Lessons Learned From Larry Honoring a Giant

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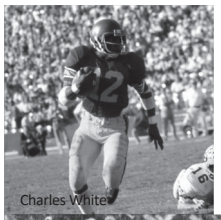
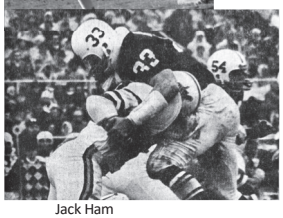
Disclosures – Leo Semes, OD, FAAO

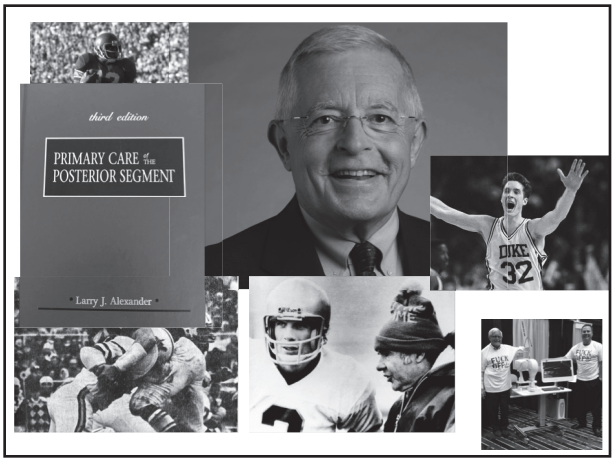
Commercial Interest	Nature of Relevant Financial Relationship	
Maculogix	Honorarium	Speaker
Science Based Health	Honorarium	Speaker
OptoVue	Honorarium	Speaker
B&L	Honorarium	Advisor
Allergan	Honorarium	Advisor
Regneneron	Honorarium	Speaker
Shire	Honorarium	Speaker
ZeaVision	Honorarium	Advisor
Reichert/Ametek	Honorarium	Speaker
HPO	Stock options	Advisor

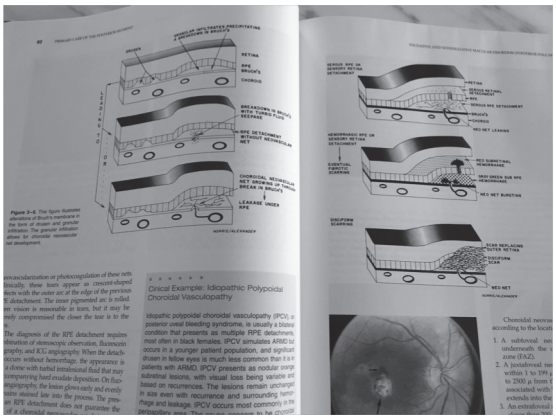

Charles White

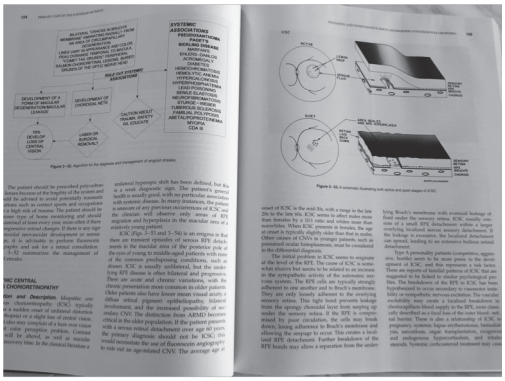

Joe Montana


Jack Ham

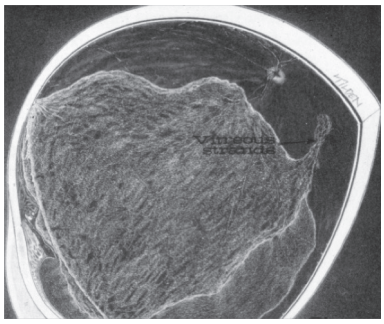
Bobby Hurley







PVD w/ continued macular traction – clinical translation



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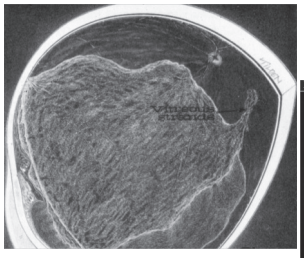
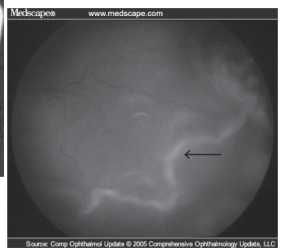
PVD w/ continued macular traction – clinical translation





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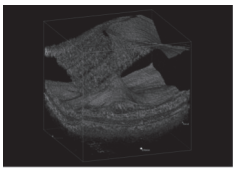
Optical Coherence Tomography Image / data acquisition

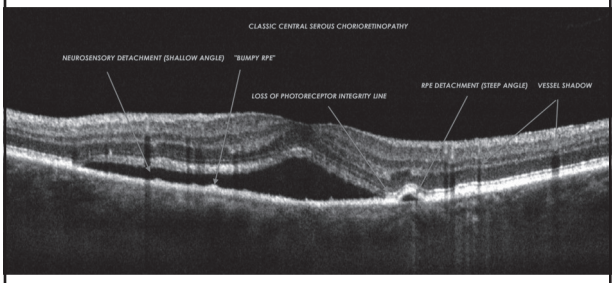
- Time domain
  - A-scans make up the B-scan that is represented as X-sect sampling
  - Resolution approaching that of excisional biopsy and histopathology (~ 10 microns)
- Fourier or Spectral domain
  - Resolution 3- 5 microns

Optical Coherence Tomography Image / data acquisition

- Fourier or Spectral domain
  - Resolution 3- 5 microns
  - Volumetric data enables non-invasive depth-resolved functional imaging

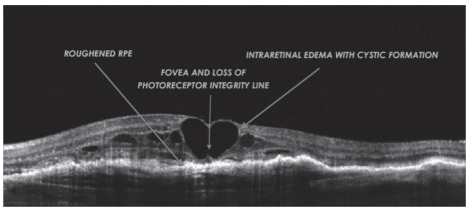


Neurosensory Detachment / Central Serous Retinopathy (CSR)



Applied *in vivo* Clinical Histology I

A Better Way to Look at Retinal Disease



Larry J Alexander, OD FAAO

Larry was famous for

- "FLMs"
- "FLDs"

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- Funny-looking maculas
- Funny-looking discs

Larry was famous for

- "FLMs"
- "FLDs"

- Funny-looking maculas
- Funny-looking discs

- "Look for changes in color and contour."

- "Do both eyes look like they belong to the same person?"

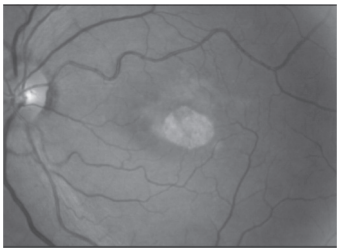
FUNNY LOOKING MACULAS

PL; Dx: CSR (OS, 20/30) 1982

now mac hole and GA

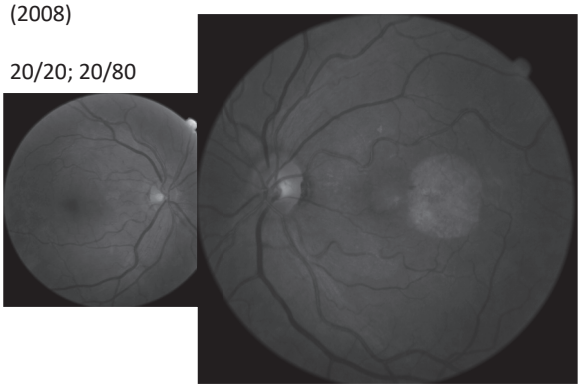
(1998)

20/60



(2008)

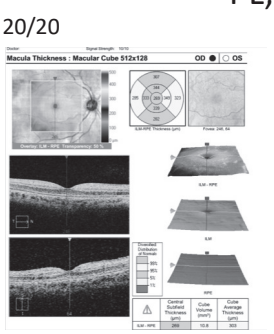
20/20; 20/80

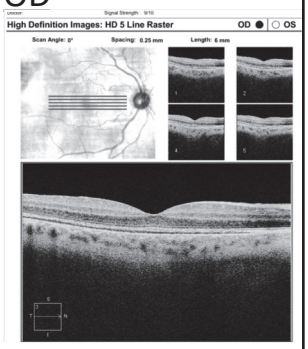


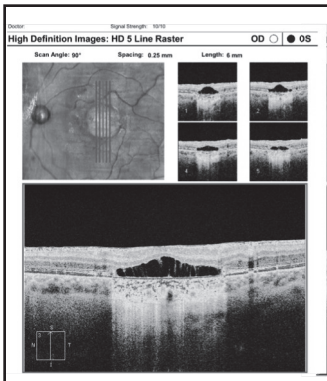
(2012)

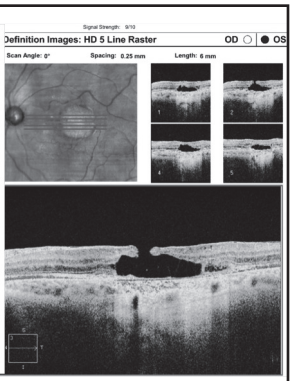
PL; OD

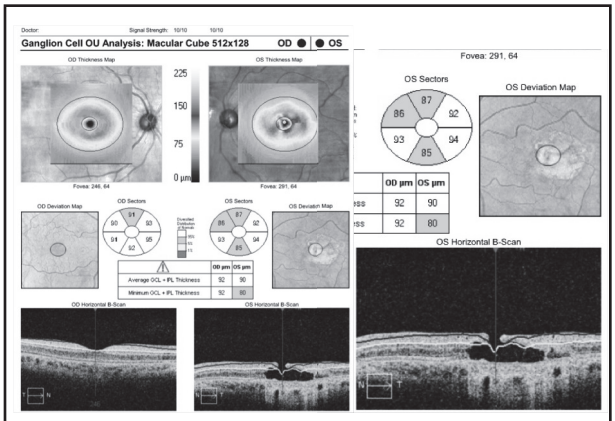
20/20

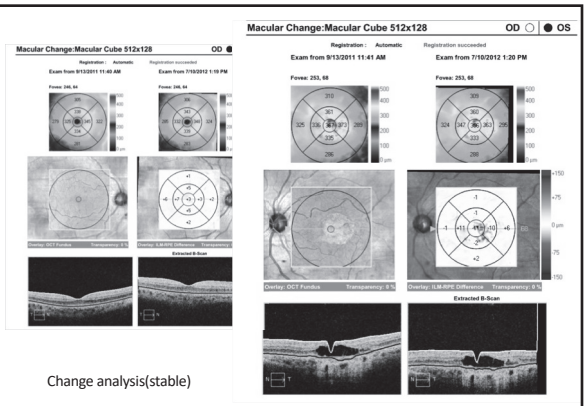












Change analysis(stable)

Note how the instrument is "fooled" OS

- "…central serous is not an innocuous disease."

