Case Files In Glaucoma

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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, Topcon, Envision Health Technologies, LKC
- Shareholder-Clearside Biomedical, Annexon Bio (<0.01% ownership)

- *All relevant relationships have been mitigated*

DISCLOSURES FOR DR SCHMIDT

- Dr Schmidt is a consultant or advisor for the following:
  - Tarsus
  - Allergan
  - B&L
  - Tenpoint Pharmaceuticals
  - Topcon
  - Orasis
  - Glaukos
  - Sun Pharmaceuticals
  - Thea Pharmaceuticals
  - Sight Science
  - Alcon
  - Apellis
  - Sydnexis
  - Visus
  - Harrow Pharmaceuticals
  - Lenz Therapeutics

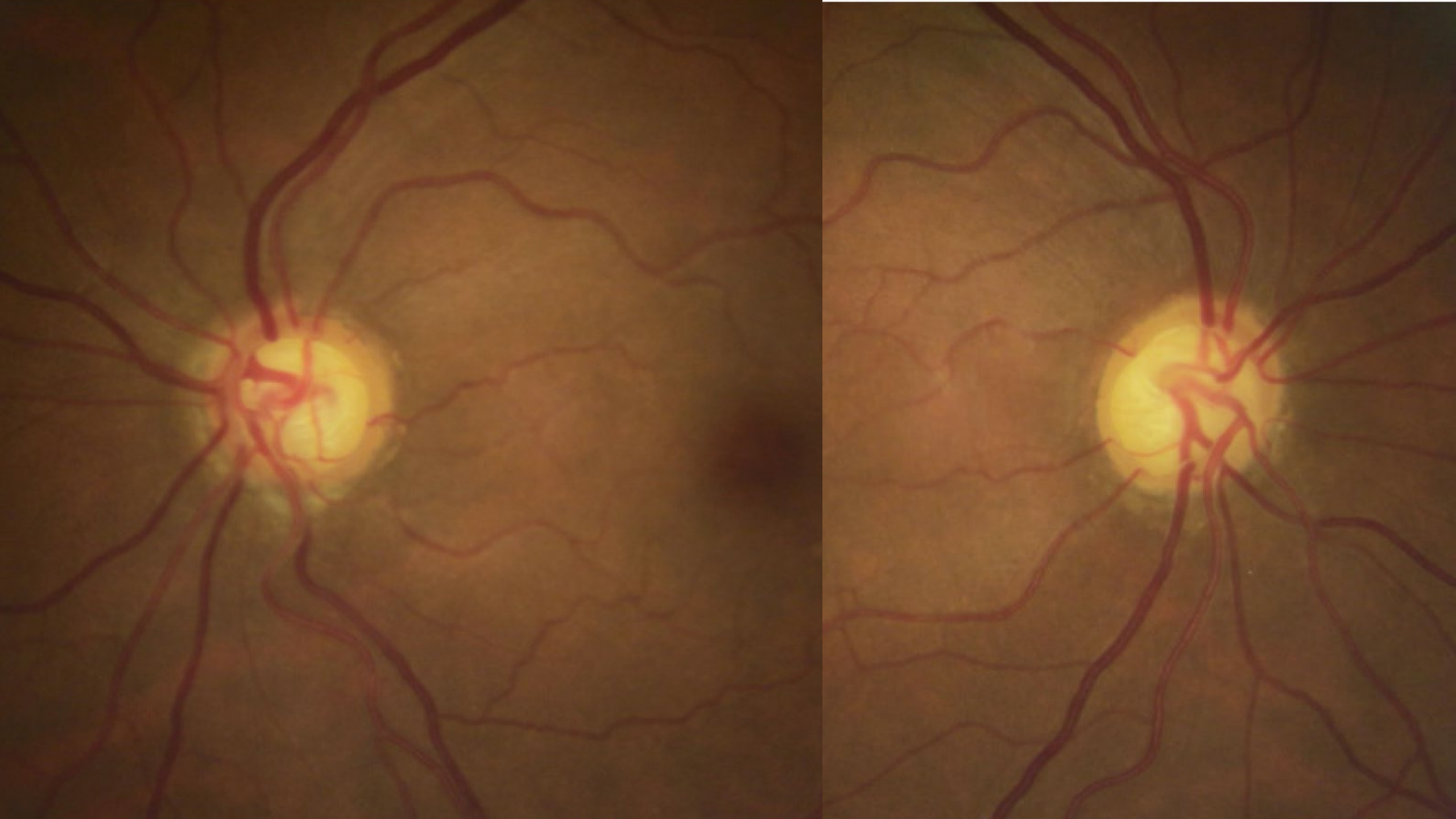
  - All relevant financial relationships have been mitigated

64 year old female

Diagnosed with POAG in her 30s with disease progression until IOP within 7-9mmHg range

Netarsudil-latanoprost QHS OU, dorzolamide-timolol BID OU

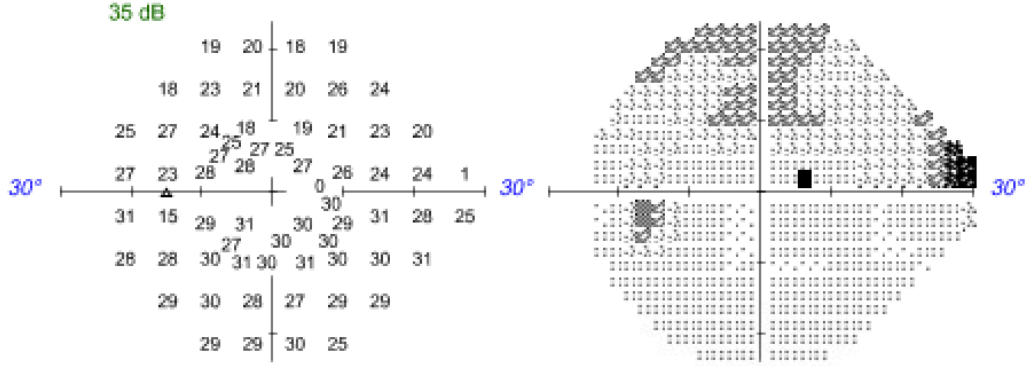
CCT 477µm OD 495µm OS

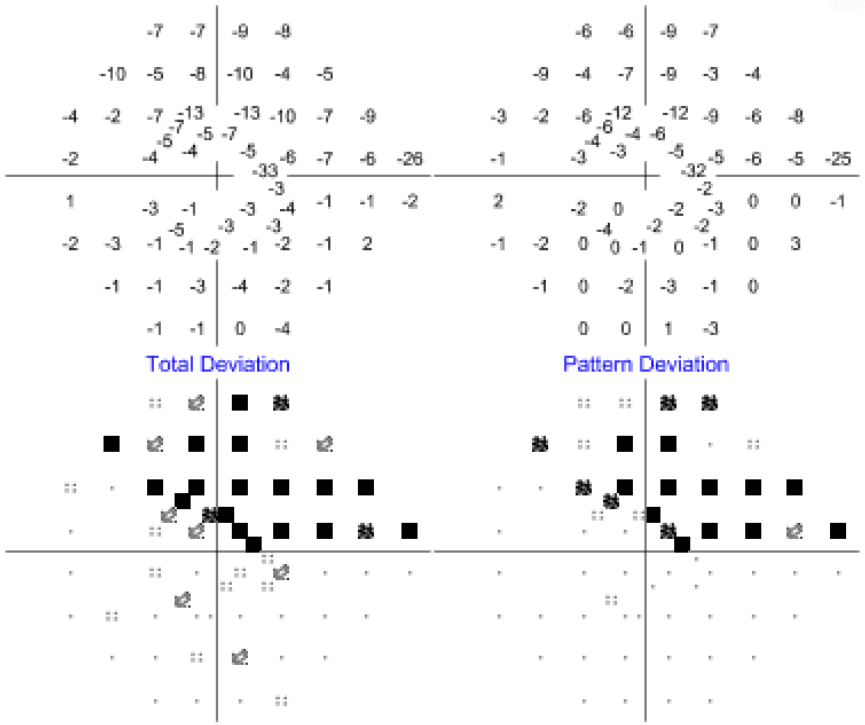


OS Single Field Analysis — Central 24-2C Threshold Test

Fixation Monitor:	Blind Spot	Stimulus:	III, White	Date:	Jan 26, 2022
Fixation Target:	Central	Background:	31.5 asb	Time:	10:37 AM
Fixation Losses:	8/12 XX	Strategy:	SITA Faster	Age:	60
False POS Errors:	9%	Pupil Diameter:			
False NEG Errors:	17%	Visual Acuity:			
Test Duration:	03:33	Rx:	+3.00 DS		
Fovea:	35 dB				

*** Low Test Reliability ***





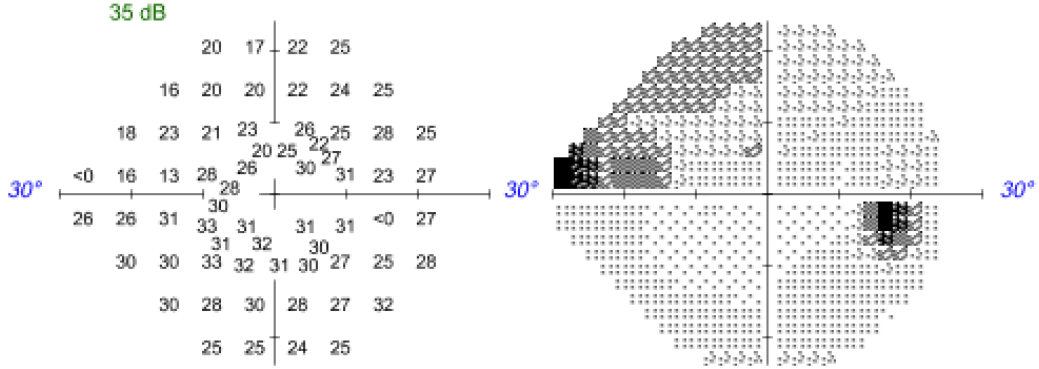
GHT: Outside Normal Limits

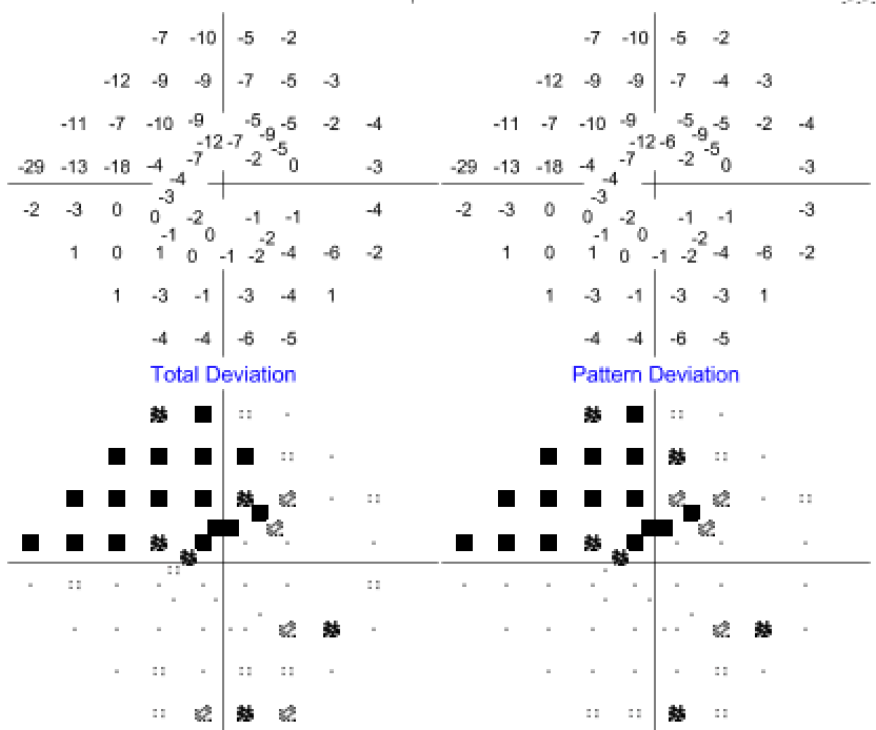
VFI24-2C: 86%
MD24-2C: -4.91 dB P < 0.5%
PSD24-2C: 5.67 dB P < 0.5%

:: P < 5%
P < 2%
P < 1%
P < 0.5%

OD Single Field Analysis — Central 24-2C Threshold Test

Fixation Monitor:	Gaze Monitor	Stimulus:	III, White	Date:	Jan 26, 2022
Fixation Target:	Central	Background:	31.5 asb	Time:	10:31 AM
Fixation Losses:	0/0	Strategy:	SITA Faster	Age:	60
False POS Errors:	9%	Pupil Diameter:	4.7 mm *		
False NEG Errors:	14%	Visual Acuity:			
Test Duration:	03:04	Rx:	+3.00 DS		
Fovea:	35 dB				





GHT: Outside Normal Limits

VFI24-2C: 88%
MD24-2C: -4.60 dB P < 1%
PSD24-2C: 4.97 dB P < 0.5%

:: P < 5%
P < 2%
P < 1%
P < 0.5%

64 year old female

Diagnosed with POAG in her 30s with disease progression until IOP within 7-9mmHg range

Netarsudil-latanoprost QHS OU, dorzolamide-timolol BID OU

CCT 477µm OD 495µm OS

Is Corneal Thickness an Independent Risk Factor for Glaucoma?

