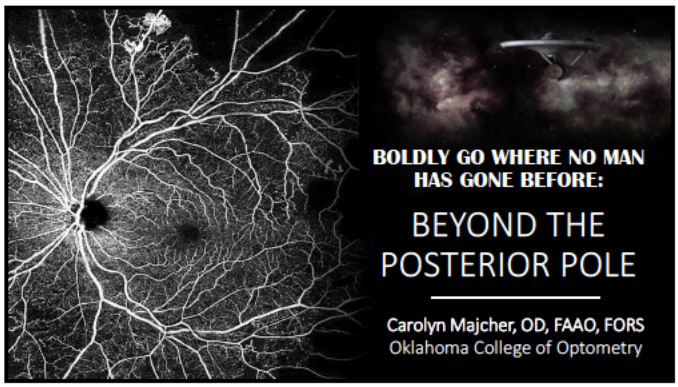
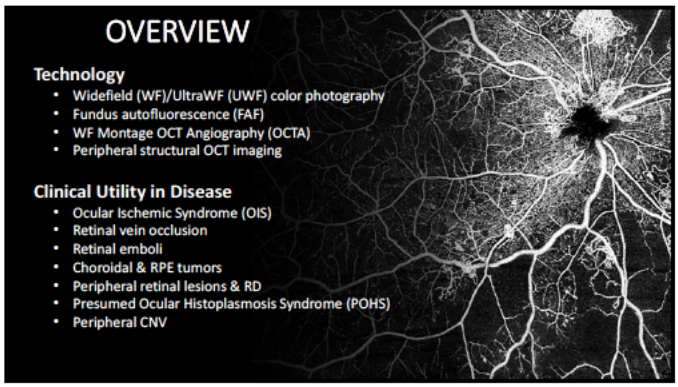

BOLDLY GO WHERE NO MAN HAS GONE BEFORE:
BEYOND THE POSTERIOR POLE
Carolyn Majcher, OD, FAAO, FORS
Oklahoma College of Optometry

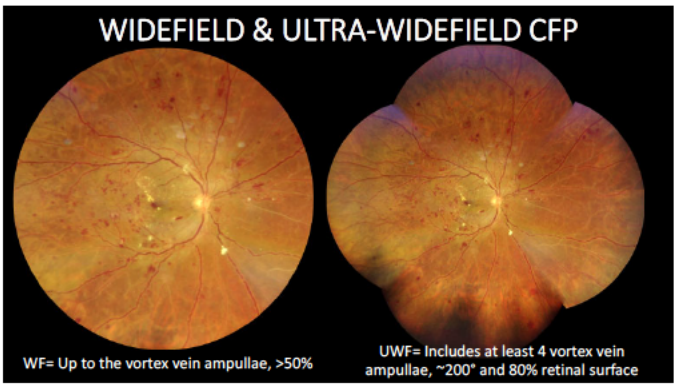
1

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
NSU OCO

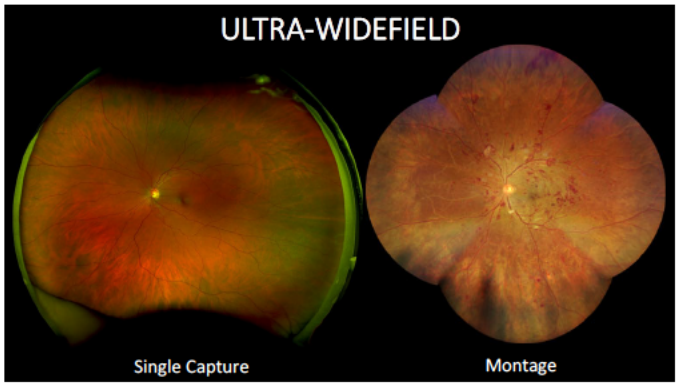
2


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

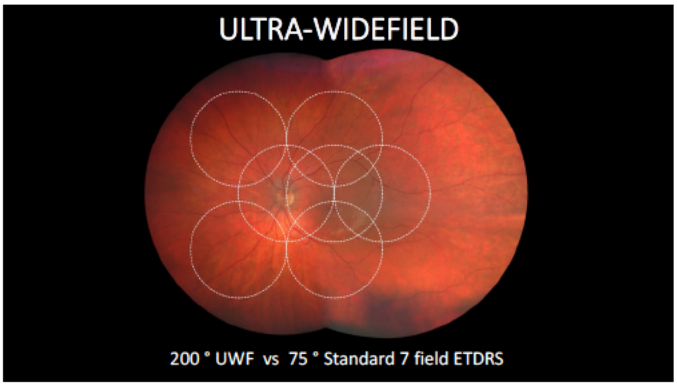
3


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

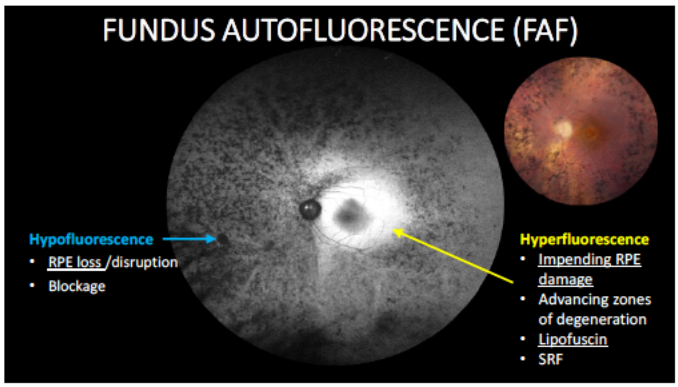
4


ULTRA-WIDEFIELD
Single Capture
Montage

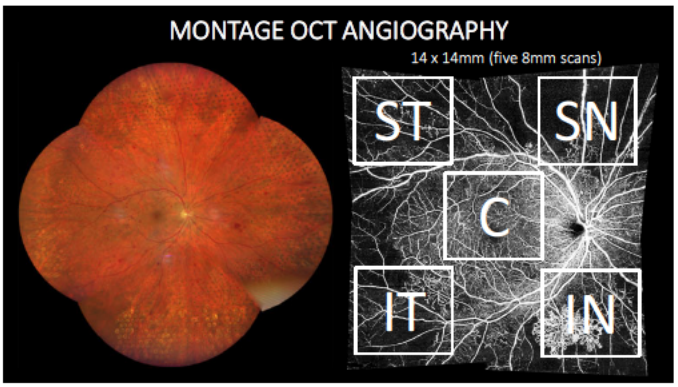
5


ULTRA-WIDEFIELD
200 ° UWF vs 75 ° Standard 7 field ETDRS

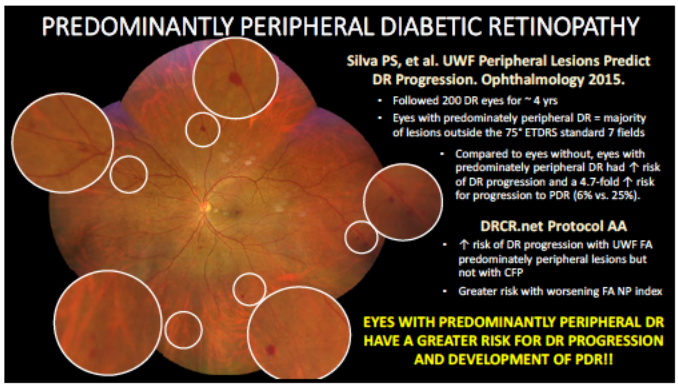
6


FUNDUS AUTOFLUORESCENCE (FAF)
Hypofluorescence
• RPE loss /disruption
• Blockage
Hyperfluorescence
• Impending RPE damage
• Advancing zones of degeneration
• Lipofuscin
• SRF

