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
- Avellino – C
- Iveric bio – C
- Ocuphire – C
- Viatris – C
- Thea – C
- Heru – C
- Eyenovia - C

All relevant relationships have been mitigated

2

Beyond Dropout and Defects

Adjunctive Technology and the Importance of Quality of Life in Glaucoma

Justin Schweitzer, OD, FAAO
Vance Thompson Vision
Optometric Externship Director

3

Case

- **57-year-old Caucasian male**
- **Referred for GLC Eval**
- **Medical History:** HTN, Hyperlidpidema
- **BCVA**: 20/20 -1 OU
- TMAX: 24 mmHG OU
- Medications: None

- **IOP**: 21 mm Hg OD; 21 mm Hg OS
- **C/D**: 0.60/0.60 OD 0.70/0.70 OS
- **Pachymetry**: 553 OD; 543 OS
- **Corneal hysteresis**: 8.0 OD 7.4 OS
- **Gonioscopy**: Open to CB OU w/ trace pigment in TM
- SLE: See next slide (s)
- **VF's** – See next slide(s)
- **OCT's** – See next slide(s)
- ONH – See next slide(s)

4

Ocular Surface Assessment

Speed Score: 9/28

Tear Osmolarity:

OD: 308

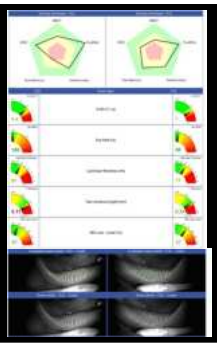
OS: 315

MMP-9: Positive OU

Lids: Normal, (-) blepharitis

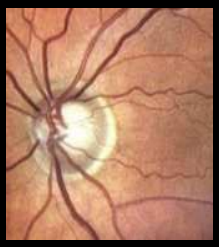
Meibomian glands:

Normal gland secretion



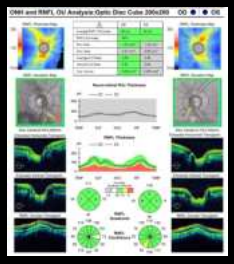
5

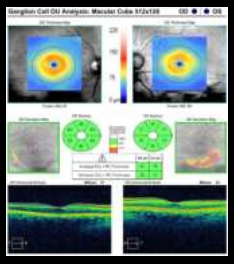
ONH's



6

OCT

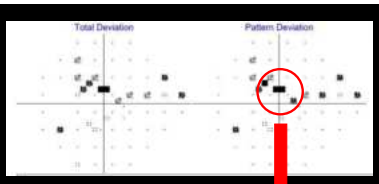




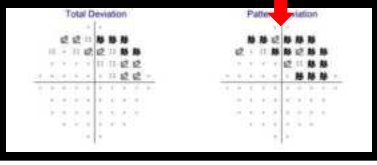
7

OS VFT's

24-2



10-2



8

Treatment Considerations

1. Must Treat the Dryness!
2. Glaucoma Treatment?
   - Monitor
   - Glaucoma Drops
   - SLT
   - Drug Delivery
   - Surgical Intervention

9

Impact of Multiple Glaucoma Medications on Dry Eye Disease

Number of Drops	Incidence of DED among 61 glaucoma patients[1]	Incidence of DED among 19,665 glaucoma patients[2]
1	11%	51%
2	39%	55%
3+	40%	60%

OSDI®-Ocular surface disease index®
1. Fechtner RD et al. Cornea. 2010;29:618-621. 2. Erb C et al. Graefes Arch Clin Exp Ophthalmol. 2008;246:1593-1601. 3. Leung EW et al. J Glaucoma. 2008;17:350-355.

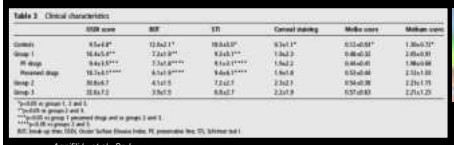
Slide Courtesy of Paul Singh MD

10

Effects on Meibomian Glands

Effect on lids/meibomian glands

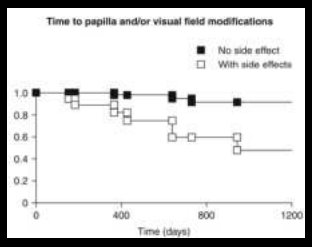
- Study on glaucoma patients 18mo stable treatment with different medications.
- Reduced number of meibomian glands
- Reduced numbers of acinae and increased dysfunction in patients
- Patients on multiple medications with preservatives = increased dysfunction and reduced number of acinae



Agnifili L., et al. Br J Ophthalmol 2013.