- R. Morris, MD (c. 1982)

("Retinologist")

JP

Let's look at an acute case

46 Asian Male

- "blurry vision" 11/20/2012
  - X 3 mo OS; began only last night OD
- Began new BP med last week
- Has never had eye exam
- Central blur in OS has improved somewhat
- + floaters X 1 yr
- - flashes, discharge, pain

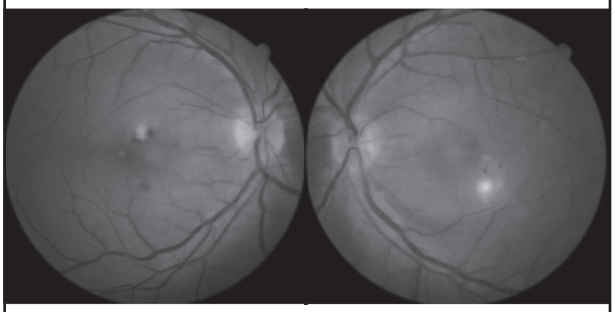
46 Asian Male

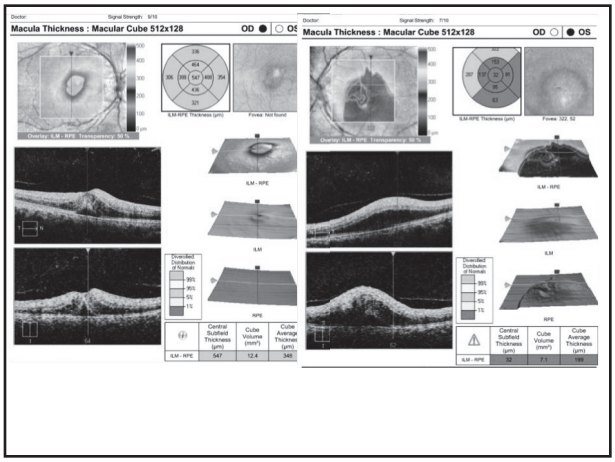
- Previous ocular history is negative for refractive correction, injury, glaucoma, cataract, strabismus, amblyopia, etc.
- Family medical / ocular histories negative
- No known allergies
- Began lisinopril qD X 1 wk. [ACE inhibitor]
- BP 150/100

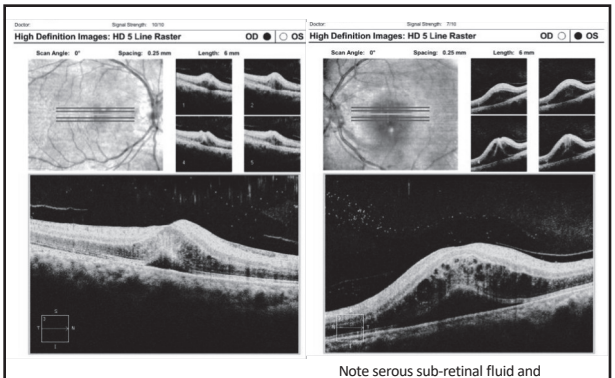
46 Asian Male

- VA 20/40- 20/400 (PHNI)
- -RAPD
- IOP: 14/14
- No EOM restrictions
- Confrontation FTFC OD, OS
- -1.50 / -2.25 -0.50 X 070 VA NI
- Anterior segment unremarkable OD, OS

11/20/12

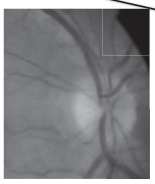




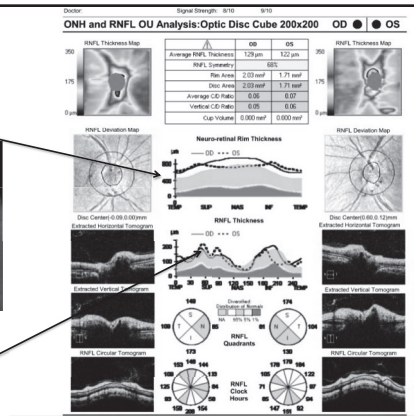


Note serous sub-retinal fluid and cystic macula

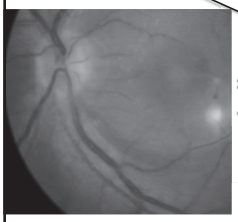
Note disc margin elevation

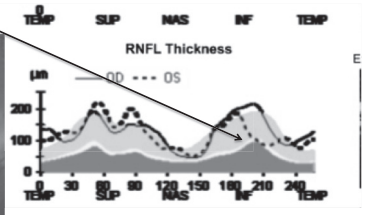


And CWS



And RNFL defect (OS)





46 A M with CSR, HR

- Initiated Nevanac bid (11/20/12)
- RTC X 1 wk
- Correspond with PCP

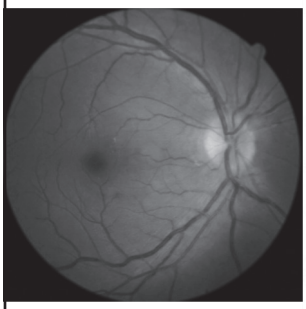
- @ 1- wk F/U (11/27/12)
- BP = 138/92
- VA 20/25 , 20/40 !!!
  - (-1.00 / -0.75 – 0.50 X 070)
- Continue Nevanac bid

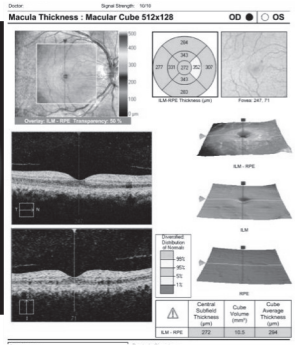
46 A M with CSR, HR

- Initiated Nevanac bid (11/20/12)

- @ 2- wk F/U (12/4/12)
- BP = 140/92
- VA 20/20- , 20/20- !!!
  - (refraction unchanged)
- Continue Nevanac bid
- RTC X 1 Wk

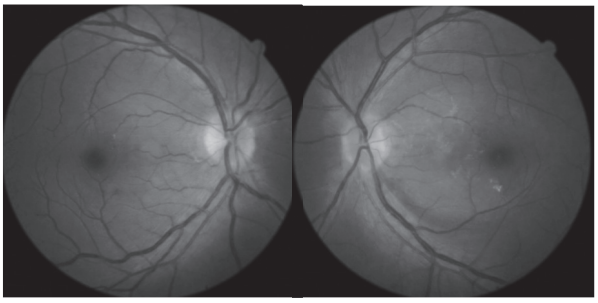
12/11/12





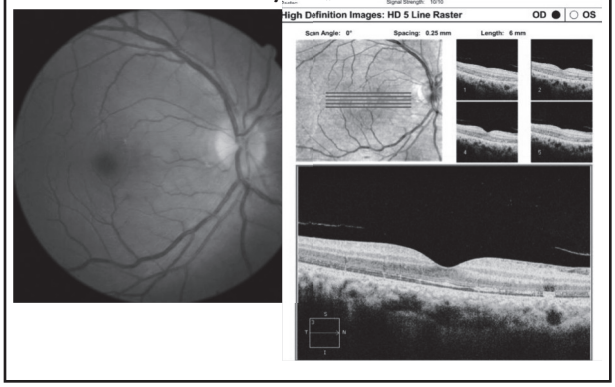
D/C Nevanac

12/11/12

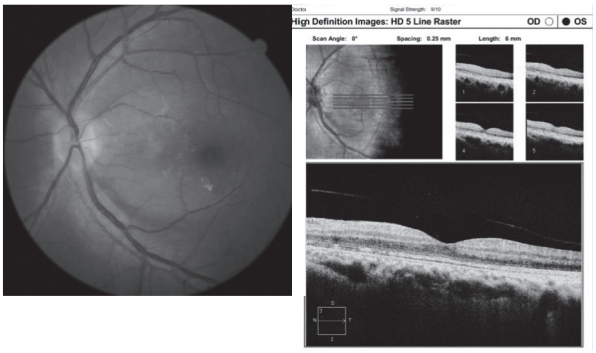


D/C Nevanac

12/11/12



12/11/12



CSR

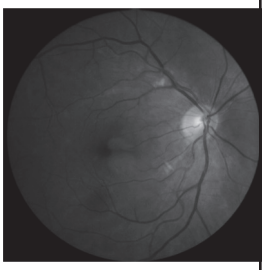
- Questions
- Comments

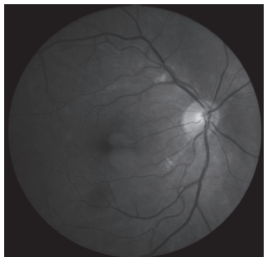
46 W F (case shared by Dr. H. Benavides)