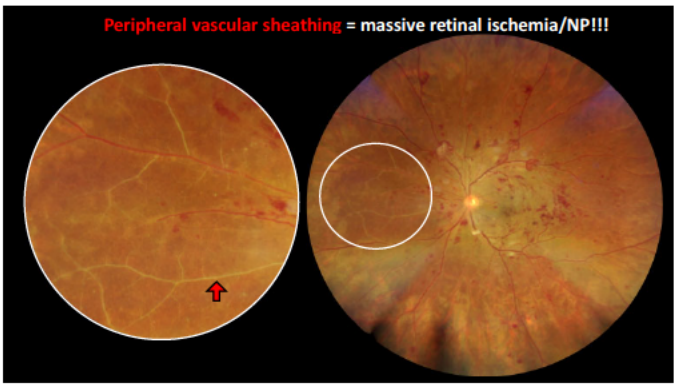
7


MONTAGE OCT ANGIOGRAPHY
14 x 14mm (five 8mm scans)
ST
SN
C
IT
IN

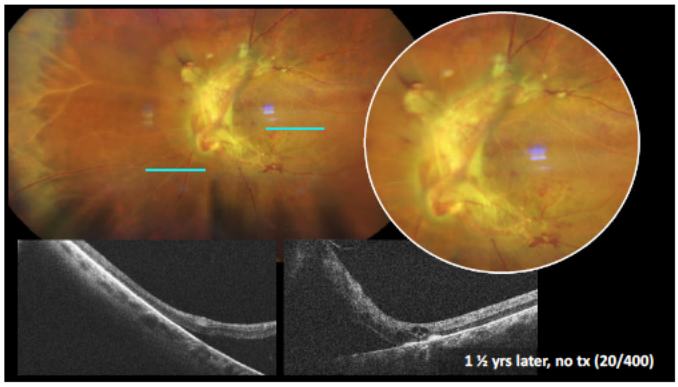
8


PREDOMINANTLY PERIPHERAL DIABETIC RETINOPATHY
Silva PS, et al. UWF Peripheral Lesions Predict DR Progression. Ophthalmology 2015.
• Followed 200 DR eyes for ~ 4 yrs
• Eyes with predominately peripheral DR = majority of lesions outside the 75° ETDRS standard 7 fields
• Compared to eyes without, eyes with predominately peripheral DR had ↑ risk of DR progression and a 4.7-fold ↑ risk for progression to PDR (6% vs. 25%).
DRCR.net Protocol AA
• ↑ risk of DR progression with UWF FA predominately peripheral lesions but not with CFP
• Greater risk with worsening FA NP index
EYES WITH PREDOMINANTLY PERIPHERAL DR HAVE A GREATER RISK FOR DR PROGRESSION AND DEVELOPMENT OF PDR!!

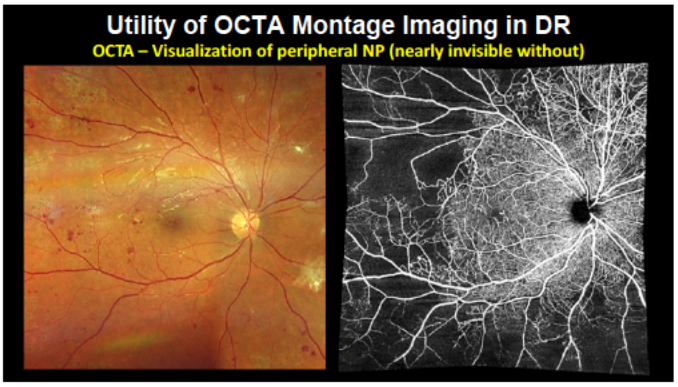
9


Peripheral vascular sheathing = massive retinal ischemia/NP!!!

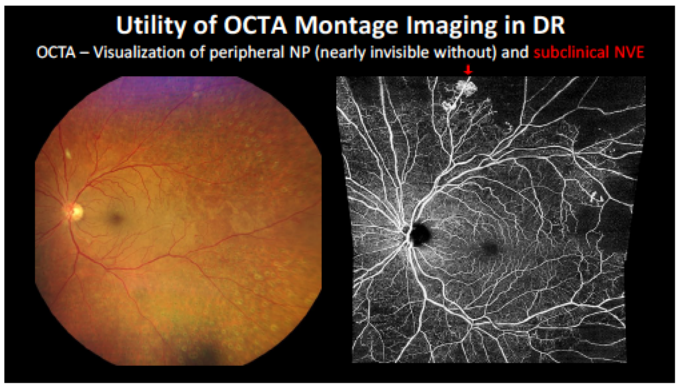
10


1 ½ yrs later, no tx (20/400)

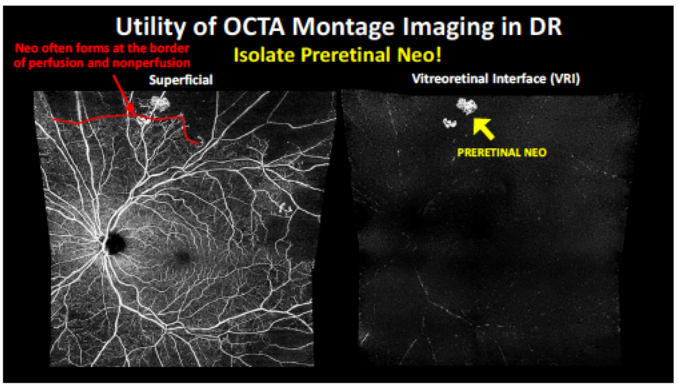
11


Utility of OCTA Montage Imaging in DR
OCTA – Visualization of peripheral NP (nearly invisible without)

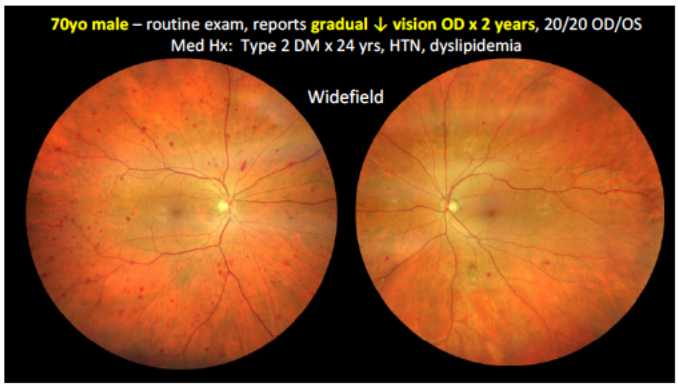
12



13



14



15

16

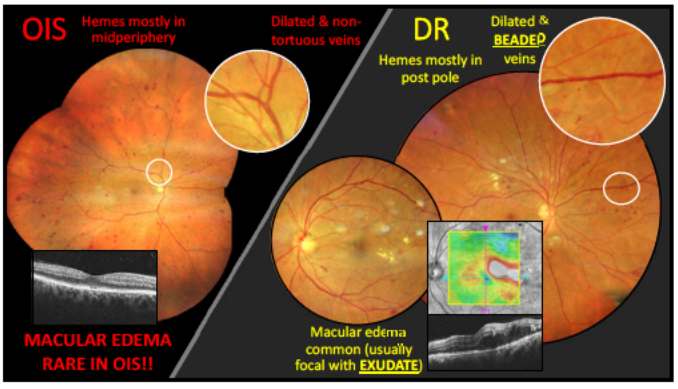
OCULAR ISCHEMIC SYNDROME

	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

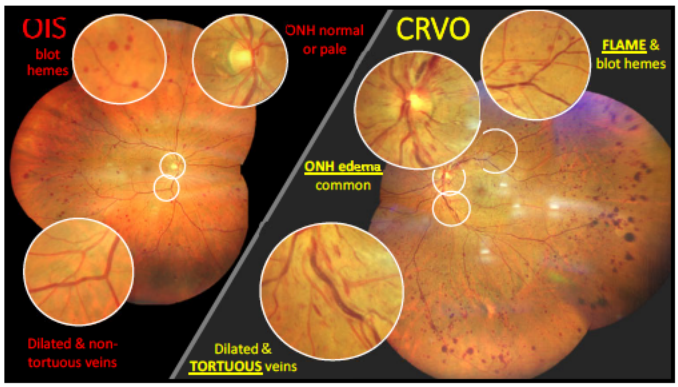
Why is the retinopathy so asymmetric??

