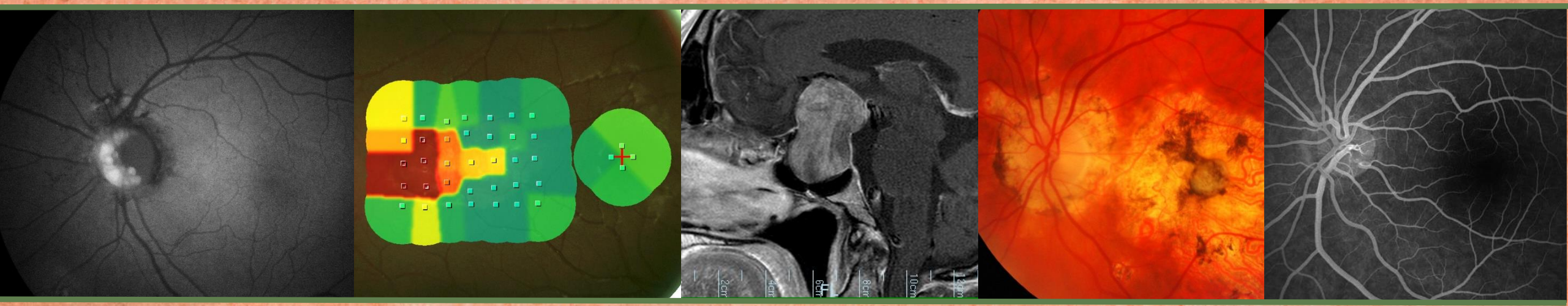
*Grand Rounds*

# MULTIMODAL DIAGNOSTICS



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# Multimodal Grand Rounds

- **Online notes**
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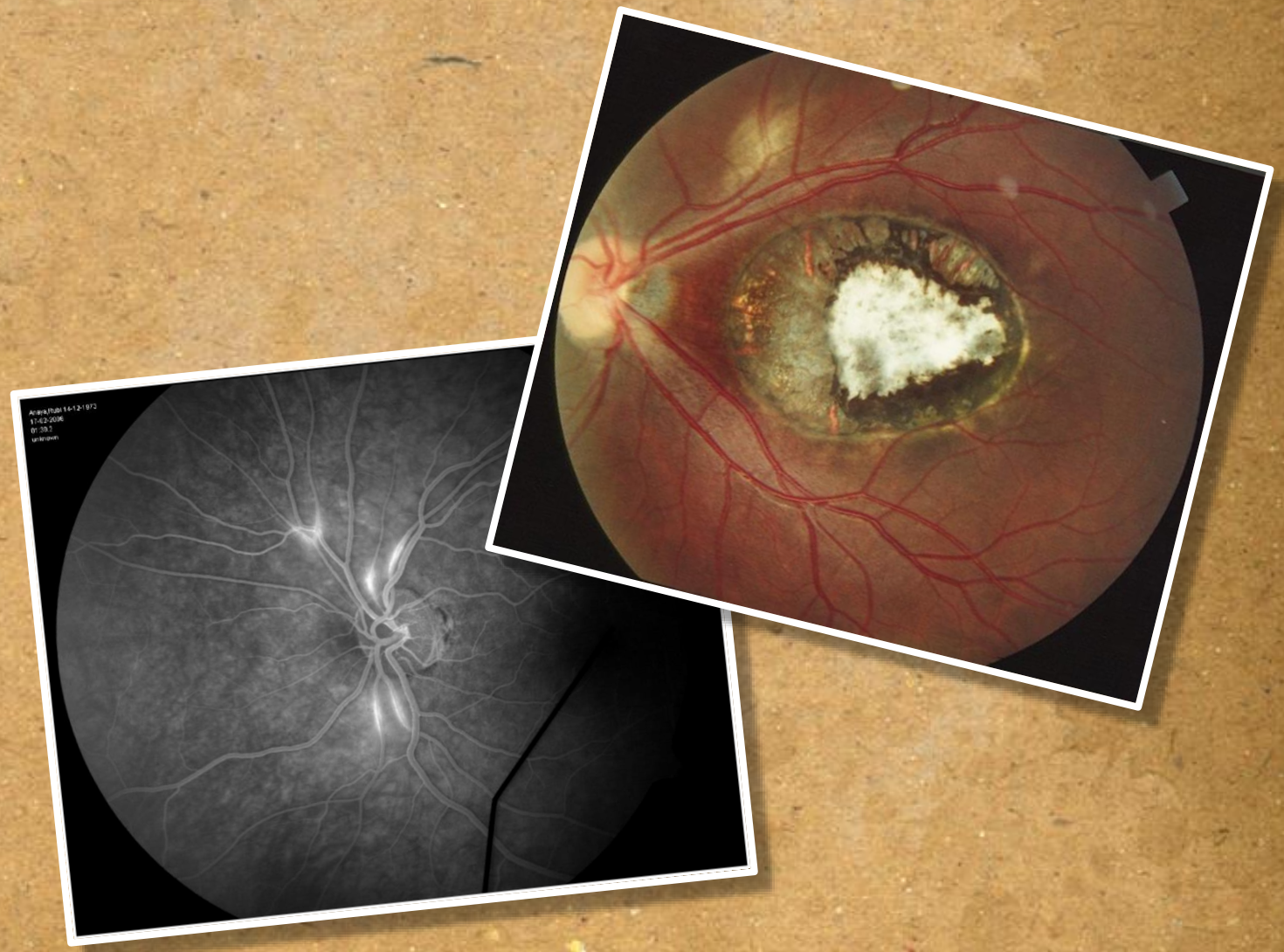
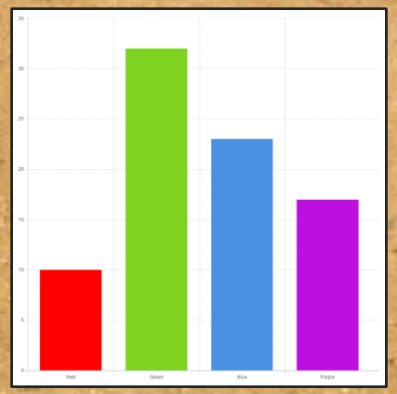
- **Email us**
  - rctrevin@iu.edu
- **Disclosures**
  - None



# Interactive Presentation

- Vote on diagnosis and management options
- Enter below address in a web browser
- **https://app.tophat.com/e/777538**
- Click “Enter as a Guest”
- Click “Mobile Site”



# Battle of the Superheros!

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

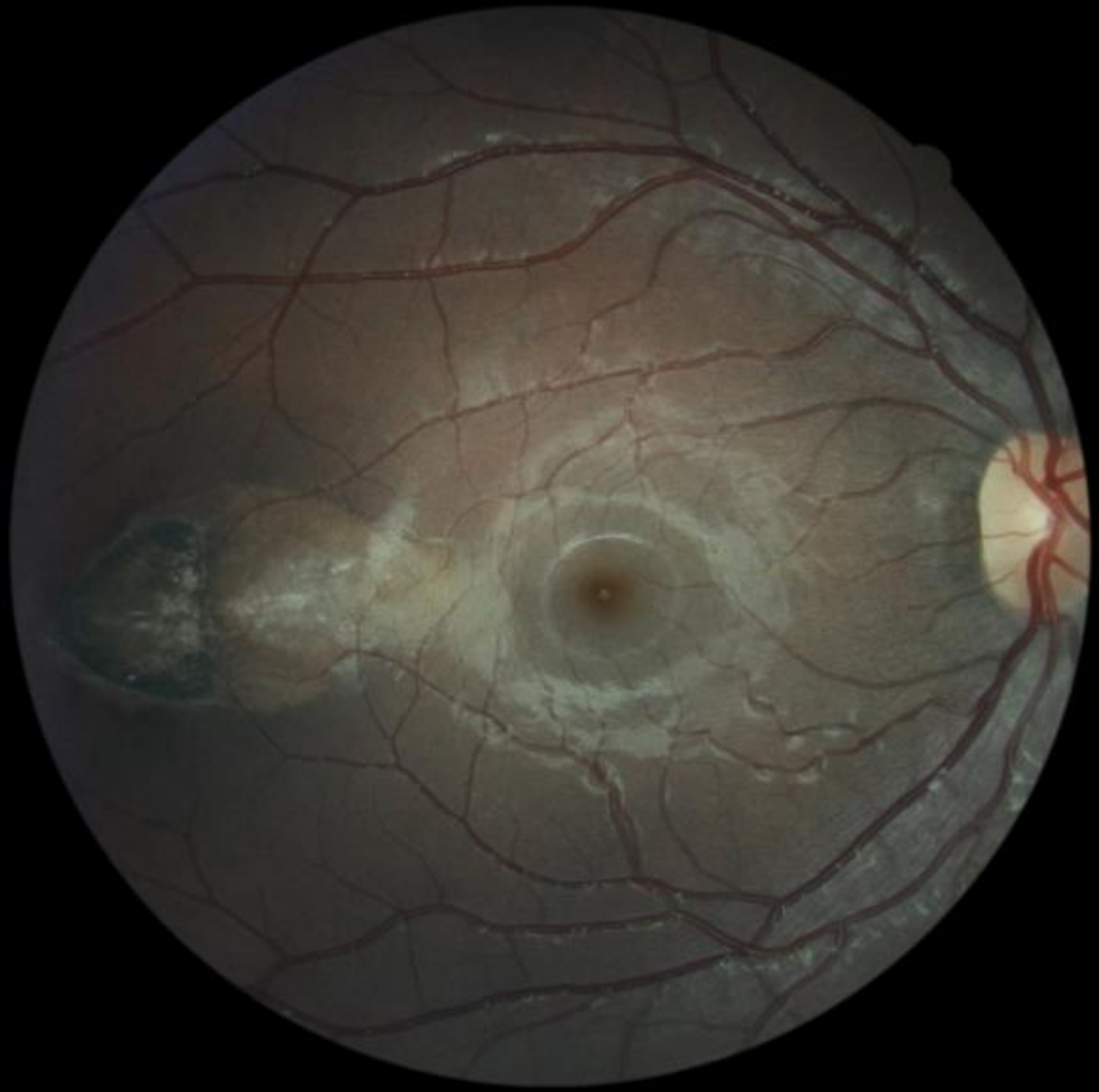

| | |
|---|---|
| Superman | A |
| Batman | B |
| Captain America | C |
| Wonder Woman | D |

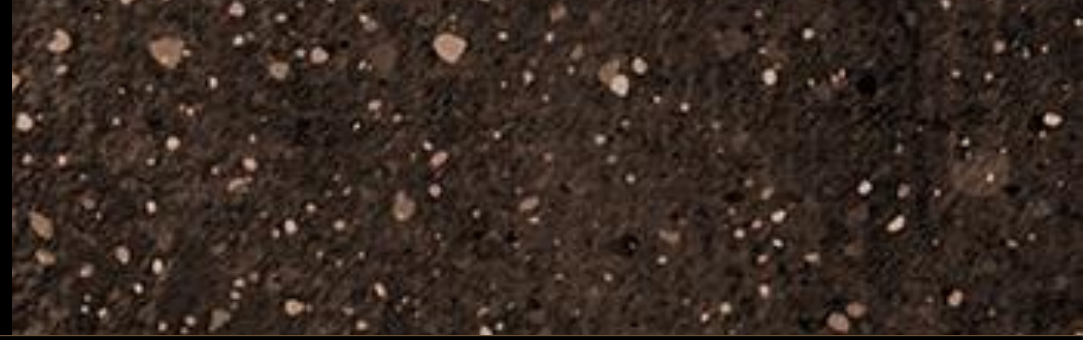
# CASE #1

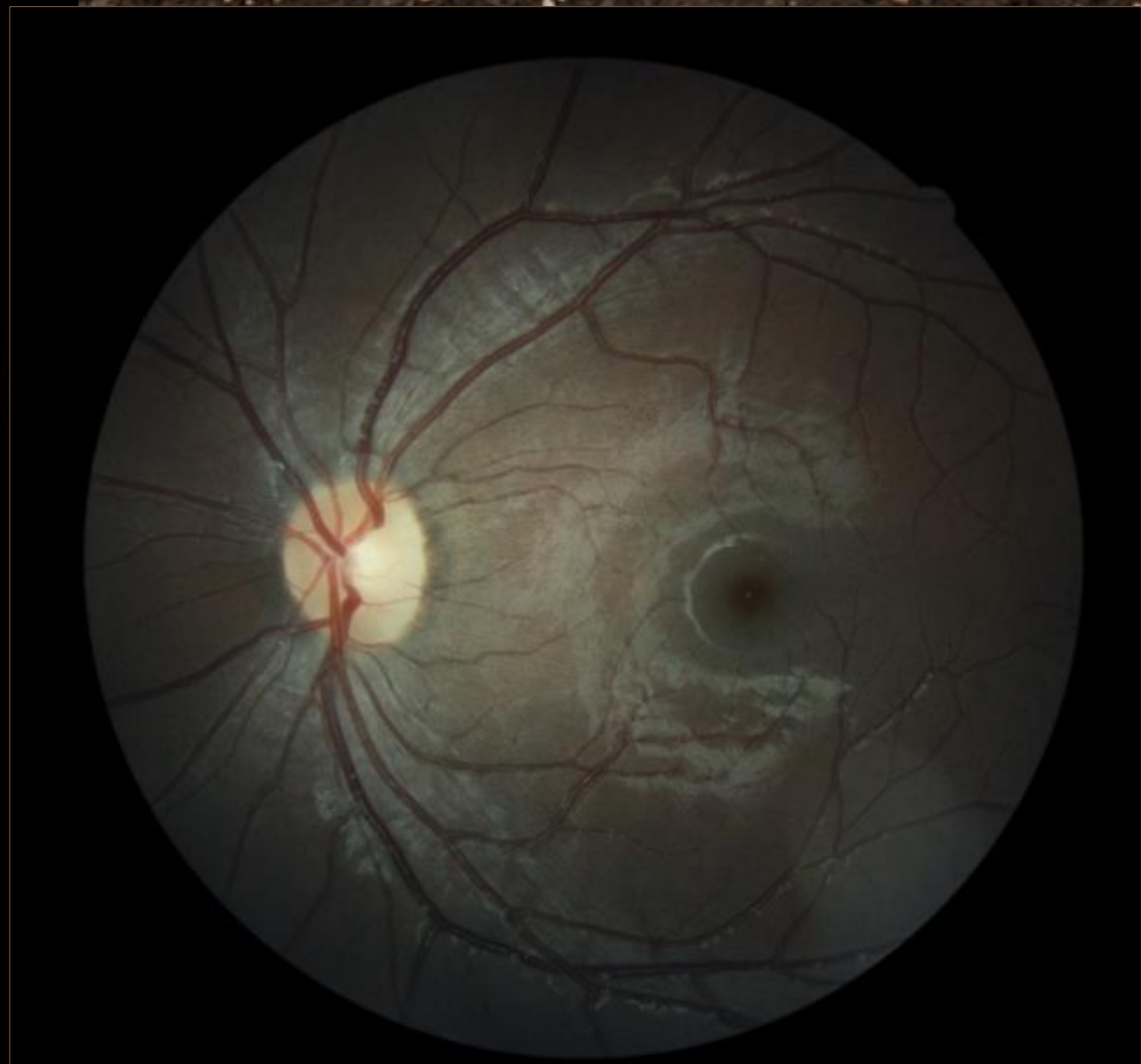
*Don't sink my battleship!*

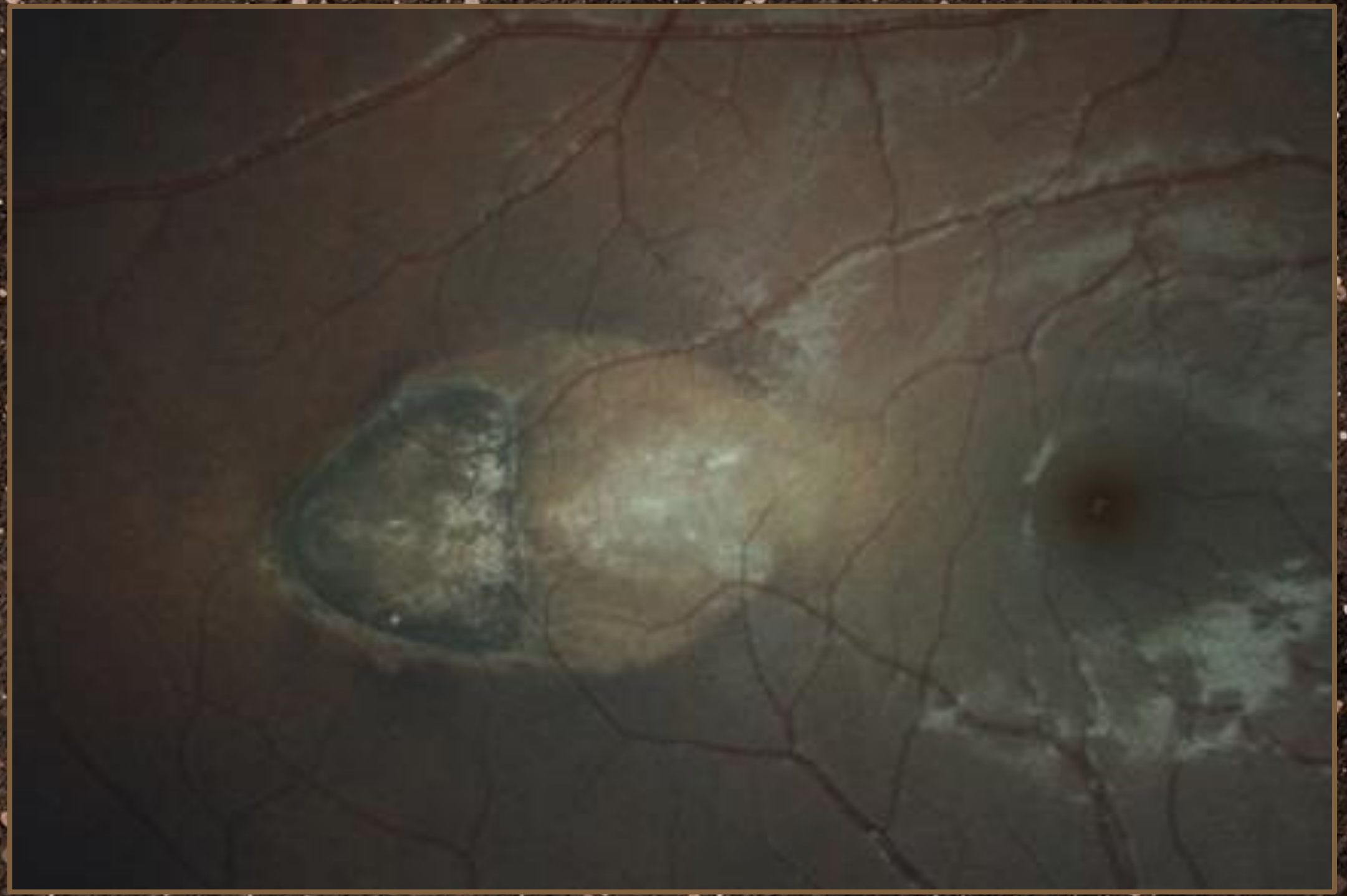
# CASE #1

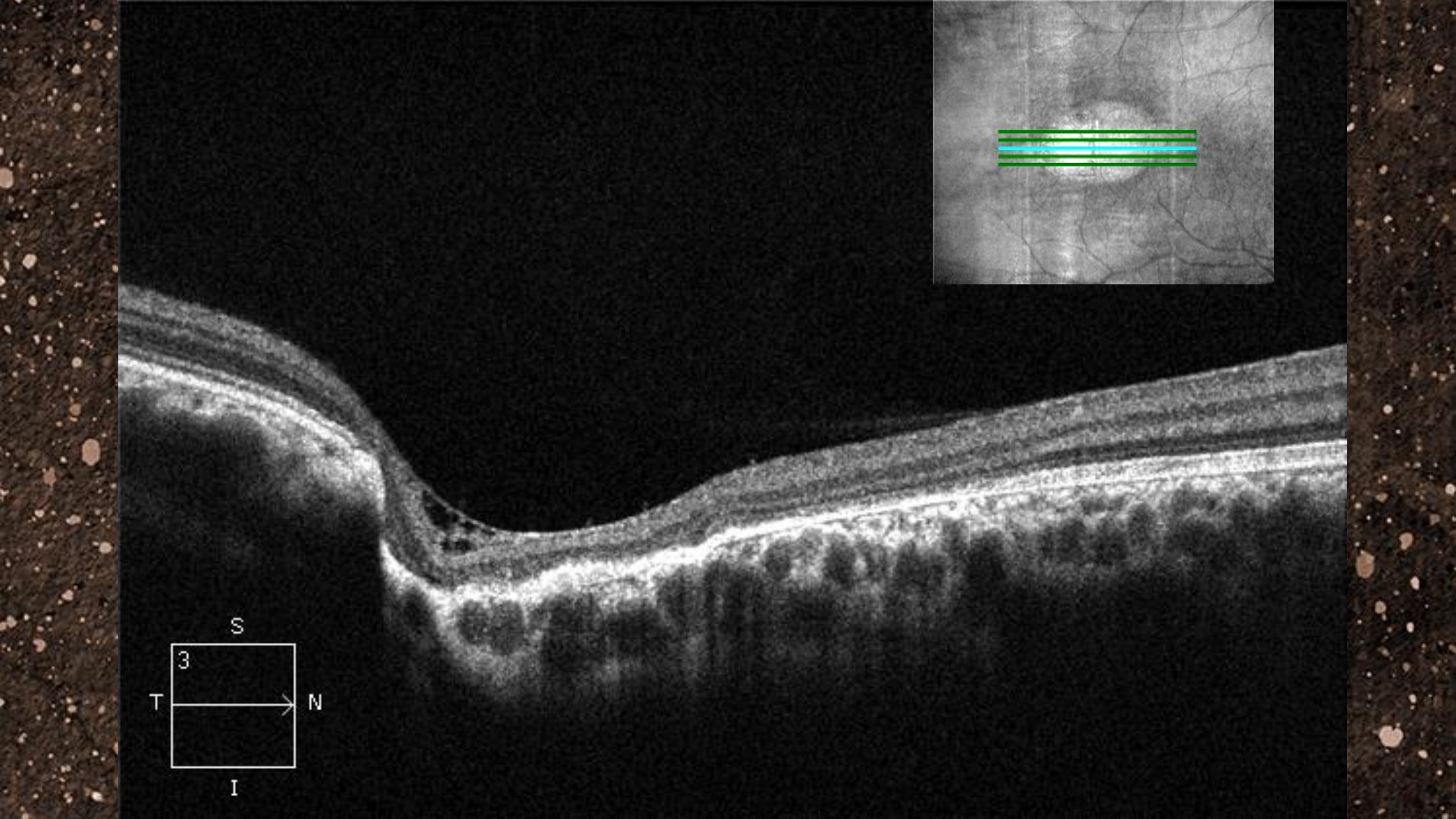
- 25yo East Indian woman presents without complaints for routine exam
- POH: Unremarkable. LEE: 1yr.
- MH: Good health. No medications
- Vision: 20/15 each eye without correction
- Entrance testing: Normal
- External exam: Normal OU
- Tonometry: 14/13 @11:00AM







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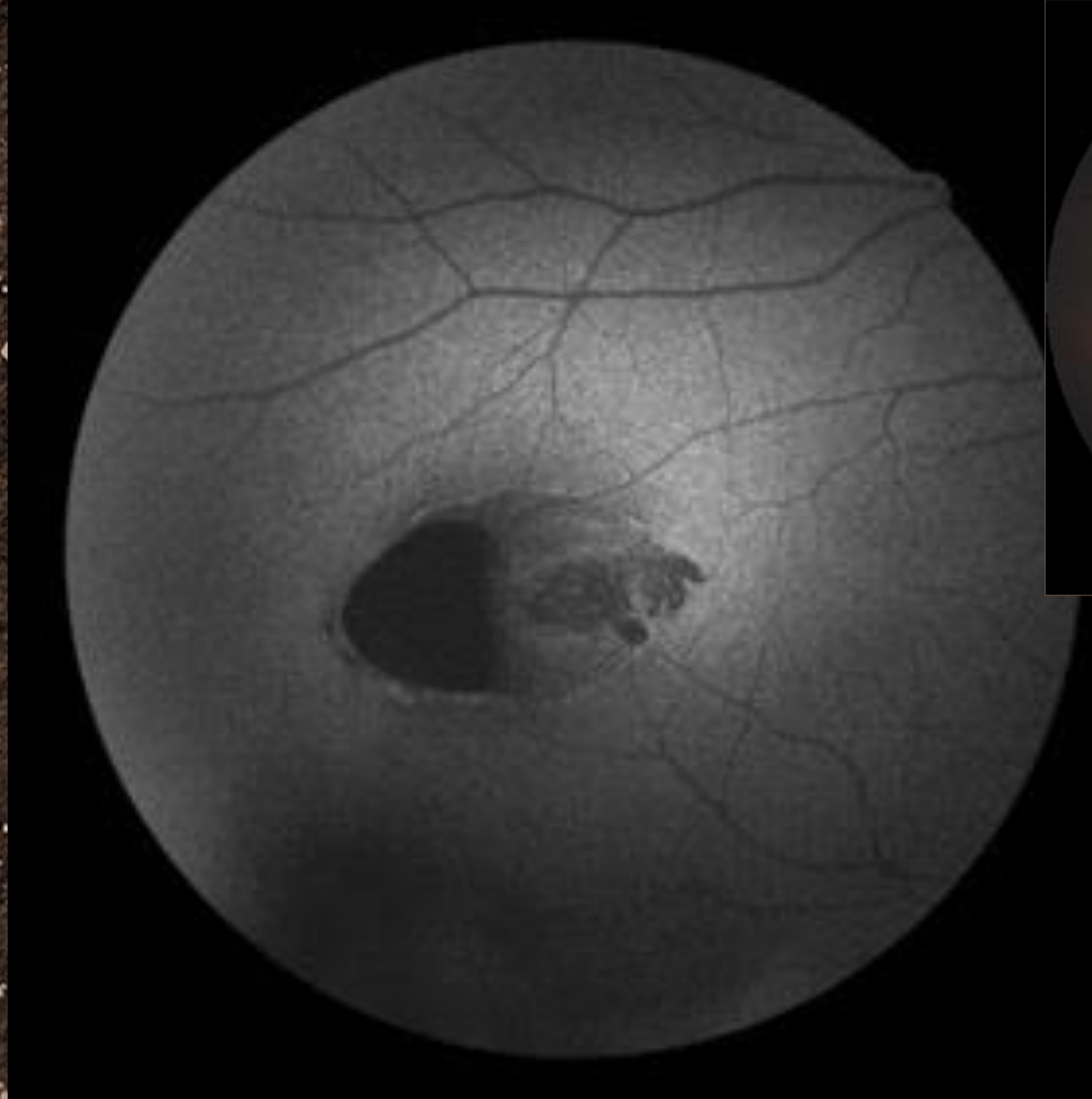
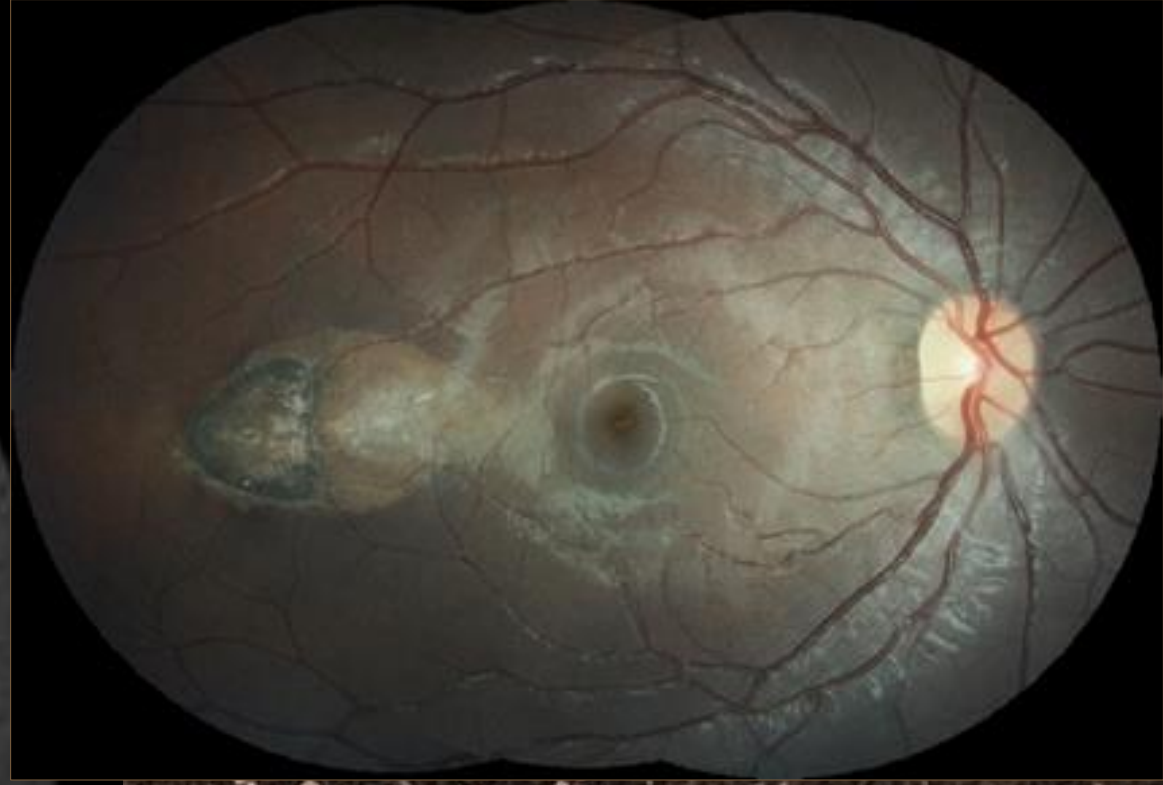
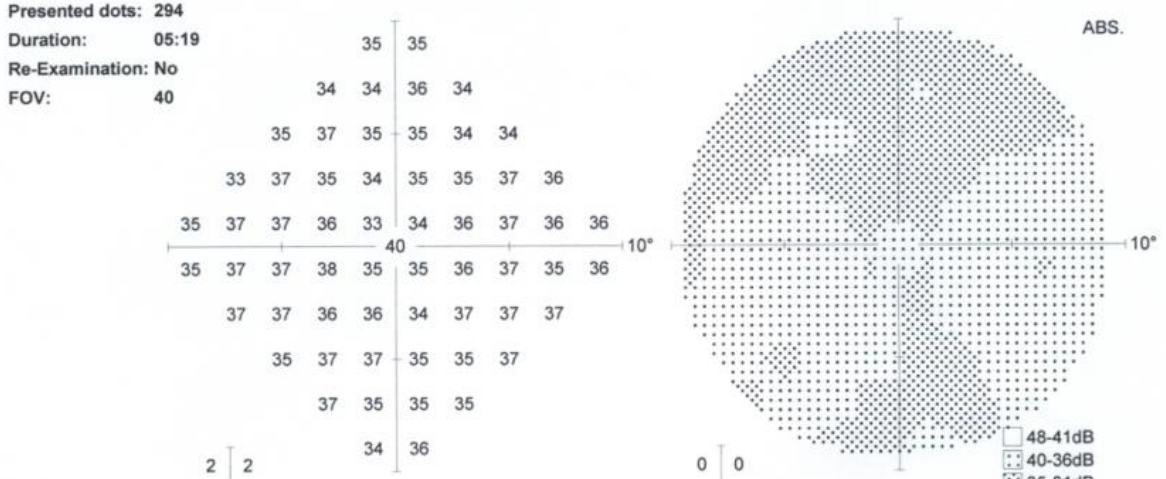




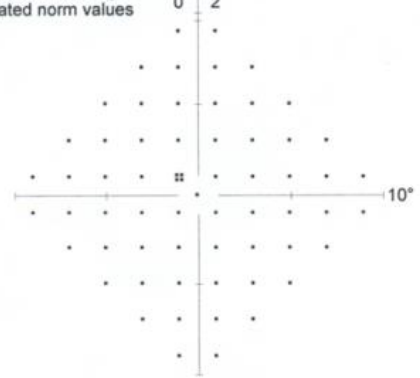
**Short-wavelength fundus autofluorescence** (SW-FAF) uses blue light to stimulate lipofuscin in RPE cells to glow. Regions without viable RPE will appear dark.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 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 | | | | | | |



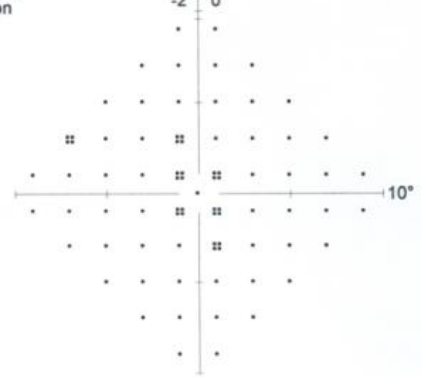


Deviation from age-related norm values





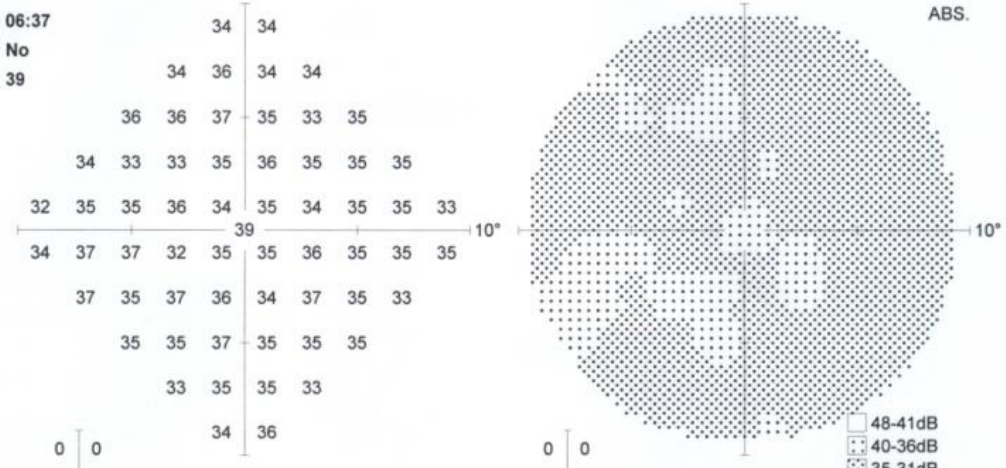
Corrected deviation

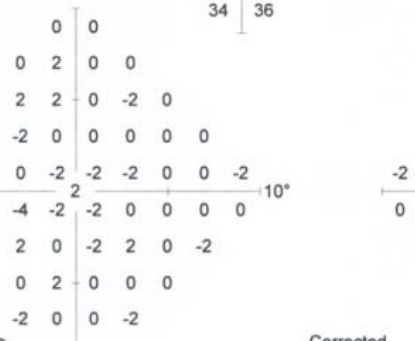



| | |
|---|---|
| MS: | 35.69 (35.02) |
| MD: | 0.67 |
| RF: | 0.98 |
| PSD: | 1.47 |
| SF: | Off |
| CPSD: | --- |

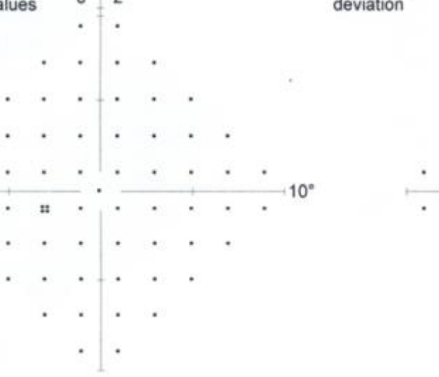
P < 5%
P < 2%
P < 1%
P < 0.5%

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 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 | | | | | | |



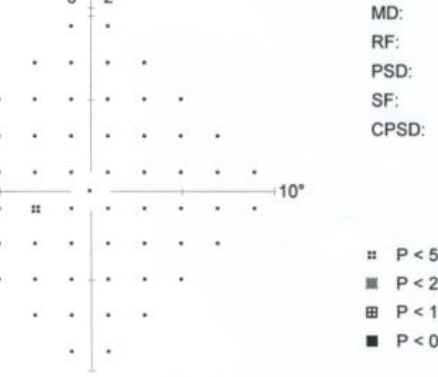




Deviation from age-related norm values





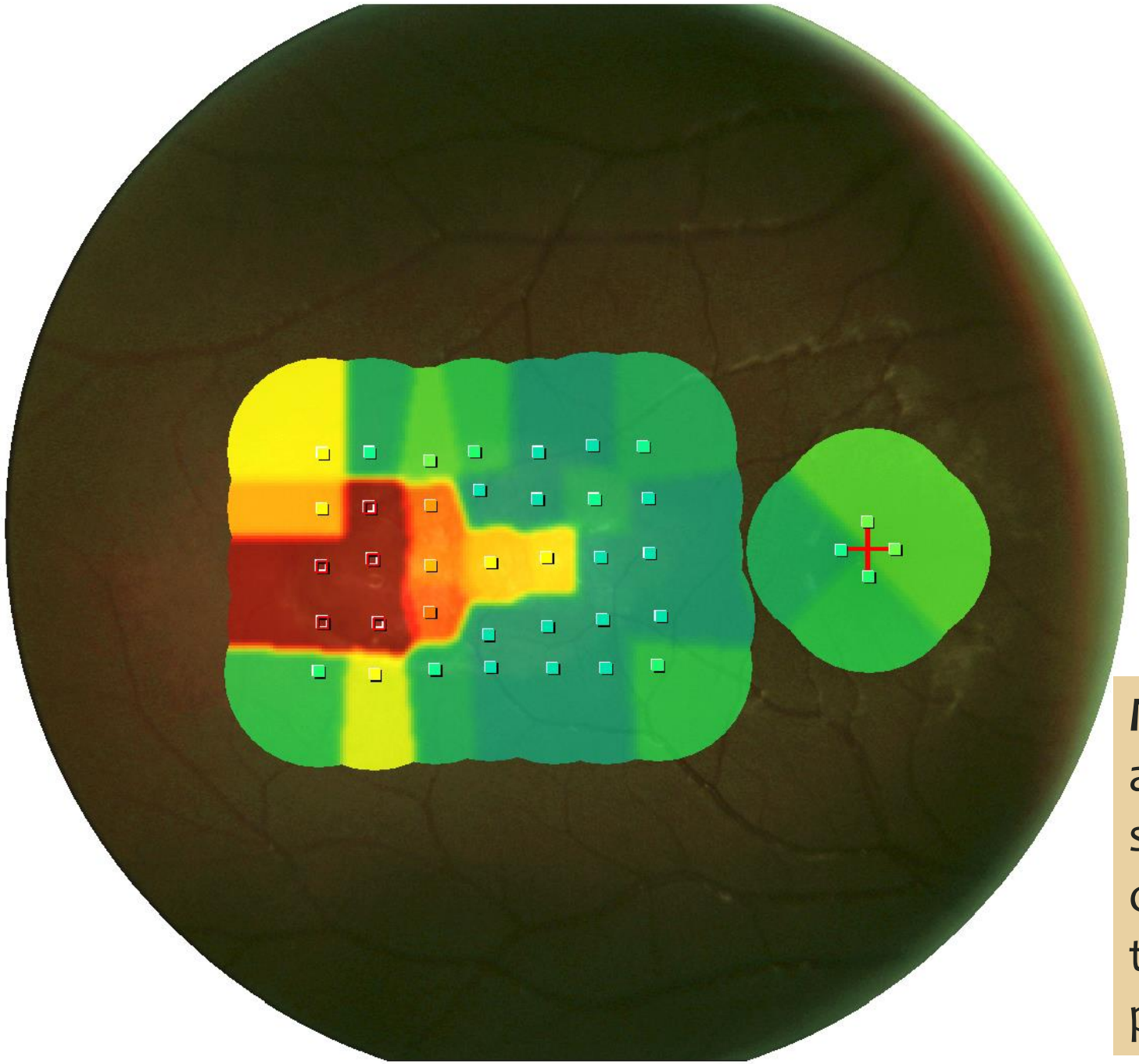
Corrected deviation




| | |
|---|---|
| MS: | 34.92 (35.05) |
| MD: | -0.13 |
| RF: | 1 |
| PSD: | 1.41 |
| SF: | Off |
| CPSD: | --- |

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

Note:



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

# 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** |

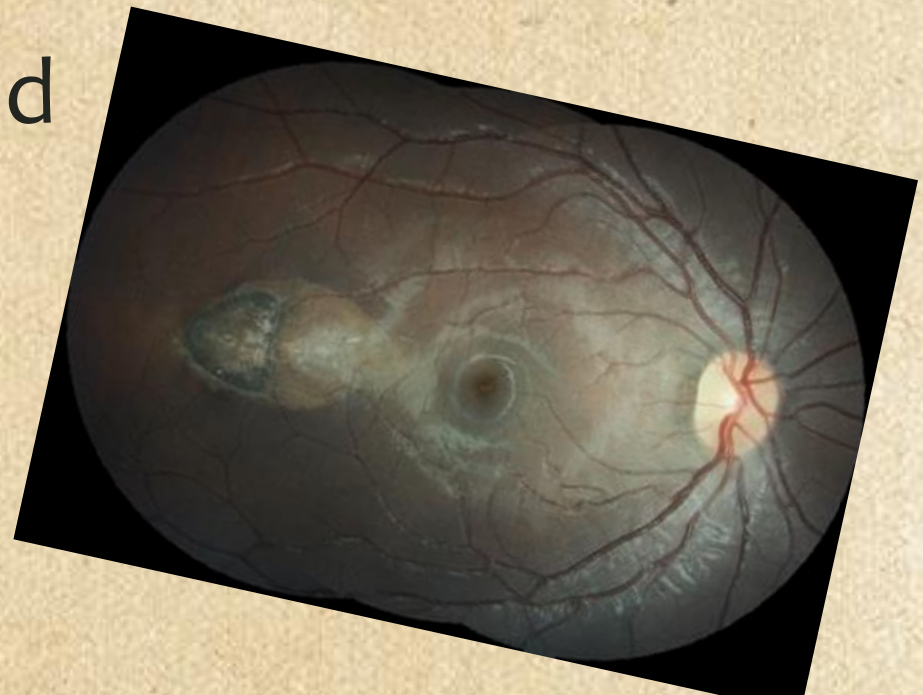
| | |
|---|---|
| **Macular coloboma (macular dysplasia)** | A heterogenous group of developmental abnormalities. Often familial, frequently **bilateral**, systemic abnormalities not uncommon. |
| **Macular dystrophy** | Widespread retinal dysfunction, **bilateral** macular lesions, inheritance pattern, 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

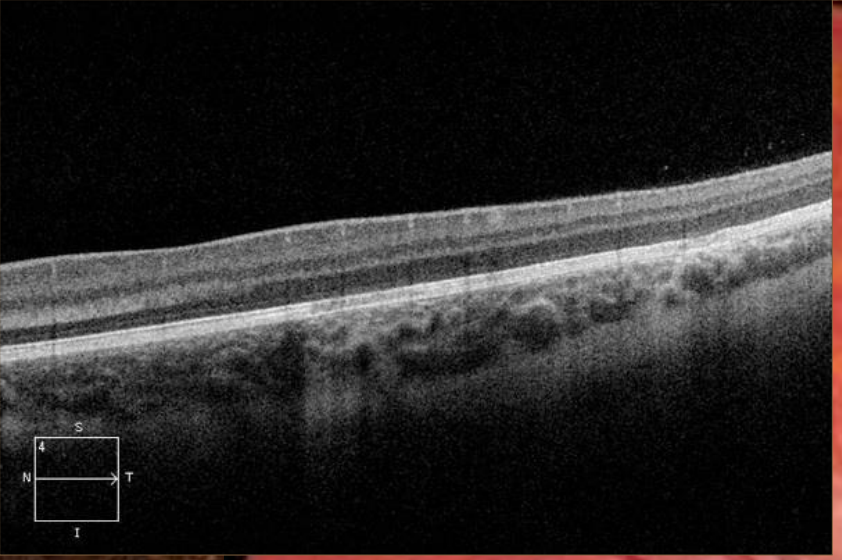
- No specific treatment indicated
- Patient education
- Routine eye care



# Torpedo Maculopathy

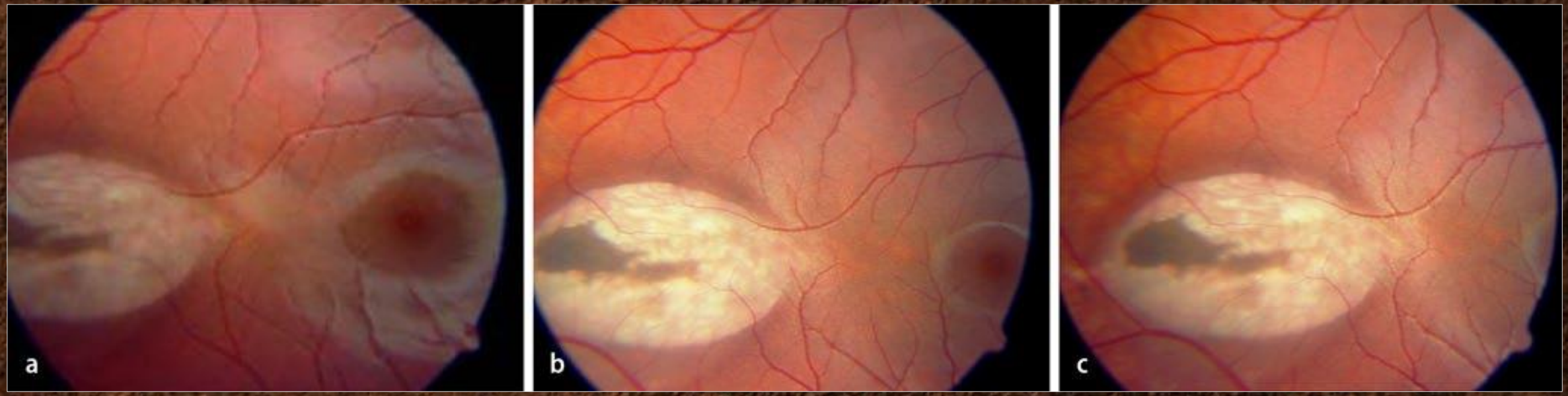
- Congenital, hypopigmented torpedo-shaped lesion in the temporal macula along the horizontal raphe
- Developmental defect of unknown etiology
- May encroach upon fovea, but rarely causes significant loss of vision
- Diagnosis based upon characteristic appearance and nonrandom location
- No treatment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

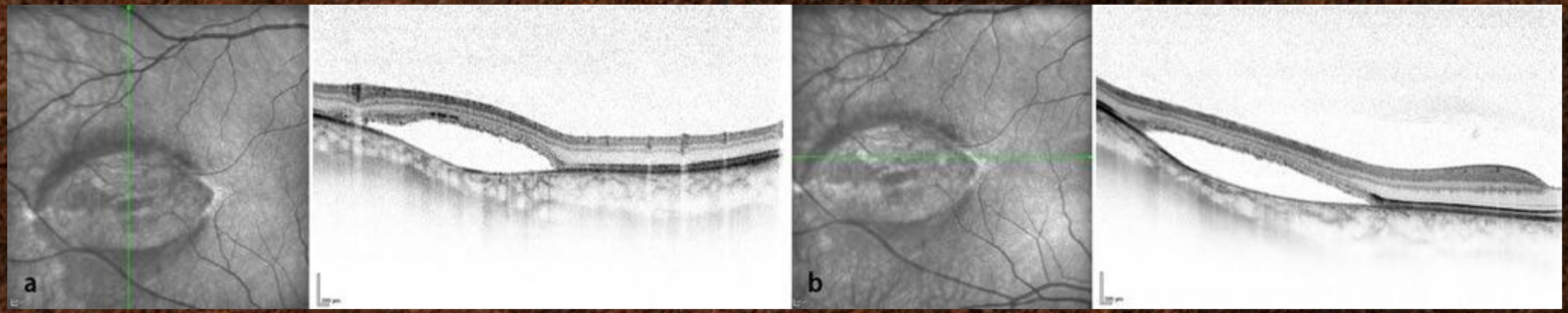
# Examples of torpedo maculopathy



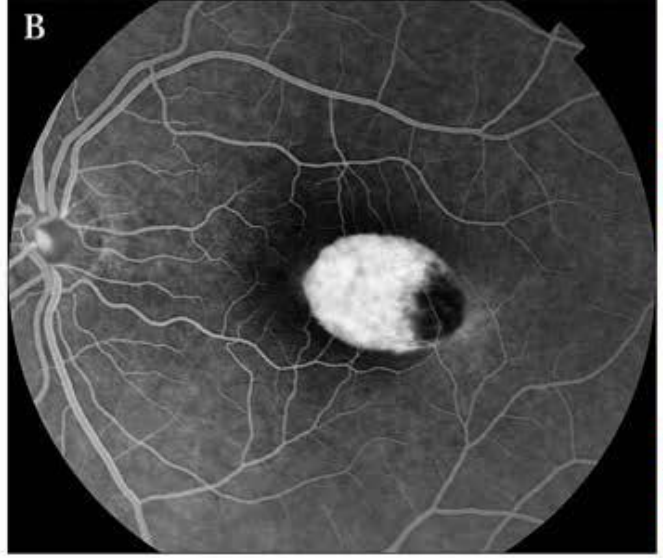

West Coast Retina, 2010

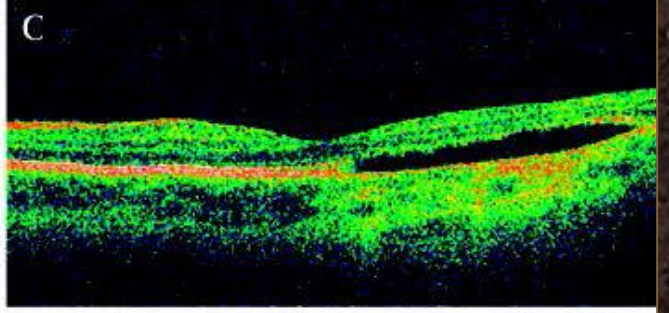
# Examples of torpedo maculopathy

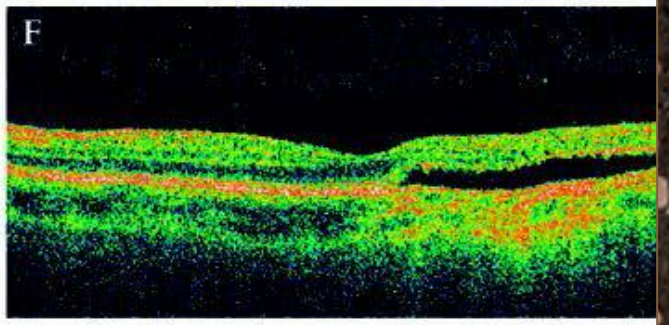


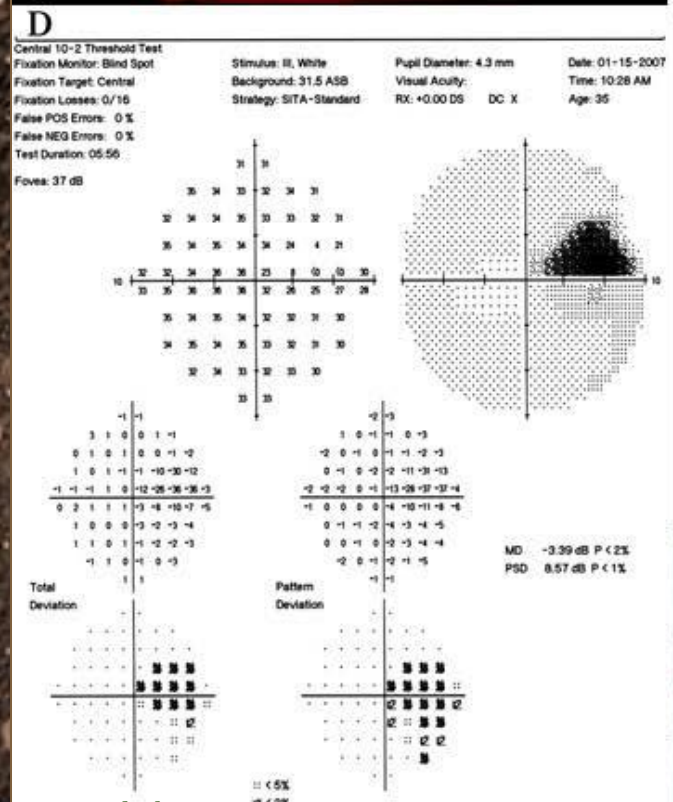



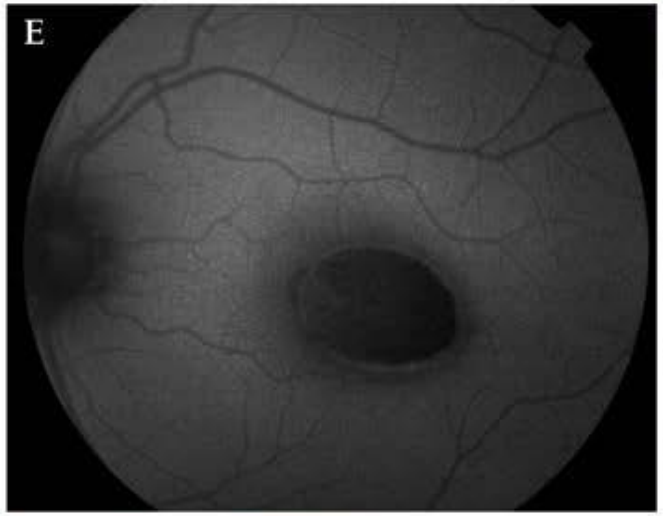

Bedar MS. Ophthalmologe, 2013;110:173

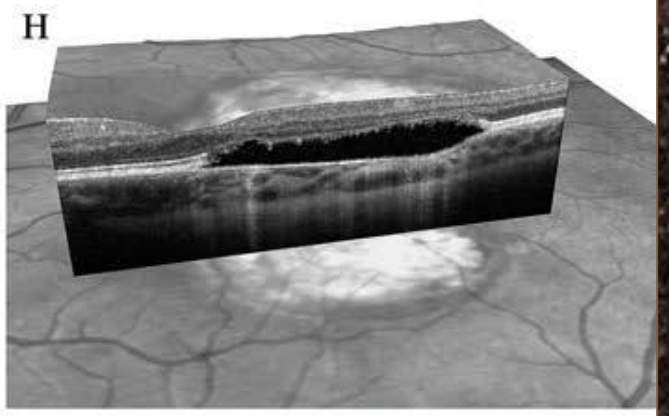



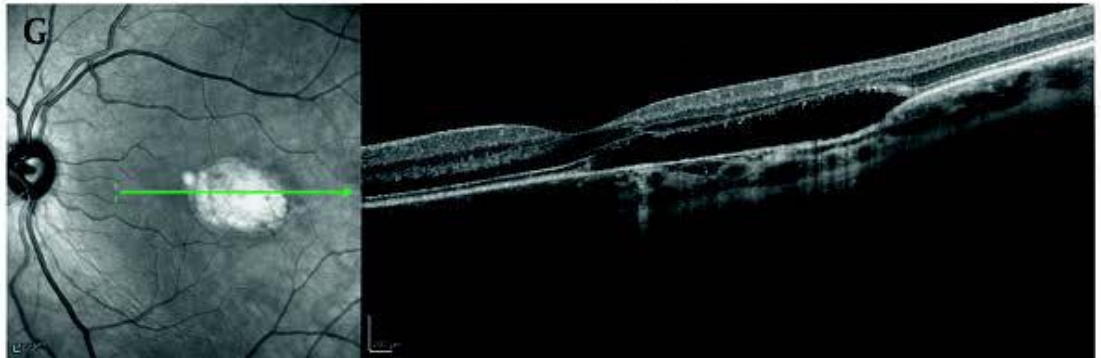




Golchet PR. BJO. 2010;94:302

# Torpedo Maculopathy

## Range of clinical presentations

**Constant features**

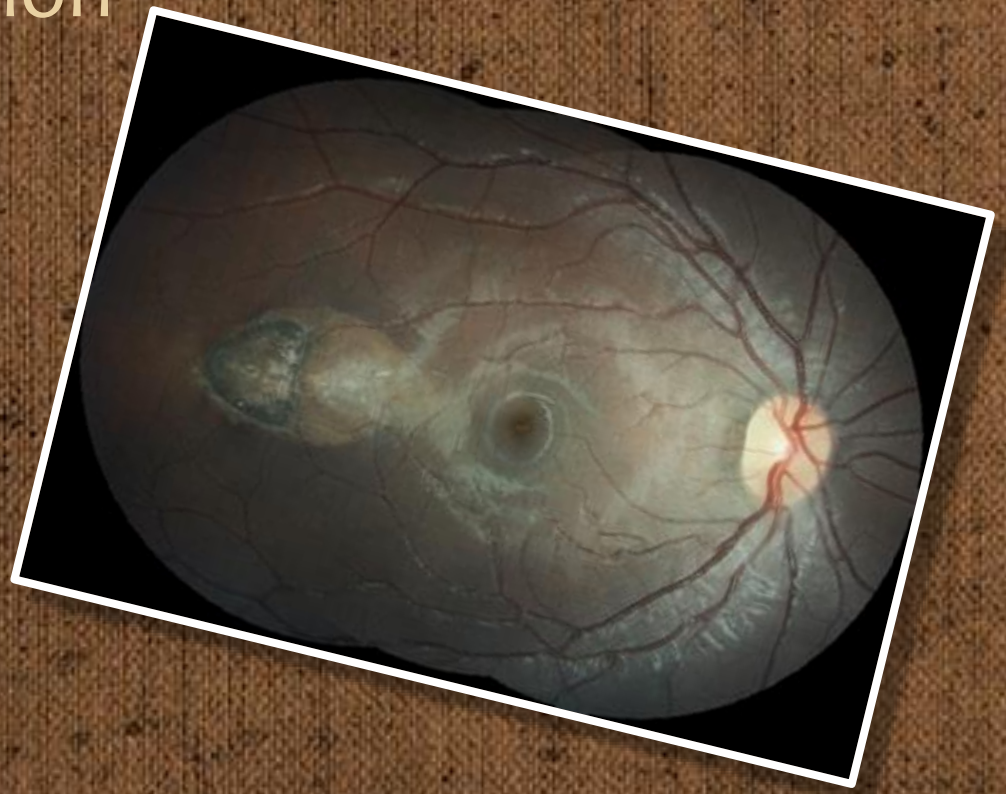
- Congenital
- Location temporal to fovea
- Horizontally oval shape
- Hypopigmentation

**Variable features**

- Schisis cavity
- Excavation
- Degree of pigmentation
- Visual defect

# Take Home Message

- Torpedo maculopathy
  - Congenital perimacular lesion
  - Distinctive appearance
  - Usually asymptomatic
  - Requires no special management



# CASE #2


*Here comes the sun. . .*

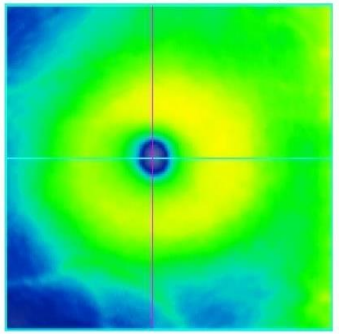

# CASE #2A

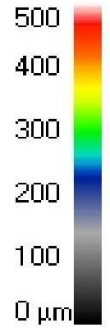
- 13yo Asian male referred for abnormal appearance of right macula on OCT
- POH: Refractive amblyopia OS
- PMH: Good health. No meds

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

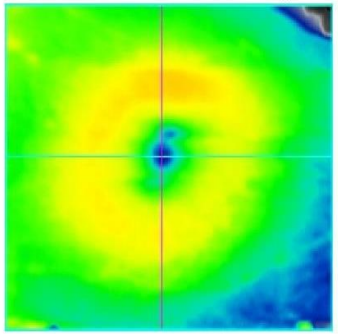
## Macula Thickness OU: Macular Cube 512x128 — OD ● | ● OS

OD ILM-RPE Thickness Map





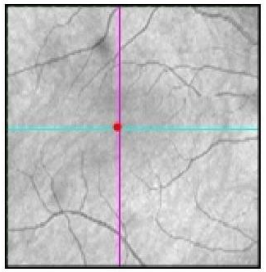

OS ILM-RPE Thickness Map



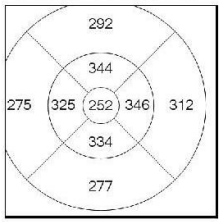
Fovea: 232, 61 | Fovea: 246, 60

Normative data is not available. Patient age < 18.