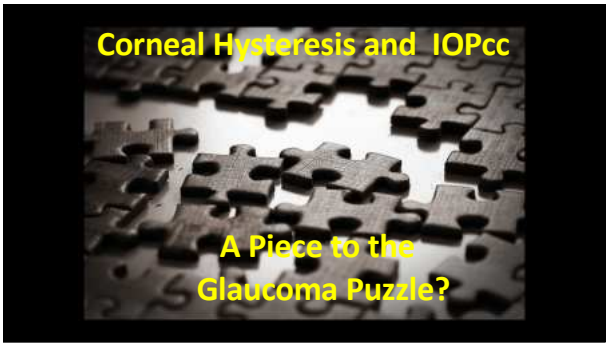
11

Treatment Challenges

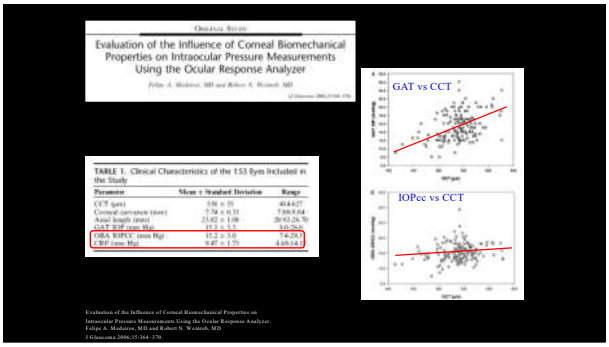


• Denis, Philippe, et al. Medical outcomes of glaucoma therapy from a nationwide representative survey

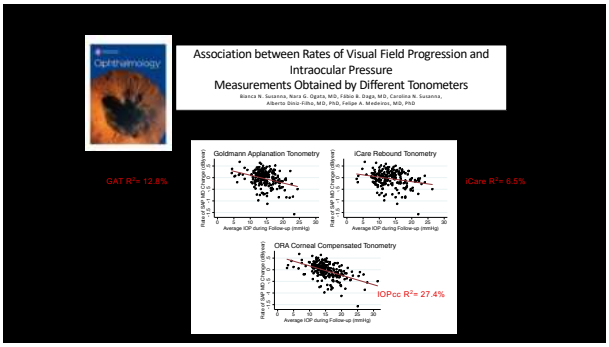
12


Corneal Hysteresis and IOPcc
A Piece to the
Glaucoma Puzzle?

13


Evaluation of the Influence of Corneal Biomechanical Properties on Intraocular Pressure Measurements Using the Ocular Response Analyzer
GAT vs CCT
IOPcc vs CCT

14


Association between Rates of Visual Field Progression and Intraocular Pressure Measurements Obtained by Different Tonometers
Goldmann Applanation Tonometry
iCare Rebound Tonometry
ORA Corneal Compensated Tonometry
GAT R²= 12.8%
iCare R²= 6.5%
IOPcc R²= 27.4%

15

Corneal Hysteresis (CH)

Corneal Hysteresis reflects the ability of the corneal tissue to dissipate energy [1]

Function of viscoelastic damping[2]

Provides insight into ocular properties that were not previously understood or conceived of

1. Luce DA. *J Cataract Refract Surg.* 2005;31:156-162.
2. Dupps WJ Jr. *J Cataract Refract Surg.* 2007;33:1499-1501.
3. Glass DH et al. *Invest Ophthalmol Vis Sci.* 2008;49:3919-3926.

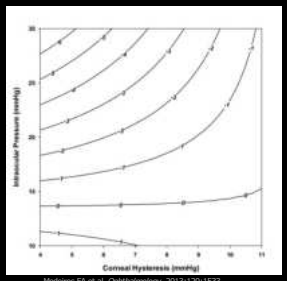
16

Average CH in Normal Subjects

	N	CH
Brazil	105	10.1 +/- 1.8
UK	272	10.2 +/- 1.2
China	125	10.9 +/- 1.5
Japan	204	10.2 +/- 1.3
Spain	88	10.8 +/- 1.5
USA	44	10.5 +/- 1.2

17

CH as a Predictor of Progression



Medeiros FA et al. *Ophthalmology.* 2013;120:1533-1540.