Felipe A. Medeiros, M.D., Ph.D. and **Robert N. Weinreb, M.D.**
Hamilton Glaucoma Center, University of California San Diego, La Jolla, CA

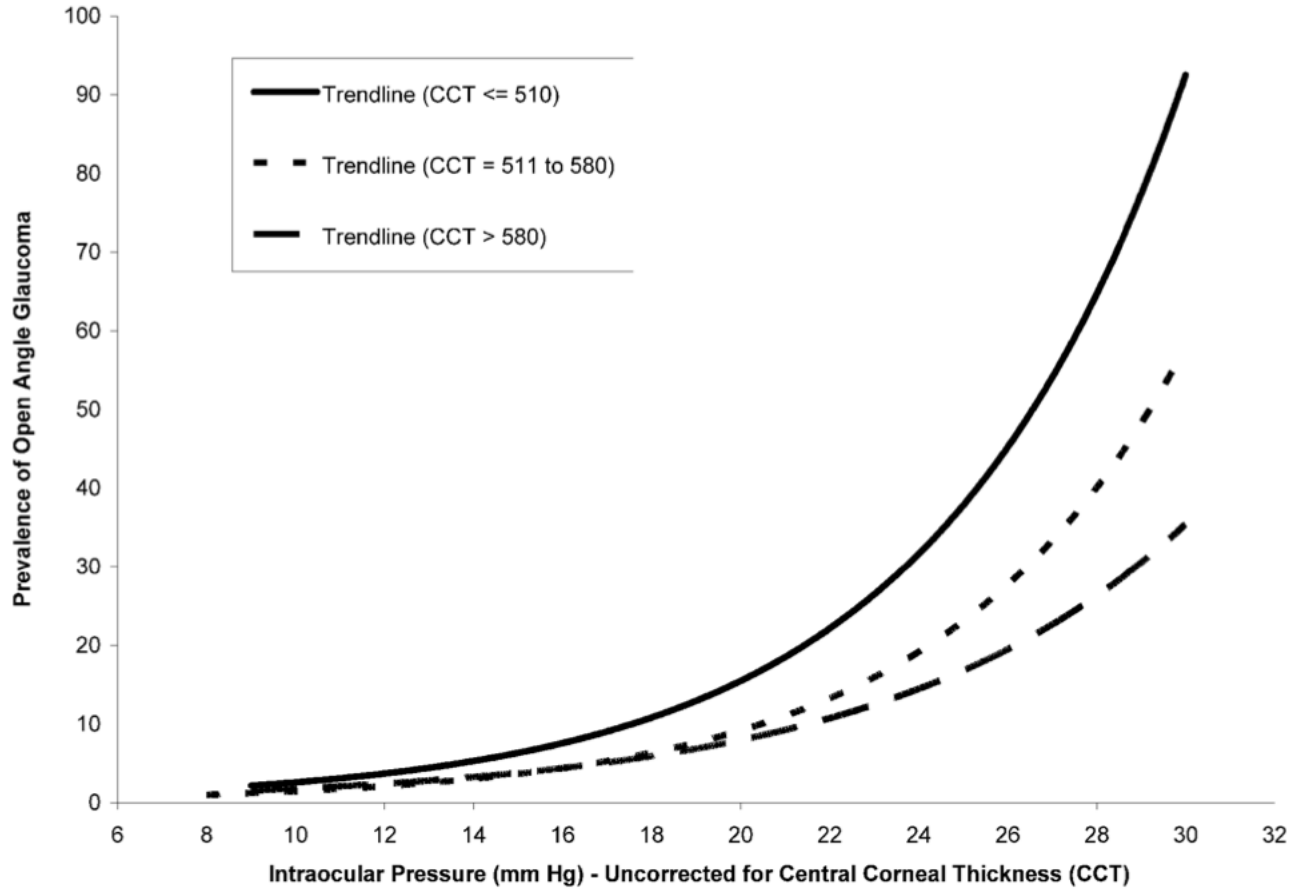
Ophthalmology. 2012 March ; 119(3): . doi:10.1016/j.ophtha.2012.01.018.

In conclusion, the results of Brandt et al suggest that the use of CCT correction formulas for GAT measurements is probably of little value in clinical practice. Instead of attempting to use these formulas, clinicians are probably better off incorporating risk information as provided by validated predictive models for glaucoma development.[6, 7] However, the conclusion that CCT is a true independent risk factor for glaucoma is not validated at this time and requires further investigations.

Intraocular Pressure, Central Corneal Thickness, and Prevalence of Open-Angle Glaucoma: The Los Angeles Latino Eye Study

Brian A. Francis, MD, MS[1], Rohit Varma, MD, MPH[1,2], Vikas Chopra, MD[1], Mei-Ying Lai, MS[2], Corina Shtir, MS[2], Stanley P. Azen, PhD[2], and **Los Angeles Latino Eye Study Group[3]**

Am J Ophthalmol. 2008 November ; 146(5): 741–746. doi:10.1016/j.ajo.2008.05.048.



Decoding the Cornea-Glaucoma Association: Evidence From Mendelian Randomization

Victor A. de Vries,[1,2] Anita Szabo,[3] Joëlle E. Vergroesen,[1,2] Siyin Liu,[3,4] Karin A. van Garderen,[1,2] Kirithika Muthusamy,[4] Petra Liskova,[5] Lubica Dudakova,[5] Anthony P. Khawaja,[6] Stephen J. Tuft,[3,4] Caroline C. W. Klaver,[1,2,7,8] Alice E. Davidson,[3,4] and Wishal D. Ramdas[1]

Conclusions. We found no evidence for a causal link between CCT and OAG. Nevertheless, CCT measurements are still valuable for population-based risk stratification. We found no clear relationship between FECD and OAG.

64 year old female

Recently underwent lower lid blepharoplasty

Reports ongoing left ocular irritation > 6 weeks post-operatively

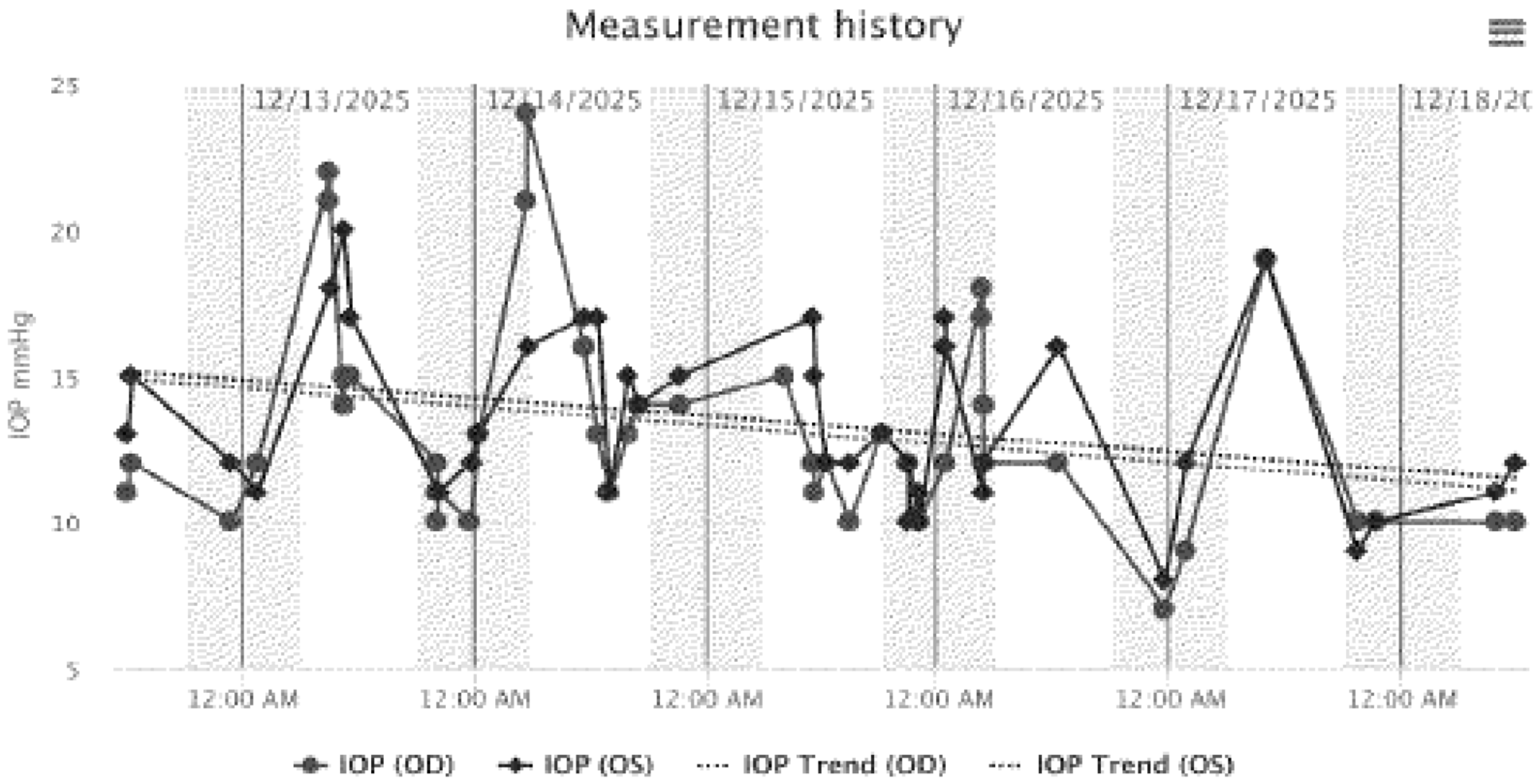
Surgeon suggested discontinuing dorzolamide-timolol

64 year old female

IOP 11mmHg OD and OS (netarsudil-latanoprost QHS OU)

Advocate for SLT…anticipated effect?

iCare Home2


Measurement history
25
20
15
10
5
IOP mmHg
12/13/2025
12/14/2025
12/15/2025
12/16/2025
12/17/2025
12/18/2(
12:00 AM
12:00 AM
12:00 AM
12:00 AM
12:00 AM
12:00 AM
IOP (OD)
IOP (OS)
IOP Trend (OD)
IOP Trend (OS)

64 year old female

Now what?!