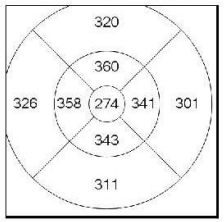
OD OCT Fundus



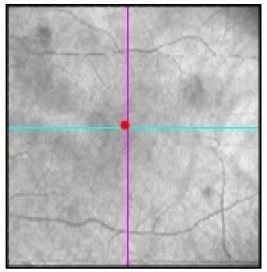
OD ILM-RPE Thickness




OS ILM-RPE Thickness

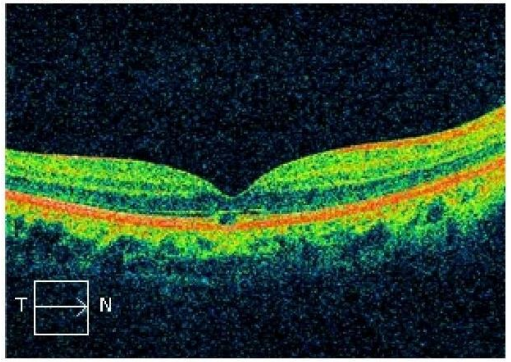



OS OCT Fundus

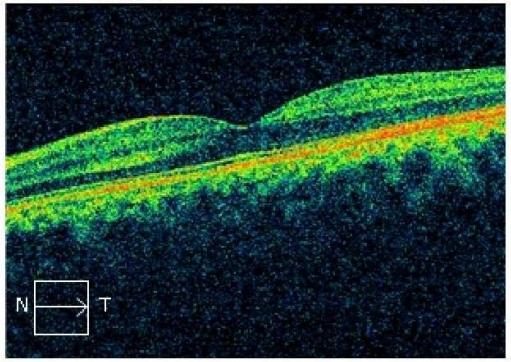


| ILM - RPE | OD | OS |
|---|---|---|
| Thickness Central Subfield (µm) | 252 | 274 |
| Volume Cube (mm³) | 10.6 | 11.1 |
| Thickness Avg Cube (µm) | 294 | 309 |

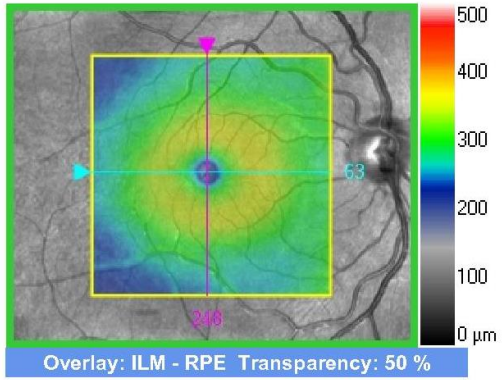
OD Horizontal B-Scan **BScan:** 61



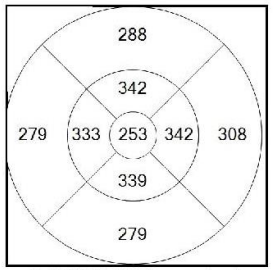

OS Horizontal B-Scan **BScan:** 60



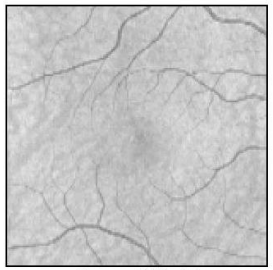

## Macula Thickness : Macular Cube 512x128 — OD ● | ○ OS



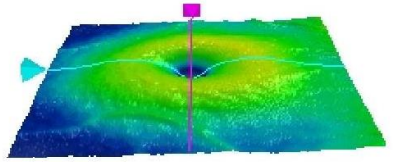

Overlay: ILM - RPE Transparency: 50 %



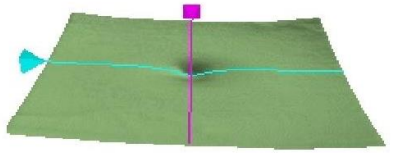

ILM-RPE Thickness (µm)



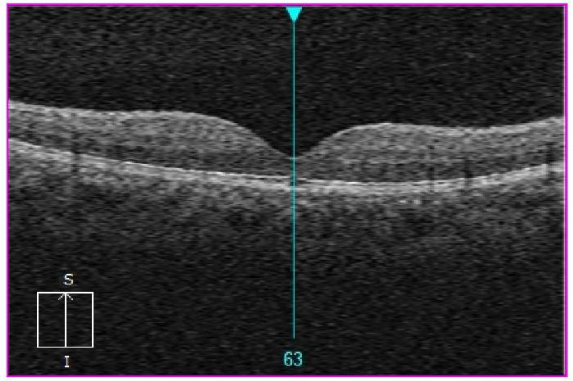
Fovea: 248, 64

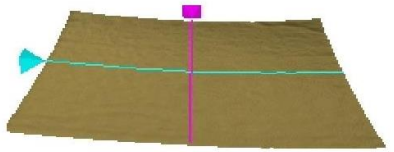
ILM - RPE



ILM




**Normative data is not available. Patient age < 18.**



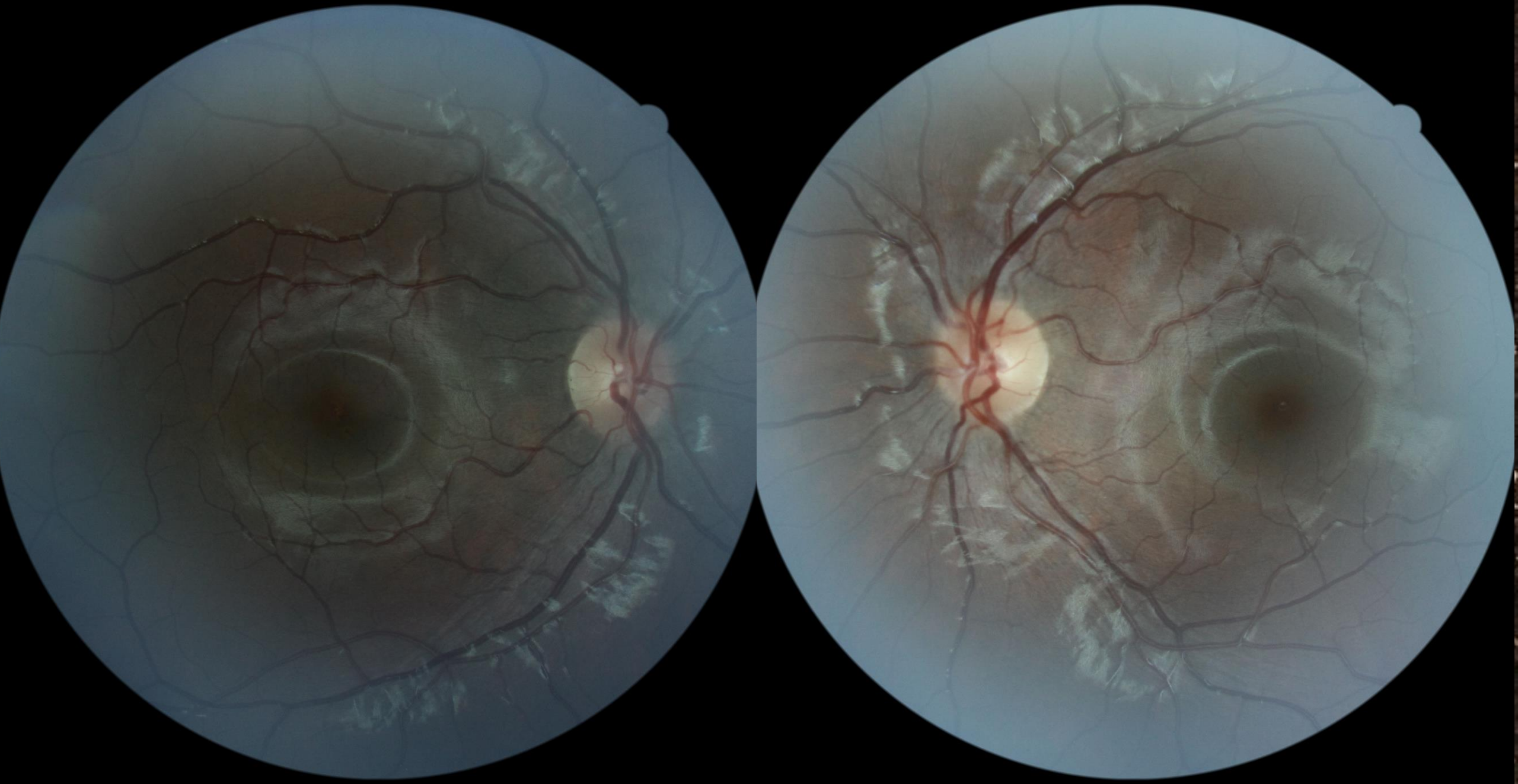
RPE

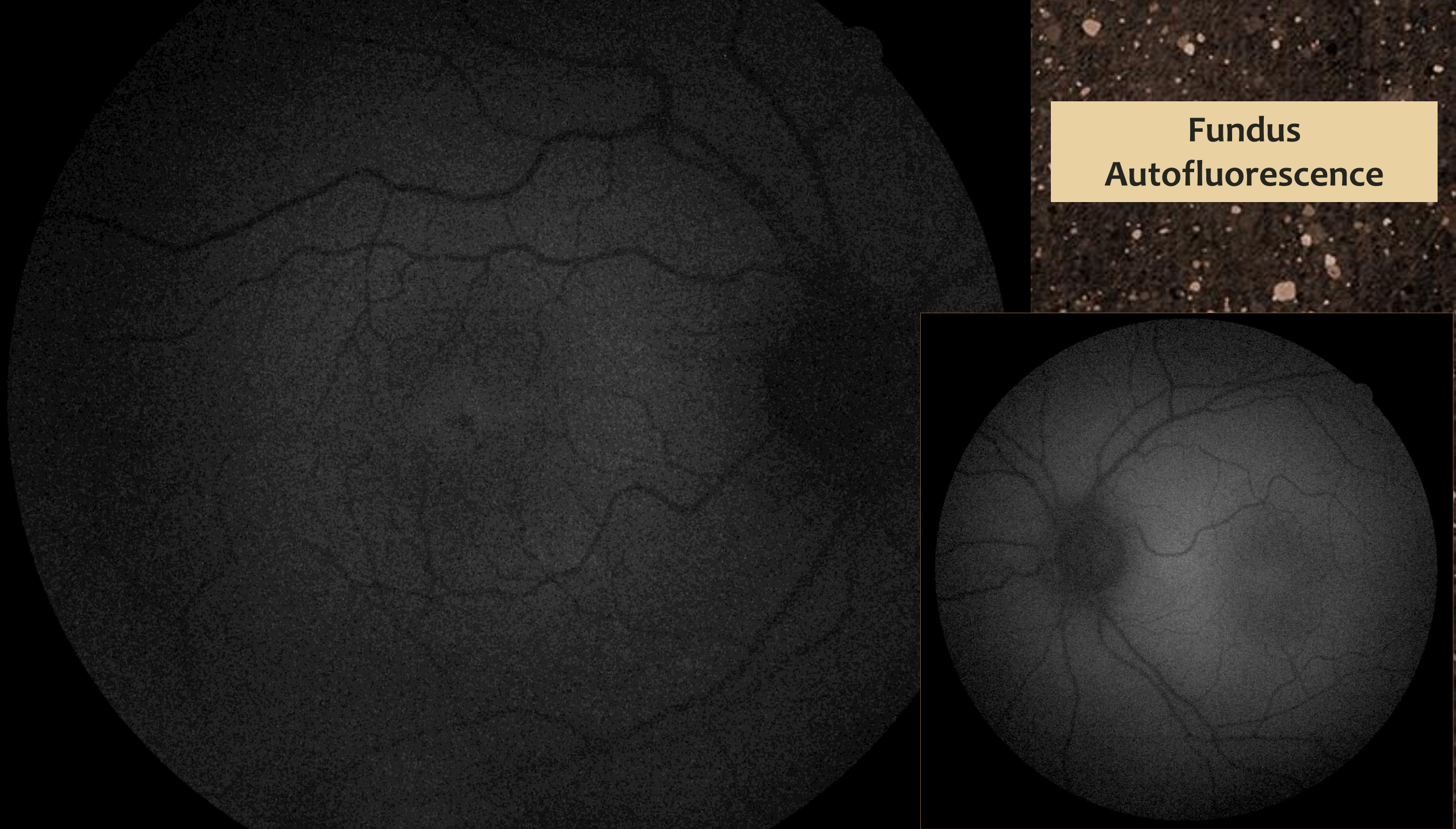
| | Central Subfield Thickness (µm) | Cube Volume (mm³) | Cube Average Thickness (µm) |
|---|---|---|---|
| ILM - RPE | 253 | 10.5 | 291 |

# CASE #2B

- 12yo Asian F (sibling of Case 3A) 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

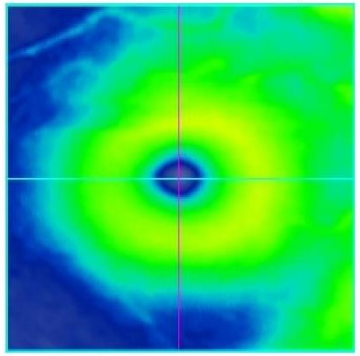




Fundus Autofluorescence

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

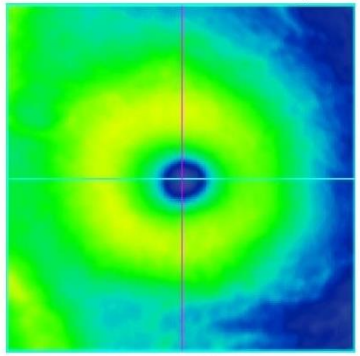
OD ILM-RPE Thickness Map



500 400 300 200 100 0 µm

Fovea: 254, 65

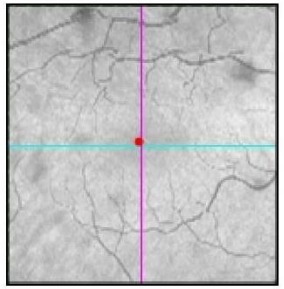
OS ILM-RPE Thickness Map



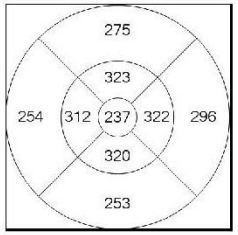
Fovea: 259, 65

Normative data is not available. Patient age < 18.

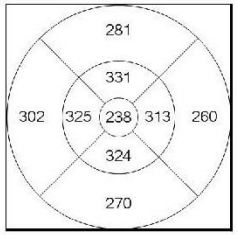
OD OCT Fundus



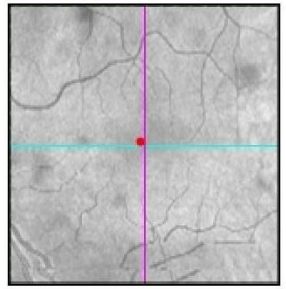
OD ILM-RPE Thickness




OS ILM-RPE Thickness

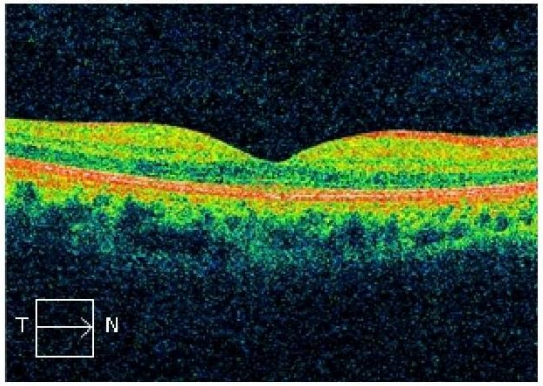



OS OCT Fundus

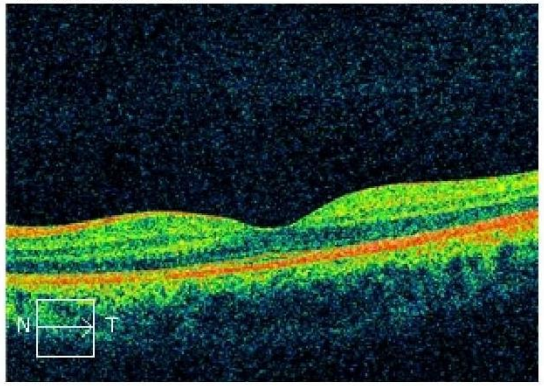


| ILM - RPE | OD | OS |
|---|---|---|
| Thickness Central Subfield (µm) | 237 | 238 |
| Volume Cube (mm³) | 9.9 | 10.1 |
| Thickness Avg Cube (µm) | 274 | 282 |

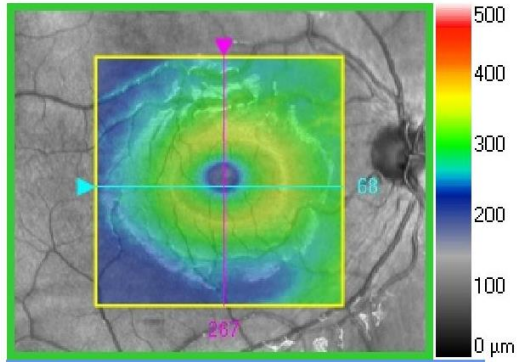
OD Horizontal B-Scan **BScan:** 65



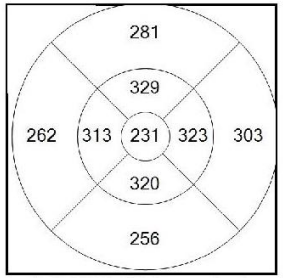

OS Horizontal B-Scan **BScan:** 65



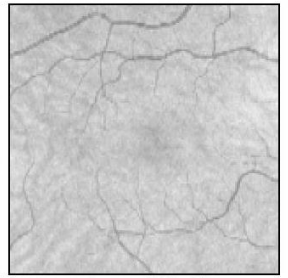

## Macula Thickness : Macular Cube 512x128 — OD ● | ○ OS



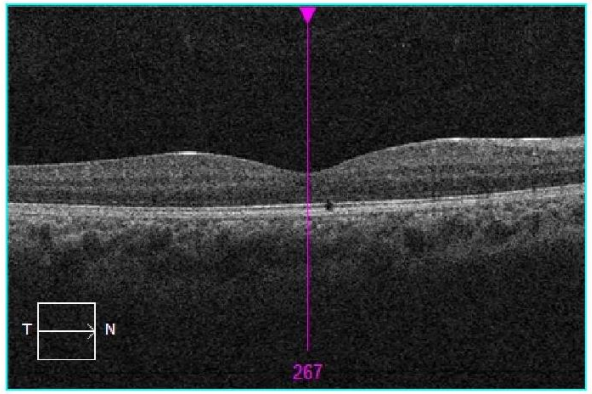

Overlay: ILM - RPE Transparency: 50 %

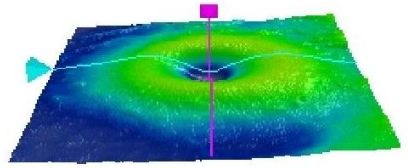



ILM-RPE Thickness (µm)

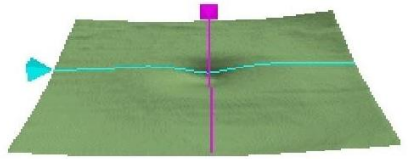


Fovea: 265, 63

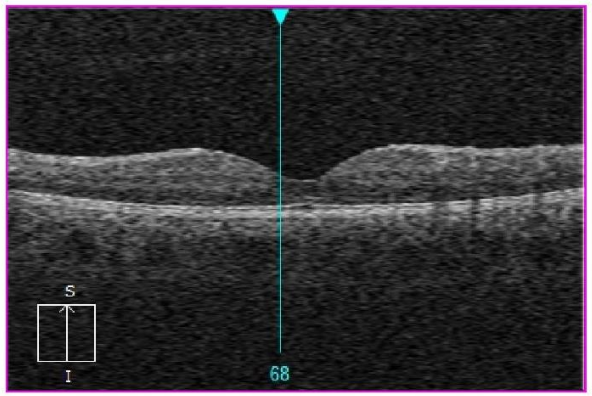


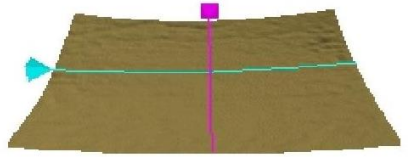



ILM - RPE



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 |

# What is going on here?


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

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

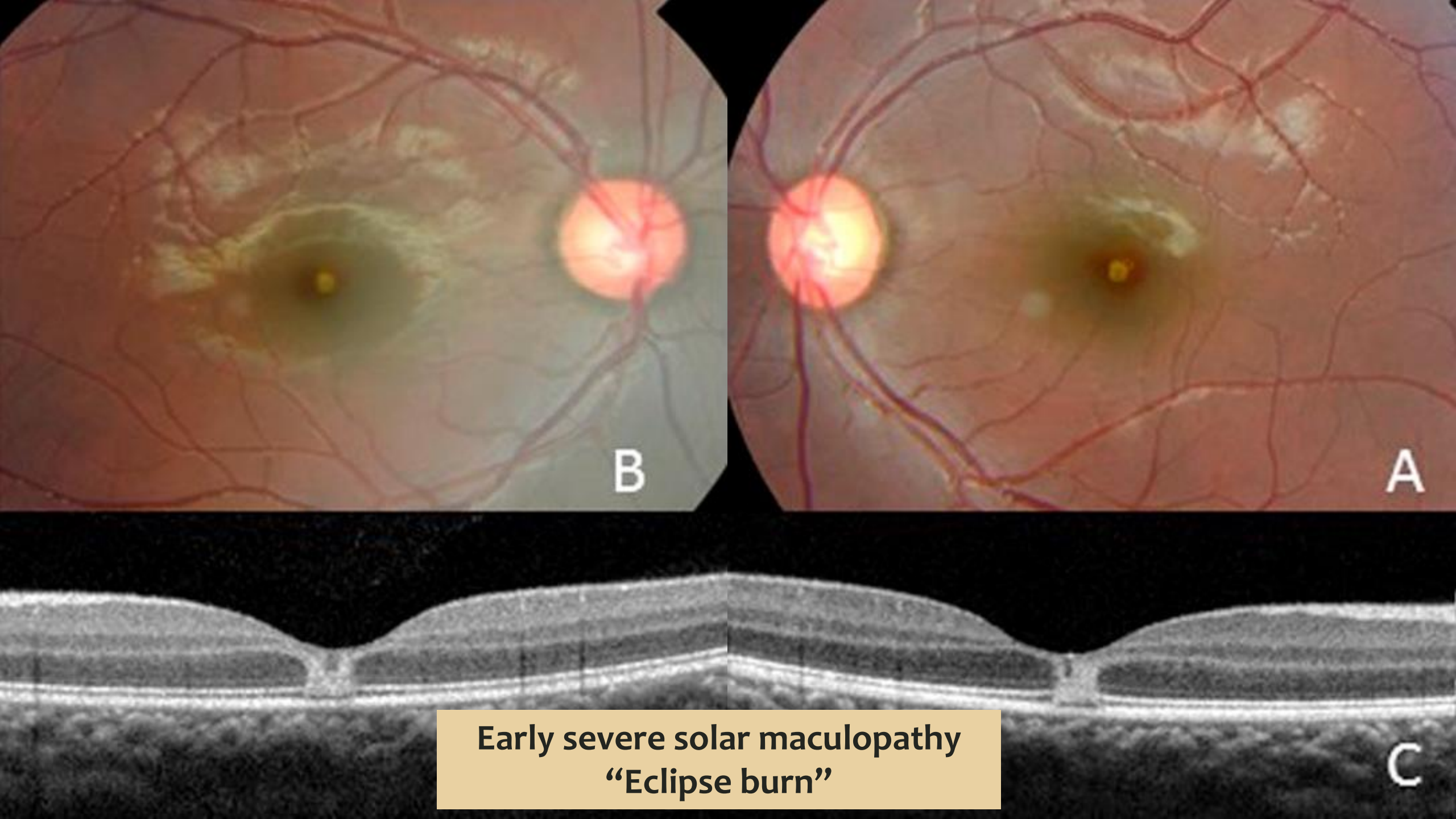
| | |
|---|---|
| **Macular coloboma (macular dysplasia)** | A heterogenous group of developmental abnormalities. Often **familial**, frequently **bilateral**, systemic abnormalities not uncommon. |
| **Macular dystrophy** | Widespread retinal dysfunction, **bilateral** macular lesions, **inheritance 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 retinopathy)

# 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 (“virtually pathognomonic”)



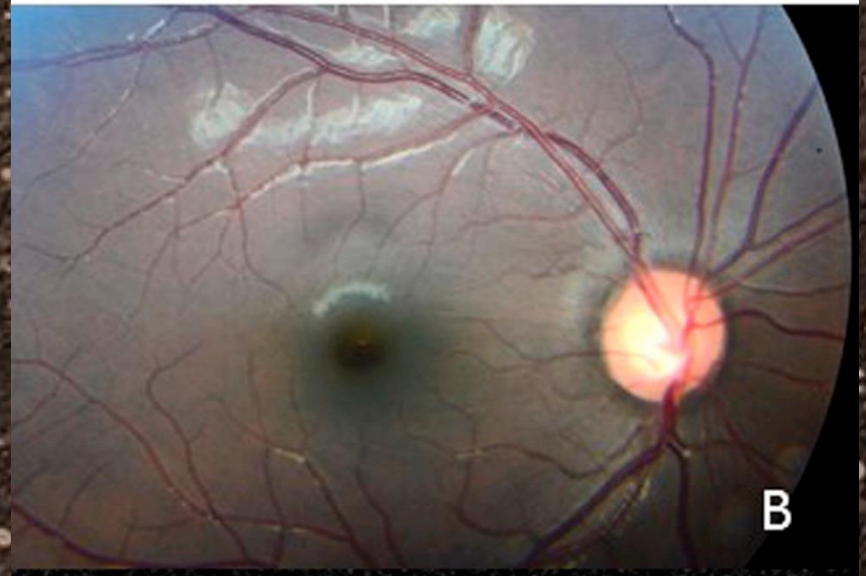

Early severe solar maculopathy
"Eclipse burn"

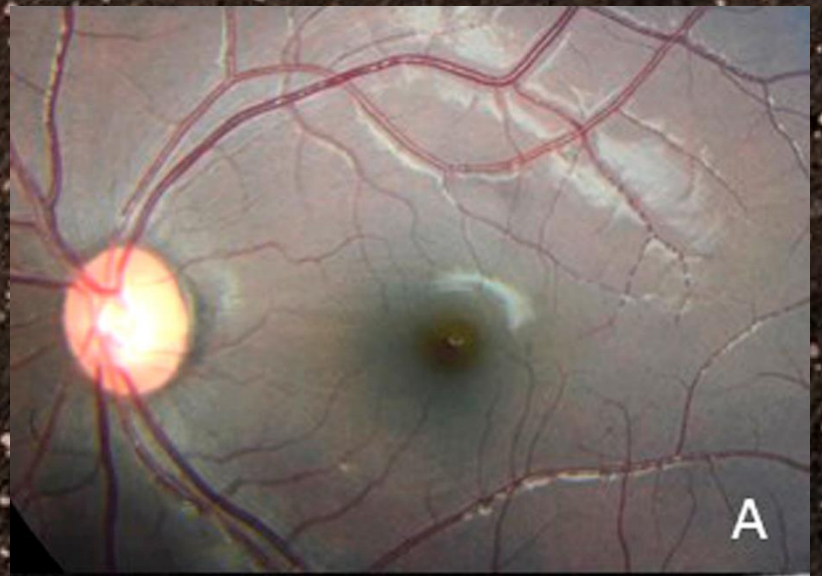
## Severe solar maculopathy at 30-days

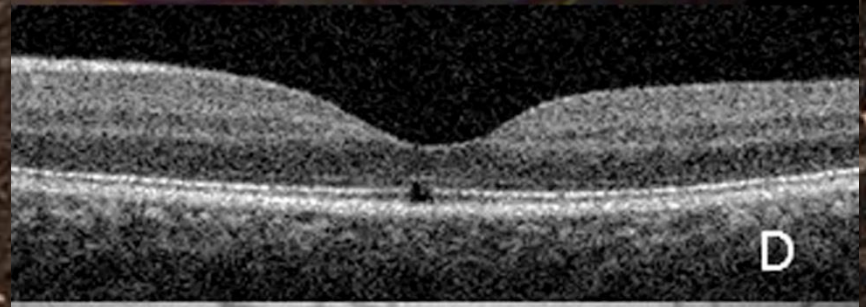
**TOP:** Resolving yellow lesions

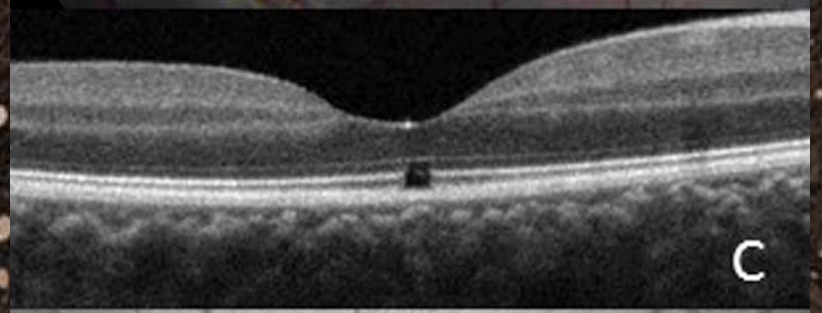
**MIDDLE:** Square-shaped foveal photoreceptor defect

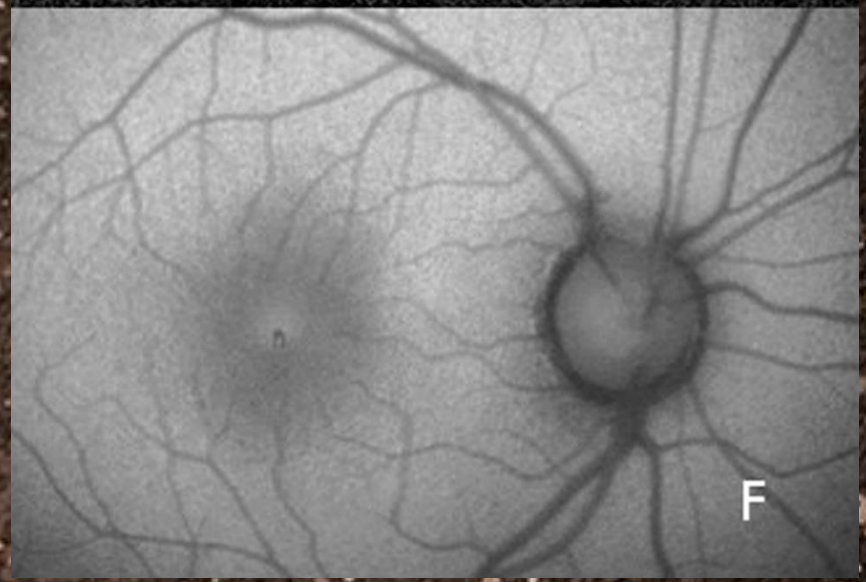
**BOTTOM:** FAF hypofluorescent spot surrounded by hyperfluorescence

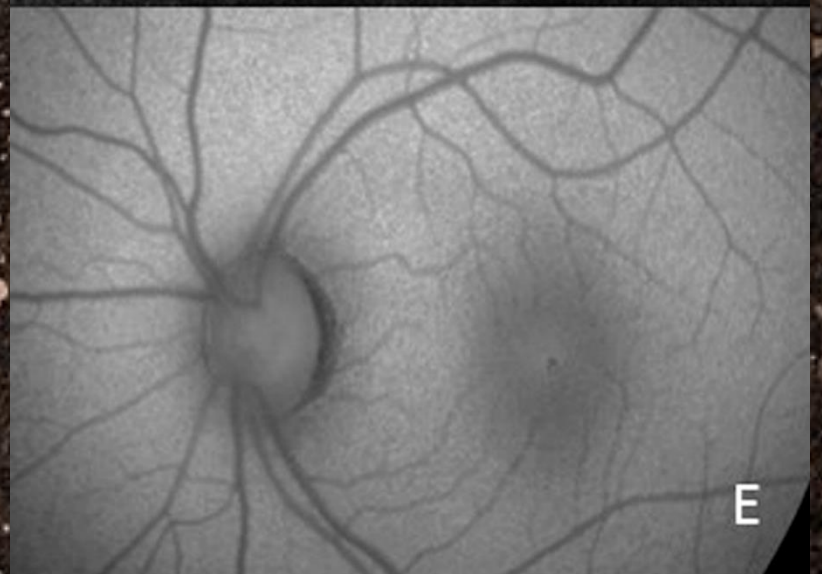


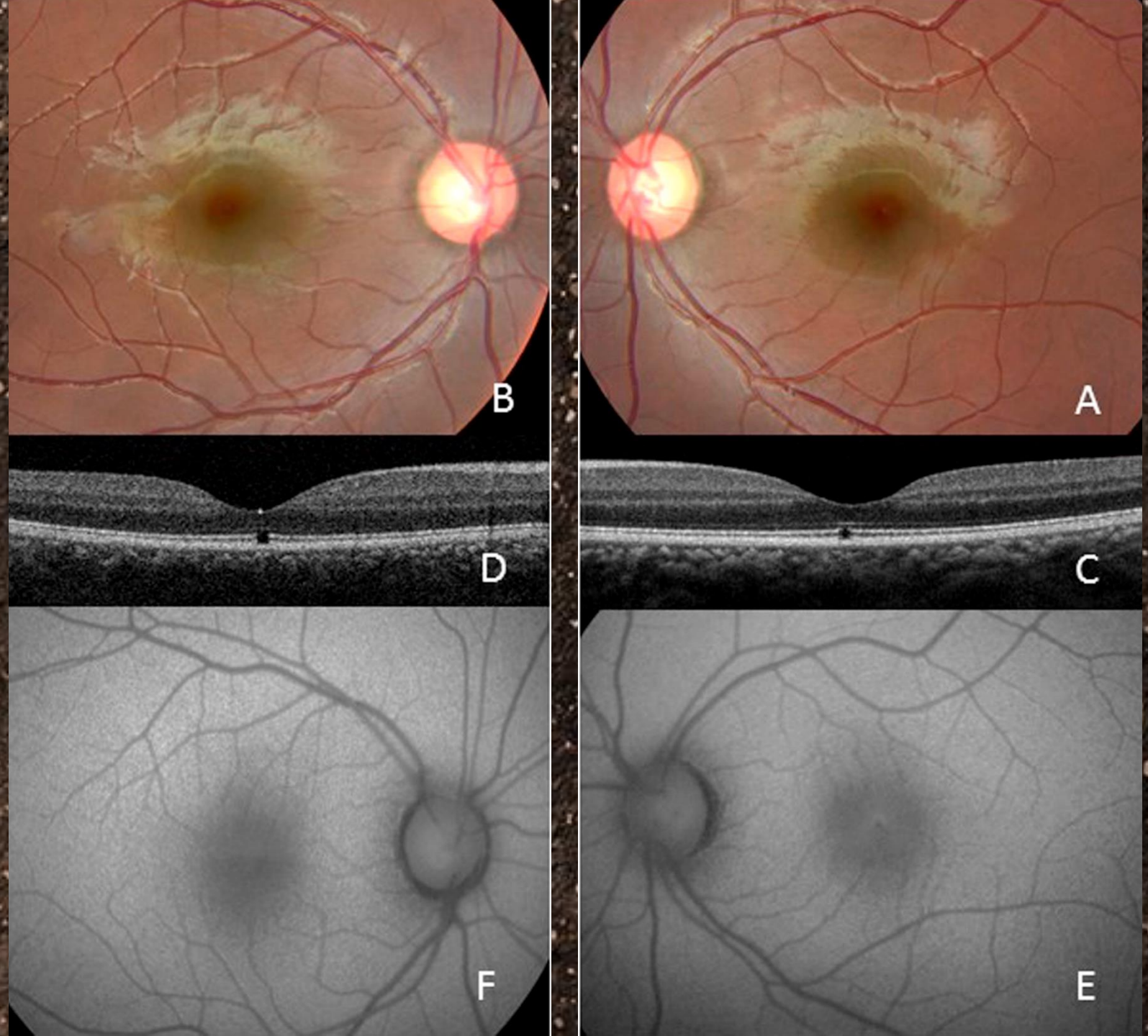



Typical findings of late-stage solar maculopathy

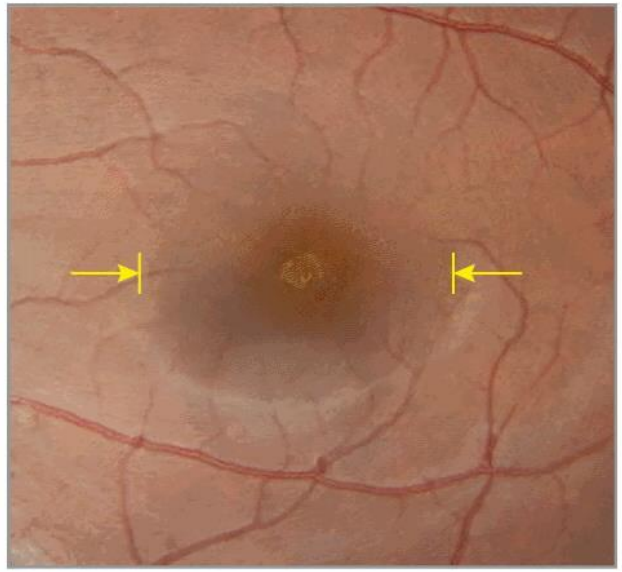
TOP: Essentially normal ophthalmoscopic appearance

MIDDLE: Rectangular photoreceptor defect in fovea on OCT

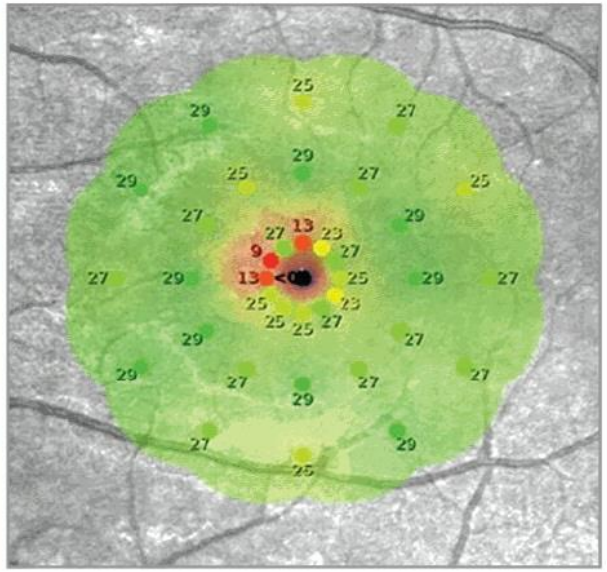
BOTTOM: FAF hypofluorescent spot corresponding to OCT photoreceptor defect



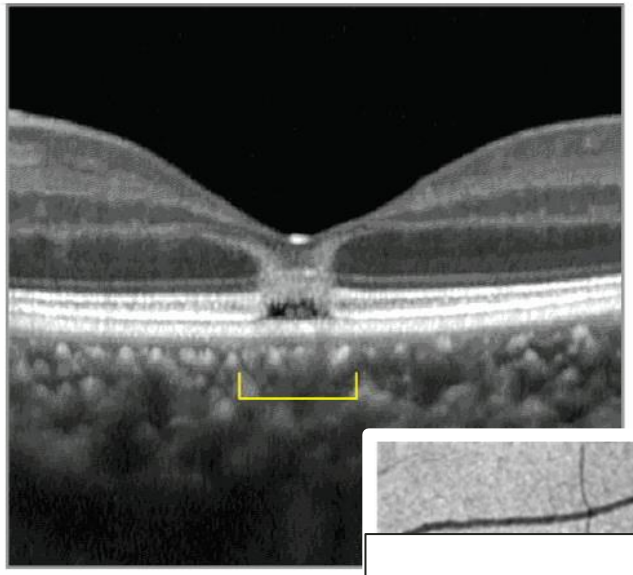
Fundus



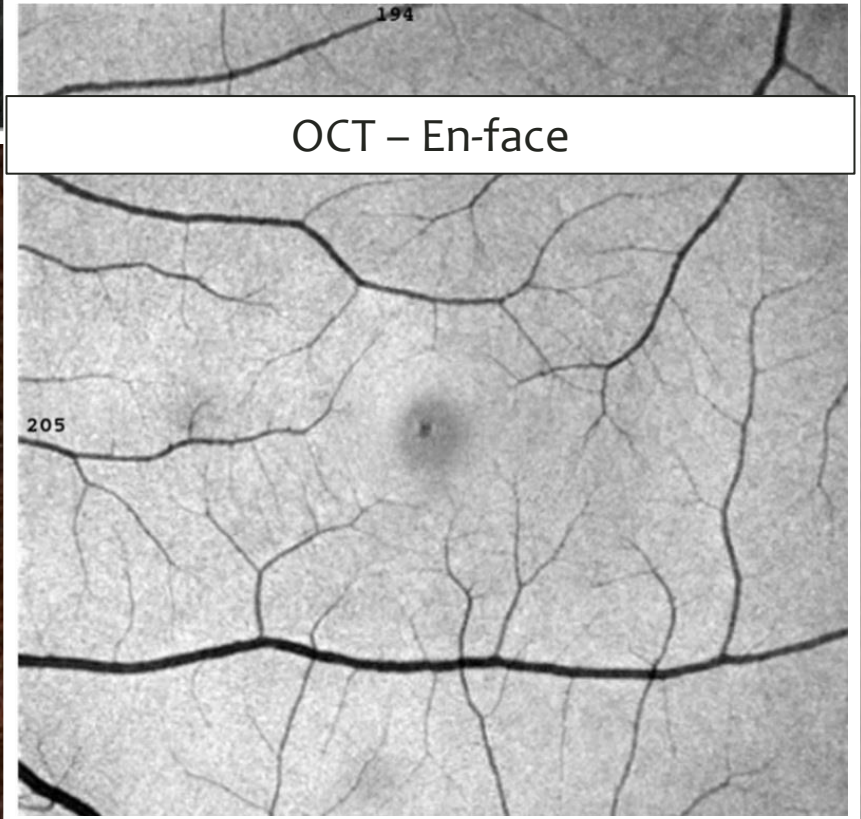
Microperimetry




OCT – B-scan



OCT – En-face




**Early severe solar maculopathy**

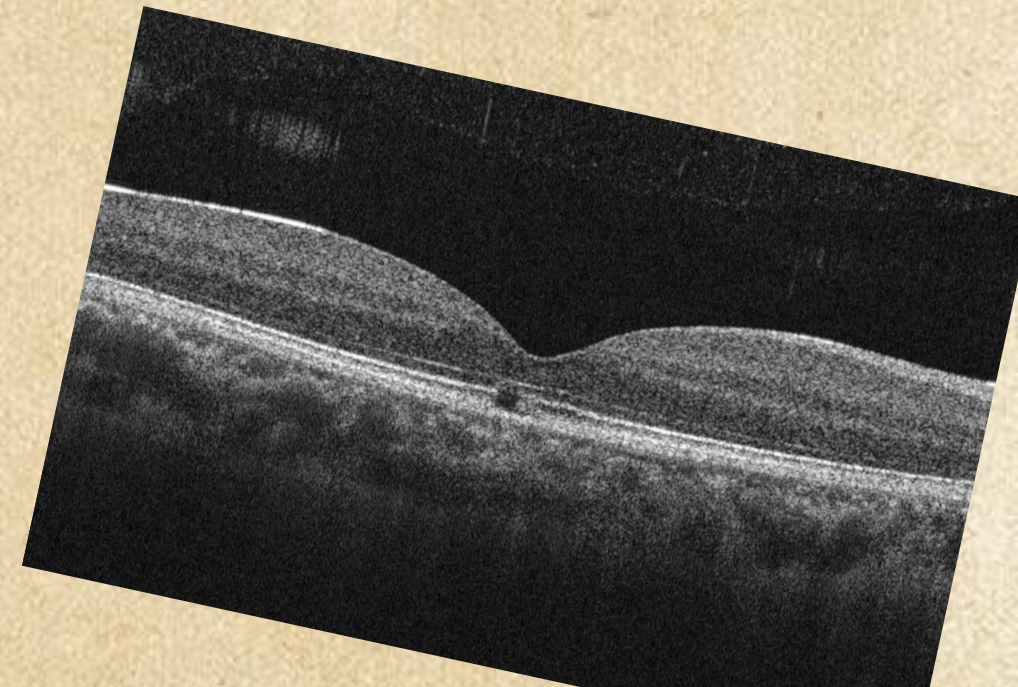
- **Microperimetry** – a small scotoma corresponding to OCT photoreceptor defect.
- **En-face OCT** – minute perifoveal photoreceptor punch-out lesion
- **Visual acuity was 20/25**

# 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
https://eclipse.aas.org
AMERICAN ASTRONOMICAL SOCIETY
Great American Eclipse

# Eclipse viewing safety


NASA | total Eclipse

ECLIPSE 101 ▾ EVENTS ▾ SCIENCE ▾ ACTIVITIES ▾ EDUCATION ▾ RESOURCES ▾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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.

