On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

vision expo

1

Financial Disclosure – Justin Schweitzer, OD, FAAO

- Alcon – C/L
- Aldeyra - C
- Allergan – C/L
- Bausch + Lomb – C/L
- Bruder - C
- Sight Sciences – C/L
- Dompe – C/L
- Zeiss – C/L
- Visus - C
- Science Based Health – C
- Tarsus – C/L
- Santen - C
- Sun – C/L
- Reichert - C
- Glaukos – C/L
- MediPrint – C
- LKC – C/L
- Viatris – C
- Thea – C
- Heru – C
- Lenz – C/L
- Harrow - C

The following financial relationships have been mitigated

2

Jessica Steen OD Financial Disclosures

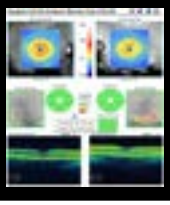
- Speakers Bureau-Carl Zeiss Meditec, Bausch and Lomb, Viatris, Thea Pharma, Alcon, Allergan, Astellas, Dompé
- Consultant-Bausch and Lomb, Balance Ophthalmics, Carl Zeiss Meditec, Opus Genetics, Viatris, Allergan, Astellas, Alcon, Radius XR, iCare, Glaukos, Eyenovia, Tarsus, Orasis
- Shareholder-Clearside Biomedical (<0.01% ownership)

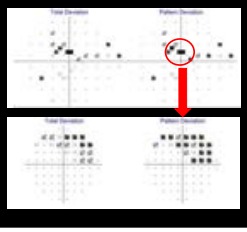
- *All relevant relationships have been mitigated*

3

Case Files in Glaucoma

Justin Schweitzer, OD, FAAO
Jessica Steen, OD, FAAO





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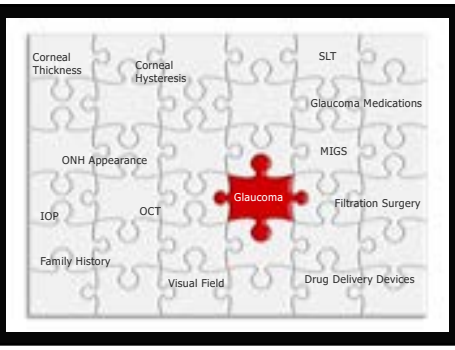


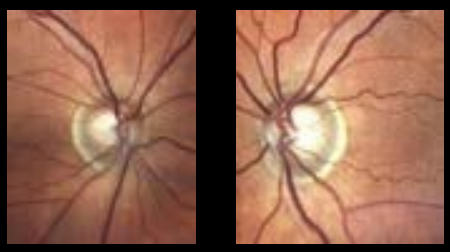
5

- **71-year-old African-American male**
- **Medical History:** HTN
- **Family History:** HTN, DM
- **BCVA**: 20/20 +1 OU

- **IOP**: 29 mm Hg OD; 26 mm Hg OS
- **C/D**: 0.60/0.60 OD 0.70/0.70 OS
- **Pachymetry**: 510 OD; 514 OS
- **Corneal hysteresis**: 8 OD 8.9 OS
- **Gonioscopy**: Open to CB OU w/ trace pigment in TM
- SLE: Unremarkable
- **VF's** – See next slide
- **OCT's** – See next slide

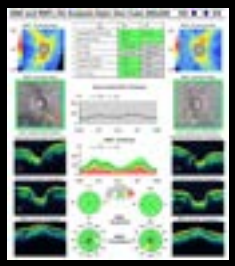
6

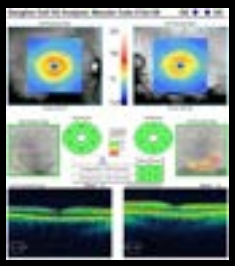
ONH's



7

OCT



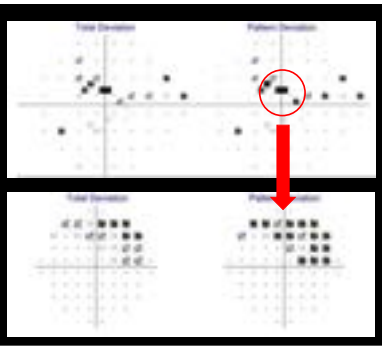


8

OS VFT's

24-2

10-2



9

The Case for 10-2's

Early Central Defects are Common

- 50% of mild to moderate GLC have defects within central 3 degrees[1]
- 16% of patients have central defect when using 24-2 alone[2]
- 9% classified as normal on 30-2 with damage on 10-2[3]
- 13% of the time 30-2 underestimates level of glaucoma[3]
- 24-2 testing found to be normal[4]
  - 10-2 defects found in:
    - 35% of OHTN
    - 39% of glaucoma suspects
    - 61% of early glaucoma

1. Schiefer U, Papageorgiou E, Sample PA, et al. Spatial pattern of glaucomatous visual field loss obtained with regionally condensed stimulus arrangements. Invest Ophthalmol Vis Sci. 2010;51(11):5685-9.
2. Traynis I, de Moraes CG, Raza AS, et al. Prevalence and nature of early glaucomatous defects in the central 10 degrees of the visual field. JAMA Ophthalmol. 2014;132(3):291-97.
3. Langerhorst C, Cannon L, Bakker D, et al. Measurements for description of very early glaucomatous field defects. In: Wall M., Heijl A, eds. Perimetry Update 1996/1997. New York, NY: Kugler Publications;1997:67-73
4. de Moraes C, Hood D, Liebmann J, et al. 24-2 visual fields miss central defects shown on 10-2 tests in glaucoma suspects, ocular hypertensives, and early glaucoma. Ophthalmology. May 24, 2017.

10

The Case for 10-2's

When to Run the Test?

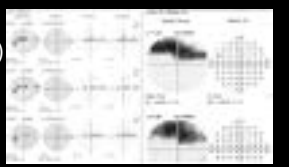
1. Any depressed points in the central 12 degrees on the 24-2 or 30-2
2. A Paracentral defect is present on 24-2
3. Any abnormal points in the central 12 points on 24-2 that correlates with thinning on GCIPL
4. GCL –IPL abnormality

Park H, Hwang B, Shin H, et al. Clinical clues to predict the presence of parafoveal scotoma on humphrey 10-2 visual field using a humphrey 24-2 visual field. Am J Ophthalmol. 2016 Jan;161:150-9.

11


Baseline 10-2 Visual Field Loss as a Predictor for Future Glaucoma Progression

Studied 394 Eyes of 202 Subjects (119 POAG and 83 Glaucoma Suspects) over 6.7 Years



22 x greater risk of developing future VF loss event if you had 10-2 defect

12

What Would You Do?