Restart dorzolamide-timolol BID OU; SLT OU

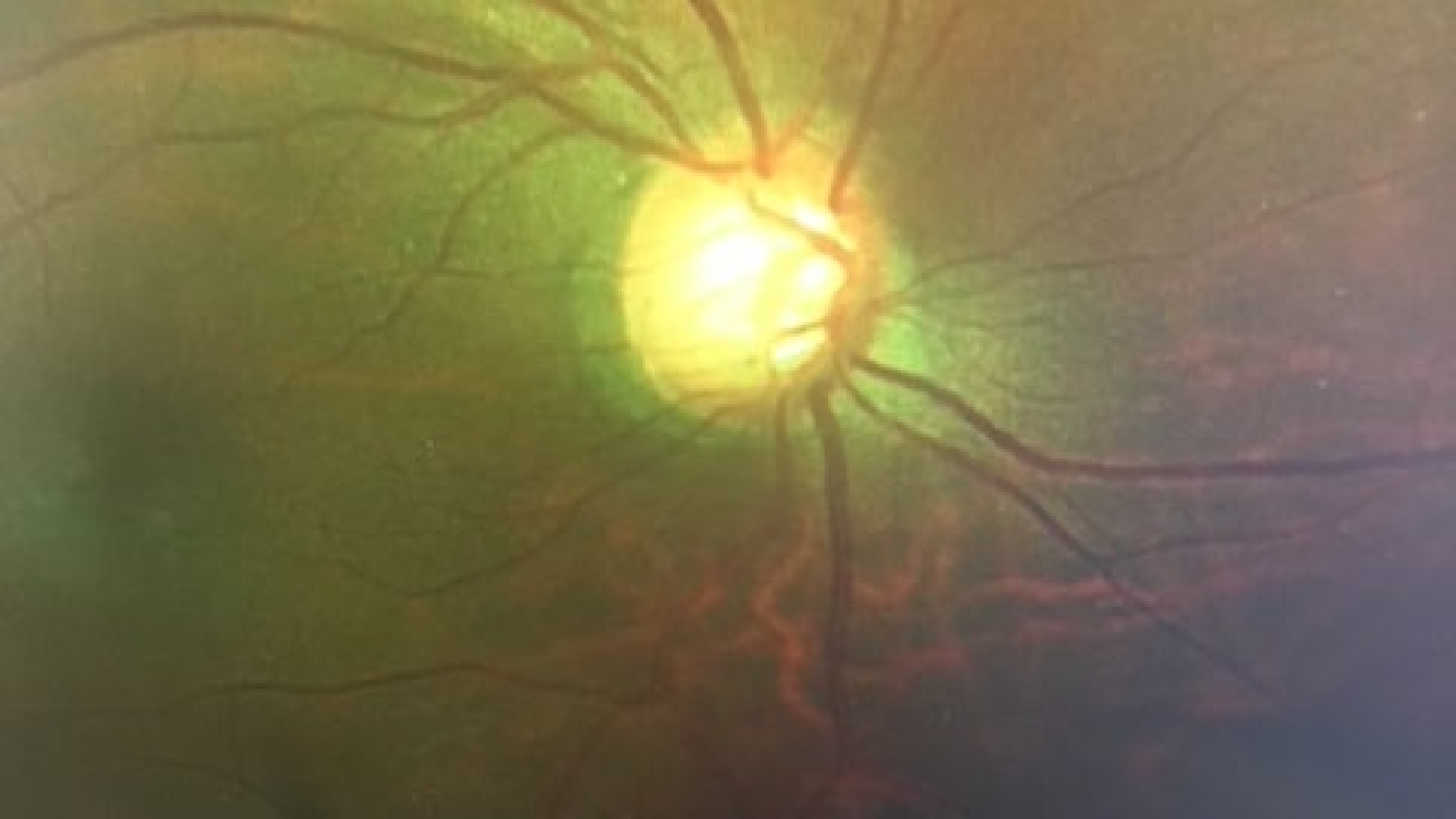
Looking ahead…

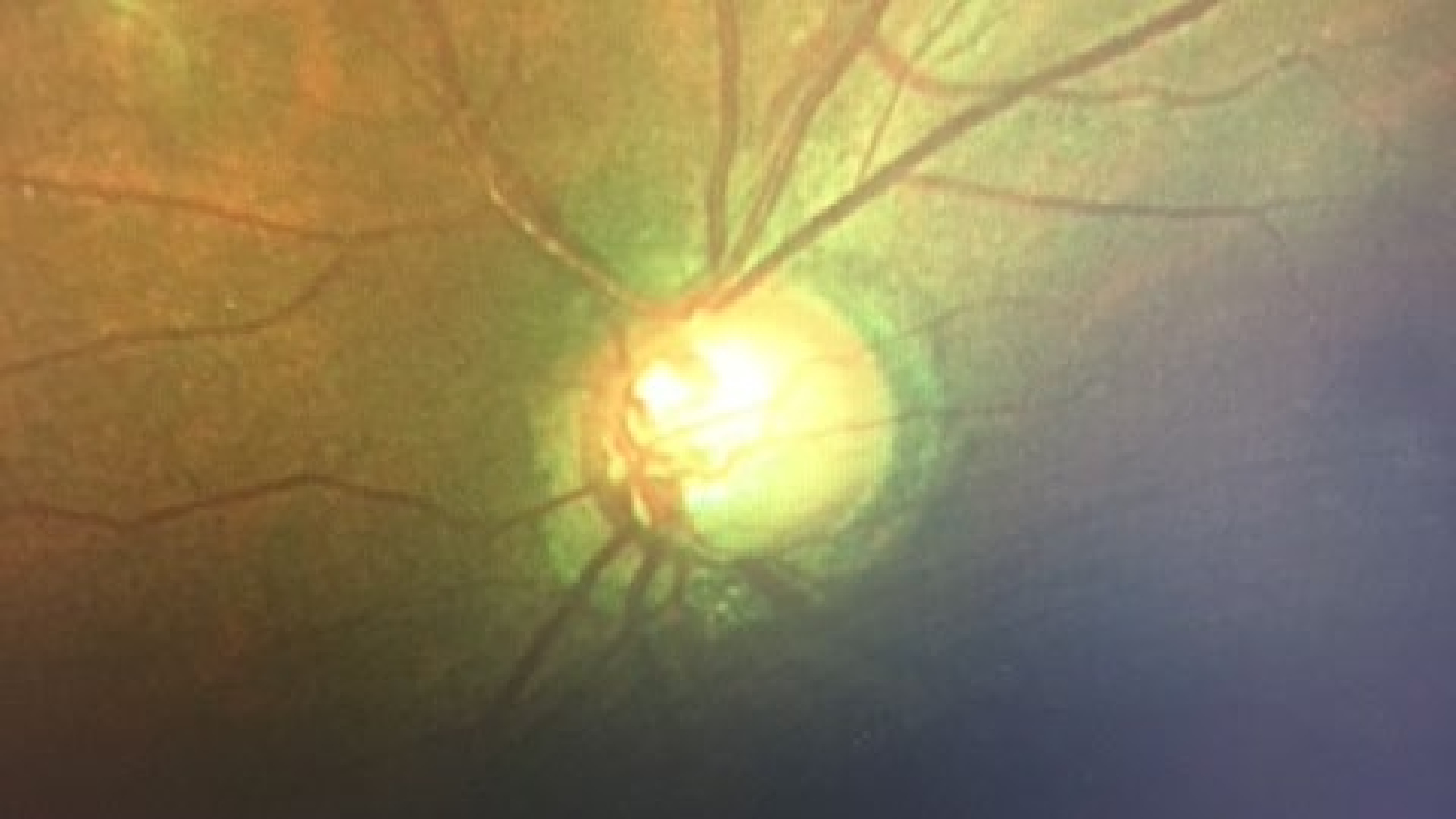
WHAT THE FACE?!?!?

- 46 y/o WF
- No complaints
- Post Lasik x 12 yrs- stable RE
- Referred because of suspicious disks (by a new eye doctor)

EXAM SPECIFICS

- VA – 20/20 OD, OS w/out RX
- Slit lamp exam – Well apposed LASIK flaps OU
- Gonio – Gr 4 360 degrees OU
- IOP – 14mm Hg OD, 18mm Hg OS
- Pachymetry - 456 OD, 442OS
- Normal Fundus Exam – Except for…





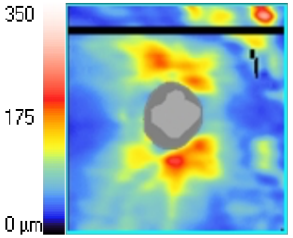
SO WHAT NOW DR GENIUS??

- Any Questions?
- Obviously more testing is needed
- But WTF??

Gender:	Female	Serial Number:	4000-7182 4000-7182
Technician:	Operator, Cirrus	Signal Strength:	7/10 7/10

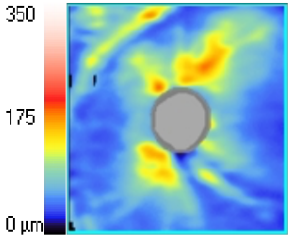
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD ● ● OS

RNFL Thickness Map

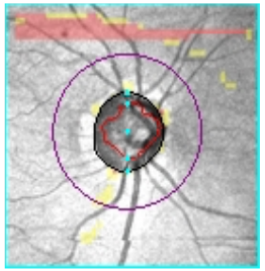


	OD	OS
Average RNFL Thickness	98 µm	87 µm
RNFL Symmetry	85%	
Rim Area	1.18 mm²	0.72 mm²
Disc Area	2.22 mm²	2.26 mm²
Average C/D Ratio	0.70	0.83
Vertical C/D Ratio	0.73	0.86
Cup Volume	0.606 mm³	0.956 mm³

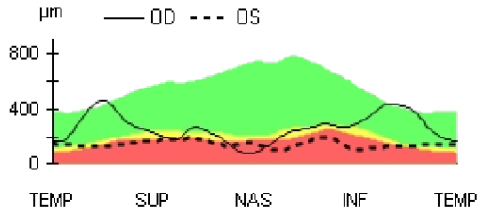
RNFL Thickness Map



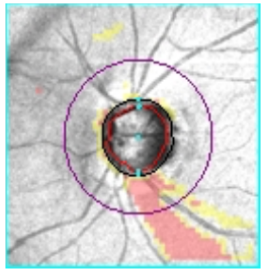
RNFL Deviation Map



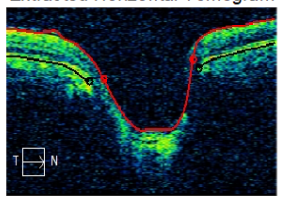
Neuro-retinal Rim Thickness



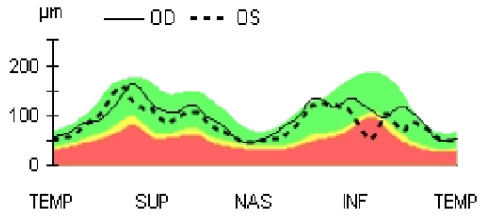
RNFL Deviation Map



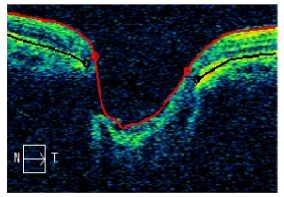
Disc Center(-0.15,0.12)mm
Extracted Horizontal Tomogram



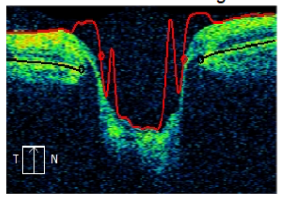
RNFL Thickness

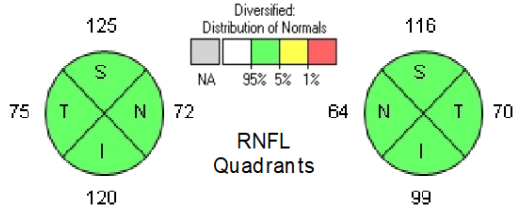


Disc Center(0.09,0.00)mm
Extracted Horizontal Tomogram

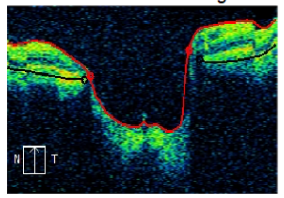


Extracted Vertical Tomogram

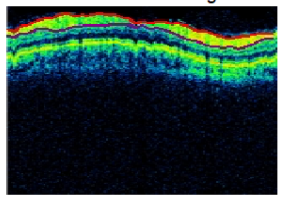


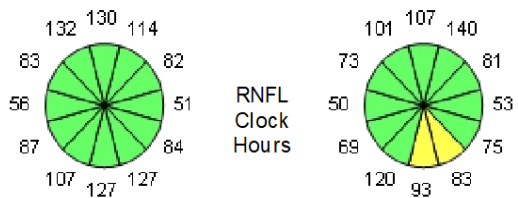


Extracted Vertical Tomogram

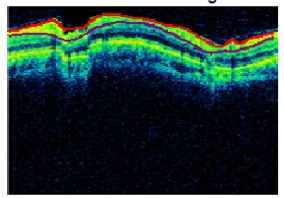


RNFL Circular Tomogram



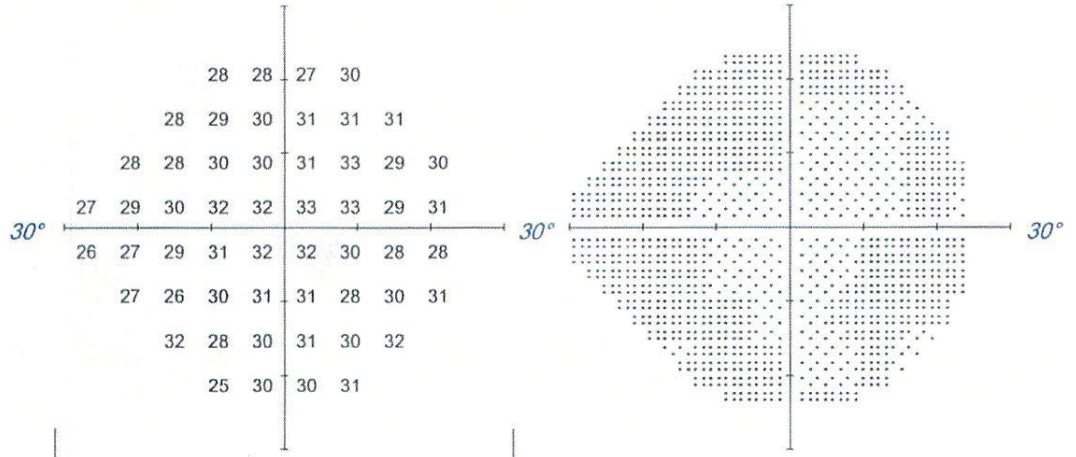


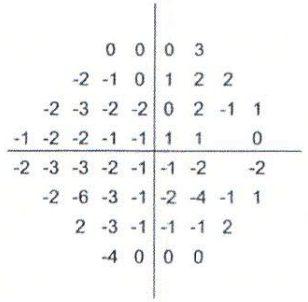
RNFL Circular Tomogram



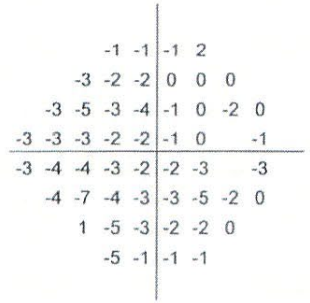
OD Single Field Analysis — Central 24-2 Threshold Test