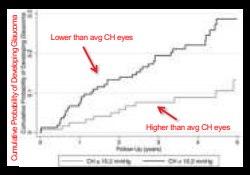
18

Corneal Hysteresis in Glaucoma
Predictive of conversion to Glaucoma in pre-perimetric Glaucoma Suspects

Purpose: To investigate the role of CH as a risk factor for **development** of glaucoma in a prospective longitudinal study.

Results: Fifty four (19%) of the 287 eyes developed repeatable visual field defects during a 4 year follow-up.

CH was *independently* predictive of conversion to glaucoma even when adjusted for age, IOP, and CCT.

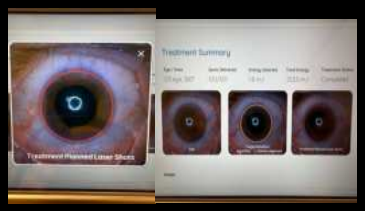


A Prospective Longitudinal Study to Investigate Corneal Hysteresis as a Risk Factor for Predicting Development of Glaucoma
Am J Ophthalmol. 2018 Mar; 187: 148–152. Felix Zhu , Alberto Diaz Rito, Linda M. Zangwill , Felipe A. Medeiros

19

19

Case Summary:



Ocular Surface Treatment:
1. Immunomodulator bid OU
2. Punctal Occlusion

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

20

20

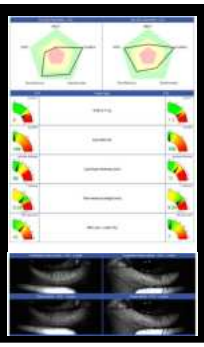
Case- Demographics & Entrance Testing

- Glaucoma Evaluation – patient had previous CEX
- IOPcc → 14, Tmax 20 / 14, Tmax 20 GAT → 14 / 14
- Meds: Artificial tears, PGA qd OU, fixed combo bid OU
- PACH → 550 / 560 CH → 7.2 / 7.2
- C/D → 0.75v / 0.80v
- Gonio: open to CB OU, mild pigment

21

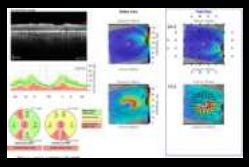
Ocular Surface Assessment

Speed Score: 12/28
Tear Osmolarity:
OD: 320
OS: 321
MMP-9: Positive OU
Lids: Normal, (-) blepharitis
Meibomian glands:
Turbid, minimal secretion



22

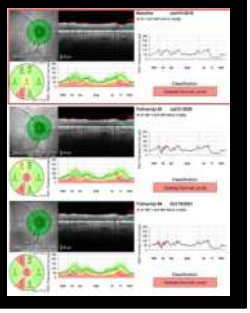
OCT



July 2021

July 2022

July 2023



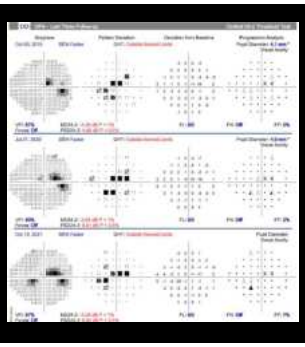
23

VFT

July 2021

July 2022

July 2023

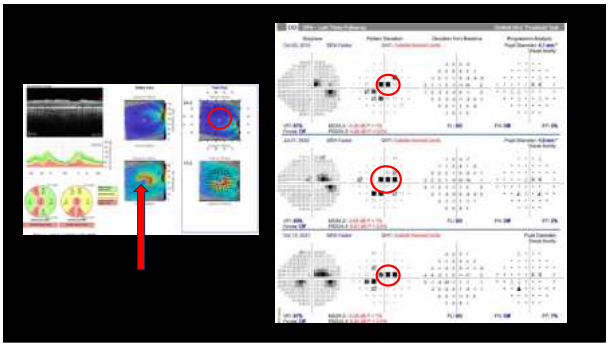


PSD 4.96

PSD 5.51

PSD 6.82

24



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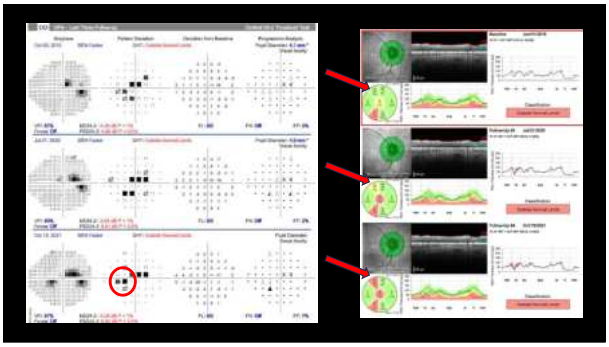