13

Treatment Considerations

- Monitor
- Glaucoma Drops
- SLT
- Drug Delivery
- Surgical Intervention

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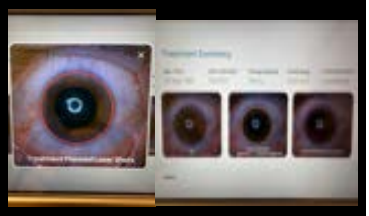
Case Summary:



IOP @ 6 weeks:
16 mm Hg OD
15 mm Hg OS

15

Automated Direct SLT

16

LIGHT trial: 6-year results of primary selective laser trabeculoplasty versus eye drops for the treatment of glaucoma and ocular hypertension

Gus Gazzard, Evgenia Konstantakopoulou, David Garway-Heath, Mariam Adeleke, Victoria Vickerstaff, Gareth Ambler, Rachael Hunter, Catey Bunce, Ned Nathwani, Keith Barton, on behalf of the LIGHT Trial Study Group

Primary Outcome - Quality of Life at 6 years
Secondary Outome – clinical effectiveness and safety

Conclusions:
- No significant difference in QOL
- 26.8% VS 19.6% progressed drops vs SLT
- Trab required in 32 eyes in drops arm compared to 13 eyes in the SLT arm
- 69.8% of SLT Drop Free @ 6 Years

17

Low-Energy SLT Repeated Annually: Rationale for the COAST Trial

Tony Realini, MD, MPH, Gus Gazzard, MD, Mark Latina, MD, Michael Kass, MD

Newly diagnosed POAG treated with:
1. ALT 360 x 1
2. Standard SLT 360 as needed
3. Low-energy SLT 360 repeated annually

10-year Results
Medication Free Rates
1. ALT – 22.6%
2. Standard SLT -25.0%
3. Low-energy SLT – 58.3%

10-year Results
Median Times to Treatment
1. ALT – 2.8 years
2. Standard SLT -3.2 years
3. Low-energy SLT – 6.2 years

18

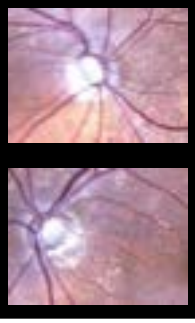
79-year-old male
CC: Glaucoma Evaluation
ROS: "Vision has been good, but OD said my eye pressures are elevated"

BCVA: 20/20 OD
20/20 OS

No Meds

IOP: 30 OD; 31 OS

Pachymetry: 550 OD
550 OS



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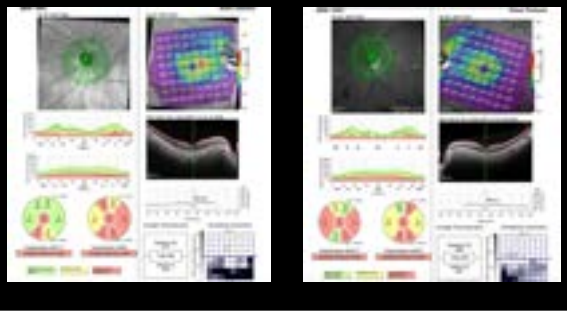

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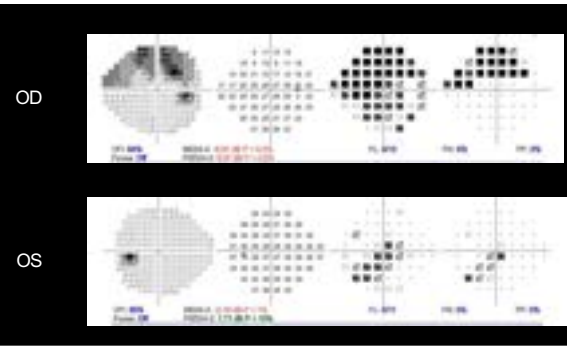

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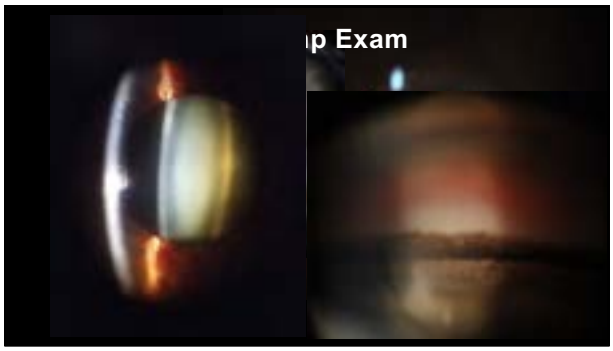

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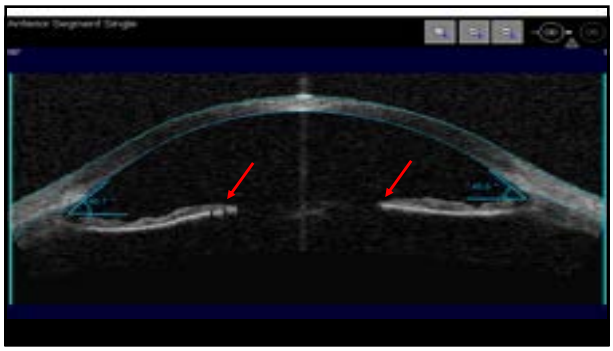


23

What Would You Do?

24

2 step Considerations in PDS or PDG

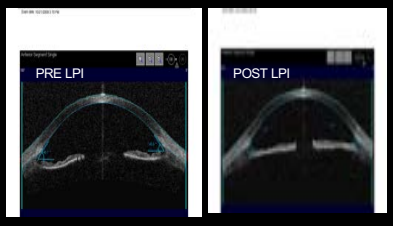
- Step 1: Reduce incidence of irido-zonular contact (LPI)
- Step 2: Open up trabecular meshwork (SLT)

- Topical therapy as needed to control IOP and prevent glaucoma

25

Treatment

- LPI and SLT OU
- IOP 18 OD; 16 OS



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Pigment Dispersion Syndrome/PD-Glaucoma

Mechanism of Disease

Abnormal Irido-zonular/Irido-lens contact

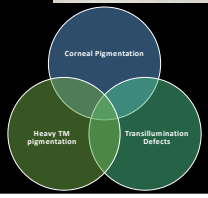
Iris pigment deposited on Cornea, Lens, AC angle

Concave Iris approach

-Fluid from PC to AC causing higher IOP in AC than PC (Ball-Valve Mechanism)

-Pressure gradient causes the iris to bow concave with higher iridolenticular contact in some people= Reverse pupillary block

-Blinking, accommodation, ***exercise*** may promote



Elevation in IOP and IOP spikes secondary to pigment occlusion of physiologic outflow.

