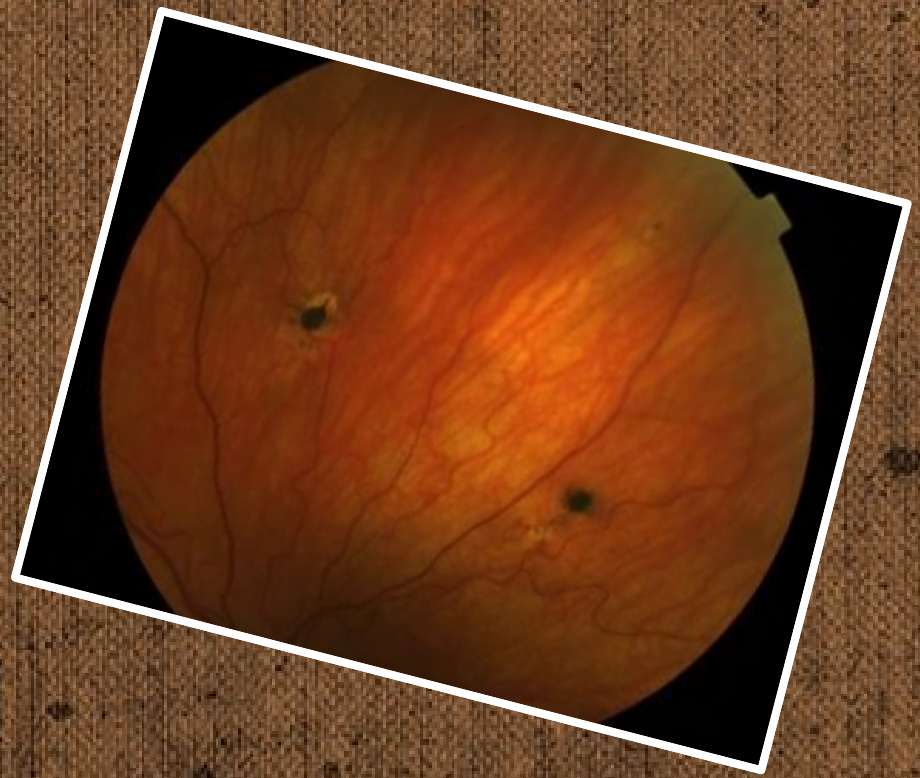
About Genetic Testing

- Free targeted testing
  - carverlab.org: Retinal and optic nerve diseases. Affiliated with University of Iowa
  - fightingblindness.org: Retinal diseases only
  - invitae.com: Retinal diseases only
- Paid full gene sequencing
  - NIH Genetic Testing Registry: Search for available conditions, tests and labs



Take Home Message

- CHRPE-like lesions may signal risk of colon cancer
- How to spot suspicious CHRPE-like lesions
  1. **Bilaterality!**
  2. > 1 quadrant per eye
  3. Lesions associated with a depigmented streak
- Consider genetic testing in patients suspected of having an inherited disorder



CASE #8

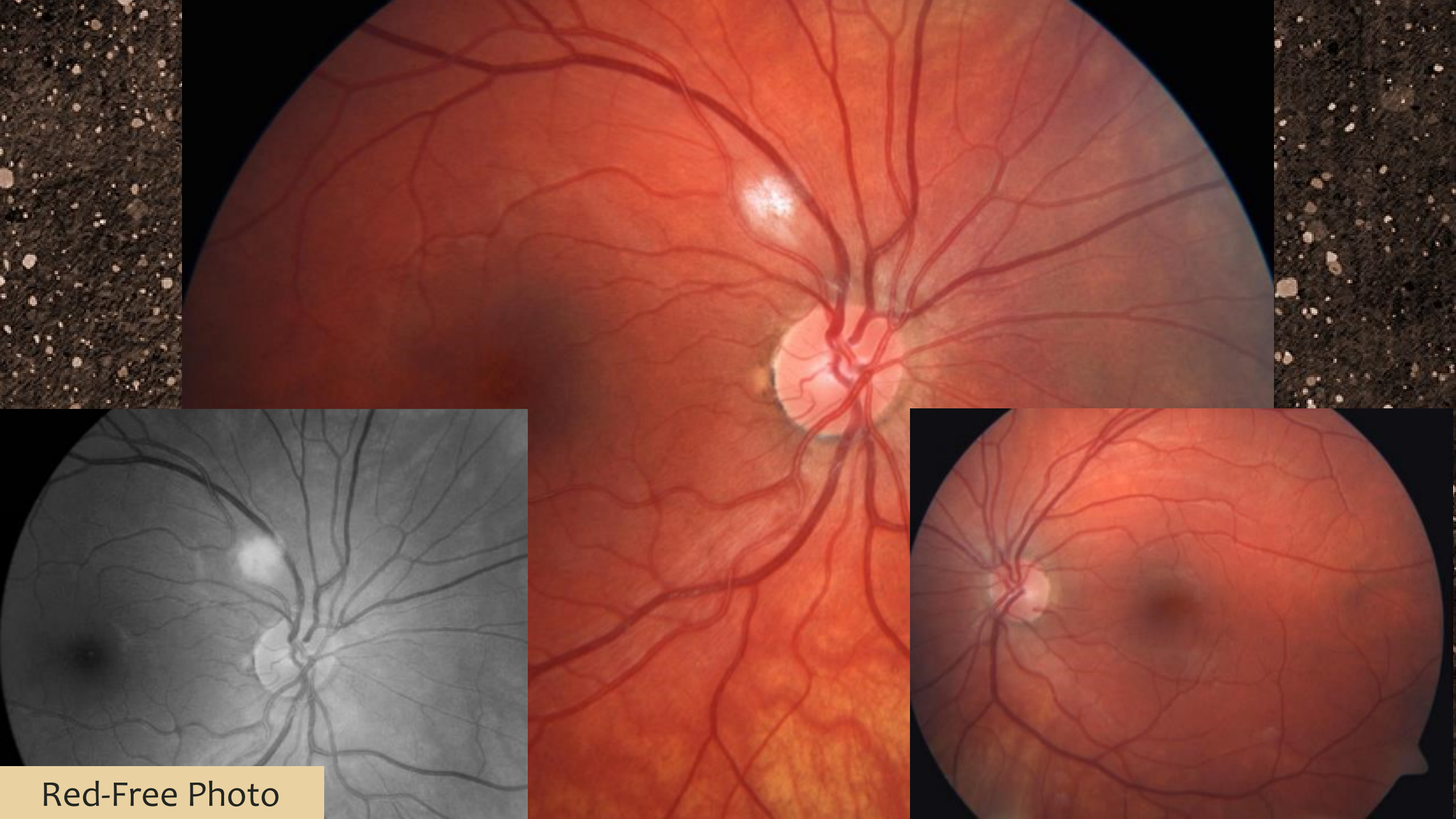
Jagged little pill

Case #8

- 24yo WF presents with c/o “blurry light spot” in the *inferior-nasal* paracentral vision of the right eye x 1 week. Symptoms are made worse while exercising.
- POH: LEE 2yrs. Negative for any prior eye dx
- MH: Good health. Nonsmoker. Meds: BCP
- FH: MGM with diabetes

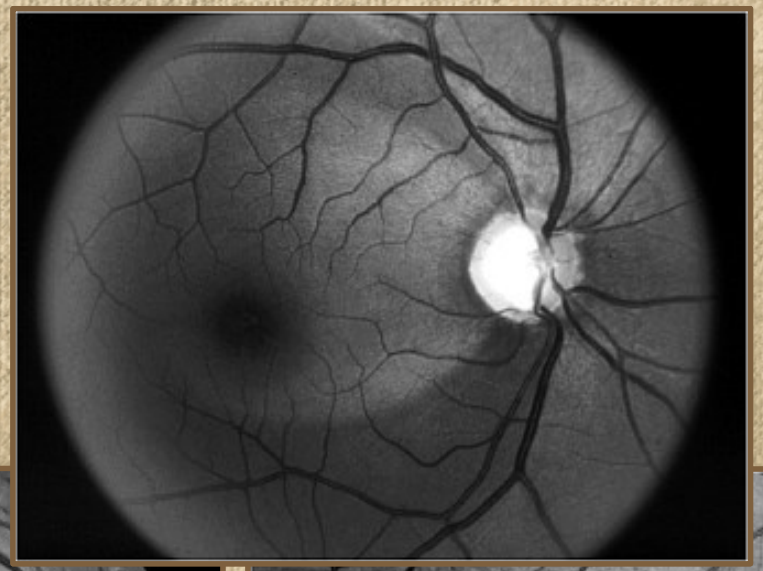
Case #8

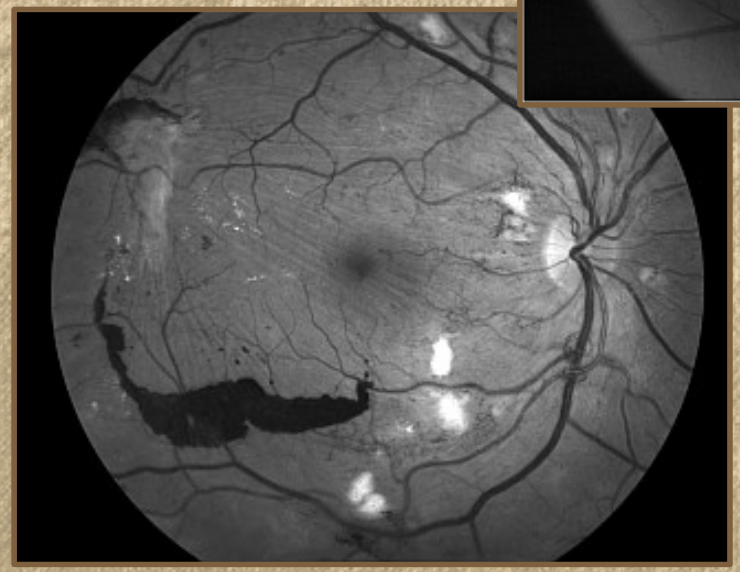
- BVA: 20/20 in each eye
- Pupils and motility: Normal
- BP: 113/71 RAS, Pulse: 81 bpm
- IOP: 13/12 mmHg @ 4pm
- Amsler: Blurred region *inferior-temporal* to fixation OD, Normal OS
- Color: Normal OU (HRR)
- External: Normal OU