26

Treatment Considerations

1. Must Treat the Dryness!
2. Glaucoma Treatment?
   a. Progression with Low IOP?
   b. Minimize Medication Burden?
      Drug Delivery, Surgery, SLT
   c. CH Low?

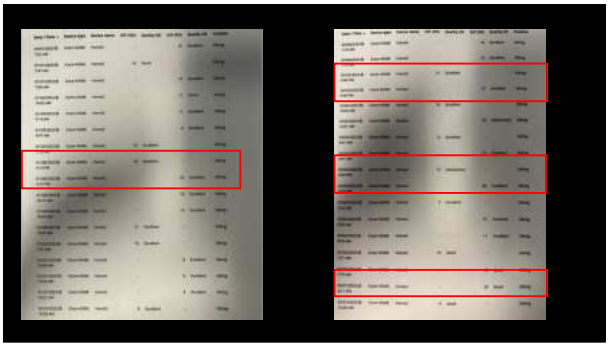
27

Home IOP Monitoring

A device is intended as an adjunct for monitoring IOP of adult patients (self-use). The tonometer is designed for use at home or on the go.




28



29

Corneal Hysteresis in Glaucoma
Association with Normal Tension Glaucoma

- 82 progressing eyes of NTG patients under treatment
- Eyes were split into two groups: higher & lower than average CH

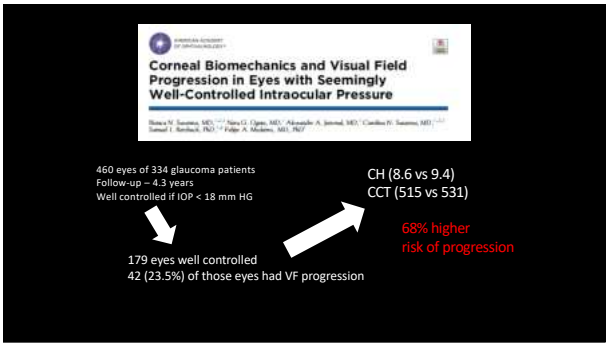
	β (95% CI)	*P* Value
Baseline VF MD (dB)	1.18 (0.96 to −1.44)	0.12
CCT (μm)	0.99 (0.97 to 1.01)	0.35
Subfoveal choroidal thickness	0.99 (0.98 to 1.00)	0.08
RNFL thickness (average)	0.96 (0.92 to 0.99)	0.04
RNFL thickness (temporal)	0.97 (0.94 to 1.01)	0.09
RNFL thickness (inferior)	0.98 (0.96 to 1.01)	0.13
Corneal Hysteresis (mmHg)	0.32 (0.17 to 0.62)	<0.01

- Of the **39 eyes with low CH, 26 (66.7%) showed progression**
- Of the **43 eyes with high CH, 15 (34.9%) showed progression**

These findings suggest that CH can be used as one of the prognostic factors for progression, independent of corneal thickness or IOP

Park EI. Al Br J Ophthalmol. 2015 Jan 2. pii: bjophthalmol-2014-305862. doi: 10.1136/bjophthalmol-2014-305862.

30



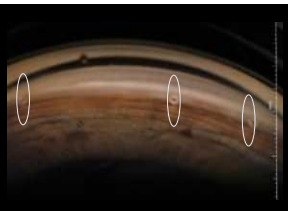
31

Ocular Sparing

- Neurostimulation
- IPL
- Heat & Expression
- Nutraceuticals
- Oral Medications

32

Case Summary:



Ocular Surface Treatment:
1. Varenicline bid
2. Punctal Occlusion
3. Heat and Gland Clearing
4. Maintenance Therapy