27

Estimated prevalence of PDS is 2.45% in the US

Disease less severe as patient ages and pigment release slows

Mechanism: Crystalline lens thickens causing an adjustment of zonular-iris contact

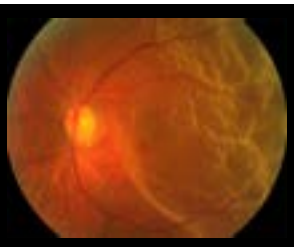
Lahola-Chomiak AA, Walter MA. Molecular Genetics of Pigment Dispersion Syndrome and Pigmentary Glaucoma: New Insights into Mechanisms. J Ophthalmol. 2018;2018:5926906.

28

The Retina and PDS

Lattice Degeneration – 22-33%

Retinal Detachment – 12%



1. Wesley P., Liebmann J., Walsh J. B., Ritch R. Lattice degeneration of the retina and the pigment dispersion syndrome. *American Journal of Ophthalmology*. 1992;114(5):539–543. doi: 10.1016/S0002-9394(14)74480-0.
2. Scuderi G., Papale A., Nucci C., Cerulli L. Retinal involvement in pigment dispersion syndrome. *International Ophthalmology*. 1995;19(6):375–378. doi: 10.1007/BF00130858.
3. Scheie H. G., Cameron J. D. Pigment dispersion syndrome: a clinical study. *The British Journal of Ophthalmology*. 1981;65(4):264–269. doi: 10.1136/bjo.65.4.264.
4. Sampaolesi R. Retinal detachment and pigment dispersion syndrome. *Klinische Monatsblätter für Augenheilkunde*. 1995;206(01):29–32. doi: 10.1055/s-2008-1035401.

29

- **78-year-old Caucasian-Female**
- **Medical History: Thyroid, HTN**
- **Meds: Levothyroxine, omeprazole, metoprolol**
- Ocular Meds: bimatoprost 0.01% qd, fixed combo agent bid
- "Eyes have been red, irritated, I just don't like taking my drops anymore"
- **BCVA**: 20/20 +1 OU

- **IOP**: 14 mm Hg OD; 15 mm Hg OS
- **C/D**: 0.75/0.75 OD 0.75/0.75 OS
- **Pachymetry**: 510 OD; 514 OS
- **Corneal hysteresis**: 8.7 OD 9.1 OS
- **Gonioscopy**: Open to CB OU w/ trace pigment in TM
- SLE: 1+ SPK OU, 1+ hyperemia OU, PCIOL's
- **VF's** – See next slide
- **OCT's** – See next slide

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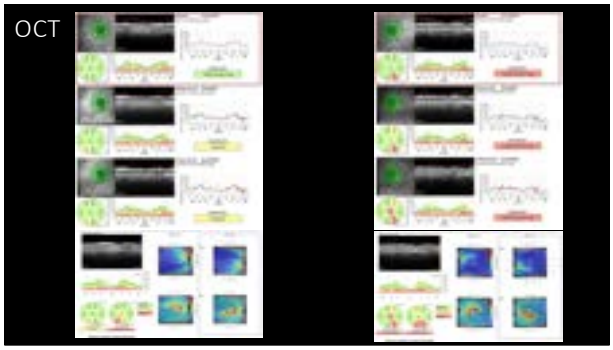
OCT



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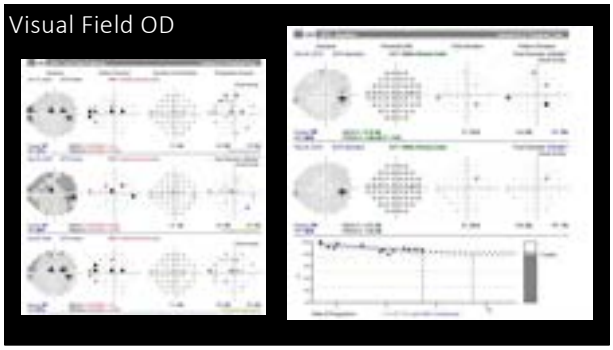
Visual Field OD



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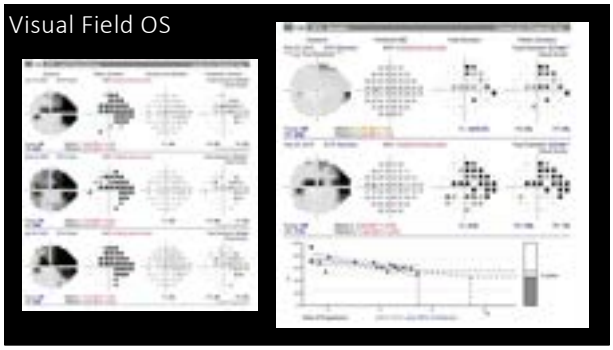
Visual Field OS



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Considerations

- Patient is not tolerating medications (tremors, OSD, hyperemia)
- OD minimal change
- OS progression is noted
- Previous CEX
- Options to address compliance, medications, and progression??

34

What Would You Do?

35

Case Summary

IOP Summary – 3 months PO
OD: 12 mmHG
OS: 14 mmHG

36

Interventional Glaucoma Mindset

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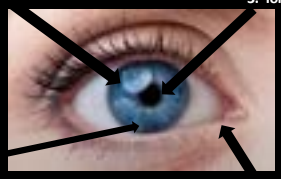
Iridocorneal Angle
1. Travoprost Intraocular Implant

Ocular Surface Devices
1. Contact Lenses
2. Microdose latanoprost
3. Iontophoresis



Injectable Systems
1. Bimatoprost SR
2. Travoprost Intracameral Implant
3. Travoprost Extended Release Implant

Punctal Plug Devices
1. Travoprost Intracanalicular I
2. Latanoprost and Travoprost punctal plug delivery system

38

Patients Attitudes Towards Drug Delivery

Triple Combination Eye Drop – 85%

Microdose Eye Spray – 54%

Drug-eluting Contact Lens – 31%

Drug-eluting Periocular Ring Insert – 43%

Injectable Subconjunctival Drug Insert- 32%

Injectable Anterior Chamber Implant – 30%

attitude is everything

Wang BB., Lin MM., Nguyen, T., et al. Patient attitudes towards novel glaucoma drug delivery approaches. Digit J Ophthalmol. 2018; 24(3): 16-23

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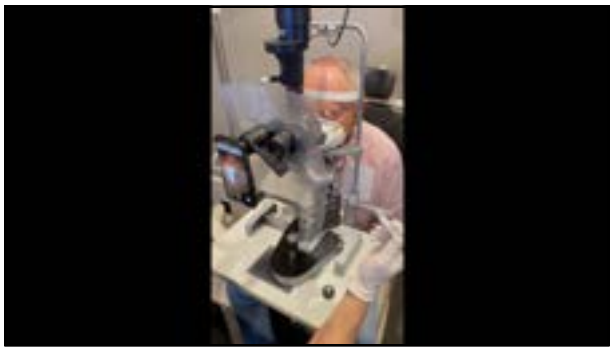
Bimatoprost SR

(10-microgram bimatoprost sustained-release implant)