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

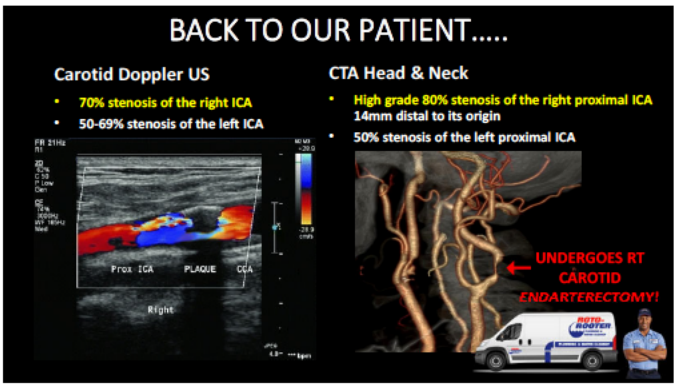
17



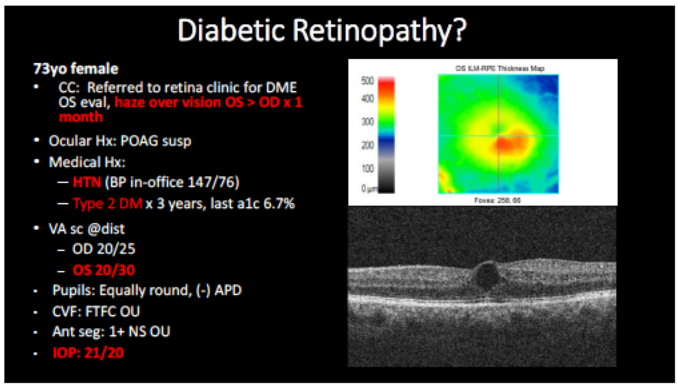
18



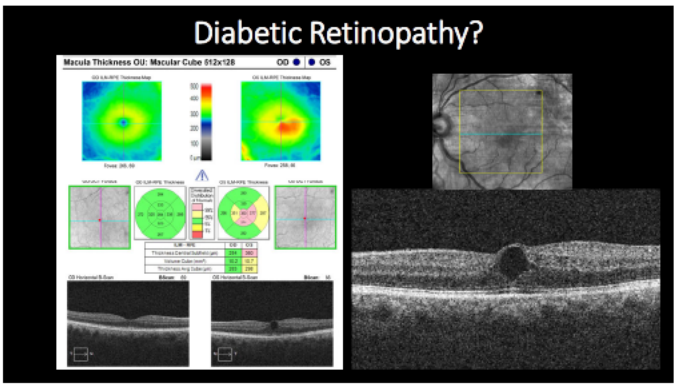
19



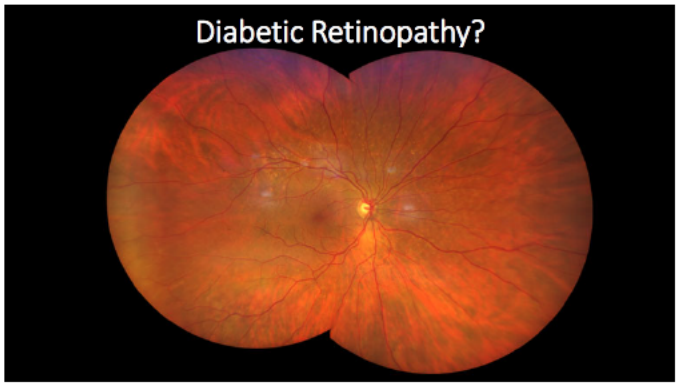
20



21



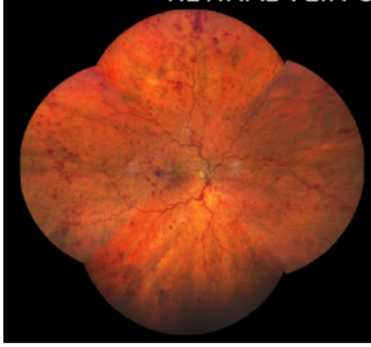
22



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

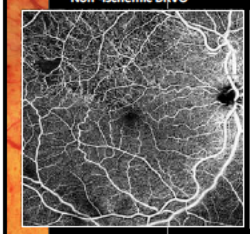
RETINAL VEIN OCCLUSION

Montage OCTA superficial

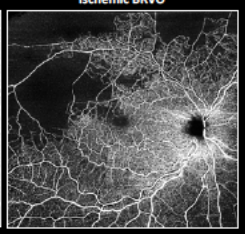
27

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

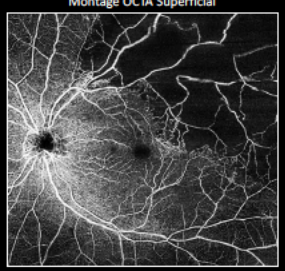
Predictive Value of Retinal NP!!!

BVOS 50/50/50 rule: ~ 50% of eyes with ischemic BRVO will develop NVD/NVE

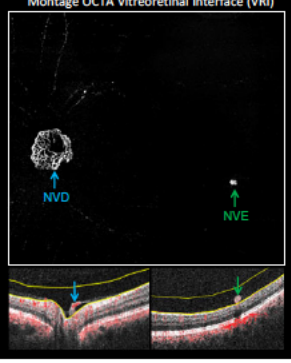
Branch Vein Occlusion Study Grp. Argon laser scatter photocoagulation for prevention of neovascularization and vit heme in BVO. A RCT. Arch Ophthalmol. 1986.

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 retinochoroiditis or retinal vasculitis: sarcoid, syphilis, SLE, TB, lyme, AIDS/CMV

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

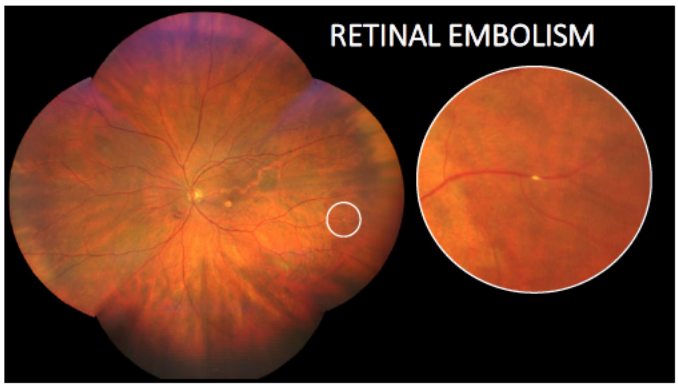
Hypercoagulable states and thrombophilia: factor V Leiden, hyperhomocysteinemia, protein C deficiency, antithrombin III , activated protein C resistance, sickle cell, antiphospholipid syndrome, anticardiolipin antibodies

Abnormal platelet function

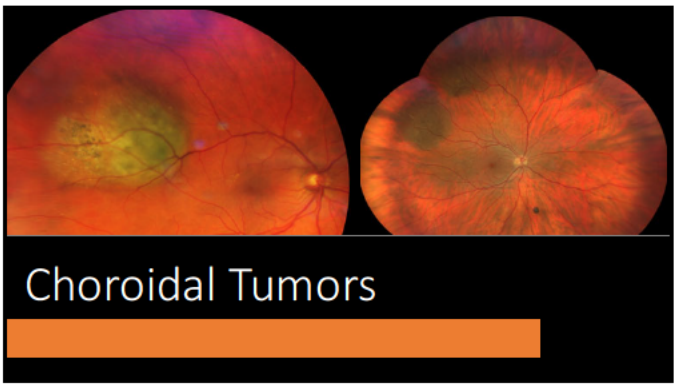
Oral contraceptive/diuretic use

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.