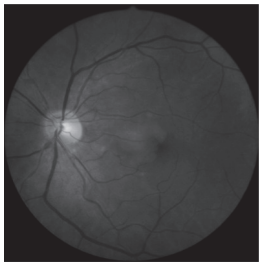
- C/O "central blindness" both eyes
- Released from hospital
  - Acute pancreatitis
  - Dyslipidemia
  - Uncontrolled systemic hypertension
  - Suspected to be 2^0 to alcohol abuse

46 W F "central blindness"

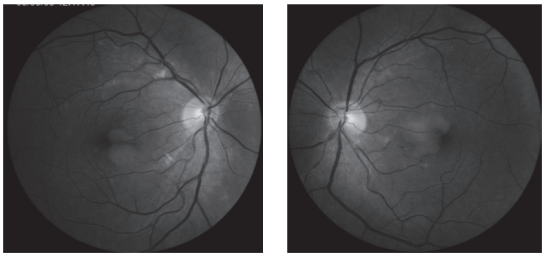
- BSCVA: 20/25(OD) 20/30 (OS) [EV]
- Pertinent lab results
  - Triglycerides > 4000
  - CBC w/diff, ESR, CRP (WNL)
  - Fundi showed cotton wool spots



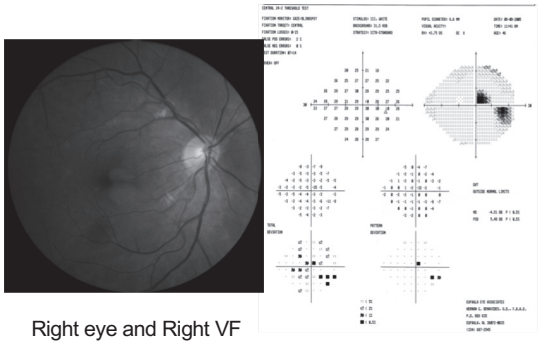




- The optic discs are unaffected
- The foveal reflex is absent
- There is evidence of disruption at the level of the nerve fiber layer that is more evident in the right eye

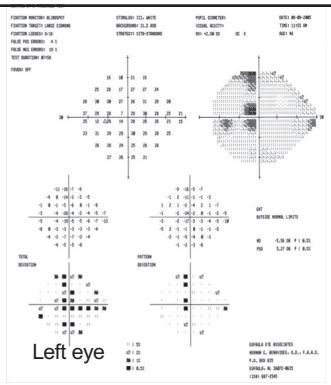


Red-free images of the right and left eyes enhances infarcts of the nerve fiber layer.

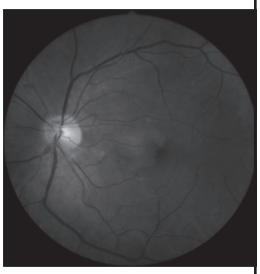


Right eye and Right VF

Notice the deep central depression.

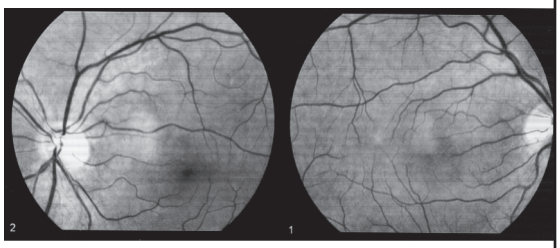


Left eye

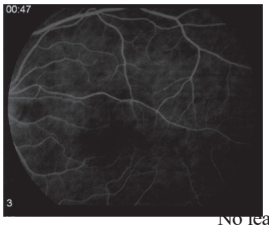


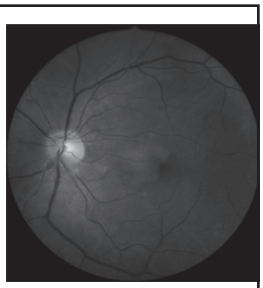
Notice the deep central depression.

FA study – Red Free



FA study

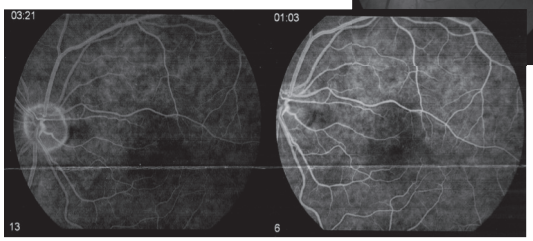




No leakage at 47 sec

Note: patchy choroidal filling

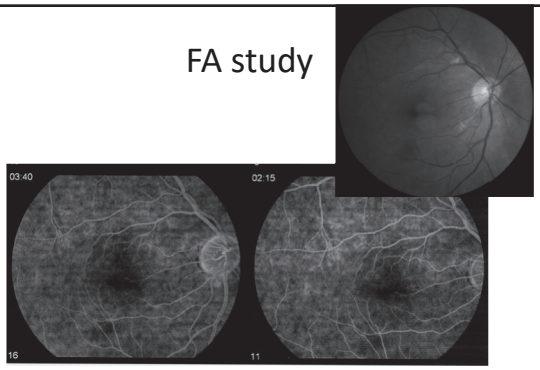
FA study



No leakage from retinal or choroidal vessels at 1:03 and 3:21

Patchy choroidal filling still evident

FA study



No late leakage in the right eye, either

46 WF with decreased central VA and abnormal choroidal filling

- Purtscher Retinopathy
- PubMed search: "visual field defect," "cotton wool spots"

- Meyer CH, Callizo J, Schmidt JC, Mennel S. Functional and anatomical findings in acute Purtscher's retinopathy. Ophthalmologica. 2006;220(5):343-6.
- www.pubmed.gov

Purtscher Retinopathy

- Initially associated with head trauma and crush injuries
- Current thinking
  - Micro circulatory defects secondary to endothelial cell damage (ischemic macula)

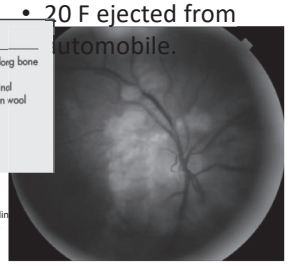
Some cases are associated with trauma

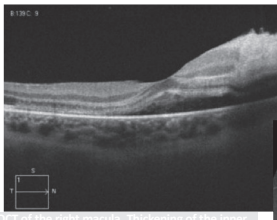
- 20 F ejected from automobile.

Table 1 Case definition (in varying combination)

(1) An associated contributing illness such as acute pancreatitis, long bone fracture, orthopaedic surgery, chest compression or crush injury
(2) Multiple areas of polygonal retinal whitening between the retinol arterioles and venules (Purtscher flecken) and/or superficial cotton wool spots in one or both eyes
- typically restricted to the posterior pole
- accompanied by minimal, if any, retinal haemorrhage
- no visible emboli in the large retinal vessels
- no direct ocular trauma

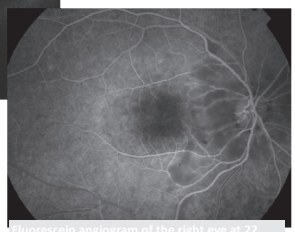
Agrawal A, McKibbin M. Purtscher's retinopathy: epidemiology, clin features, and outcome. *Br J Ophthalmol.* 2007;91(11):1456-1459.





OCT of the right macula. Thickening of the inner nasal retina correlates with the location of cotton wool spots. Additional findings include shallow subretinal fluid and discontinuity of the photoreceptor layer.

http://www.osnsupersite.com/view.aspx?rid=95396



Fluorescein angiogram of the right eye at 22 seconds. Peripapillary hypofluorescence and an enlarged foveal avascular zone are observed.

Table 2 Patient characteristics

Case	Age	Sex	Precipitating injury	Eye	Presenting features	Initial acuity	Final acuity
1	36	F	Acute pancreatitis	Right	PF, CWS, RH	CF	CF
				Left	PF, CWS	CF	CF
2	38	F	Acute pancreatitis	Right	PF, CWS, RH	CF	6/60
				Left	PF, CWS, RH	CF	CF
3	31	M	Acute pancreatitis	Right	PF, CWS, RH	6/18	6/6
				Left	PF, CWS, RH	HM	CF
4	30	M	Chest compression	Right	RH	6/5	6/5
				Left	RH	6/6	6/5
5	50	M	Chest compression	Right	CWS, RH	6/60	6/6
				Left	CWS, RH	2/60	6/6
6	48	M	Chest compression	Right	CWS, RH	6/12	6/6
				Left	CWS, RH	6/12	6/6
7	37	M	Chest compression	Right	PF, CWS, RH	HM	HM
				Left	CWS, RH	6/5	6/6
8	76	F	Chest compression	Right	PF, CWS, RH	HM	6/6
				Left	—	—	—
9	25	M	Chest compression	Right	PF, CWS, RH	6/60	6/60
				Left	—	—	—
10	67	F	RTA + long bone fracture	Right	CWS	6/9P	6/9
				Left	CWS	6/9P	6/6
11	38	M	RTA + long bone fracture	Right	CWS, RH	6/36	6/18
				Left	—	—	—
12	44	F	RTA + long bone fracture	Right	PF, CWS, RH	6/18	6/5
				Left	—	—	—
13	44	M	RTA + long bone fracture	Right	PF, CWS, RH	6/9	6/9
				Left	—	—	—
14	32	M	Road traffic accident	Right	CWS, RH	HM	6/5
				Left	CWS, RH	HM	6/5
15	37	M	Road traffic accident	Right	—	—	—
				Left	CWS, RH	HM	6/60

CF, count fingers; CWS, cotton wool spot; HM, hand movements; P, port; PF, Purtscher flecken; RH, retinal haemorrhage; RTA, road traffic accident.