- Biodegradable bimatoprost sustained-release implant
- FDA-approved and indicated to reduce IOP in patients with open angle glaucoma or OHT
- Single intracameral administration
- Phase I/II/III Studies

40



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Travoprost intraocular implant

Resides in AC angle, anchored behind TM

- Length: 1.8 mm
- Diameter: 0.5 mm
- Titanium
- Non-ferrous

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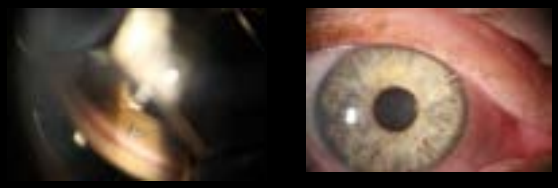
Travoprost intraocular implant



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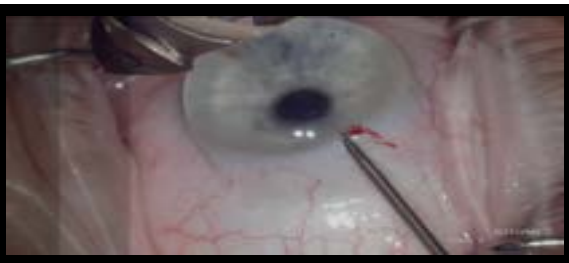

36 Month Update

1. 70% and 68% of subjects in fast and slow-release were well-controlled on fewer or same medications as baseline.
2. Average IOP reductions were 8.3 mmHg and 8.5mmHg in the fast and slow-release arms.

44

Saheb H, Ahmed, IIK. Micro-invasive glaucoma surgery: current perspectives and future directions. Curr Opin Ophthalmol. 2012;23(2): 96-104.

45

Trabecular Microbypass Stent (iStent Inject W)

Schlemm Canal Microstent (Hydrus)

46

HORIZON Trial

		CL+MS	CL	Difference
Main selection	Baseline (dB)	26.73 [26.43, 27.03]	26.74 [26.36, 27.18]	0.01 [-0.52, 0.54]
	RoP (dB/year)	-0.26 [-0.36, -0.16]	-0.49 [-0.63, -0.34]	0.23 [-0.40, -0.05]

Microstent lowers the rate of visual field loss per year:

47%

vs cataract surgery alone

Gazzard G, Montesano G, Ometto G. Five-year Visual Field Outcomes from the Multi-center, Randomized, HORIZON trial. AmJournalofOph, Feb 20, 2023.

47

OSD IMPROVEMENT IN IMPLANTED EYES[1]

- Prospective, multicenter trial evaluating four ocular surface metrics 3 months post-stent implantation.
- n=47 eyes
- Other ocular health metrics improved as well:
  - 49% longer time to tear break-up (FTBUT) (p<0.0001)
  - Significantly reduced corneal/conjunctival staining (Oxford Schema) (p<0.0001)
  - Trend toward less hyperemia (Efron Score)

Schweitzer JA, Hauser WH, Ibach M, Baartman B, Gollamudi SR, Crothers AW, Linn JE, Bardsley JP. Prospective Interventional Cohort Study of Ocular Surface Disease Changes in Eyes After Trabecular Micro-Bypass Stent(s) Implantation (iStent or iStent inject) with Phacoemulsification. Ophthalmol Ther. 2020 Aug 13.

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Trabecular Microbypass Stent x 3 (iStent infinite)

Three-stent, standalone procedure

Three wide-flange stents preloaded in injector system, to facilitate placement across ~6 clock hrs. of Schlemm's canal

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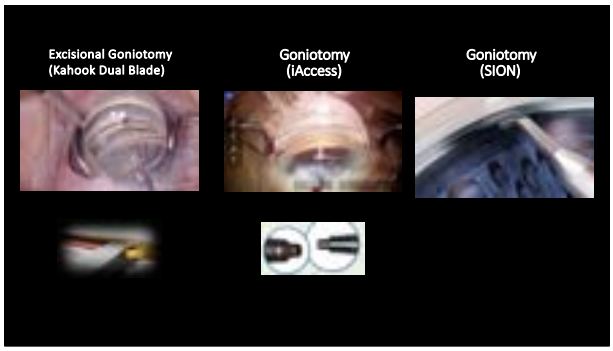

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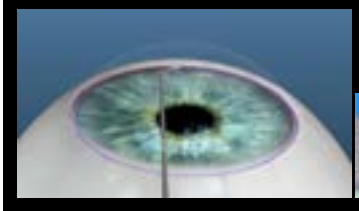
Ab-interno Trabeculotomy + Canaloplasty (OMNI)



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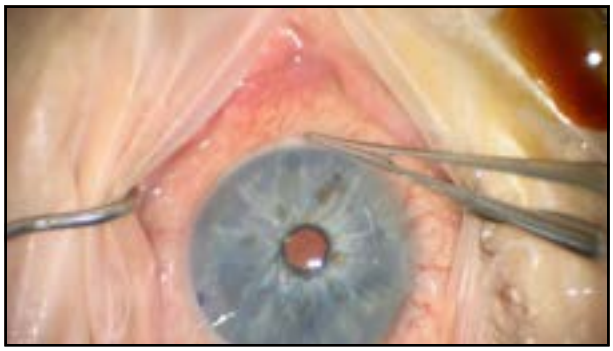
Subconjunctival Stent
(Xen)

Xen 45 Gel Stent
US Pivotal Clinical Trial

	Baseline	12 month
Medicated IOP	25.1 (3.7)	15.9 (5.2)
Glaucoma Meds	3.5 (1.0)	1.7 (1.5)

Hypotony 16 (24.6%)
Bleb Needling 21 (32.3%)

52



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A Peek into The Future…

Elios
- Excimer Laser Technology
- 10 Microchannels in the TM
- Combo with CEX

Vialase
- Femtosecond laser
- Micron-accurate gonio imaging
- Non-invasive
- Customized drainage channels

Camera

Femtosecond Laser

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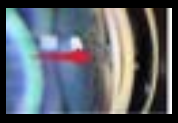
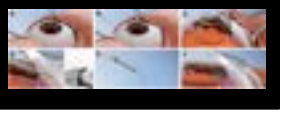
A Peek into The Future…

MINIject
- 5-mm-long uveoscleral device
- 2-year outcomes of 25 patients have shown a 40% reduction of IOP.