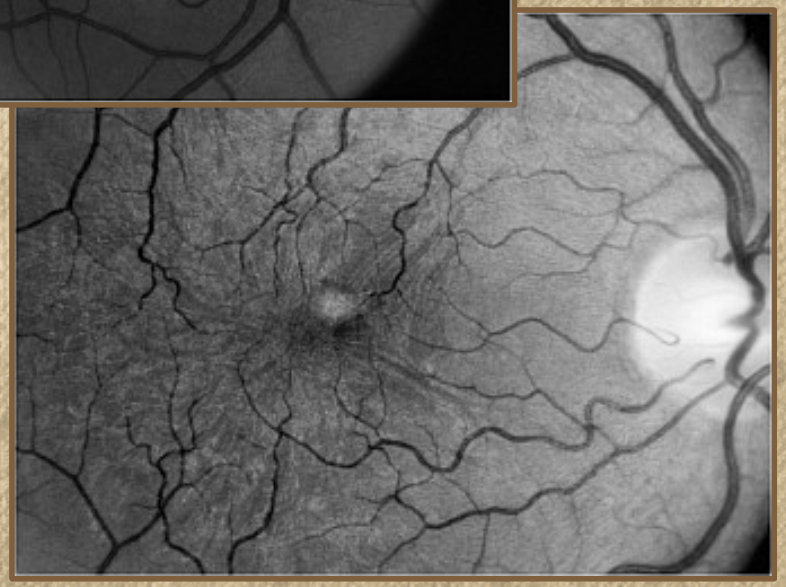

Red-Free Photo

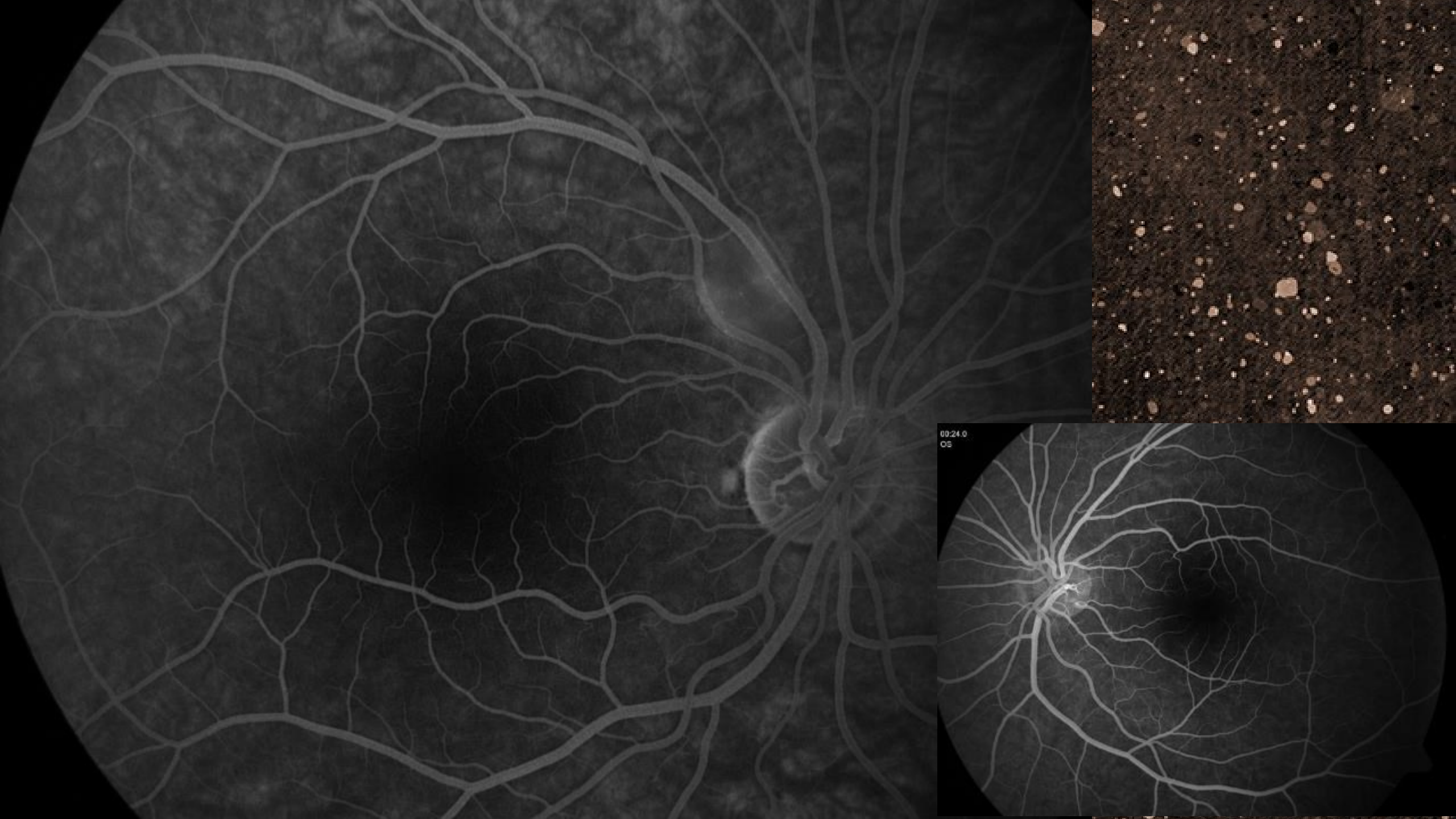
About Red-free Fundus Photography

- Uses green filter (540nm)
- Green light is absorbed by blood and does not penetrate RPE
- Why use it?
  - Visualization of blood and RNFL
  - **Doctors with abnormal color vision**








00:24.0
OS

SINGLE FIELD ANALYSIS

EYE: RIGHT

NAME:
ID:

DOB: 03-18-1987

CENTRAL 24-2 THRESHOLD TEST

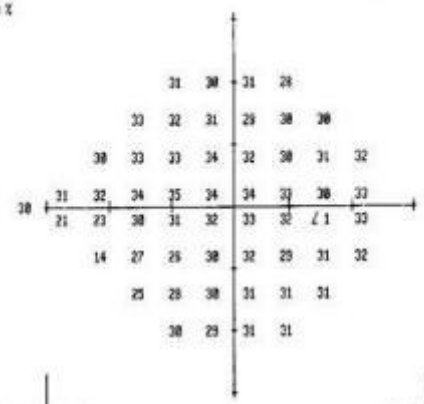
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 1/10
FALSE POS ERRORS: 0 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 03:11

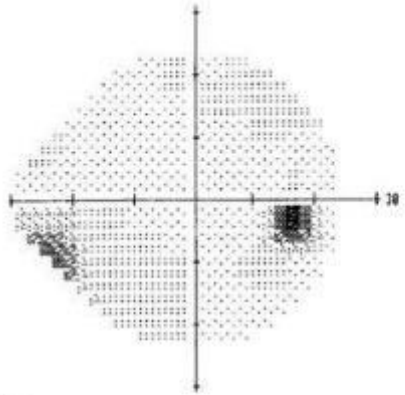
FOVEA: OFF

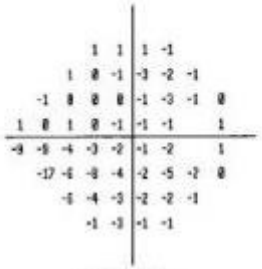
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-FAST

PUPIL DIAMETER: 7.7 MM
VISUAL ACUITY:
RX: -0.50 OS DC X

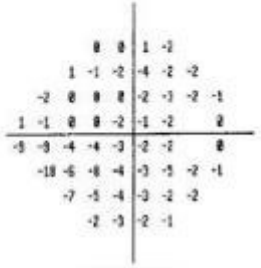
DATE: 07-22-2011
TIME: 2:31 PM
AGE: 24







TOTAL DEVIATION

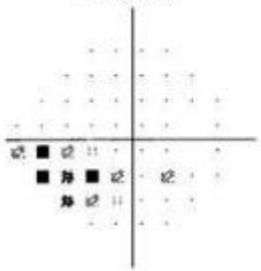


PATTERN DEVIATION

GHT
OUTSIDE NORMAL LIMITS

VFI 57%

MD -2.11 DB P < 5%
PSD 3.30 DB P < 1%



:: < 5%
< 2%
< 1%
■ < 0.5%

UTW SCHOOL OF OPTOMETRY
9725 DATAPOINT DRIVE
SAN ANTONIO, TX
78229

SINGLE FIELD ANALYSIS

EYE: LEFT

NAME:
ID:

DOB: 03-18-1987

CENTRAL 24-2 THRESHOLD TEST

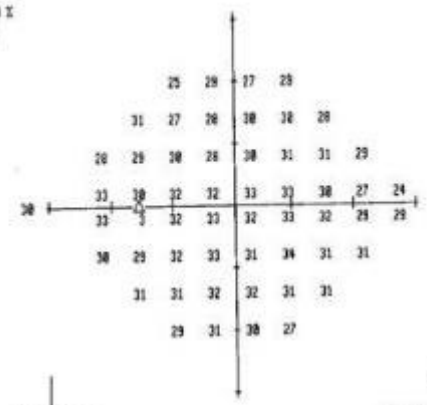
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 2/11
FALSE POS ERRORS: 4 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 03:13

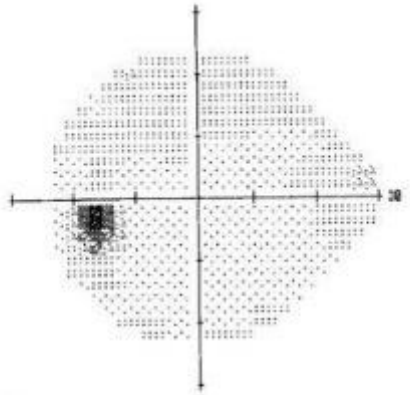
FOVEA: OFF

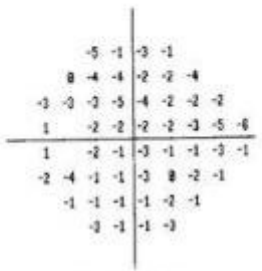
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-FAST

PUPIL DIAMETER: 7.4 MM
VISUAL ACUITY:
RX: OS DC X

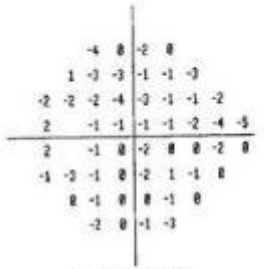
DATE: 07-22-2011
TIME: 2:36 PM
AGE: 24







TOTAL DEVIATION

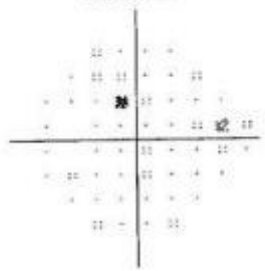


PATTERN DEVIATION

GHT
WITHIN NORMAL LIMITS

VFI 99%

MD -2.84 DB P < 5%
PSD 1.45 DB



:: < 5%
< 2%
< 1%
■ < 0.5%

UTW SCHOOL OF OPTOMETRY
9725 DATAPOINT DRIVE
SAN ANTONIO, TX
78229

Assessment

- Isolated cotton wool spot in an apparently healthy young woman

Management

- Medical evaluation to identify cause for CWS
- Recommend D/C BCP and start ASA
- Follow-up in 2 weeks