Agrawal A, McKibbin M. Purtscher's retinopathy: epidemiology, clinical features, and outcome. *Br J Ophthalmol.* 2007;91(11):1456-1459.

46 WF Purtscher Retinopathy

- W/in 3 weeks VA 20/20 (OD) and 20/25 (OS)
- Fundus picture improved
  - Medications include:
    - Diovan 160 mg. po qd (Valsartan and Hydrochlorothiazide) for HBP
    - Pravachol 40 mg po qd
    - Zocor 80 mg po ad
    - Librax 2 tab po qhs (Librium (chlordiazepoxide hydrochloride) + the anticholinergic/spasmolytic effects of Quarzan (clidinium bromide)

Purtscher Retinopathy

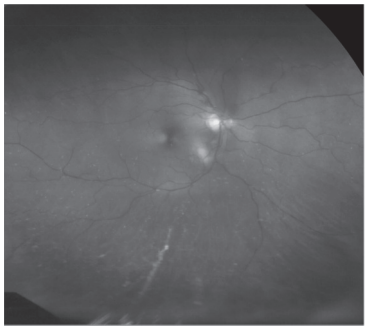
- Questions
- Comments

55 BF referred for imaging of Choroidal Nevus

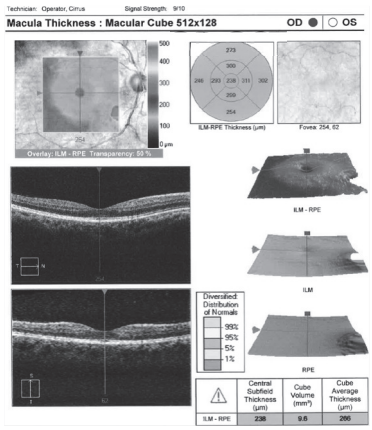
- Healthy
- No medications
- Histories non contributory
- VA 20/20 OD, OS; wears full-time monovision CL correction
- IOP = 15/16 mm Hg (10 AM)
- Anterior segments unremarkable by slit-lamp microscopy

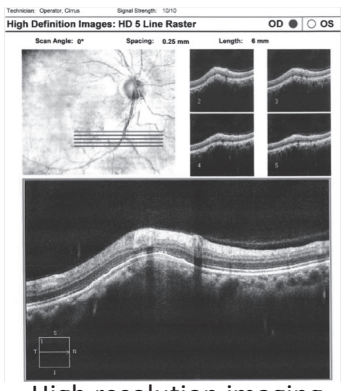
NIH

Wide-angle fundus photo



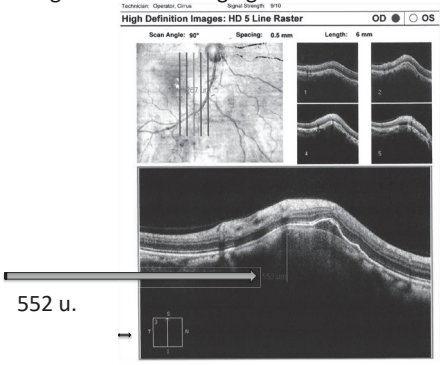
Note the alteration of color, and stereoscopically, contour.



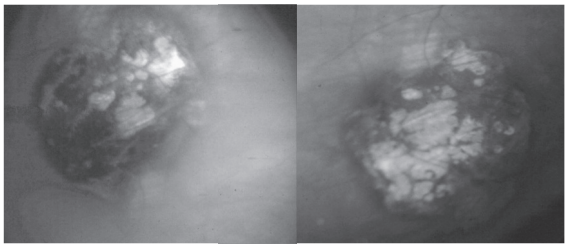


High resolution imaging

High resolution imaging with thickness measurement



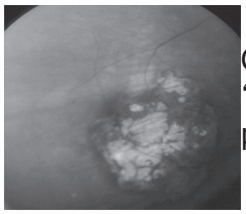
CHRPE vs. Chorioretinal scar



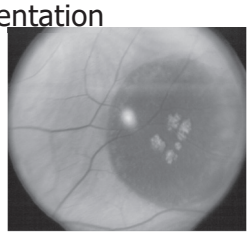
26 WF 20/20
Asymptomatic

31 WF 20/20
Asymptomatic

CHRPE – clinical examples



Characateristic "moth-eaten" presentation



Note <u>overlying</u> retinal vasculature →

BL

Diabetic Retinopathy with DME and RNFL infarct

Diabetic macular edema (clinically significant)

3

born: 7 April 1957 *(S.T.)*

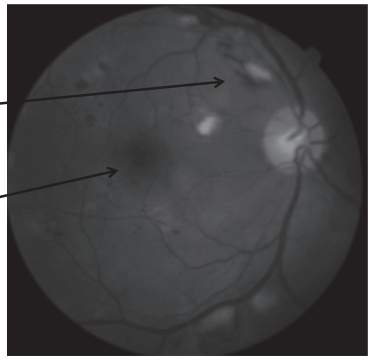
- First seen 19 April 2012
- DIABETIC (insulin) / HTN X 20 yrs (2 meds)
- BS: 140-200; A1C is unknown

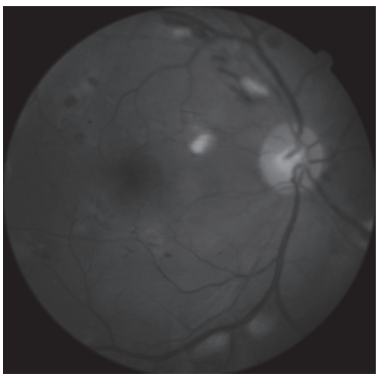
19 April 2012 **<u>VA 20/25</u>** OD = OS

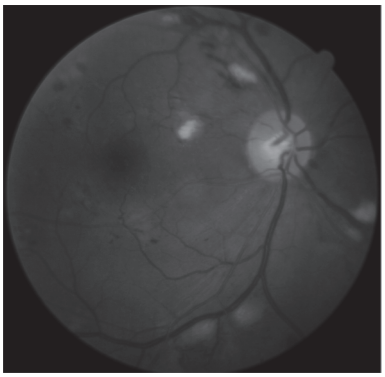
Note cotton wool spots

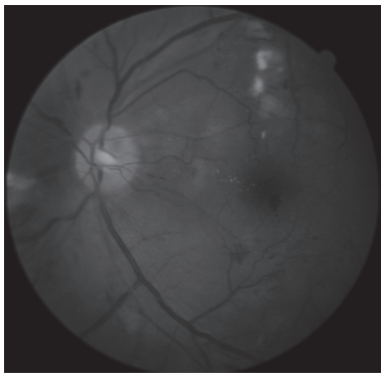
Esp.

Note: macula is definable

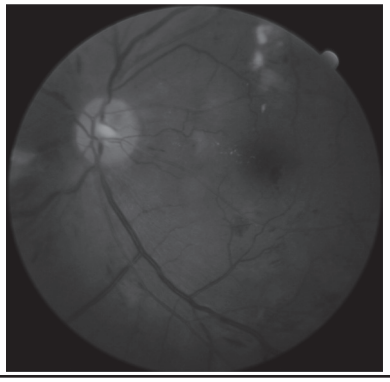








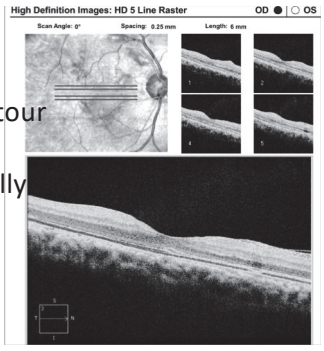
Left eye has CWS as well



Right eye

Normal macular contour

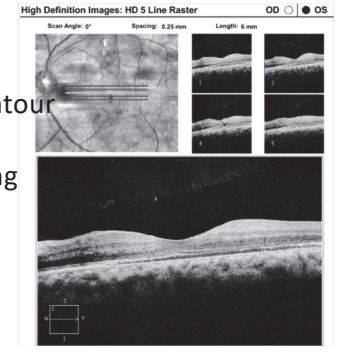
No thickening centrally



Left eye

Normal macular contour

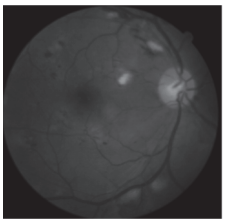
No fluid or thickening

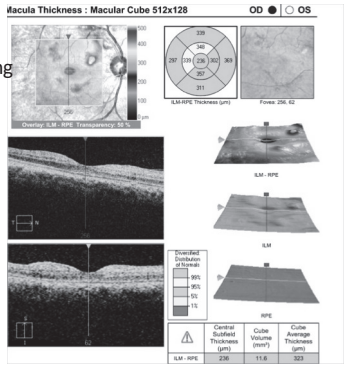


Correlation between clinical and OCT

OD

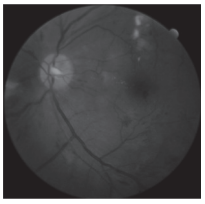
Note mild retinal thickening outside the macula but absence of fluid

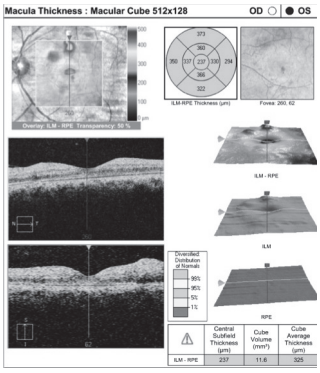




OS

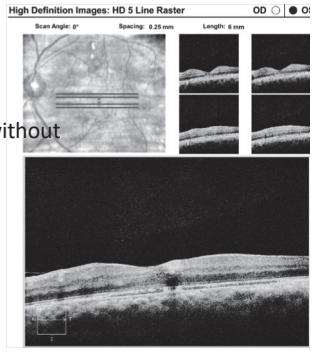
Note mild retinal thickening (consistent w/CWS) surrounding macula but absence of fluid at the macula