Minimally invasive micro-sclerostomy (MIMS)
- Stent-less
- 90-micron diameter cylinder of scleral tissue
- Ab interno approach

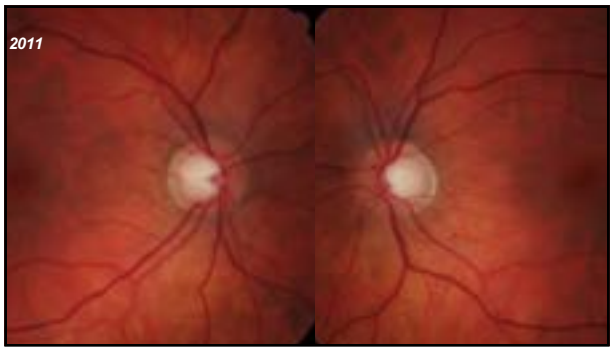


55

55 year old white male

- Suspicious of glaucoma since 2003 (33 years old) based on optic disc appearance

56



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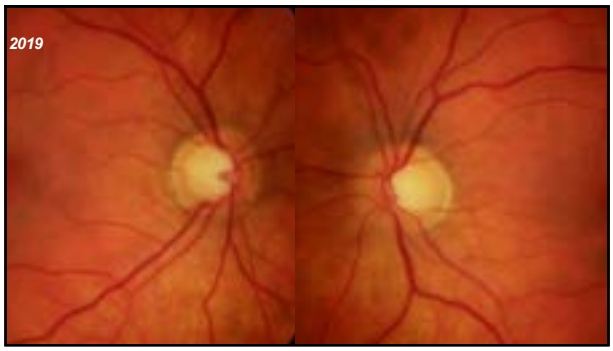

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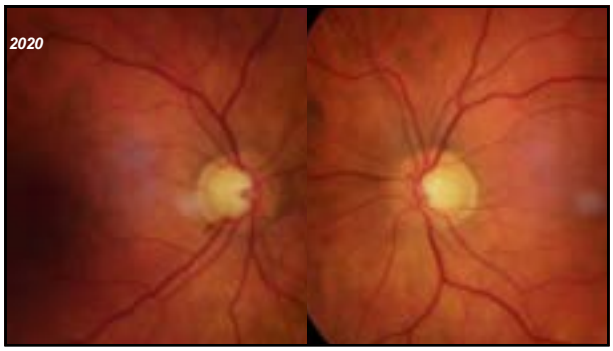

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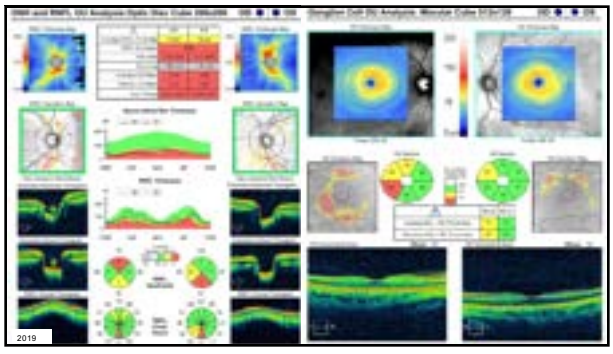

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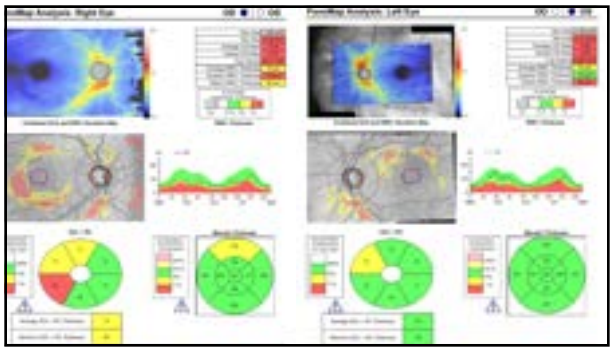

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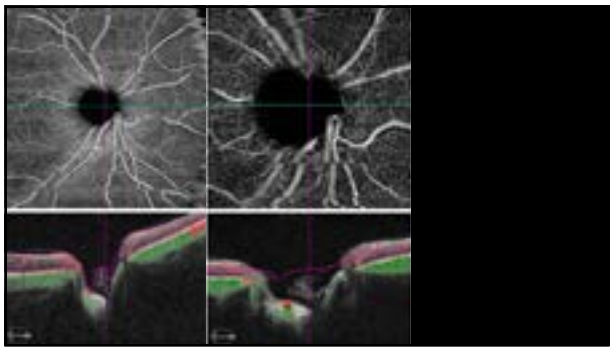

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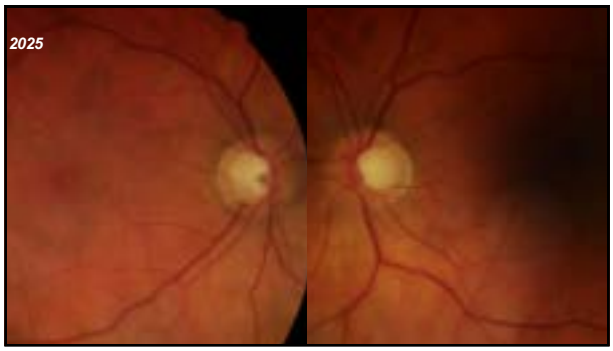

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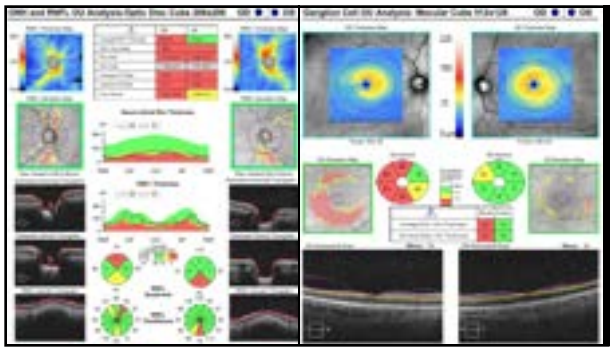

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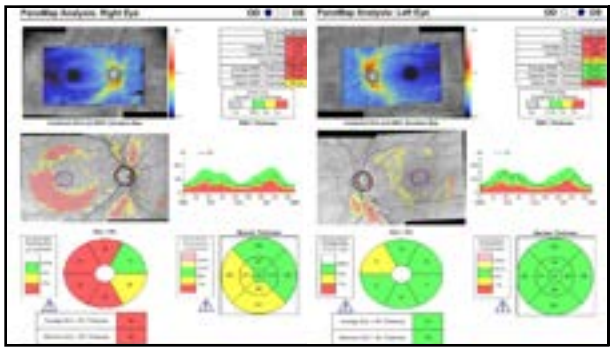

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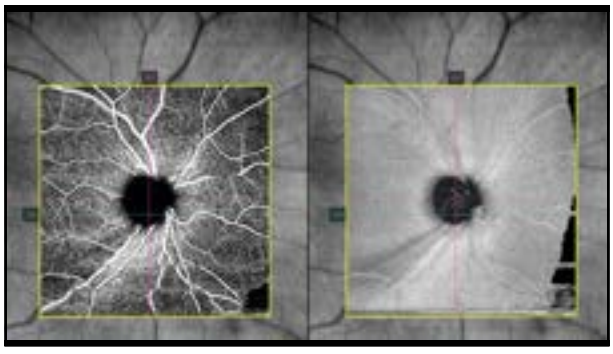

