


BOLDLY GO WHERE NO MAN HAS GONE BEFORE:

BEYOND THE POSTERIOR POLE

Carolyn Majcher, OD, FAAO, FORS
Oklahoma College of Optometry

1




Contact:

- majcher@nsuok.edu
- 918-444-4155

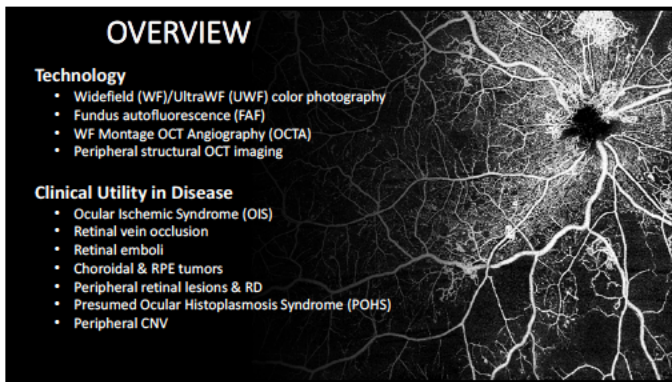
Disclosures:

- Paid consultant/speaker for:
 - Carl Zeiss Meditec
 - Regeneron Pharmaceuticals
 - Iveric Bio (Astellas)
 - Optomed
 - Apellis Pharmaceuticals
- Paid advisory board member for LENZ Therapeutics, Notal Vision, Ocuterra, Topcon, Tarsus, Genentech

All relevant relationships have been mitigated



2



OVERVIEW

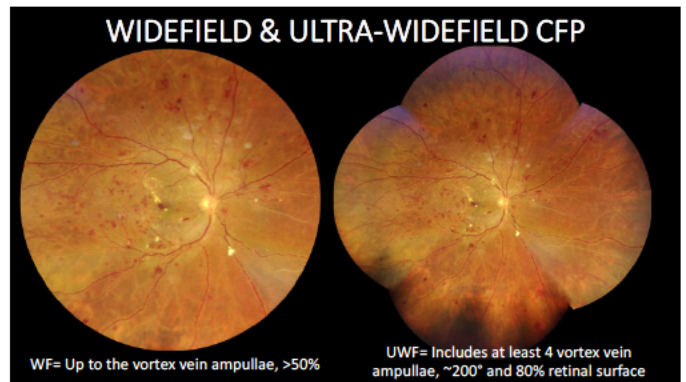
Technology

- Widefield (WF)/UltraWF (UWF) color photography
- Fundus autofluorescence (FAF)
- WF Montage OCT Angiography (OCTA)
- Peripheral structural OCT imaging

Clinical Utility in Disease

- Ocular Ischemic Syndrome (OIS)
- Retinal vein occlusion
- Retinal emboli
- Choroidal & RPE tumors
- Peripheral retinal lesions & RD
- Presumed Ocular Histoplasmosis Syndrome (POHS)
- Peripheral CNV