IOP @ 3 months:
13 mm Hg OD; 13 mm Hg OS
No medications

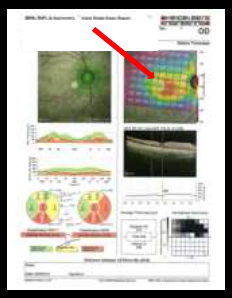
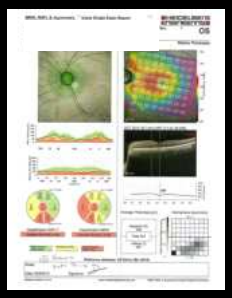
33

Case

- **56-year-old Caucasian female**
- **Medical History:** HTN
- **Family History:** HTN, DM
- **BCVA**: 20/20 +1 OU
- TMAX: Unknown
- Medications: None

- **IOP**: 23 mm Hg OD; 18 mm Hg OS
- **C/D**: 0.65/0.65 OD 0.65/0.65 OS
- **Pachymetry**: 545 OD; 545 OS
- **Corneal hysteresis**: 10.5 OD 10.5 OS
- **Gonioscopy**: Open to CB OU w/ trace pigment in TM
- SLE: Unremarkable
- **VF's** – See next slide
- **OCT's** – See next slide

34

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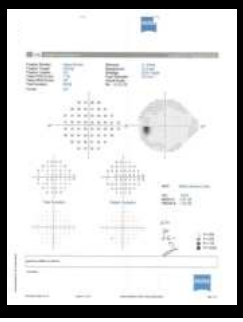
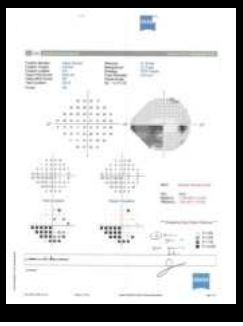

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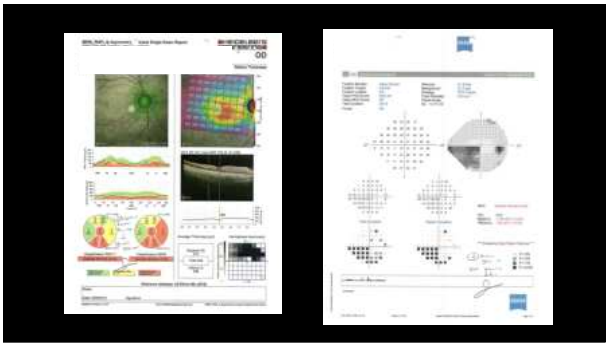

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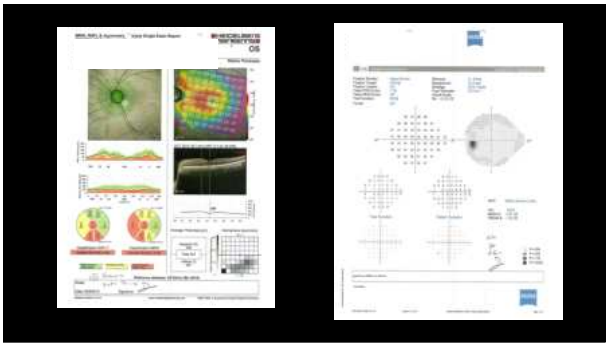


38

Case Considerations

Other Technology To Assist?

Understanding Artifacts

Understanding Red vs Green Disease

Repeat Testing

39

OCT Angiography: the Next Chapter

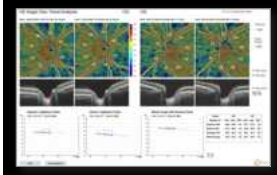


Image courtesy of Eric D. Mudleman, MD and Michael H. Goldbaum, MD of Shiley Eye Institute, University of California at San Diego, La Jolla, CA

Correlates well with OCT Technology

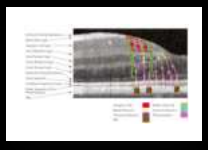
Utilization:
- High Myopia
- Advanced Glaucoma

Rao HL, Pradhan ZS, Suh MH, Moghimi S, Mansouri K, Weinreb RN. Optical Coherence Tomography Angiography in Glaucoma. J Glaucoma. 2020 Apr;29(4):312-321. doi: 10.1097/IJG.0000000000001463. PMID: 32053551; PMCID: PMC7117982.

40

Electroretinography

Measures the electrical responses of various cell types in the retina, including the **photoreceptors** (rods and cones), **inner retinal cells** (bipolar and amacrine cells), and the **ganglion cells** in response to a stimulus.