AAS AMERICAN ASTRONOMICAL SOCIETY · AMERICAN ACADEMY OF OPHTHALMOLOGY · NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION · AMERICAN ACADEMY OF OPTOMETRY · NSF NATIONAL SCIENCE FOUNDATION

### 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.

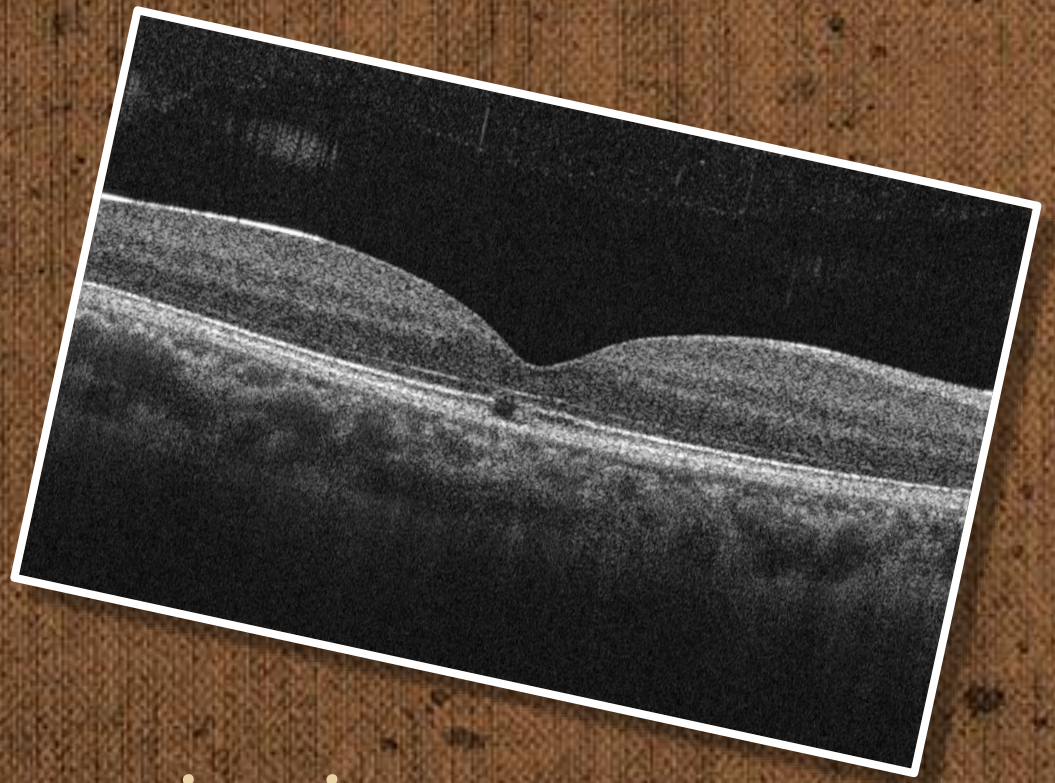
The only safe way to look directly at the uneclipsed or partially eclipsed sun is through special-purpose solar filters, such as "eclipse glasses" (example shown at left) or hand-held solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the sun; they 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



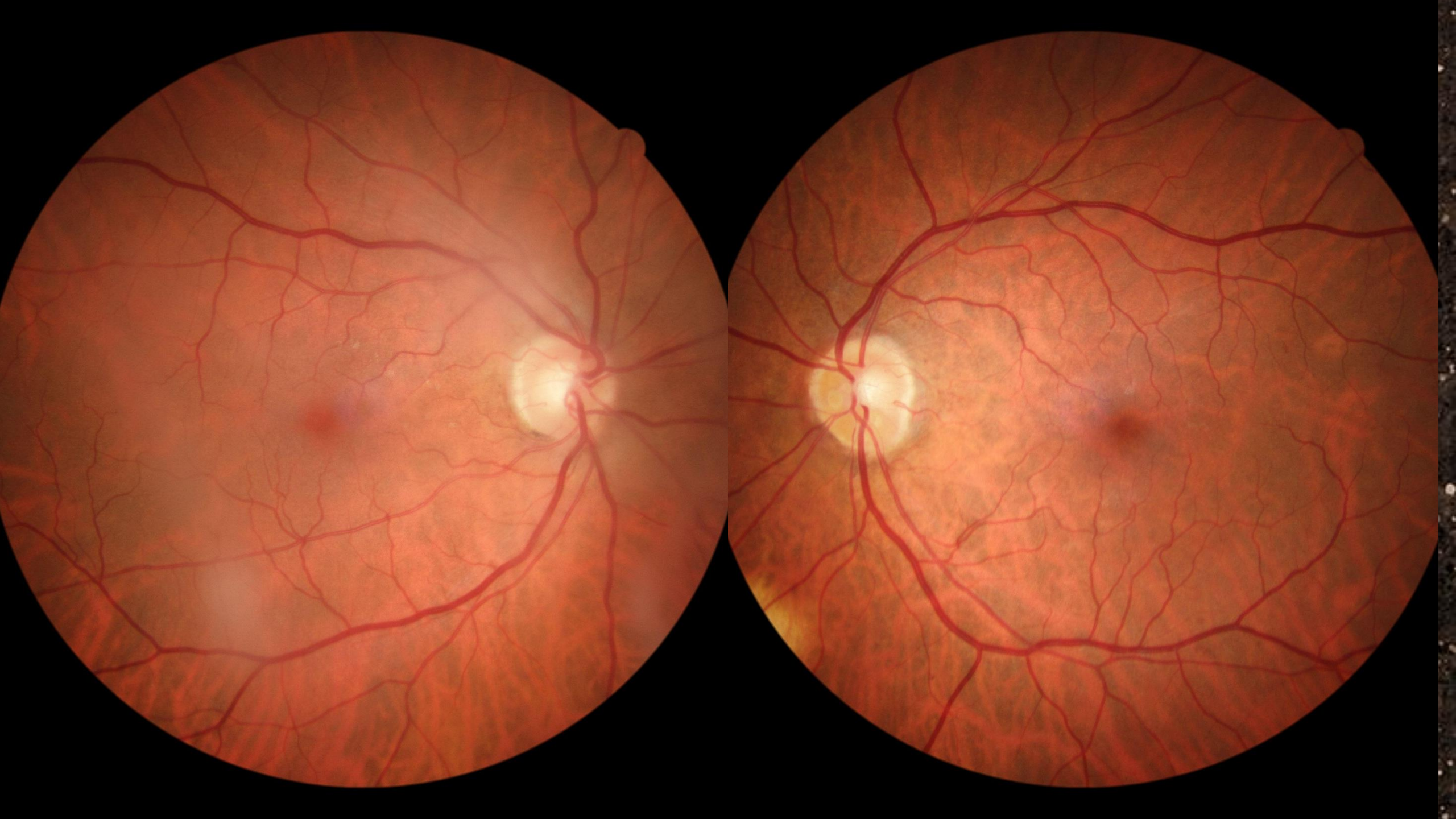
# CASE #3

*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

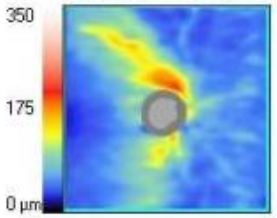
- Vision: 20/20 OD, 20/25 OS
- Ta: 14/22 @10:00AM; PERRL, No APD
- SLE: W&Q OU



| Name: | | | OD | OS |
|---|---|---|---|---|
| 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 |

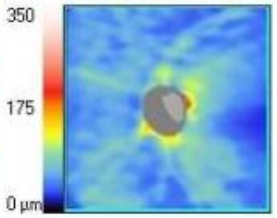
## ONH and RNFL OU Analysis:Optic Disc Cube 200x200 — OD ● | ● OS

RNFL Thickness Map

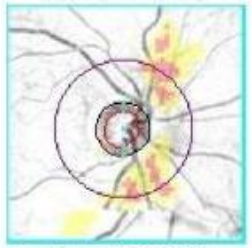



| | OD | OS |
|---|---|---|
| Average RNFL Thickness | 68 µm | 69 µm |
| RNFL Symmetry | 47% | |
| Rim Area | 0.81 mm² | 1.20 mm² |
| Disc Area | 1.43 mm² | 1.59 mm² |
| Average C/D Ratio | 0.65 | 0.50 |
| Vertical C/D Ratio | 0.65 | 0.56 |
| Cup Volume | 0.232 mm³ | 0.127 mm³ |

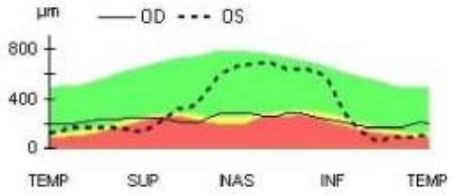
RNFL Thickness Map



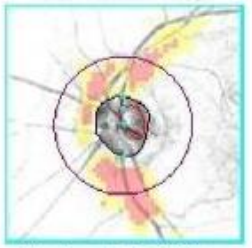

RNFL Deviation Map



Neuro-retinal Rim Thickness

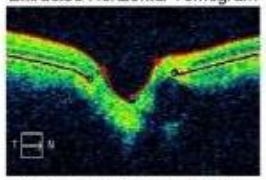



RNFL Deviation Map

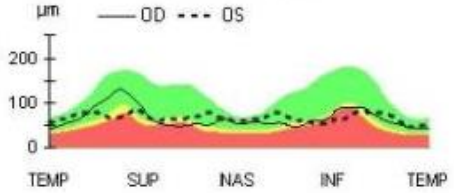


Disc Center(-0.09,-0.09)mm

Extracted Horizontal Tomogram

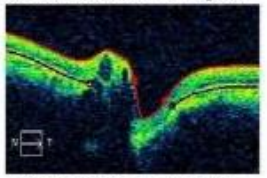


RNFL Thickness

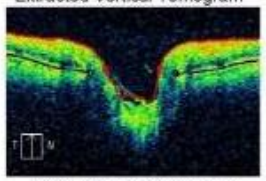



Disc Center(-0.06,0.00)mm

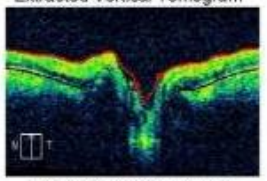
Extracted Horizontal Tomogram



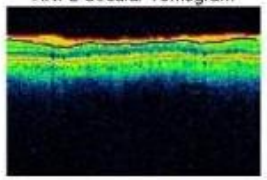
Extracted Vertical Tomogram



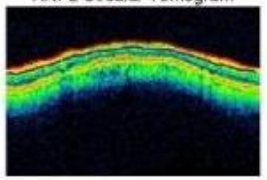

Extracted Vertical Tomogram



RNFL Circular Tomogram



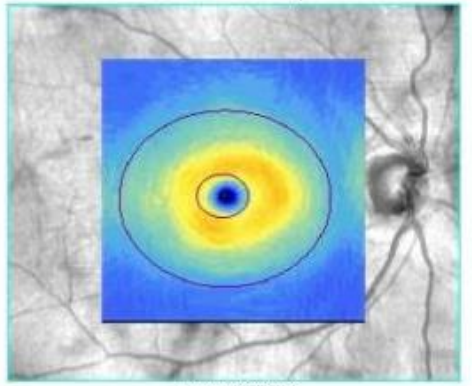

RNFL Circular Tomogram



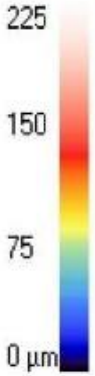
| Name: | | | OD | OS |
|---|---|---|---|---|
| ID: | | Exam Date: | 4/25/2018 | 4/25/2018 |
| DOB: | 2/18/1952 | Exam Time: | 5:15 PM | 5:15 PM |
| Gender: | Unknown | Serial Number: | 4000-6813 | 4000-6813 |
| Technician: | Operator, Cirrus | Signal Strength: | 8/10 | 8/10 |

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

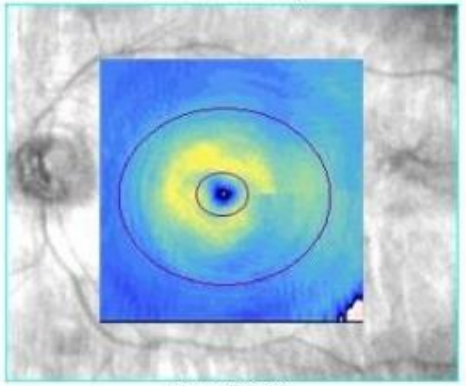
OD Thickness Map



Fovea: 238, 67

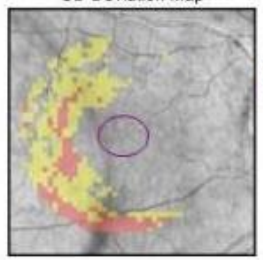



OS Thickness Map

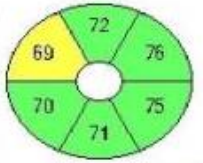


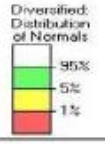
Fovea: 241, 66

OD Deviation Map

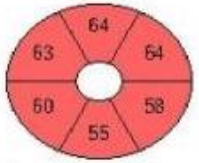


OD Sectors

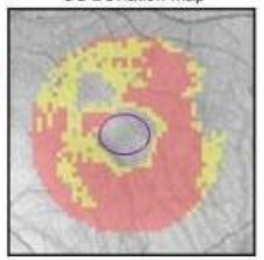



OS Sectors

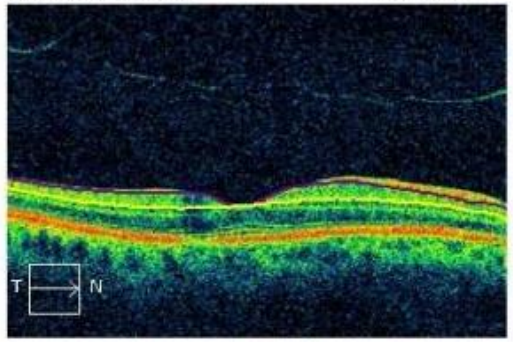



OS Deviation Map

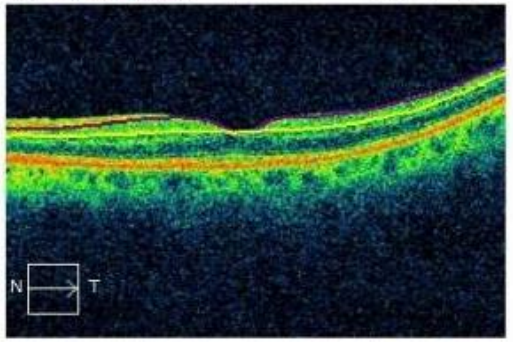


| | OD µm | OS µm |
|---|---|---|
| Average GCL + IPL Thickness | 72 | 61 |
| Minimum GCL + IPL Thickness | 72 | 56 |

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

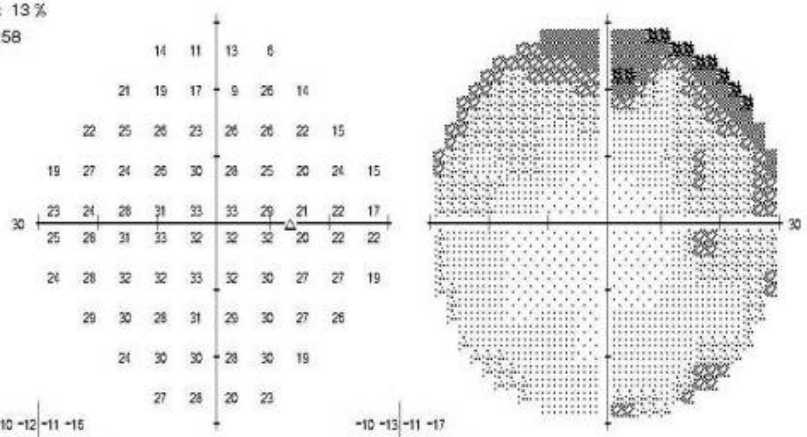
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 4/19 xx
False POS Errors: 14 %
False NEG Errors: 13 %
Test Duration: 09:58

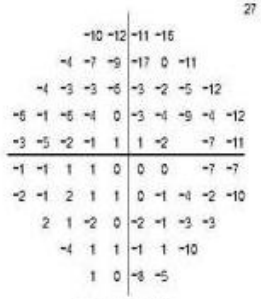
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

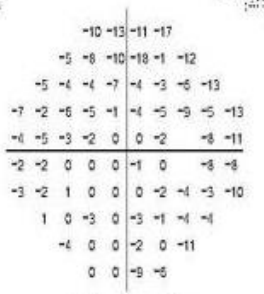
Pupil Diameter:
Visual Acuity:
RX: +3.00 DS DC X

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

Fovea: OFF







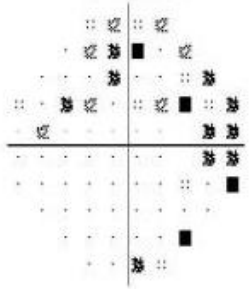
*** Low Test Reliability ***

GHT
Outside Normal Limits

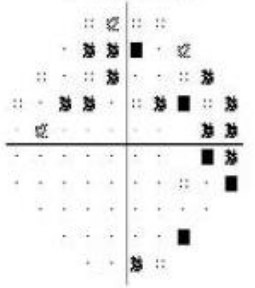
VFI 95%

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

Total Deviation

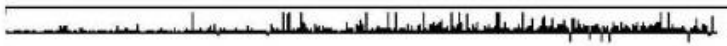


Pattern Deviation



:: < 5%
▨ < 2%
▩ < 1%
■ < 0.5%

BOWDEN EYE CARE



Single Field Analysis

Eye: Left

DOB: 02-18-1952

Central 30-2 Threshold Test

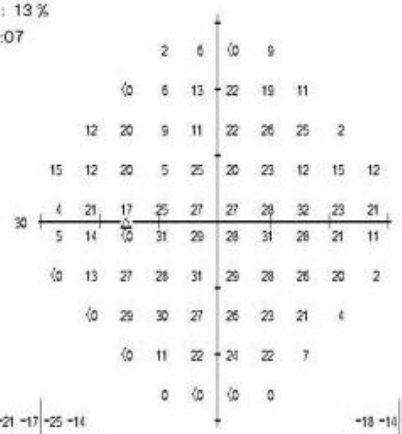
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 1/23
False POS Errors: 14 %
False NEG Errors: 13 %
Test Duration: 14:07

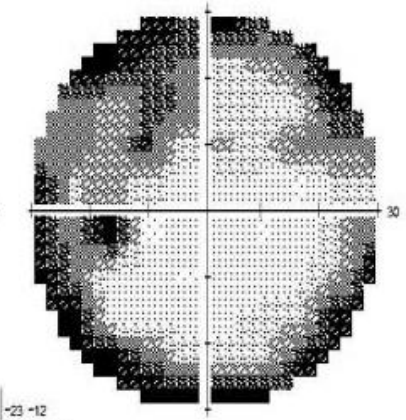
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

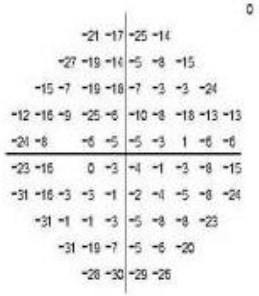
Pupil Diameter:
Visual Acuity:
RX: +1.50 DS DC X

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

Fovea: OFF





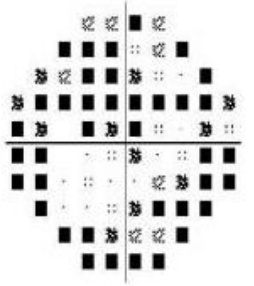


GHT
Outside Normal Limits

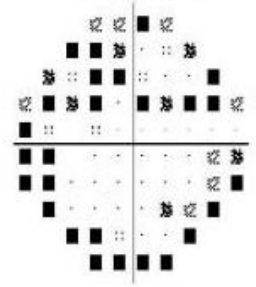
VFI 85%

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

Total Deviation

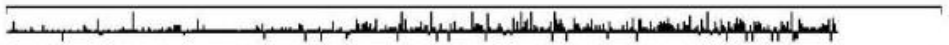


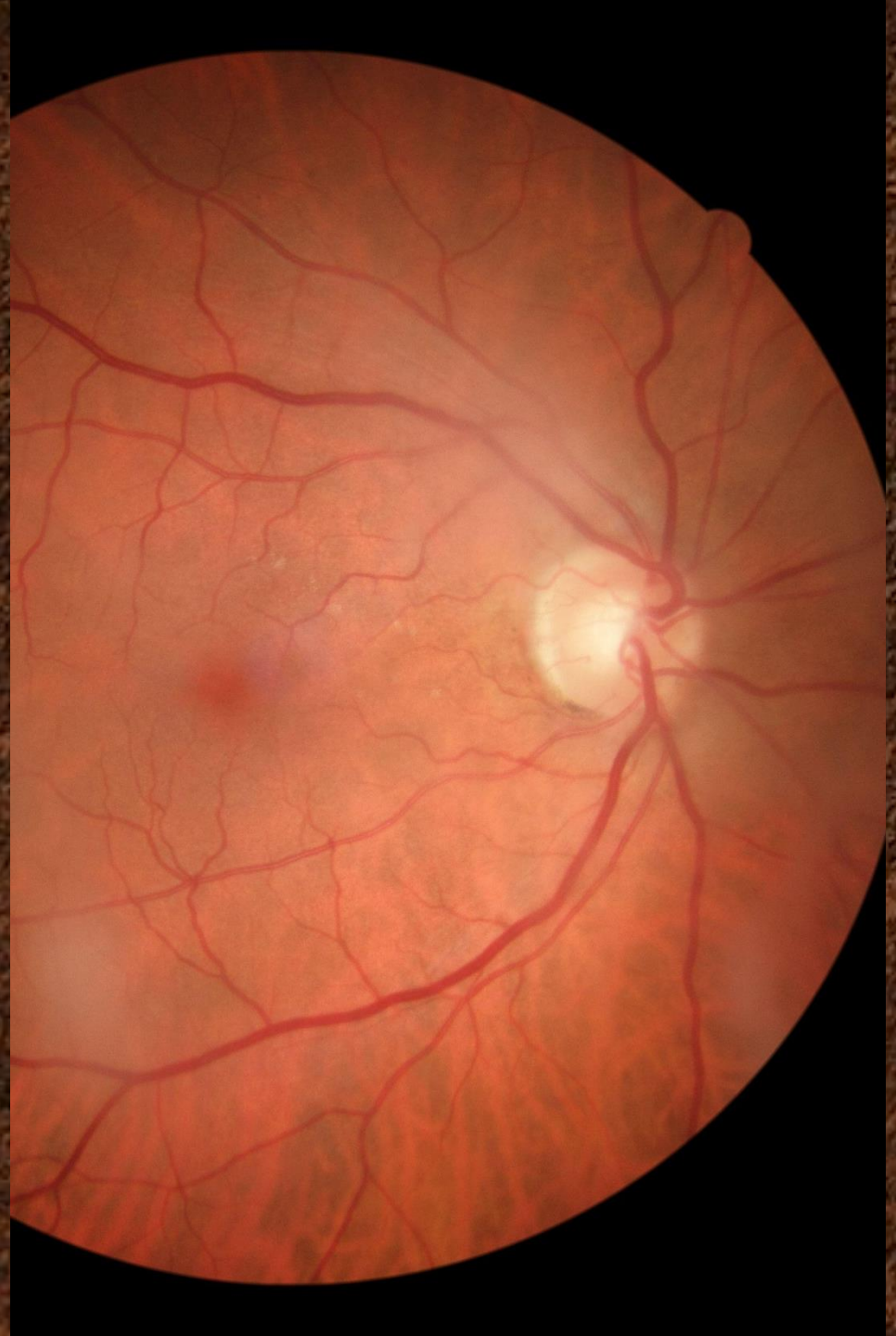
Pattern Deviation

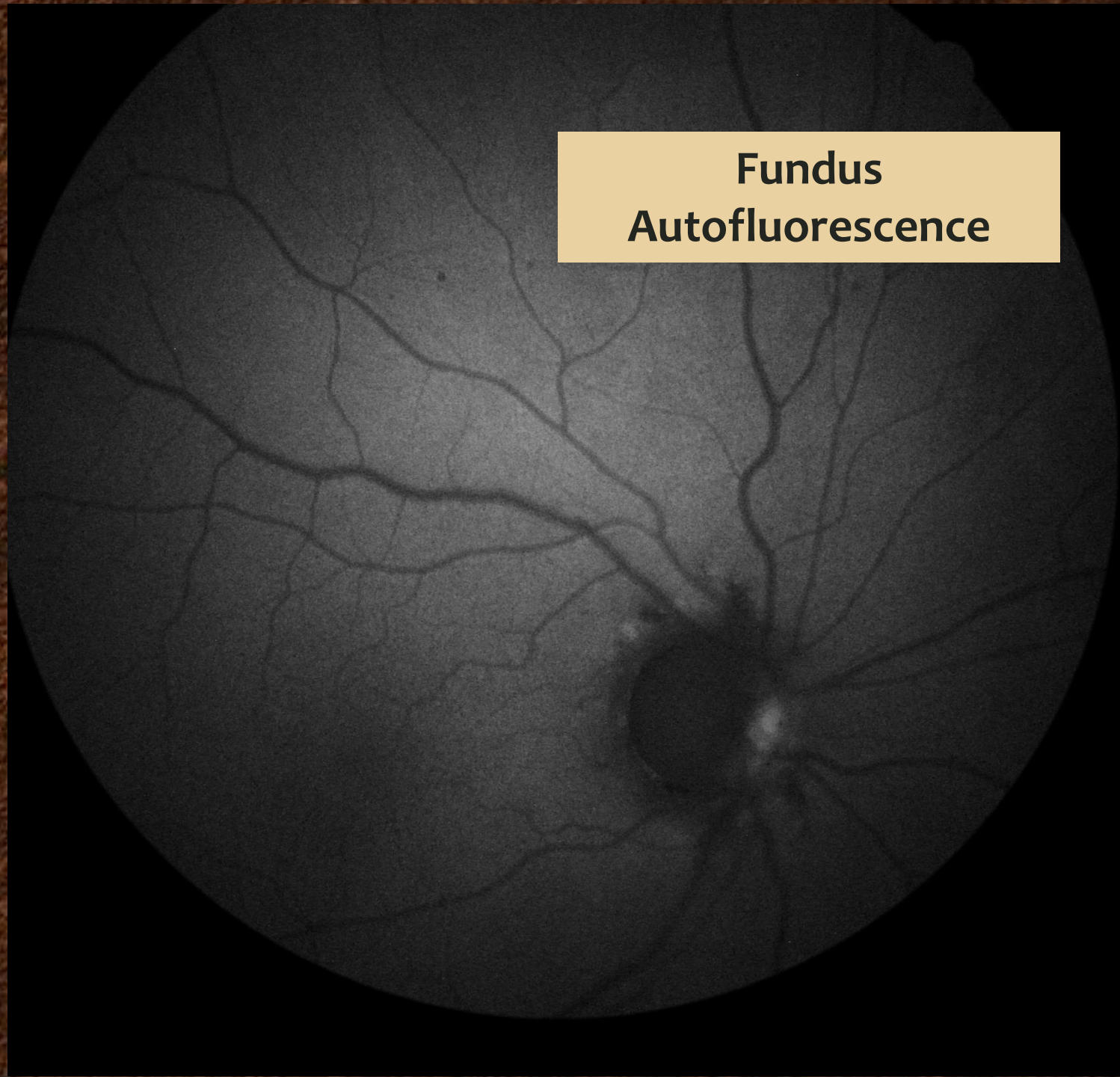


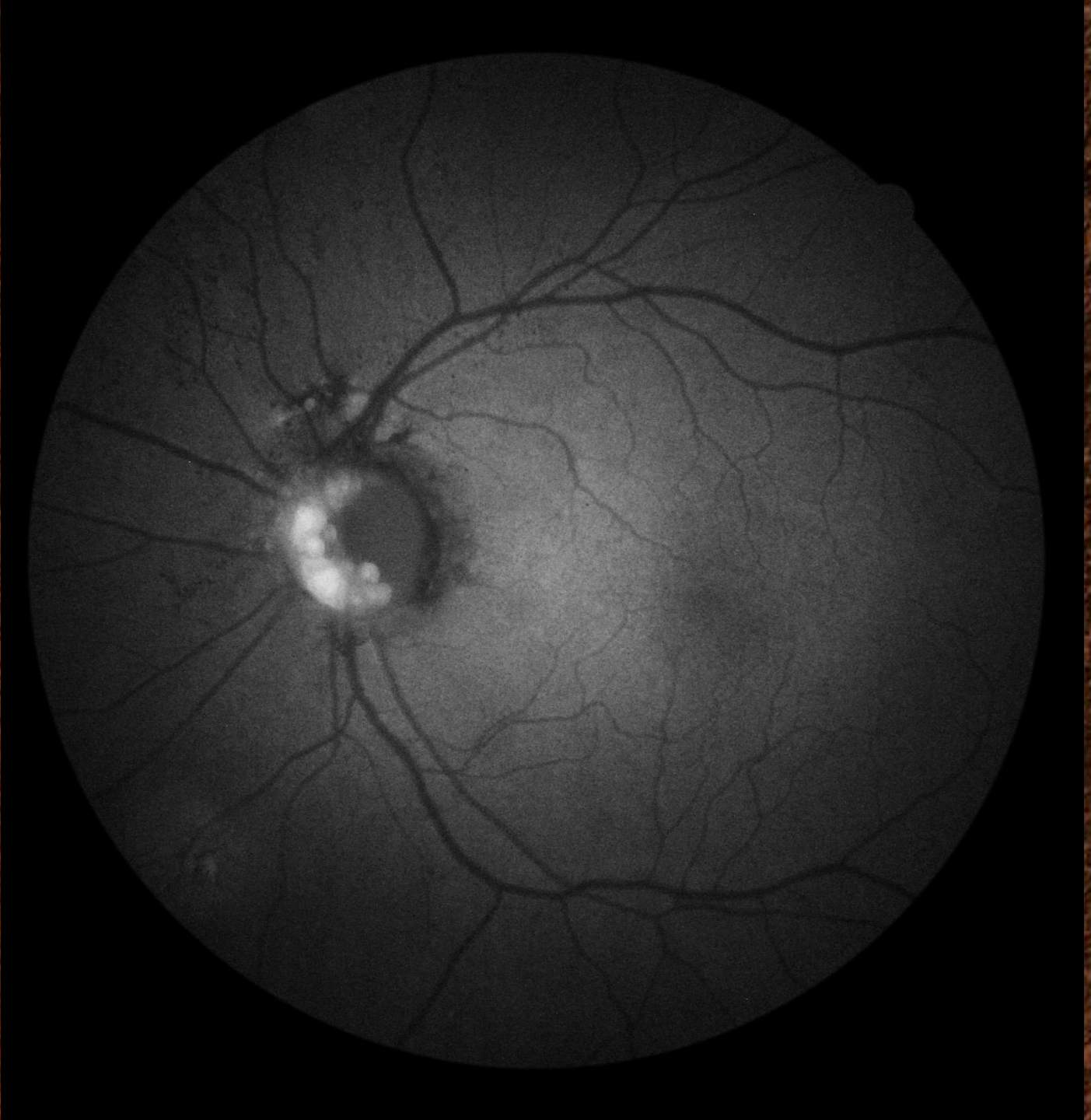
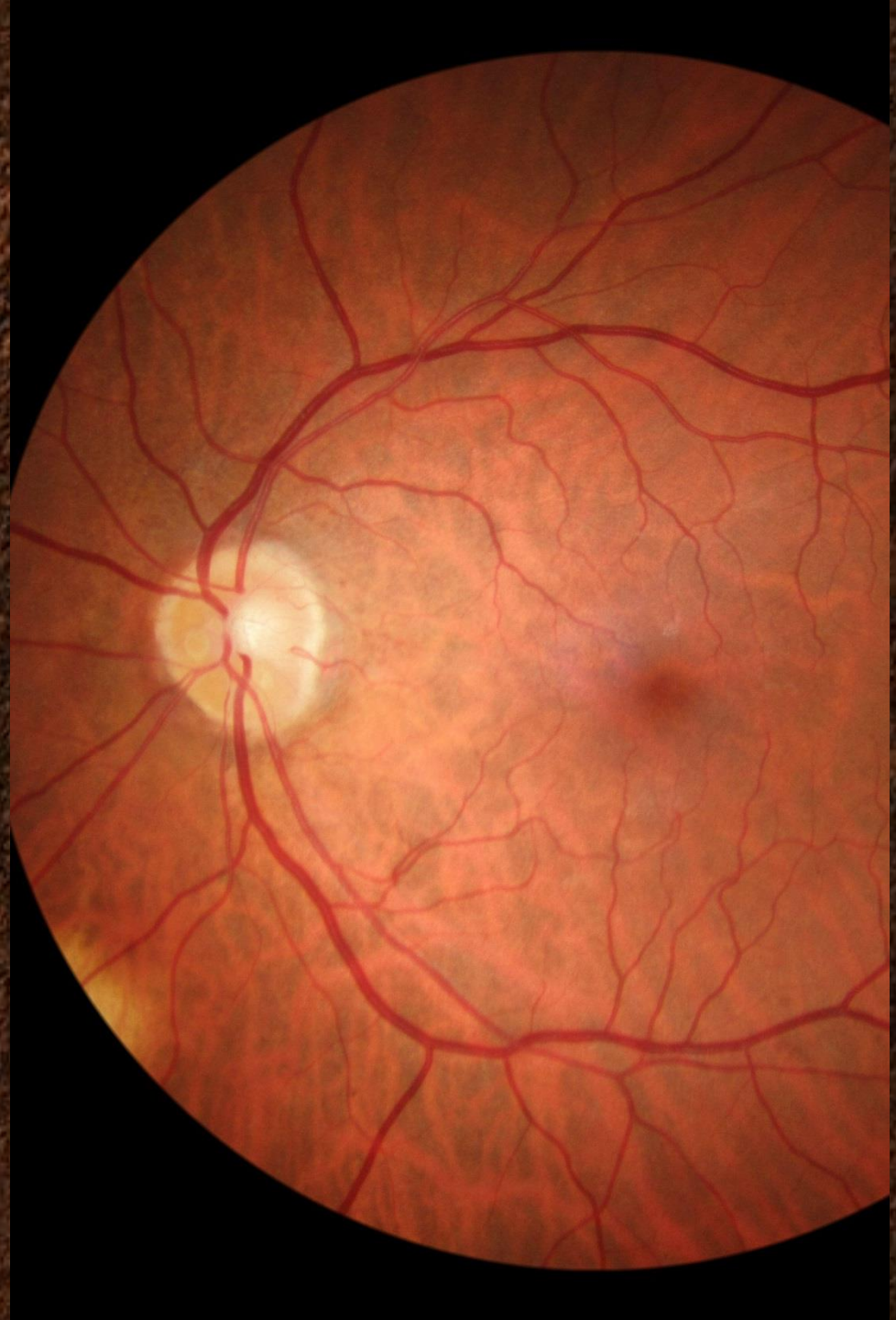
:: < 5%
▨ < 2%
▩ < 1%
■ < 0.5%

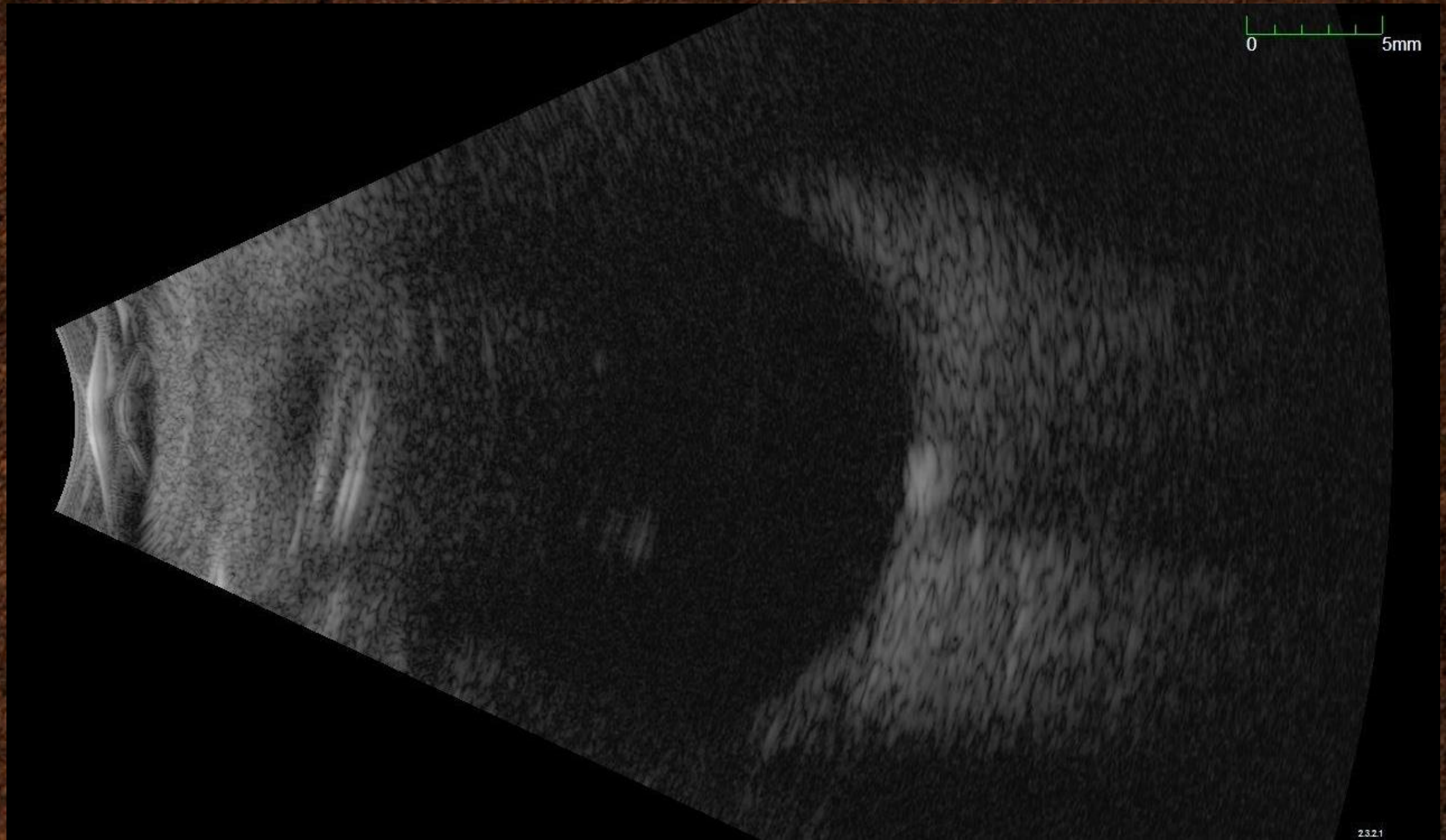
BOWDEN EYE CARE






Fundus
Autofluorescence


0
5mm
23.2.1

# What is going on here?

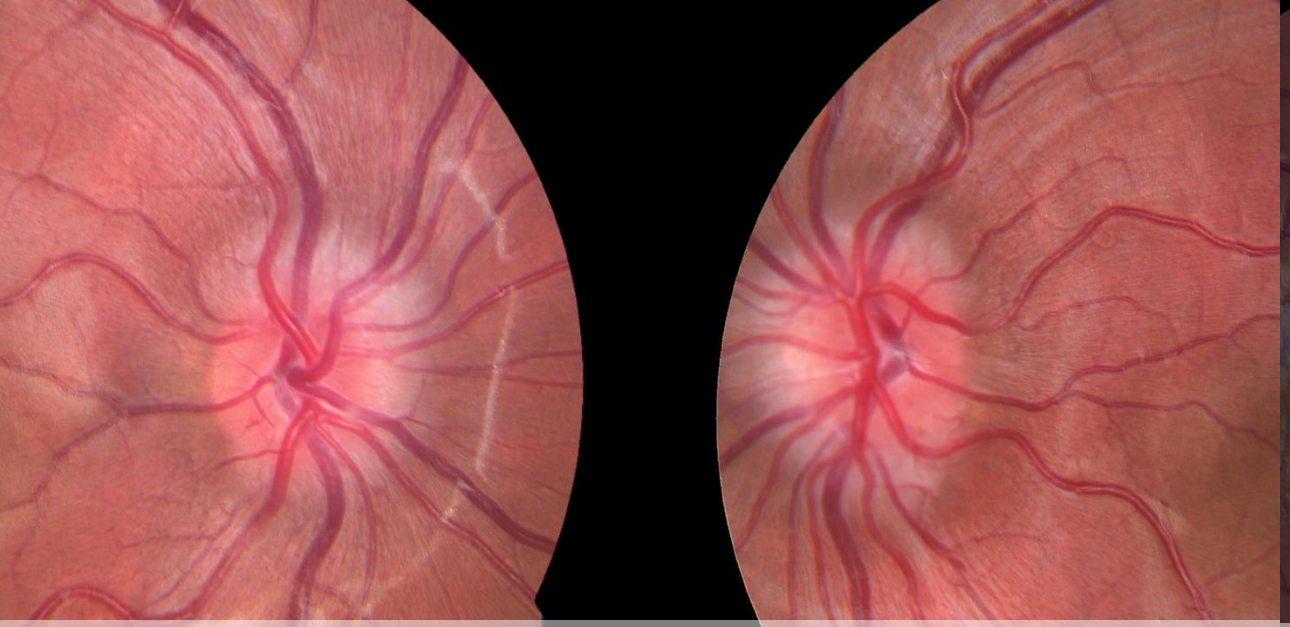

https://app.tophat.com/e/777538

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

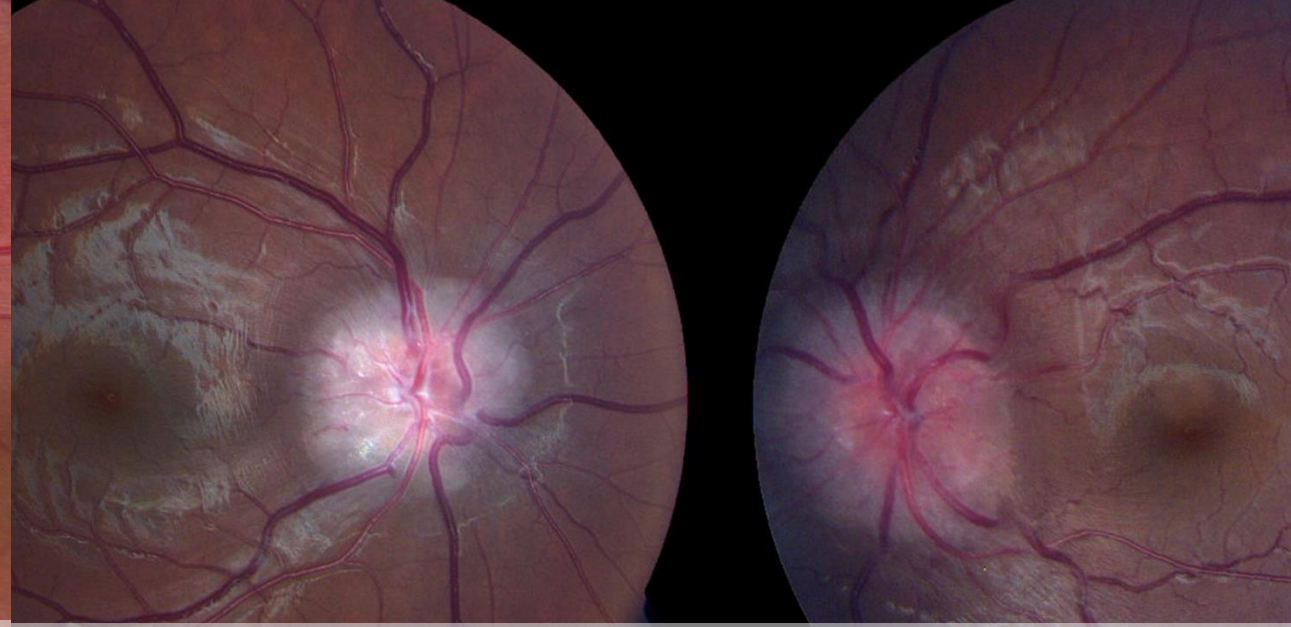
| | |
|---|---|
| **Glaucoma** | Abnormal **IOP asymmetry** (14/22). Large optic cups with **rim area** < 1 $mm^2$. Characteristic **VF defects** |
| **Papilledema** | Bilateral **disc edema** secondary to increased intracranial pressure. |
| **Foster-Kennedy Syndrome** | **Unilateral papilledema** with 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

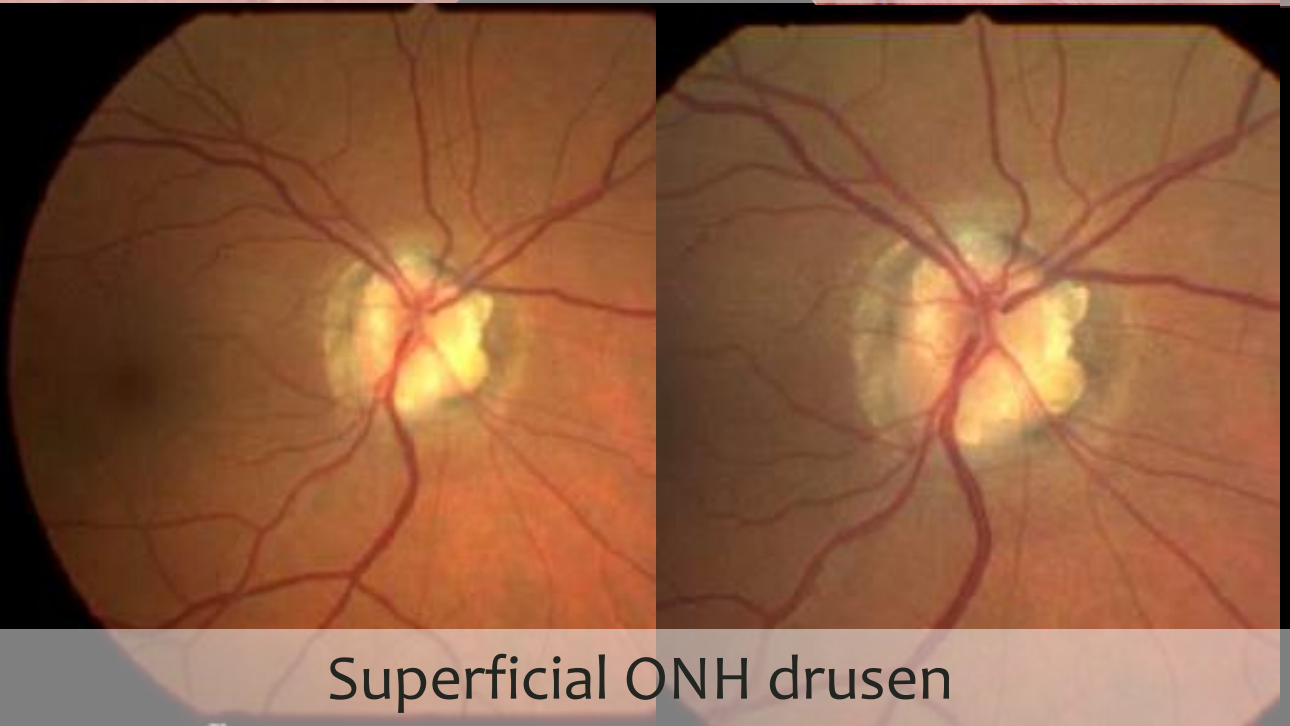
- Acellular calcific deposits of the ONH; 66%-80% bilateral
- Idiopathic; Familial clustering suggests genetic factors
- Early childhood onset of lesions deep in ONH ("buried drusen")
- Lesions usually increase in visibility and size over time
- 25%-75% of adults have VF defect (enlarged BS, arcuate)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



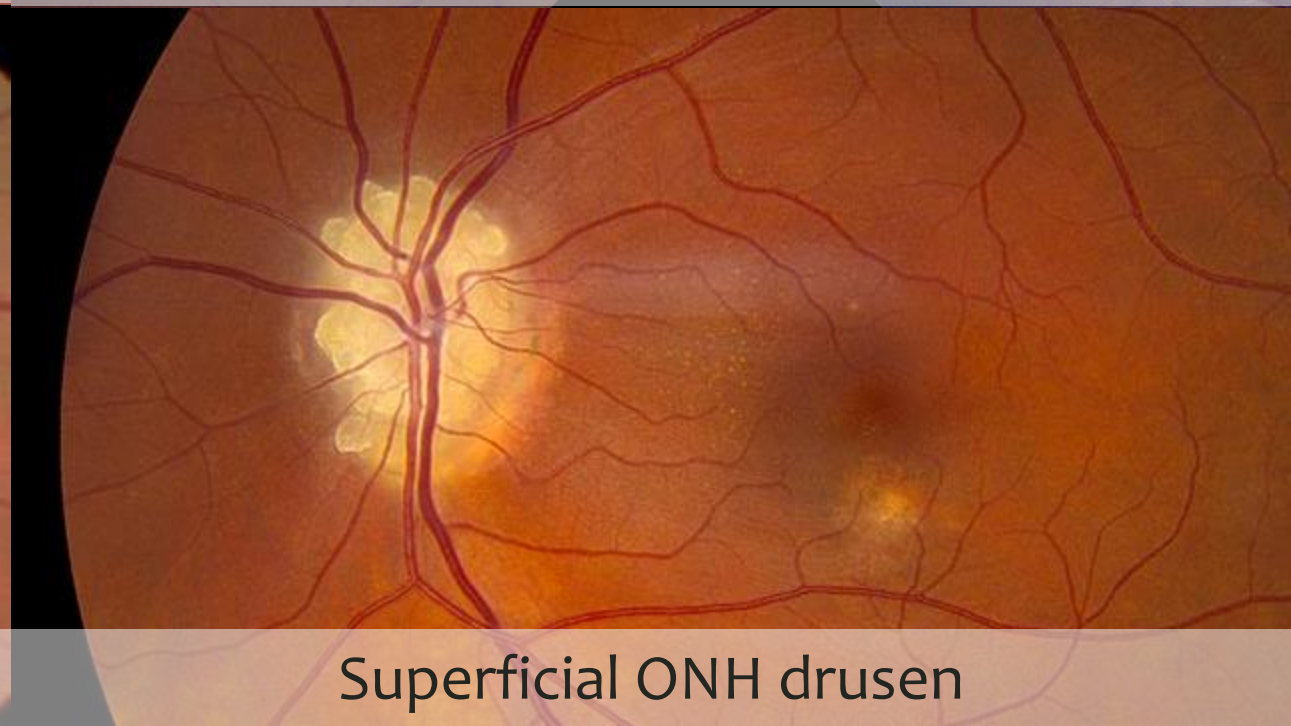
Buried drusen (10yo child)



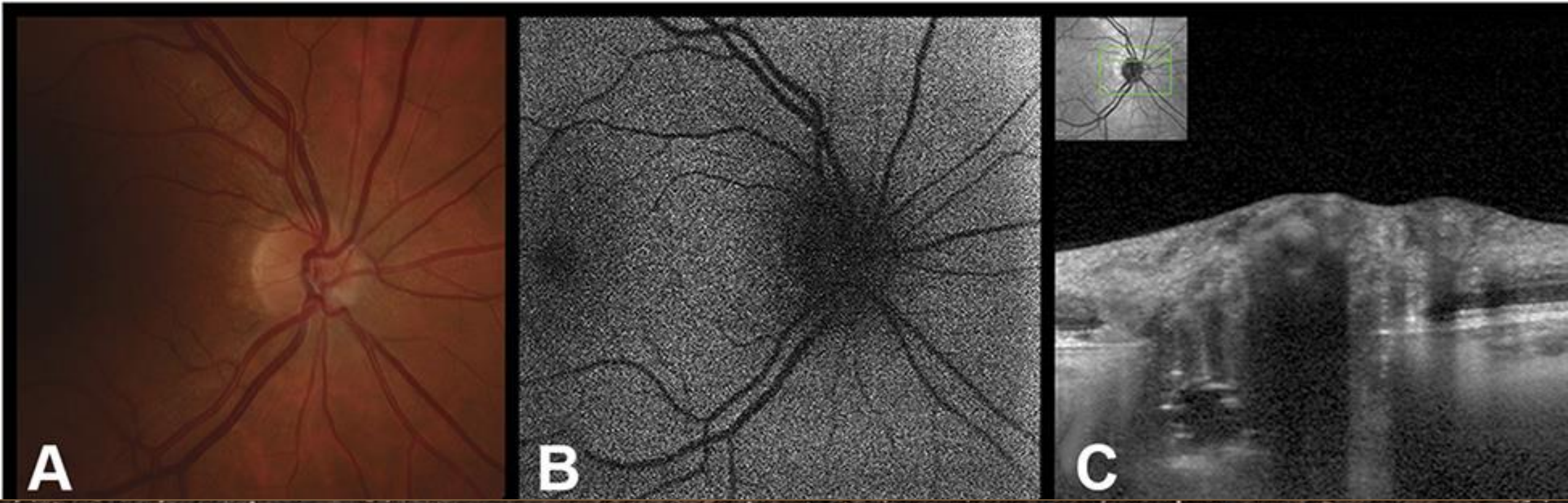
Partially exposed drusen (12yo child)



Superficial ONH drusen



Superficial ONH drusen

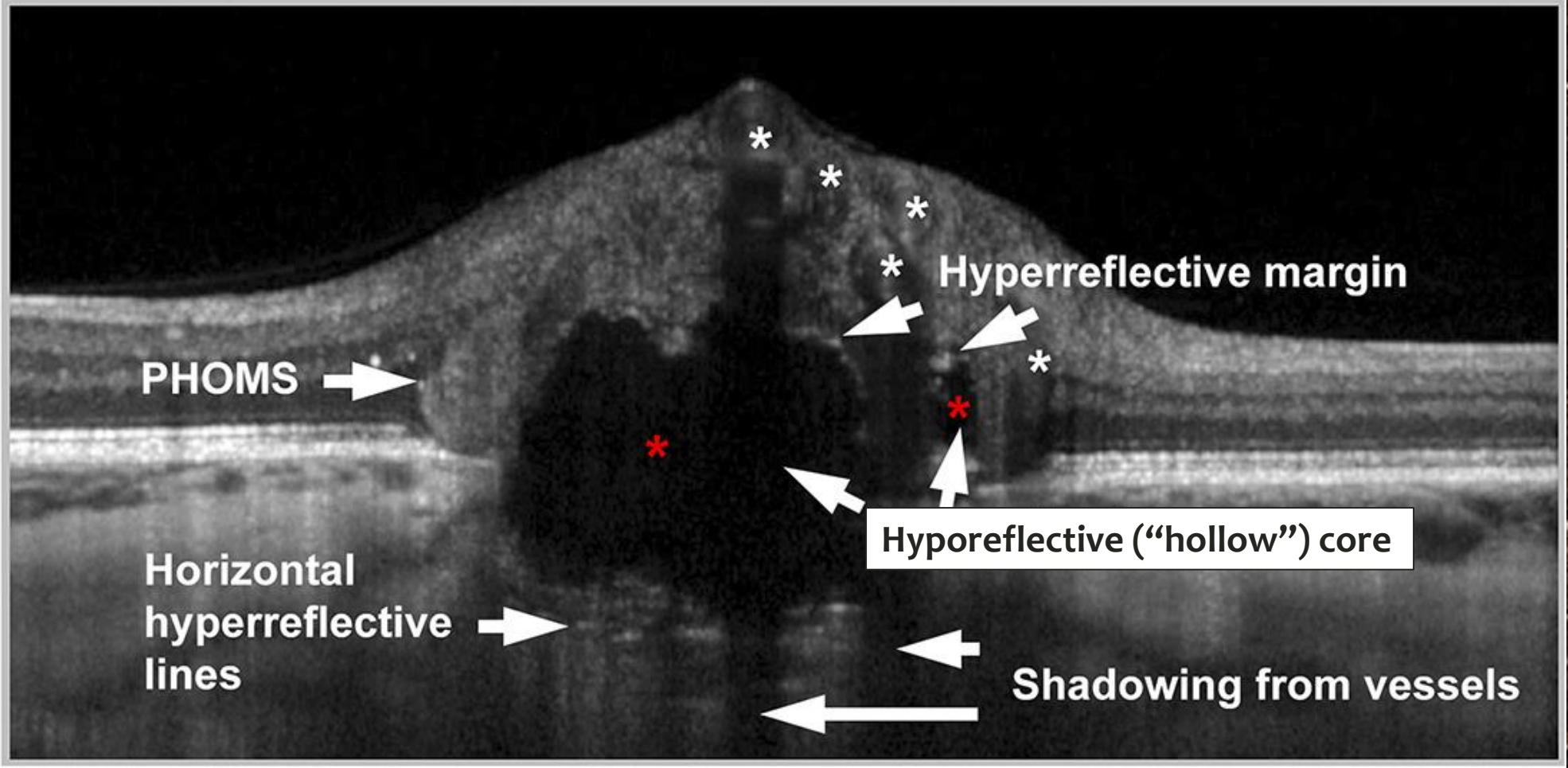



**Absence of FAF signal in a pt with deep buried ONH drusen**

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

Loft, J Neuroophth, 2019

- 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")

Internal reflectivity represents the fusion of multiple ODD

Hyperreflective horizontal lines might be early ODD

PHOMS circumscribe the disc and are not ODD.