What is going on here?

https://app.tophat.com/e/777538

- Idiopathic cotton wool spot
- Undiagnosed diabetes
- Undiagnosed HIV
- Undiagnosed NTG
- BRAO

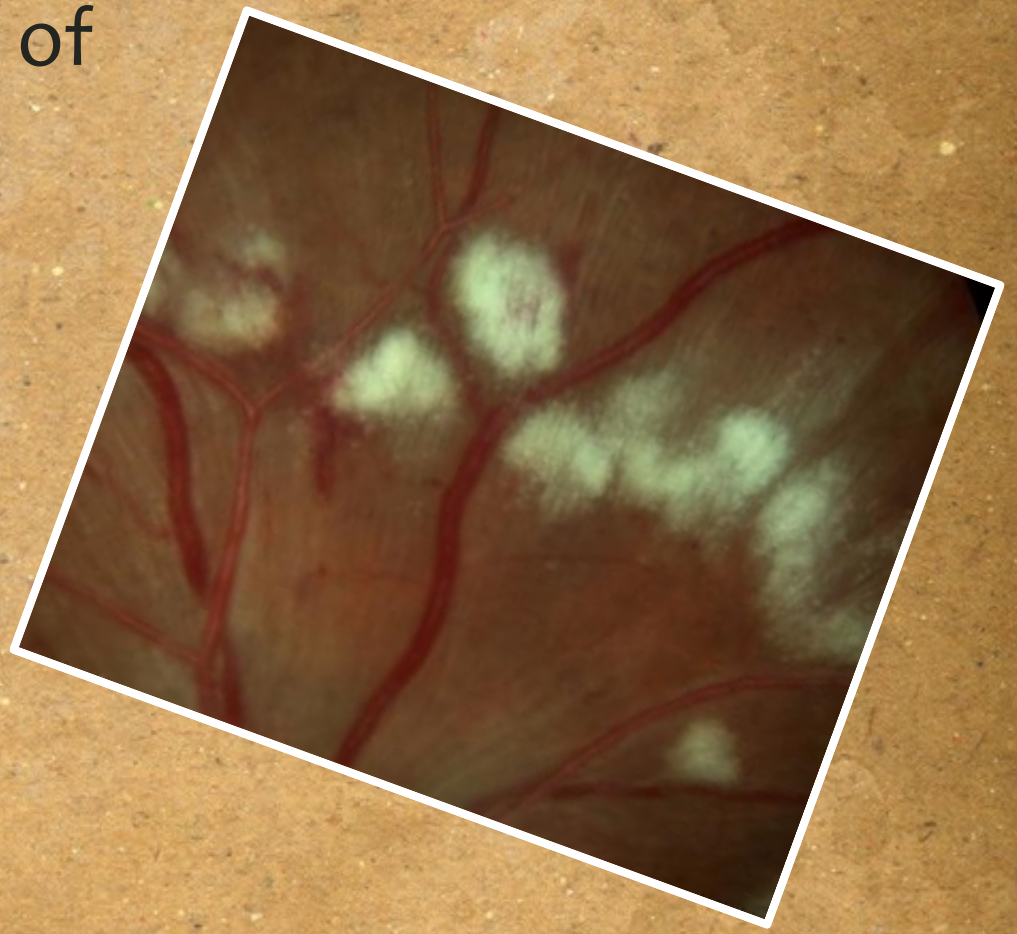
Idiopathic CWS	It has been reported that an underlying disorder can be found in 95% of patients with isolated CWS
Diabetes	Undiagnosed diabetes is the **most common** cause of isolated CWS in an apparently normal patient
HIV	CWS are a prominent feature of HIV noninfectious retinopathy, the prevalence of which is inversely related to the patient's CD4+ count
NTG	Cotton wool spots are not associated with NTG
BRAO	CWS are a universal feature of BRAO

Medical Evaluation

- Physical exam by PCP was normal
- Normal laboratory testing: Fasting glucose, CBC, ANA, Rheumatoid factor, C-reactive protein, HIV screen
- Normal carotid Doppler and echocardiogram
- FTA-ABS was minimally reactive
  - Serologic ELISA testing for Lyme disease recommended
- Follow-up: Photopsia persisted x 4-6 wks before abating. VF defect remained unchanged

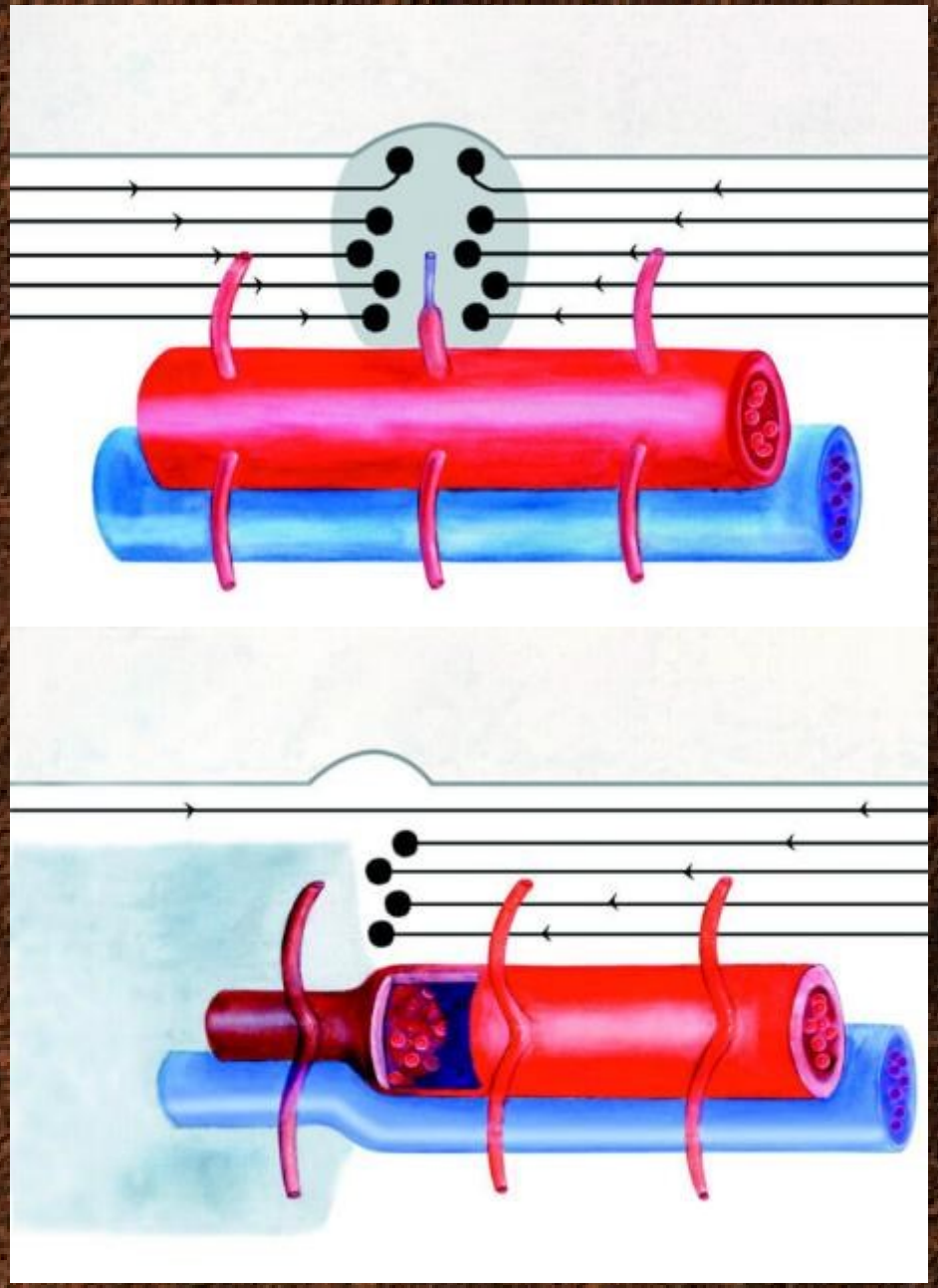
What is a CWS?

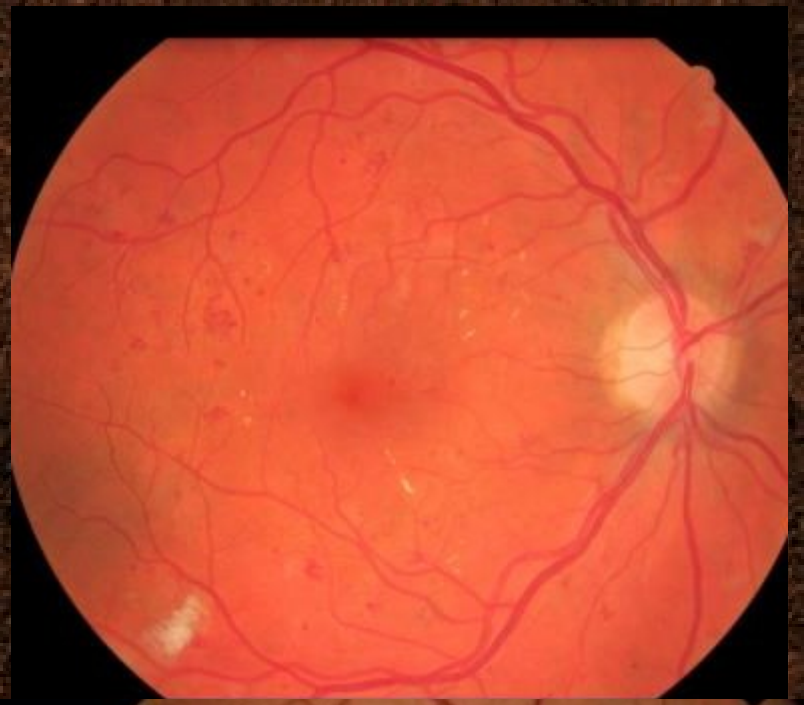
- CWS is a localized accumulations of axoplasmic material within adjacent bundles of ganglion cell axons.
- Two clinical presentations:
  1. Focal ischemia from terminal arteriolar occlusion.
  2. Appearance at the boundary of an ischemic region of the retina