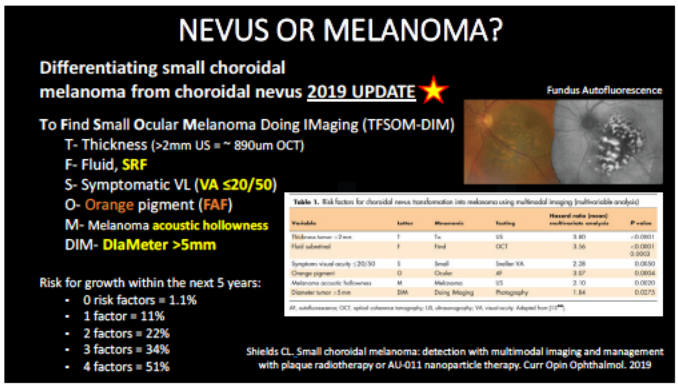
30



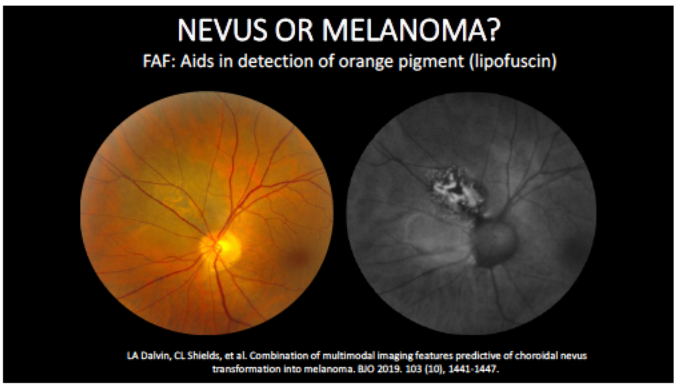
31



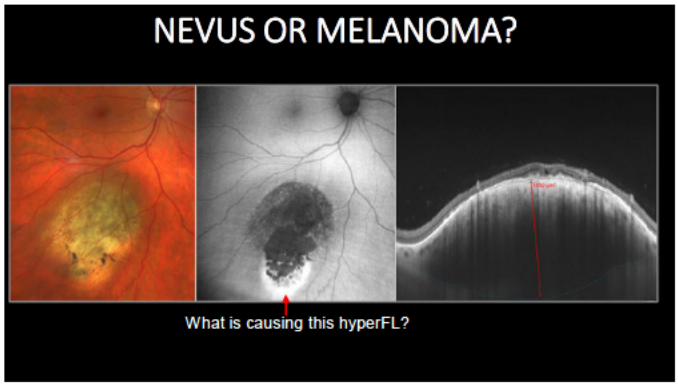
32



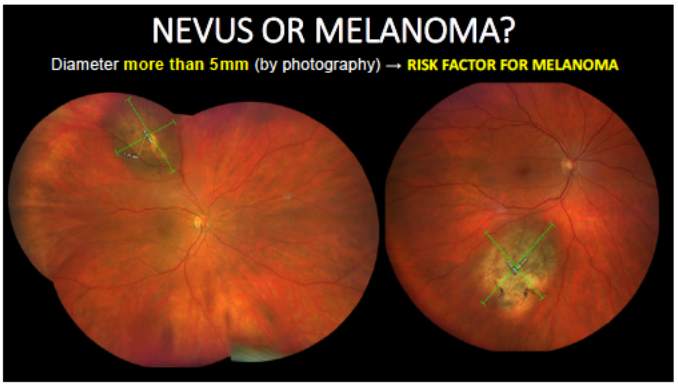
33



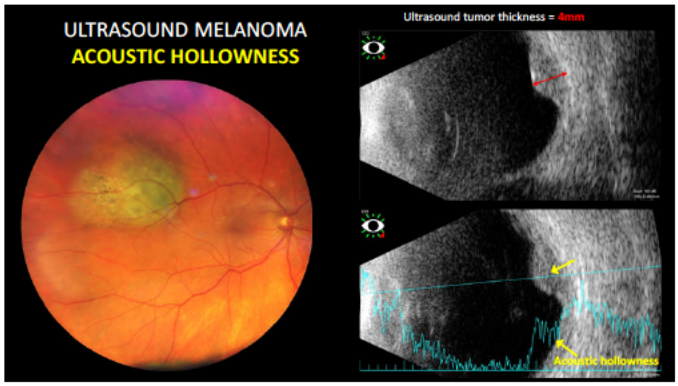
34



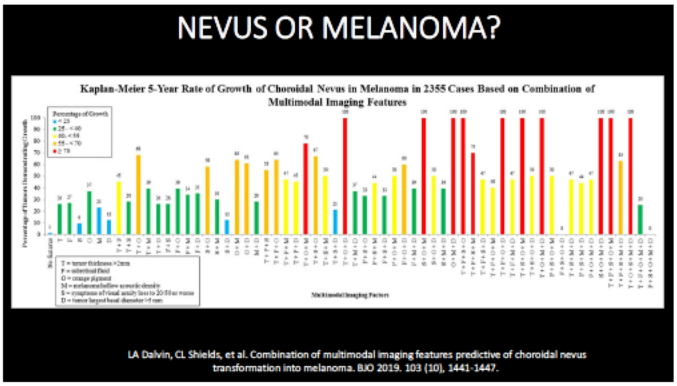
35



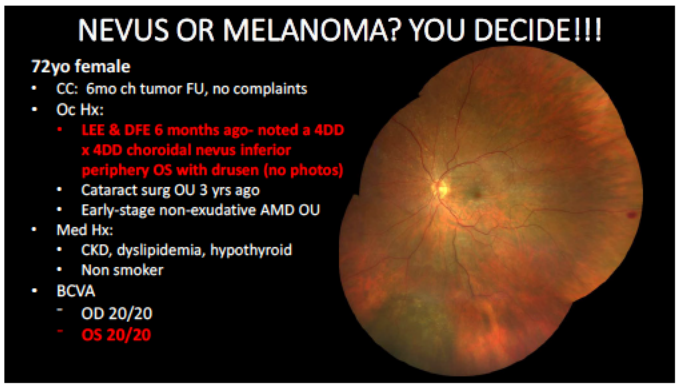
36



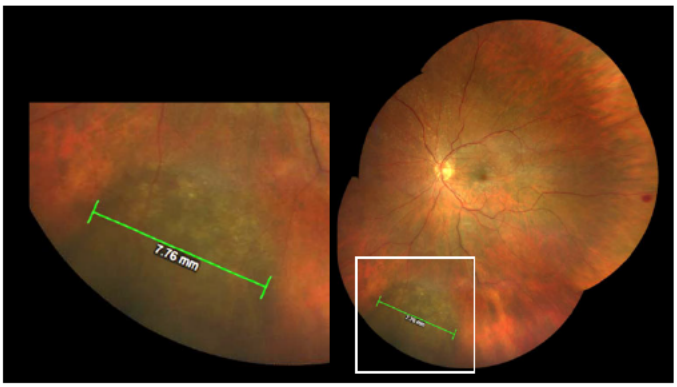
37



38

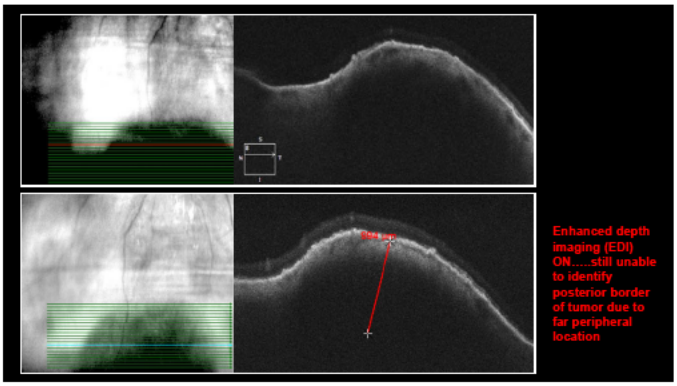


39

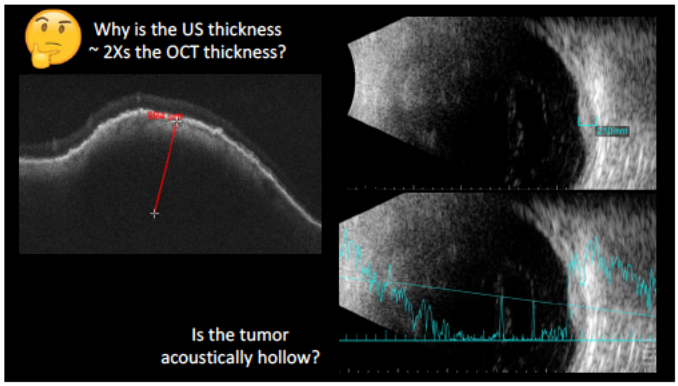