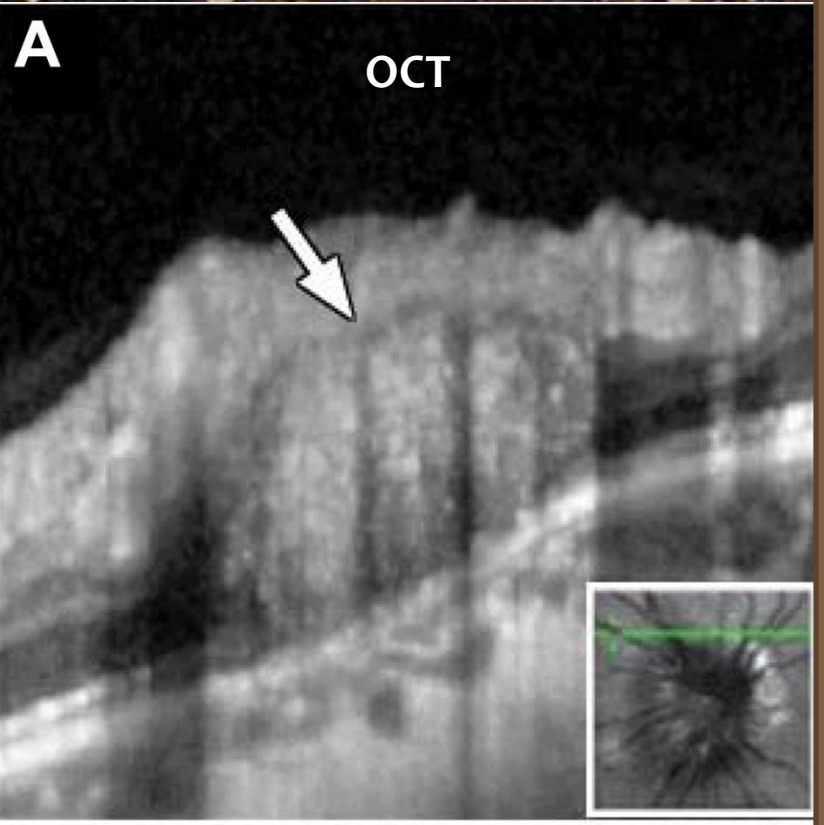
**White asterisks:** vessels.

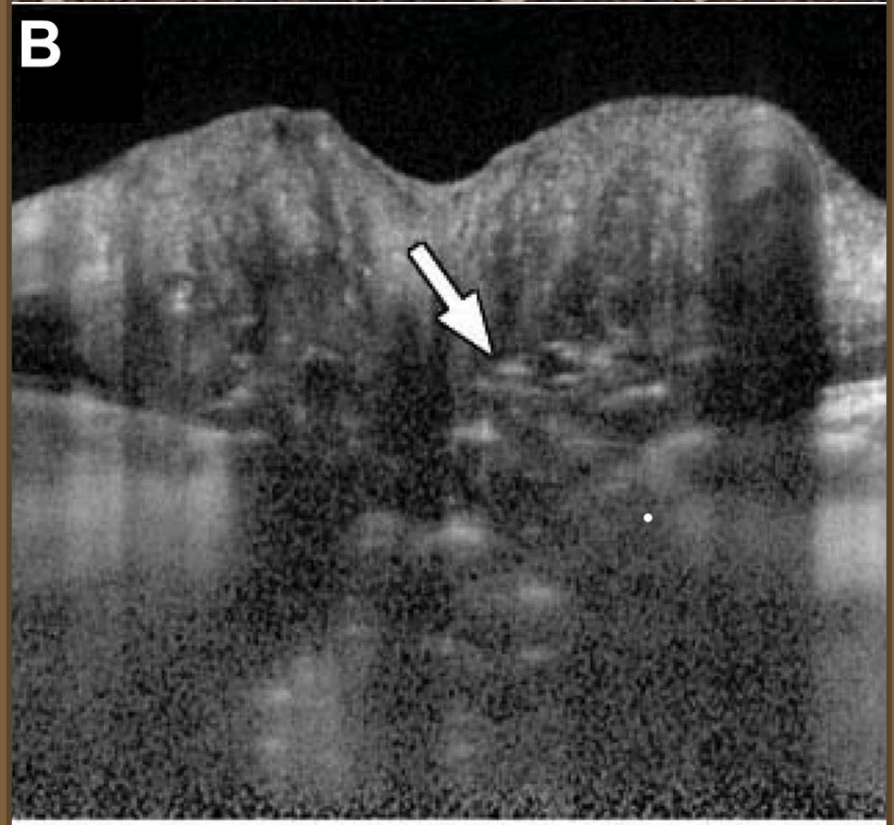
**Red asterisks:** ODD.

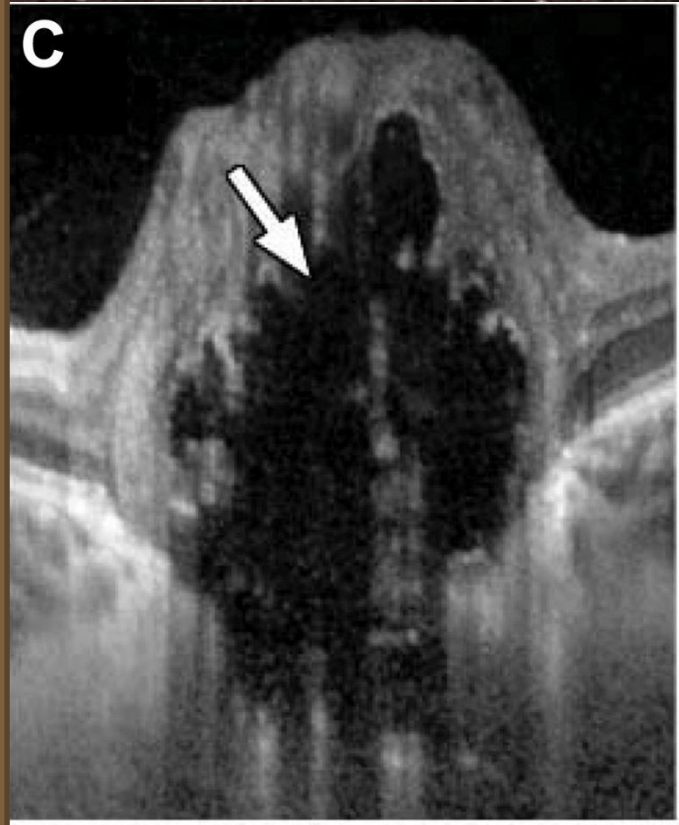
**ODD:** optic disc drusen

**PHOMS:** peripapillary hyperreflective ovoid mass-like structures.

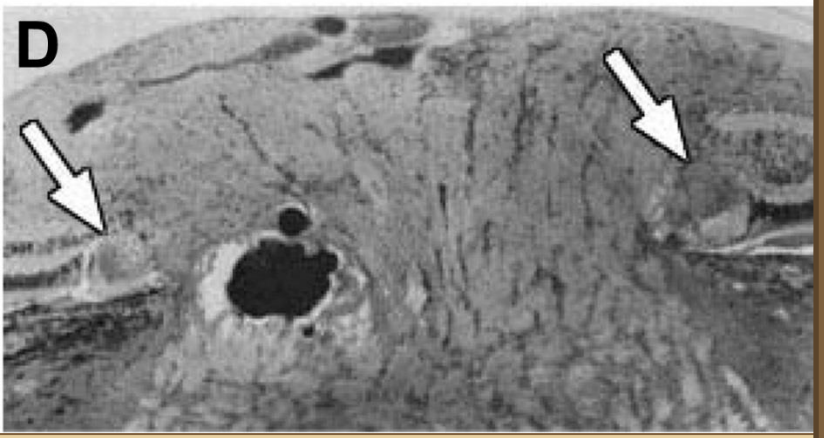
Malmqvist, 2017

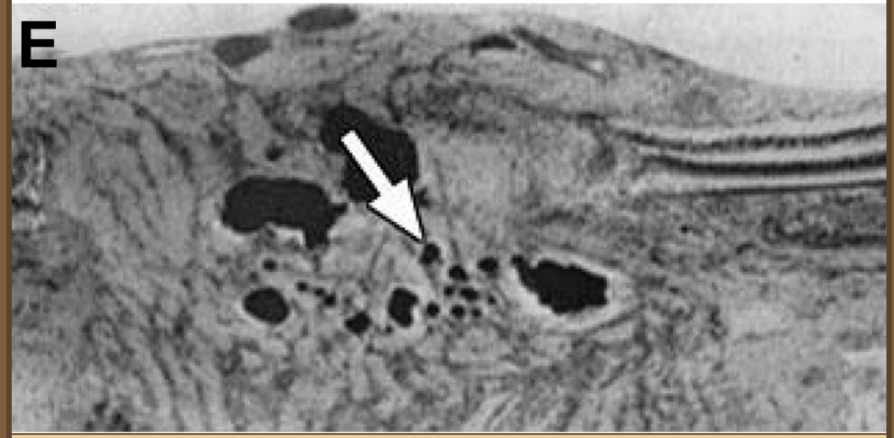


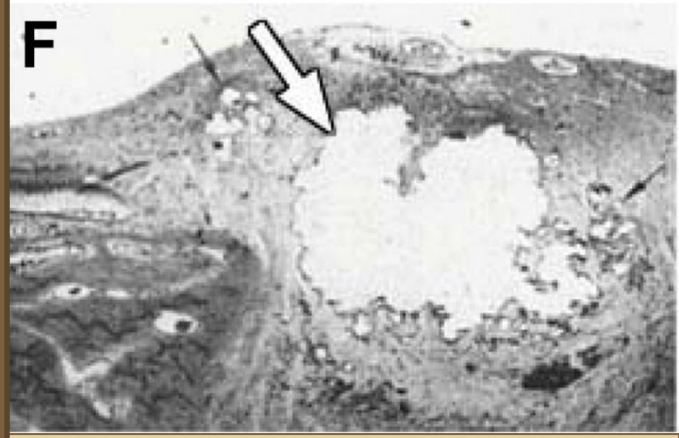




HISTOLOGY



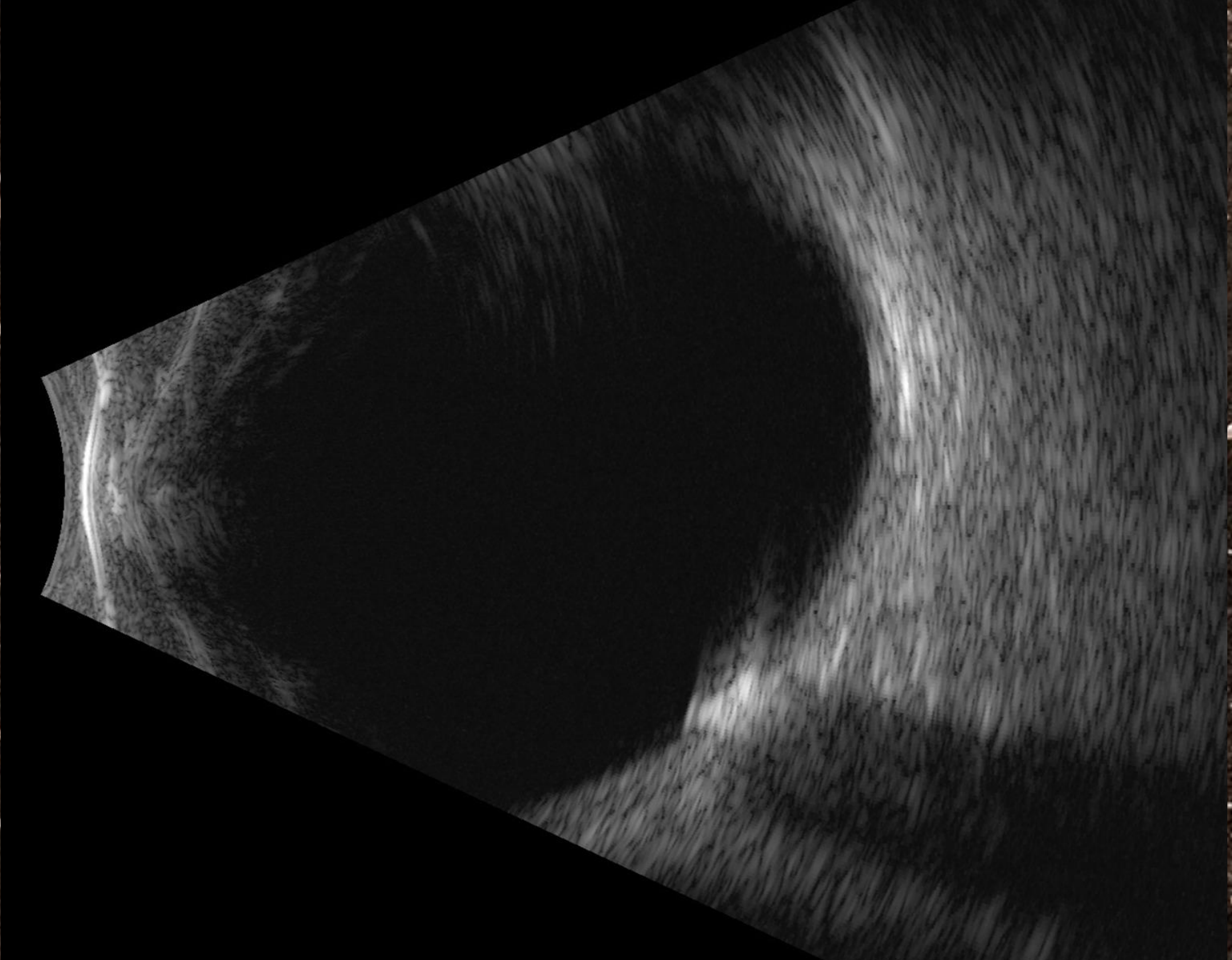




Peripapillary waste (not hollow)

Small drusen (horizontal lines)

Confluent drusen (septa)

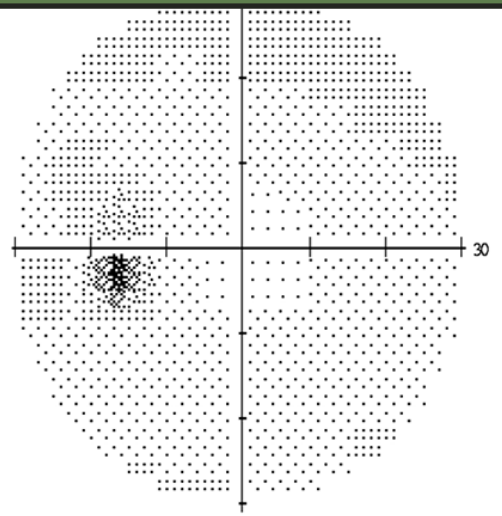


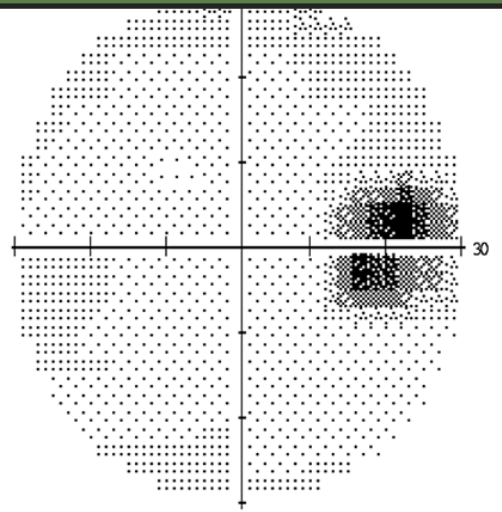
Ultrasonography has high sensitivity (90%) and specificity (80%) in diagnosis of ONH drusen

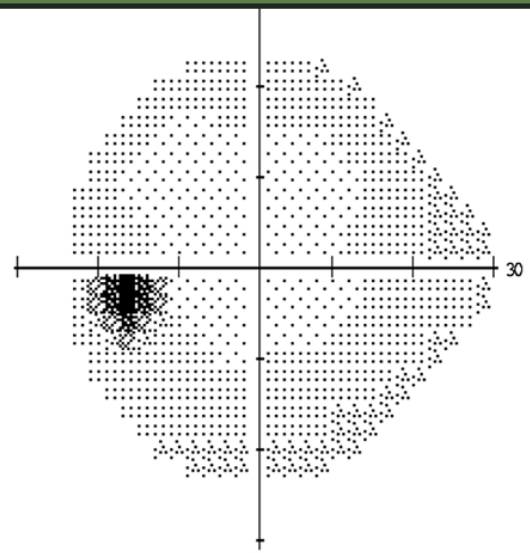
Represents “gold standard” for diagnosis

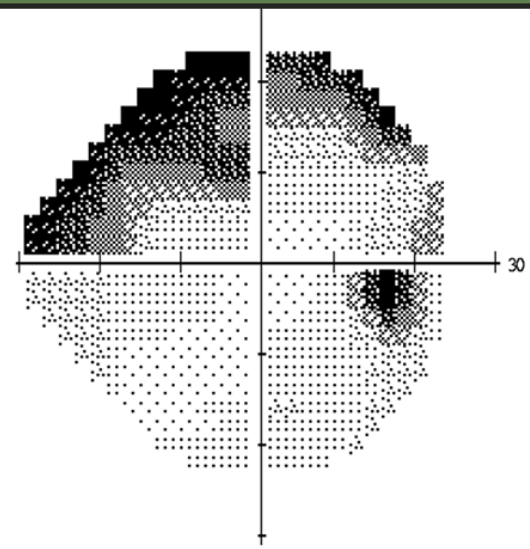
Carter, 2014

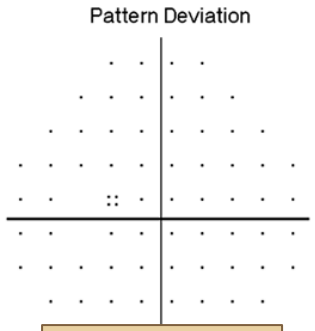
# VF Defects with ONH Drusen



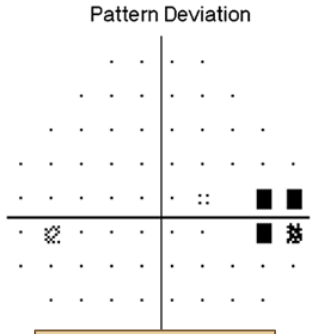



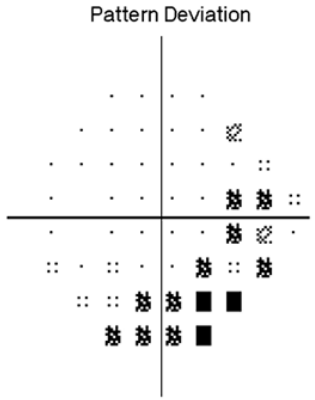



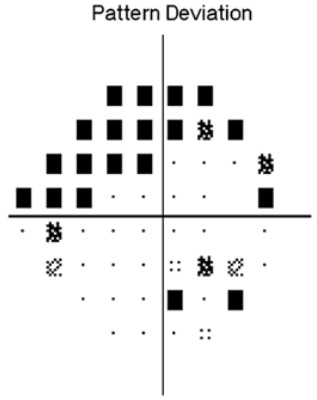

20% cases




50% cases




30% cases




Normal

Enlarged Blind Spot

Early Arcuate

Adv. Arcuate

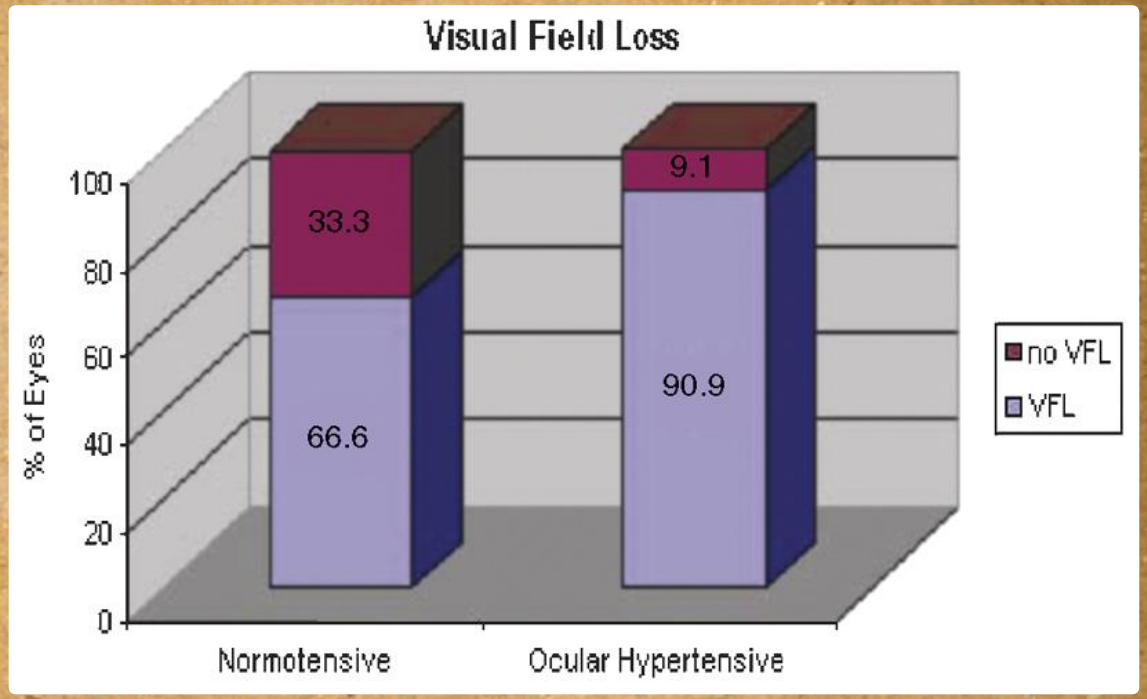
# VF Defects with ONH Drusen

- Over 80% of adult cases will have VF defects
- Enlarged BS, arcuate defects and constricted VF are most common
- VF loss tends to progress slowly over time
- Eyes with larger and more superficial drusen tend to have greater VF damage
- Arcuate VF defects have associated RNFL thinning
- Visual acuity and color vision usually remain 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**

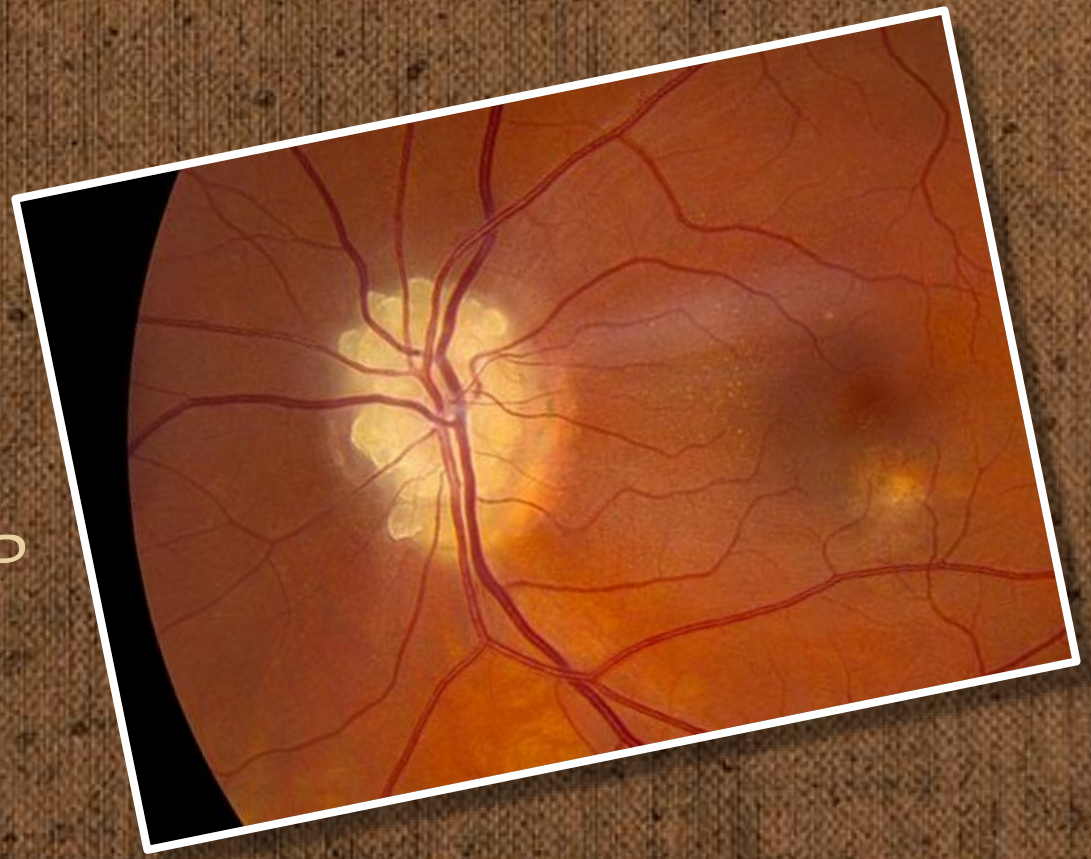
Grippo, 2008



# 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

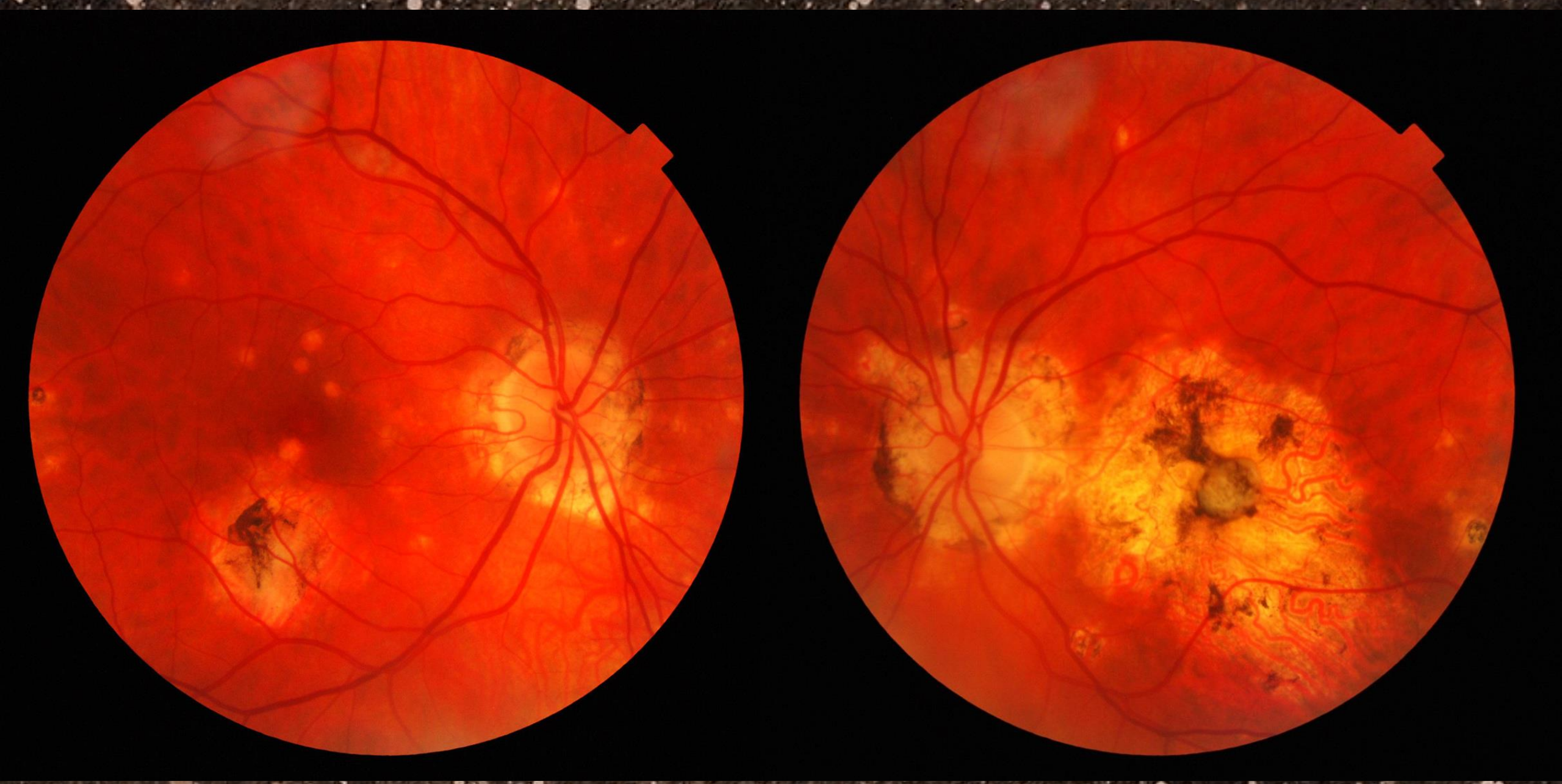


# CASE #4

*The bird man 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

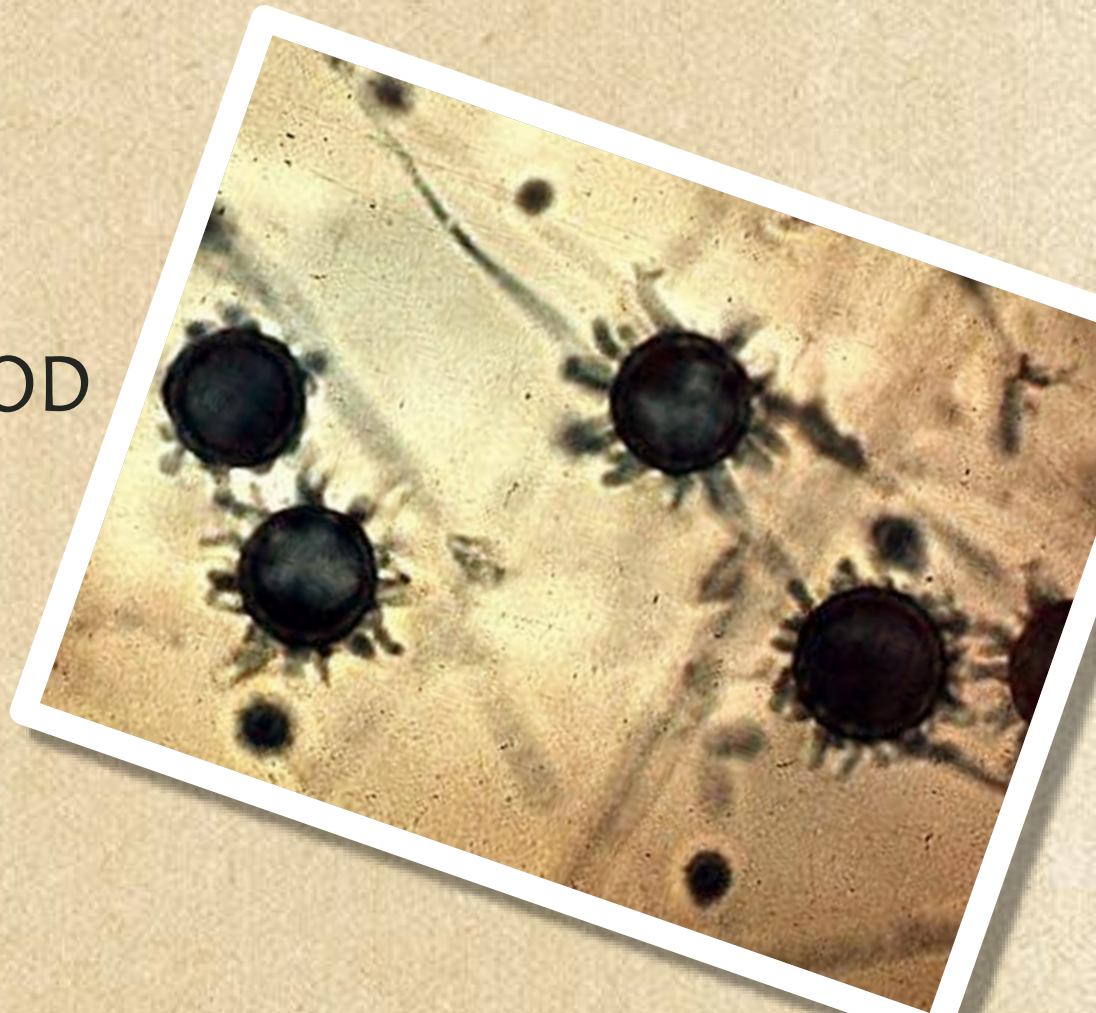


20/20

Finger counting

# Assessment

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



# What is the plan?

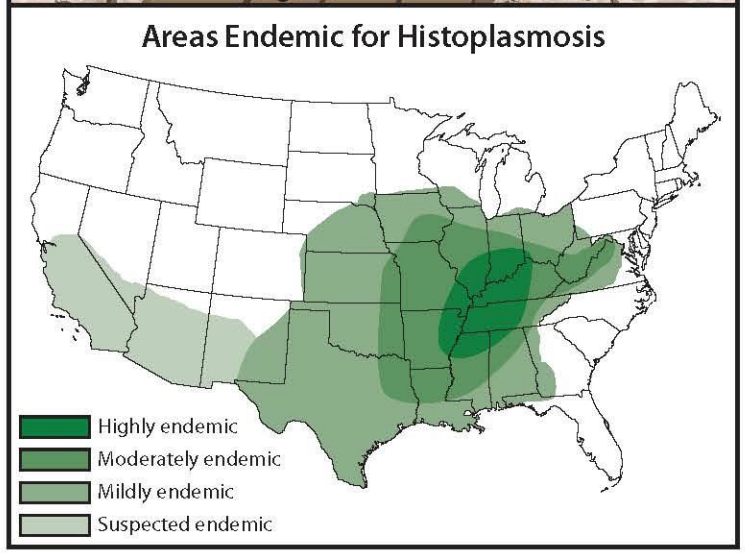

**https://app.tophat.com/e/777538**

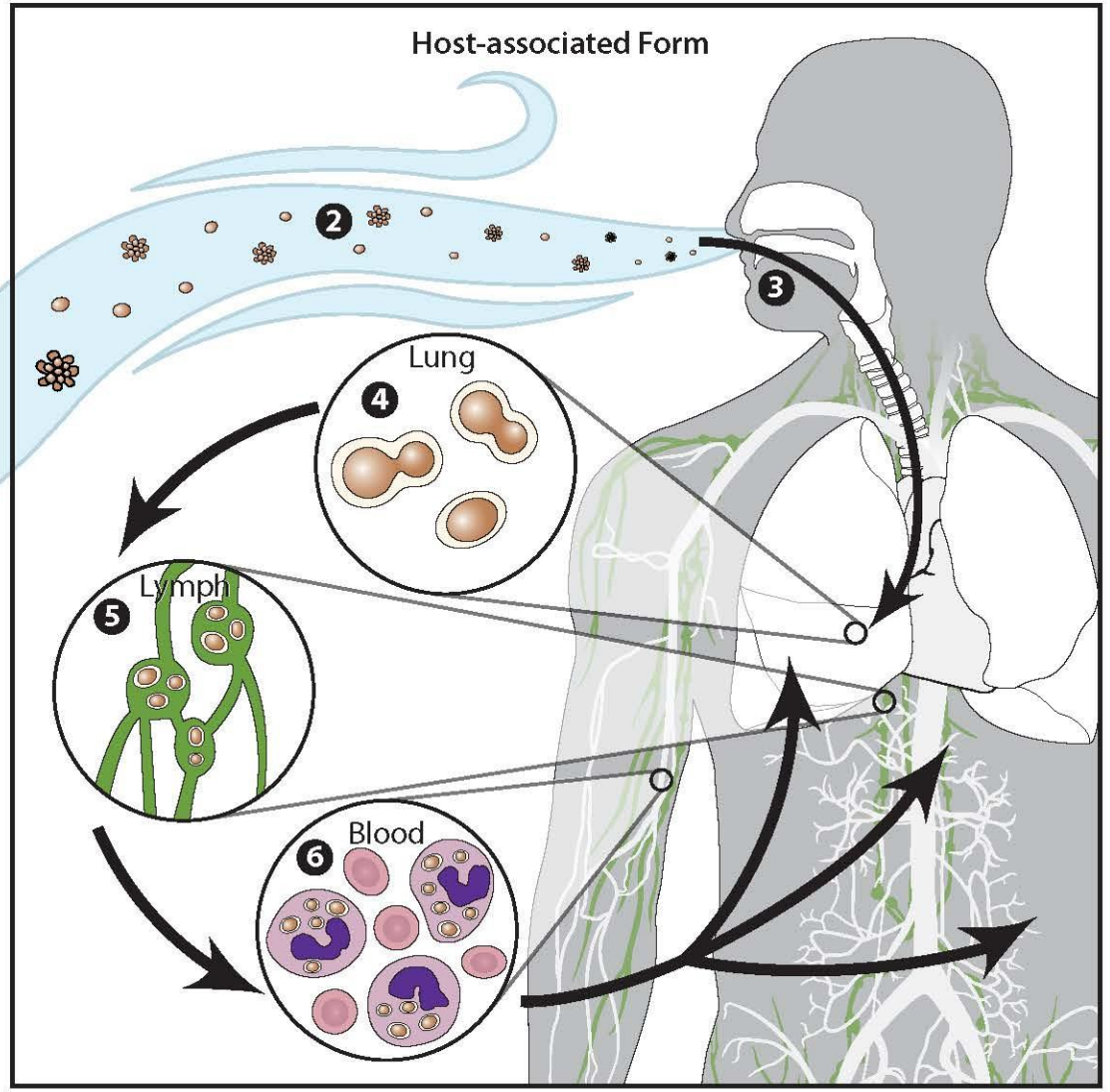
- Referral for laser photocoagulation
- Referral for Avastin injection
- Mask or ventilator use at work
- Referral for low vision care
- Routine annual eye exams

# 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

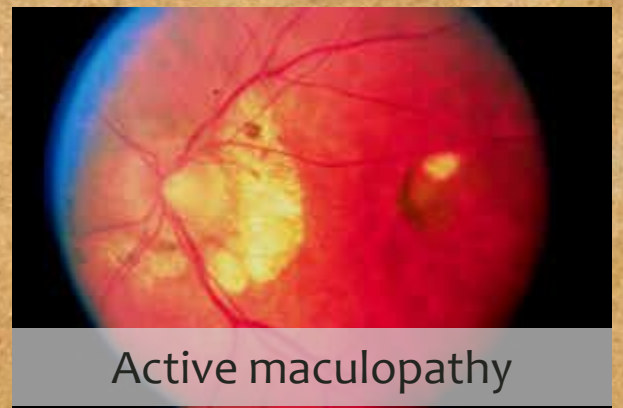

In the environment, *Histoplasm capsulatum* exists as a mold (1) with aerial hyphae. The hyphae produce macroconidia and microconidia (2) spores that are aerosolized and dispersed. Microconidia are inhaled into the lungs by a susceptible host (3). The warmer temperature inside the host signals a transformation 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

Perimacular histo spot

5 years



Active maculopathy

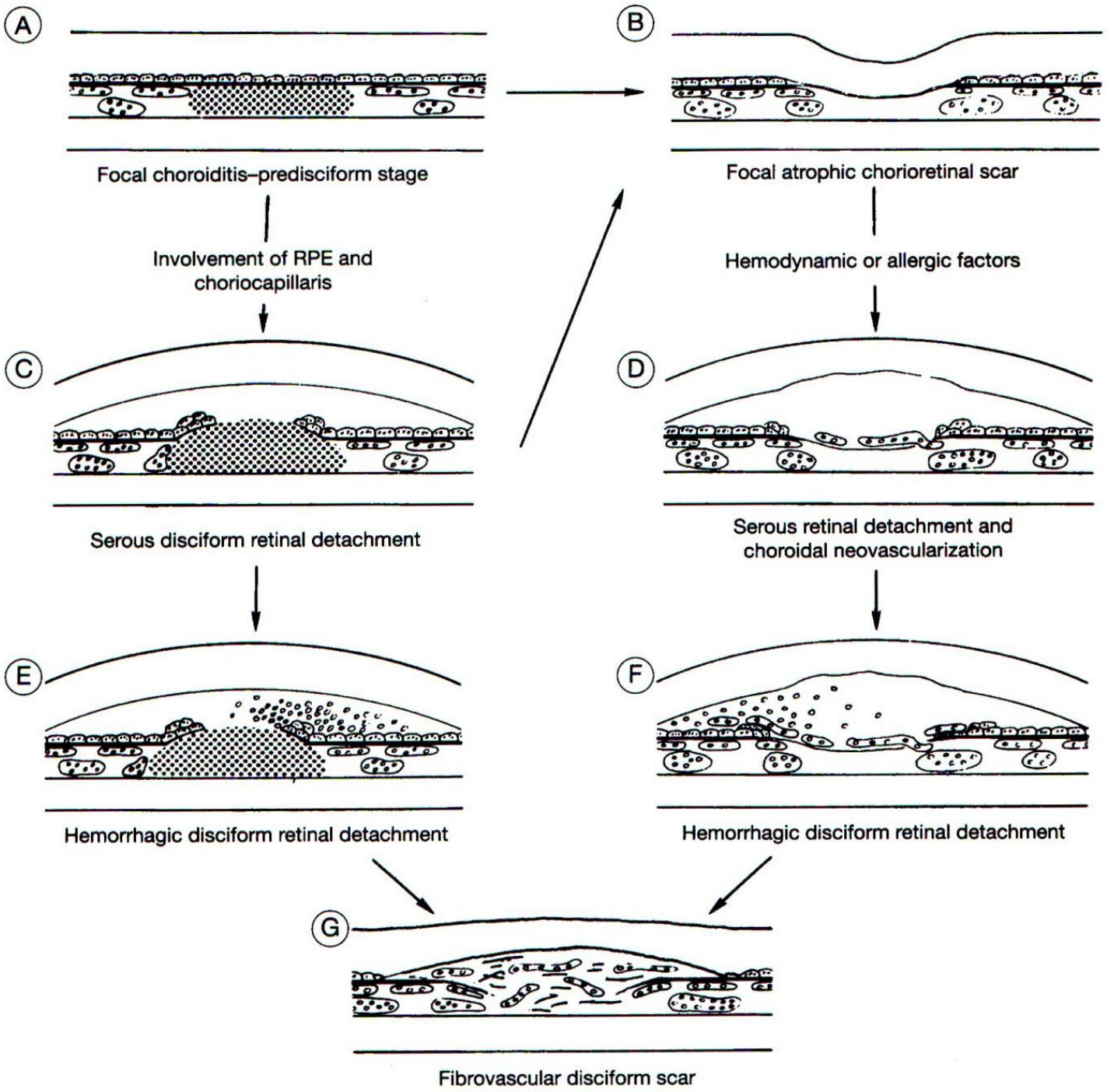
## Inflammatory maculopathy pathway

Focal choroiditis

Serous detachment

Subretinal hemorrhage

Scar



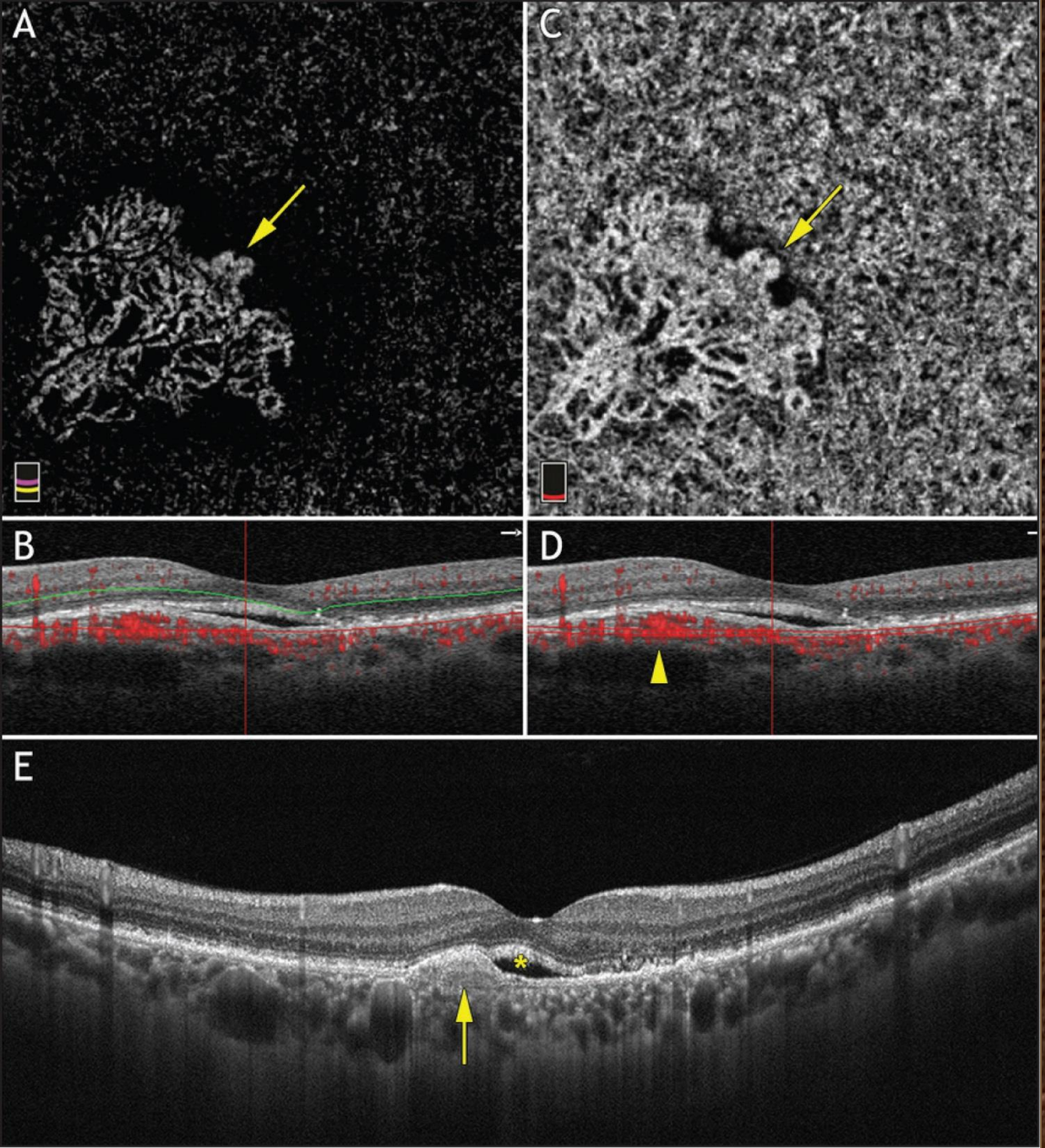

## Neovascular maculopathy pathway

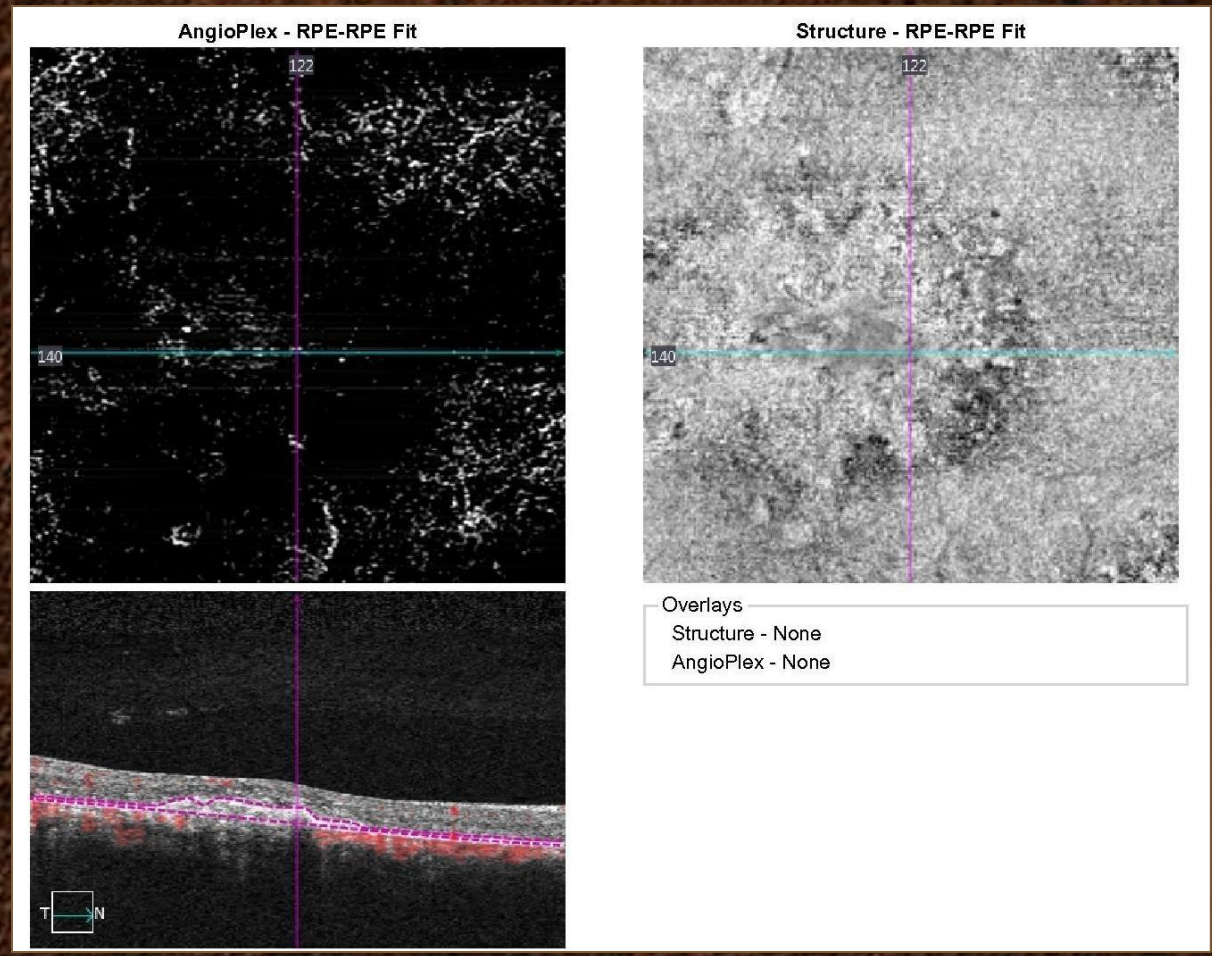
Histo spot

CNV

Subretinal hemorrhage

Scar




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

# 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, 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

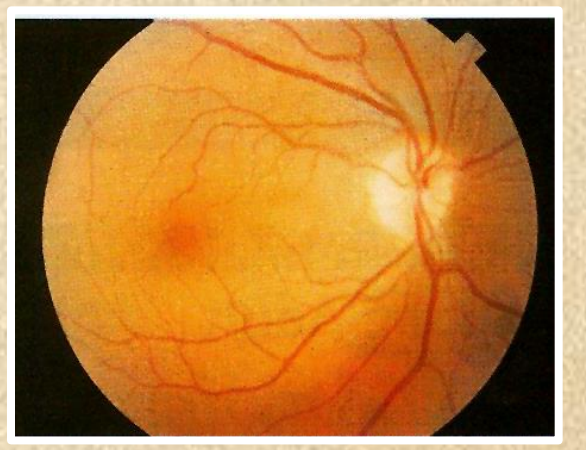
*Hear no evil, see no evil!*

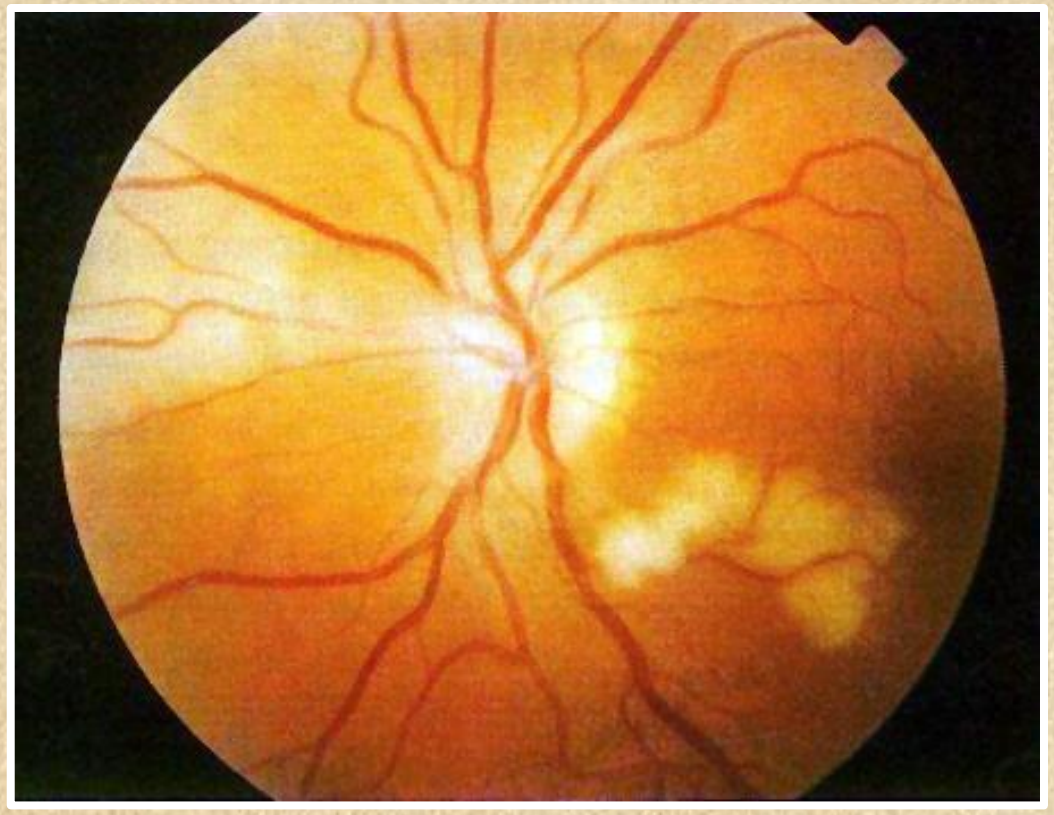
# Visit 1 (1993)