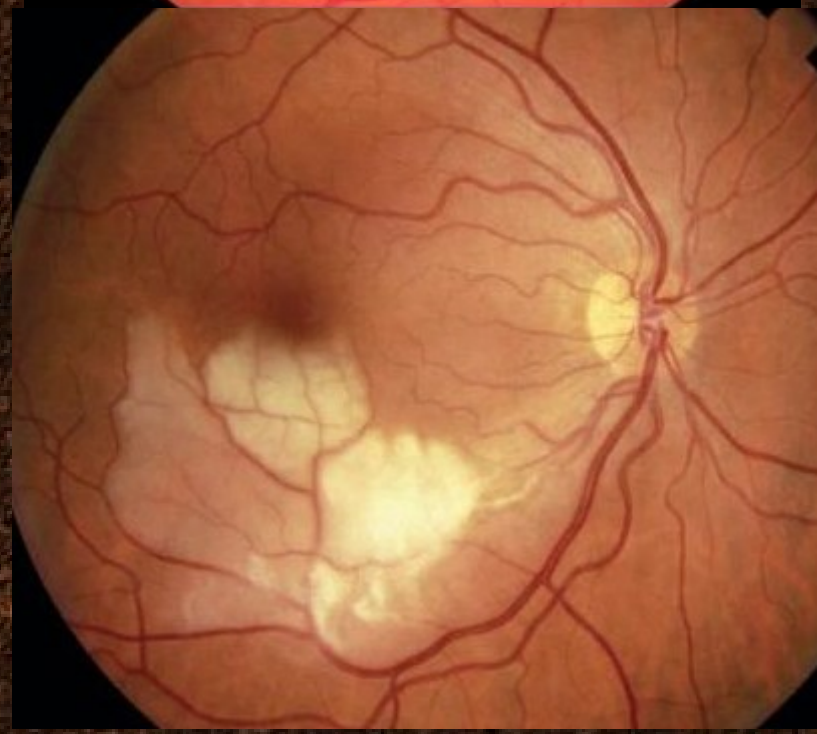


Focal ischemia: Occlusion of a terminal branch of a retinal arteriole results in a small area of infarction (grey) in the RNFL where axoplasmic transport is obstructed.

Sentinal lesion: Occlusion of a retinal arteriole results in retinal infarction







Vision Loss Associated with CWS

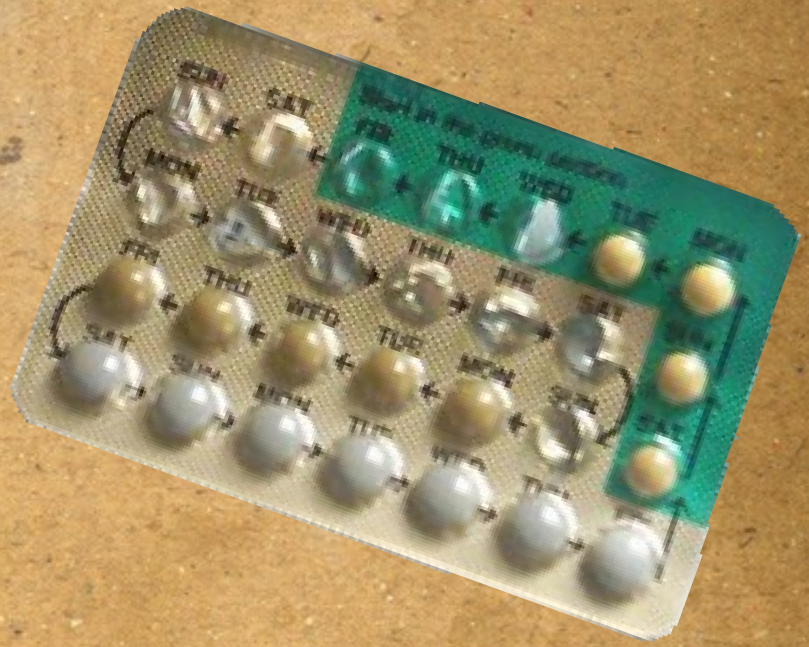
- CWS are almost always asymptomatic
- Localized or arcuate scotomas common
- OCT studies reveal permanent loss of the inner retinal layers at the site of resolved CWS lesions
- Some visual recovery may occur following resolution of CWS lesions

Evaluation of Idiopathic CWS

- Search for conditions that predispose the patient toward embolism and thrombosis
- Common: **Diabetes**, hypertension, and collagen vascular disease
- Less common: HIV and other infections, hematologic disease and coagulopathies, pancreatitis, embolic disease, trauma, and pregnancy

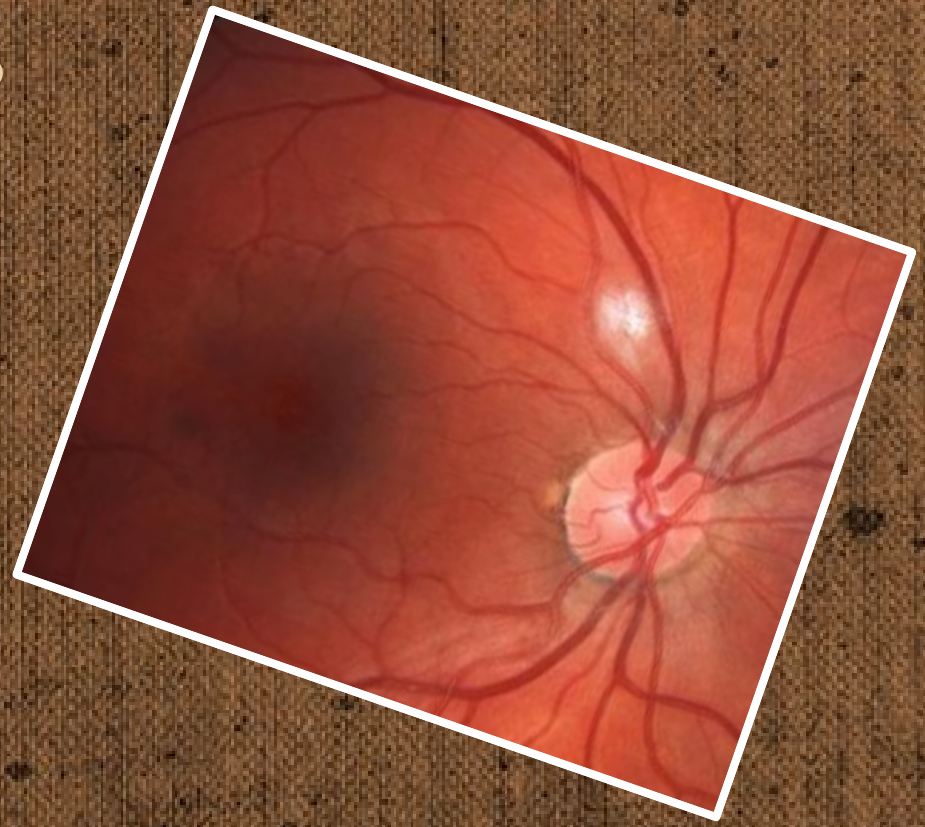
OCP and Thromboembolism

- Birth control pills increase the risk of venous thromboembolism (VTE) by about 5x
  - Additional risk factors: **smoking**, obesity, HTN, coagulopathies, and a FH of thromboembolic disease
- Third & fourth generation OCPs
  - Lower risk of many side effects (weight gain, acne, headaches and unwanted hair growth)
  - **Risk of thrombosis higher than second generation pills**



Take Home Message

- Isolated CWS are not truly isolated
- Diabetes, hypertension, and collagen vascular disease are common causes of CWS
- CWS are frequently associated with permanent VF defects
- Birth control pills are a significant risk factor for vascular occlusions in young healthy women



CASE #9

Hair of the Dog

Case #9

- 69yo WF presents for routine eye exam.
- POH: LEE 1yr. Negative for any prior eye dx
- MH: Good health

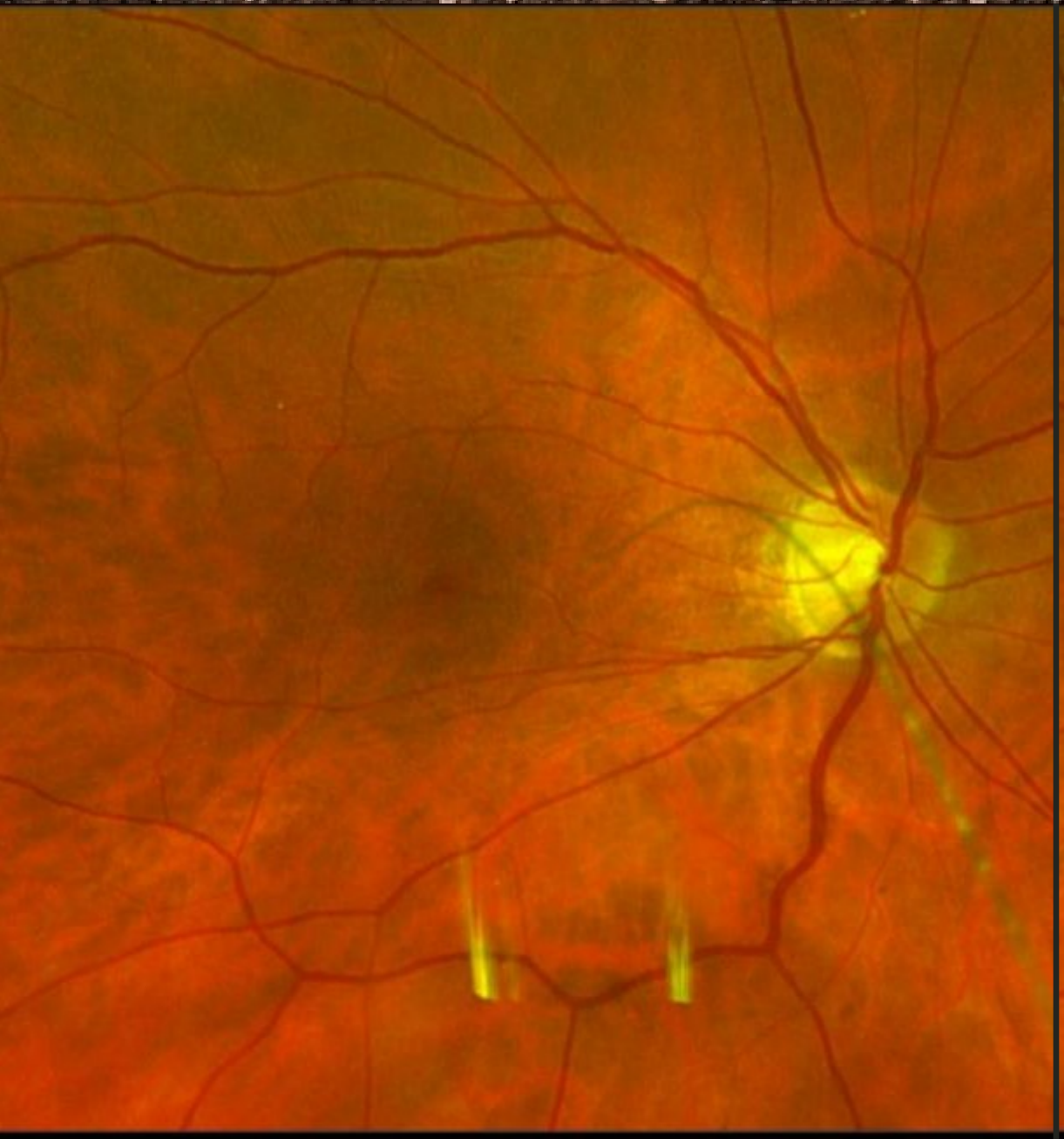
- VA: 20/25+ OD, 20/20 OS
- PERRL, (-)APD
- GAT: 27/28 @ 12pm
- SLE: White & Quiet