Fixation Monitor:	Gaze Monitor	Stimulus:	III, White	Date:	Dec 12, 2022
Fixation Target:	Central	Background:	31.5 asb	Time:	4:27 PM
Fixation Losses:	0/0	Strategy:	SITA Faster	Age:	52
False POS Errors:	0%	Pupil Diameter:	5.3 mm *		
False NEG Errors:	0%	Visual Acuity:			
Test Duration:	02:07	Rx:	+1.75 DS		
Fovea:	Off				



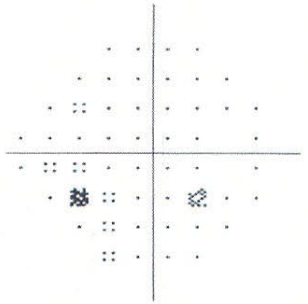


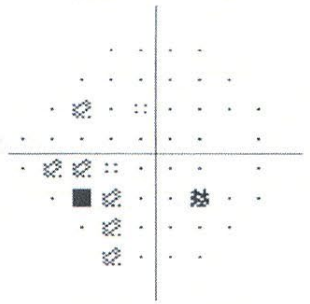
Total Deviation



Pattern Deviation

GHT:	Borderline
VFI:	98%
MD24-2:	-1.10 dB
PSD24-2:	1.79 dB P < 10%

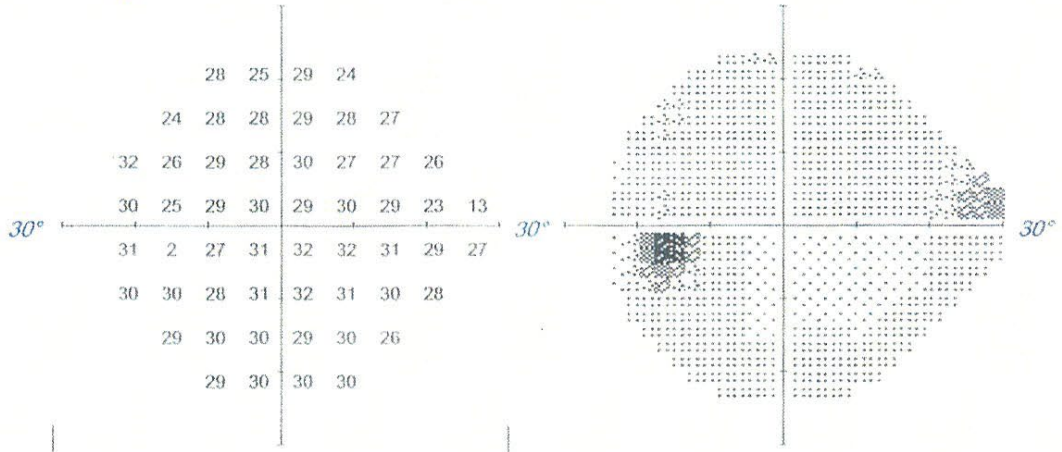


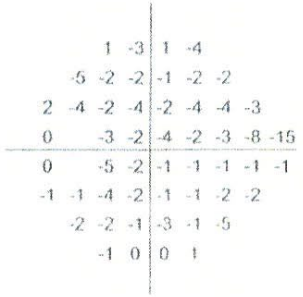


:: P < 5%
P < 2%
P < 1%
P < 0.5%

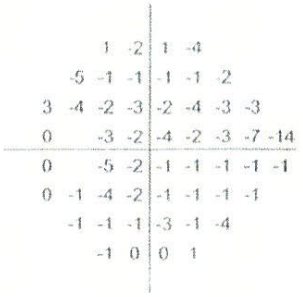
OS Single Field Analysis — Central 24-2 Threshold Test

Fixation Monitor:	Gaze Monitor	Stimulus:	III, White	Date:	Dec 12, 2022
Fixation Target:	Central	Background:	31.5 asb	Time:	4:24 PM
Fixation Losses:	0/0	Strategy:	SITA Faster	Age:	52
False POS Errors:	0%	Pupil Diameter:	4.8 mm *		
False NEG Errors:	0%	Visual Acuity:			
Test Duration:	02:03	Rx:	+1.75 DS		
Fovea:	Off				



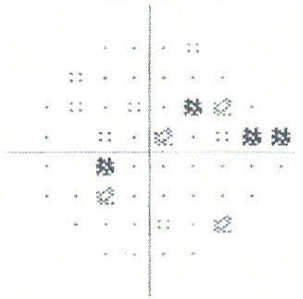


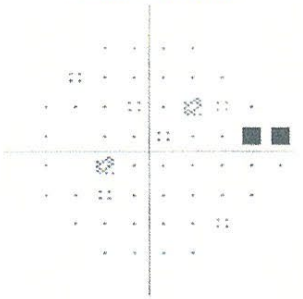
Total Deviation



Pattern Deviation

GHT:	Outside Normal Limits
VFI:	97%
MD24-2:	2.26 dB P < 5%
PSD24-2:	2.20 dB P < 5%





:: P < 5%
P < 2%
P < 1%
P < 0.5%

SO GIVEN THE EVIDENCE BEFORE YOU WHAT DO YOU DO?

- Observe
- Additional Testing
- Treat
- If so, with what?

- This is a difficult case, am I right?

WHAT ARE THE BIGGEST "PERTINENTS" IN THIS CASE?

- Optic Nerves?
- OCT?
- Pachymetry?

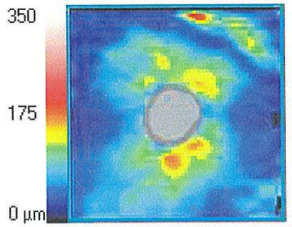
IF YOU DECIDE TO TREAT…

- What is your Target IOP?
- How Low Do You Go? (How do you know?)
- How do you get the IOP to that Target?

ID:	CZMI247065527	Exam Date:	03/13/2023	03/13/2023 CZM
DOB:	08/11/1970	Exam Time:	3:38 PM	3:34 PM
Gender:	Female	Serial Number:	4000-7182	4000-7182
Technician:	Operator, Cirrus	Signal Strength:	6/10	7/10

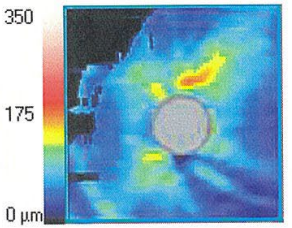
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD OS

RNFL Thickness Map

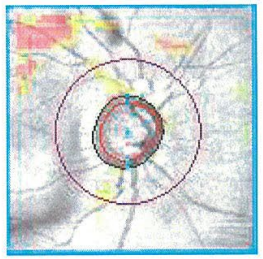


	OD	OS
Average RNFL Thickness	88 µm	80 µm
RNFL Symmetry	51%	
Rim Area	0.79 mm²	0.65 mm²
Disc Area	2.24 mm²	2.37 mm²
Average C/D Ratio	0.61	0.66
Vertical C/D Ratio	0.78	0.66
Cup Volume	0.678 mm³	1.093 mm³

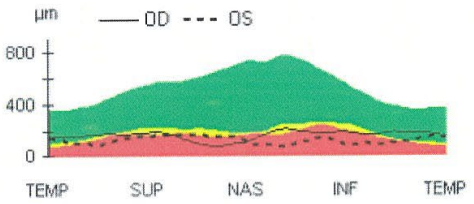
RNFL Thickness Map



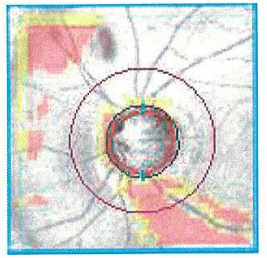
RNFL Deviation Map



Neuro-retinal Rim Thickness

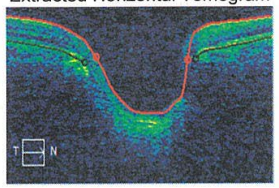


RNFL Deviation Map

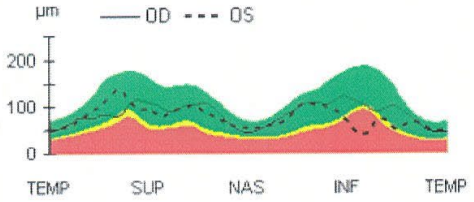


Disc Center(-0.12,-0.03)mm

Extracted Horizontal Tomogram

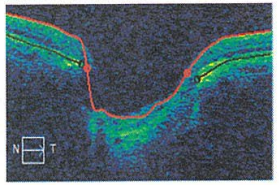


RNFL Thickness

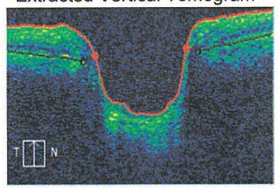


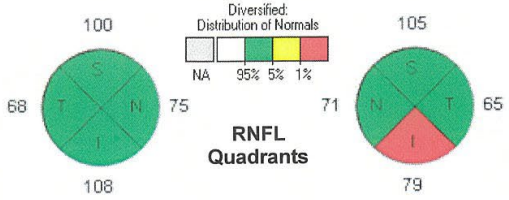
Disc Center(0.21,-0.27)mm

Extracted Horizontal Tomogram

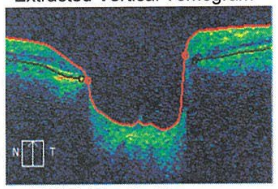


Extracted Vertical Tomogram

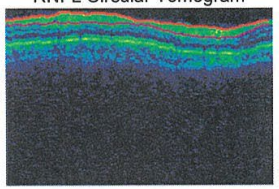


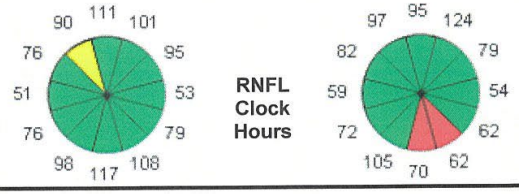


Extracted Vertical Tomogram

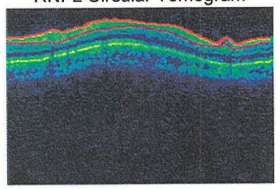


RNFL Circular Tomogram





RNFL Circular Tomogram

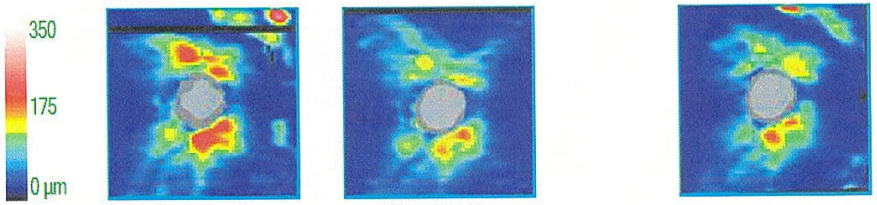


ID:	CZMI247065527	Exam Date:	08/08/2019	03/13/2023	CZM
DOB:	08/11/1970	Exam Time:	5:59 AM	3:38 PM	
Gender:	Female	Serial Number:	4000-7182	4000-7182	
Technician:	Operator, Cirrus	Signal Strength:	7/10	6/10	

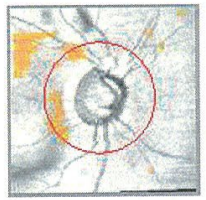
Guided Progression Analysis: (GPA™)

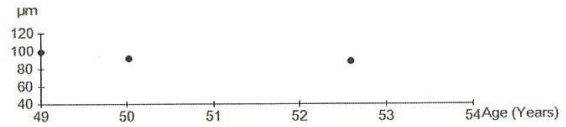
OD ● ○ OS

Baseline 1	Baseline 2	Exam 3	Exam 4
08/08/2019 5:59:13 AM	08/17/2020 12:04:18 PM	03/13/2023 3:38:20 PM	
4000-7182	4000-7182	4000-7182	
SS: 7/10	R1 SS: 7/10	R2 SS: 6/10	
Average Thickness: 98	Average Thickness: 91	Average Thickness: 88	