3

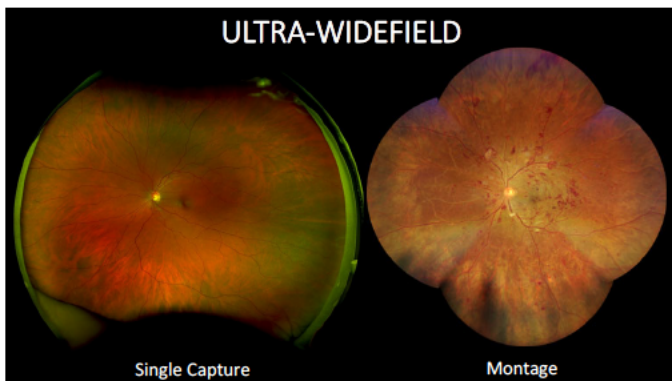


WIDEFIELD & ULTRA-WIDEFIELD CFP

WF= Up to the vortex vein ampullae, >50%

UWF= Includes at least 4 vortex vein ampullae, ~200° and 80% retinal surface

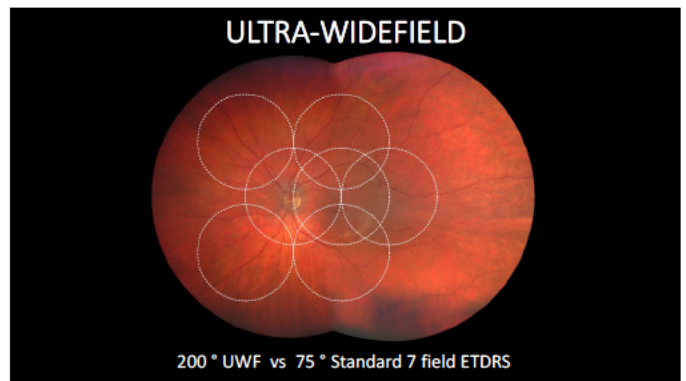
4



ULTRA-WIDEFIELD

Single Capture Montage

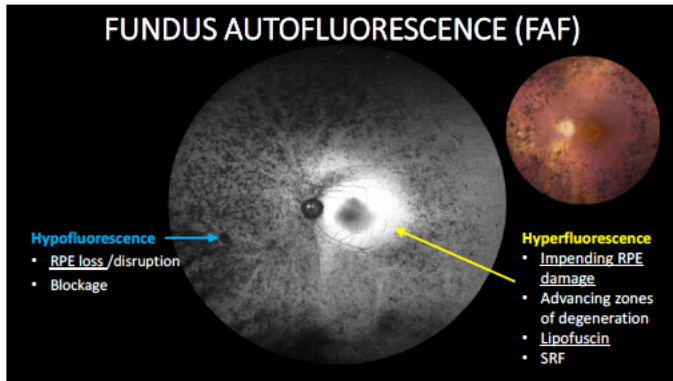
5



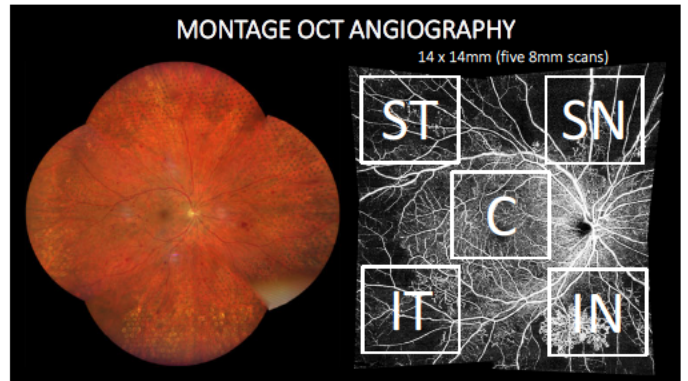
ULTRA-WIDEFIELD

200° UWF vs 75° Standard 7 field ETDRS

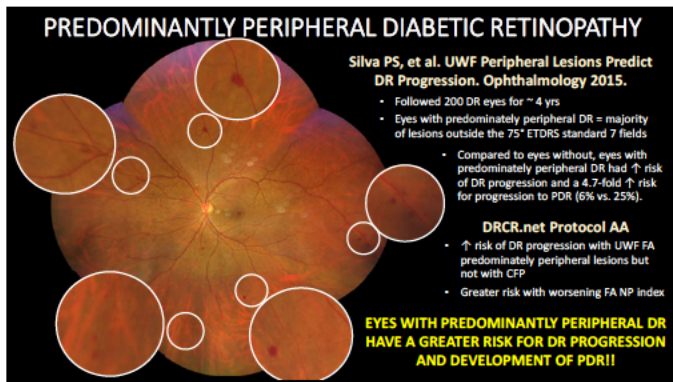
6



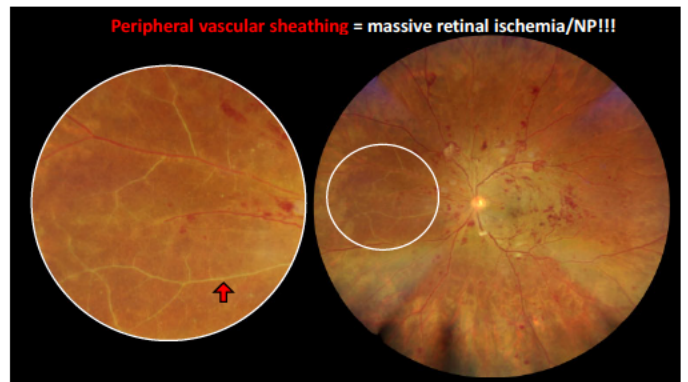
7



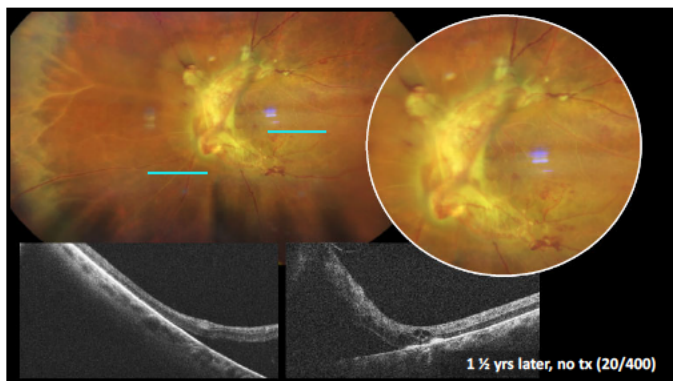
8



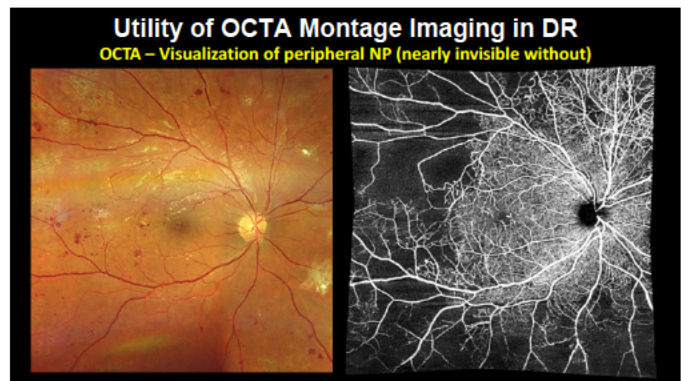
9



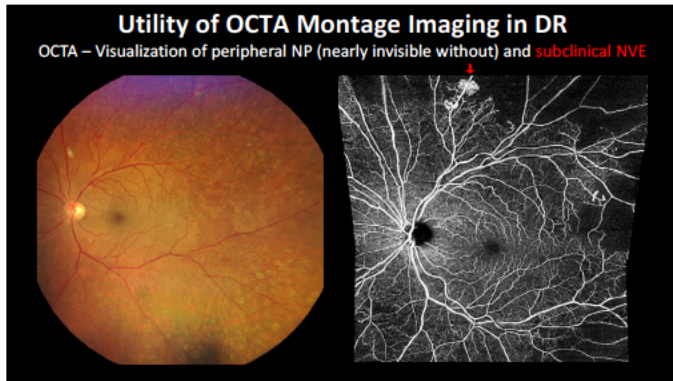
10



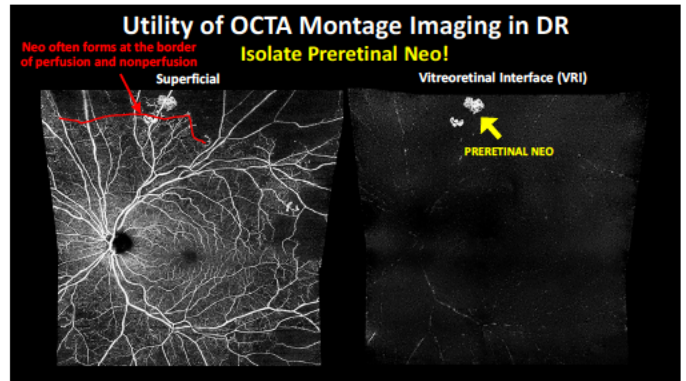
11



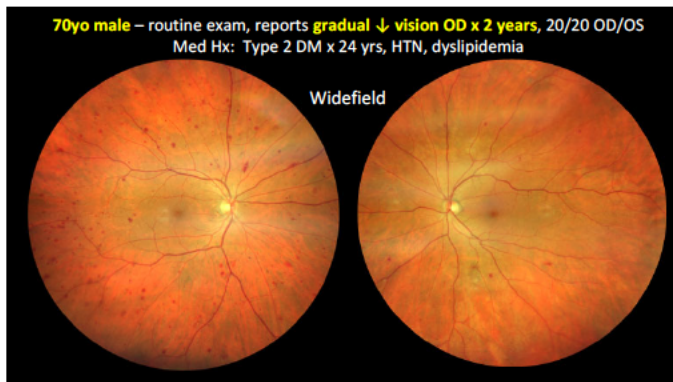
12



13



14



15



16

OCULAR ISCHEMIC SYNDROME

	Ocular Ischemic Syndrome (OIS)	Diabetic Retinopathy	CRVO
Symmetry	asymmetric	symmetric	asymmetric
Heme Shape	blot	blot	flame > blot
Heme Location	Midperiphery/periphery > post pole	Usually more concentrated within the post pole	Usually more concentrated within the post pole
Retinal Vessels	Veins dilated and non-tortuous, arteriolar attenuation	Veins dilated & beaded	Veins dilated and tortuous
ONH	Normal to pale	Normal	Edematous
Mac Edema	Rare	Common, usually focal (decentered) with exudate	Common (central & diffuse CME)
Onset	Insidious	Insidious	Acute

Why is the retinopathy so asymmetric??

WHEN PRESUMED DR IS ASYMMETRIC THINK ABOUT OCULAR ISCHEMIC SYNDROME (OIS) AND CRVO!!!