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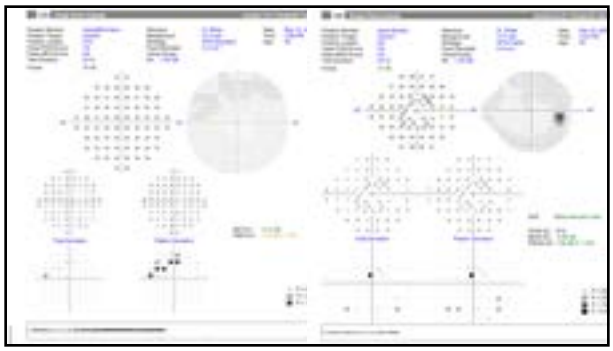

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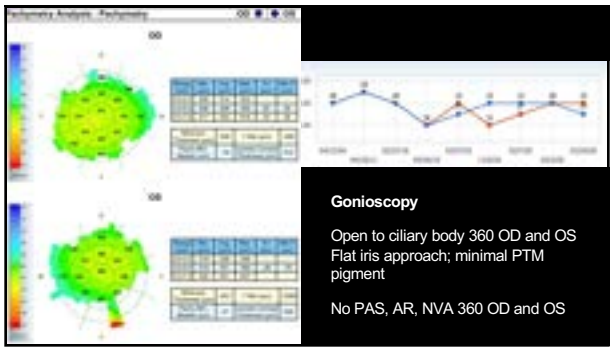
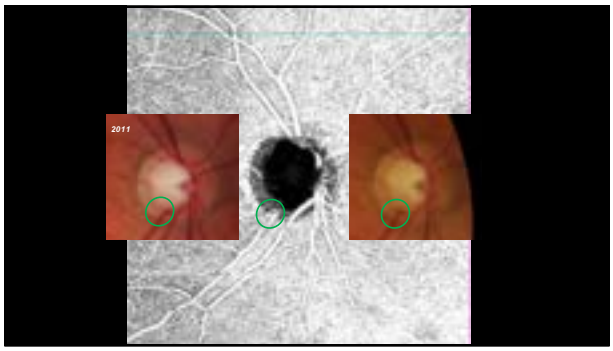


Gonioscopy

Open to ciliary body 360 OD and OS
Flat iris approach; minimal PTM pigment

No PAS, AR, NVA 360 OD and OS

69



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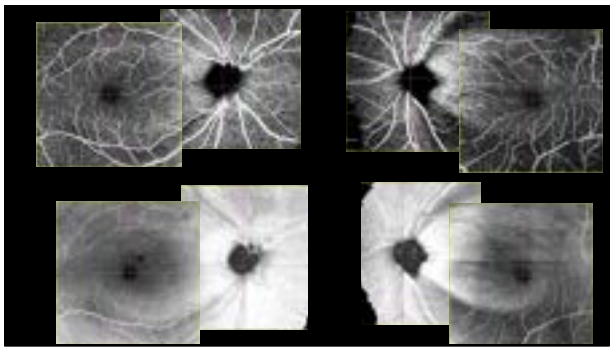

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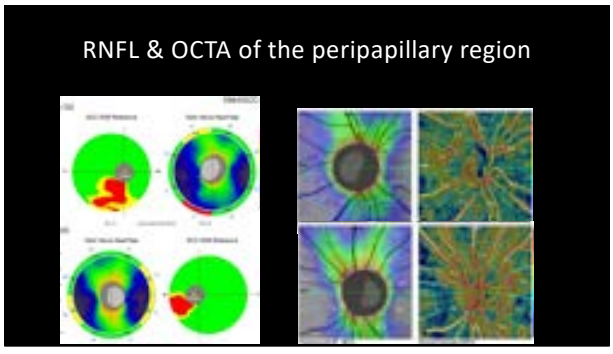

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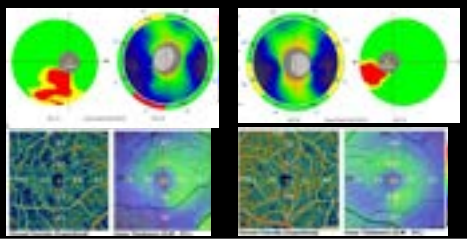
Ganglion Cell Complex Analysis



73

What Happens First?

- Glaucomatous eyes have reduced ocular blood flow
- Reduced peripapillary capillary density may be observed in glaucomatous eyes
- **Does decreased ocular blood flow cause optic neuropathy--or does optic disc damage cause decreased blood flow?**
  - A) Ischemia leads to ganglion cell death
  - B) GC loss results in reduced metabolic demand

74

Chicken or Egg?

- Metaphysical questions have metaphysical answers
- We're clinicians.

75

It's Not Actually That Simple

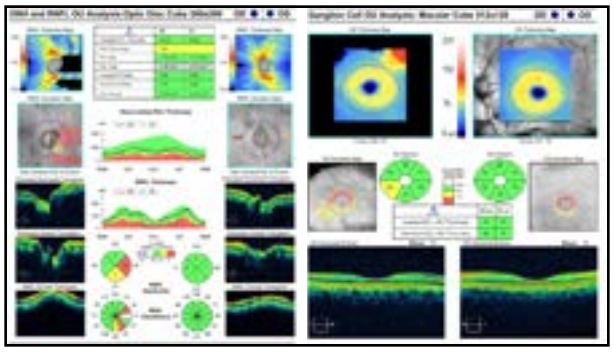
- Neurons, glial cells, cerebral microvascular endothelium function together = neurovascular unit
- Remember, we are limited in a clinical environment by the parameters that we are provided by a device
  - Velocity of blood flow (not yet)
    - Variation of interscan time
  - *Research parameters are developed into clinical parameters-eventually*

76

59 year old female

- Diagnosed with POAG in Haiti about 10 years ago
  - Latanoprost QHS OU
- IOP 16-18mmHg range OD and OS
  - CCT 560um OD 540um OS
- Hypertension
  - Labetalol

77



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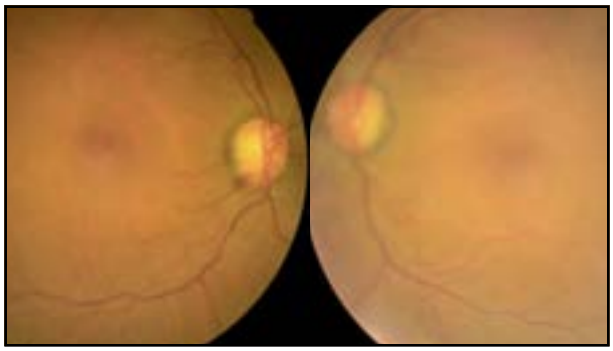

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Ischemic stress? Or mechanical stress?