- 36yo WF presents with c/o “gray haze” OS x 2 weeks
  - 1 week prior had suffered 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 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

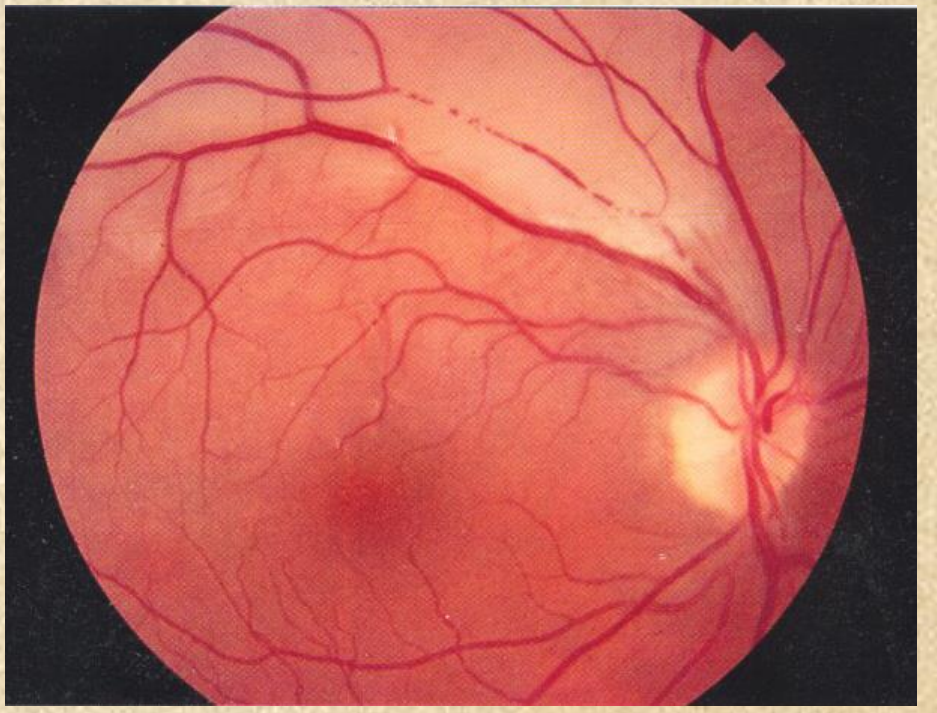
- BRAO OS

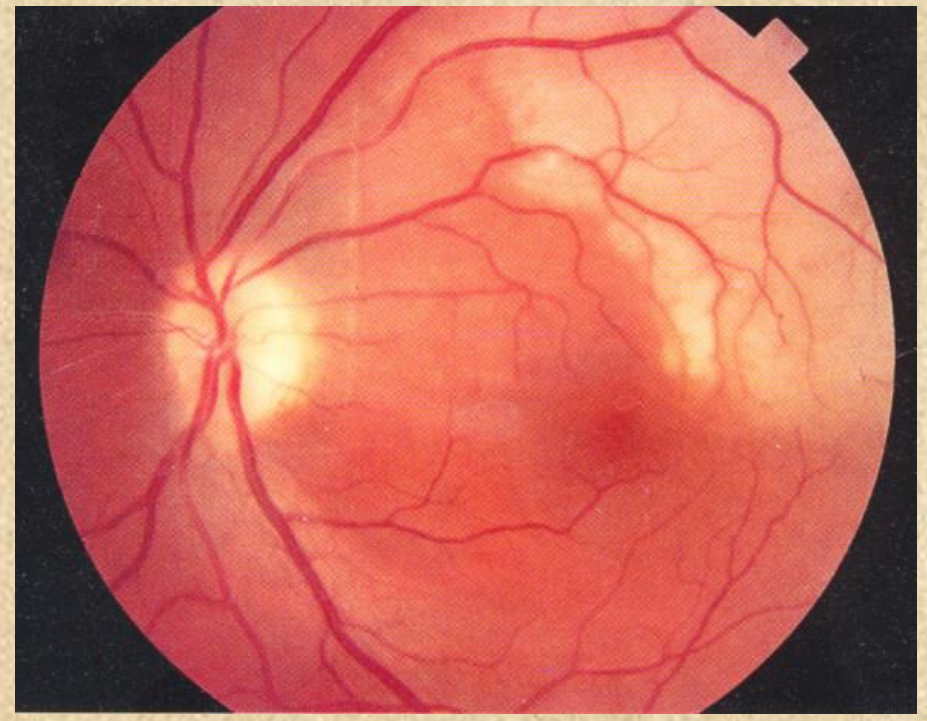
# Management

- 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

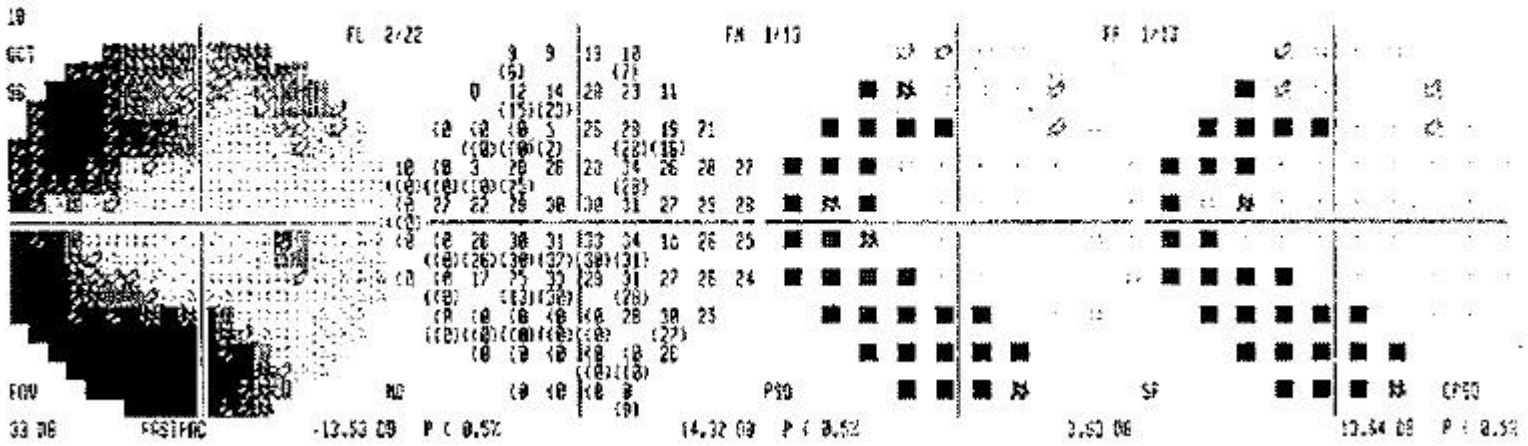
- Presented 2 weeks later with photopsia OD
- Examination was remarkable for the presence of new BRAO OD





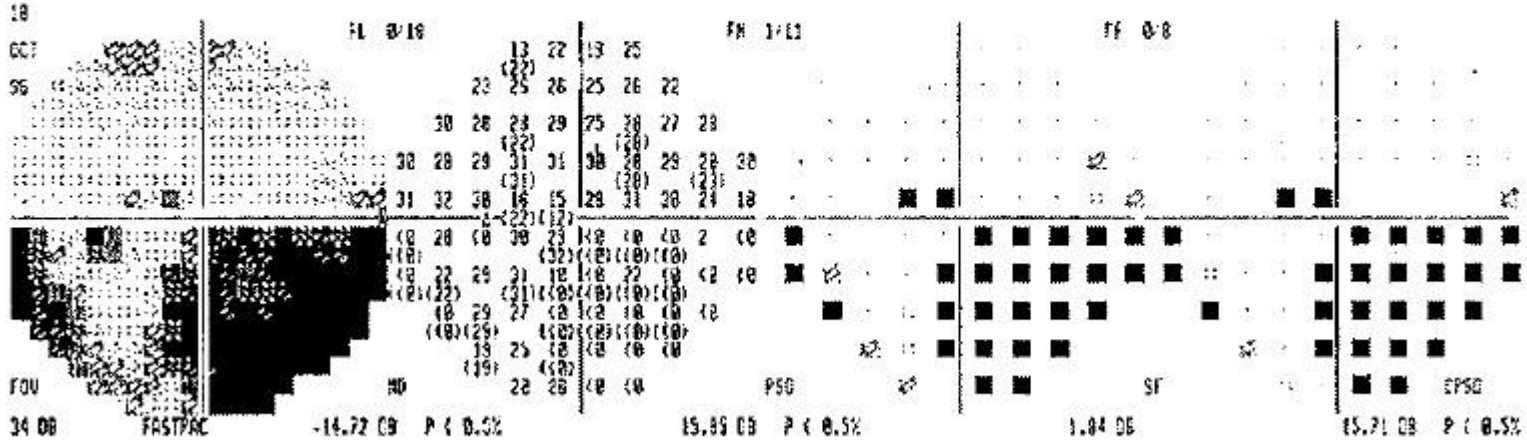
RIGHT C30-2

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

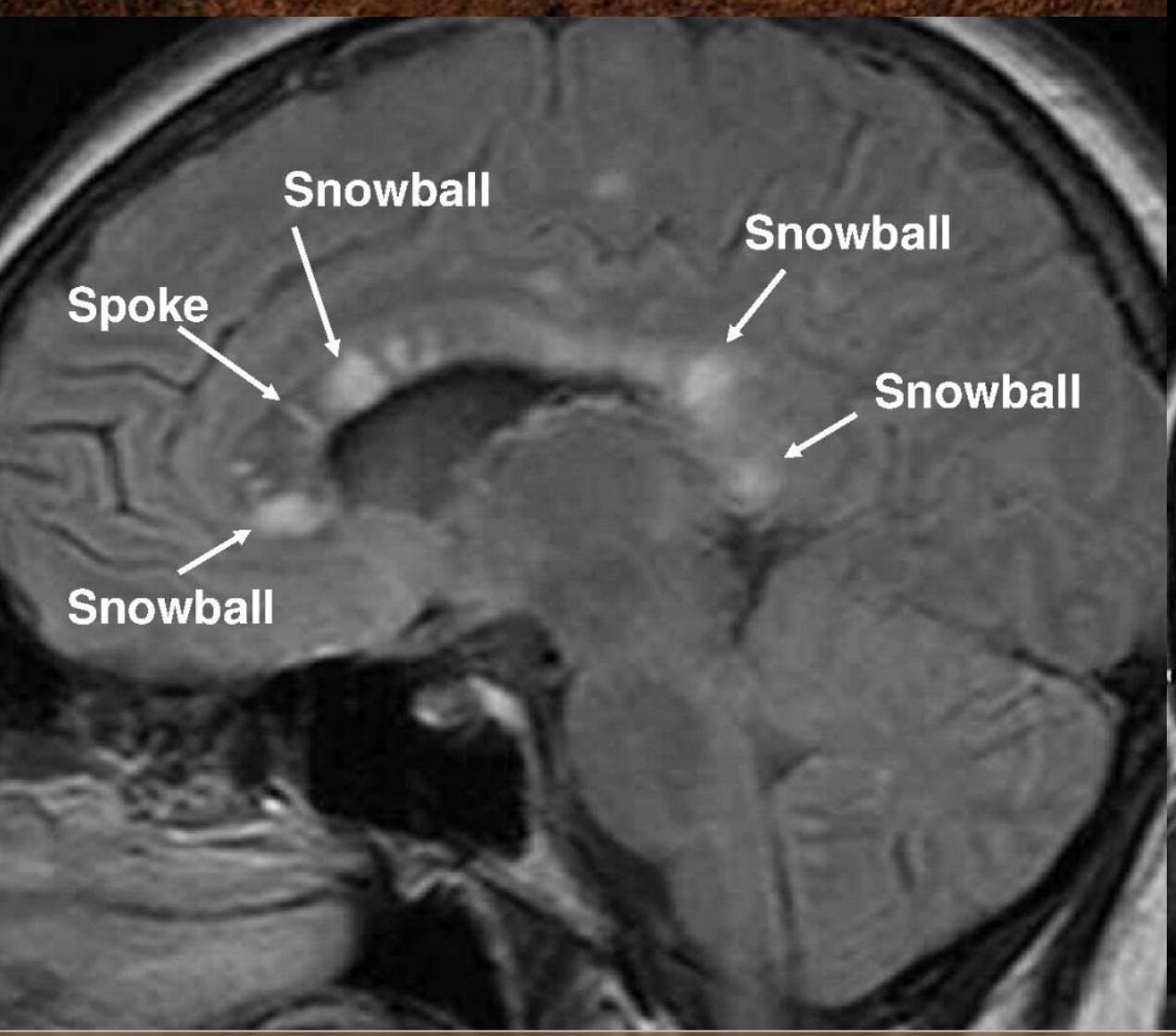
| | |
|---|---|
| **Multiple sclerosis** | Uveitis and retinal phlebitis are common posterior segment manifestations of MS. **BRAO is not associated with MS** |
| **Systemic lupus erythematosis** | Retinopathy may include CWS, **BRAO**, neovascularization and VH. Diagnosis made on clinical and lab grounds. |
| **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 |

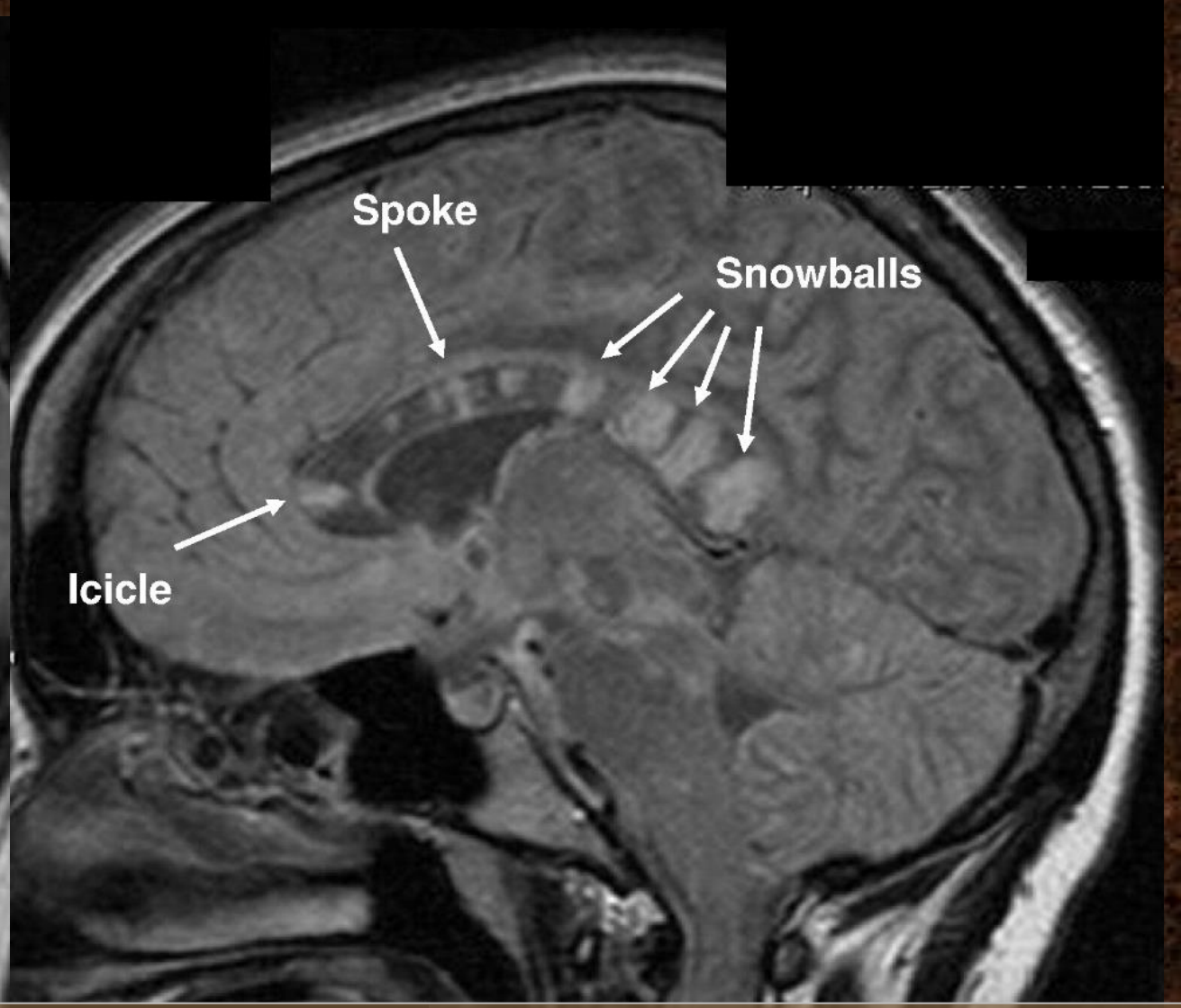
# BRAO in the Young

| | |
|---|---|
| **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

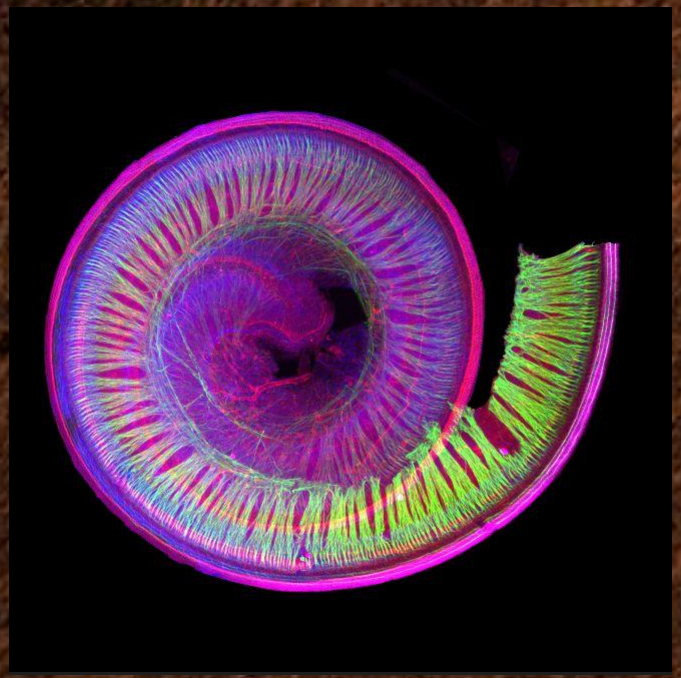
- Clinical triad of (1) encepholopathy, (2) BRAO, and (3) hearing loss that typically occurs in young adult women
- First described by Susac in 1994
- Immune mediated microangiopathy affecting blood vessels in the retina, chochlea and brain
- MRI findings of lesions in the corpus callosum
- Treatment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

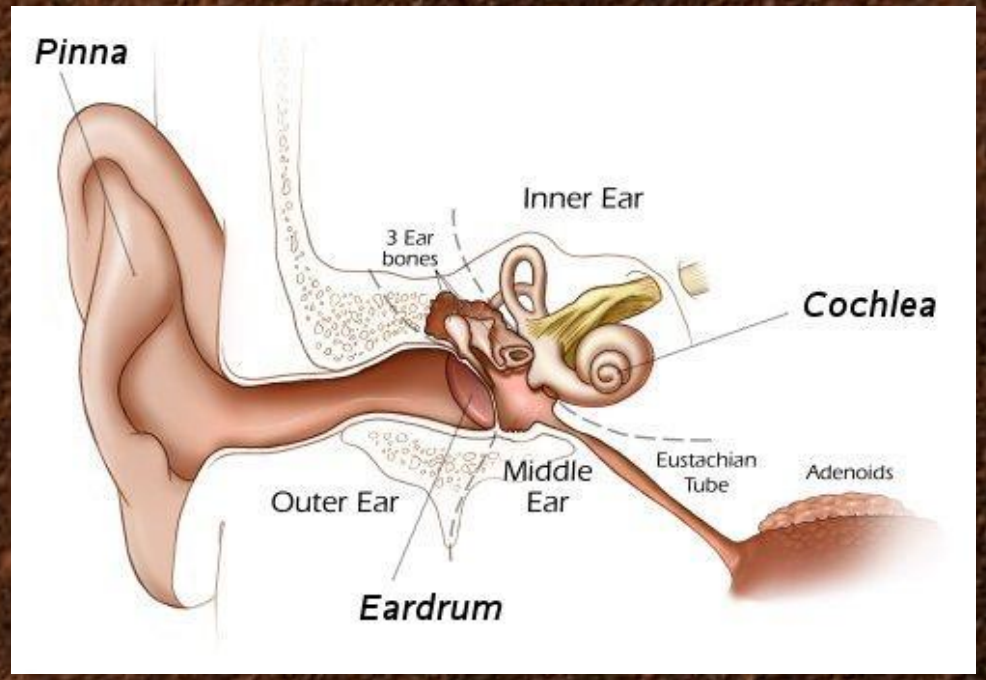


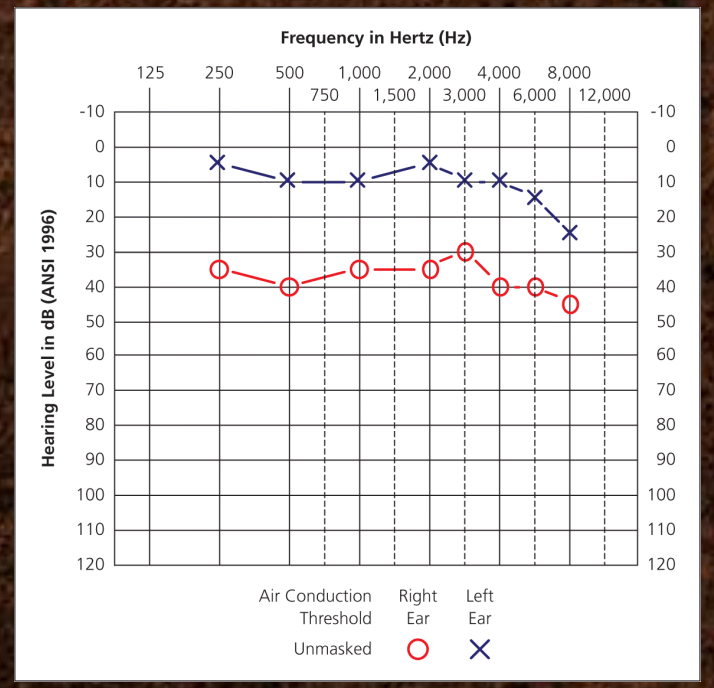




# MRI findings in the corpus callosum of patients with Susac's syndrome

Rennebohm R. J Neurol Sci. 2010;299:86–91

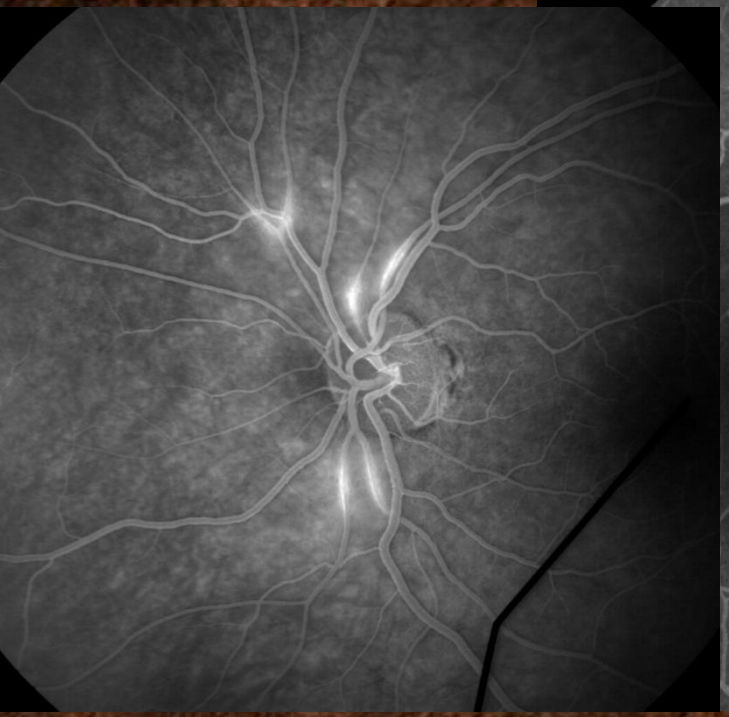


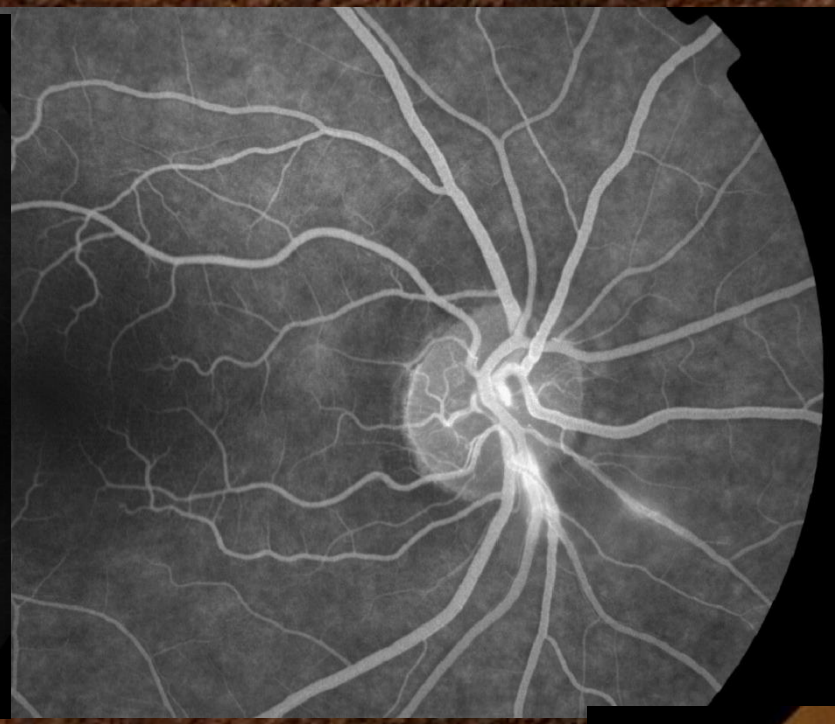


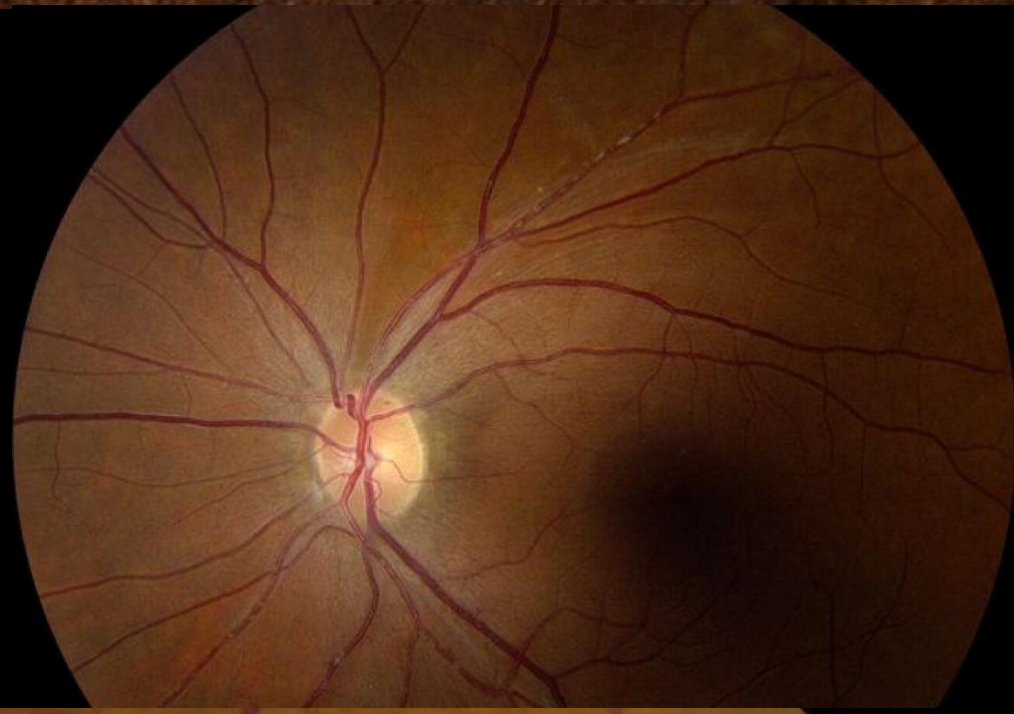




Damage to the cochlea (inner ear) results in sensorineural hearing loss, and is a key diagnostic finding in Susac's syndrome

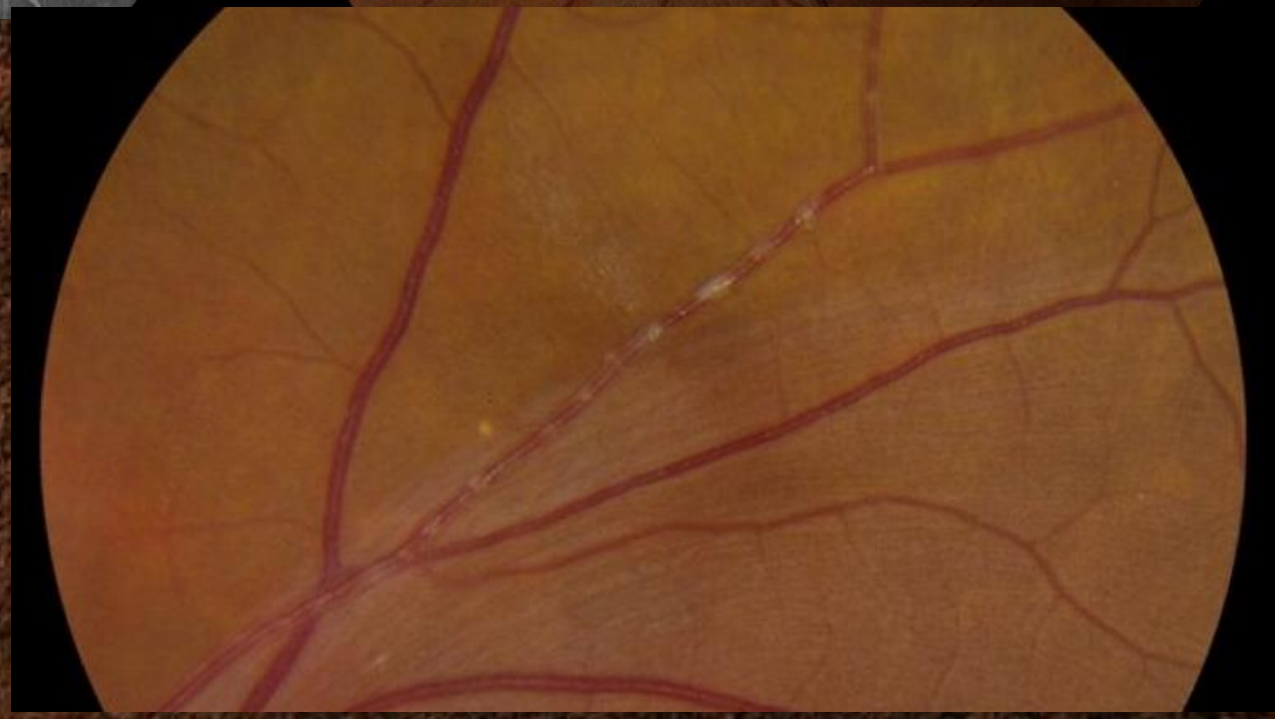
Egan RA. J Neurol Sci. 2010;299:97–100



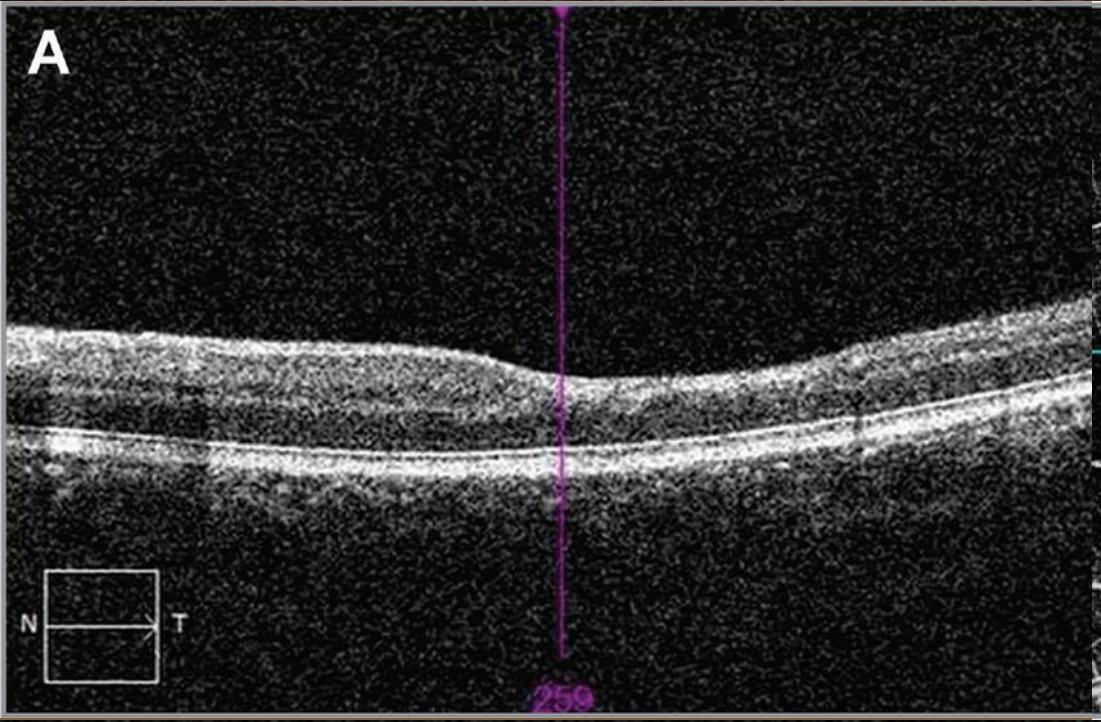


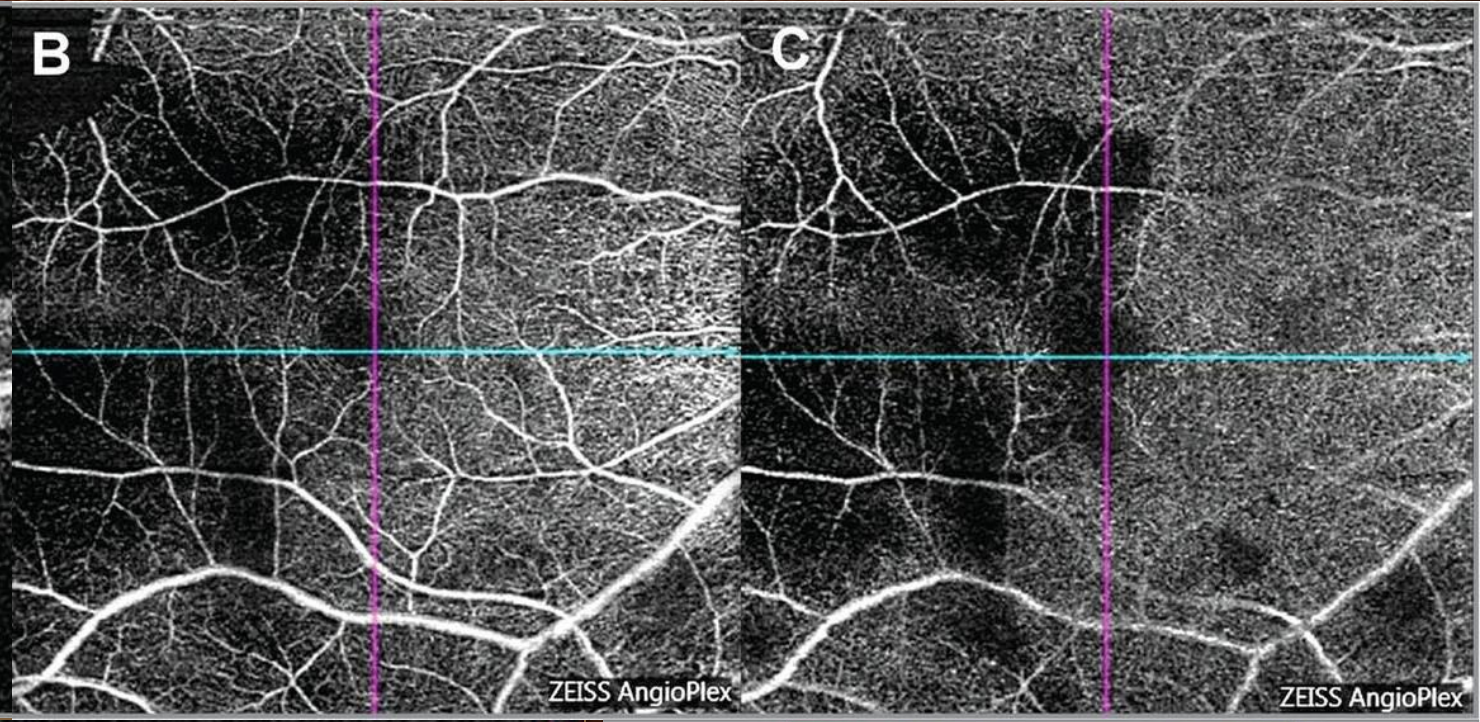


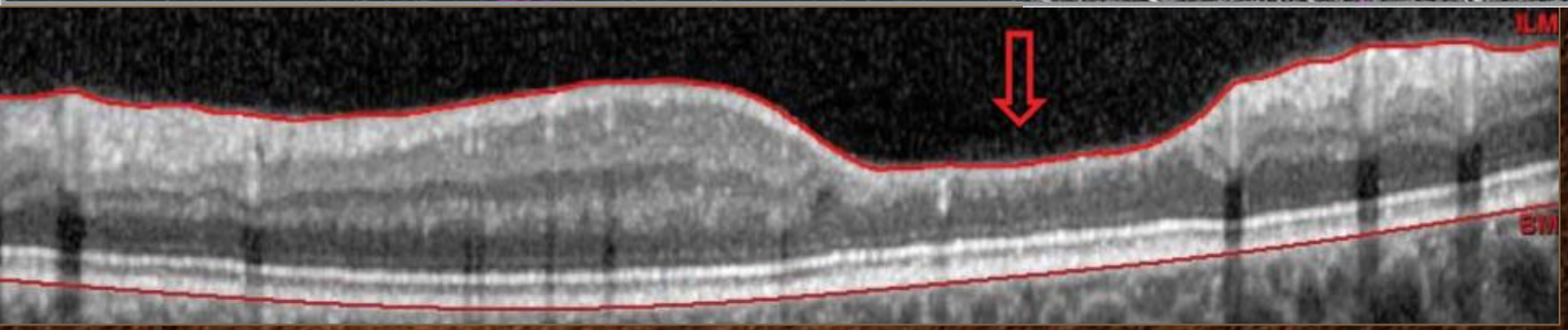
Acute retinal findings include arterial wall hyperfluorescence on FA and “Gass plaques” – yellow deposits believed to represent focal damage to the arterial wall

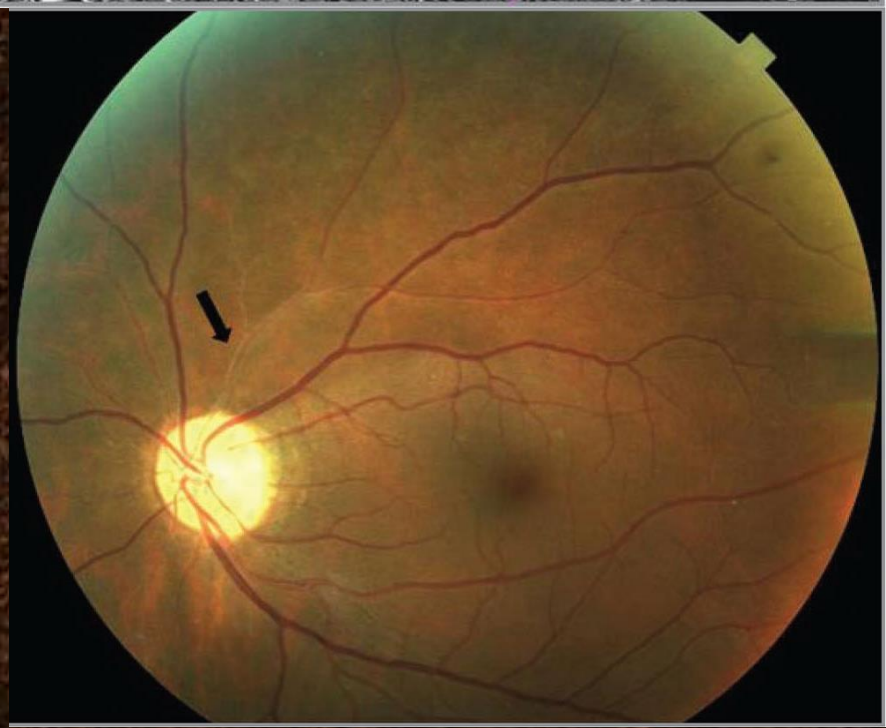


Egan RA. J Neurol Sci. 2010;299:97–100



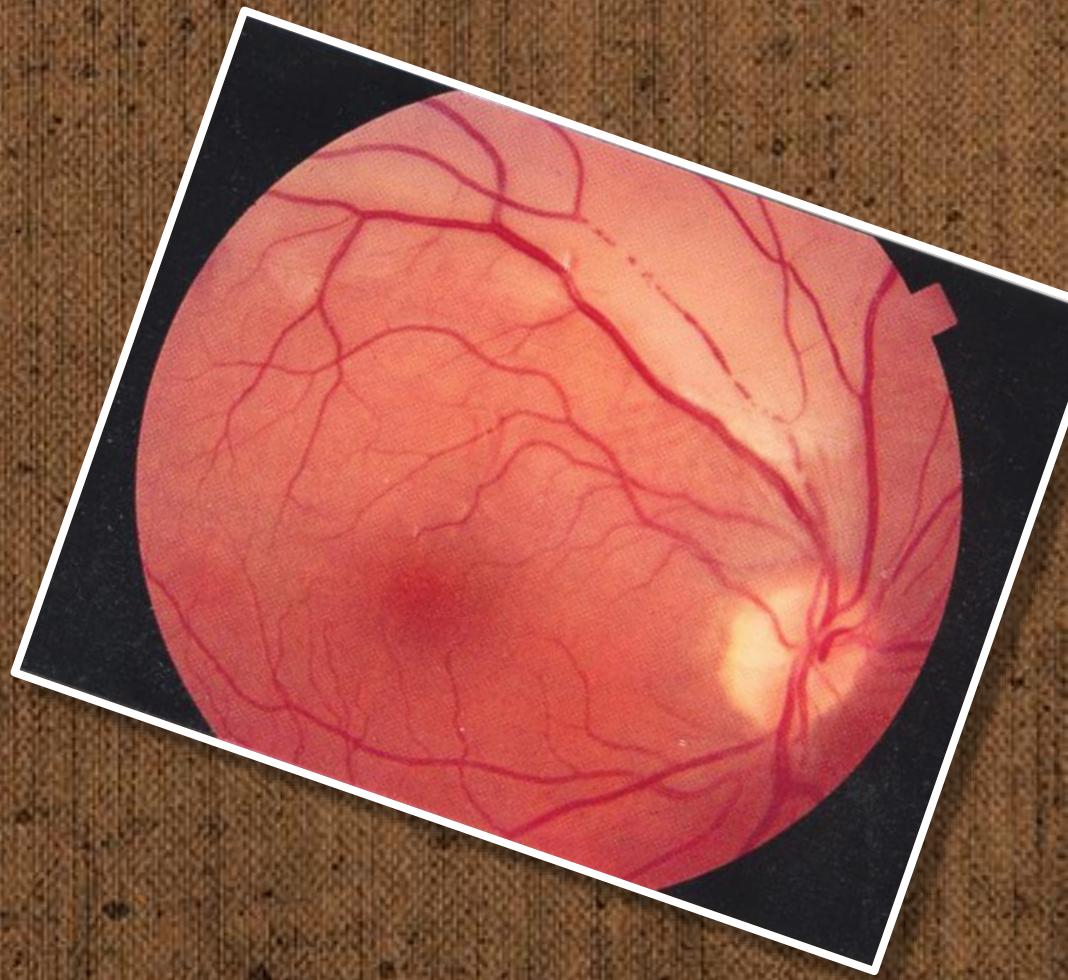



Late retinal findings include arterial attenuation, inner retinal atrophy and regions of nonperfusion

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

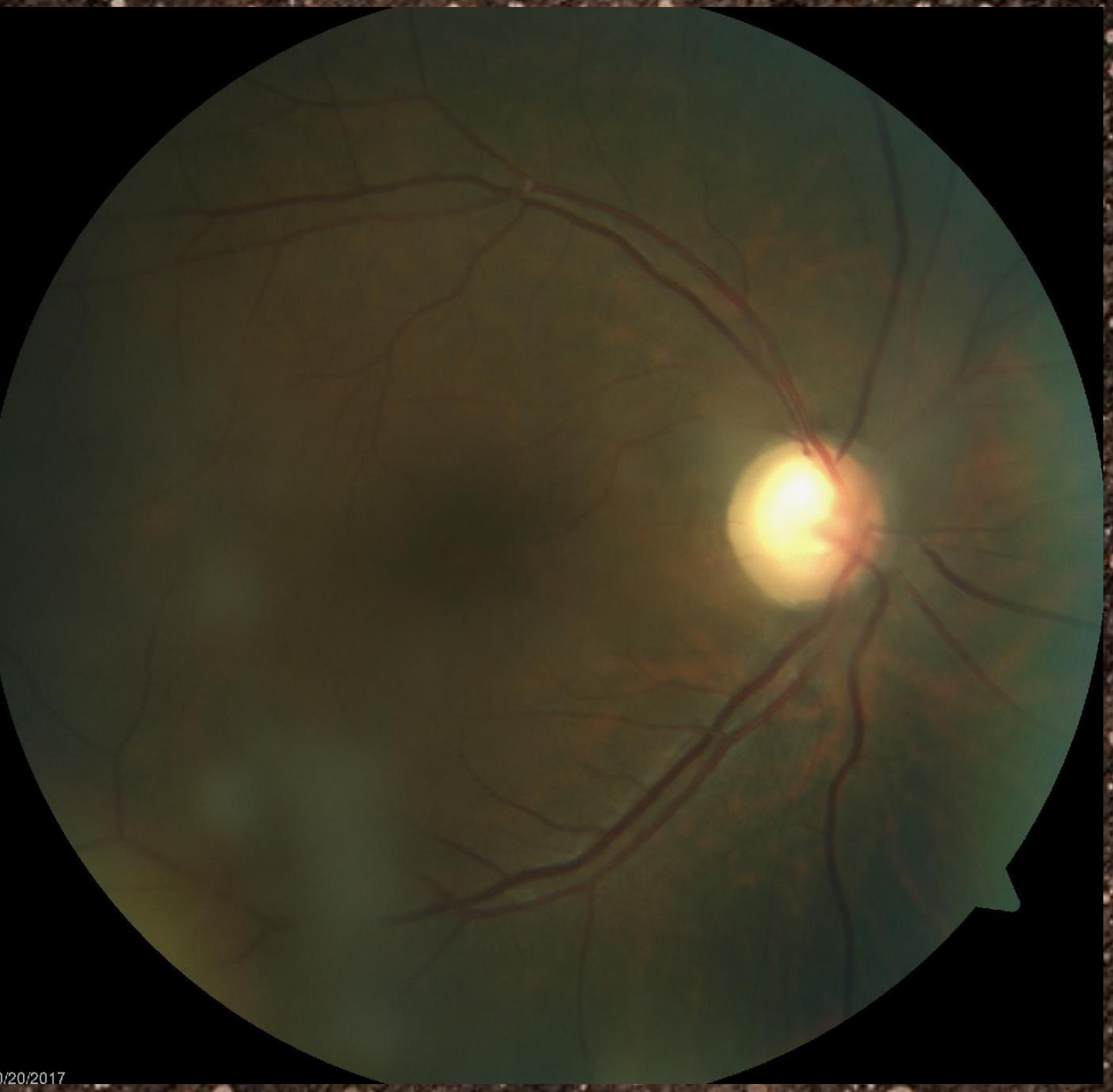
Color: 2/0 (HRR)