40

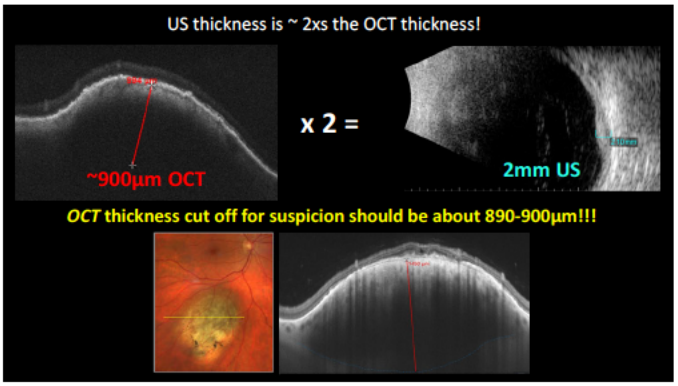
41



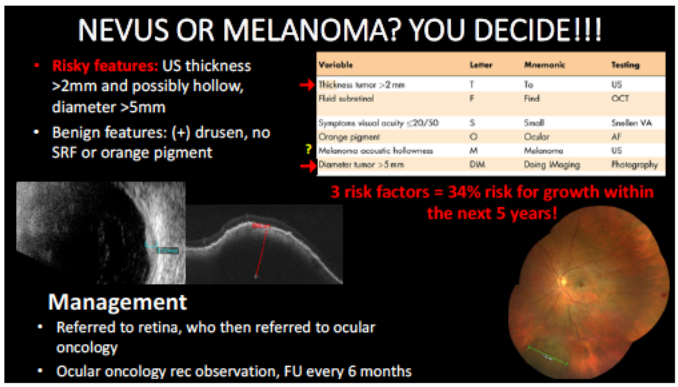
42



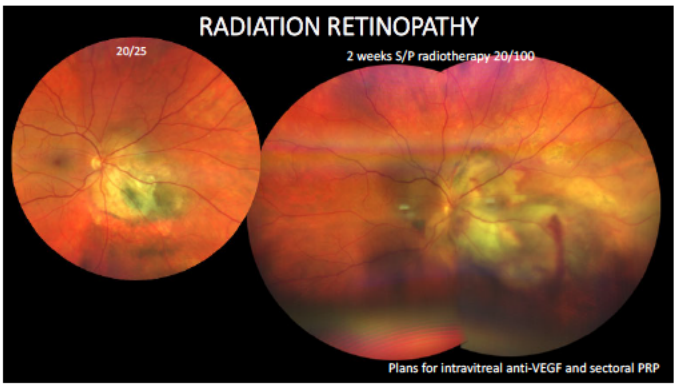
43



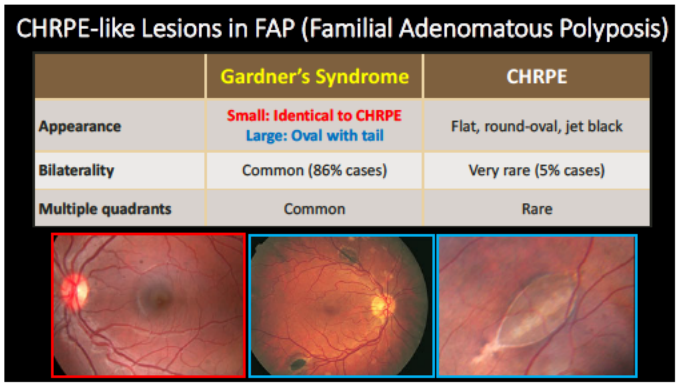
44



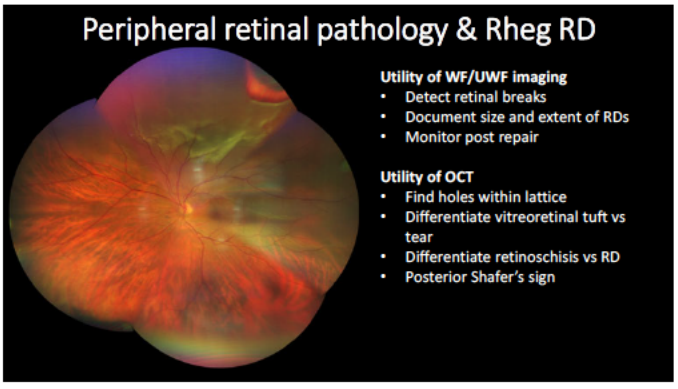
45



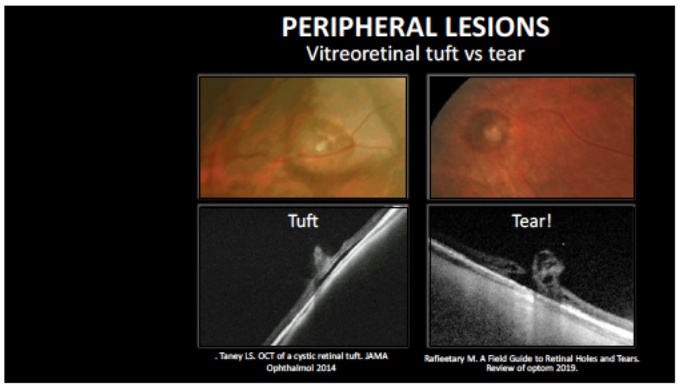
46



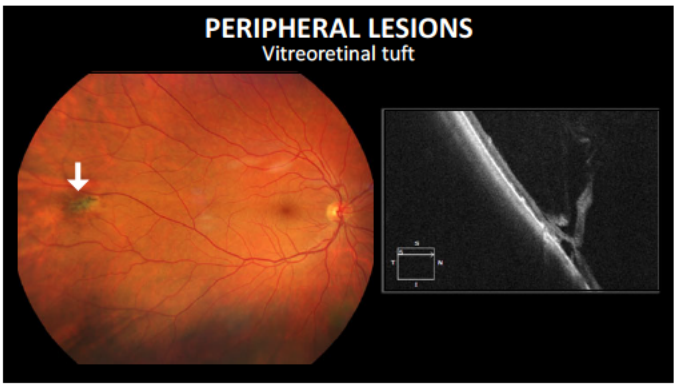
47



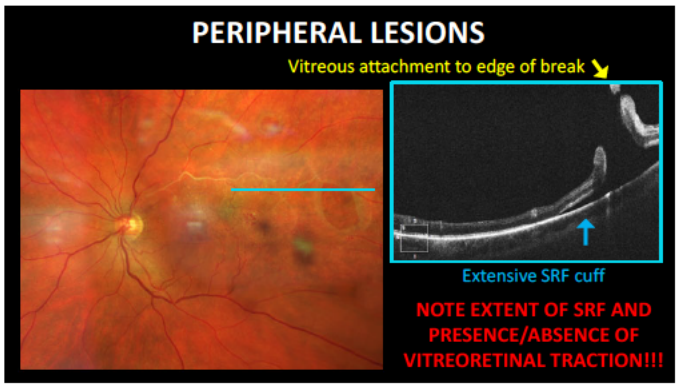
48



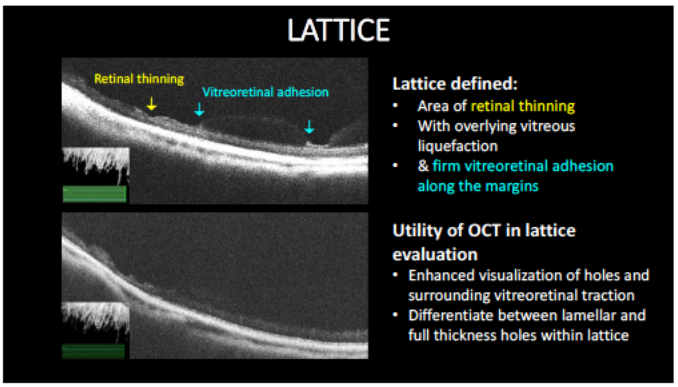
49