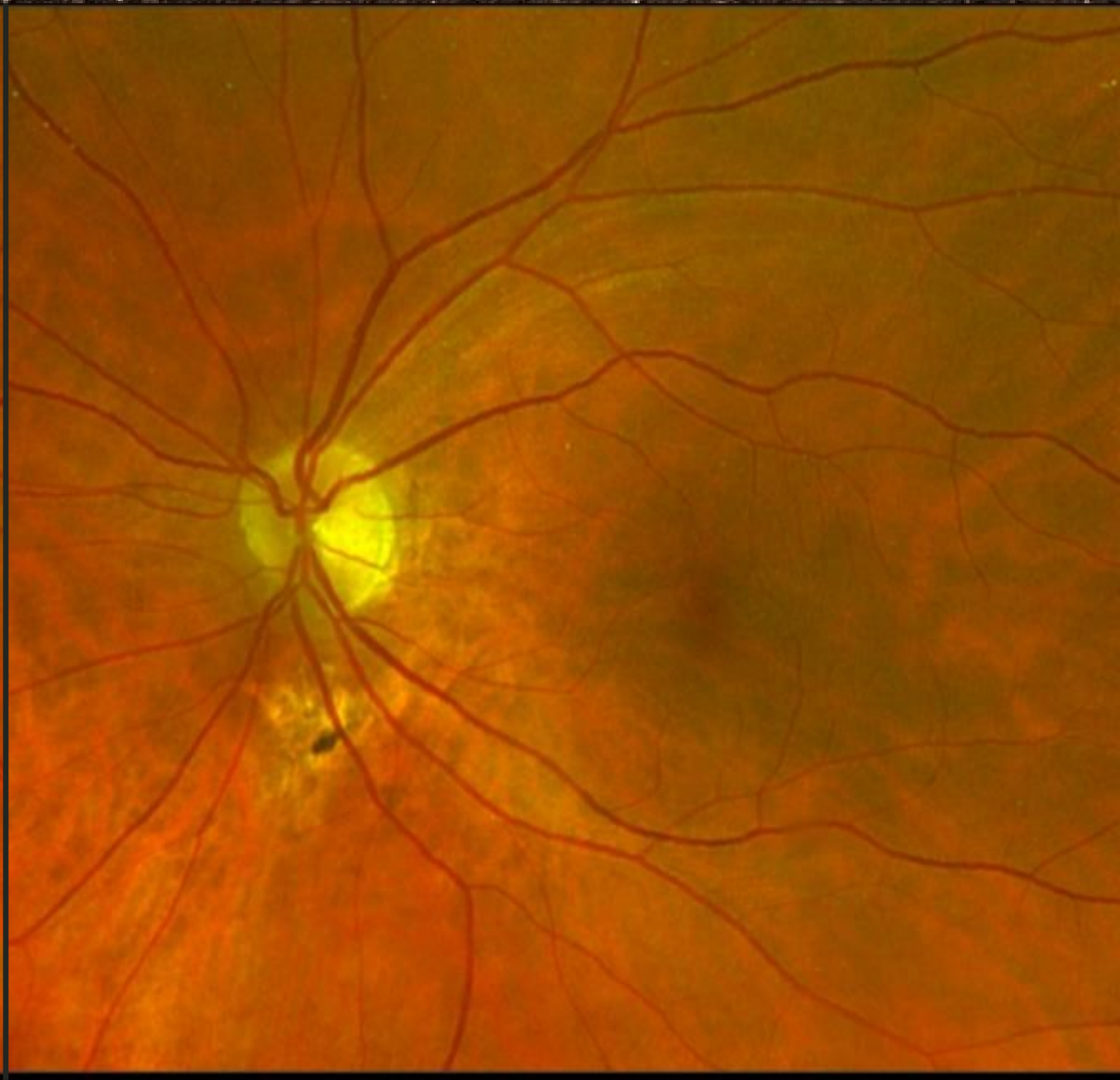
↑10 mmHg
from 1yr ago

Case #9

- C/D: 0.6 OD, 0.5 OS
- Mild ERM OD
- Gonio: D4of OU
- CCT: 572 OD, 576 OS
- IMP: Glaucoma suspect
- PLAN: Schedule OCT & VF

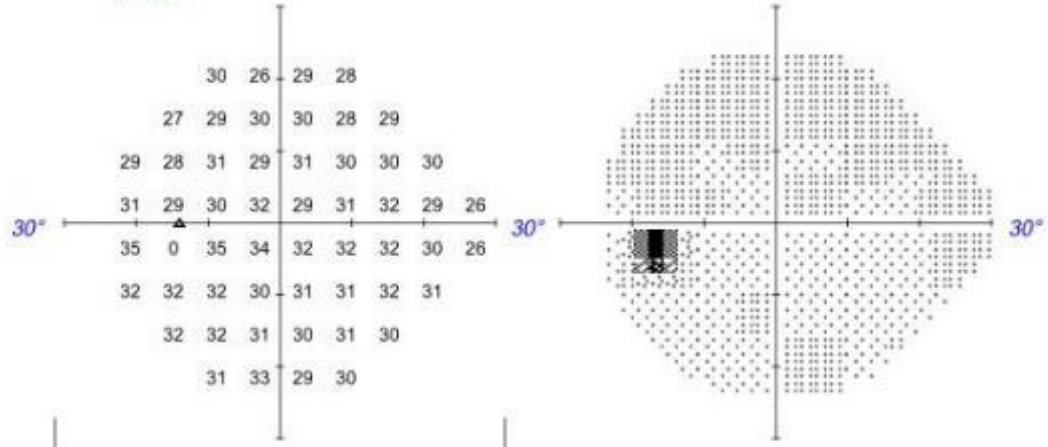
Fundus photos taken with OPTOS camera



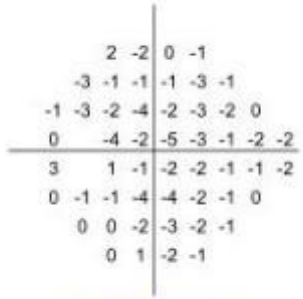


OS Single Field Analysis — Central 24-2 Threshold Test

Fixation Monitor:	Gaze/Blind Spot	Stimulus:	III, White	Date:	Dec 07, 2021
Fixation Target:	Central	Background:	31.5 asb	Time:	10:43 AM
Fixation Losses:	7/15 XX	Strategy:	SITA Standard	Age:	69
False POS Errors:	3%	Pupil Diameter:	4.6 mm *		
False NEG Errors:	0%	Visual Acuity:			
Test Duration:	05:16	Rx:	+1.50 DS		
Fovea:	34 dB				



Total Deviation



Pattern Deviation

GHT: Borderline

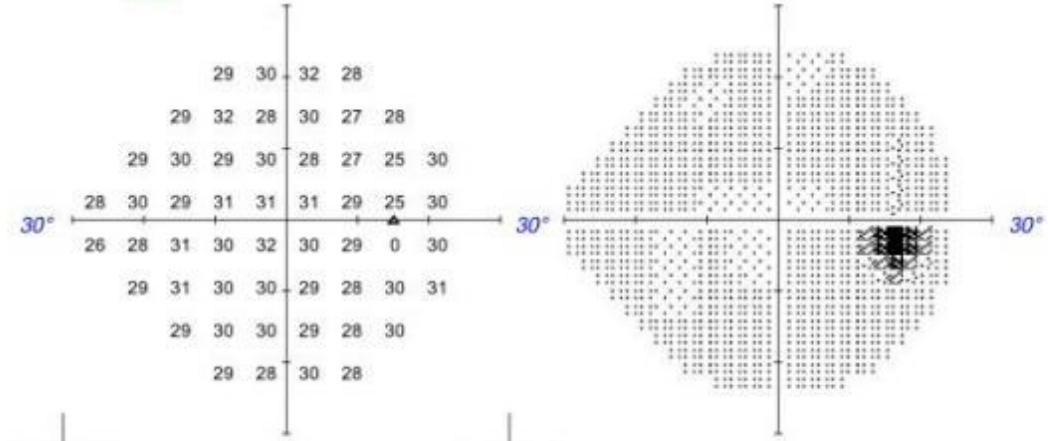
VFI24-2: 99%
MD24-2: 0.78 dB
PSD24-2: 1.65 dB

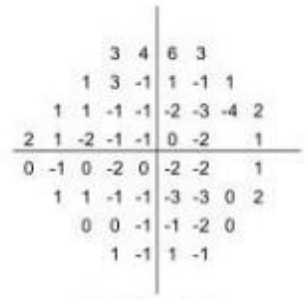
*** Low Test Reliability ***

:: P < 5%
P < 2%
P < 1%
P < 0.5%

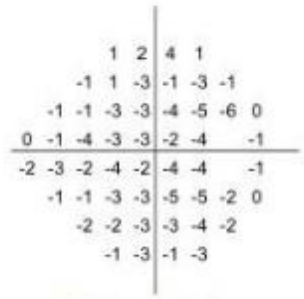
OD Single Field Analysis — Central 24-2 Threshold Test

xation Monitor:	Gaze/Blind Spot	Stimulus:	III, White	Date:	Dec 07, 2021
xation Target:	Central	Background:	31.5 asb	Time:	10:31 AM
xation Losses:	1/14	Strategy:	SITA Standard	Age:	69
lse POS Errors:	2%	Pupil Diameter:	5.3 mm *		
lse NEG Errors:	0%	Visual Acuity:			
st Duration:	04:53	Rx:	+2.75 DS -1.25 DC X 70		
vea:	33 dB				