SLE

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

Gonio: D40r OU

Pachs: 616/611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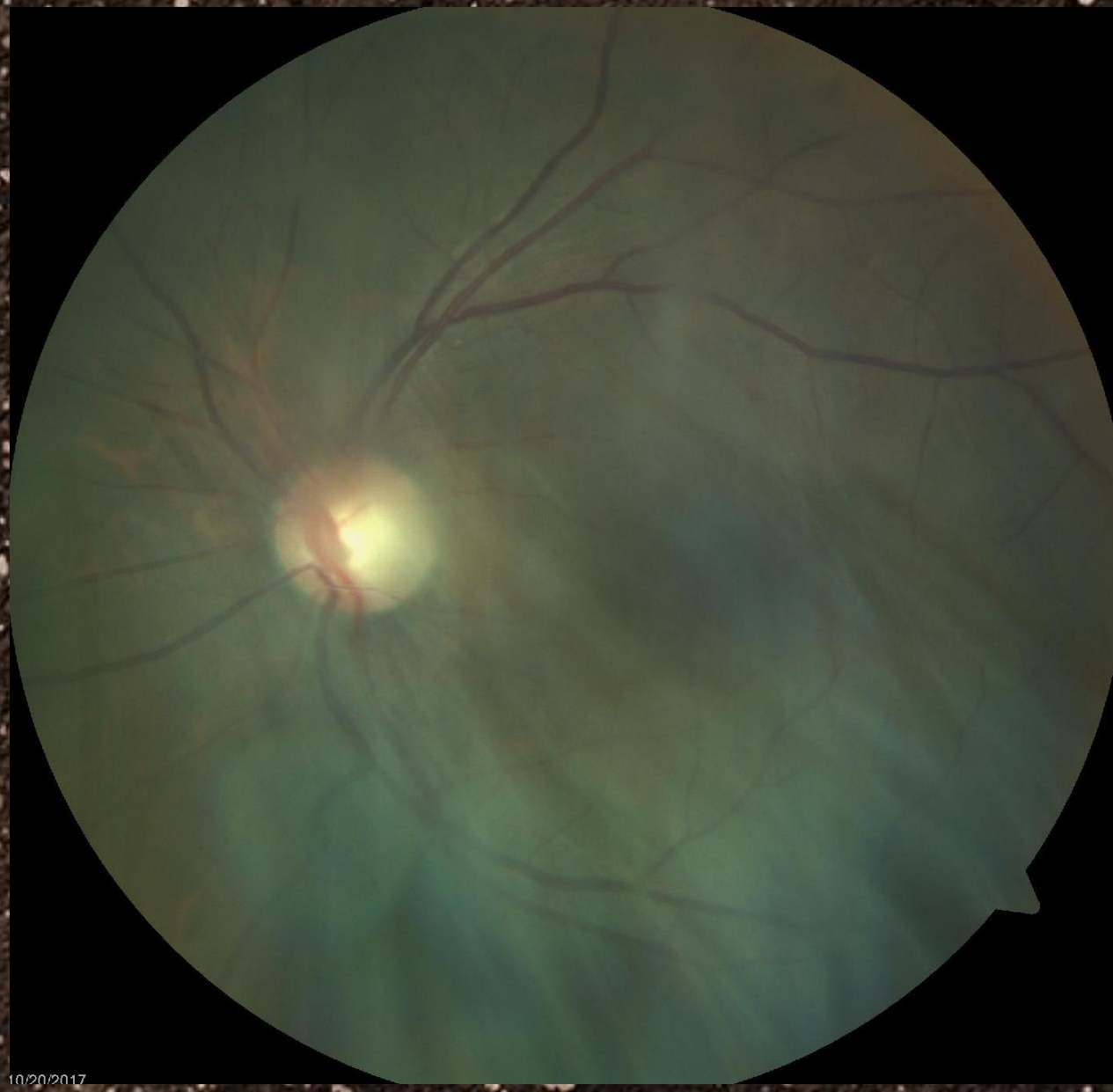
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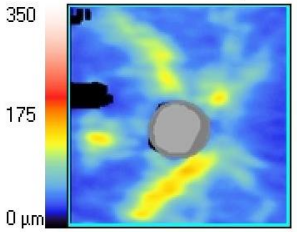
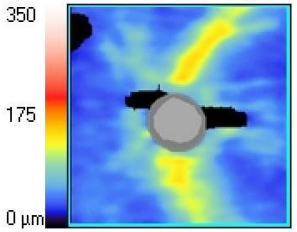
## ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD ● ● OS

RNFL Thickness Map

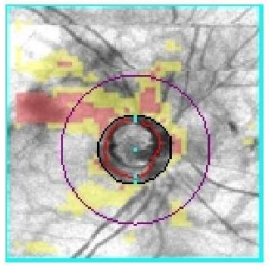



| | OD | OS |
|---|---|---|
| Average RNFL Thickness | 75 µm | 70 µm |
| RNFL Symmetry | 66% | |
| Rim Area | 0.81 mm² | 0.79 mm² |
| Disc Area | 2.12 mm² | 2.02 mm² |
| Average C/D Ratio | 0.79 | 0.77 |
| Vertical C/D Ratio | 0.85 | 0.76 |
| Cup Volume | 0.774 mm³ | 0.623 mm³ |

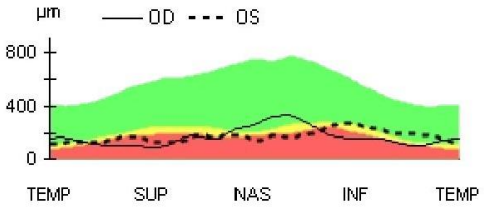
RNFL Thickness Map



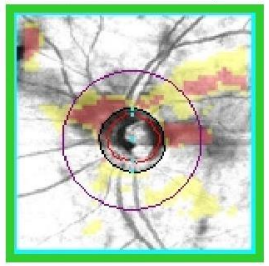

RNFL Deviation Map



Neuro-retinal Rim Thickness

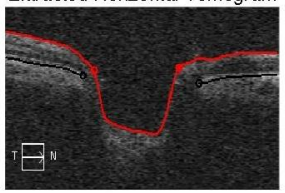



RNFL Deviation Map

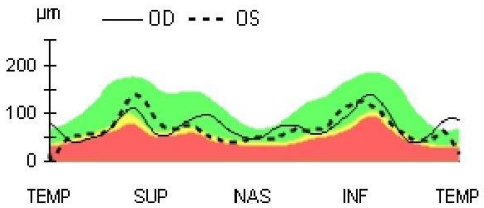


Disc Center(0.00,-0.36)mm

Extracted Horizontal Tomogram

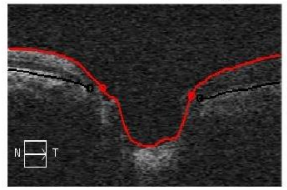


RNFL Thickness

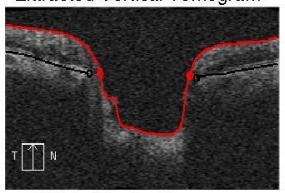


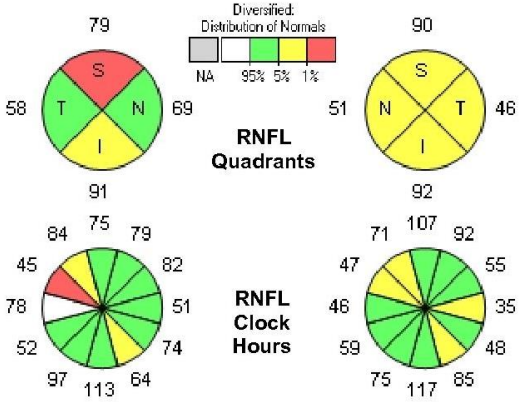

Disc Center(-0.09,-0.15)mm

Extracted Horizontal Tomogram

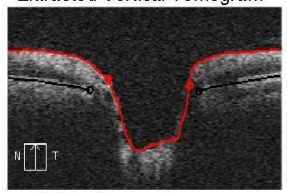


Extracted Vertical Tomogram

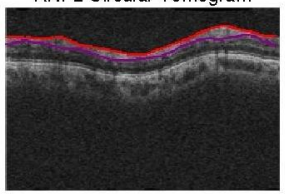




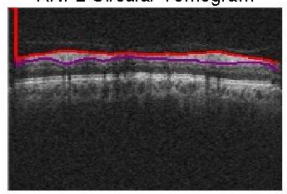

Extracted Vertical Tomogram

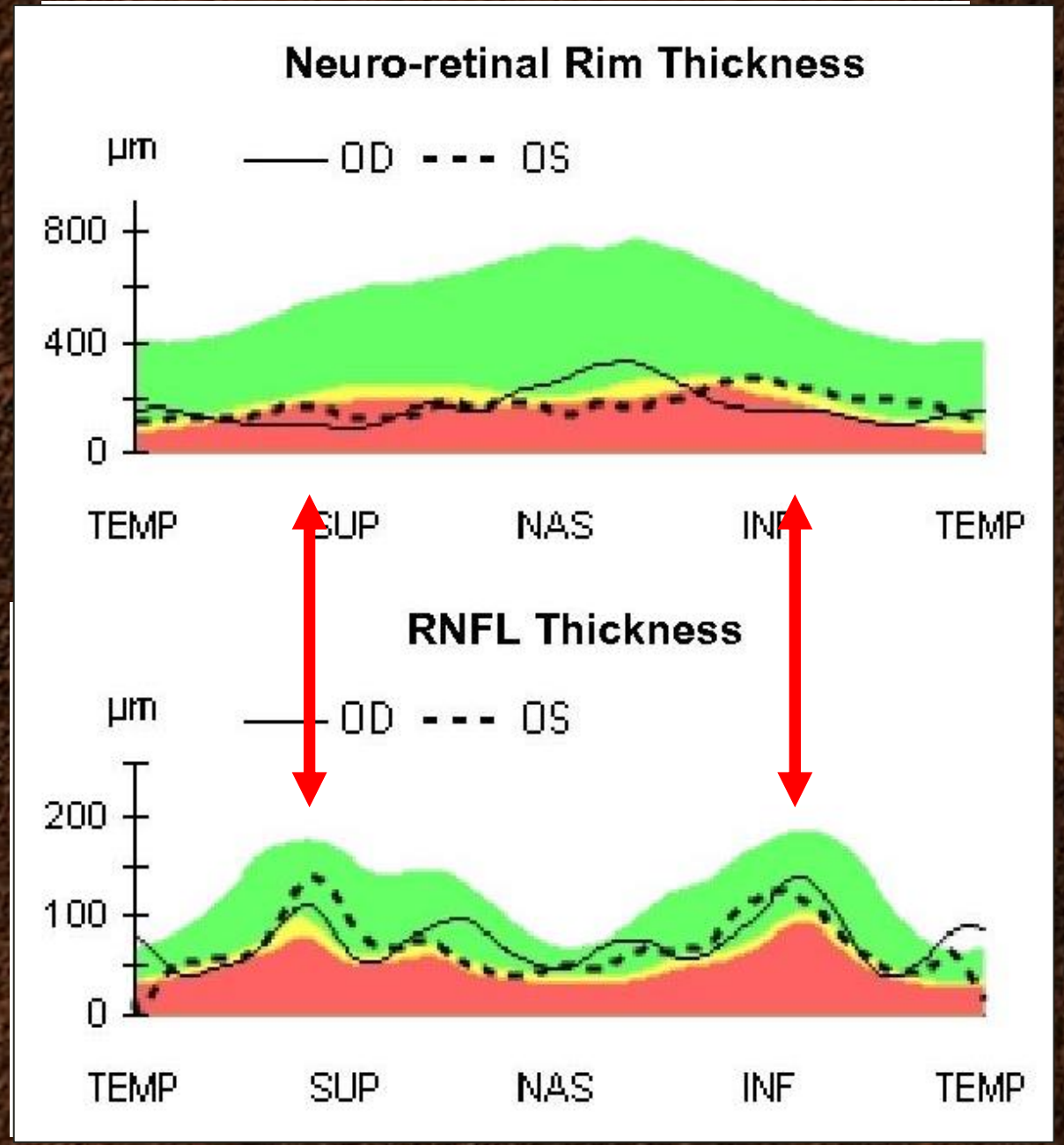


RNFL Circular Tomogram



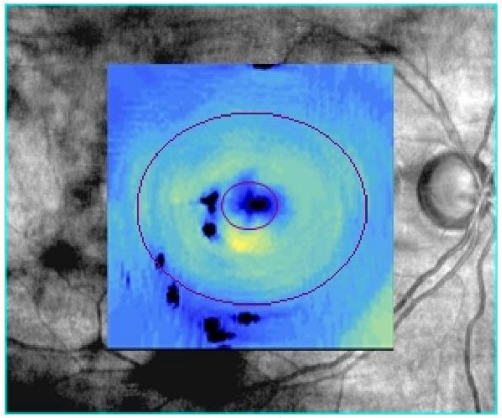
RNFL Circular Tomogram





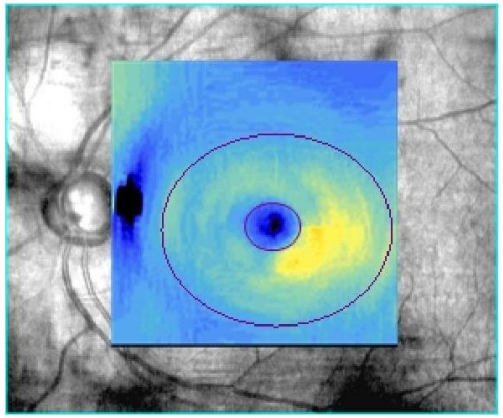
## Ganglion Cell OU Analysis: Macular Cube 512x128 — OD ● ● OS

OD Thickness Map



225 / 150 / 75 / 0 µm

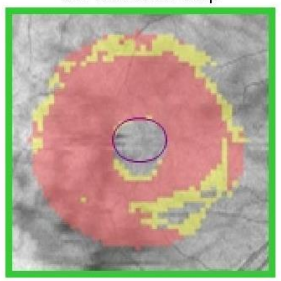
OS Thickness Map



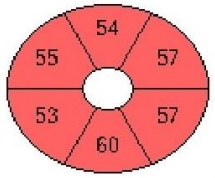
Fovea: Not found

Fovea: 291, 75

OD Deviation Map

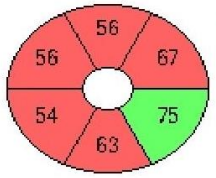


OD Sectors

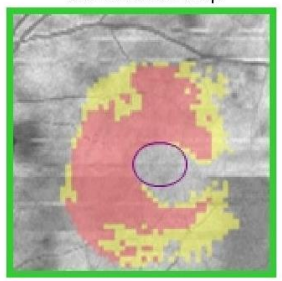



Diversified: Distribution of Normals — 95% / 5% / 1%

OS Sectors

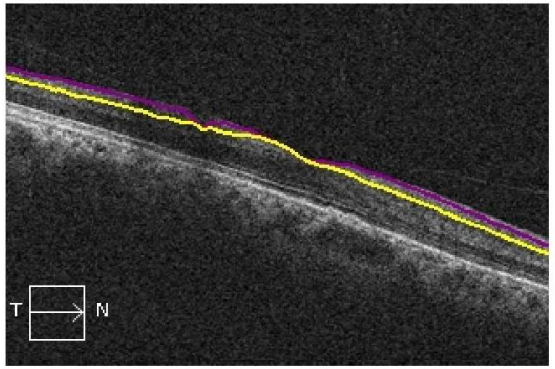



OS Deviation Map

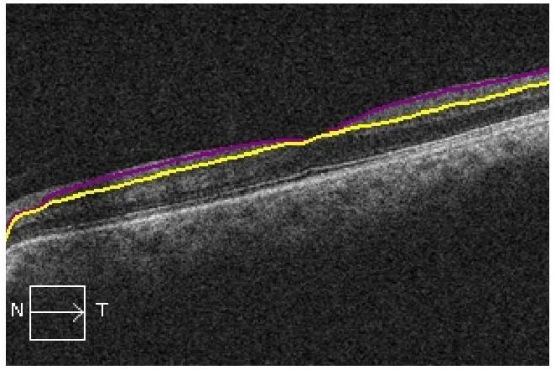


| | OD µm | OS µm |
|---|---|---|
| Average GCL + IPL Thickness | 56 | 62 |
| Minimum GCL + IPL Thickness | 49 | 53 |

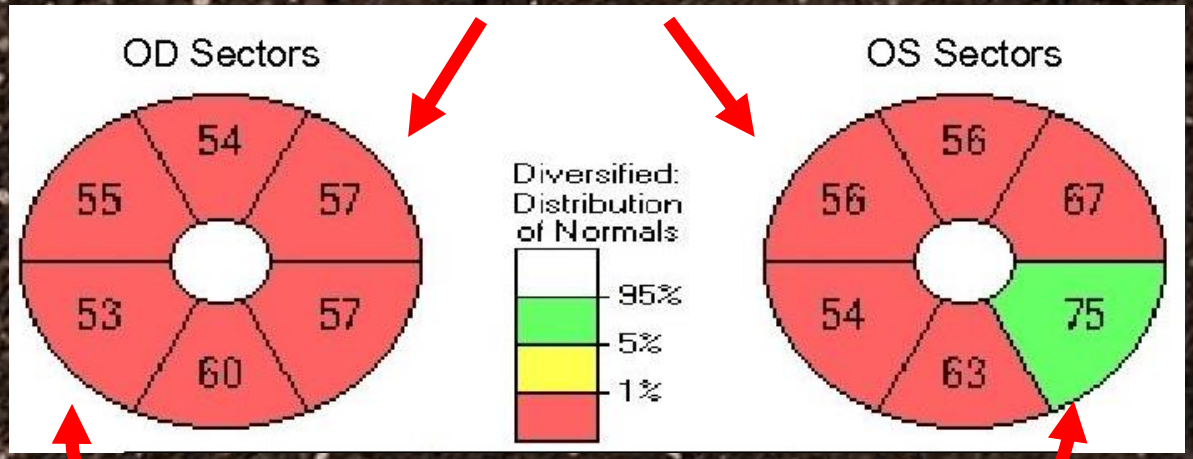
OD Horizontal B-Scan — **BScan:** 64



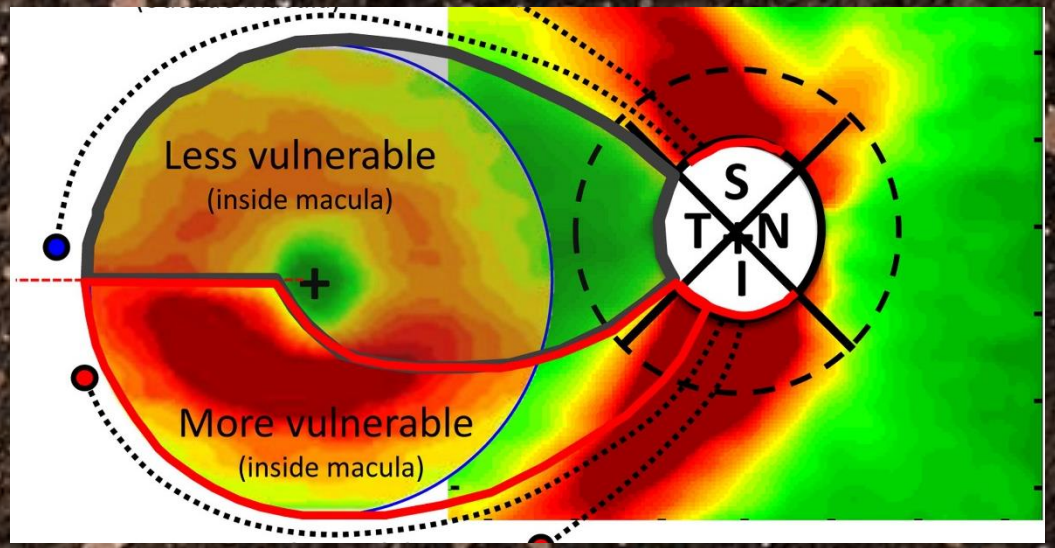

OS Horizontal B-Scan — **BScan:** 75




NASAL




TEMPORAL



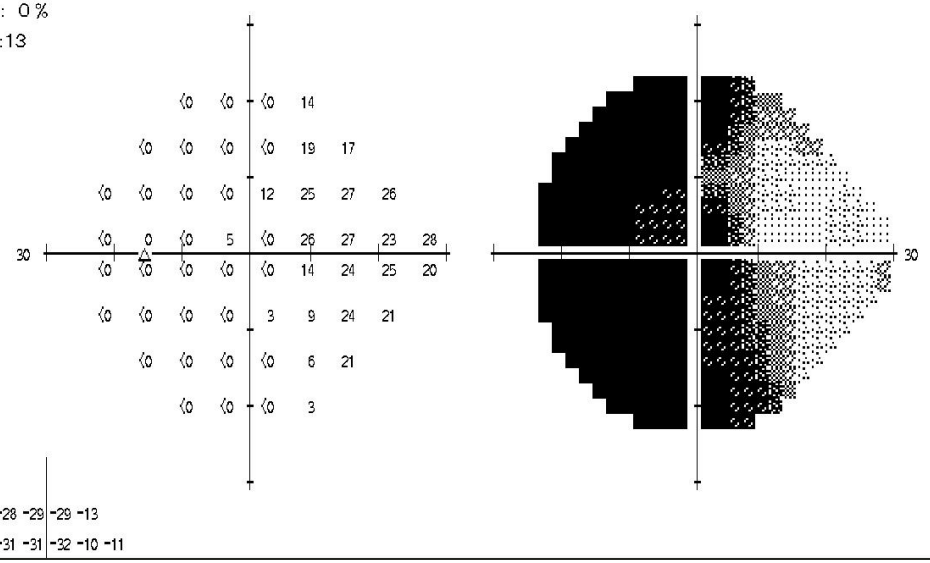
Fixation Monitor: Blind Spot
Fixation Target: Central
Fixation Losses: 1/14
False POS Errors: 3 %
False NEG Errors: 0 %
Test Duration: 06:13

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



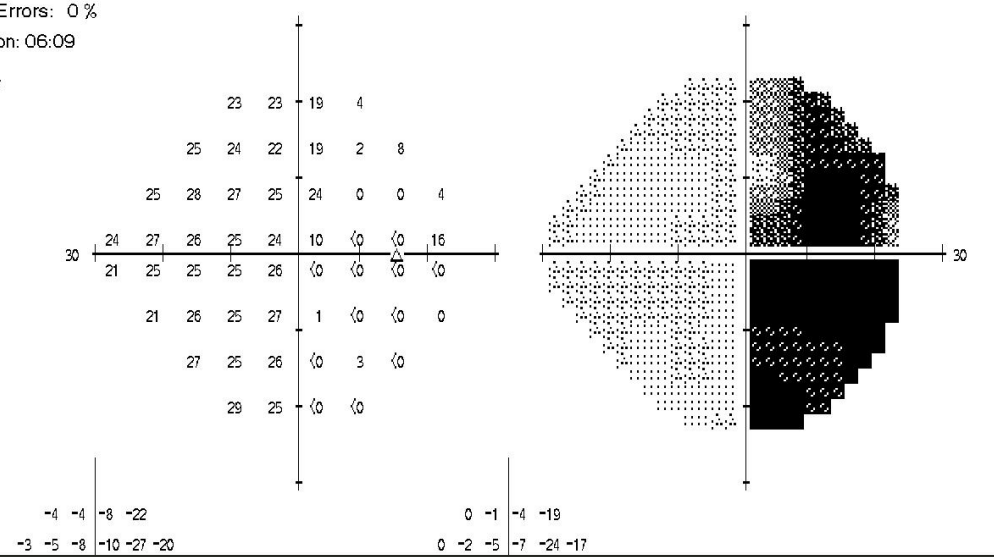
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 2/15
False POS Errors: 0 %
False NEG Errors: 0 %
Test Duration: 06:09

Fovea: OFF

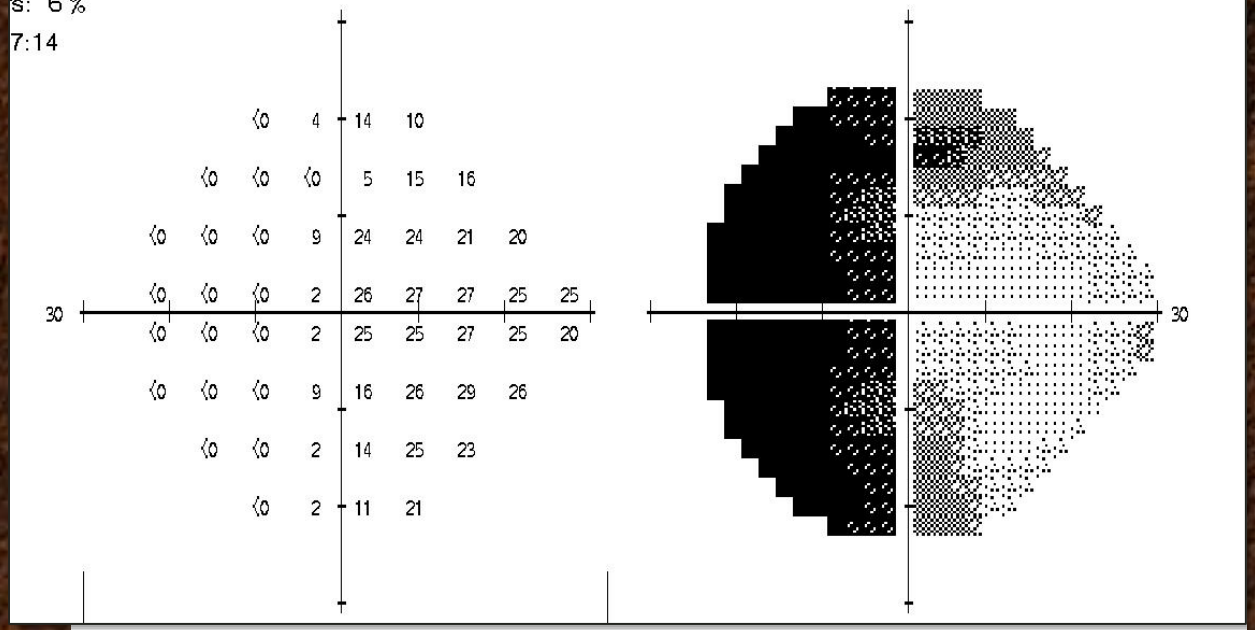
Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

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

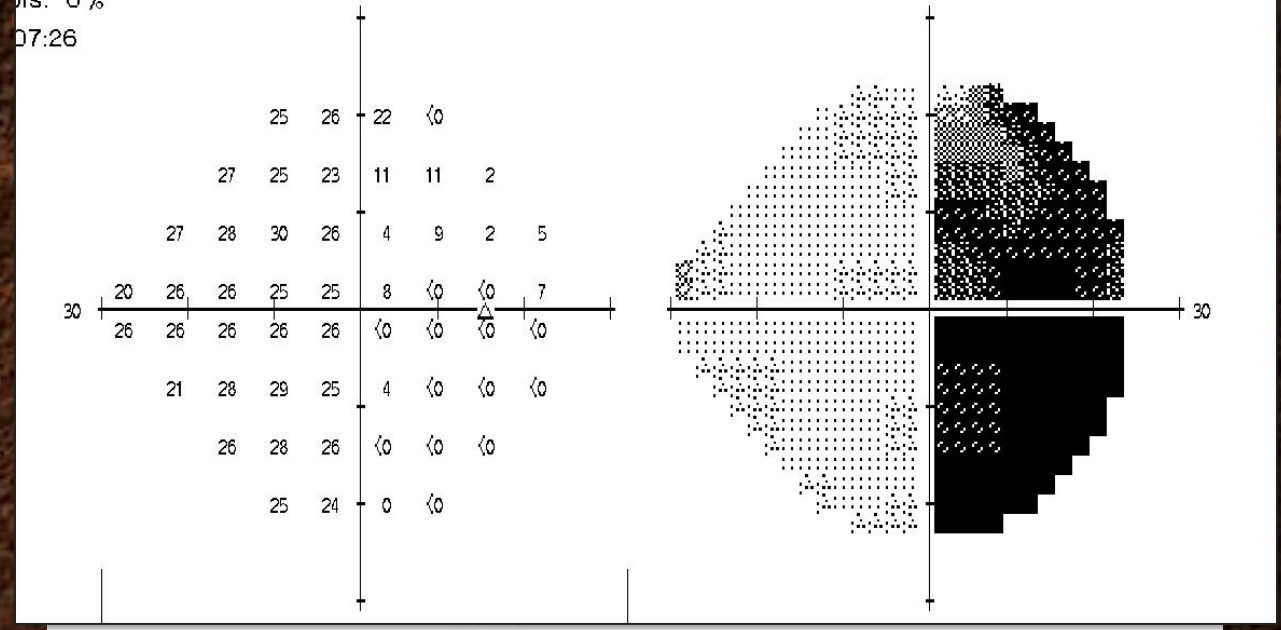
Date: 10-20-2017
Time: 12:56 PM
Age: 57



s: 6 %
7:14



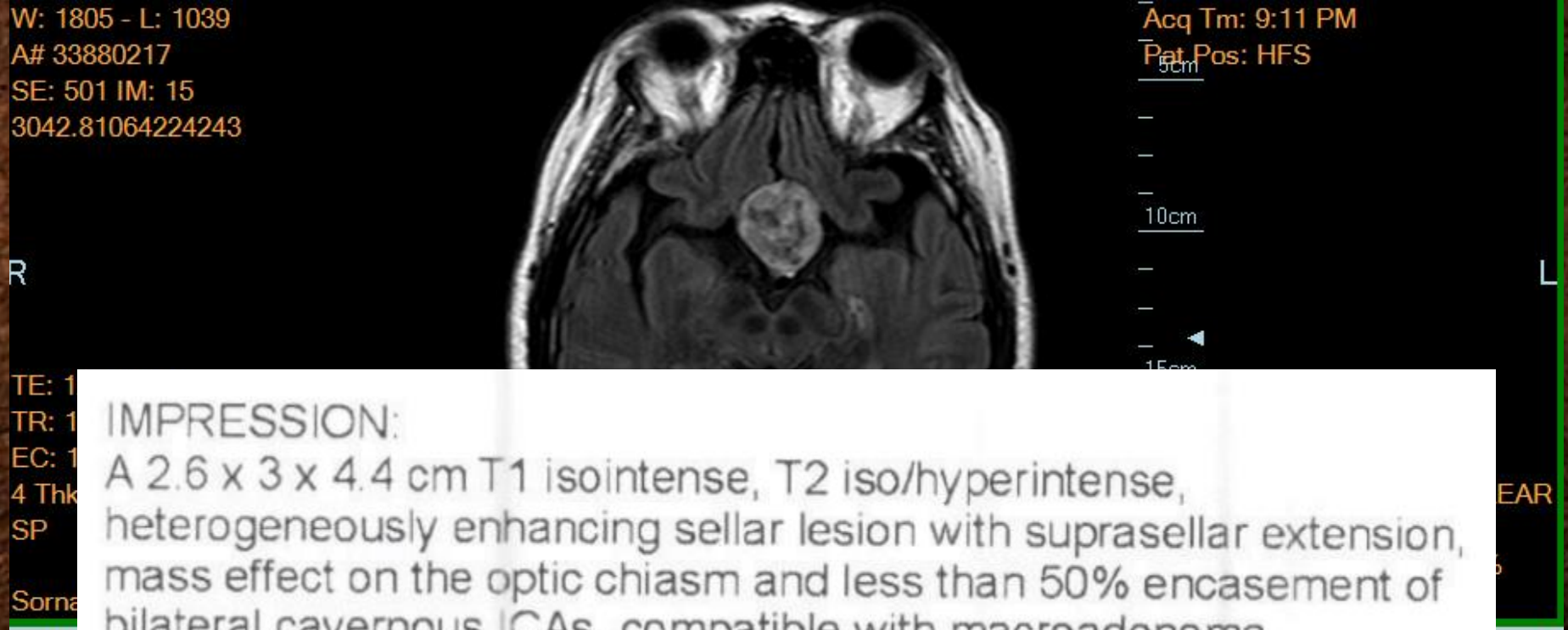
rs: 0 %
07:26



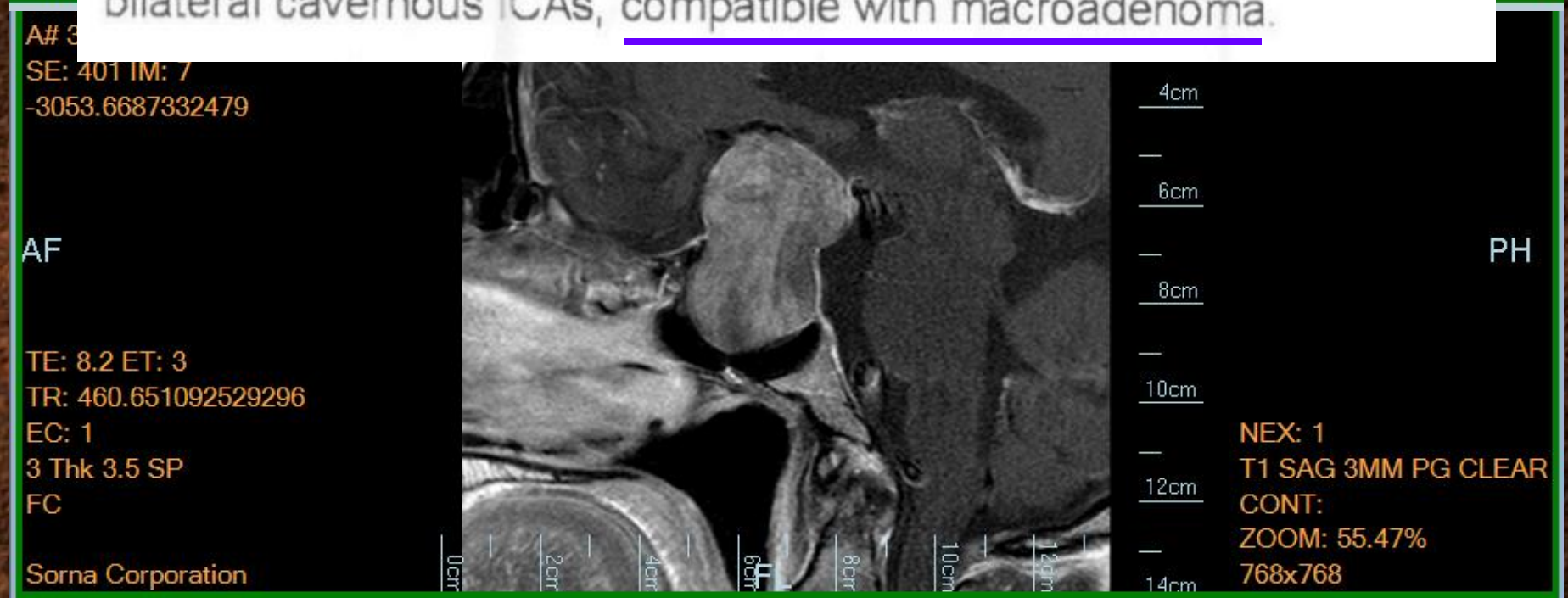
# Now what?


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

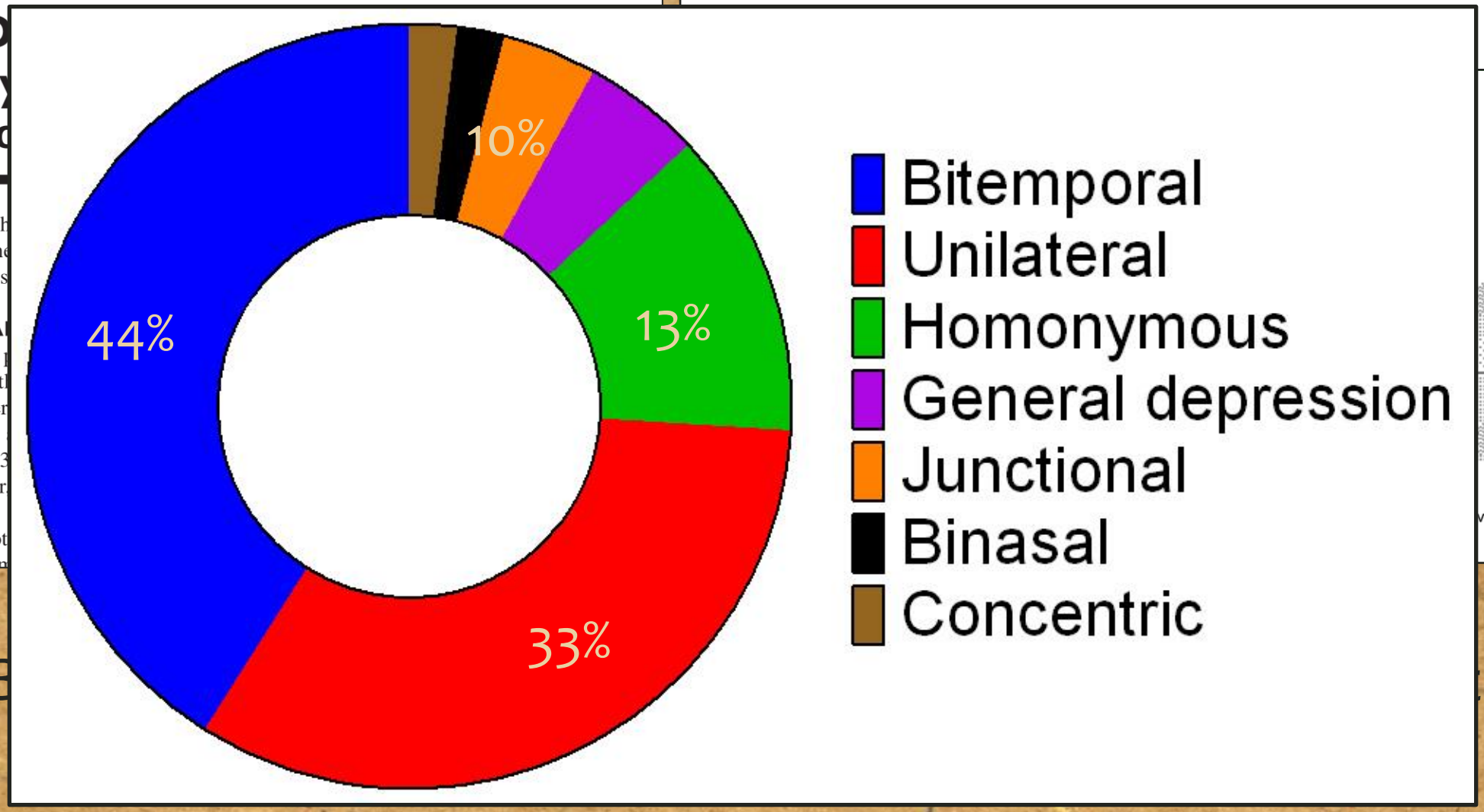
| | |
|---|---|
| Send patient to ER stat | **A** |
| Refer patient to ophthalmology | **B** |
| Order MRI of head | **C** |
| Call patient's PCP | **D** |
| Prescribe PGA and RTC in 4 weeks | **E** |



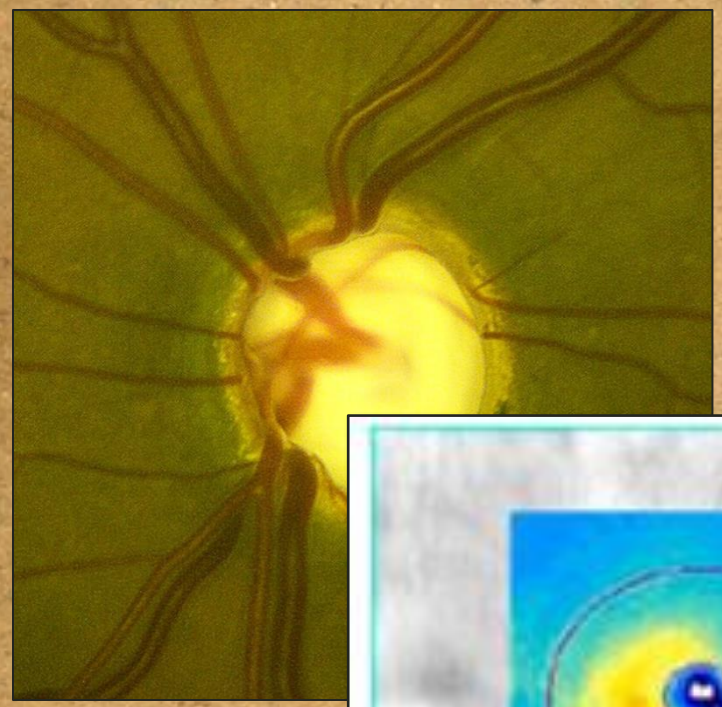

IMPRESSION:
A 2.6 x 3 x 4.4 cm T1 isointense, T2 iso/hyperintense, heterogeneously enhancing sellar lesion with suprasellar extension, mass effect on the optic chiasm and less than 50% encasement of bilateral cavernous ICAs, compatible with macroadenoma.

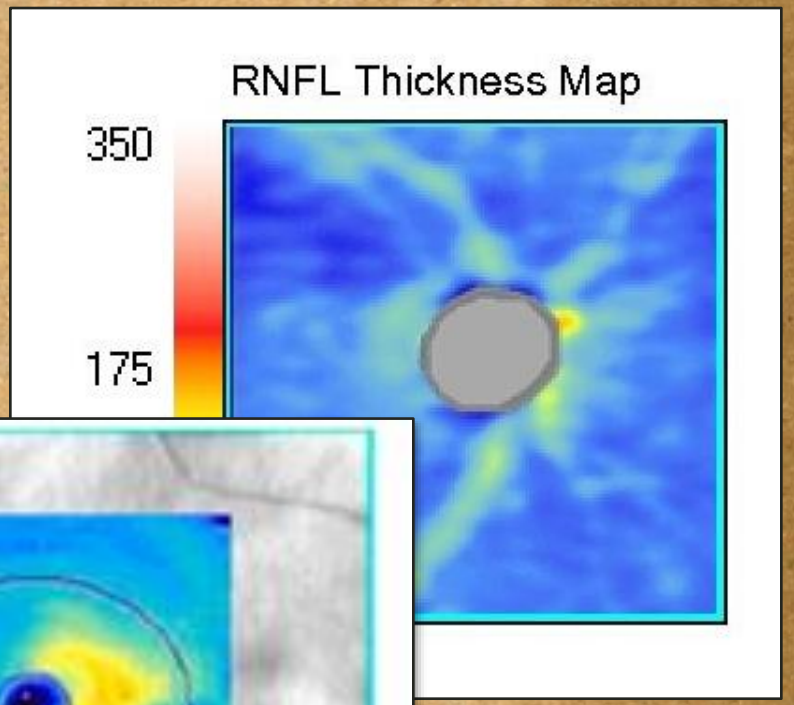


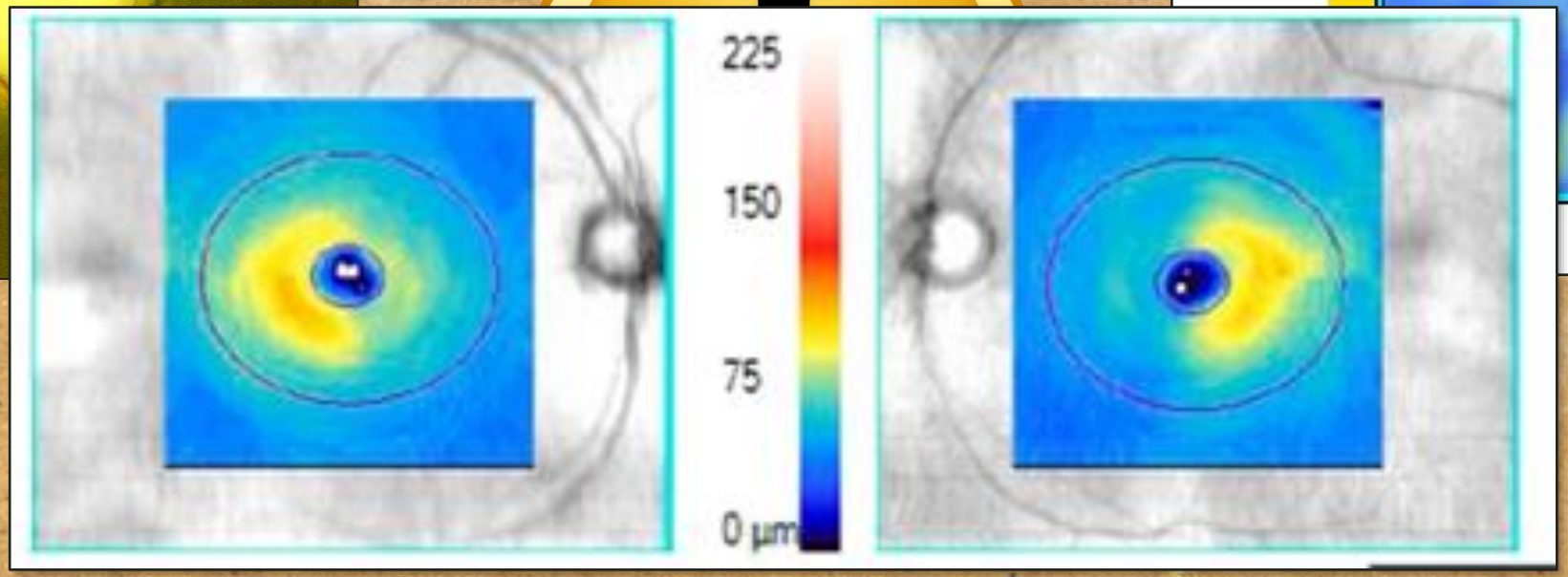
# Pituitary Adenoma Visual Field Defects



# Pituitary Adenomas + Glaucoma

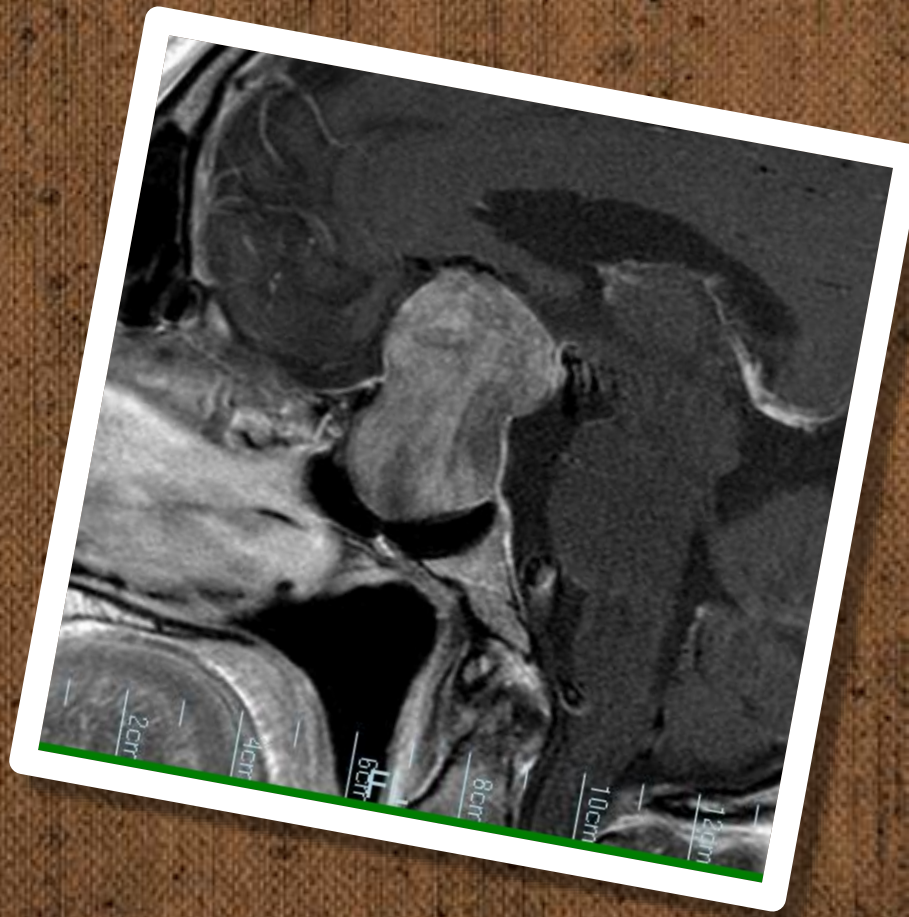




# Take Home Message

- 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

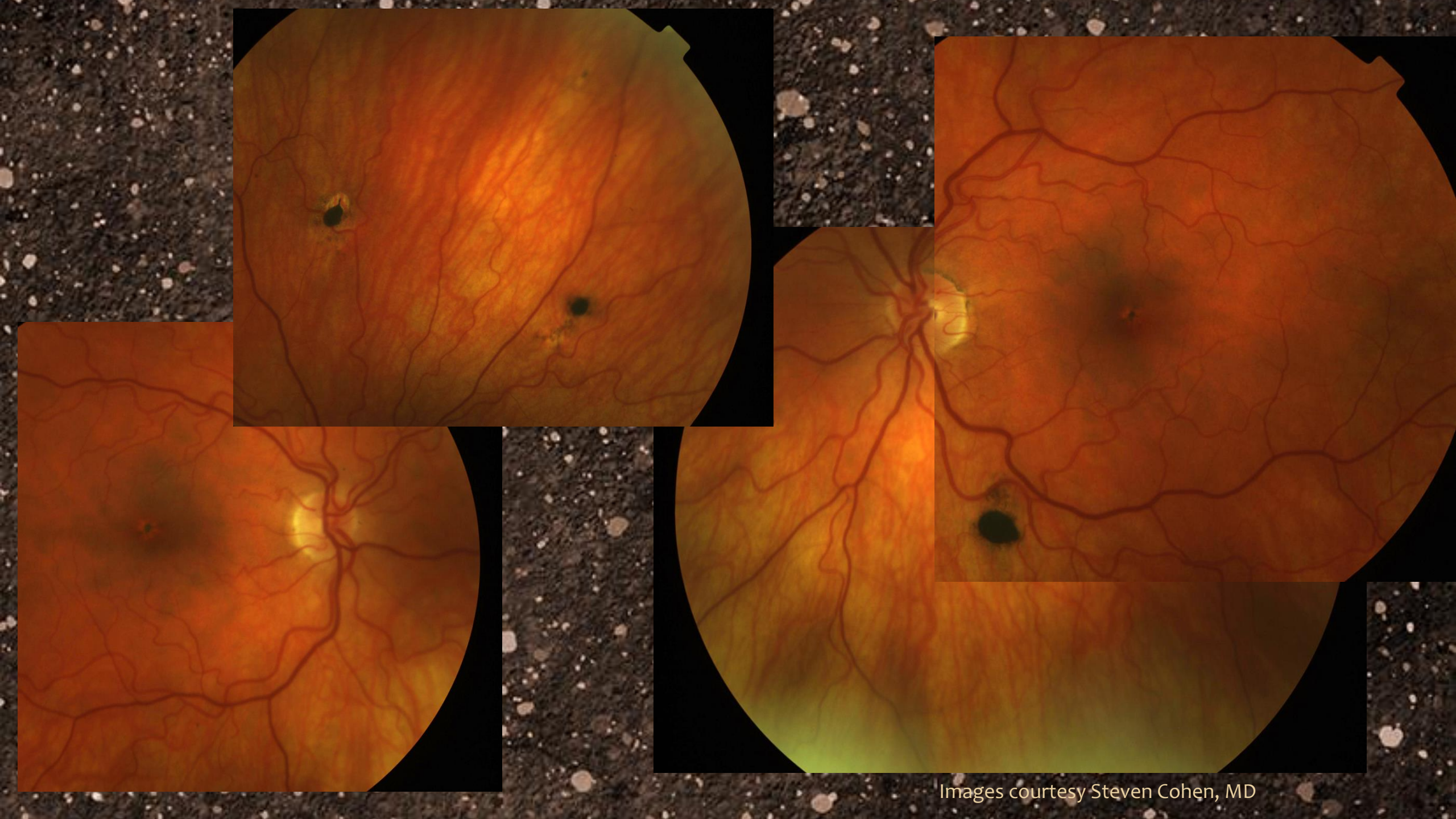


# CASE #7

*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

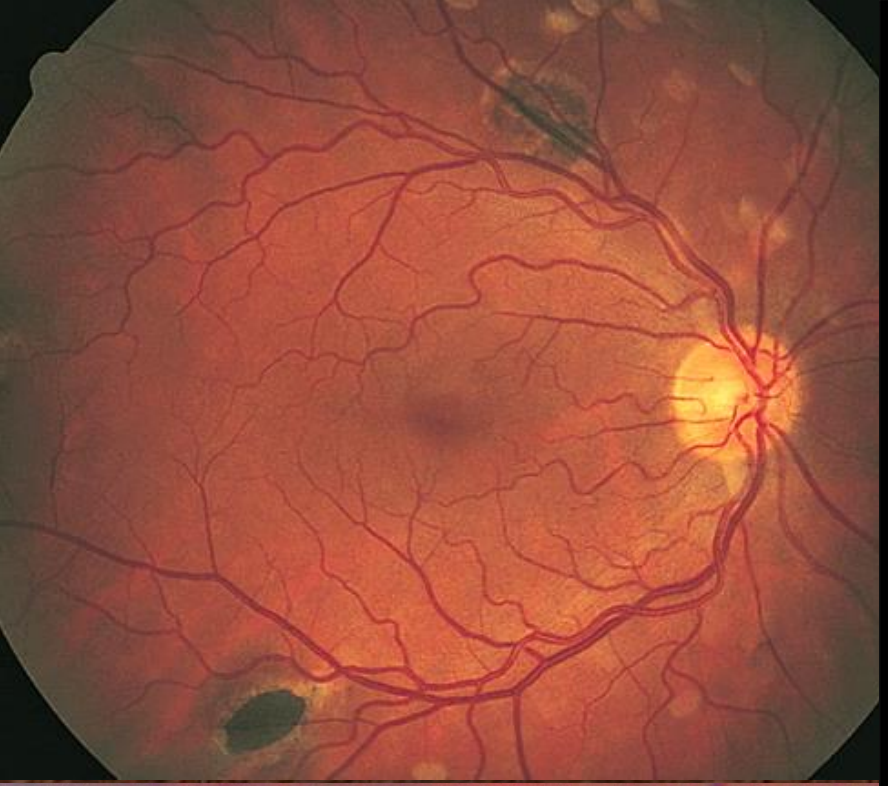
- Multiple, bilateral CHRPE-like lesions
- Suspect familial adenomatous polyposis