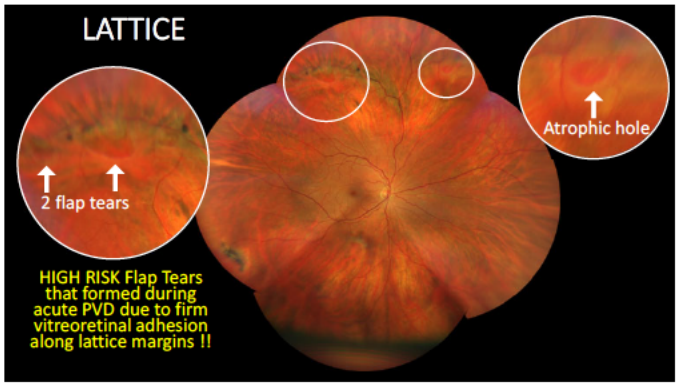
50



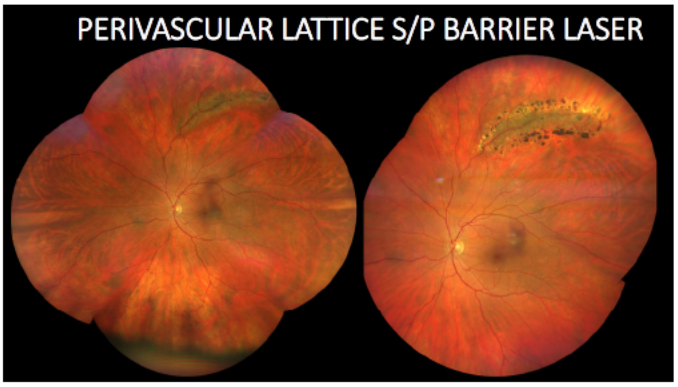
51



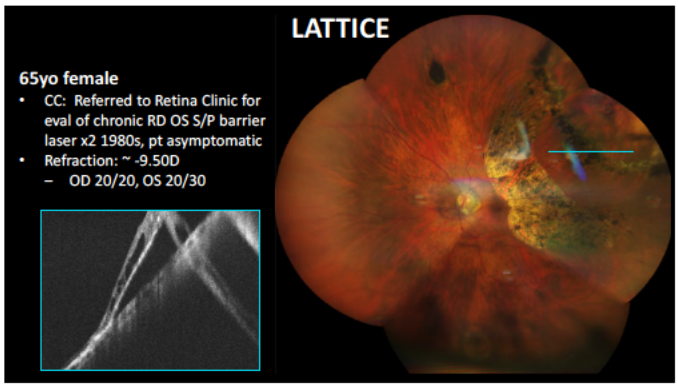
52



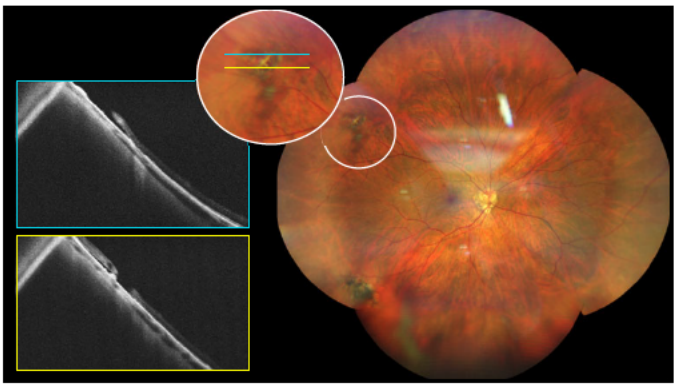
53



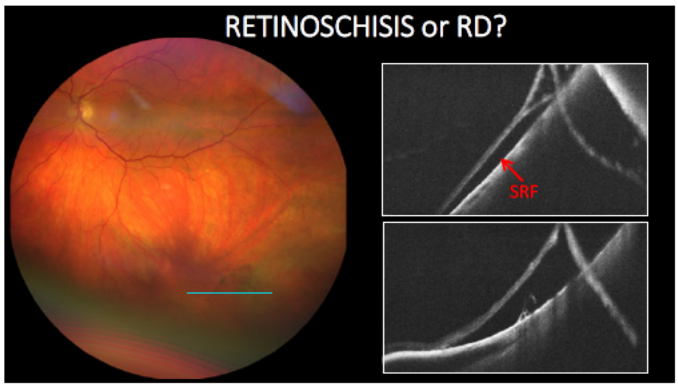
54



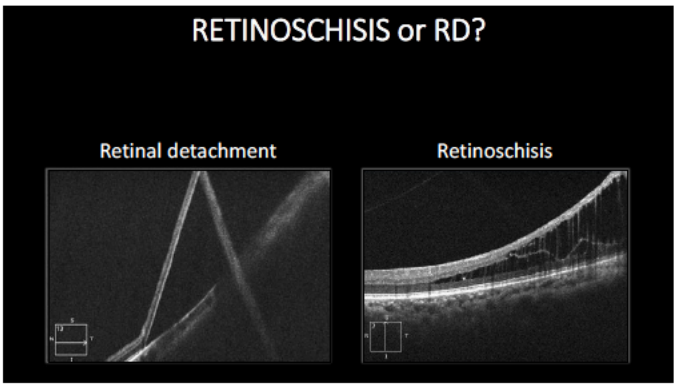
55



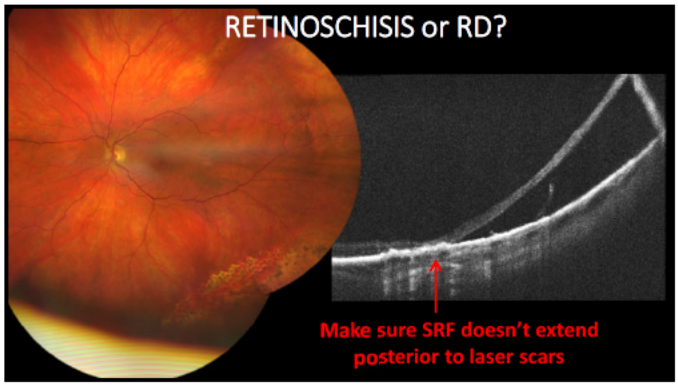
56



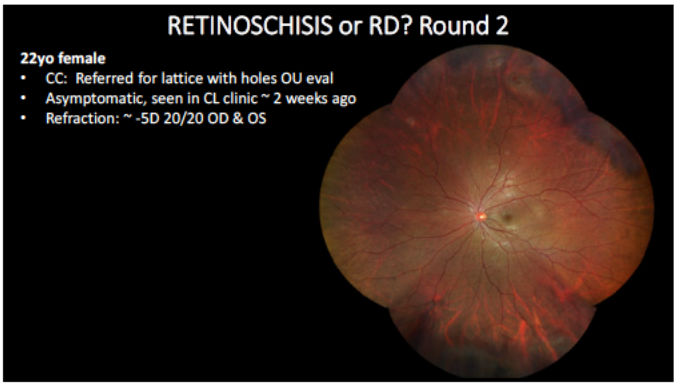
57



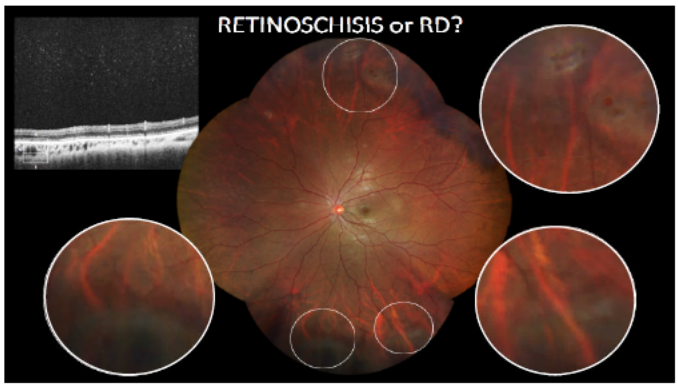
58



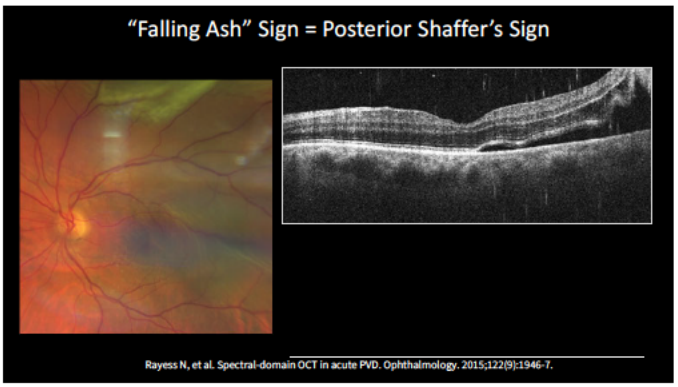