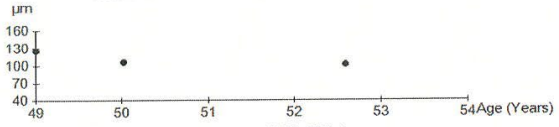


Baseline 1 Baseline 2

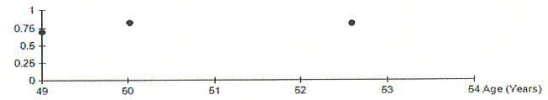




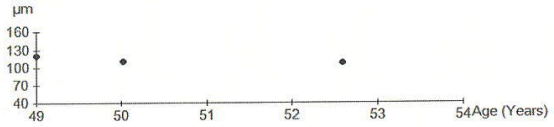
Average RNFL Thickness



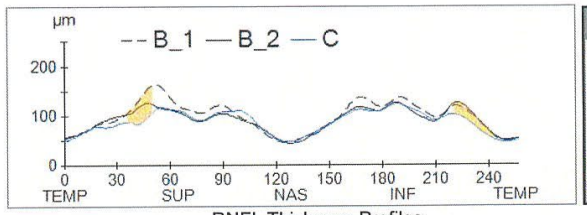
Superior RNFL Thickness



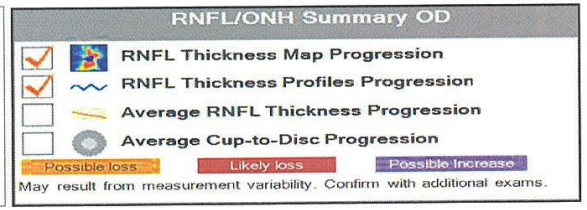
Average Cup-to-Disc Ratio



Inferior RNFL Thickness



RNFL Thickness Profiles

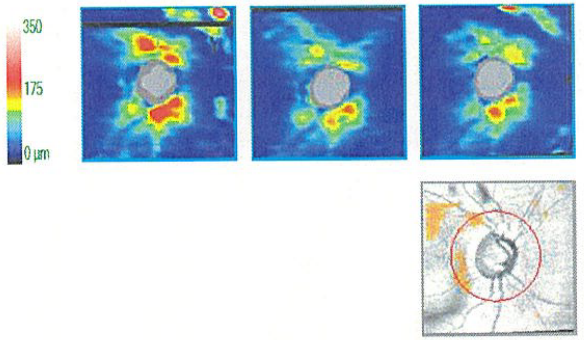


Name:	**Kern, Marilyn**		**Baseline 1**	**Current**	
ID:	CZMI247065527	Exam Date:	08/08/2019	03/13/2023	CZM
DOB:	08/11/1970	Exam Time:	5:59 AM	3:38 PM	
Gender:	Female	Serial Number:	4000-7182	4000-7182	
Technician:	Operator, Cirrus	Signal Strength:	7/10	6/10	

Guided Progression Analysis: (GPA™)

OD ● | ○ OS

Baseline1 Baseline2 Exam 3 Exam 4 Exam 5 Exam 6 Exam 7 Exam 8



RNFL and ONH Summary Parameters

		Exam Date/Time	Serial Number	Registration Method	SS	Avg RNFL Thickness (µm)	Inf Quadrant RNFL (µm)	Sup Quadrant RNFL (µm)	Rim Area (mm^2)	Average Cup-to-Disc Ratio	Vertical Cup-to-Disc Ratio	Cup Volume (mm^3)
Baseline1:	1	08/08/2019 5:59:13 AM	4000-7182		7/10	98	120	125	1.18	0.70	0.73	0.606
Baseline2:	2	08/17/2020 12:04:18 PM	4000-7182	R1	7/10	91	111	107	0.72	0.83	0.80	0.931
Current:	3	03/13/2023 3:38:20 PM	4000-7182	R2	6/10	88	108	101	0.79	0.81	0.78	0.878

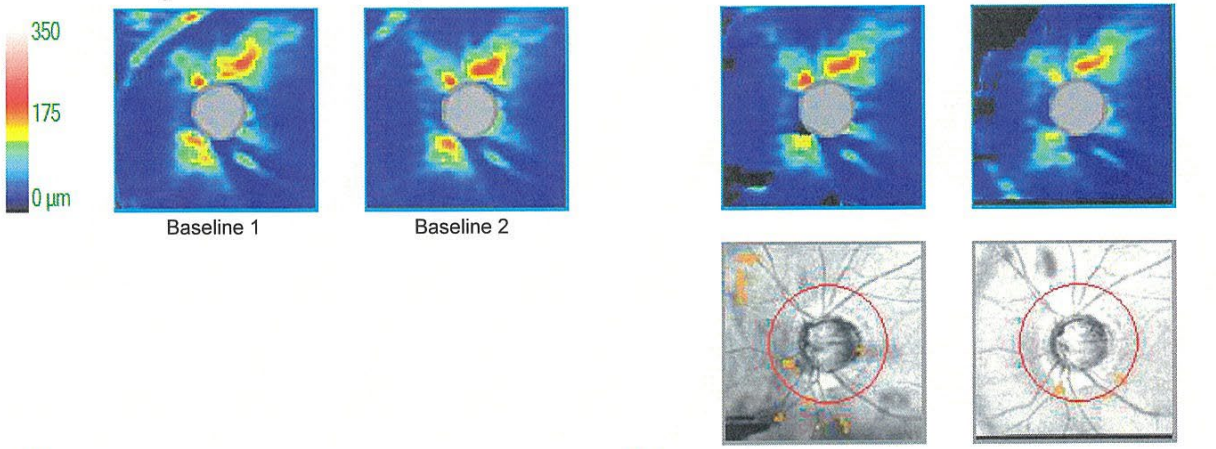
Registration Methods
R2 - Registration based on translation and rotation of OCT fundus
R1 - Registration based only on translation of disc center

ID:	CZMI247065527	Exam Date:	08/08/2019	03/13/2023	CZM
DOB:	08/11/1970	Exam Time:	6:27 AM	3:34 PM	
Gender:	Female	Serial Number:	4000-7182	4000-7182	
Technician:	Operator, Cirrus	Signal Strength:	7/10	7/10	

Guided Progression Analysis: (GPA™)

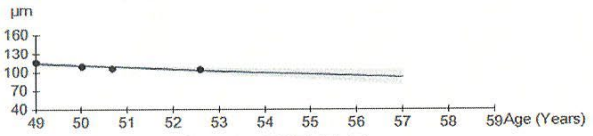
OD ○ | ● OS

Baseline 1	Baseline 2	Exam 3	Exam 4
08/08/2019 6:27:51 AM	08/17/2020 12:05:44 PM	04/12/2021 3:57:44 PM	03/13/2023 3:34:32 PM
4000-7182	4000-7182	4000-7182	4000-7182
SS: 7/10	R2 SS: 7/10	R2 SS: 6/10	R2 SS: 7/10
Average Thickness: 87	Average Thickness: 85	Average Thickness: 81	Average Thickness: 80

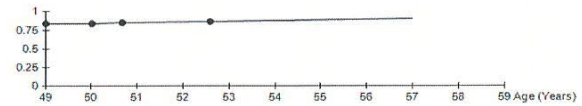


Baseline 1 Baseline 2

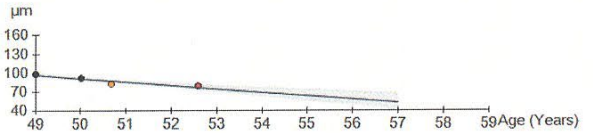
Average RNFL Thickness
Rate of change: -2.01 +/- 2.24 µm/Year



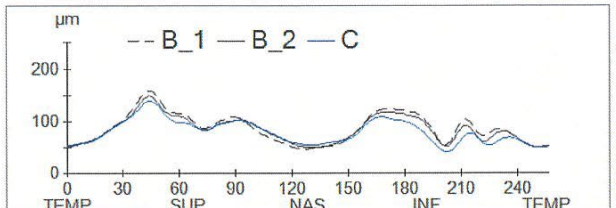
Superior RNFL Thickness
Rate of change: -2.77 +/- 4.99 µm/Year



Average Cup-to-Disc Ratio
Rate of change: 0.01 +/- 0.01 /Year



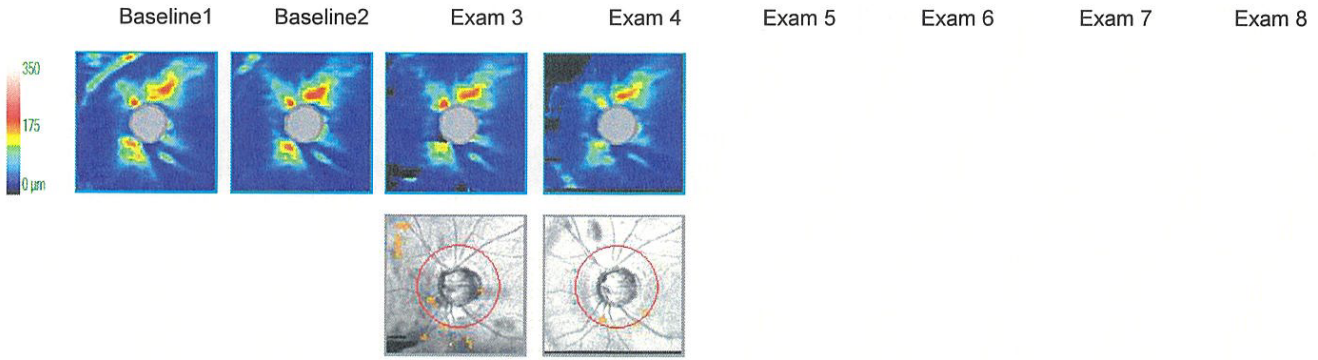
Inferior RNFL Thickness
Rate of change: -5.40 +/- 5.98 µm/Year



ID:	CZMI247065527	Exam Date:	08/08/2019	03/13/2023	CZM
DOB:	08/11/1970	Exam Time:	6:27 AM	3:34 PM	
Gender:	Female	Serial Number:	4000-7182	4000-7182	
Technician:	Operator, Cirrus	Signal Strength:	7/10	7/10	

Guided Progression Analysis: (GPA™)

OD ○ | ● OS



RNFL and ONH Summary Parameters

		Exam Date/Time	Serial Number	Registration Method	SS	Avg RNFL Thickness (µm)	Inf Quadrant RNFL (µm)	Sup Quadrant RNFL (µm)	Rim Area (mm^2)	Average Cup-to-Disc Ratio	Vertical Cup-to-Disc Ratio	Cup Volume (mm^3)
Baseline1:	1	08/08/2019 6:27:51 AM	4000-7182		7/10	87	99	116	0.72	0.83	0.86	0.956
Baseline2:	2	08/17/2020 12:05:44 PM	4000-7182	R2	7/10	85	92	110	0.71	0.83	0.86	1.000
	3	04/12/2021 3:57:44 PM	4000-7182	R2	6/10	81	83	106	0.65	0.86	0.86	1.074
Current:	4	03/13/2023 3:34:32 PM	4000-7182	R2	7/10	80	79	105	0.65	0.86	0.86	1.093

Registration Methods
R2 - Registration based on translation and rotation of OCT fundus
R1 - Registration based only on translation of disc center

Likely Loss
Possible Loss

Compared to baseline, statistically significant loss of tissue detected. For Average RNFL, Superior RNFL, Inferior RNFL, Rim Area the values have decreased. For Cup-to-Disc Ratios and Cup Volume values have increased.

-200D pre-LASIK

Notes: LT6 Dx
Rocklatan → Hypotension

GLAUCOMA TRACKING SHEET

Pachymetry: Date 4/3/17
OD 456 OS 442 - Post lasik

NAME Marlyn Kern DOB 8/11/70 FHX (+) Father

Date	IOP	Target	C/D	Dil.	Gonio	VF	HRT	FP	VA	Ref.	Sx	Meds
10/21/16	15.4/18.3	14	.85/.85 .8/.8						20/20 20/20	✓	Lasik 1999	Lumi. QHS OU
1/16/17	13/11		.85/.85 .85/.9			✓			20/20 20/25			Cont. Lumigan QHS OU
4/3/17	12/12		.85/.85 .9/.9				✓		20/20-2 20/20-			Latanoprost QHS
7/11/17	138/15.9	12	.85/.85 .85/.9	✓				✓	20/20 20/25-2			Cont. Latanoprost QHS OU
10/12/17	13.7/10.6	12							20/25-2 20/25-2	✓		D/C Latan. Start Zioptan QHS OU
1/23/18	16.6/18.7	12	.9/1.8 .9/.85			✓			20/20- 20/25			D/C zioptan. Start Lumigan QHS OU
3-20-18	15.1/15.7		.9/.85 .9/.9	✓					20/20 20/20-2			Cont. Lumi QHS OU
6.28.18	12/12						✓		20/20- 20/20-			cont Lumigan QHS OU
9.24.18	10/11		.9/.9 .9/.9						20/20 20/30+1	✓		"
1-3-19	10/11		.9/.9 .9/.9			✓						Lumigan QHS
5/2/19	12/13		.85/.90 .90/.95	✓					N/A			"
8/8/19	12/13	12	.85/.90 .85/.90				✓		20/20 20/25-			"
11/7/19	14/13	12	.9/.85 .9/.9						20/20 20/20	✓		"
02/18/20	12/12	10	.9/.85 .9/.9			✓			20/20 20/20			Rocklatan QHS
6/17/20	18/11	10			✓				20/20 20/25			d/c Rocklatan try Azopt OU BID
8/17/20	16/15	10	.9/.9 .9/.9				✓		20/20 20/20			d/c Azopt add Alphagan BID + Lumigan QHS
												OU BID, cont Lumi QHS
11/9/20	12/11	12	.9/.9 .9/.9			✓			20 20			Cont Lumigan OU QHS
2/8/21	11/12								25 20			Cont Lumigan OU QHS
4/12/21	12/12	12	.9/.9 .9/.9				✓		20- 20-			Lumigan OU QHS
7/19/21	12/14		.9/.85 .85/.85						20 25	✓		Lumigan OU QHS
10/12/21	14/13	12	.85/.9 .9/.85	✓					20 20-1			"Lumigan" OU QHS
1/31/22	12/13	12	[illegible]			✓			20 25			Cont Lumigan OU QHS
8-18-22	13/12	12	.85/.9 .9/.85					✓	30- 30--			Cont. Lumigan OU QHS
9/26/22	14/14	12	.8/.8 .9/.85							✓		Okay to use Lumify OU BID Cont. Lumigan
3/13/23	7/7	12	.85/.85 .9/.9				✓		30- 30-			Cont. Lumigan QHS

IS SHE REALLY STABLE?