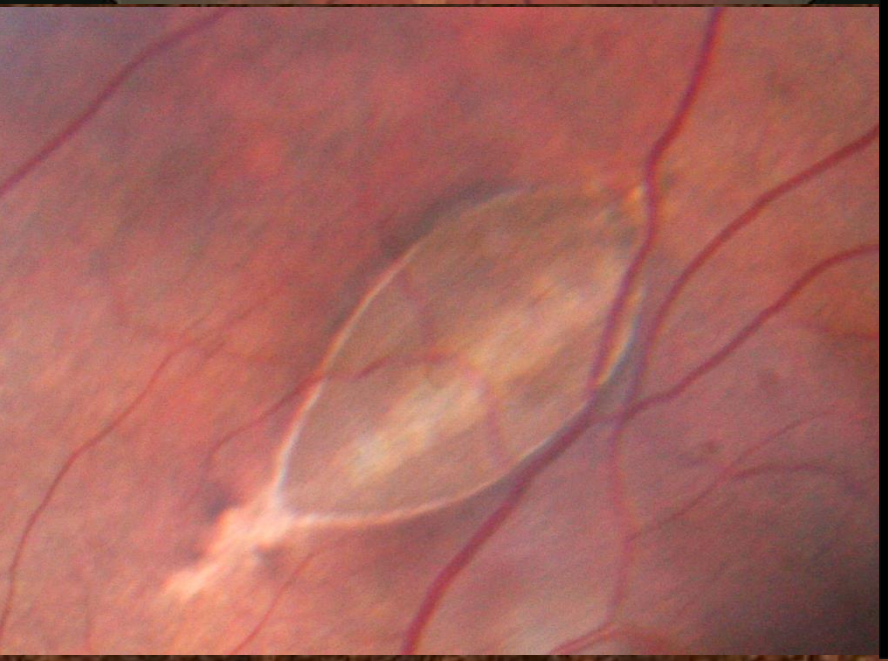
# Management

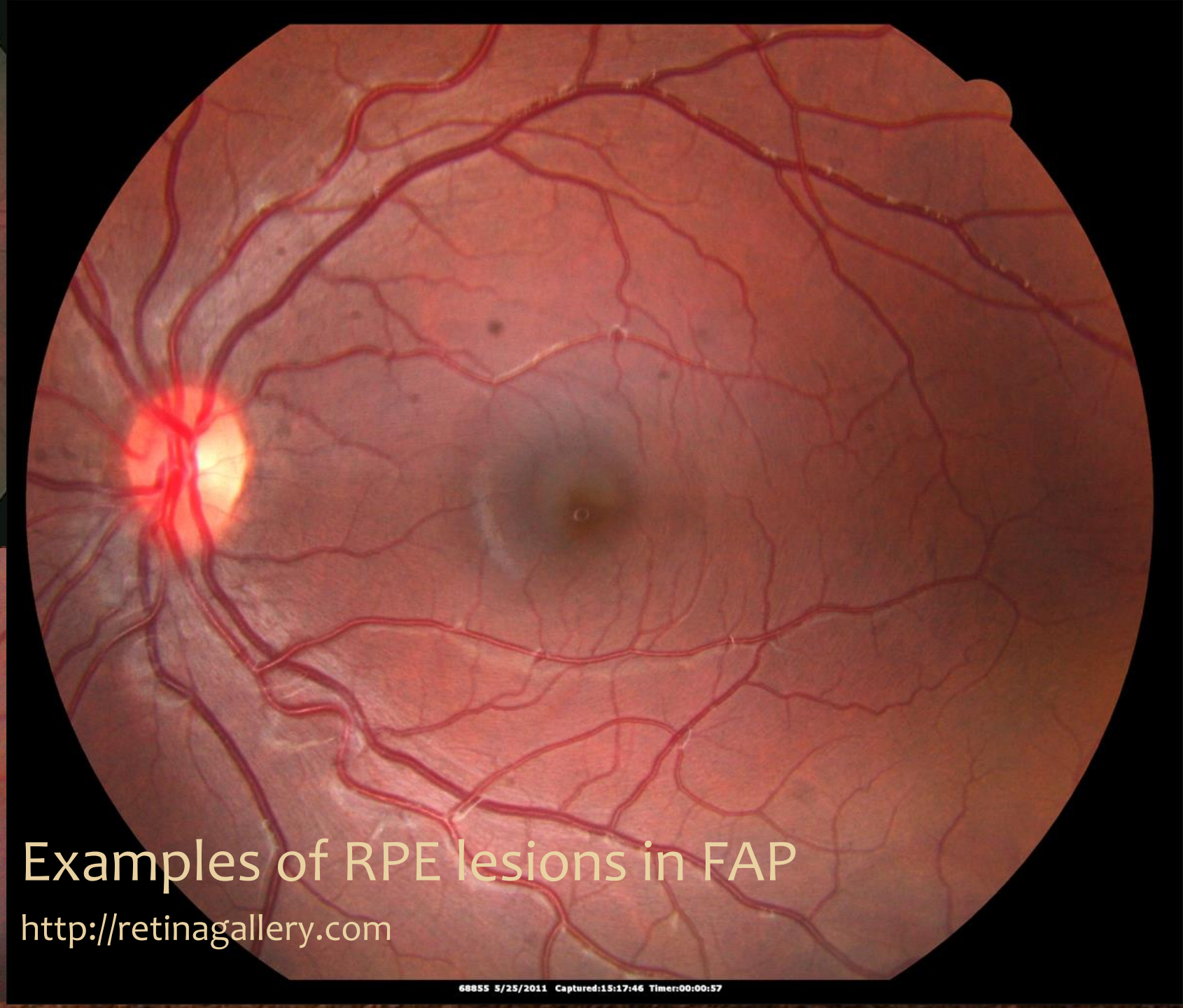
- Gastroenterology consult – negative colonoscopy of child and parents
- Genetic testing offered – declined by parents
- Medical surveillance for onset of polyposis

# 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

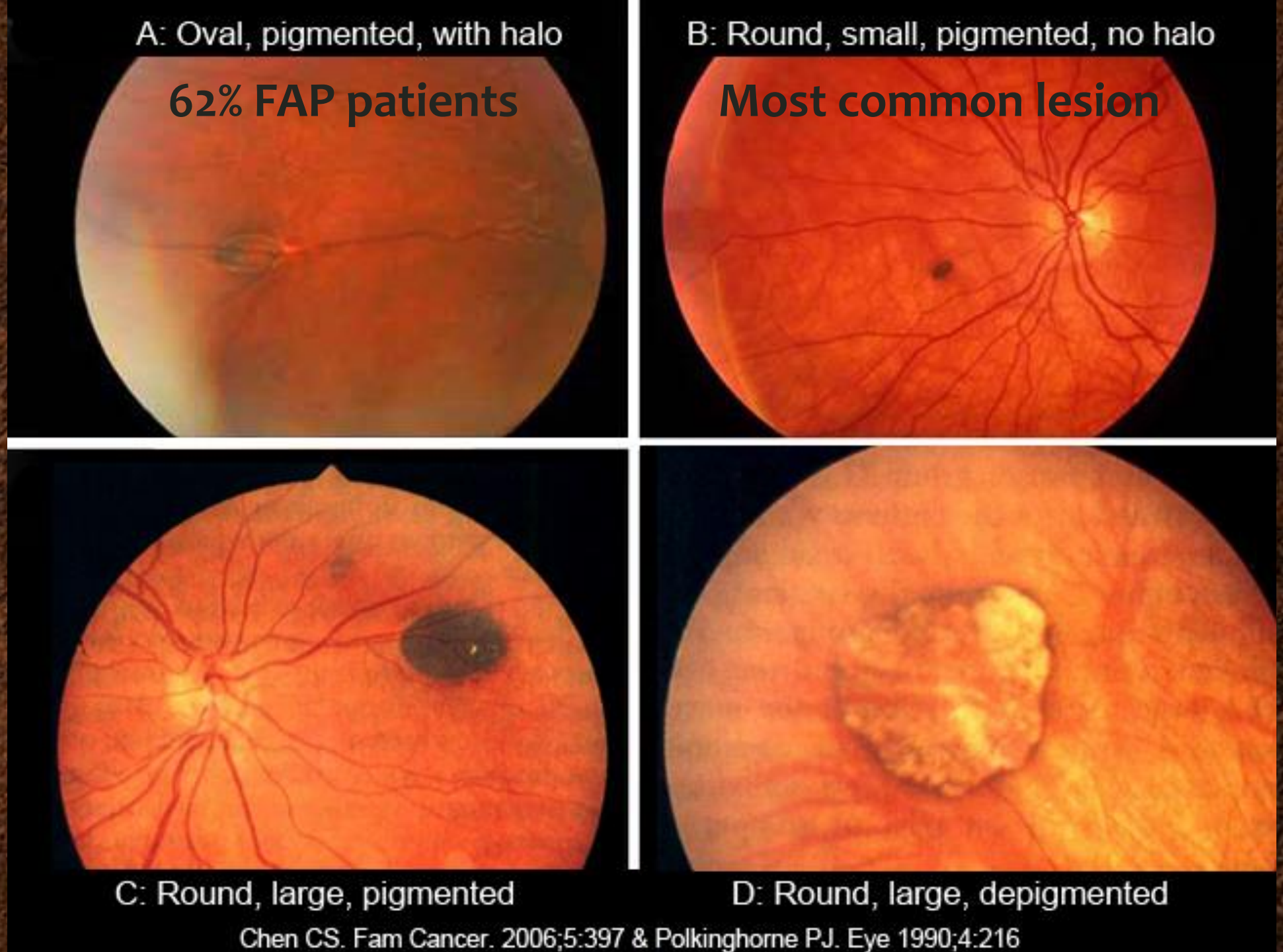







# Examples of RPE lesions in FAP

http://retinagallery.com

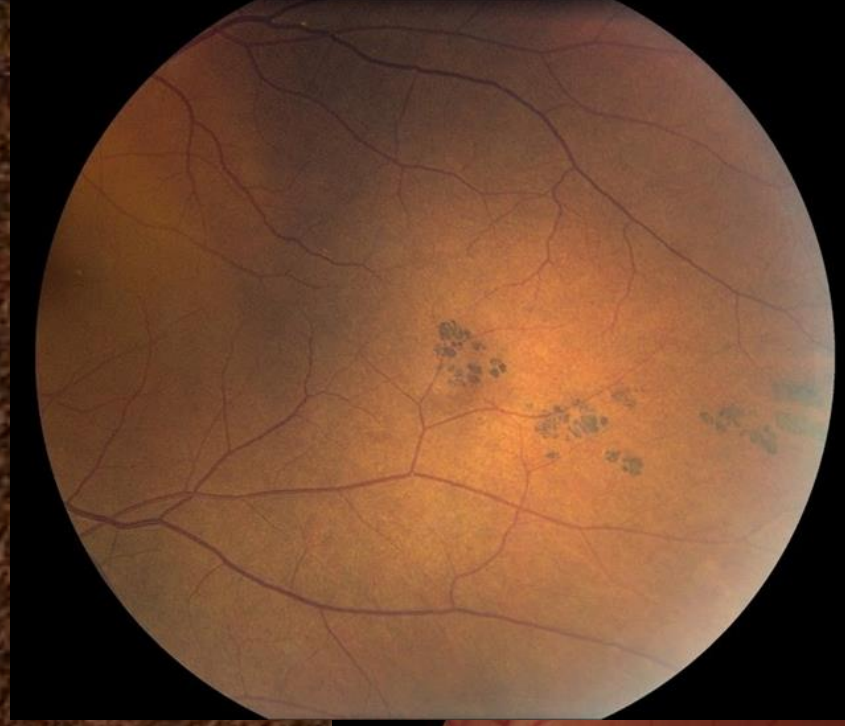


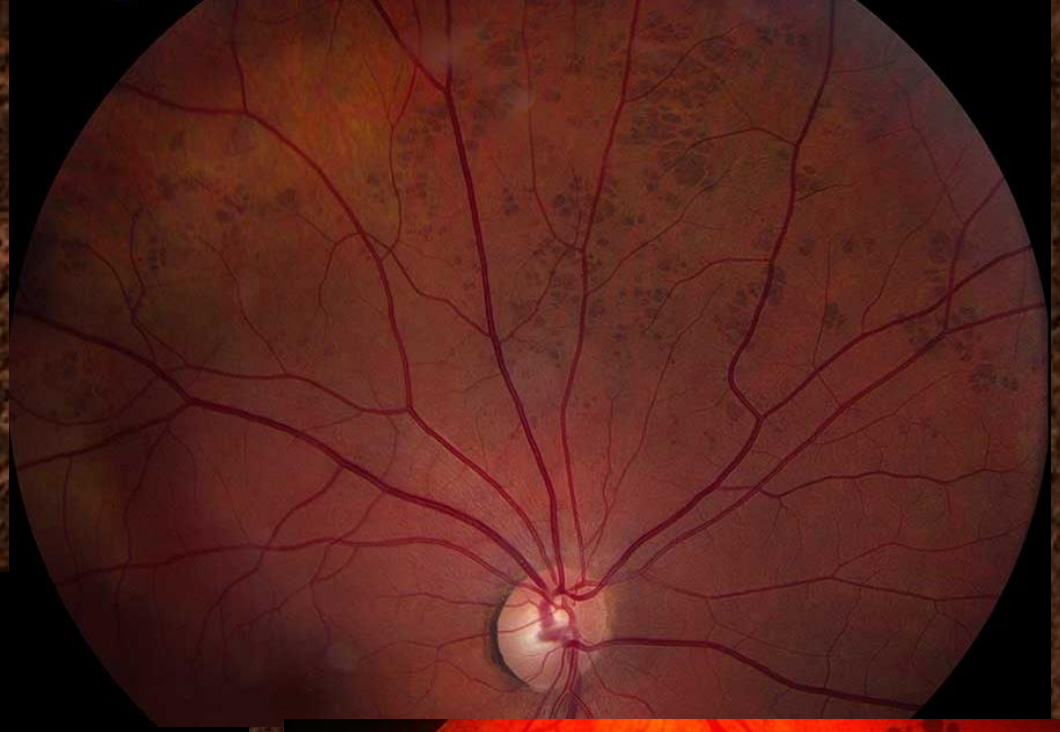

Chen CS. Fam Cancer. 2006;5:397 & Polkinghorne PJ. Eye 1990;4:216

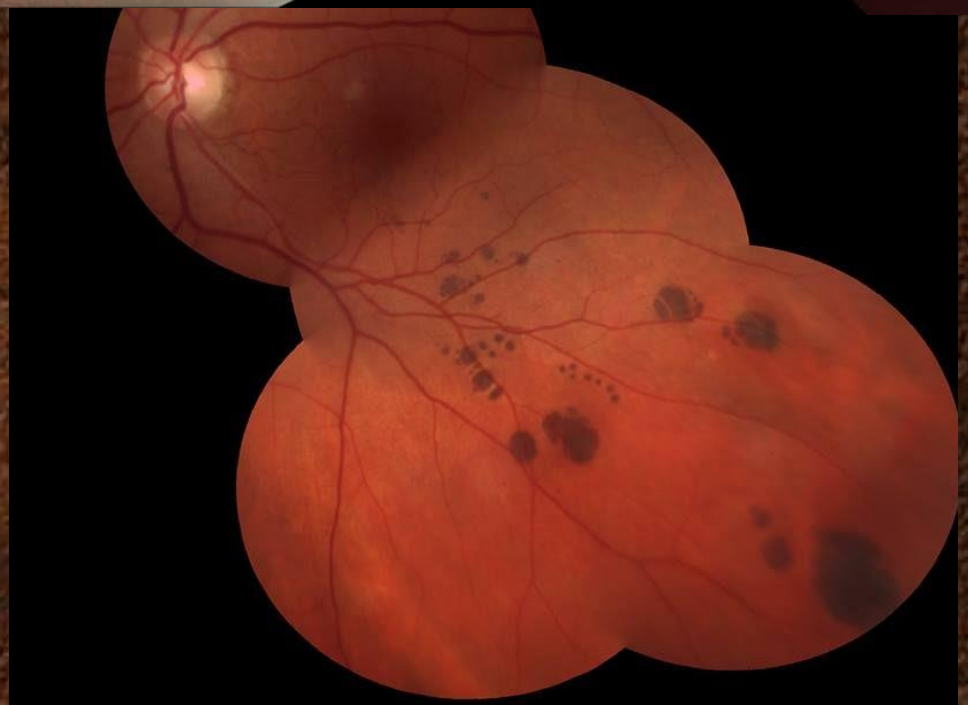
# CHRPE-like Lesions in FAP

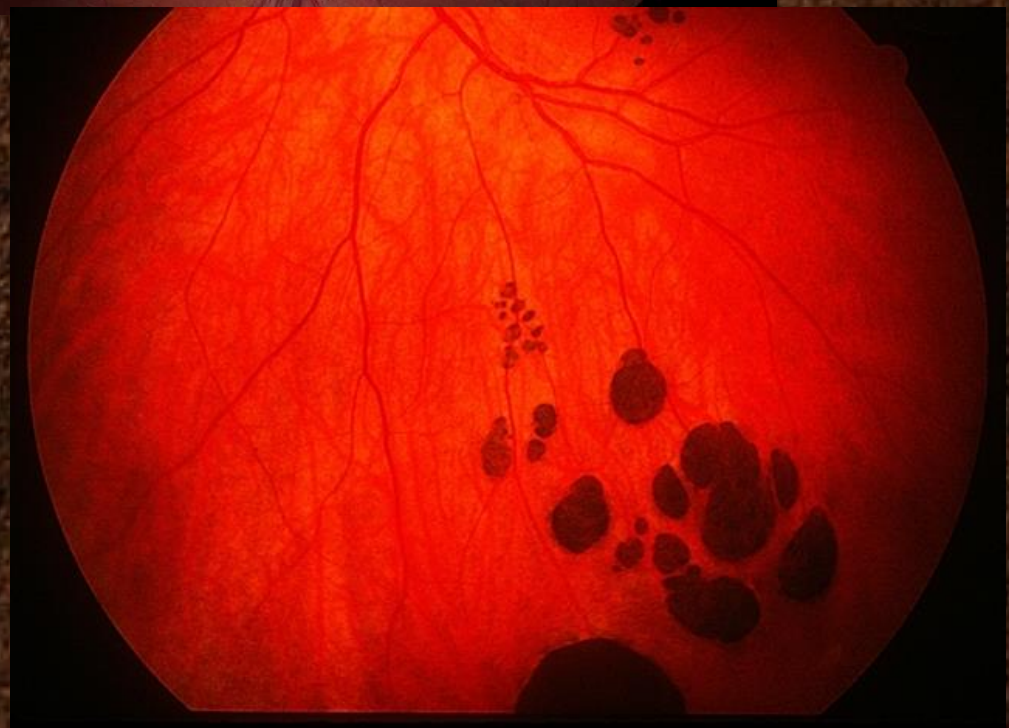
| | Gardner's Syndrome | CHRPE |
|---|---|---|
| **Appearance** | Small: Identical to CHRPE<br>Large: Oval with tail | Flat, round-oval, jet black |
| **Bilaterality** | Common (86% cases) | Very rare (5% cases) |
| **Multiple quadrants** | Common | Rare |

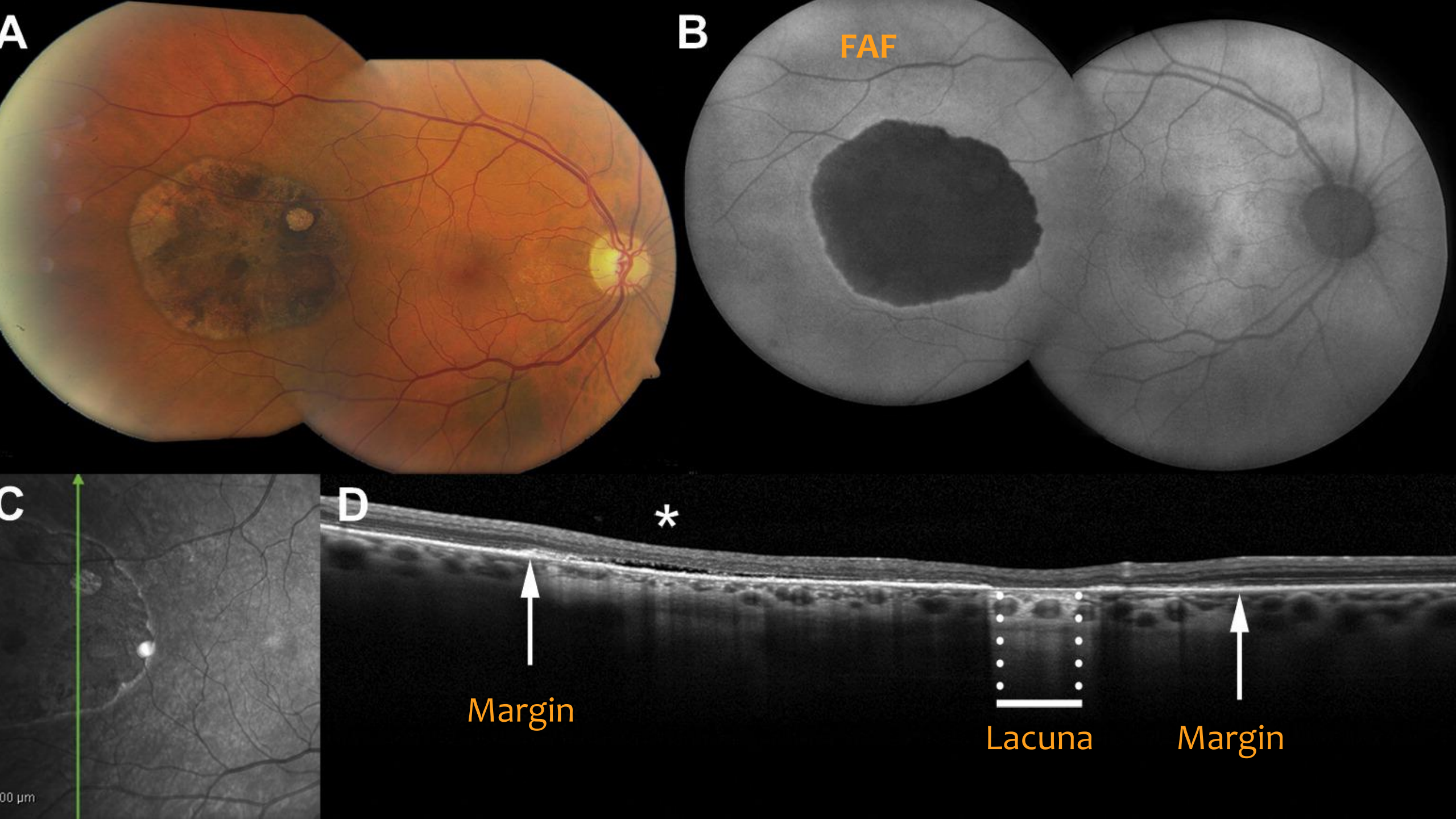
# Examples of “Bear Tracks”

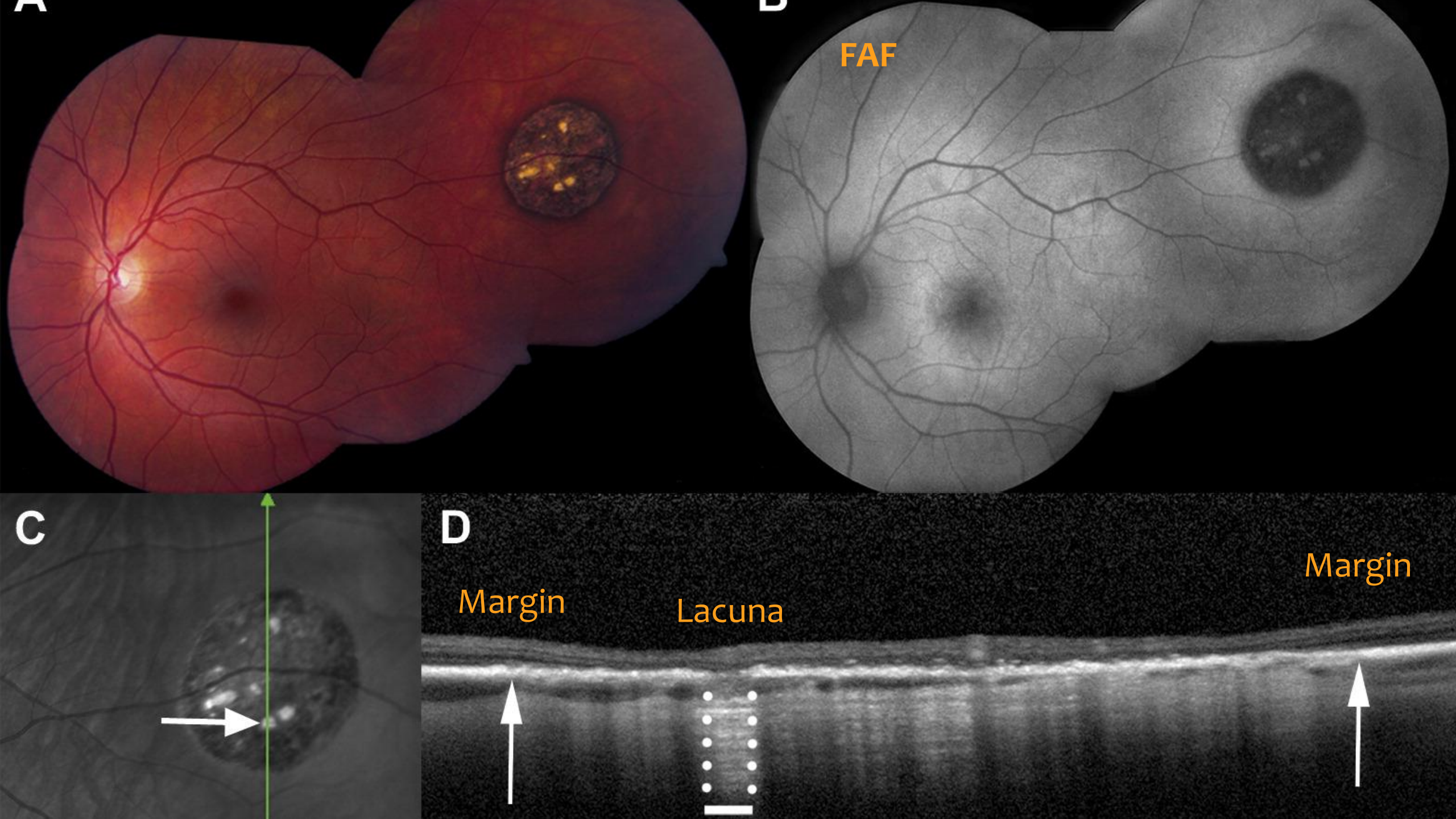









A
B
FAF
C
D
*
Margin
Lacuna
Margin

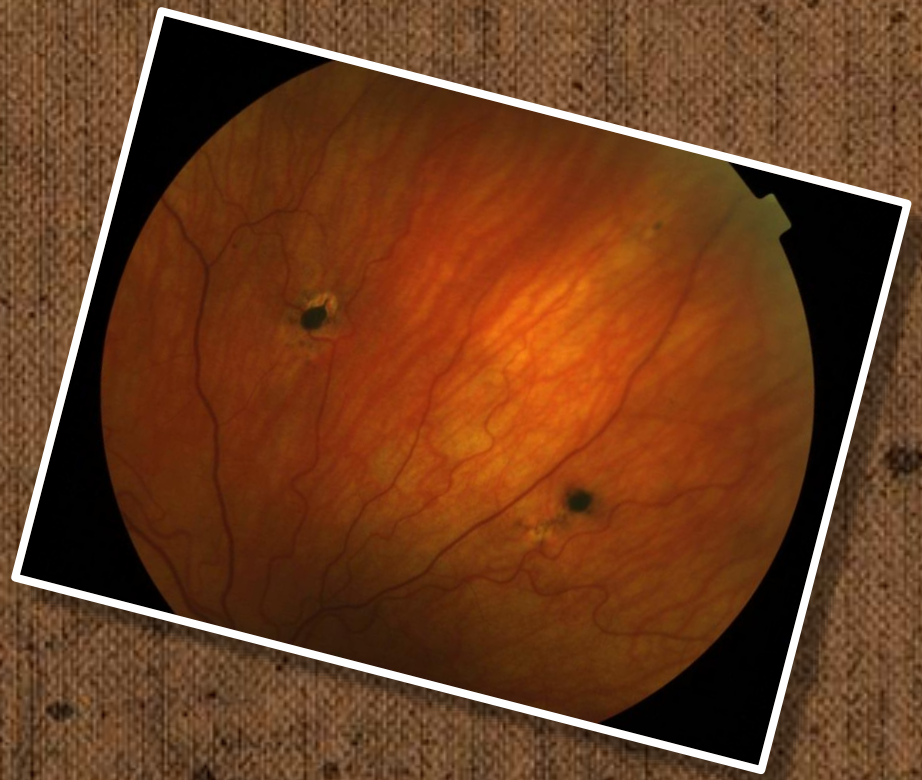

A
B
FAF
C
D
Margin
Lacuna
Margin

# 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

# 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



# CASE #8

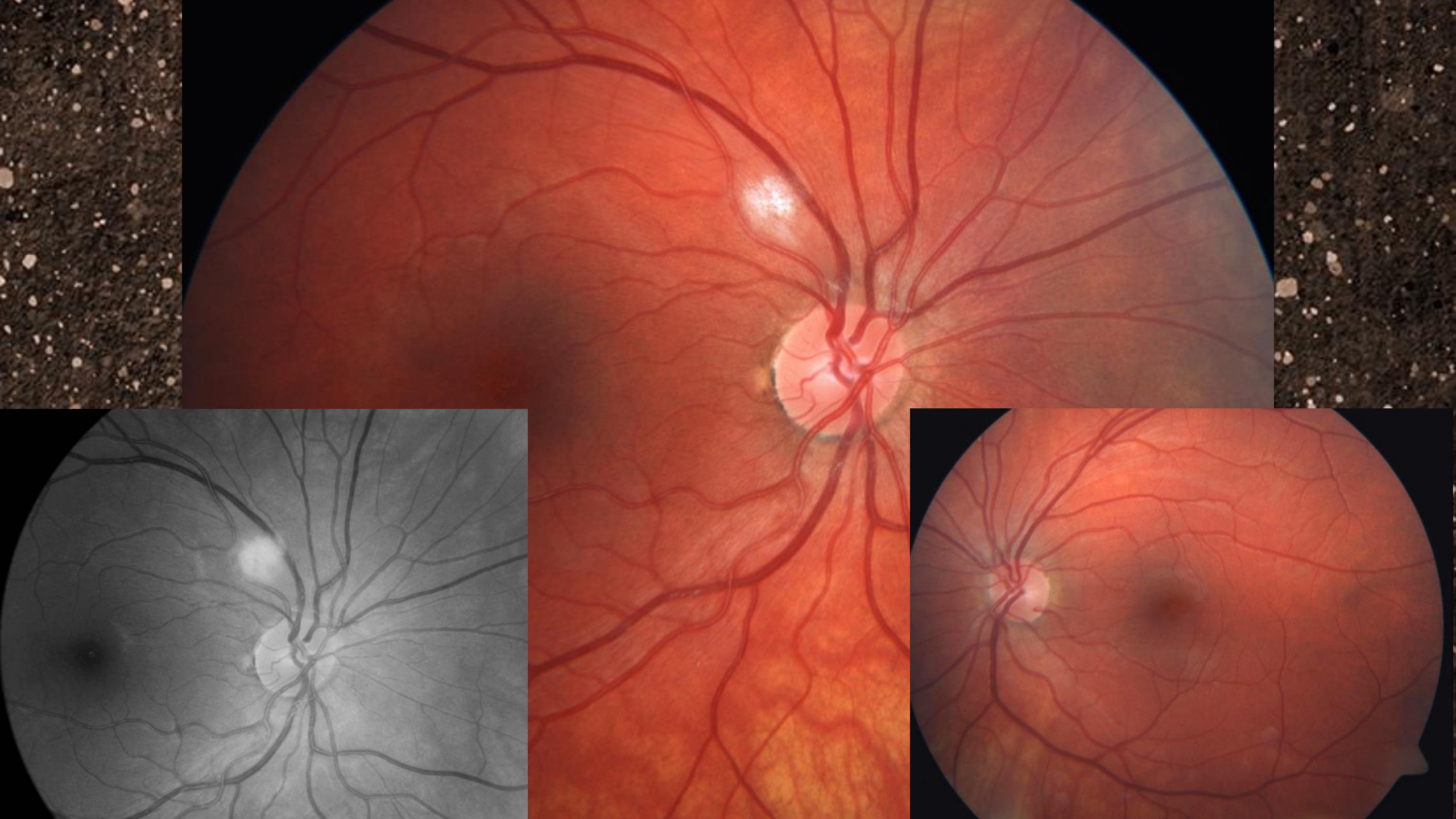
*Jagged little pill*

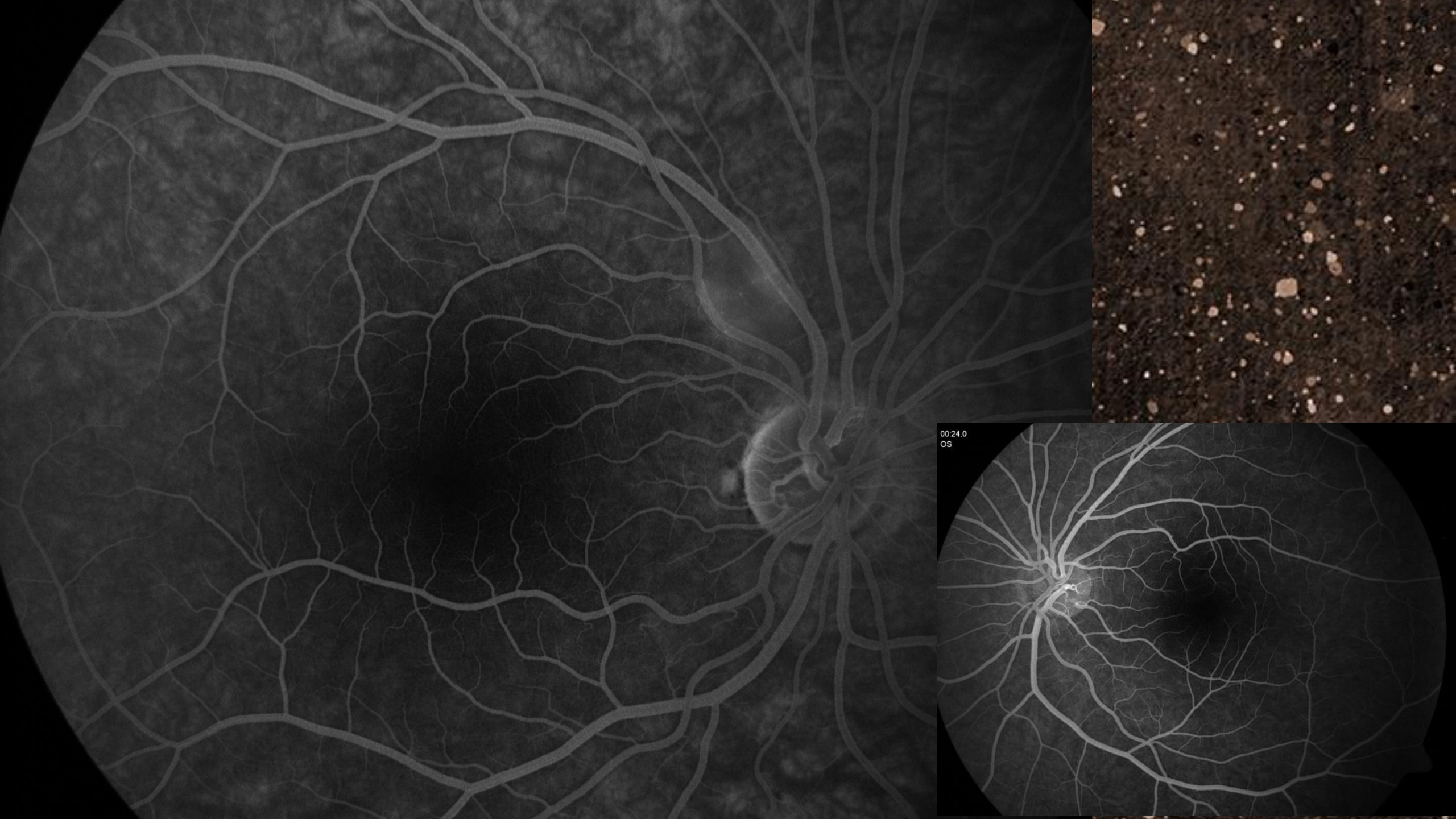
# Case #8

- 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




00:24.0
OS

SINGLE FIELD ANALYSIS

EYE: RIGHT

NAME:
ID:

DOB: 03-18-1987

CENTRAL 24-2 THRESHOLD TEST

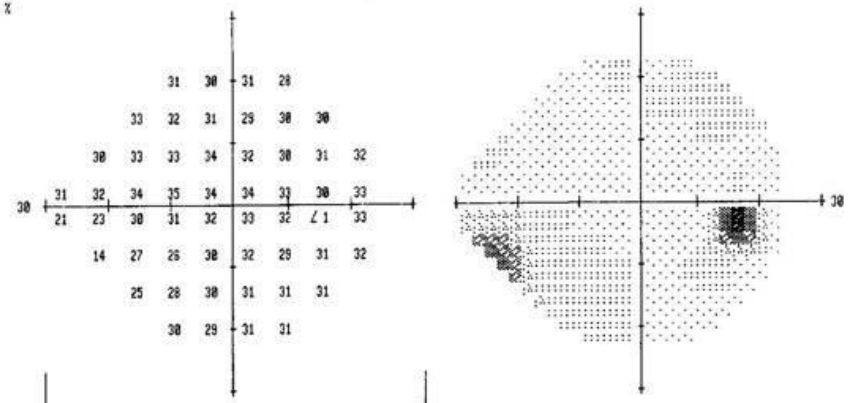
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 1/10
FALSE POS ERRORS: 0 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 03:11

FOVEA: OFF

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

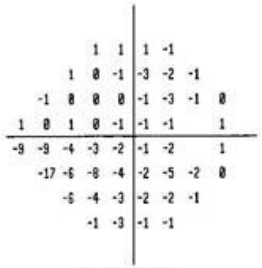
PUPIL DIAMETER: 7.7 MM
VISUAL ACUITY:
RX: -0.50 OS DC X

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

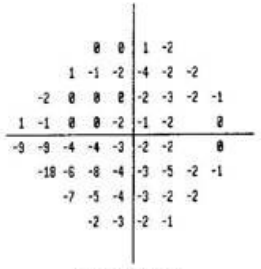









TOTAL DEVIATION

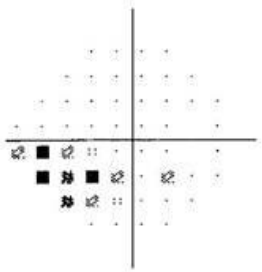



PATTERN DEVIATION

GHT
OUTSIDE NORMAL LIMITS

VFI 97%

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



:: < 5%
▽ < 2%
✱ < 1%
■ < 0.5%

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




HFA II 750-13293-4.2.2/4.2.2

SINGLE FIELD ANALYSIS

EYE: LEFT

NAME:
ID:

DOB: 03-18-1987

CENTRAL 24-2 THRESHOLD TEST

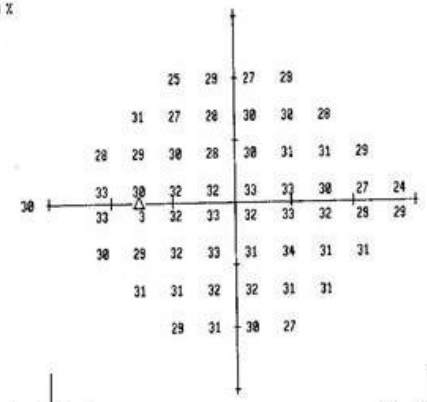
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 2/11
FALSE POS ERRORS: 4 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 03:13

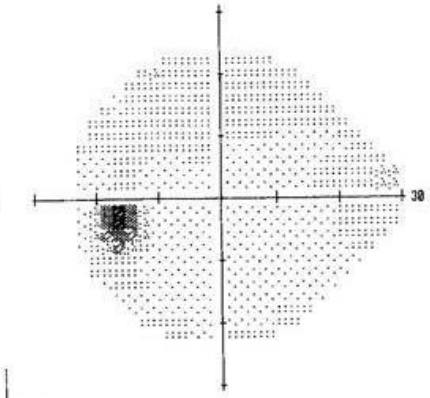
FOVEA: OFF

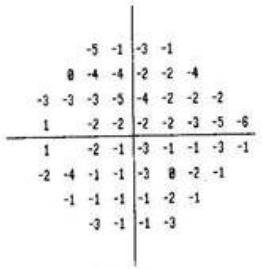
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-FAST

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

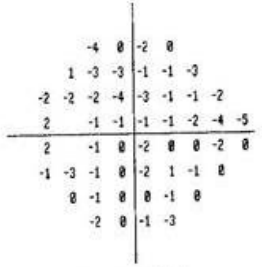
DATE: 07-22-2011
TIME: 2:36 PM
AGE: 24




TOTAL DEVIATION

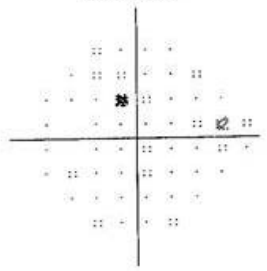



PATTERN DEVIATION

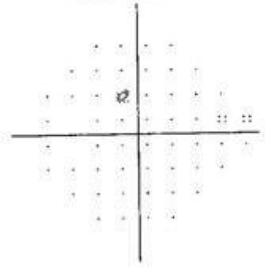
GHT
WITHIN NORMAL LIMITS

VFI 99%

MD -2.04 DB P < 5%
PSD 1.45 DB



:: < 5%
▽ < 2%
✱ < 1%
■ < 0.5%



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


HFA II 750-13293-4.2.2/4.2.2

# 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

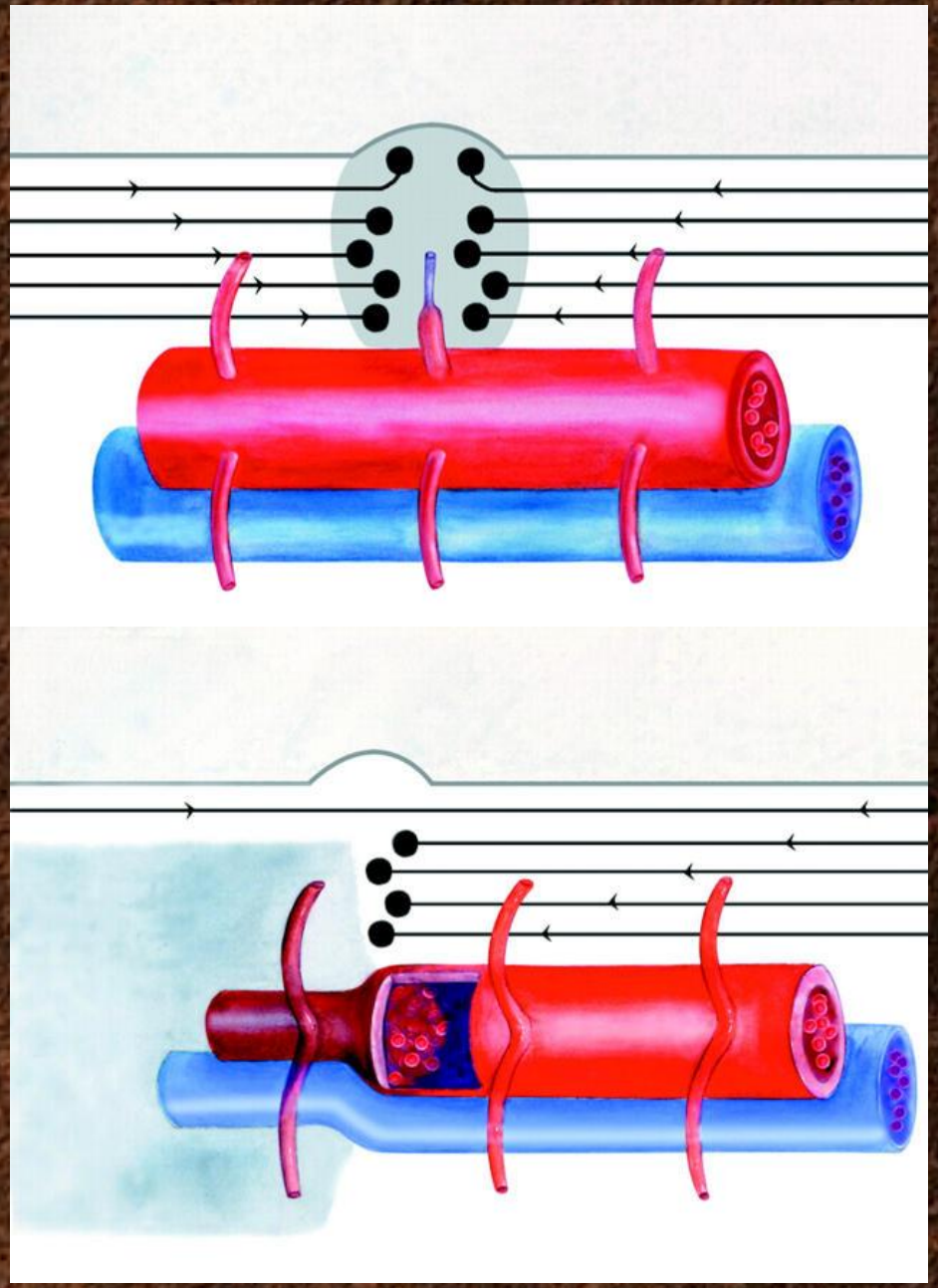
- Physical exam by PCP was normal
- Normal laboratory testing: Fasting glucose, CBC, ANA, Rheumatoid factor, C-reactive protein, HIV screen
- Normal carotid Doppler and echocardiogram
- FTA-ABS was minimally reactive
  - Serologic ELISA testing for Lyme disease recommended
- Follow-up: Photopsia persisted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

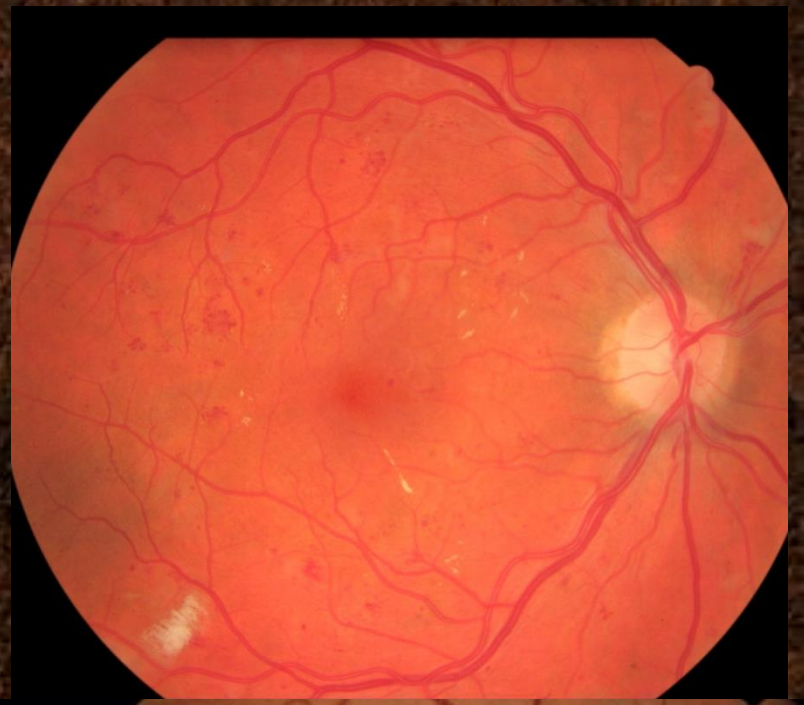
# What is a CWS?