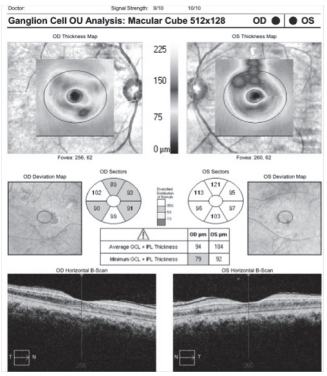


High-definition images

Mild retinal thickening without fluid accumulation

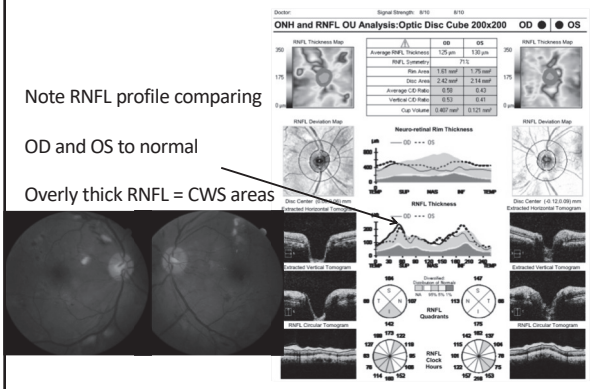


Each macula shows mild thickening



Note RNFL profile comparing OD and OS to normal

Overly thick RNFL = CWS areas

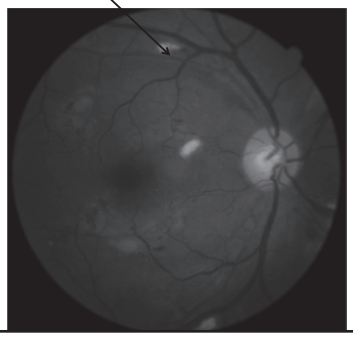


Subsequent Visits

- VA 1 June 2012 No OCT or photos
  – 20/20- 20/40
- VA 21 June 2012 No OCT or photos
  – 20/25 20/25

Recommend retina specialist consult;
Treatment recommended;
Pt. refuses treatment

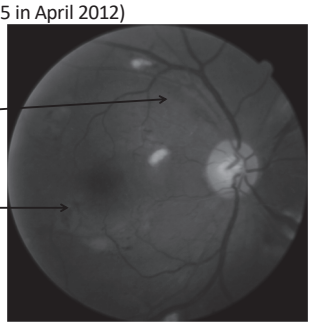
17 July 2012 VA = 20/20 20/25 [diffuse DME]
ST RNFL defect

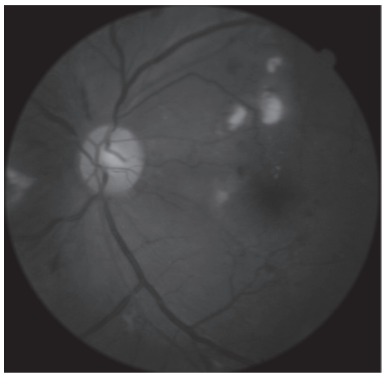


2 October 2012 CSME 20/50
(reduced from 20/25 in April 2012)

RNFL defect
(not glaucoma)

And "muddy
macula"

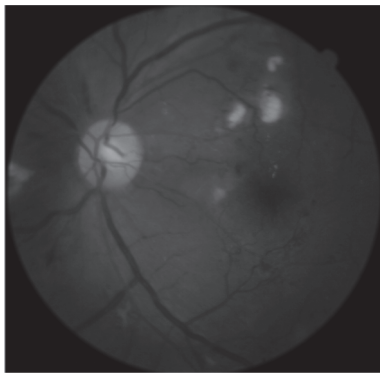


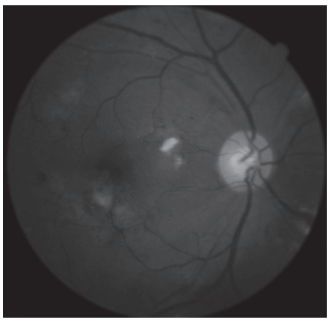


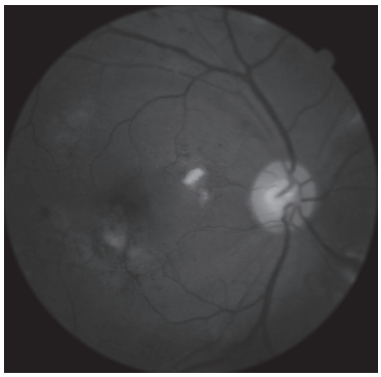
Left eye appears
less involved

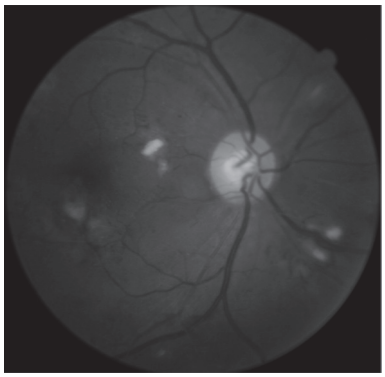
20/30

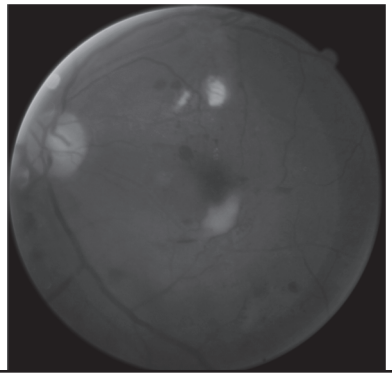
Except nasally . . .

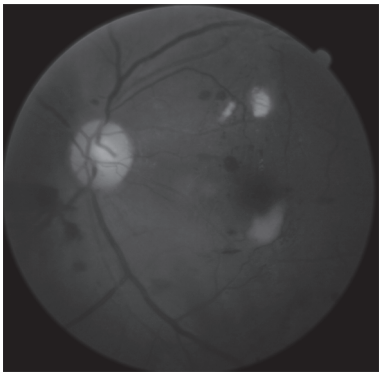




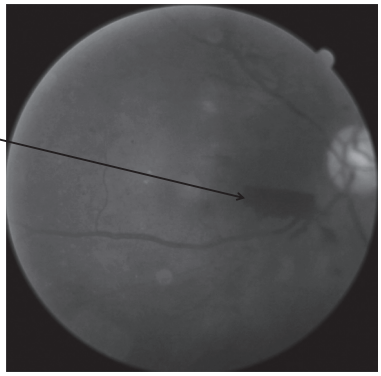




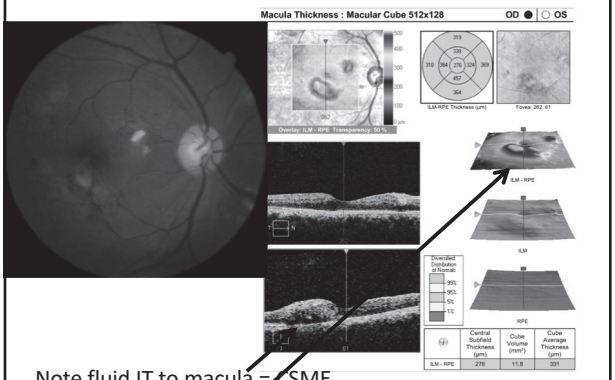




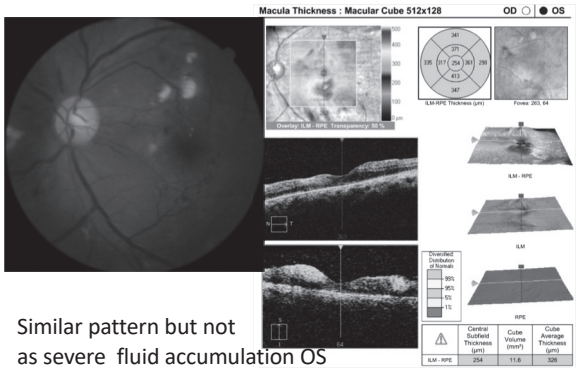
Note NV and
Pre-retinal heme
Nasal to ONH



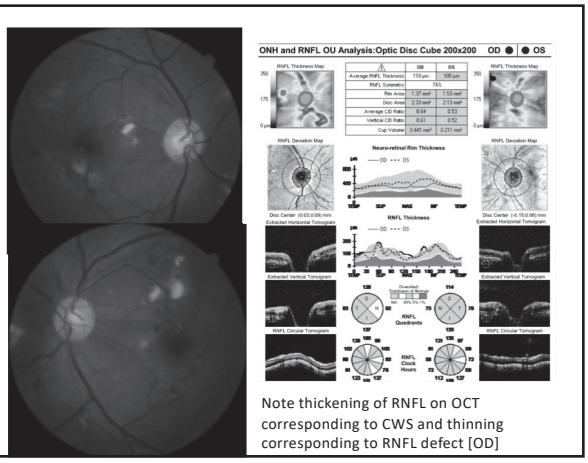
Correlation between clinical and OCT



Note fluid IT to macula = CSME
Macular thickening

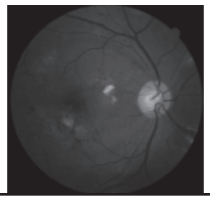


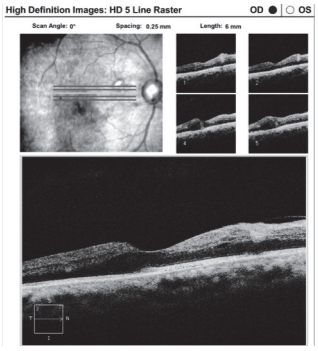
Similar pattern but not as severe fluid accumulation OS
Macular thickening corresponds to CWS & fluid



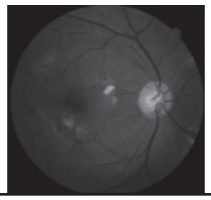
Note thickening of RNFL on OCT corresponding to CWS and thinning corresponding to RNFL defect [OD]

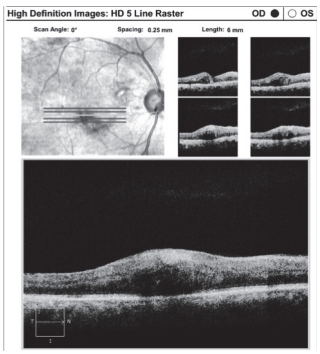
High definition images show CWS and macular fluid / thickening consistent with CSME (OD, 20/50).