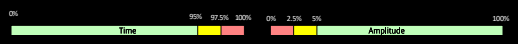


42

Interpretation

How should I think about yellow/red results?

Yellow and red results require closer attention and other tests to confirm disease.



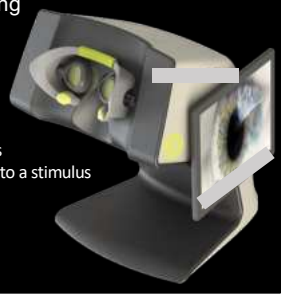
SLOW IMPLICIT TIMES
- Too Slow: Possibly indicative of cellular stress

AMPLITUDES
- Too Small: Possibly indicative of cell damage

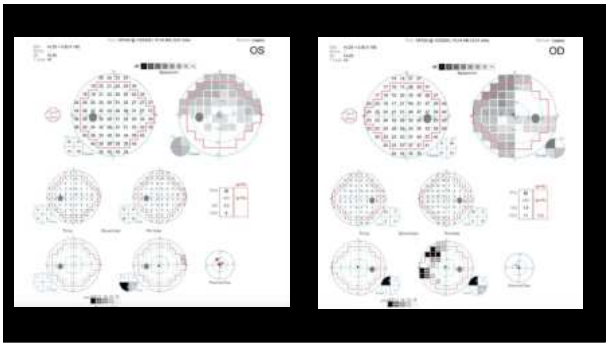
43

Objective Visual Field Testing

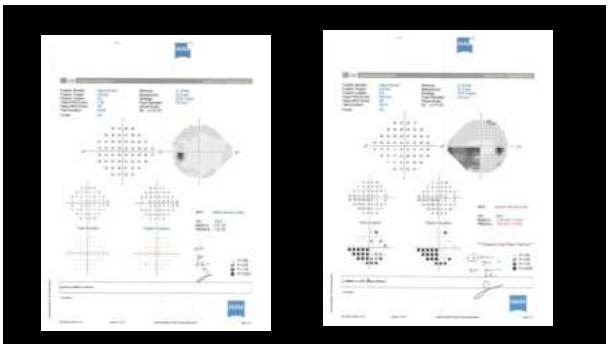
FDA 510(K) Cleared
Tests OU simultaneously in 7 minutes
Measures the response of the pupils to a stimulus



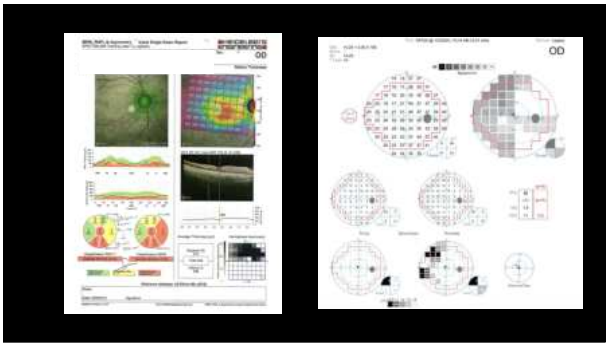
44



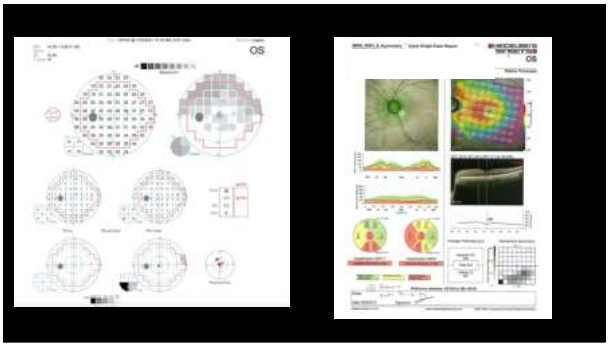
45



46



47

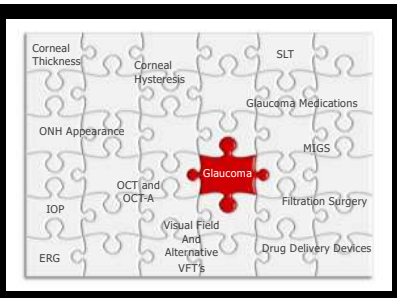


48

Case Summary:

IOP @ 6 weeks:
13 mm Hg OD; 13 mm Hg OS
No medications

49



justin.schweitzer@vancethompsonvision.com

50