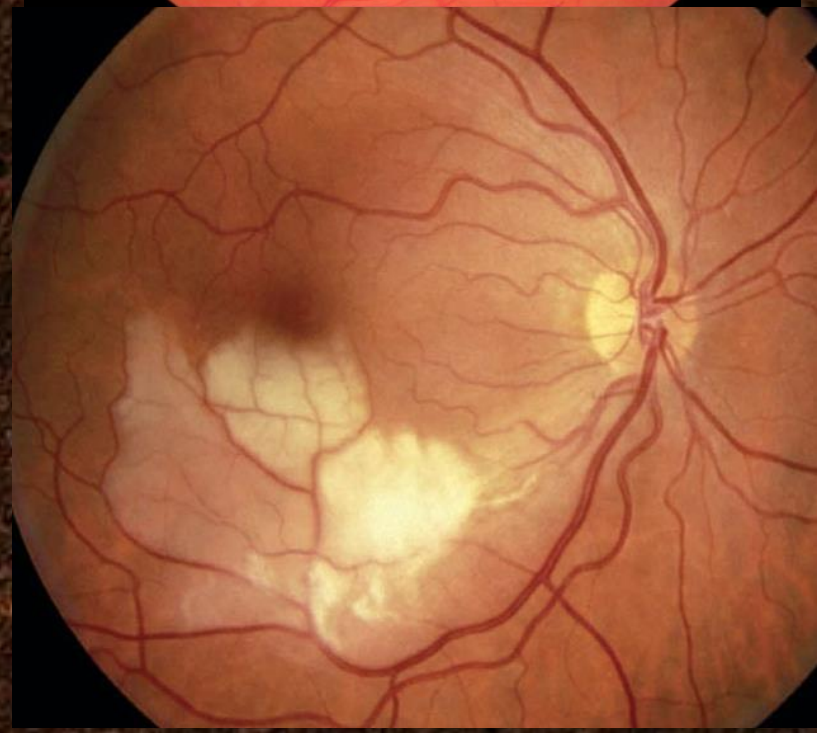
- CWS is a localized accumulations of axoplasmic material within adjacent bundles of ganglion cell axons.
- Two clinical presentations:
  1. Focal ischemia from terminal arteriolar occlusion.
  2. Appearance at the boundary of an ischemic region of the retina

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

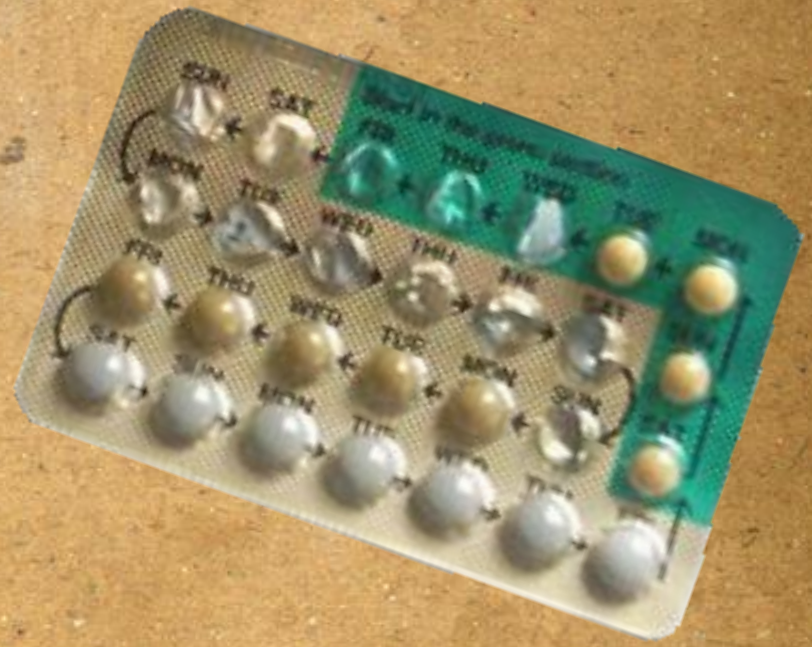
- CWS are almost always asymptomatic
- Localized or arcuate scotomas common
- OCT studies reveal permanent loss of the inner retinal layers at the site of resolved CWS lesions
- Some visual recovery may occur following resolution of CWS lesions

# 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

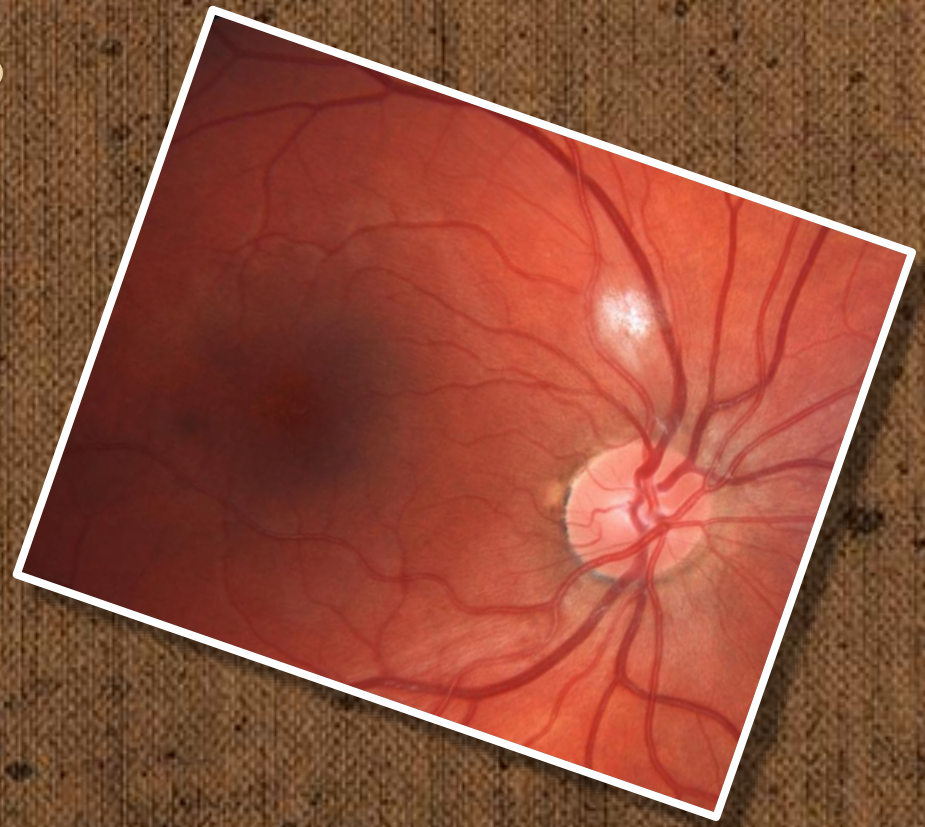
# OCP and Thromboembolism

- 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 generation OCPs
  - Lower risk of MI, CVA, and other side effects (weight gain, acne, headaches and unwanted hair growth)
  - **Higher risk of VTE**



# 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

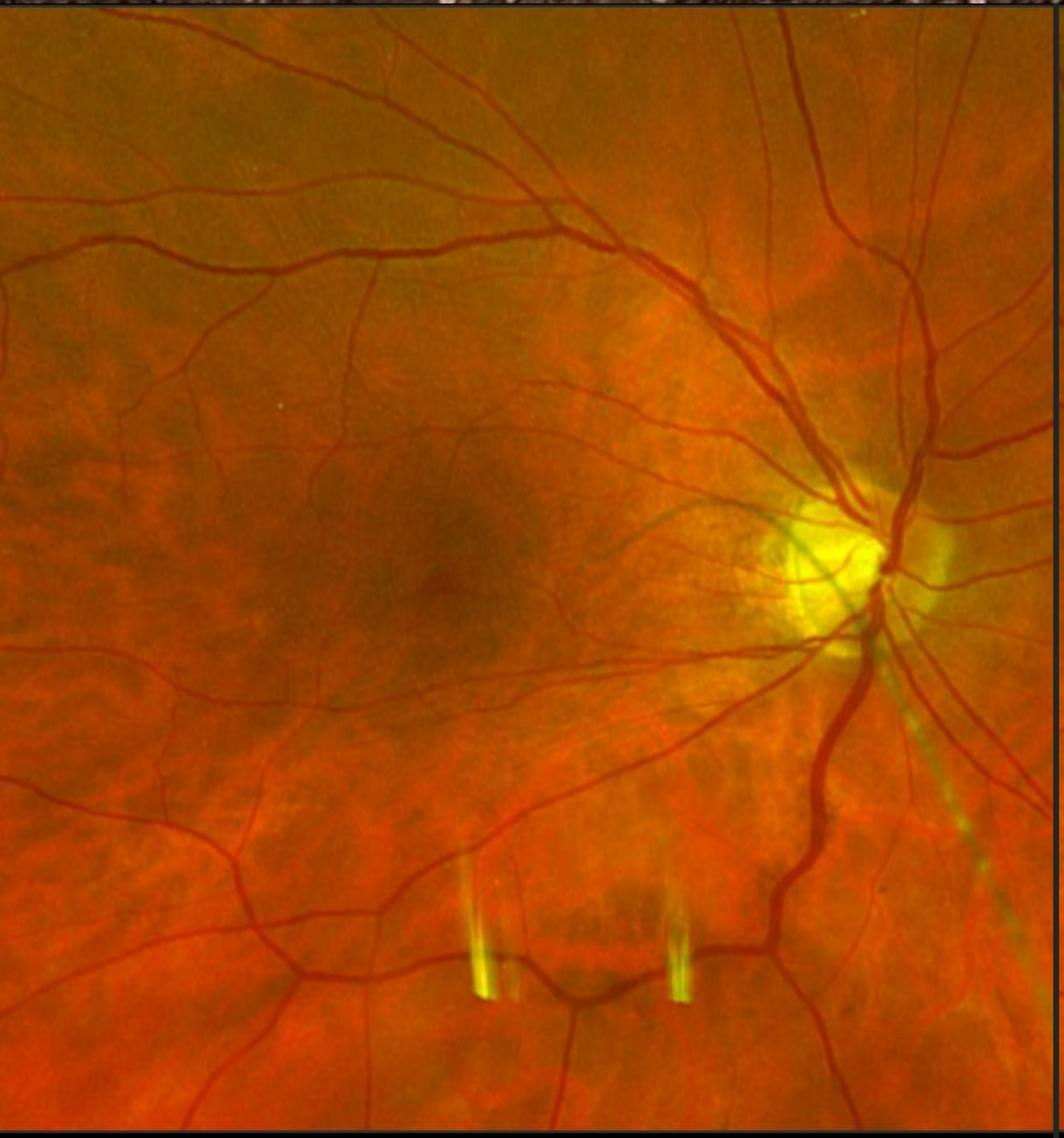
- VA: 20/25+ OD, 20/20 OS
- PERRL, (-)APD
- GAT: 27/28 @ 12pm
- SLE: White & Quiet

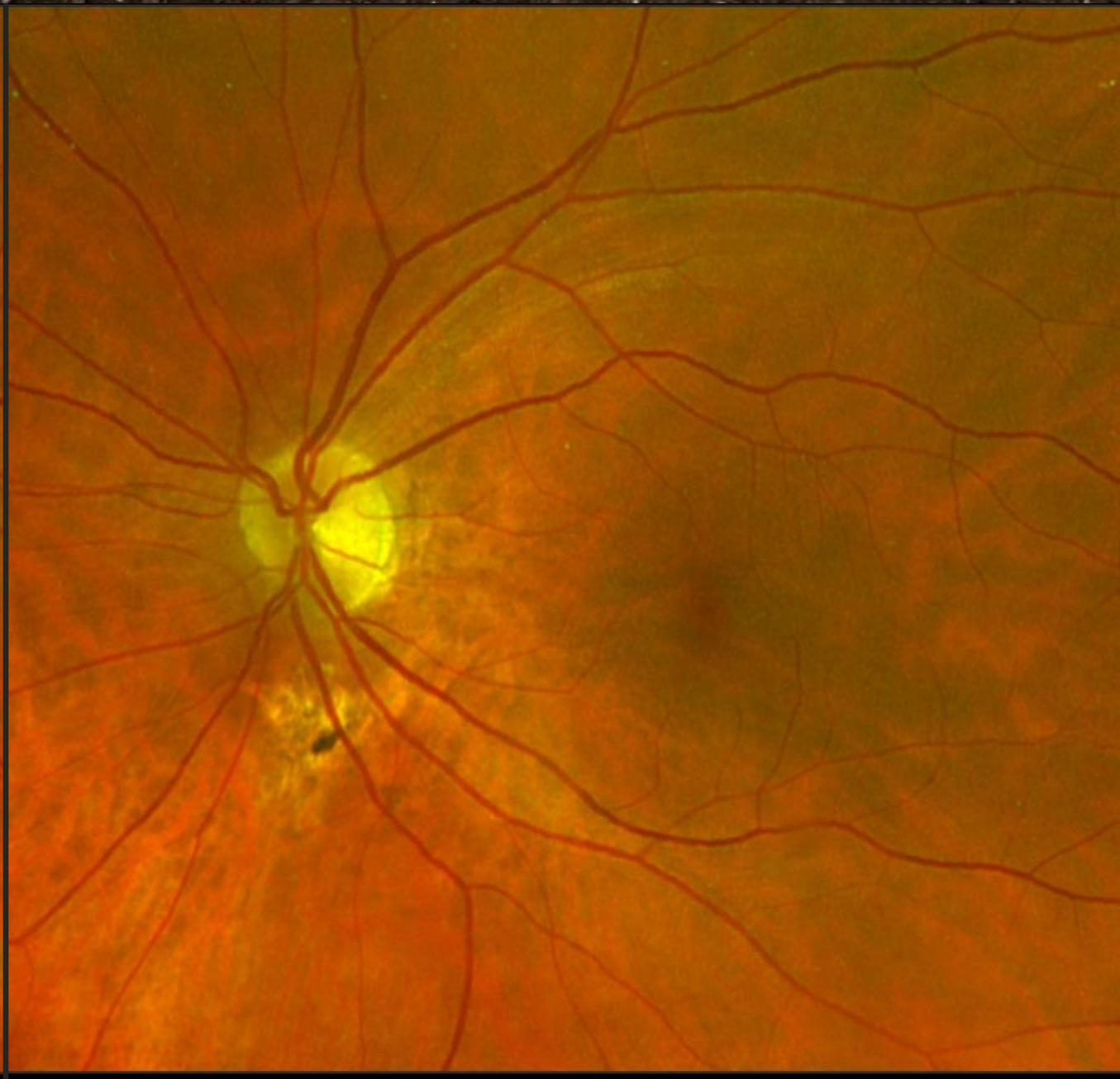
↑10 mmHg
from 1yr ago

# 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

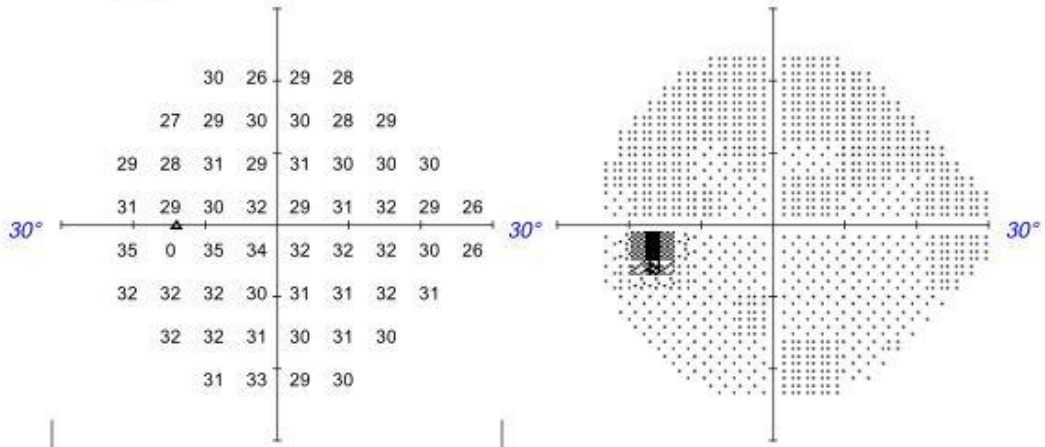
# Fundus photos taken with OPTOS camera

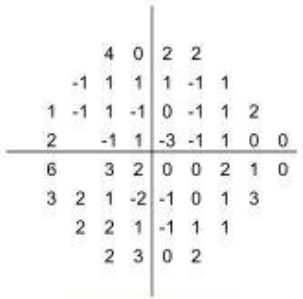




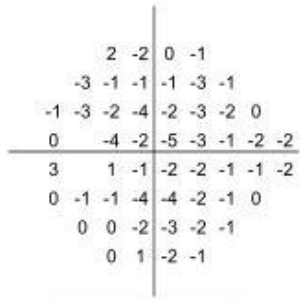
## OS Single Field Analysis — Central 24-2 Threshold Test

| | | | | | |
|---|---|---|---|---|---|
| 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



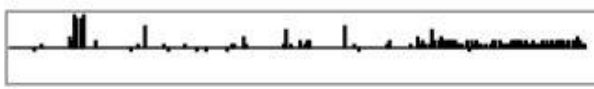
Pattern Deviation

GHT: Borderline

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

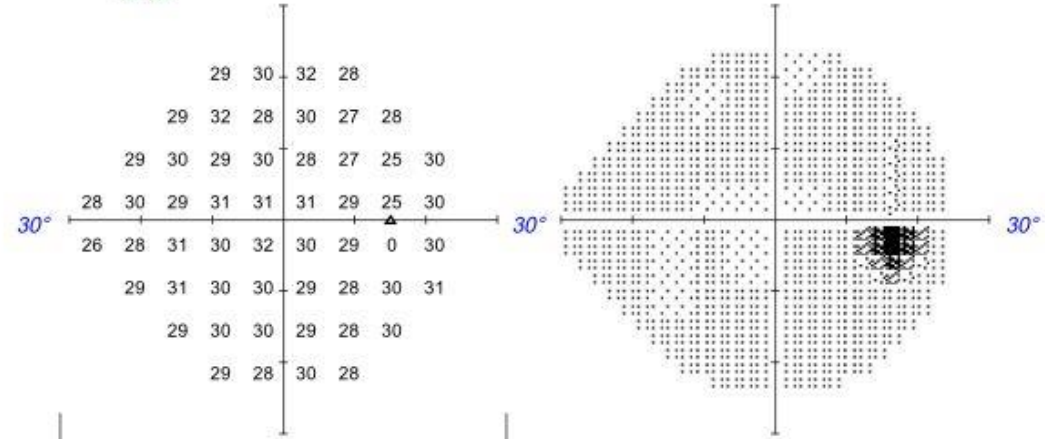
*** Low Test Reliability ***

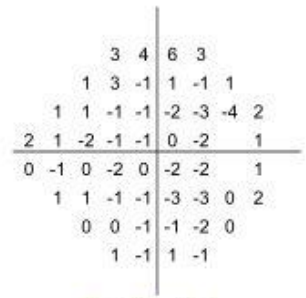
:: P < 5%
P < 2%
P < 1%
P < 0.5%



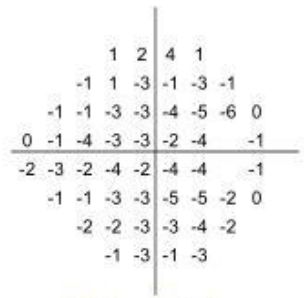
## OD Single Field Analysis — Central 24-2 Threshold Test

| | | | | | |
|---|---|---|---|---|---|
| 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 | | |
| ovea: | 33 dB | | | | |



Total Deviation

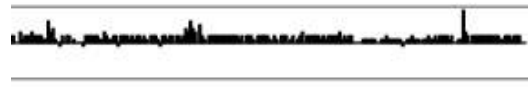


Pattern Deviation

GHT: Borderline

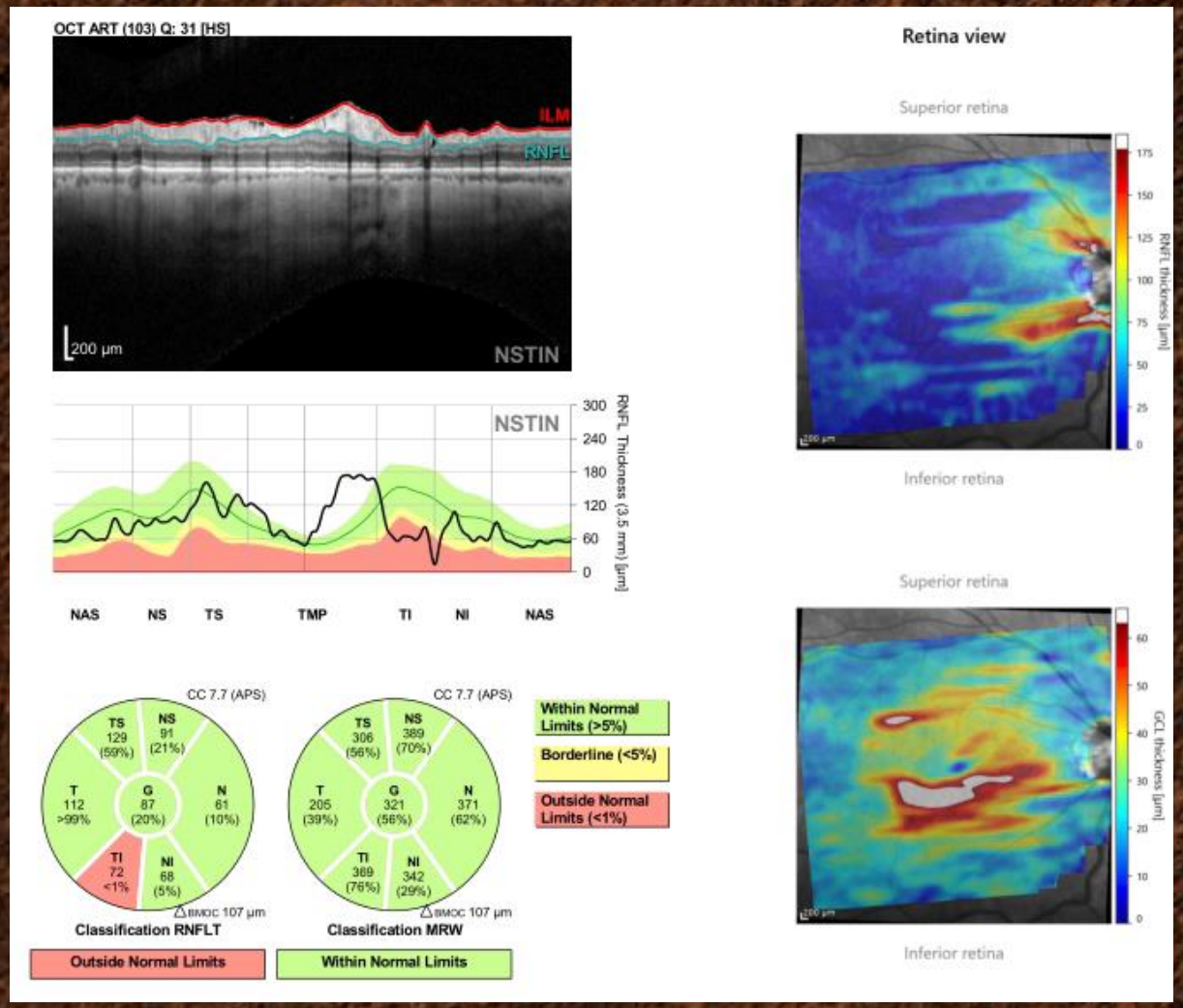
VFI24-2: 98%
MD24-2: -0.44 dB
PSD24-2: 1.74 dB

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

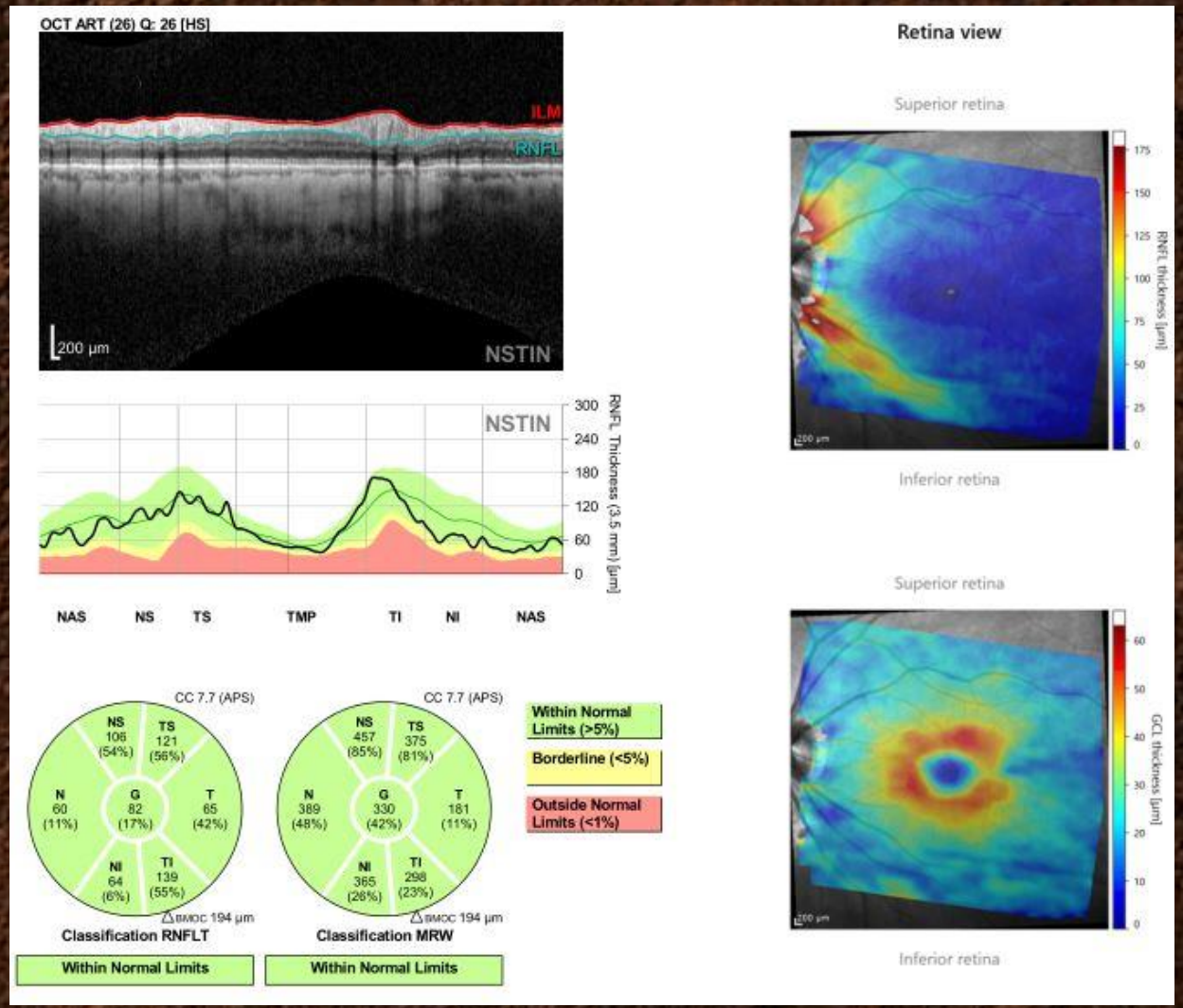


# Hood report reveals effect of ERM OD

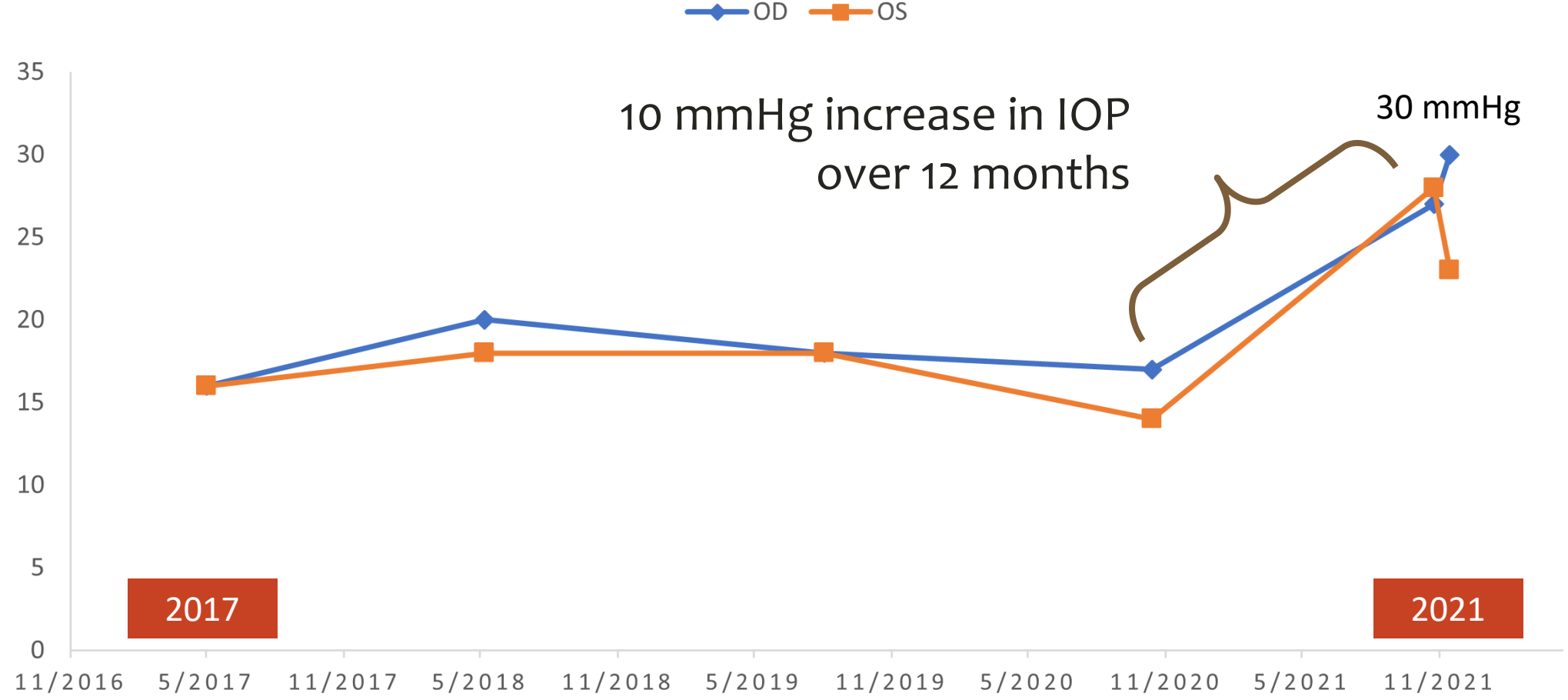
## OD




## 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 |

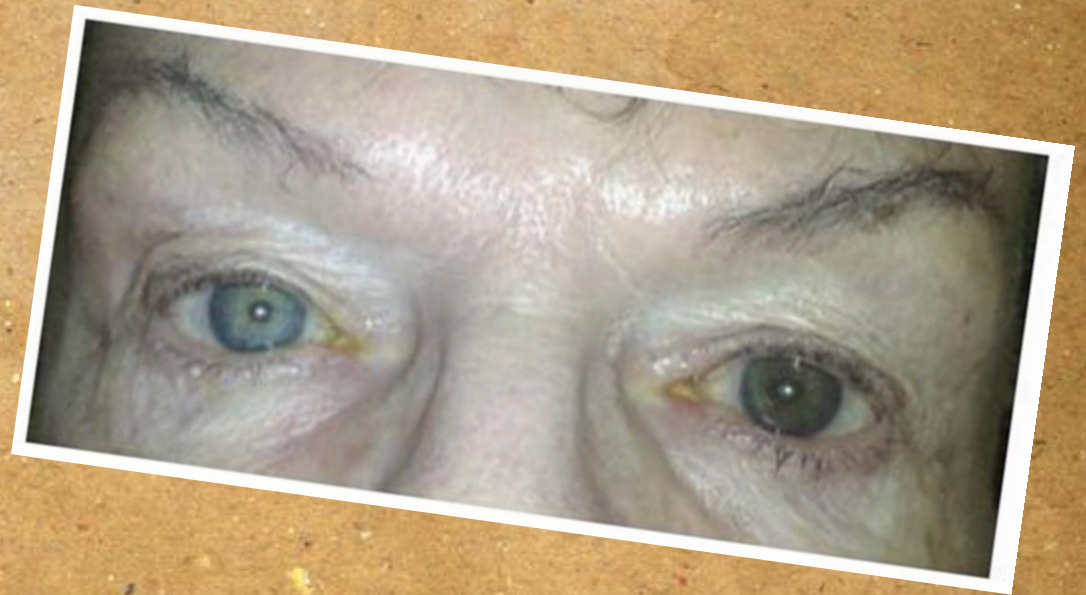
# BEFORE


# AFTER 16 WEEKS

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

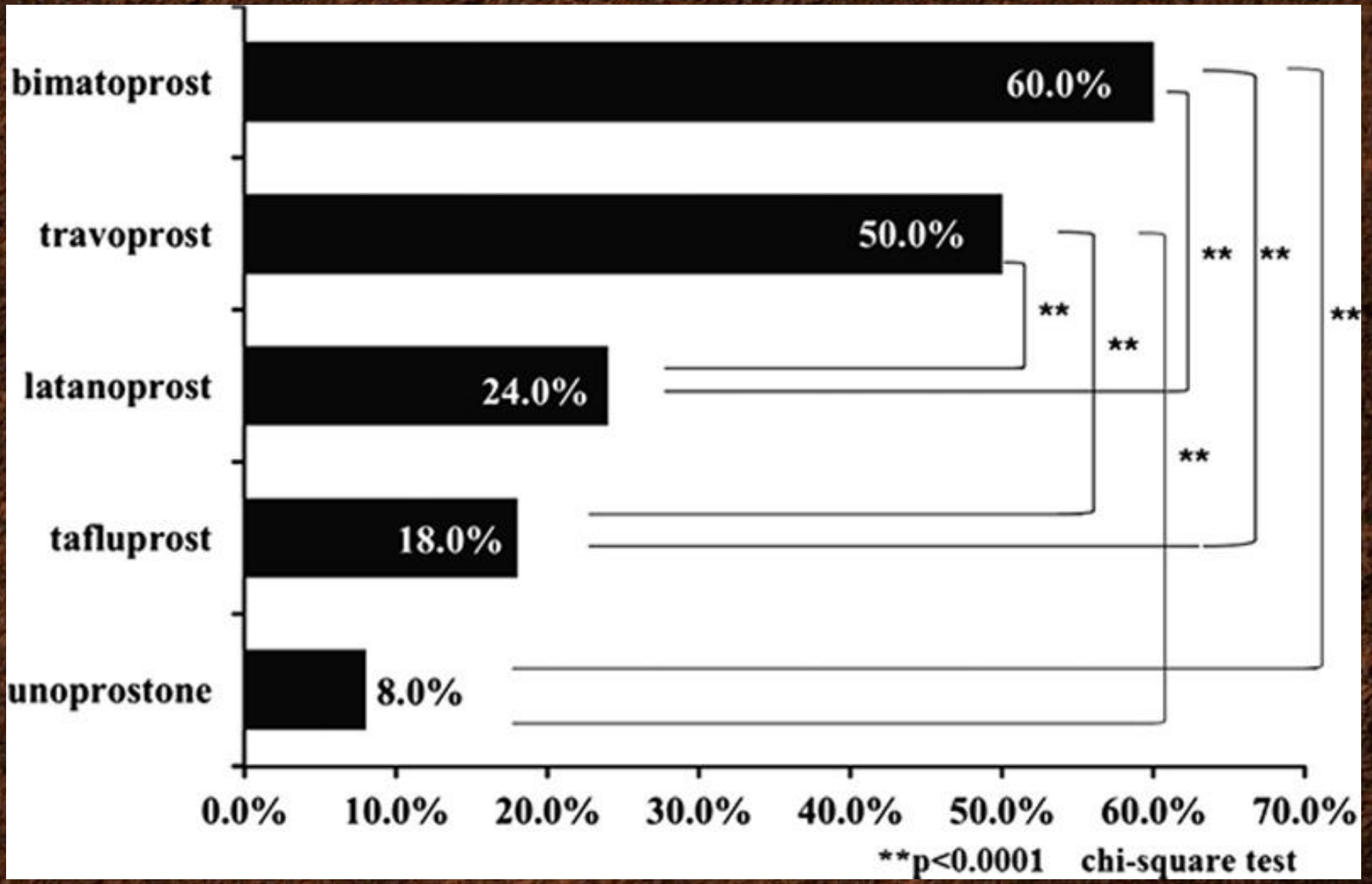

Once nightly, start by ensuring your face is clean, makeup and contact lenses are removed.


Remove an applicator from its tray. Then, holding the sterile applicator horizontally, place one drop of LATISSE® on the area of the applicator closest to the tip but not on the tip.


Then immediately draw the applicator carefully across the skin of the upper eyelid margin at the base of the eyelashes (where the eyelashes meet the skin) going from the inner part of your lash line to the outer part.


Blot any excess solution beyond the eyelid margin. If the solution gets into the eye, it is not expected to cause harm. The eye should not be rinsed.


Dispose of the applicator after one use. Repeat for the opposite upper eyelid margin using a new sterile applicator. This helps minimize any potential for contamination from one eyelid to another.




Frequency of upper lid sulcus deepening

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

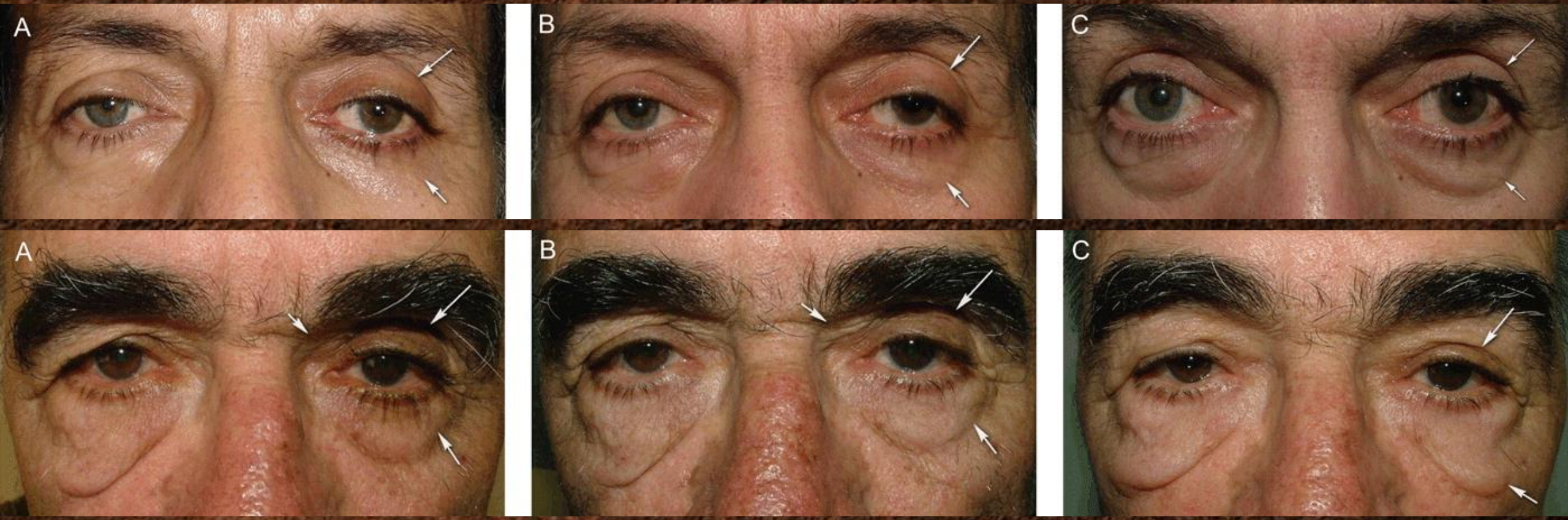
Source: Kenji (2013)

# Persistence of periorbitopathy after D/C bimatoprost

Initial presentation

4mos after d/c bimatoprost

30 mos

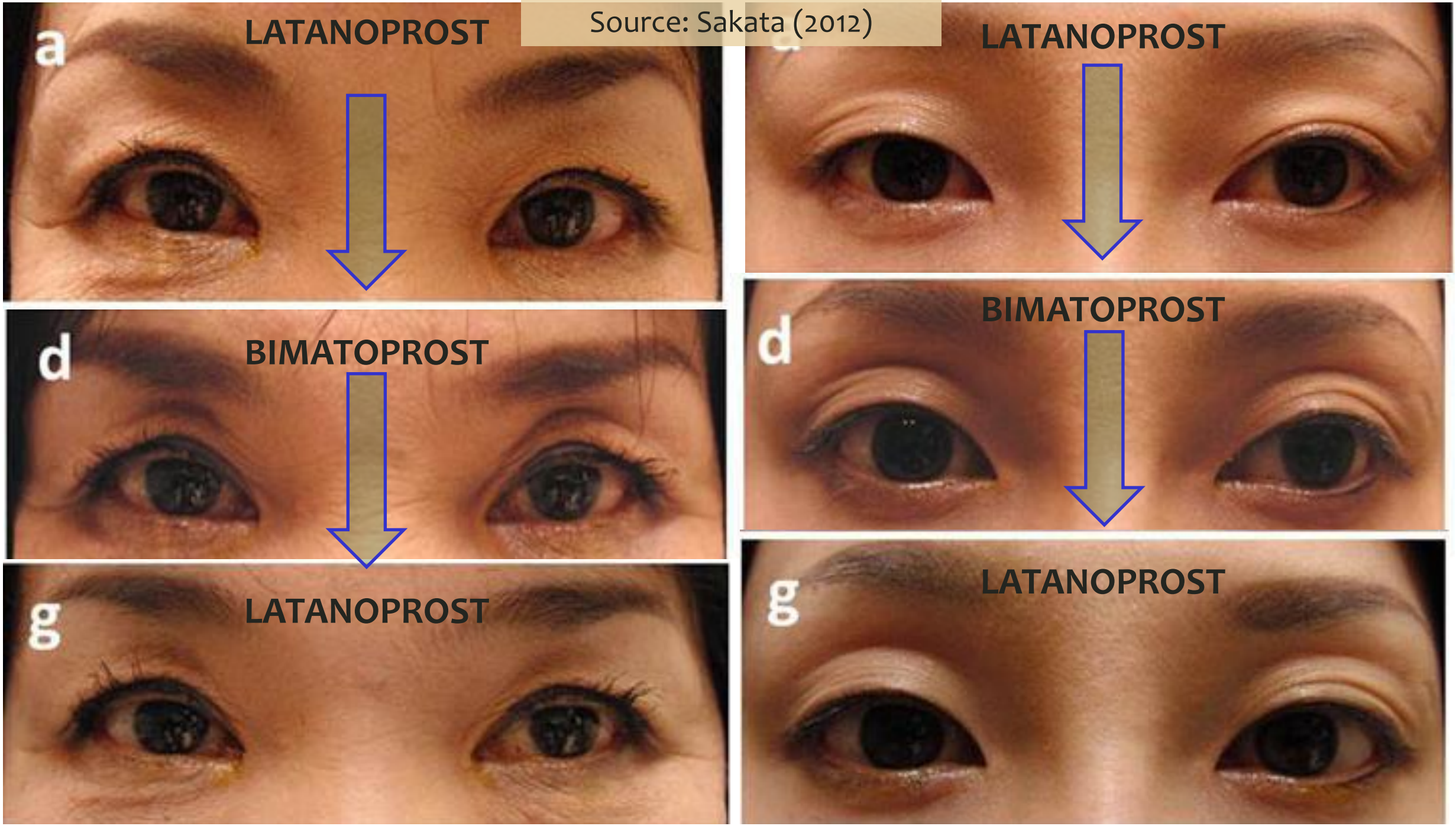



Initial presentation

5mos after d/c bimatoprost

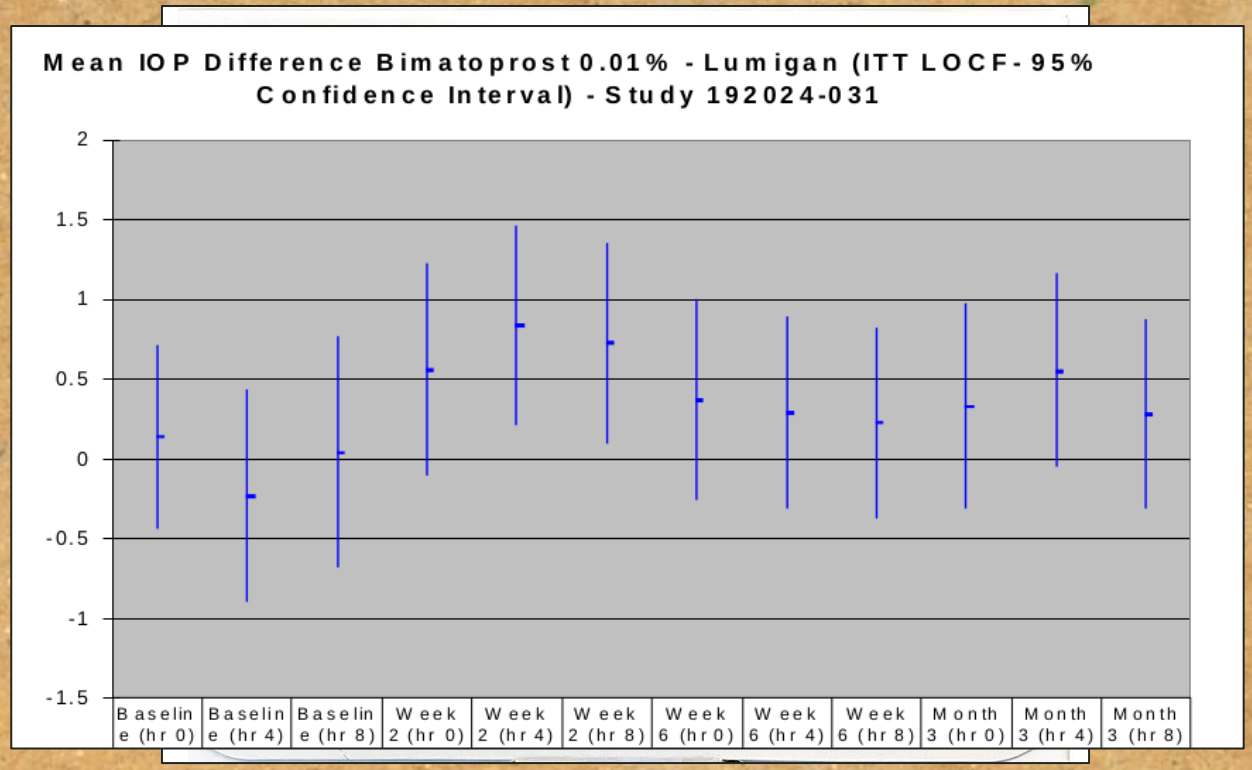
24 mos

Source: Aydin (2010)


Source: Sakata (2012)
a
LATANOPROST
LATANOPROST
d
BIMATOPROST
d
BIMATOPROST
g
LATANOPROST
g
LATANOPROST

# Generic

# Name-Brand



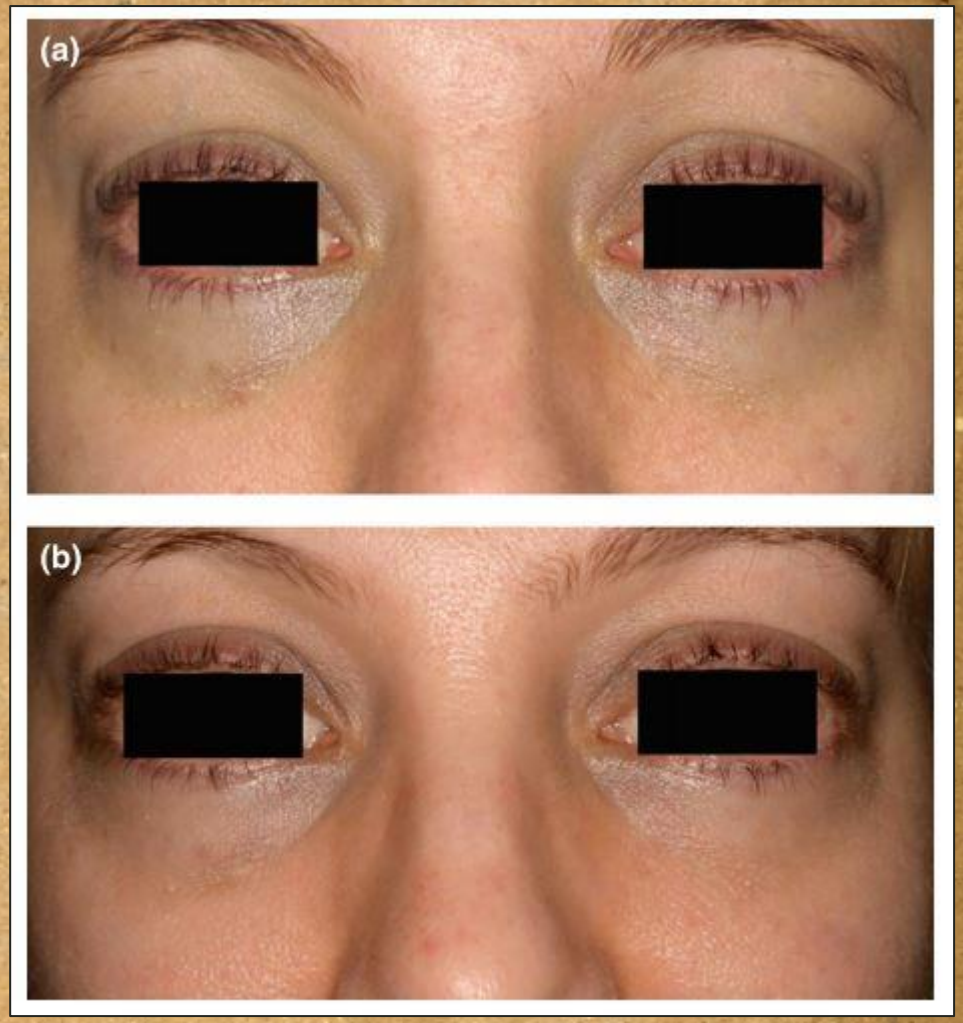
Greater IOP lowering
More side effects
Less BAK (0.005%)

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*



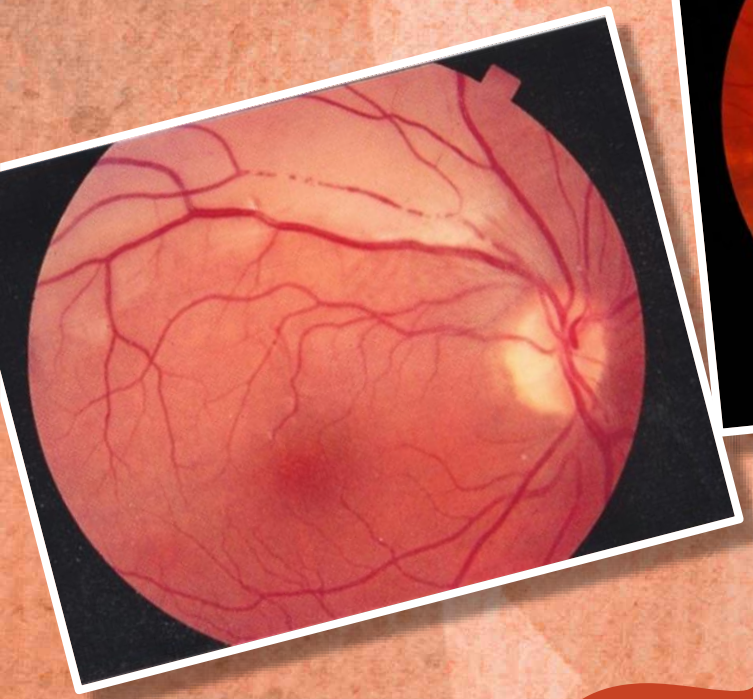

**OTC eyelash serums may contain isopropyl cloprostenate,** a PGA that can trigger the same periorbital changes seen with bimatoprost.

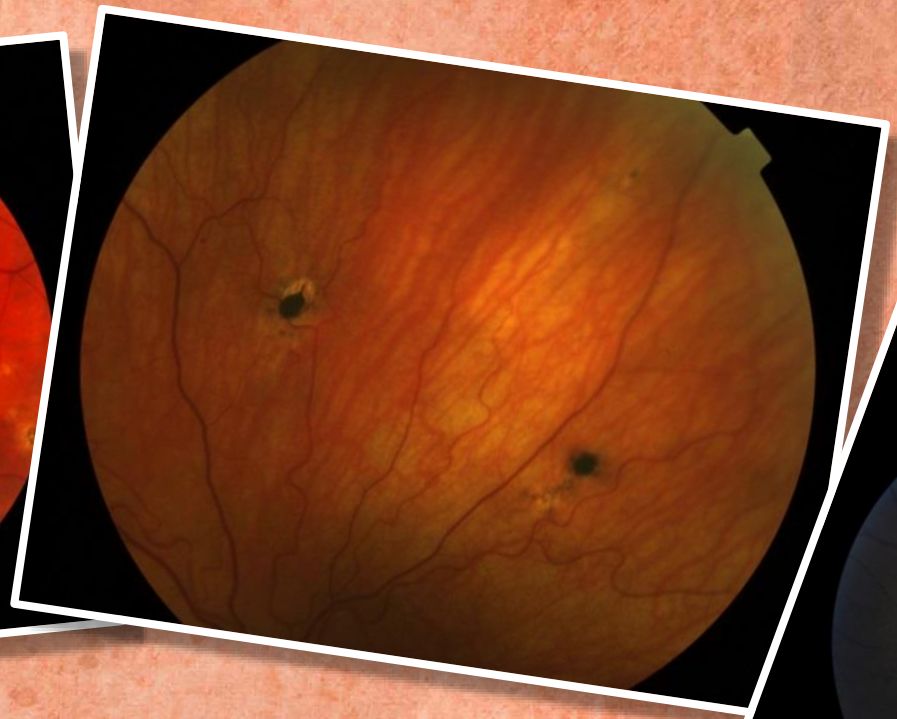
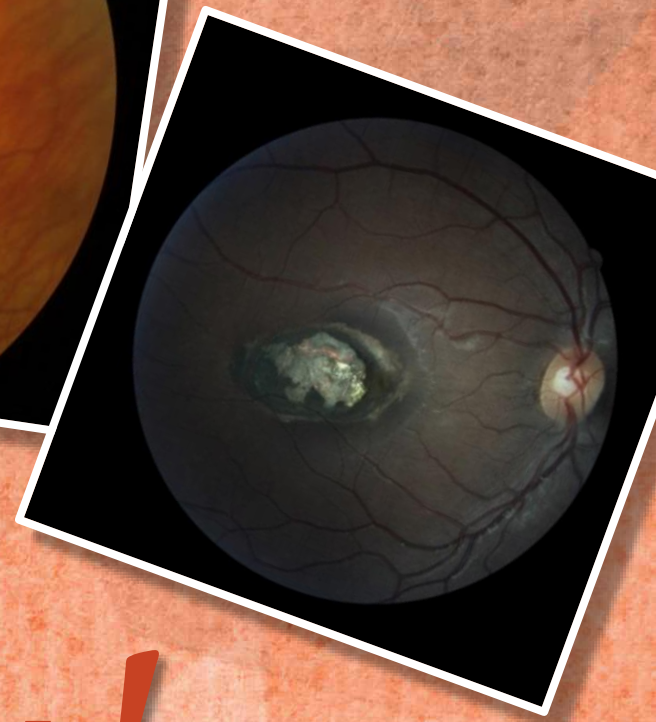
All have been withdrawn by FDA(?)

Source: Horvath, 2017

# 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!