59



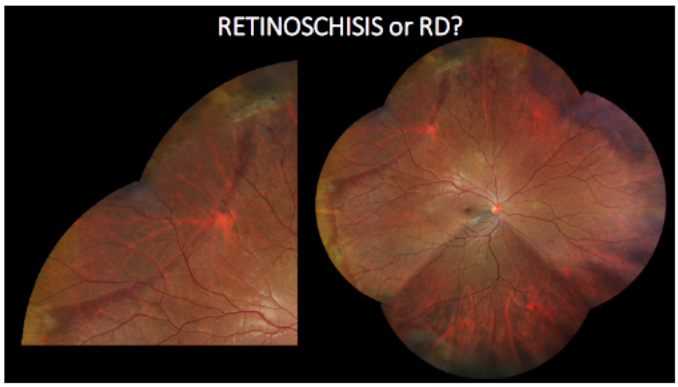
60



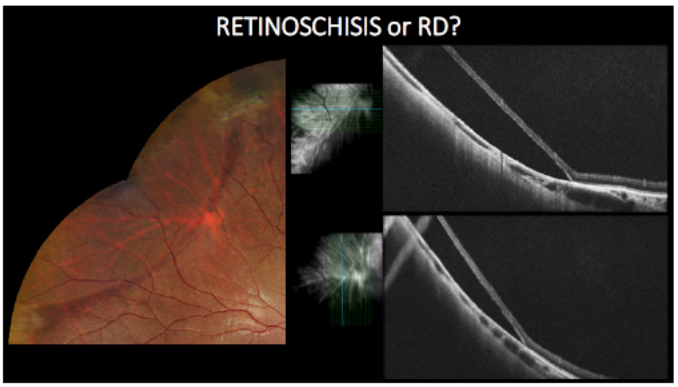
61



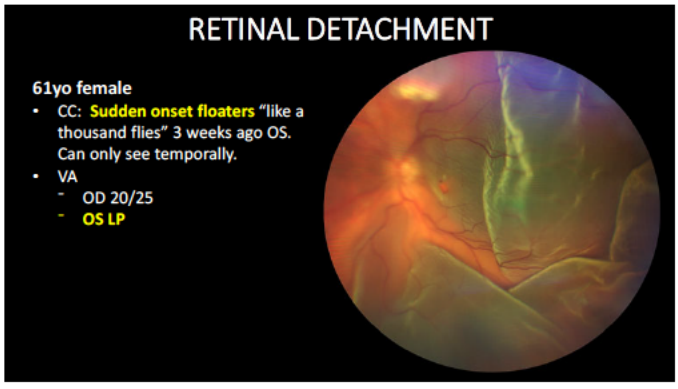
62



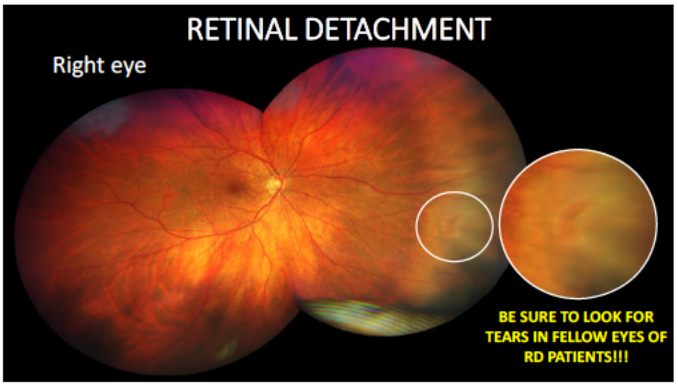
63



64



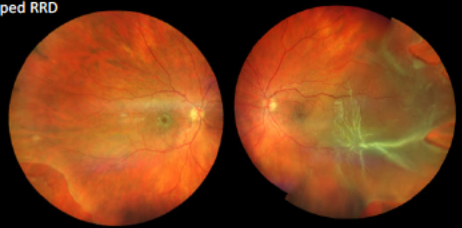
65



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



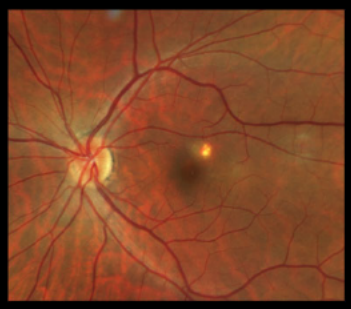
Mitry D, et al. The fellow eye in RD: findings from the Scottish RD Study. Br J Ophthalmol 2012.