Total Deviation

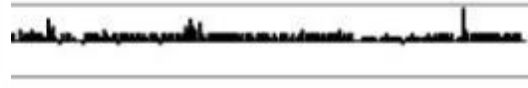


Pattern Deviation

GHT: Borderline

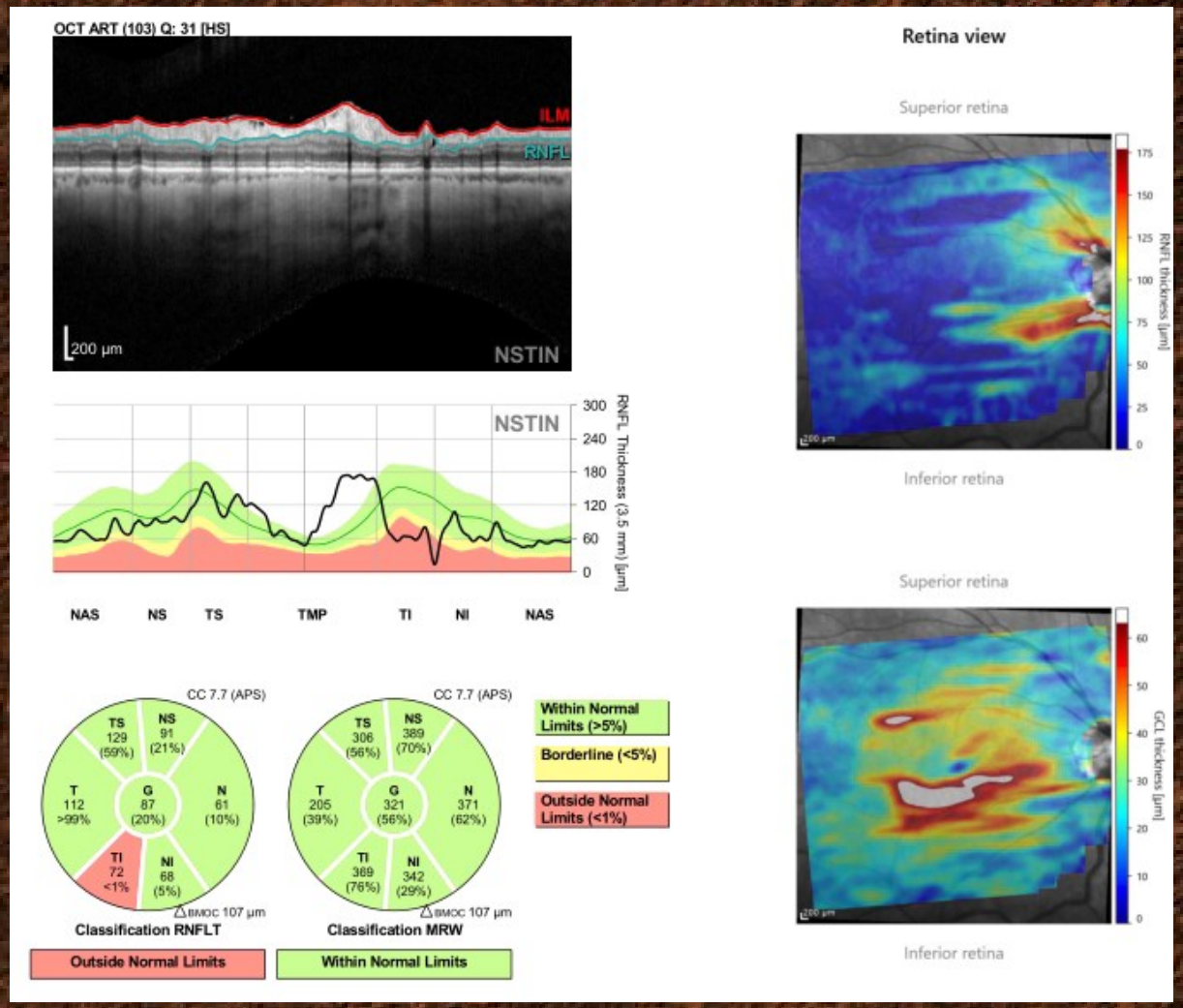
VFI24-2: 98%
MD24-2: -0.44 dB
PSD24-2: 1.74 dB

:: P < 5%
P < 2%
P < 1%
P < 0.5%

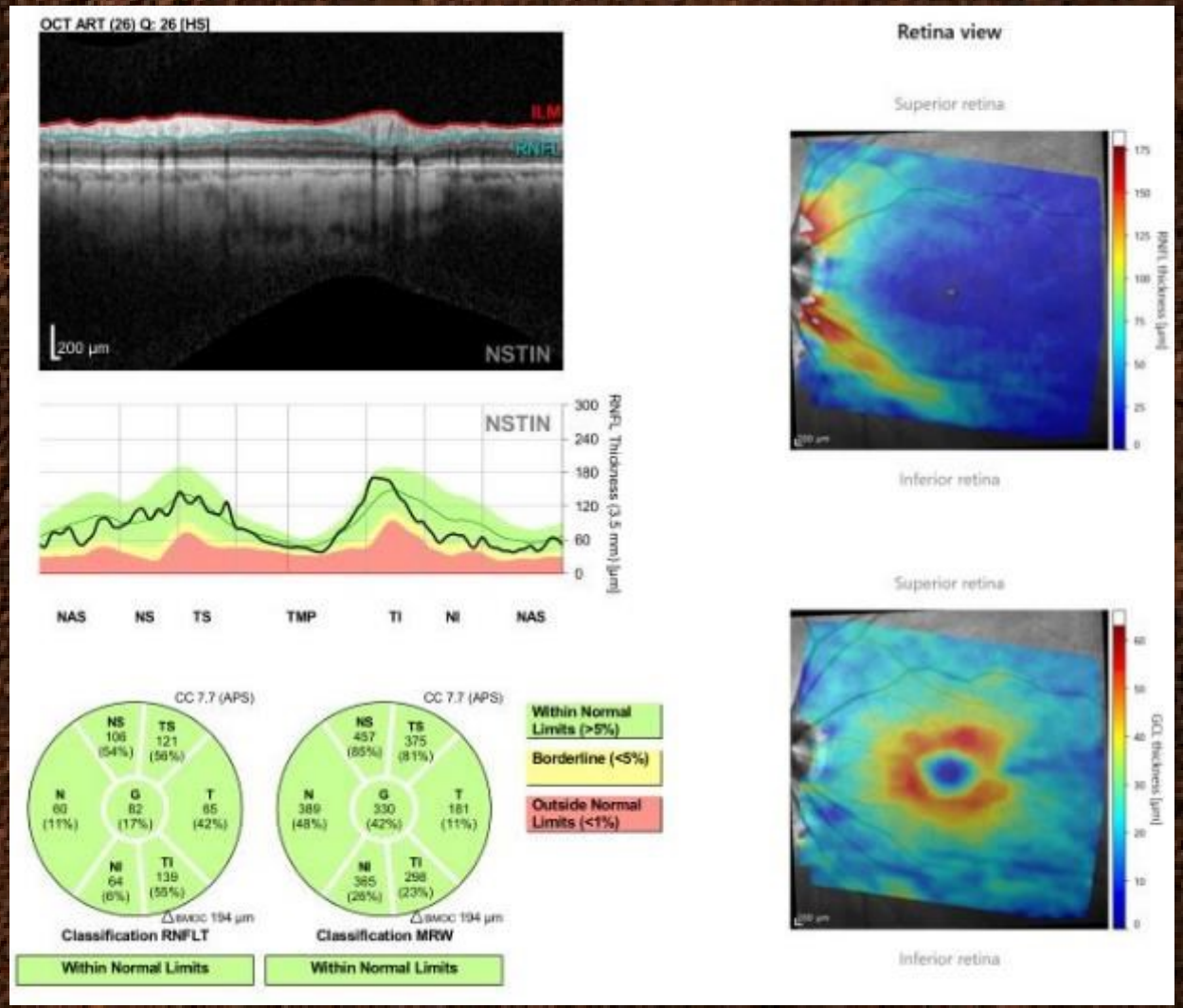


Hood report reveals effect of ERM OD

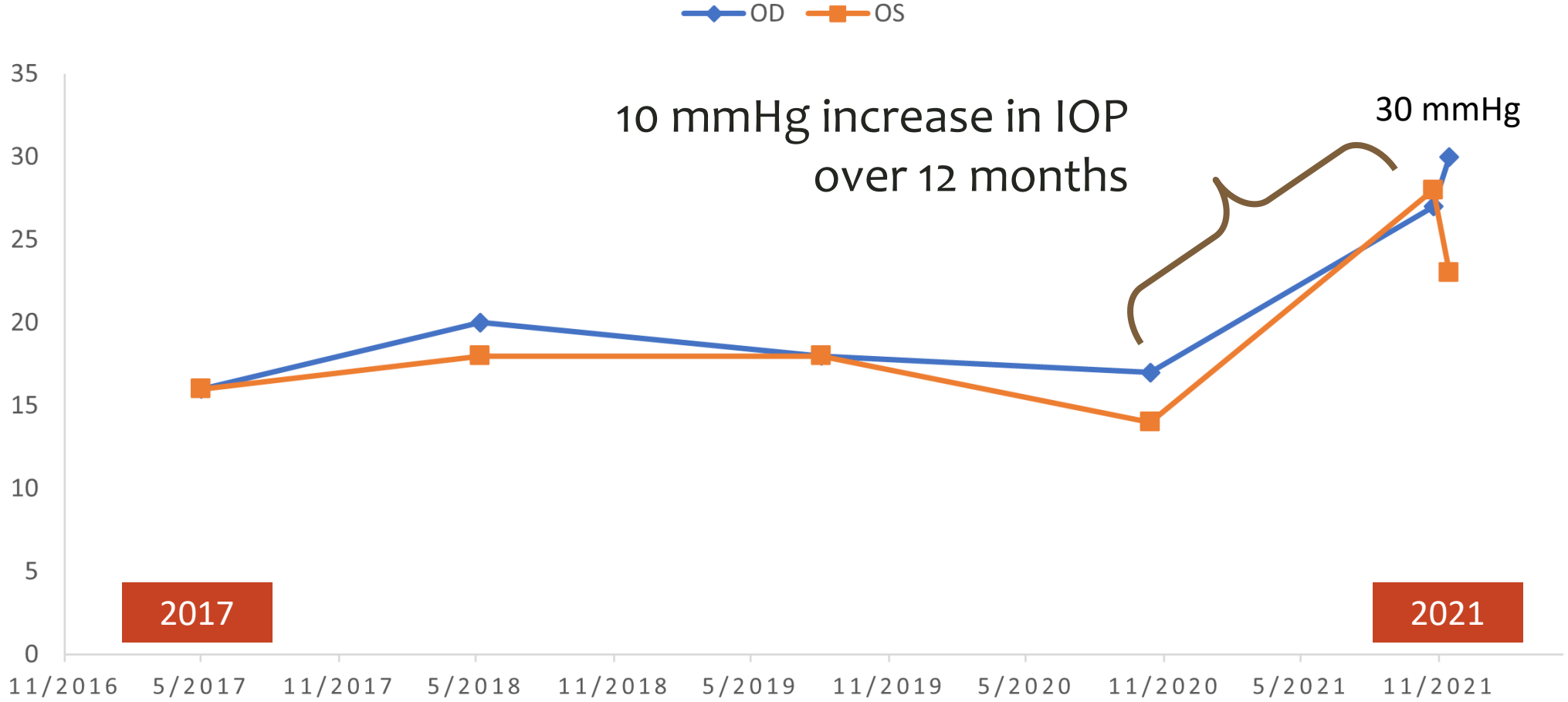
OD



OS



IOP PROFILE



	5/24/2017	5/30/2018	8/26/2019	11/5/2020	11/16/2021	12/7/2021
OD	16	20	18	17	27	30
OS	16	18	18	14	28	23

What is going on here?