- Look at the VF
- Look at the OCT Progression Analysis
- Look at the IOP variability
- How can you maintain a stable and (very) low IOP?

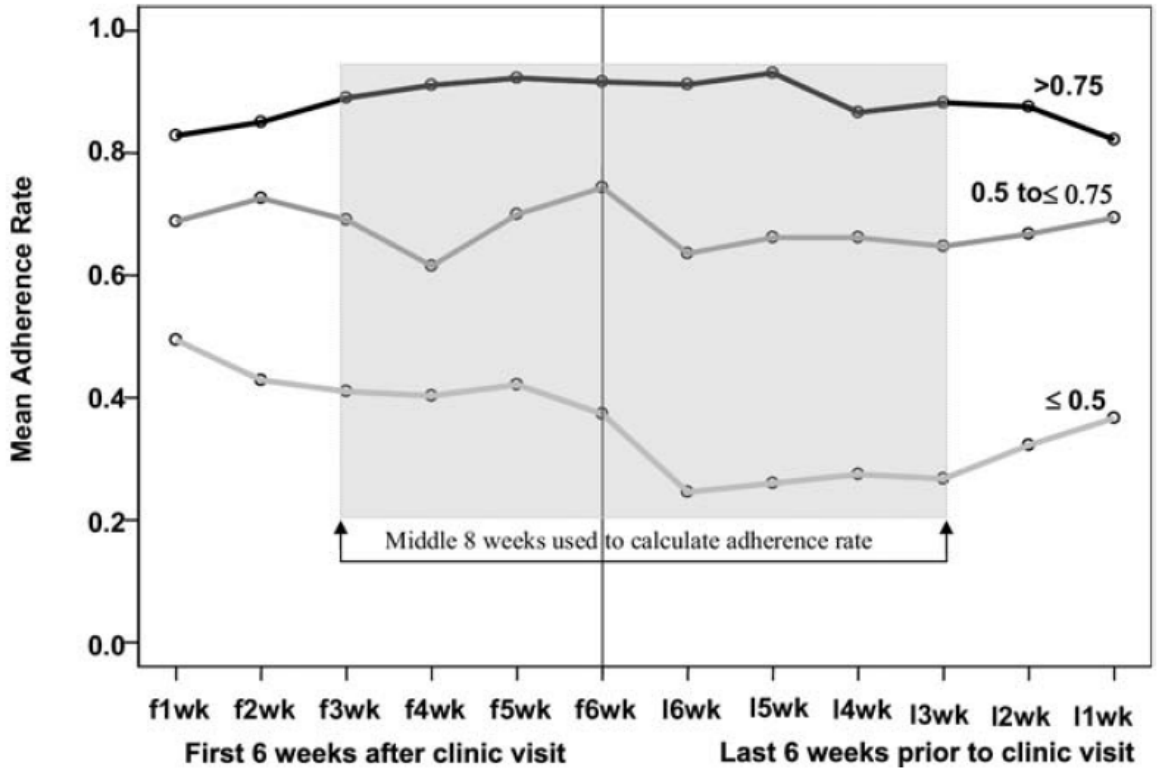
57 year old female

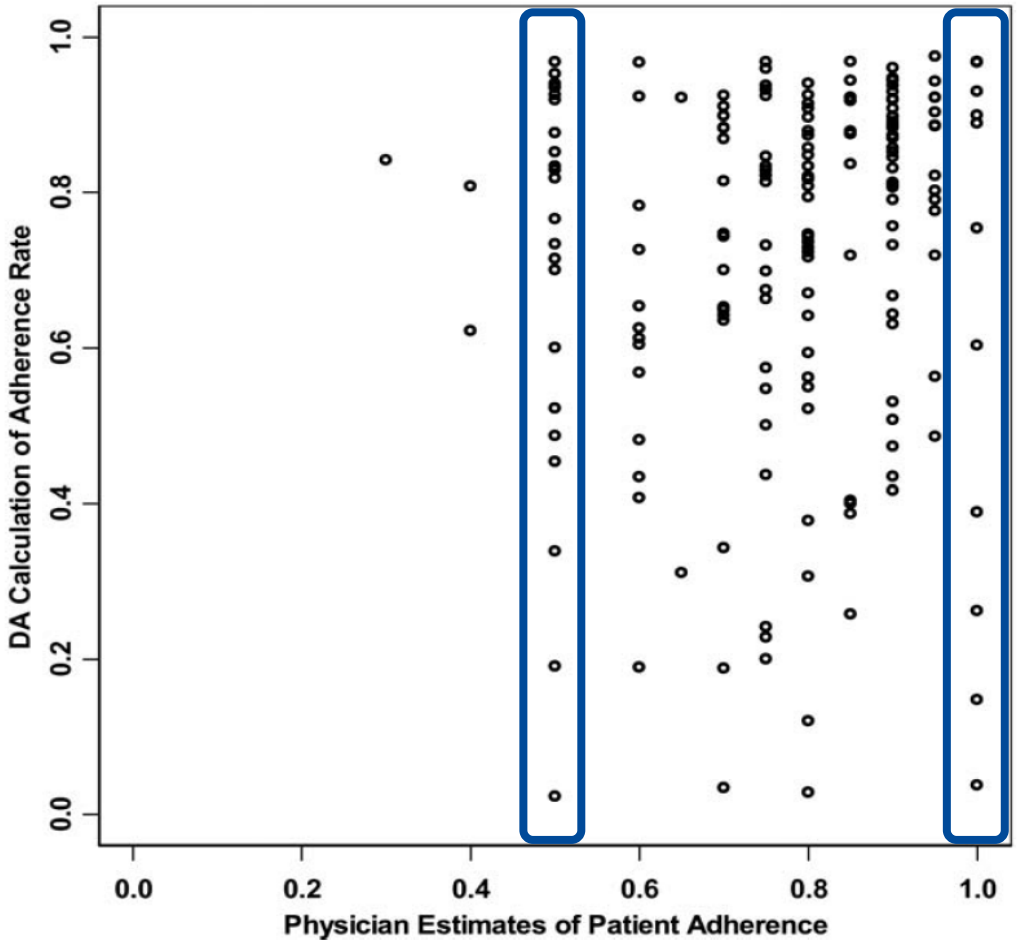
Peak untreated IOP 21mmHg OD 26mmHg OS

Transferred care for 5 years; returned taking latanoprost QHS OU…misses about 2 night per week due to irritation

"Do I have glaucoma?"
"Do I need to keep taking these eyedrops?"

Adherence during known monitoring



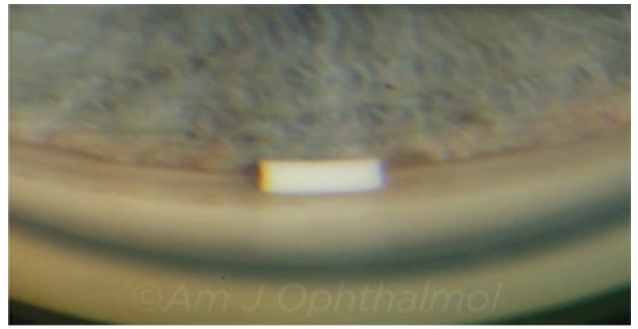


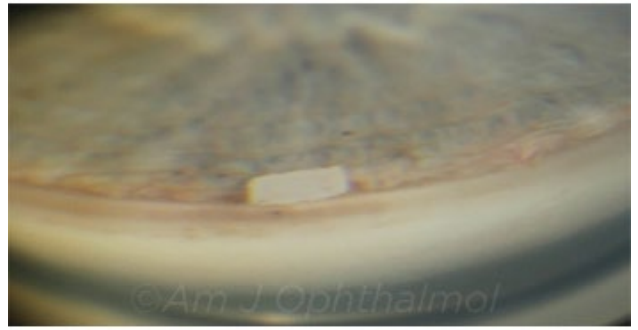
Okeke CO, Quigley HA, Jampel HD, Ying GS, Plyler RJ, Jiang Y, Friedman DS. Adherence with topical glaucoma medication monitored electronically the Travatan Dosing Aid study. Ophthalmology. 2009 Feb;116(2):191-9.

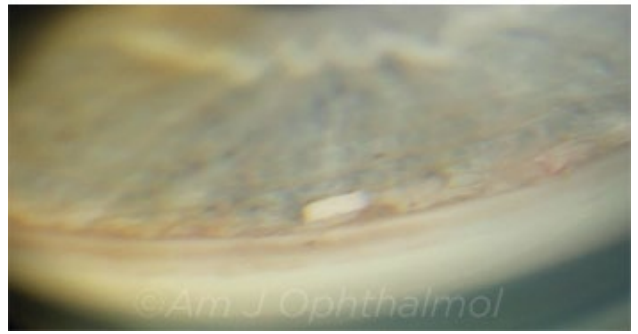
Sustained delivery options

Bimatoprost implant 10mcg Equivalent to about 2-3 drops of bimatoprost 0.01%
Drug release complete in 3-4 months

197 eyes, 94.9% pseudophakic, 41.6% prior SLT, mean age 80.4
Effect approximately 1 year; reduction in medication use
16.9% underwent SLT within first 12 months



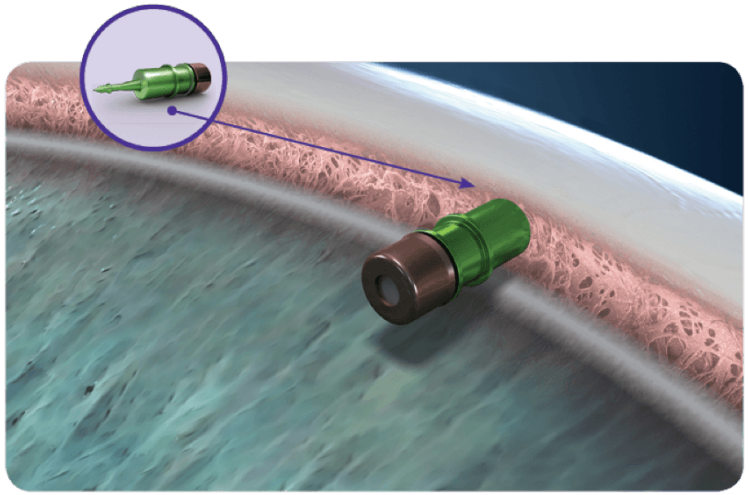




Travoprost titanium implant
FDA approved December 14, 2023
Not refillable

36 month data: 70% (fast-release) and **68% (slow-release)** fewer or same medications as baseline

Mean IOP reduction: 8.3mmHg (fast-release) and 8.5mmHg (slow-release)



Teymoorian S, Craven ER, Nguyen L, Werts E. Real-World Study of the Effectiveness and Safety of Intracameral Bimatoprost Implant in a Clinical Setting in the United States. Clin Ophthalmol. 2024 Jan 19;18:187-199. Berdahl JP, Sarkisian SR Jr, Ang RE, Doan LV, Kothe AC, Usner DW, Katz LJ, Navratil T; Travoprost Intraocular Implant Study Group. Efficacy and Safety of the Travoprost Intraocular Implant in Reducing Topical IOP-Lowering Medication Burden in Patients with Open-Angle Glaucoma or Ocular Hypertension. Drugs. 2024 Jan;84(1):83-97.

"Do I <u>really</u> need to use these eyedrops?