80

Ocular perfusion pressure

OPP is the difference between blood pressure and IOP

Indirect assessment of ocular blood flow

81

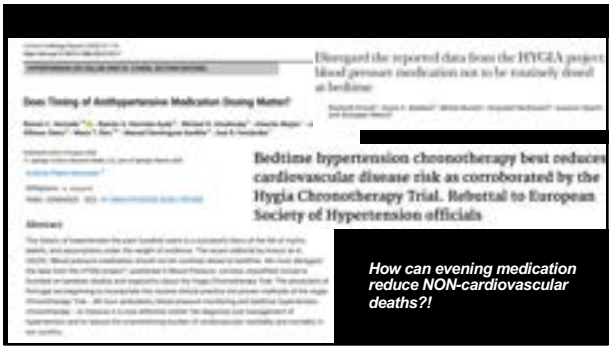
Labetalol(?!)

May be initial therapy in severe disease-or used to treat hypertensive crisis

Non-selective beta blocker; also has alpha blocking activity

Selective beta-blockers: atenolol, metoprolol

82



How can evening medication reduce NON-cardiovascular deaths?!

83

84

61 year old male

- Referred by primary care medicine due to glaucoma history-recently moved from out of state
- Reports glaucoma diagnosis in 2008 with the use of latanoprost QHS OU, dorzolamide-timolol BID OU, and prednisolone acetate 1% TID OD
- BCVA 20/200 OD, 20/100 OS; 2+ APD OD
- Bilateral ptosis; EOM full; no improvement with modified ice pack, no worsening with sustained upgaze

85

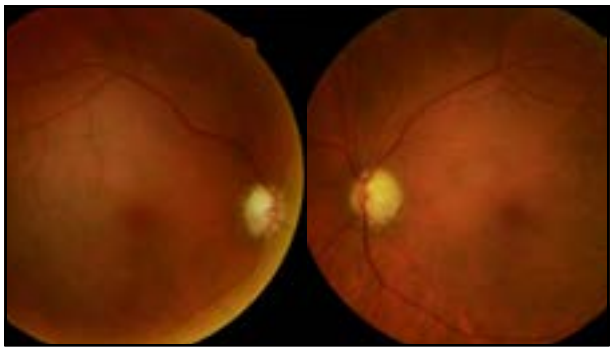
61 year old male

- IOP 7mmHg OD 15mmHg OS
- Gonioscopy open to CBB 360 OD and OS; tube in good position OD
  - No PAS, AR, NVA OD and OS; flat iris approach OD and OS
  - 2+ PTM pigment OD and OS
- SPEED score 2

86

Glaucoma Symptom Scale (1998)

87



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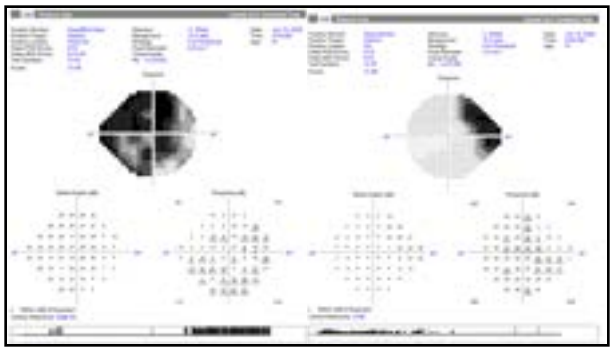


89

61 year old male

- Coordination of low vision services
  - Vocational skills, orientation and mobility training
- Registration with Division of Blind Services
- ***"Doc, is there anything else I can do?"***

90

Nicotinamide and Pyruvate for Neuroenhancement in Open-Angle Glaucoma
A Phase 2 Randomized Clinical Trial

?

Restoration of Blood-Retinal Barrier Integrity Prevents Neurodegeneration in Glaucoma

A Phase 1 Trial of Topical Insulin for Patients with Glaucoma

91

American Glaucoma Society-American Academy of Ophthalmology Position Statement on Nicotinamide Use for Glaucoma Neuroprotection

Aakriti Garg Shukla, MD, MSc, George A. Cioffi, MD, Simon W.M. John, PhD, Qing Wang, MD, PhD, Jeffrey M. Liebmann, MD, on behalf of the American Glaucoma Society and American Academy of Ophthalmology

Accepted Date: 7 January 2025

300 patients dosed across trials; 2 have developed drug-induced liver injury

73 year old woman with POAG and normal liver function

69 year old Chinese woman in Singapore; BMI 15

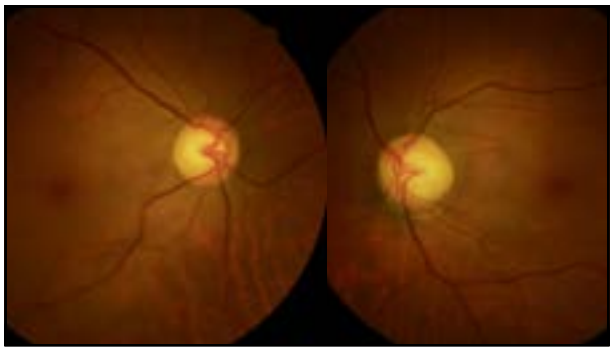
Changed study protocol to LFT at baseline, 1 week, 2 months, 4 months, every 4-6 months

92

67 year old female

- History of primary open angle glaucoma of the left eye in 2022
- Presented taking latanoprost 0.005% QHS OU
- IOP in office 16mmHg OD 17mmHg
  - CCT 554 µm OD 560 µm OS
- ***Is this good?***

93



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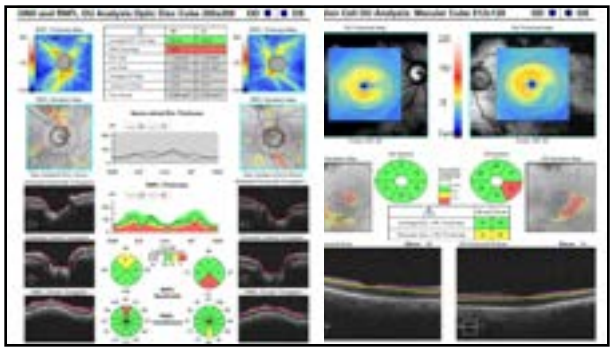

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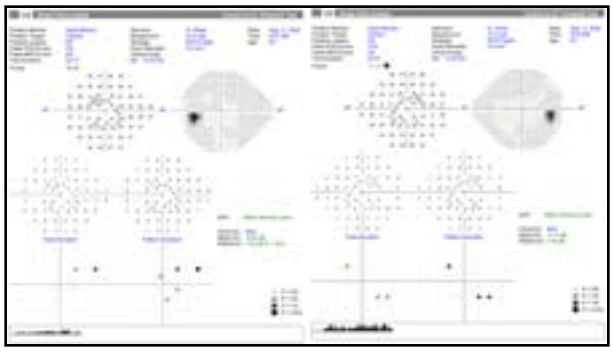

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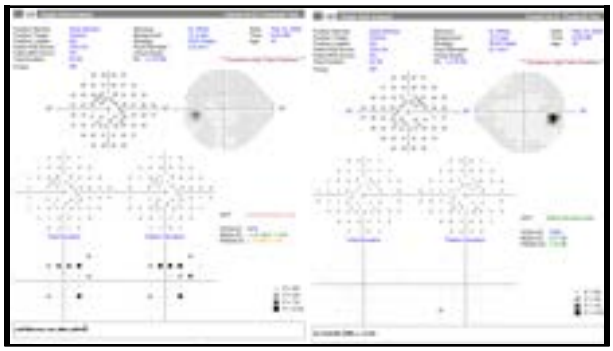


97

Is this good?!