17

OIS Hemes mostly in midperiphery

Dilated & non-tortuous veins

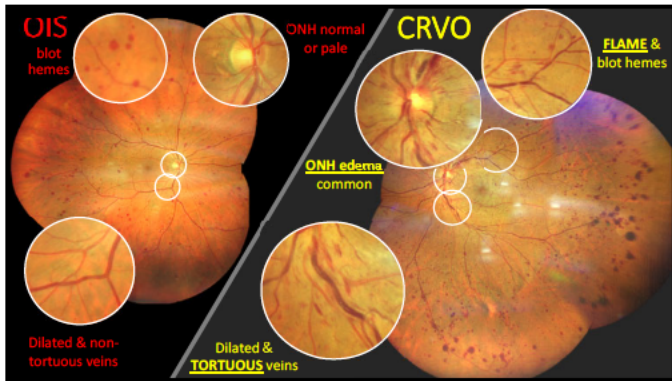
DR Hemes mostly in post pole

Dilated & BEADED veins

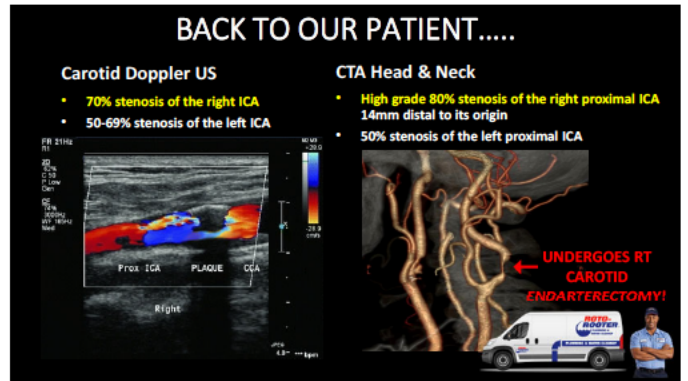
MACULAR EDEMA RARE IN OIS!!

Macular edema common (usually focal with EXUDATE)

18



19



20

Diabetic Retinopathy?

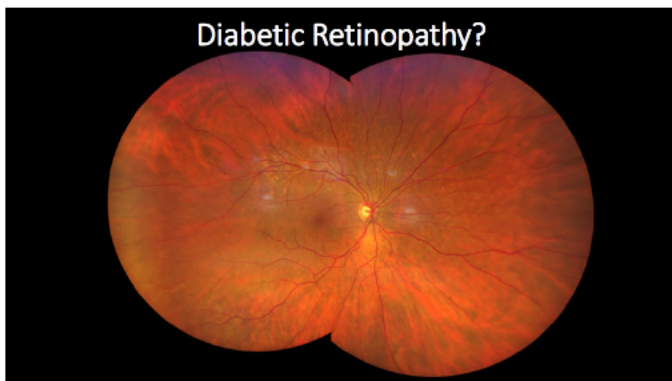
73yo female

- CC: Referred to retina clinic for DME OS eval, haze over vision OS > OD x 1 month
- Ocular Hx: POAG susp
- Medical Hx:
 - HTN (BP in-office 147/76)
 - Type 2 DM x 3 years, last a1c 6.7%
- VA sc @dist
 - OD 20/25
 - OS 20/30
- Pupils: Equally round, (-) APD
- CVF: FTFC OU
- Ant seg: 1+ NS OU
- IOP: 21/20

21

Diabetic Retinopathy?

22




23



24

RETINAL VEIN OCCLUSION



Utility of WF/UWF imaging


- Document extent of involvement
- Montage OCTA
 - Classify as ischemic vs nonischemic
 - Detect post seg neo

25

RETINAL VEIN OCCLUSION

40yo female


- CC: **Routine exam, no complains**
- Medical Hx:
 - **HTN** (BP in-office 133/83)
- VA sc @ dist
 - OS 20/20
- Pupils: Equally round, (-) APD
- **CVF: OD restriction inf nasal**
- Ant seg: WNLs
- IOP: 15/16



26

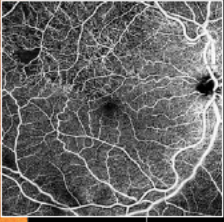

RETINAL VEIN OCCLUSION

Montage OCTA superficial



27

MONTAGE OCTA IN RVO

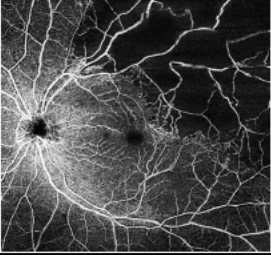

Non-Ischemic BRVO	Ischemic BRVO
	

- Estimate the degree of NP and classify as ischemic or nonischemic
- CRVO → ant seg neo
- BRVO → post seg neo

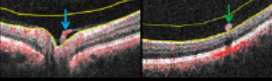
Predictive Value of Retinal NP!!!
BVOS 50/50/50 rule:
 ~ 50% of eyes with ischemic BRVO will develop NVD/NVE

Branch Vein Occlusion Study Grp. Argon laser scatter photocoagulation for prevention of neovascularization and vit hema in BVO. A RCT. Arch Ophthalmol. 1986.

28

Montage OCTA Superficial	Montage OCTA Vitreoretinal Interface (VRI)
	

**Ischemic BRVO with post seg neo:
 REFER FOR SECTORAL PRP!!!
 40yo- get systemic WU!**



29

RETINAL VEIN OCCLUSION

RVO Zebra Work-Up

If young patient (<50), BRVO that did not occur at a A/V crossing, no history of HTN, or bilateral RVO consider more extensive systemic workup:

Causes of retinchoroiditis or retinal vasculitis: sarcoid, syphilis, SLE, TB, lyme, AIDS/CMV


Hyperviscosity states: leukemia, Waldenström's macroglobulinemia, polycythemia, lymphoma, multiple myeloma, cryoglobulinemia

Hypercoagulable states and thrombophilia: factor V Leiden, hyperhomocysteinemia, protein C deficiency, antithrombin III, activated protein C resistance, sickle cell, antiphospholipid syndrome, anticardiolipin antibodies