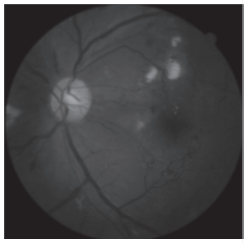




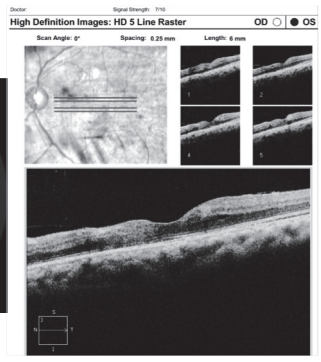
High definition images show CWS and macular fluid / thickening consistent with CSME (OD, 20/50).



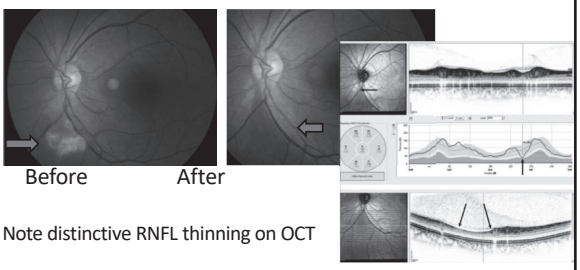




High definition images show CWS and macular fluid / thickening consistent with CSME (OS 20/30).



RNFL defect following CWS appearance in hypertension



Before After

Note distinctive RNFL thinning on OCT

Zhang L, Xu L, Zhang JS, Zhang YQ, Yang H, Jonas J
Cotton-wool spot and optical coherence tomography of a retinal nerve fiber layer defect. Arch Ophthalmol. 2012 Jul 1;130(7):913.

- Questions
- Comments

LS

FUNNY LOOKING DISCS

Glaucoma suspect

This case appeared in PCON February 2-14

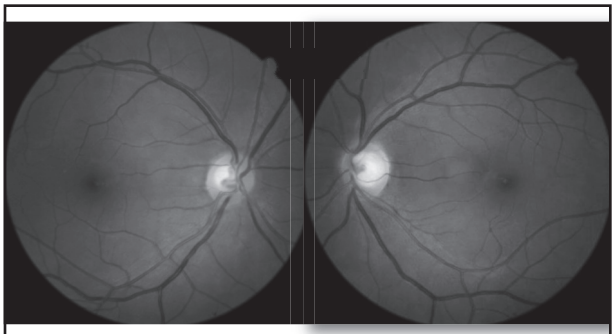
CBLS

33 F (nurse)

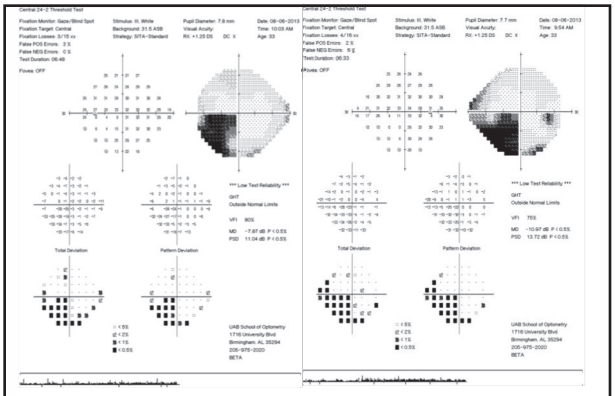
- Referred to UAB Eye Care as a glaucoma suspect
- Medical history non-contributory
- Family history positive for “glaucoma”
- Ocular history: refractive correction and mention of amblyopia.
-

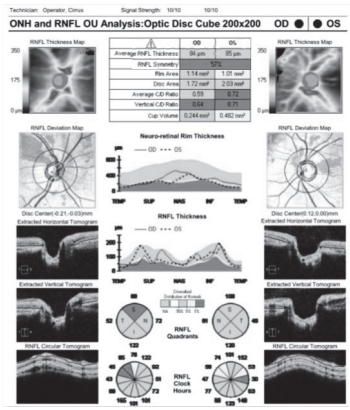
33 F (nurse)

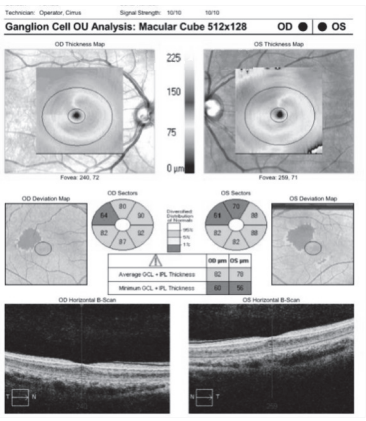
- BSCVA 20/20 OD, OS. Minimal hyperopic refraction
- IOP: 16 mm Hg OD and 18 mm Hg OS
- Pachymetry:m567 microns OD and 562 microns OS
- Angles open with visible CB 360 OS, OS
- Anterior segment unremarkable



Which ONH looks more suspicious?







Radiology interpretation

"Right peritrigonal luecomalacia which is most likely developmental causing a left homonyous inferior quanrantic defect. She is completely stable."

-MSV

- Questions
- Comments

LS

28 W/M

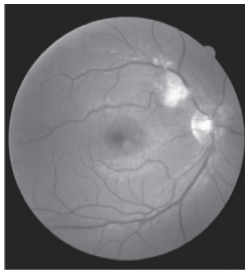
- History / RFV
  - Healthy Dental Student II
  - 2-day observation of "floater" OD only
  - No current medications/allergies
  - No chronic or acute medical problems

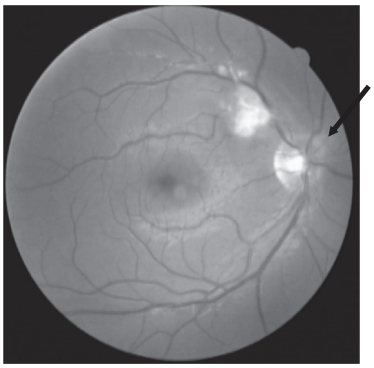
28 W/M

- Findings
  - UCVA 20/20 in each eye
  - Normal motility
  - VF - FFCF
  - PERLA (-) APD
  - Anterior segment unremarkable OD/OS
  - T_A 14/14 mm Hg (OD/OS)

28 W/M

- Findings (con't) DFE
  - $1\text{-}2^+$ Vitritis (OD)
  - Granuloma





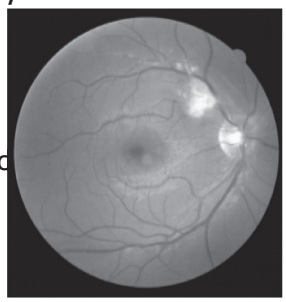
28 W/M

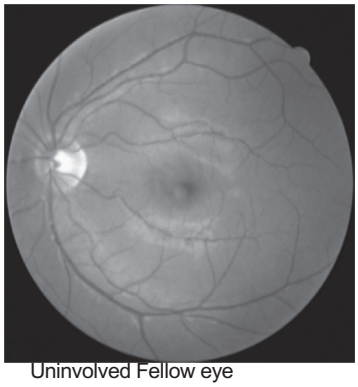
- What are some differential diagnoses?
  - Toxoplasmosis
  - Histoplasmosis
  - Toxocariasis
  - Cat-scratch neuroretinitis

28 W/M

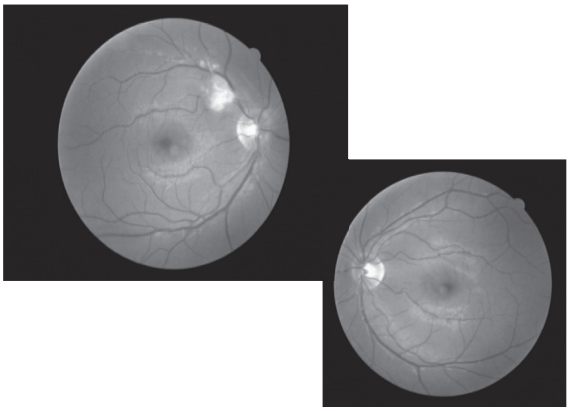
- DFE (OD)
  - Granuloma +
  - Elevated nasal disc margin +
  - parapapillary retinal edema

    = Neuroretinitis !