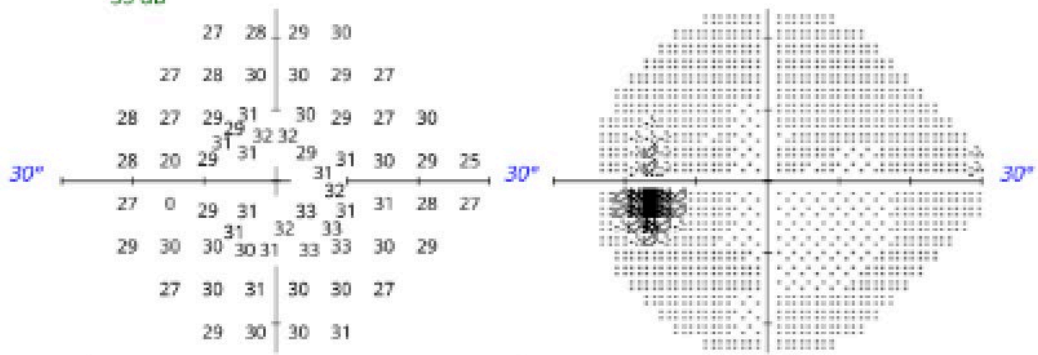
In office: 16mmHg OD and 17mmHg OS
CCT 555 μm OD 562 μm OS

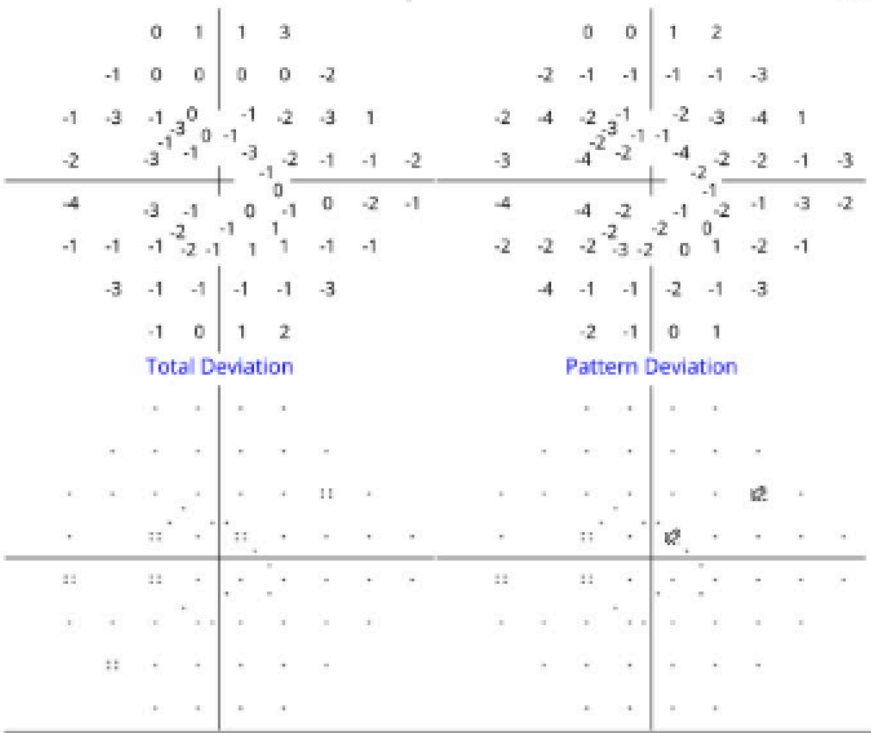
Medication holiday

IOP 21mmHg OD and 22mmHg OS

OS Single Field Analysis — Central 24-2C Threshold Test

Fixation Monitor:	Gaze Monitor	Stimulus:	III, White	Date:	Jan 29, 2026
Fixation Target:	Central	Background:	31.5 asb	Time:	11:29 AM
Fixation Losses:	0/0	Strategy:	SITA Faster	Age:	57
False POS Errors:	0%	Pupil Diameter:	6.5 mm *		
False NEG Errors:	0%	Visual Acuity:			
Test Duration:	02:20	Rx:	+2.00 DS		
Fovea:	35 dB				





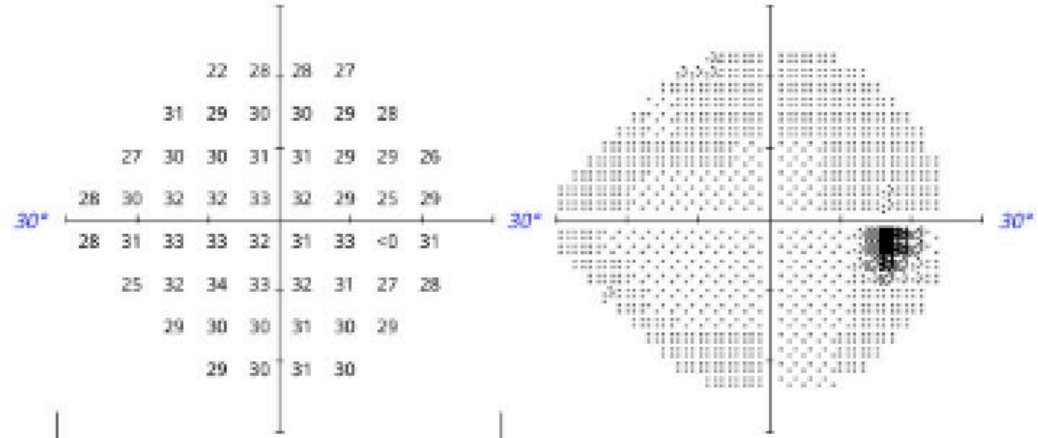
GHT: Within Normal Limits

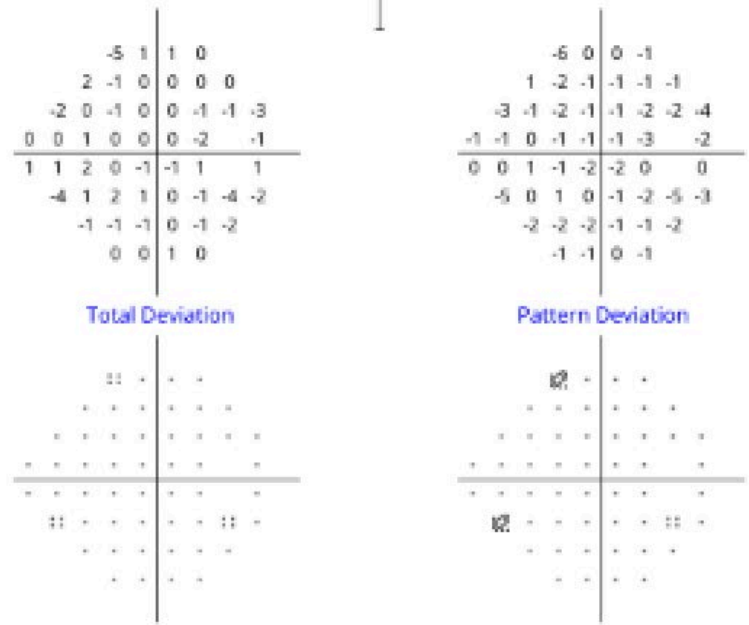
VFI24-2C: 99%
MD24-2C: -1.00 dB
PSD24-2C: 1.34 dB

:: P < 5%
P < 2%
P < 1%
P < 0.5%

OD Single Field Analysis — Central 24-2 Threshold Test

Fixation Monitor:	Gaze Monitor	Stimulus:	III, White	Date:	Jan 29, 2026
Fixation Target:	Central	Background:	31.5 asb	Time:	11:25 AM
Fixation Losses:	0/0	Strategy:	SITA Faster	Age:	57
False POS Errors:	0%	Pupil Diameter:	6.6 mm *		
False NEG Errors:	0%	Visual Acuity:			
Test Duration:	02:00	Rx:	+1.50 DS		
Fovea:	34 dB				





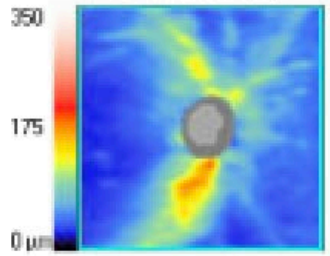
GHT: Within Normal Limits

VFI24-2: 99%
MD24-2: -0.24 dB
PSD24-2: 1.35 dB

:: P < 5%
P < 2%
P < 1%
P < 0.5%

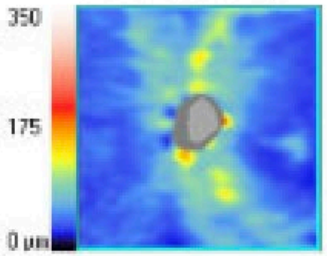
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD ● ● OS

RNFL Thickness Map

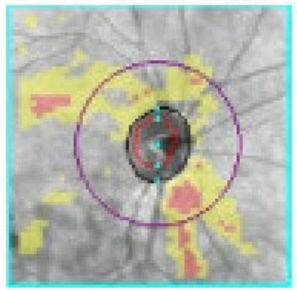


	OD	OS
Average RNFL Thickness	70 µm	65 µm
RNFL Symmetry	85%	
Rim Area	0.92 mm²	0.77 mm²
Disc Area	1.62 mm²	1.37 mm²
Average C/D Ratio	0.66	0.67
Vertical C/D Ratio	0.67	0.77
Cup Volume	0.283 mm³	0.243 mm³