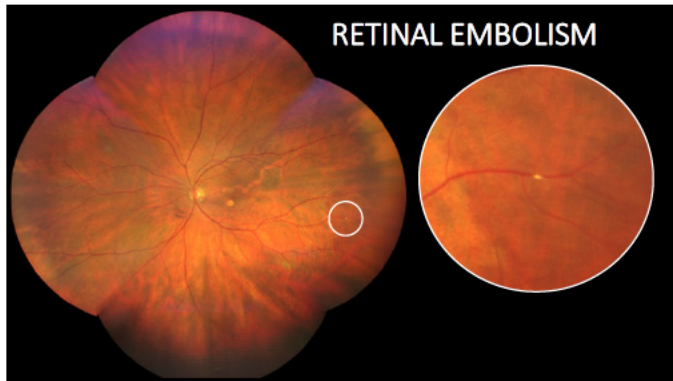
Abnormal platelet function

Oral contraceptive/diuretic use

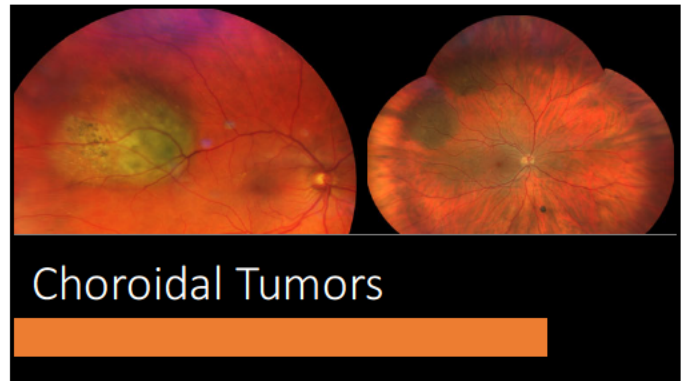
Recommend: BP, A1c, CBC with diff & plat count, PT/aPTT, ESR, INR, lipid profile, homocysteine levels, ANA, FTA-ABS/RPR, QuantIFERON TB gold or PPD, hemoglobin & serum protein electrophoresis, antiphospholipid antibodies, protein C and S levels, HIV screen, factor V Leiden mutation, antithrombin III mutation, prothrombin G20210A mutation.



30



31



32

NEVUS OR MELANOMA?

Differentiating small choroidal melanoma from choroidal nevus **2019 UPDATE** ★

To Find Small Ocular Melanoma Doing IMaging (TFSOM-DIM)

- T- Thickness (>2mm US = ~ 890um OCT)
- F- Fluid, **SRF**
- S- Symptomatic VL (**VA ≤20/50**)
- O- Orange pigment (**FAF**)
- M- Melanoma **acoustic hollowness**
- DIM- **DiaMeter >5mm**

Risk for growth within the next 5 years:

- 0 risk factors = 1.1%
- 1 factor = 11%
- 2 factors = 22%
- 3 factors = 34%
- 4 factors = 51%

Variable	Letter	Measurement	Scaling	Hazard ratio (95% confidence interval)	P-value
Thickness tumor <2mm	T	Tu	US	3.80	<0.0001
Fluid subretinal	F	Fluid	OCT	3.56	<0.0001
Symptomatic visual acuity <20/50	S	Small	Snellen VA	2.28	0.0030
Orange pigment	O	Orange	FAF	3.87	0.0004
Melanoma acoustic hollowness	M	Melanoma	US	2.10	0.0030
Diameter tumor <2mm	DIM	Using Imaging	Photography	1.84	0.0275

Shields CL. Small choroidal melanoma: detection with multimodal imaging and management with plaque radiotherapy or AU-011 nanoparticle therapy. *Curr Opin Ophthalmol*. 2019

33

NEVUS OR MELANOMA?

FAF: Aids in detection of orange pigment (lipofuscin)

LA Dalvin, CL Shields, et al. Combination of multimodal imaging features predictive of choroidal nevus transformation into melanoma. *BJO 2019*. 103 (10), 1441-1447.

34

NEVUS OR MELANOMA?

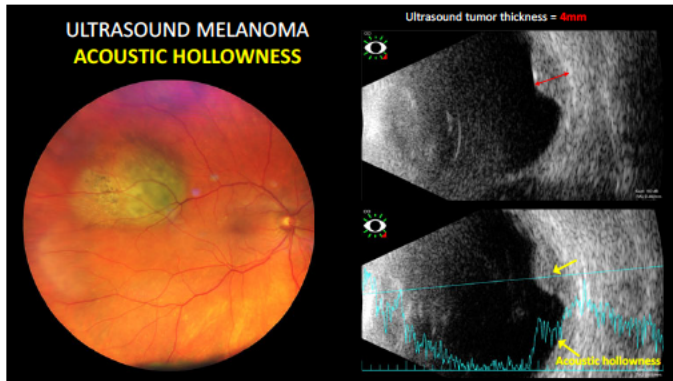
What is causing this hyperFL?

35

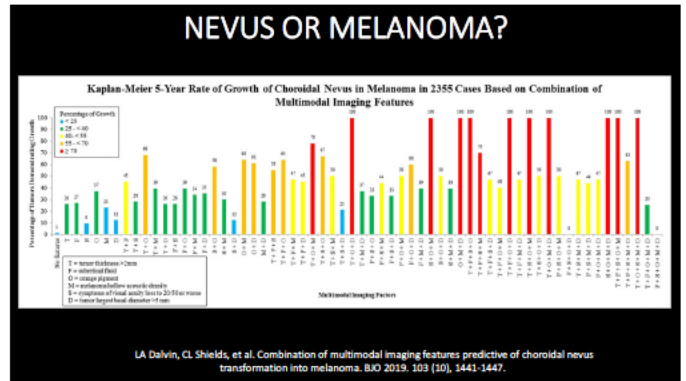
NEVUS OR MELANOMA?

Diameter **more than 5mm** (by photography) → **RISK FACTOR FOR MELANOMA**

36



37



38

NEVUS OR MELANOMA? YOU DECIDE!!!

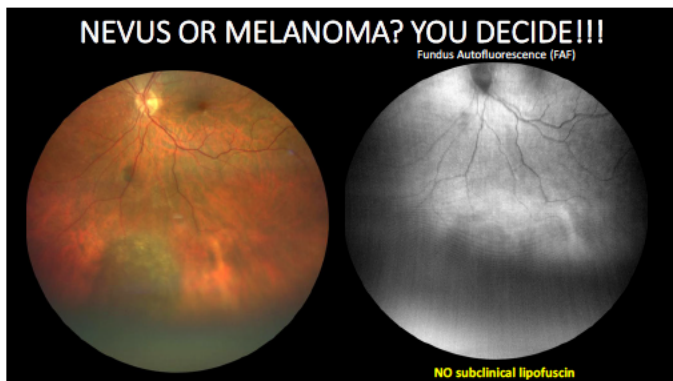
72yo female

- CC: 6mo ch tumor FU, no complaints
- Oc Hx:
 - LEE & DFE 6 months ago- noted a 4DD x 4DD choroidal nevus inferior periphery OS with drusen (no photos)
 - Cataract surg OU 3 yrs ago
 - Early-stage non-exudative AMD OU
- Med Hx:
 - CKD, dyslipidemia, hypothyroid
 - Non smoker
- BCVA
 - OD 20/20
 - OS 20/20

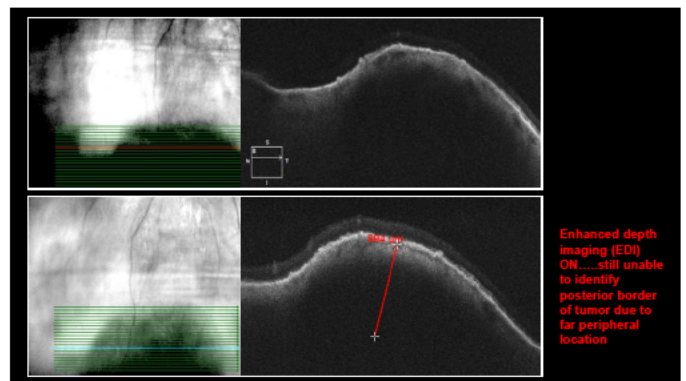
39



40



41



42

Why is the US thickness ~2Xs the OCT thickness?