Uninvolved Fellow eye



28 W/M

- Cat-scratch neuroretinitis
  - Granuloma @ optic disc (OD)
  - Slight optic nerve head edema with spread to retina on nasal side (OD)
  - *History of new kittens with scratch (still healing) on back of left hand*

28 W/M

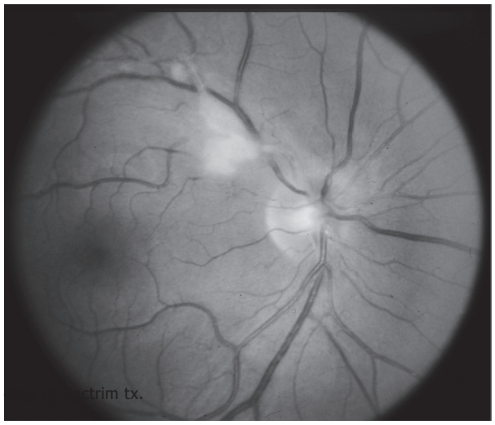
- Treatment
  - Bactrim DS
  - 1 tab, PO, bid X 4 wks.

28 W/M

Discussion

- Optic nerve swelling as an early sign in cat-scratch disease

Wade NK, Levi L, Jones MR, et al. Optic disk edema associated with peripapillary serous retinal detachment: an early sign of systemic *Bartonella henselae* infection. Am J Ophthalmol 2000; 130: 327-334.

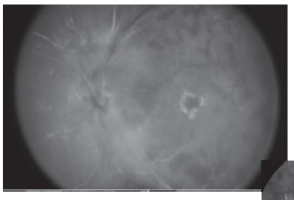


S/P 2 [illegible]ctrim tx.

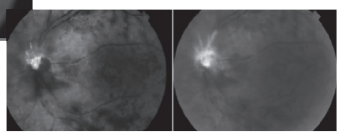
Case Example 28 W/M

- Cat-scratch neuroretinitis
  - Treatment with Bactrim DS [sulfmethoxazole + trimethoprim] bid X 2 weeks and re-check
  - Serology to confirm diagnosis
  - Resolution is sometimes spontaneous without ocular consequences

Neuroretinitis with CRAO, CRVO, (& NVG)

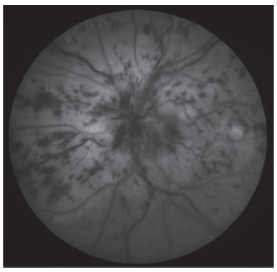


Arterial attenuation, sclerosis, disc edema, pale retina, resolving macular exudates



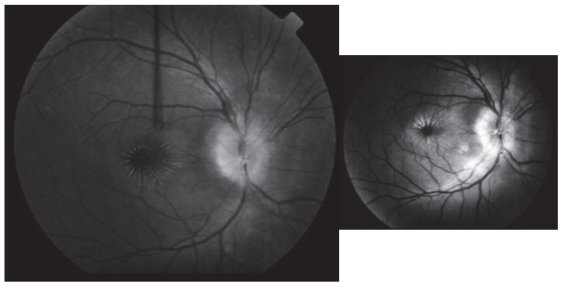
FA @ 49 sec fails to reveal retinal perfusion

Neuroretinitis with CRAO, CRVO, & NVG

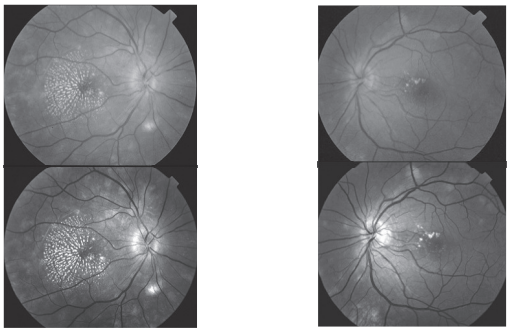


@ 1 month
- Disc edema
- Dilated tortuous veins
- Thin arteries
- Intraretinal hemorrhages
- Retinal pallor

Neuroretinitis (optic disc edema with macular star, ODEMS)

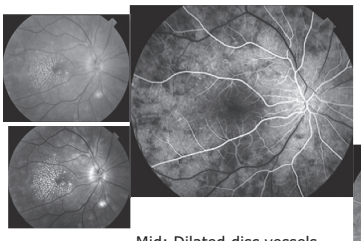


ODEMS (May be bilateral)



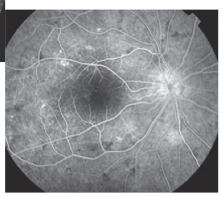
Note choroidal lesions on the RF photo

ODEMS: FA

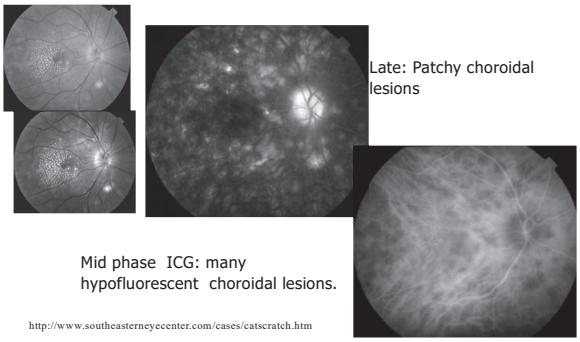


Early: Retinal arterioles filled; patchy choroidal filling

Mid: Dilated disc vessels and hypofluorescence in choroid



ODEMS: FA



Late: Patchy choroidal lesions

Mid phase ICG: many hypofluorescent choroidal lesions.

http://www.southeasterneyecenter.com/cases/catscratch.htm

- Questions
- Comments

PRE-PERIMETRIC GLAUCOMA

late 50s WM

- First seen at UAB Eye Care 4/24/2014

Past Medical History	
Conditions	Hernia Sx, Tinnitus
Details	Hernia Sx - couple years ago, all okay now. Past Hx of bad rxn to Penicillin Past Hx of Tinnitus Pt. thinks he has Sleep apnea? *

*SAS ruled out – new Dx = heart murmur (cardiac ultrasound)
No medications

Past / Present Ocular History		
		Date Diagnosed
Glaucoma	Negative	
Cataracts	Negative	
Age-Related Macular Degeneration	Negative	
Eye Injury	Negative	
Retinal Disease	Lattice Degeneration OU	
Other Disease	Negative	
Blindness	Negative	
Strabismus	Negative	
Amblyopia	Negative	
Diabetes	Negative	
Dry Eye	Negative	
Refractive	Glasses Full-time	
Other	H/o transient dipl/intermittant dipl, resolved (spectacle adjustment)	

Social History	
Drugs	None
Alcohol	None
Occupation	Engineer (currently unemployed)
Hobbies	Writer, Musician, Woodworker
Tobacco	Quit smoking 3 yrs ago, uses Nicotine lozenges
Smoking Status	Former smoker

Family History	
Glaucoma	Negative
Cataracts	Mother, Father
ARMD	Negative
Eye Injury	Negative
Retinal Disease	Negative
Other Disease	Negative
Blindness	Negative
Strabismus	Sister - DV, wears prism in glasses
Amblyopia	Negative
Diabetes	Negative
Cancer	MGM - skin
Heart Disease	Negative
Hypertension	Negative
High Cholesterol	Negative
Kidney Disease	Negative
Stroke	Negative

Medications

Date	Name	Strength	Form	S I G
4/21/2014	Advil			
6/9/2010	Ibruprofen			
4/24/2014	Zyrtec	10 mg	Add'l Sig	

Ophthalmic findings

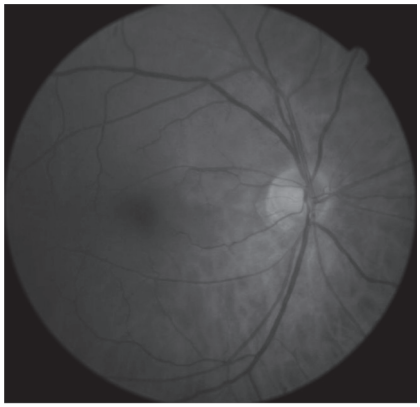
- BSCVA 20/20 20/20

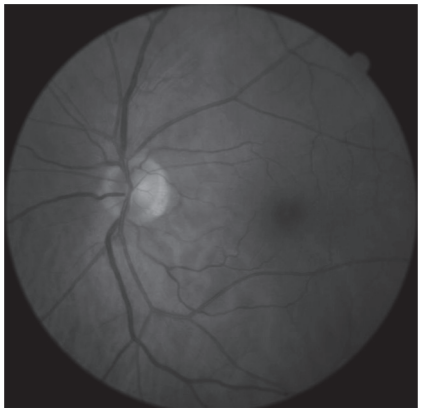
-2.25 – 0.50 X 090 -2.50-0.75X 090

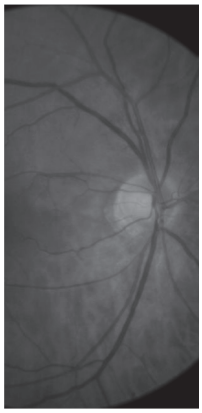
- Pupils – normally reactive w/o RAPD
- IOP history (Goldmann)
  - 13/14 (4/24/2014)
  - 16/15 (7/22/2014)
- Pachymetry: 587u, 586u
- Anterior segment – unremarkable
- ACA – open; AC - D&Q

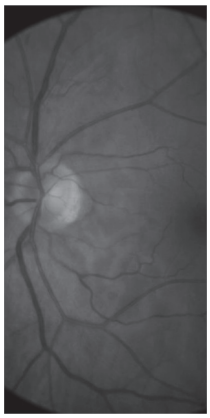
Ophthalmic findings

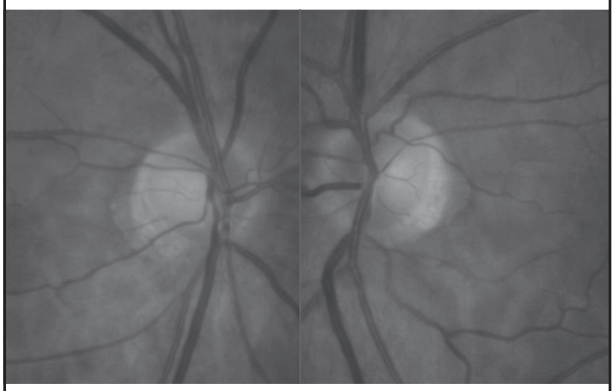
- Lens (LOCSIII) : NO 1 / NC2 CS 0 PSC 0 (OD = OS)
- Optic disc
- VF
- OCT
- What do you expect?