https://app.tophat.com/e/777538

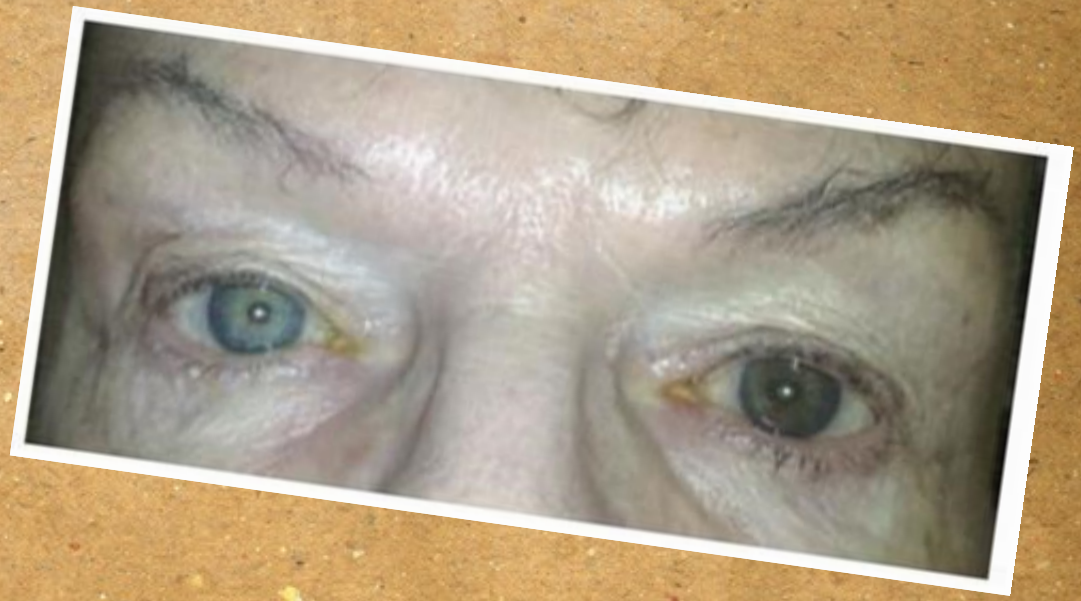
- Angle Closure
- Start on steroid medication
- Previously undetected large diurnal variation
- Discontinuation of systemic beta blocker
- Influence of other drugs or activities

Angle closure	Always suspect angle closure in patients with sudden changes in IOP
Steroid	Any steroid by any route of administration can elevate IOP
Diurnal variation	Normal: 2-6 mmHg. Checking IOP on another day, Water drinking test or iCare HOME to investigate
Beta blocker	Systemic beta blockers can affect IOP same as topical
Other factors	Caffeine, ethanol, marijuana, exercise

Source: lattise.com

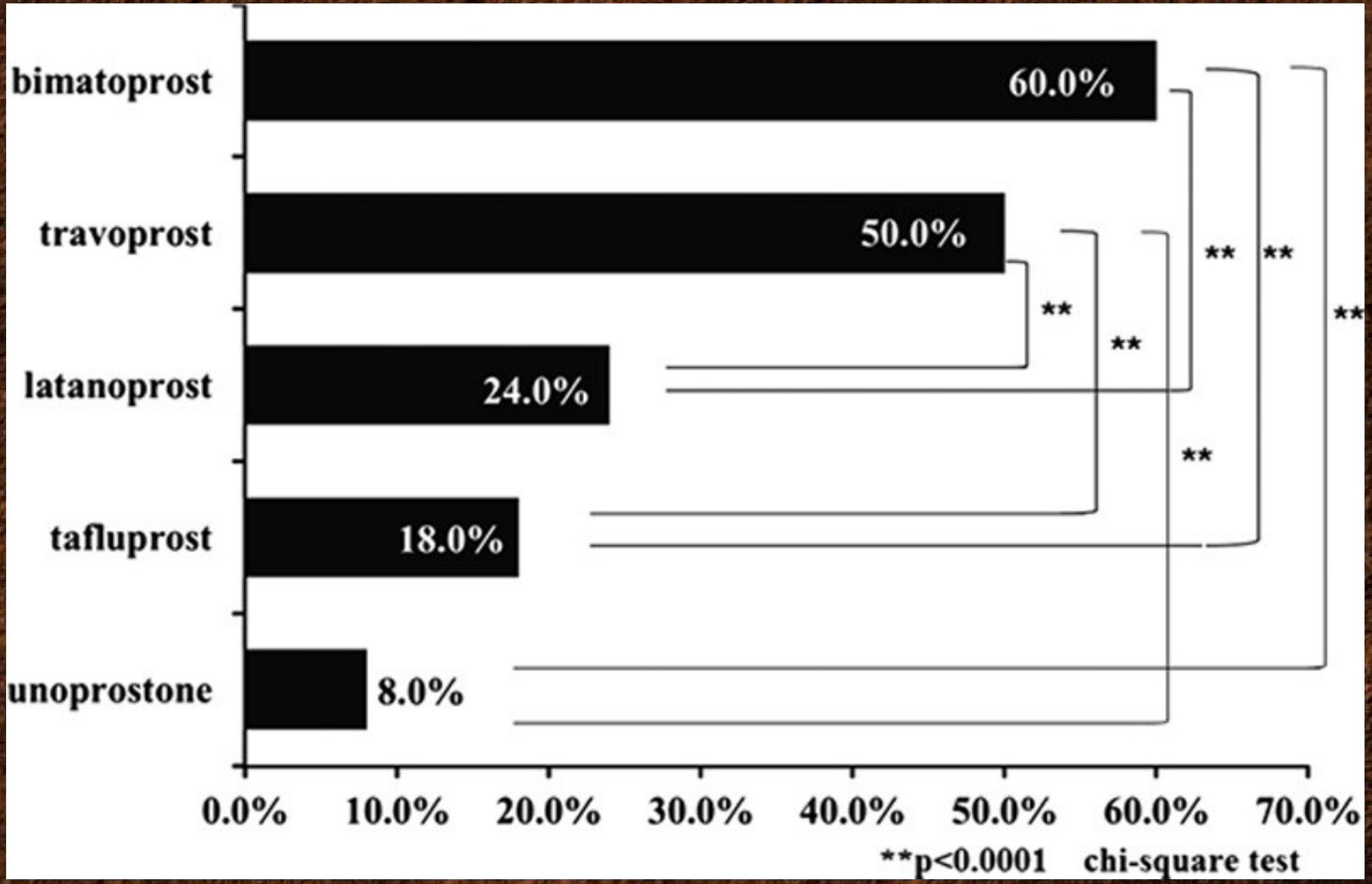
Latisse

- Latisse == Generic Lumigan == bimatoprost 0.03%
- Latisse has all the same clinical effects as Lumigan
- Adverse effects with Latisse:
  conjunctival hyperemia and irritation,
  increase in iris pigmentation,
  periocular skin pigmentation,
  and periorbital fat atrophy



Latisse is applied to the upper lid only.

Excess solution is immediately removed to minimize risk of periorbitopathy

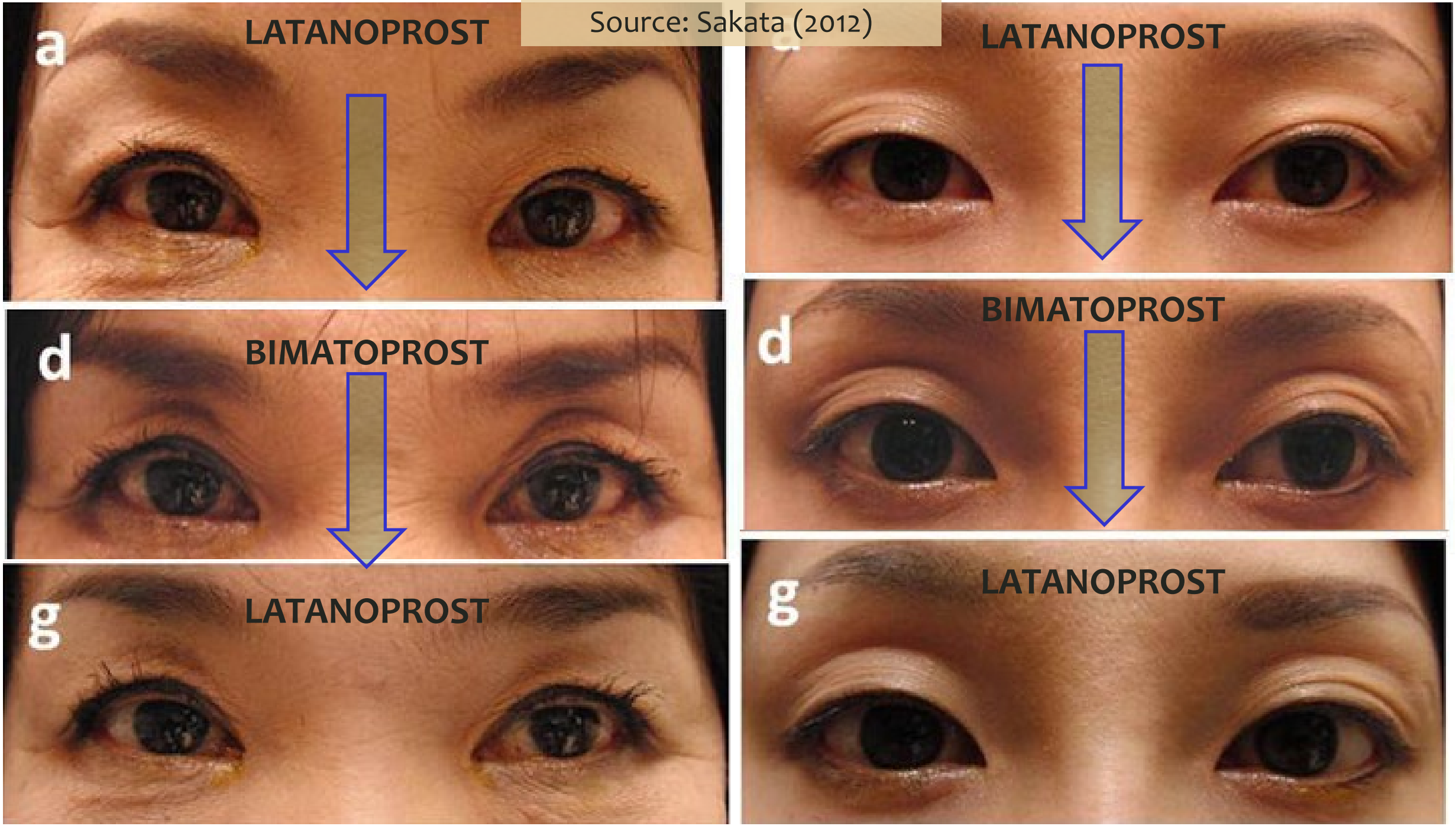


Frequency of upper lid sulcus deepening

There are significant differences in the incidence of PAP among various PGAs

Source: Kenji (2013)