Is the tumor acoustically hollow?

43

US thickness is ~ 2xs the OCT thickness!

OCT thickness cut off for suspicion should be about 890-900µm!!!

44

NEVUS OR MELANOMA? YOU DECIDE!!!

- Risky features:** US thickness >2mm and possibly hollow, diameter >5mm
- Benign features:** (+) drusen, no SRF or orange pigment

Variable	Letter	Mnemonic	Testing
Thickness tumor >2mm	T	To	US
Fluid subretinal	F	Find	OCT
Symptoms visual acuity <20/30	S	Small	Swellen VA
Orange pigment	O	Ocular	AF
Melanoma acoustic hollowness	M	Melanoma	US
Diameter tumor >5mm	D	Doing Imaging	Photography

3 risk factors = 34% risk for growth within the next 5 years!

Management

- Referred to retina, who then referred to ocular oncology
- Ocular oncology rec observation, FU every 6 months

45

RADIATION RETINOPATHY

Plans for intravitreal anti-VEGF and sectoral PRP

46

CHRPE-like Lesions in FAP (Familial Adenomatous Polyposis)

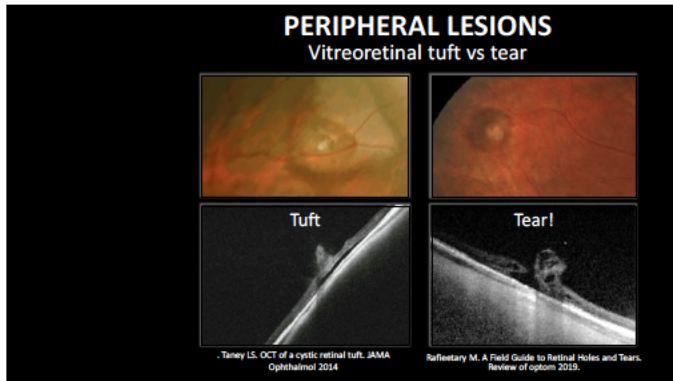
	Gardner's Syndrome	CHRPE
Appearance	Small: Identical to CHRPE Large: Oval with tail	Flat, round-oval, jet black
Bilaterality	Common (86% cases)	Very rare (5% cases)
Multiple quadrants	Common	Rare

47

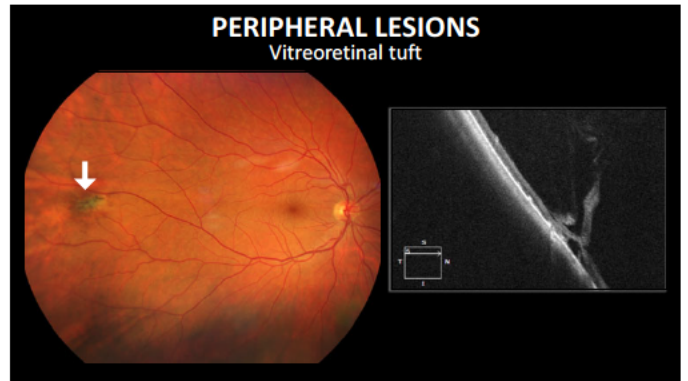
Peripheral retinal pathology & Rheg RD

- Utility of WF/UWF imaging**
 - Detect retinal breaks
 - Document size and extent of RDs
 - Monitor post repair
- Utility of OCT**
 - Find holes within lattice
 - Differentiate vitreoretinal tuft vs tear
 - Differentiate retinoschisis vs RD
 - Posterior Shafer's sign