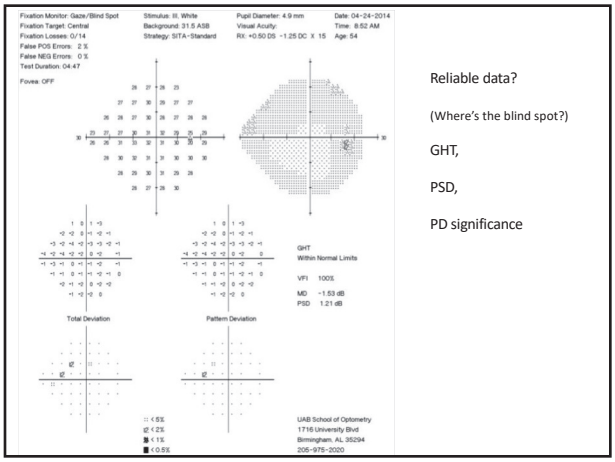




What are your observations of the ONHs

What are your observations of the ONHs

- Small
- Temporal crescent consistent with RE
- OBL insertion OS > OD
- Inferior notch OD > OS
- β-zone PPA (OD where rim tissue is thinnest; OS greater temporally than inferiorly)



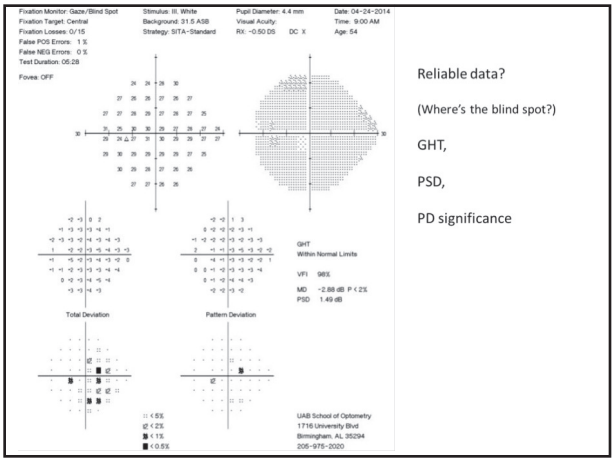
Reliable data?

(Where's the blind spot?)

GHT,

PSD,

PD significance



Reliable data?

(Where's the blind spot?)

GHT,

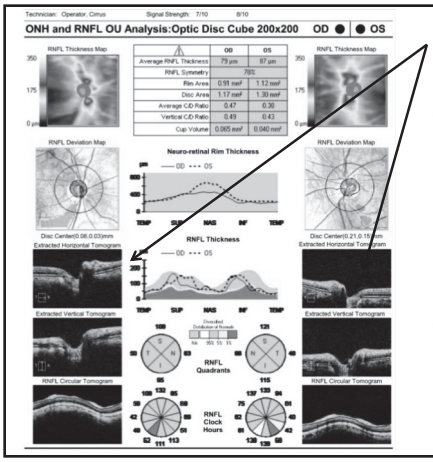
PSD,

PD significance

What is your interpretation of the VF

- Right
  - Correct test
  - Correct eye
  - Appropriate correction
- Reliable data
- GHT – WNL
- PSD – not flagged
- PD significance – no clusters in areas suspicious for glaucoma

- Left
  - Correct test
  - Correct eye
  - Appropriate correction
- Reliable data
- GHT – WNL
- PSD – not flagged
- PD significance – ? clusters in areas suspicious for glaucoma



Good scan quality
Note segmentation markers

⇐

Symmetry
Ave RNFL thickness
ONH size
C/D!

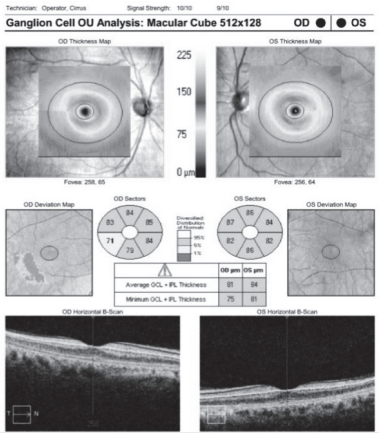
⇐

Disc margin

Note RNFL defects.
RNFL profile

And, RNFL average sectors are within reference range,

But clock hour IT OS, OS show thinning.



Excellent scan quality

Note the island of GCC thinning IT OD that corresponds to RNFL defect.

And, RNFL average sectors are within reference range.

What are our next steps?

What are our next steps?

- Reviewing the data
  - Good VA
  - (-) family history of glaucoma
  - ? SAS / (+) heart murmur // no beta-blocker meds.
  - Normal IOP
- Apparently clean VF
- Evidence of ONH / RNFL damage

Diagnostic labeling

- Glaucoma suspect
- Glaucoma
- Pre-perimetric glaucoma
- OHT

Pre-perimetric Glaucoma Explanation

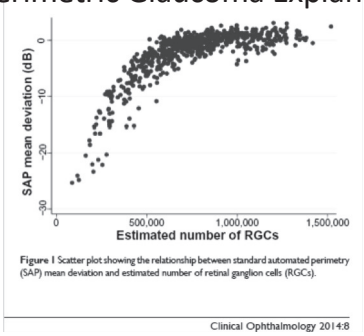
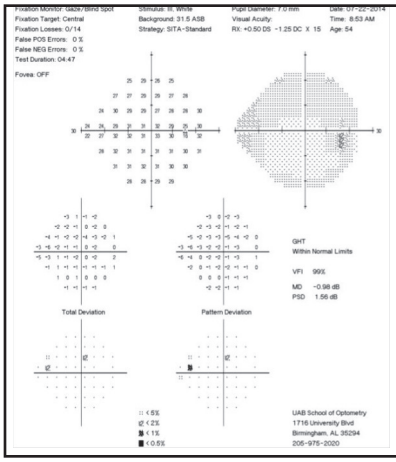


Figure 1 Scatter plot showing the relationship between standard automated perimetry (SAP) mean deviation and estimated number of retinal ganglion cells (RGCs).

Clinical Ophthalmology 2014:8

http://dx.doi.org/10.2147/OPTH.S44586

REPEAT THE VISUAL FIELD !!!



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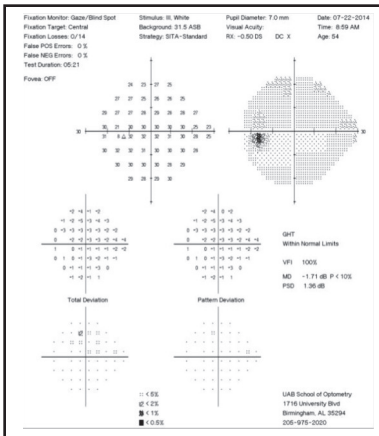
(Where's the blind spot?)

GHT,

PSD,

PD significance



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What is your interpretation of the VF

- Right
  - Correct test
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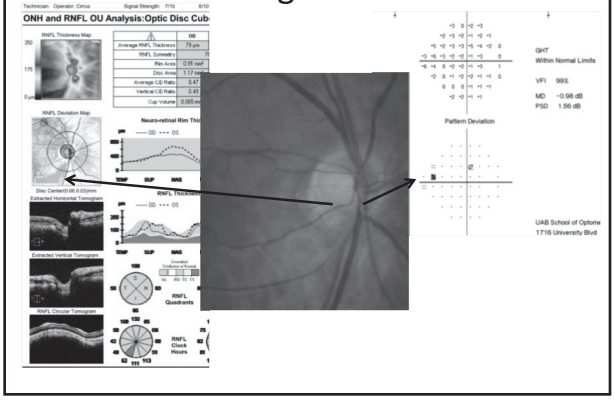
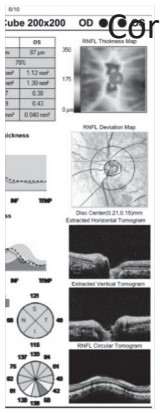
  - Appropriate correction
- Reliable data
- GHT – WNL
- PSD – not flagged
- PD significance –? cluster in nasal step region

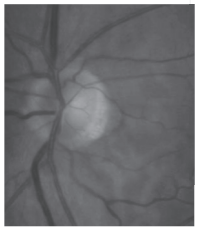
- Left
  - Correct test
  - Correct eye
  - Appropriate correction
- Reliable data
- GHT – WNL
- PSD – not flagged
- PD significance – no clusters in areas suspicious for glaucoma

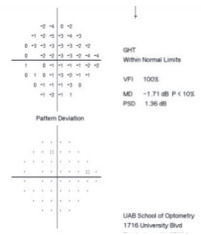
Reconciling the data-OD



Correlating the data-OS







Management

- Critical questions
  - Degree of damage
  - Burden of treatment
  - Life span

Management

- Critical questions
  - Degree of damage
  - Burden of treatment
  - Life span
- No treatment at this time
- Follow, repeating all tests X 6 mo
- ? Alternatives?

Most recent visit

- IOP = 19/20
- Updated disrupted sleep status – diagnosed with SAS and using CPAP device. Reportedly, "…feeling much better."
- Does this change our thinking?