Source: Sakata (2012)



Generic

Name-Brand

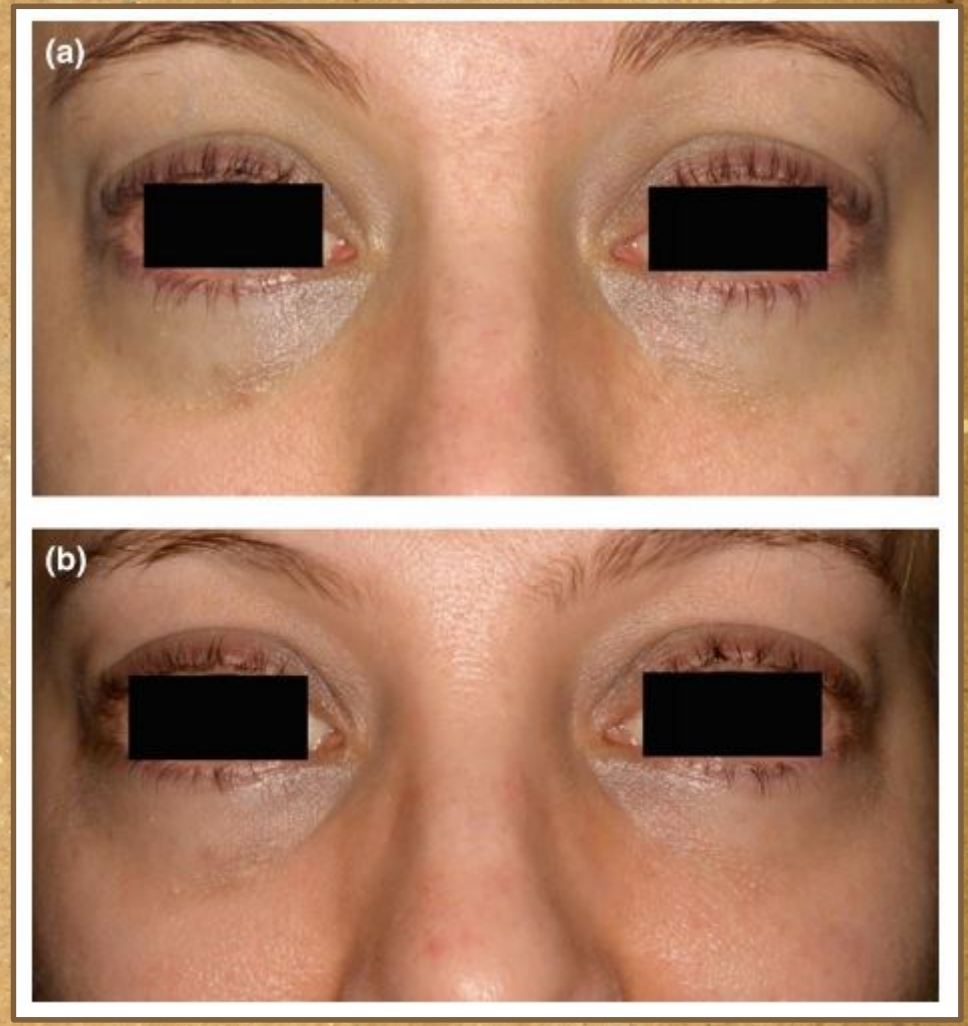
Greater IOP lowering
More side effects
Less BAK (0.005%)

Less IOP lowering
Fewer side effects
More BAK (0.05%)

Periocular discoloration after using a prostaglandin analog for eyelash enhancement: evaluation with reflectance confocal microscopy

Orsolya N Horváth, MD, Valerie Letulé, MD, Thomas Ruzicka, MD, Thomas Herzinger, MD, Ilana Goldscheider, MD, & Tanja von Braunmühl, MD

Department of Dermatology and Allergology, Ludwig Maximilian University, Munich, Germany



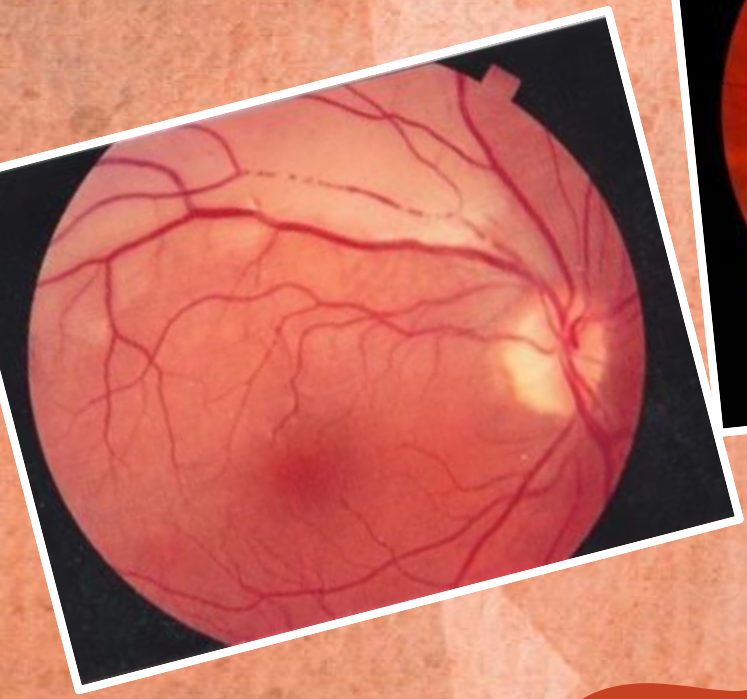
OTC eyelash serums may contain isopropyl cloprostenate, a PGA that can trigger the same periorbital changes seen with bimatoprost.

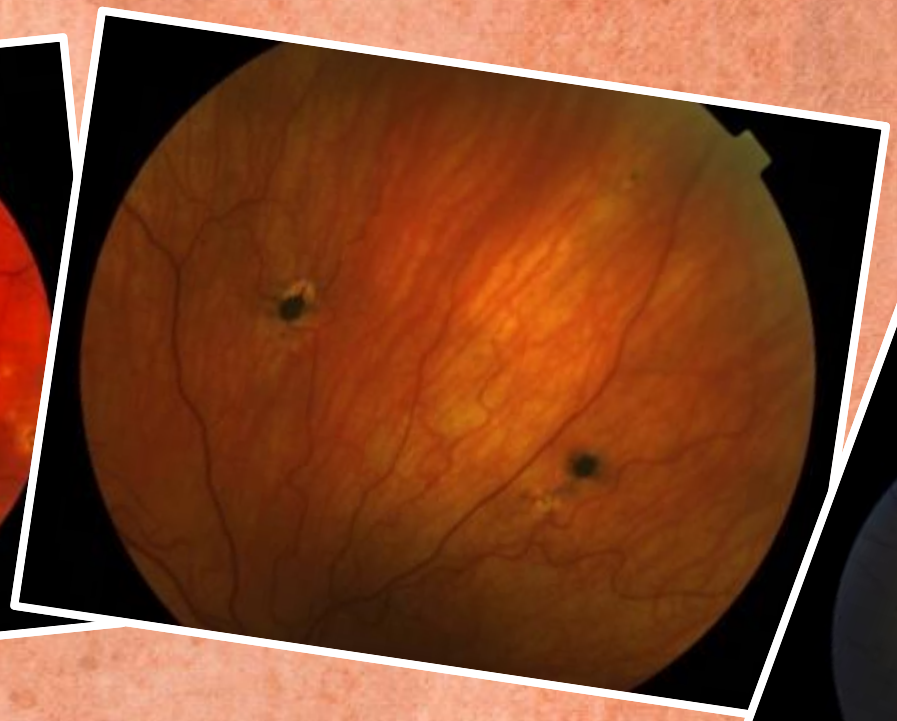
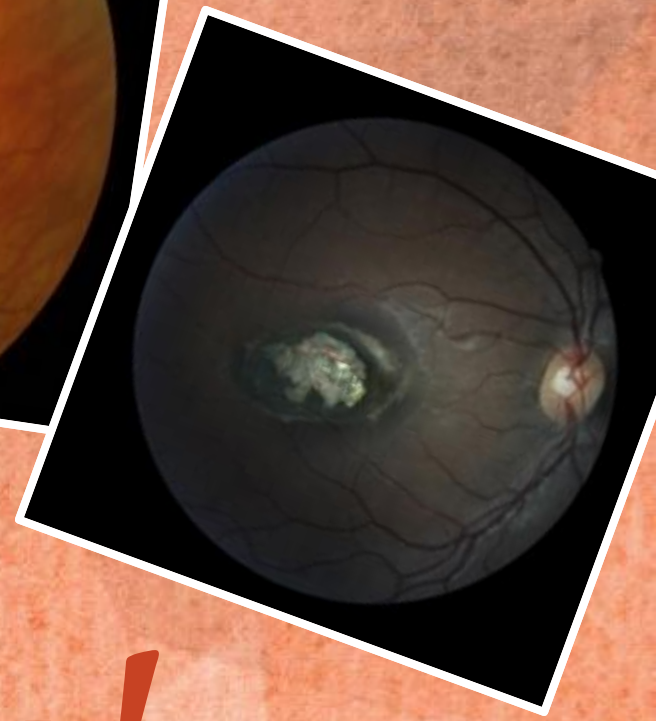
All have been withdrawn by FDA(?)

PMID: 27595988

Take Home Message

- Latisse can significantly affect IOP
- Bimatoprost is more frequently associated with periorbitopathy than latanoprost
- Periorbitopathy improves following D/C of PGA, but may not fully resolve
- OTC products containing isopropyl cloprostenate can induce periorbitopathy



Thank You!