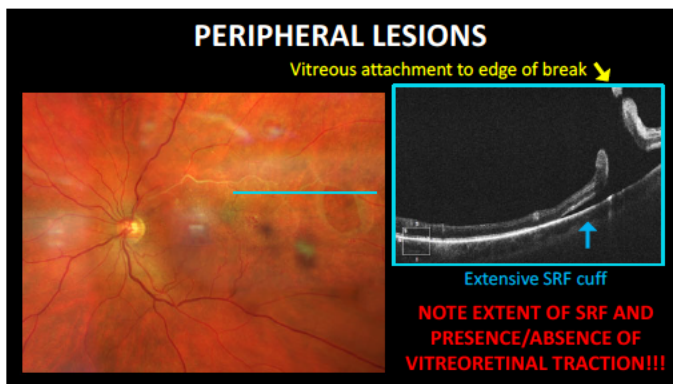
48



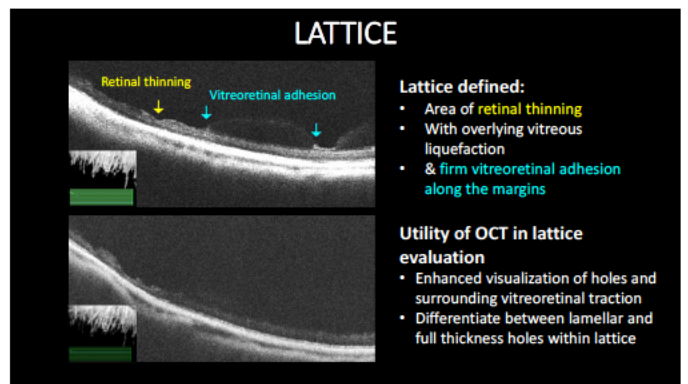
49



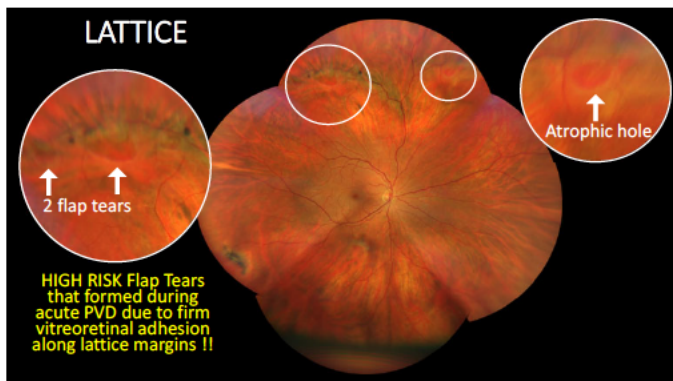
50



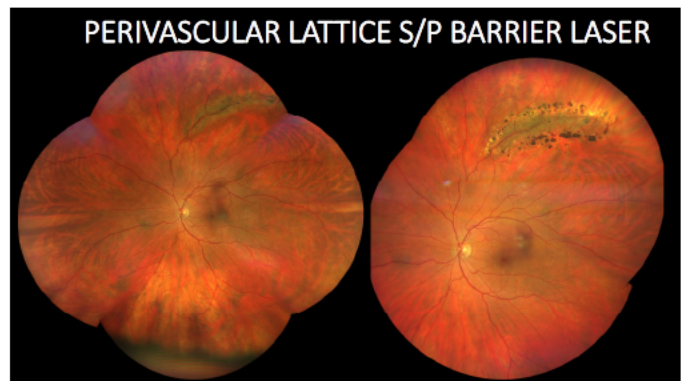
51



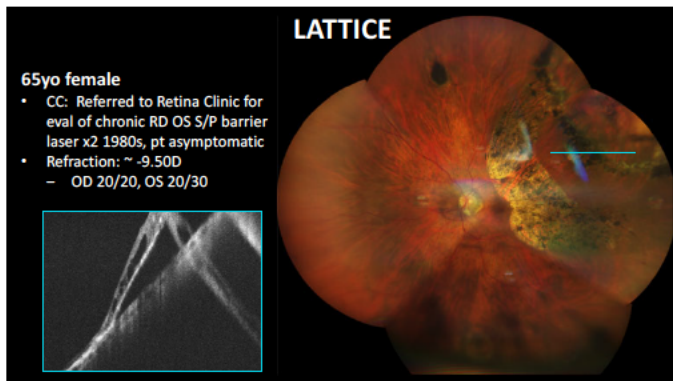
52



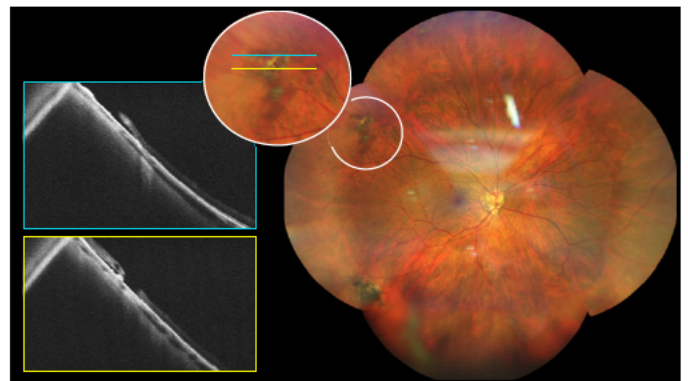
53



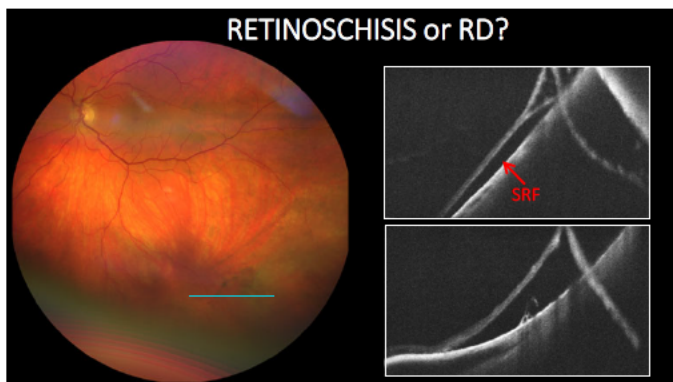
54



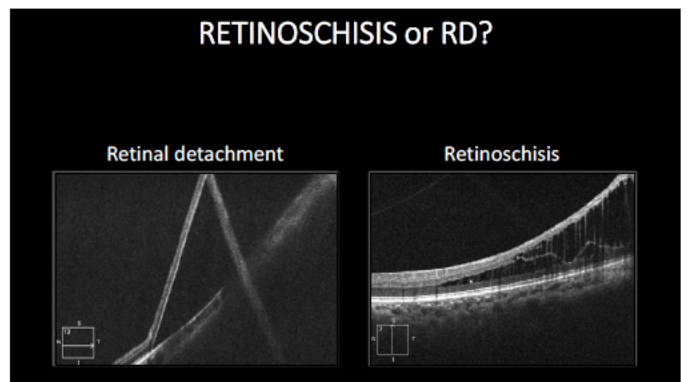
55



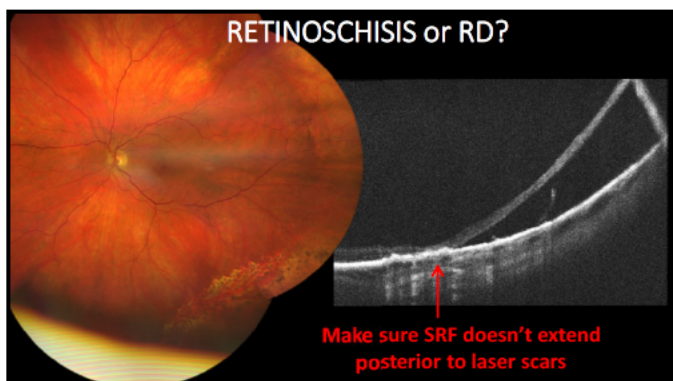
56



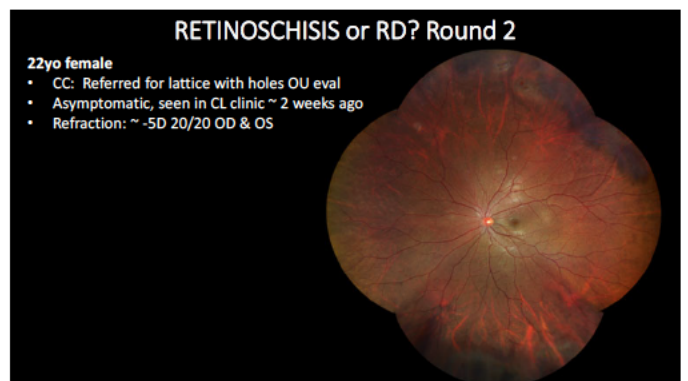
57



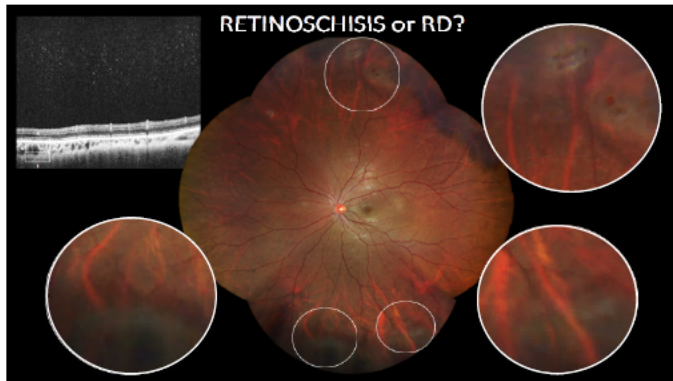
58



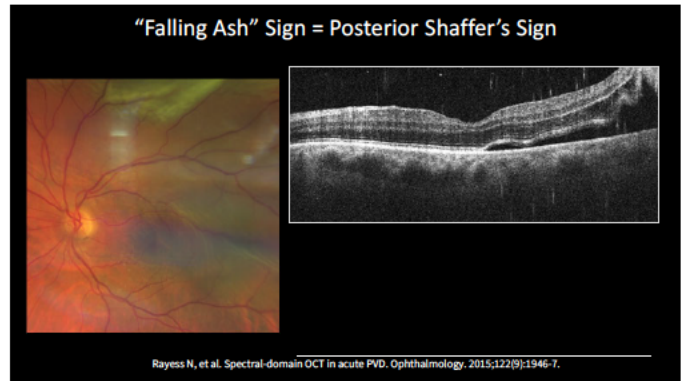
59



60



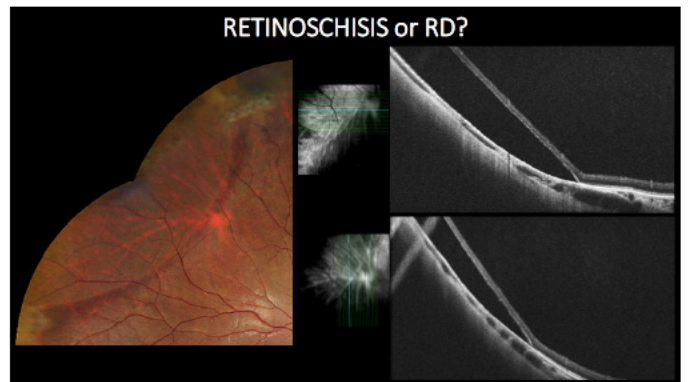
61



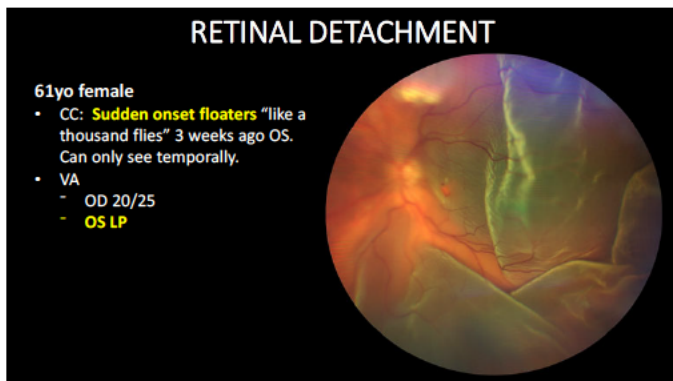
62



63

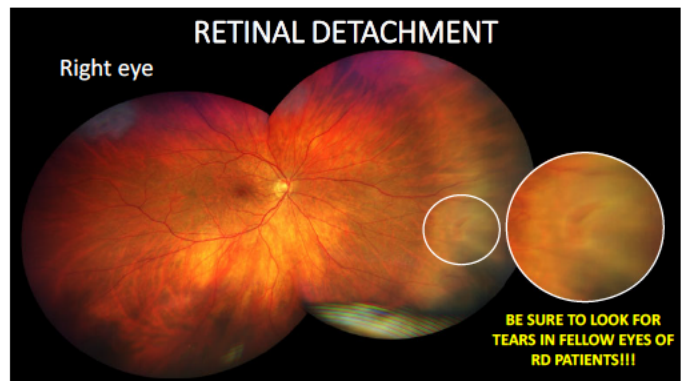


64



65

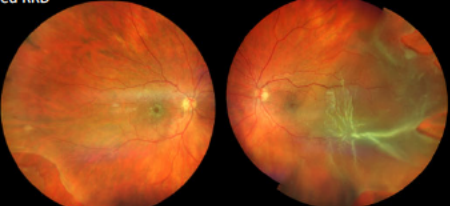
- 61yo female
- CC: **Sudden onset floaters** "like a thousand flies" 3 weeks ago OS. Can only see temporally.
 - VA
 - OD 20/25
 - **OS LP**



66

RETINAL DETACHMENT

- High incidence of asymptomatic retinal breaks (8.4%) and lattice (14.5%) in fellow eyes of RRD patients