Peak untreated IOP 18mmHg OD and 18mmHg

Treated IOP 16mmHg and 17mmHg OS

Blood pressure: 115/80mmHg on treatment

History of TIA 2011, stroke 2010
Bilateral hip replacement: 2016 & 2017
Fibromyalgia 2018

98

Now what?

Adherence?

Discontinue treatment

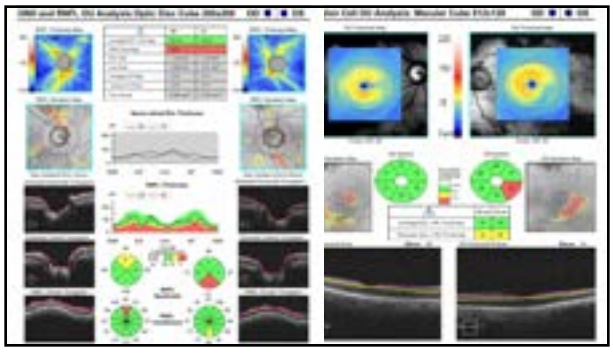
IOP 1 month later: 16mmHg OD 15mmHg OS

99

Evaluation of data gathered on that day—and <u>most</u> importantly, compared to previous data for change over time

100

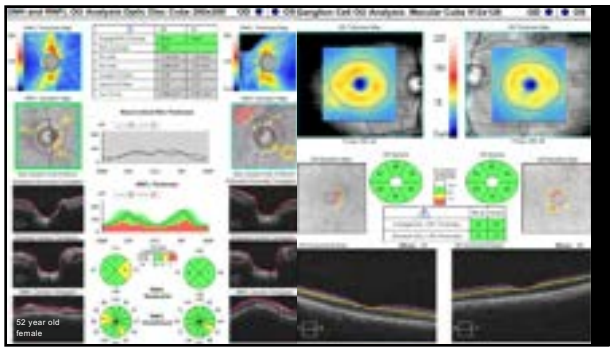
101



102

Does this patient have glaucoma?!

103



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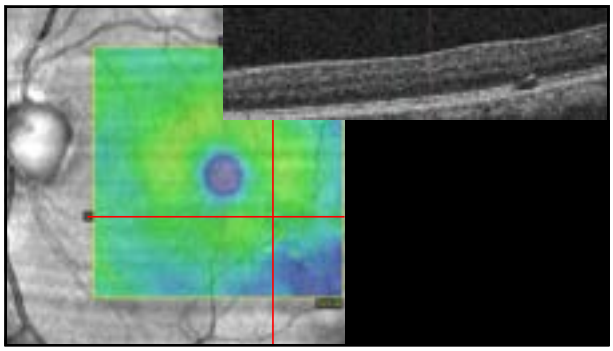

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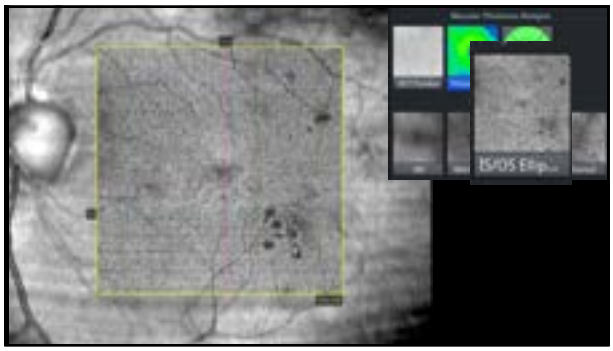

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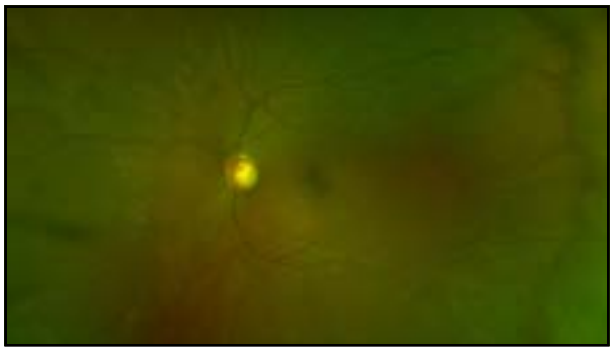

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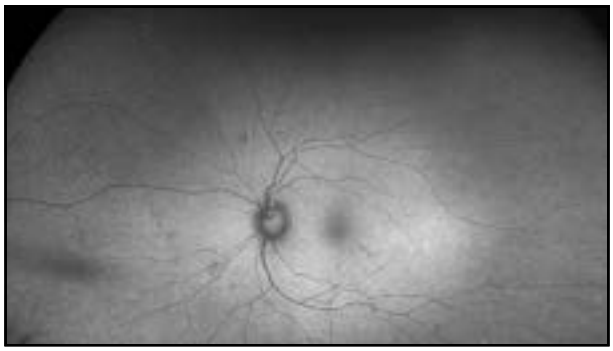

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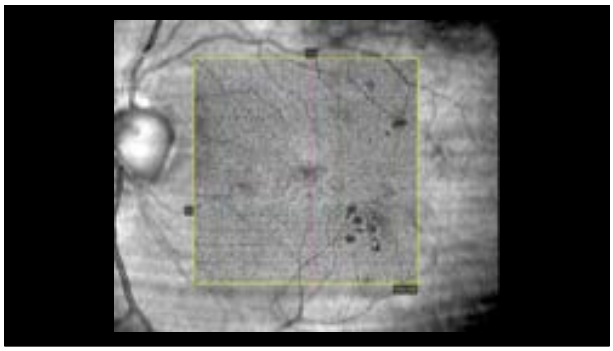

109

What else can cause RNFL defect?...and therefore visual field

Retinal ischemia

Diabetes mellitus, hypertension, systemic lupus erythematosus, HIV

Nonarteritic ischemic optic neuropathy

Optic disc drusen

…

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Thank You!!

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