67

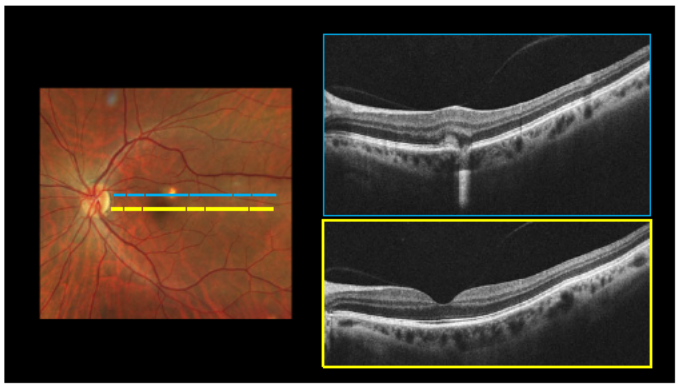
ACUTE ONSET METAMORPHOPSIA

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



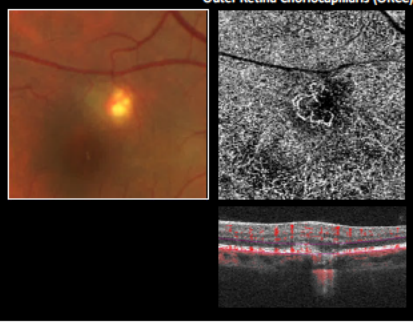
68



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

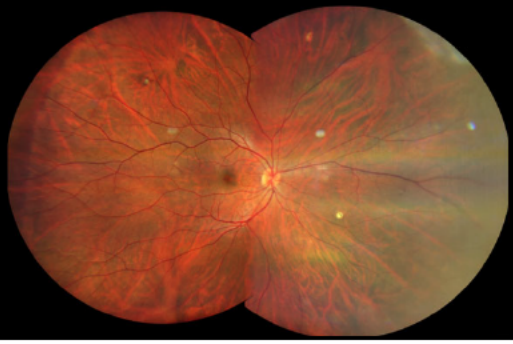
PRESUMED OCULAR HISTOPLASMOSIS SYNDROME (POHS)

Clinical POHS Triad:

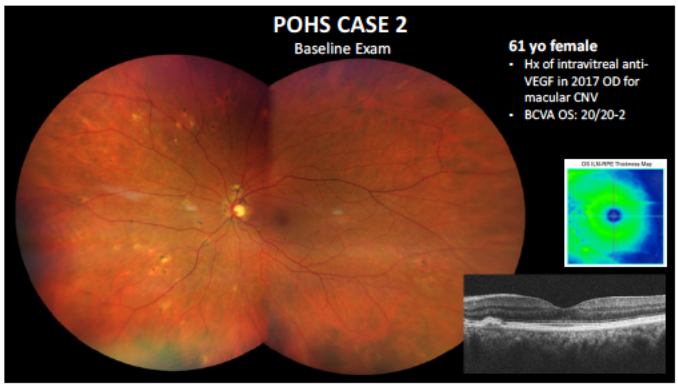
1. Histo spots: multiple atrophic "punched out" chorioretinal scars within the midperiphery/ posterior pole
2. Peripapillary atrophy
3. Maculopathy: CNV & subretinal neo possible

71

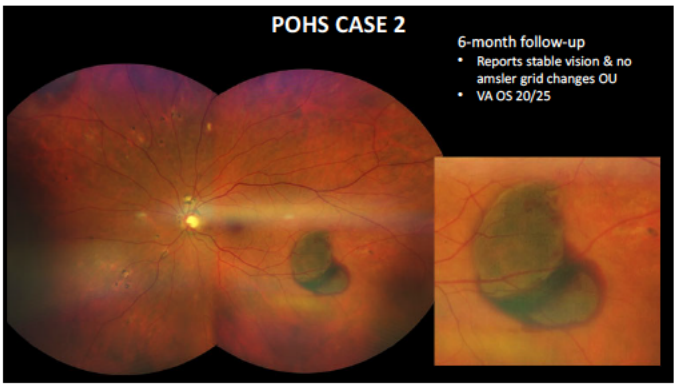
PRESUMED OCULAR HISTOPLASMOSIS SYNDROME (POHS)



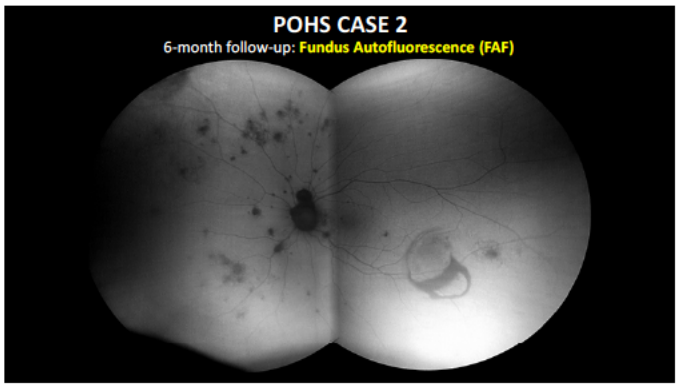
72



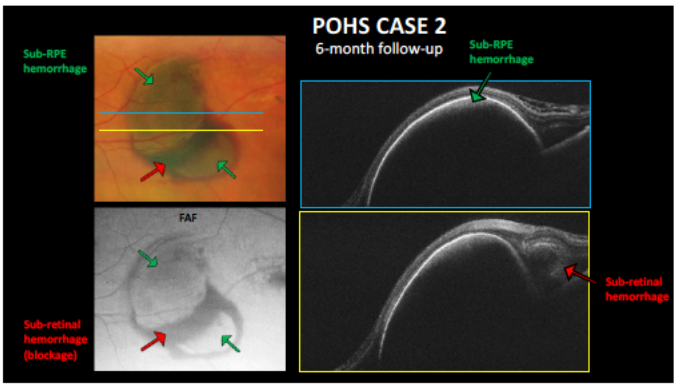
73



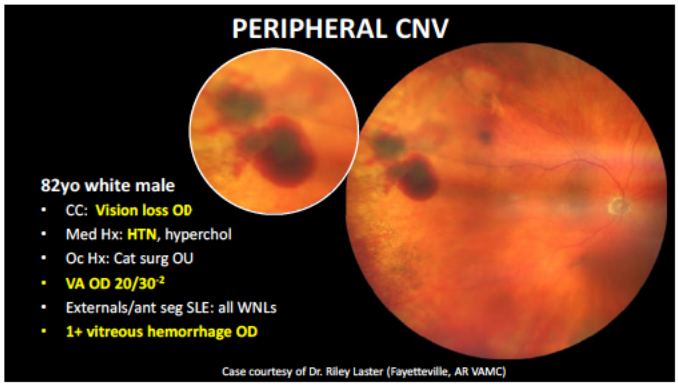
74



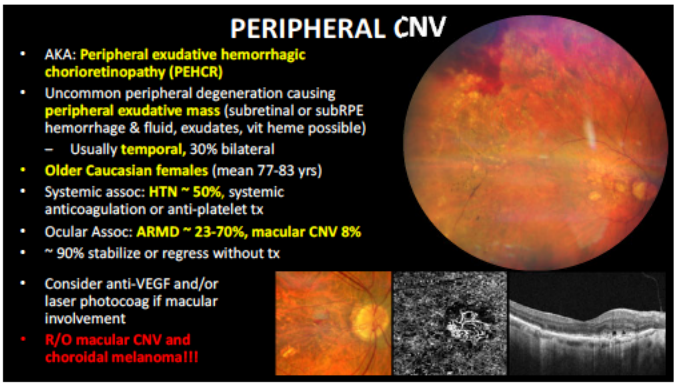
75



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

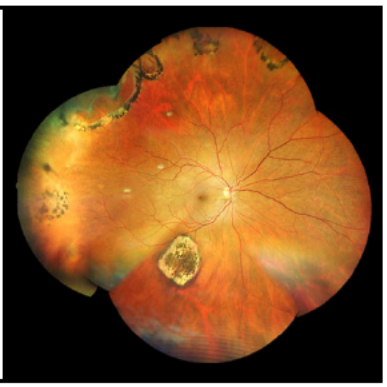
Peripheral lesions
- OCT useful to differentiate schisis from RD
- OCT useful to differentiate lamellar from full thickness breaks, and to monitor SRF surrounding breaks
- High risk for tears in fellow eyes of RRD patients

79

I ♥ UWF

Thank You!!!
Majcher@nsuok.edu

NSU OCO



80