- Fellow eye RD more common in pseudophakic and myopic patients
- Despite prophylactic barrier laser of fellow eye breaks, 5.8% of treated eyes still developed RRD




Mistry D, et al. The fellow eye in RD: findings from the Scottish RD Study. Br J Ophthalmol 2012.

67

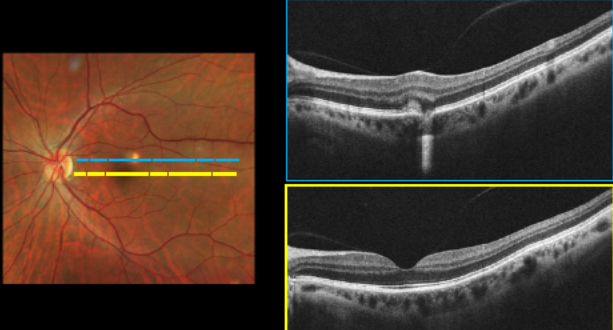
ACUTE ONSET METAMORPHOSIA

38yo Native American female

- CC: new onset floaters and slightly distorted vision OS x 3 days
- Oc Hx: LASIK OU 2010, pt reports there were "old scars" seen in the back of the eyes when she had LASIK done
- Med Hx: WNL
- BCVA :
 - OD: 20/20
 - OS: 20/25+2



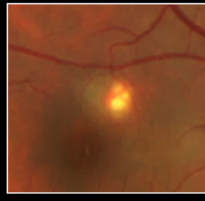
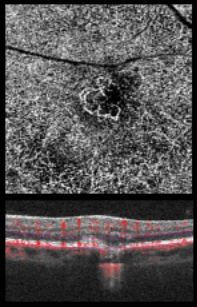
68



69

OD OCT Angiography 3x3mm Macula

Outer Retina Choriocapillaris (ORCC)

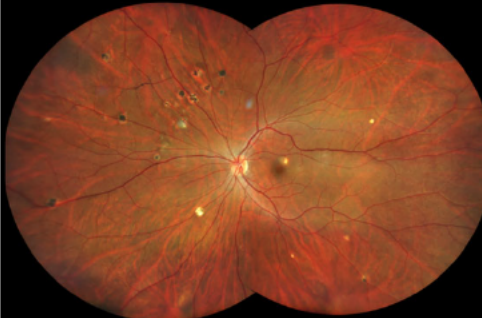



Why does a 38yo have macular CNV? 🤔

Myopic degeneration
 Trauma (choroidal rupture)
 POHS
 Angioid streaks
 Pachychoroid disease
 Past choroiditis
 Idiopathic

70

PRESUMED OCULAR HISTOPLASMOSIS SYNDROME (POHS)

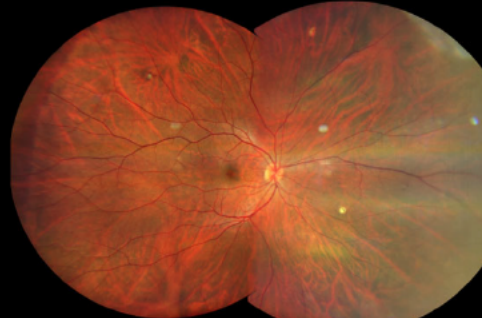


Clinical POHS Triad:

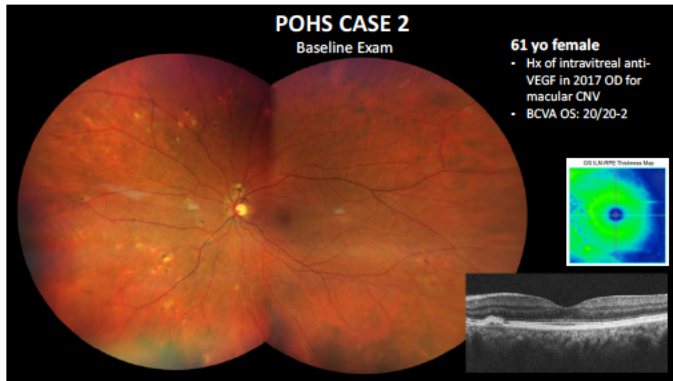
1. Histo spots: multiple atrophic "punched out" chorioretinal scars within the midperiphery/posterior pole
2. Peripapillary atrophy
3. Maculopathy: CNV & subretinal neo possible

71

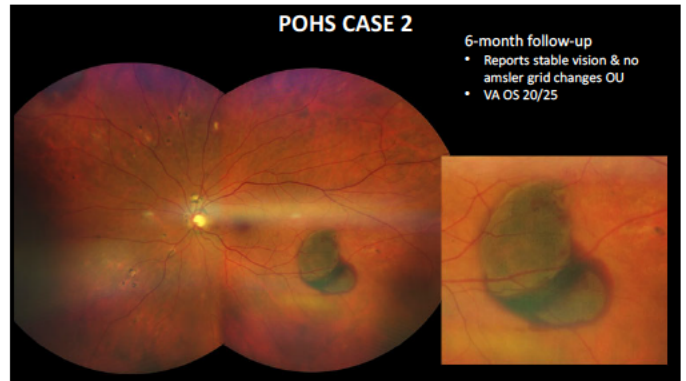
PRESUMED OCULAR HISTOPLASMOSIS SYNDROME (POHS)



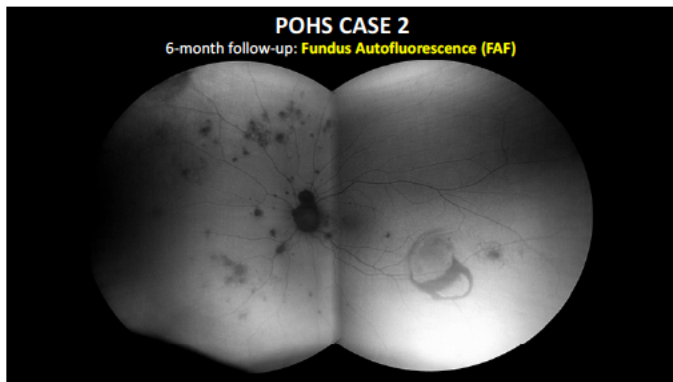
72



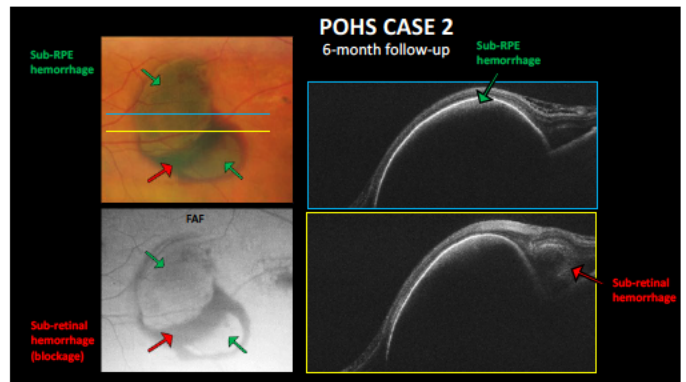
73



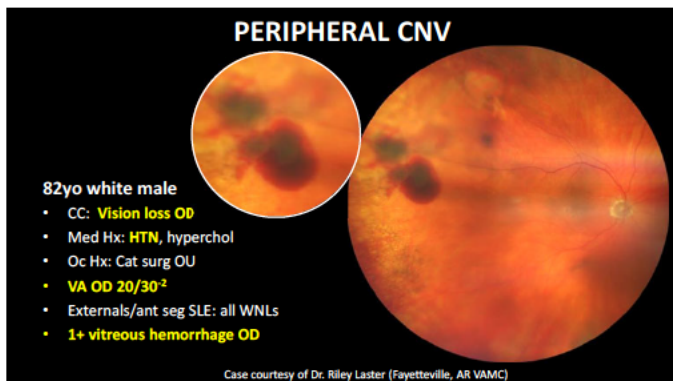
74



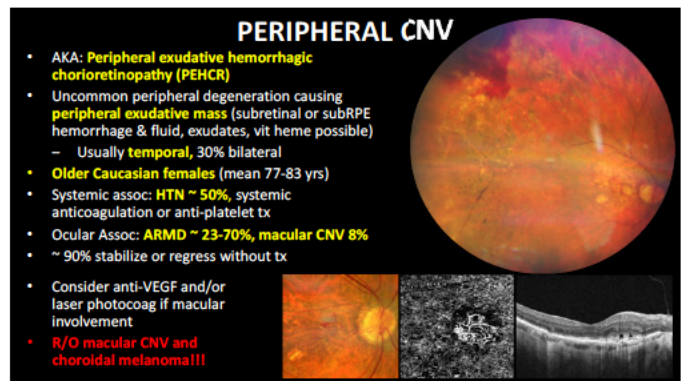
75



76



77



78

THE "TAKE HOME" MESSAGE

Diabetic Retinopathy

- Eyes with predominantly peripheral findings have a greater risk for DR progression and development of PDR
- OCT useful in the detection of retinal breaks and early tractional RD
- Montage OCTA useful in detection of early PDR and quantification of peripheral nonperfusion

Choroidal Tumors

- TFSOM
- FAF highlights subtle lipofuscin that increases risk for melanoma
- OCT useful in detection of fluid and measure thickness

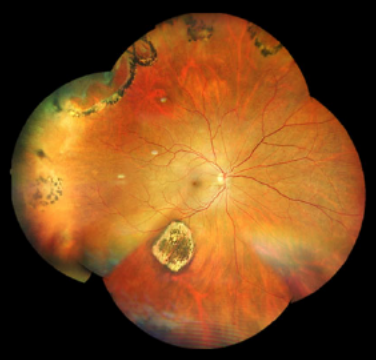

Peripheral lesions

- OCT useful to differentiate schisis from RD
- OCT useful to differentiate lamellar from full thickness breaks, and to monitor SRF surrounding breaks
- High risk for tears in fellow eyes of RRD patients

79

I ♥ UWF

Thank You!!!
Majcher@nsuok.edu



80