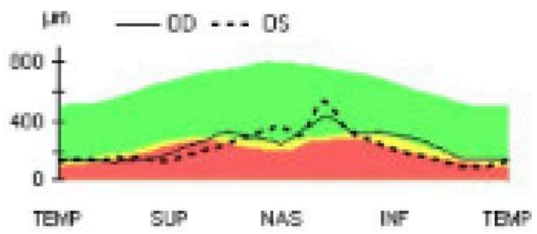
RNFL Thickness Map



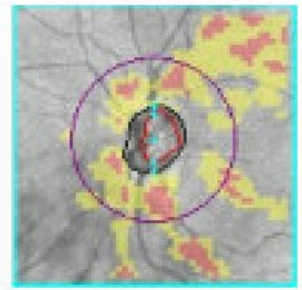
RNFL Deviation Map



Neuro-retinal Rim Thickness

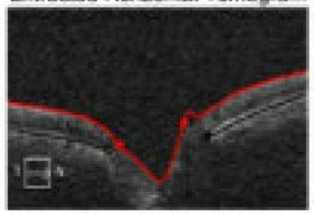


RNFL Deviation Map

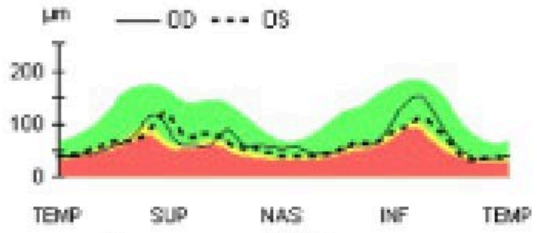


Disc Center(0.15,0.06)mm

Extracted Horizontal Tomogram

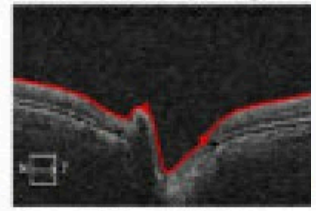


RNFL Thickness

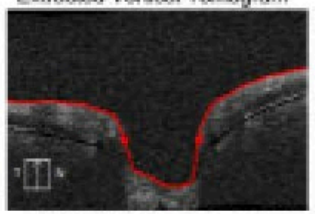


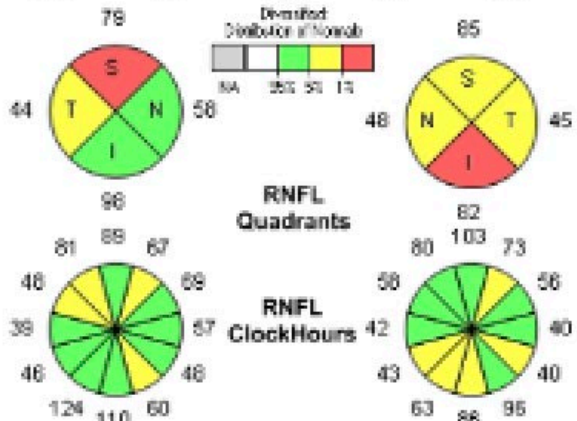
Disc Center(-0.06,0.15)mm

Extracted Horizontal Tomogram

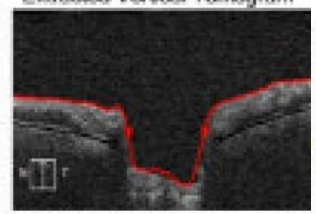


Extracted Vertical Tomogram

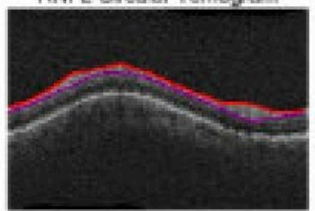




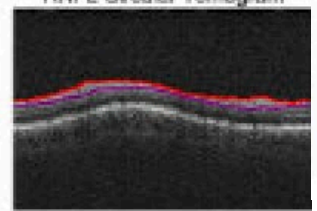
Extracted Vertical Tomogram



RNFL Circular Tomogram

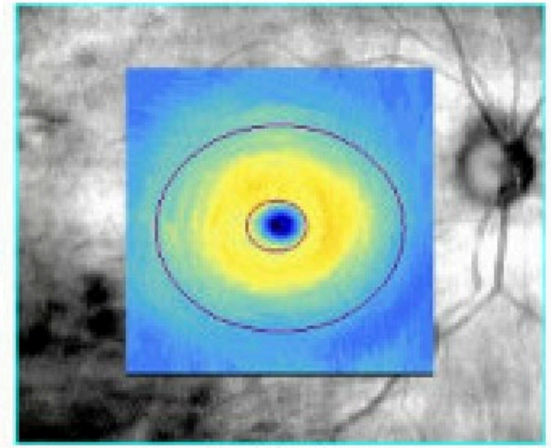


RNFL Circular Tomogram

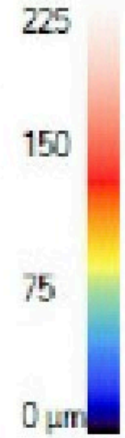


Ganglion Cell OU Analysis: Macular Cube 512x128 OD ● ● OS

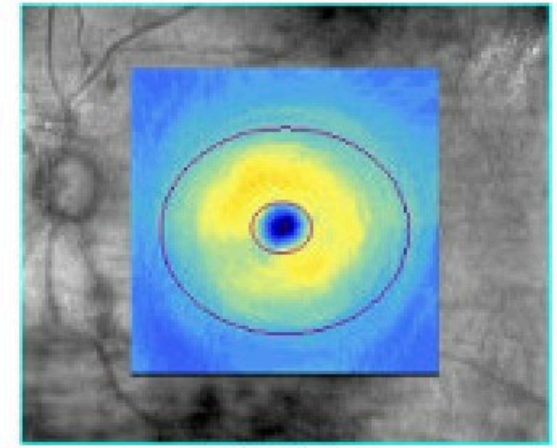
OD Thickness Map



Fovea: 254, 66

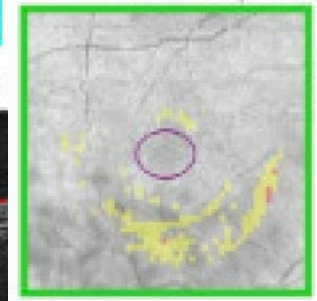


OS Thickness Map

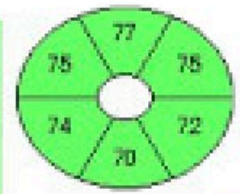


Fovea: 254, 67

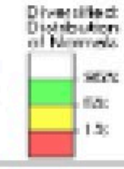
OD Deviation Map



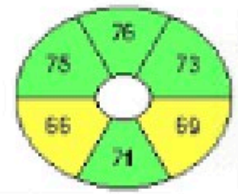
OD Sectors



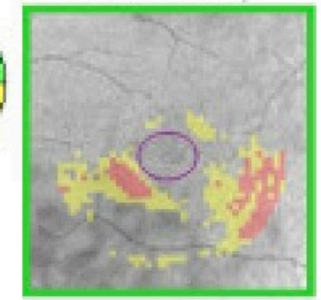
Diversified Distribution of Normals



OS Sectors

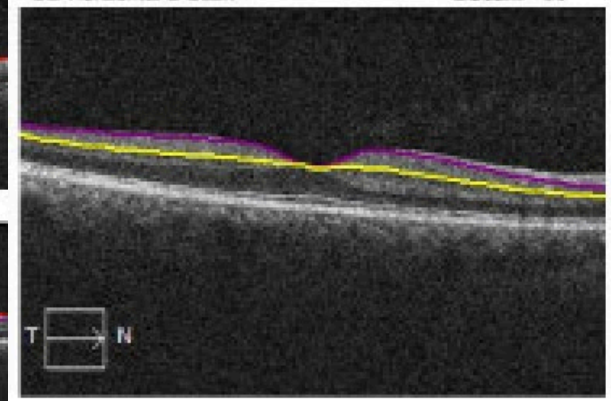


OS Deviation Map

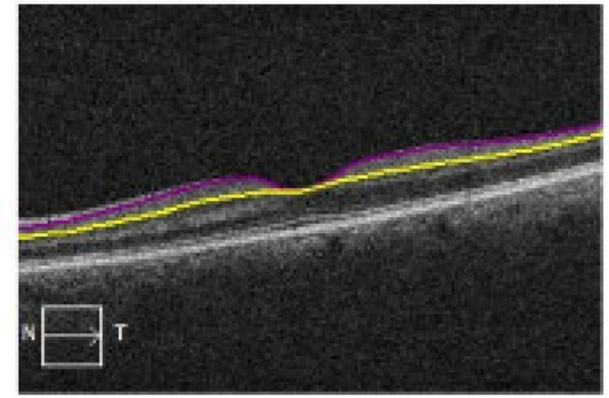


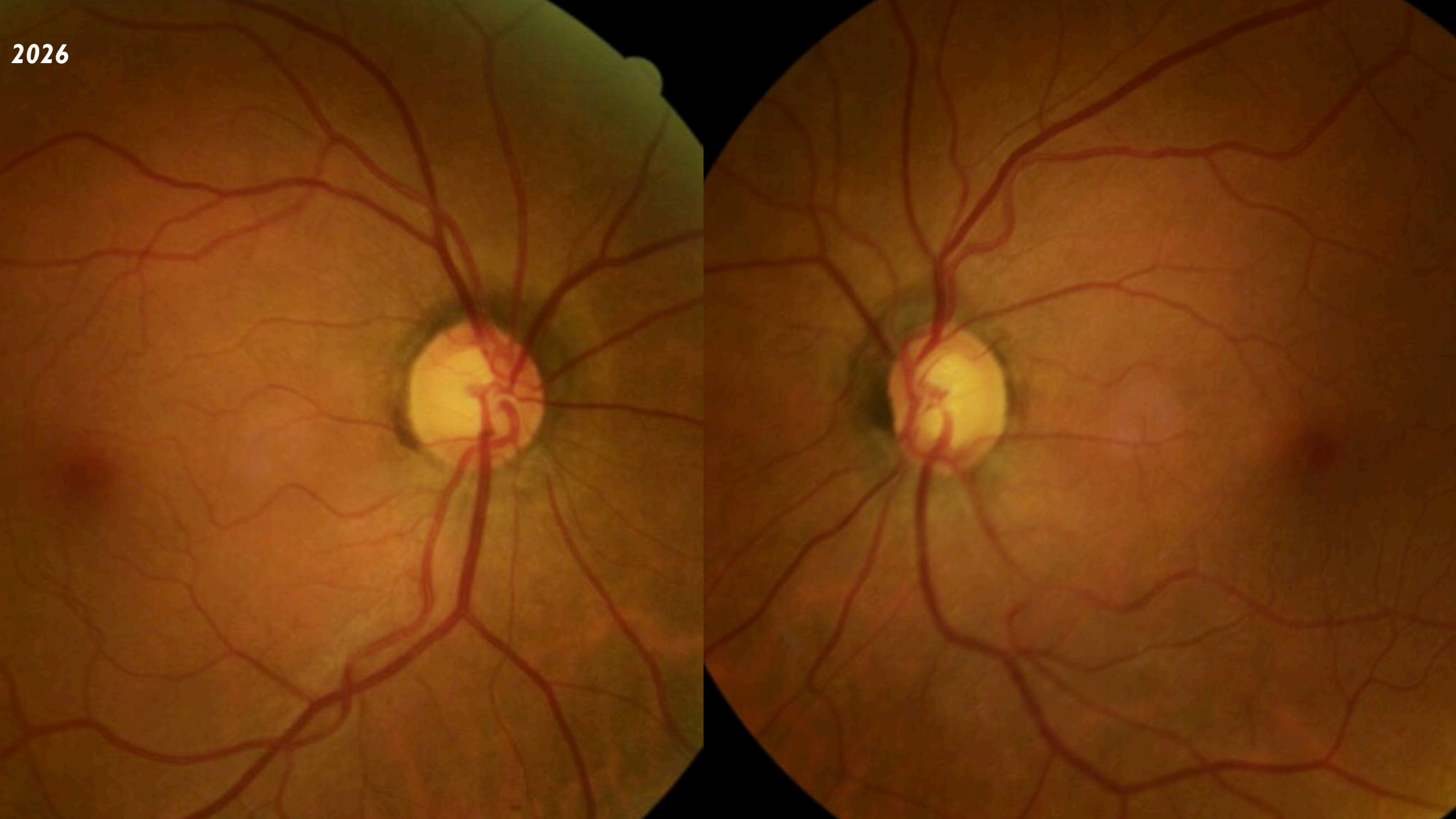
	OD µm	OS µm
Average GCL + IPL Thickness	74	72
Minimum GCL + IPL Thickness	73	66

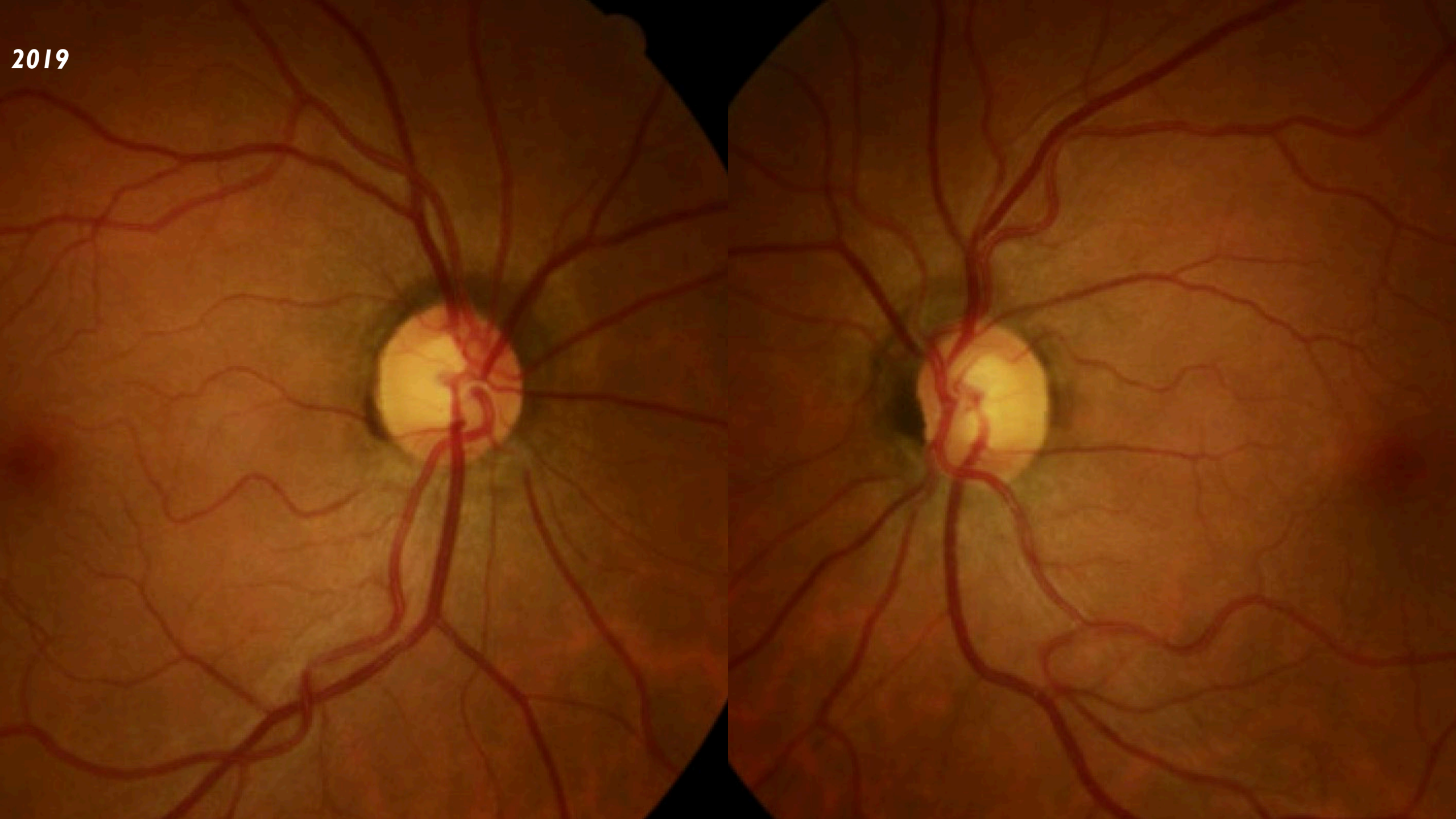
OD Horizontal B-Scan BScan: 66

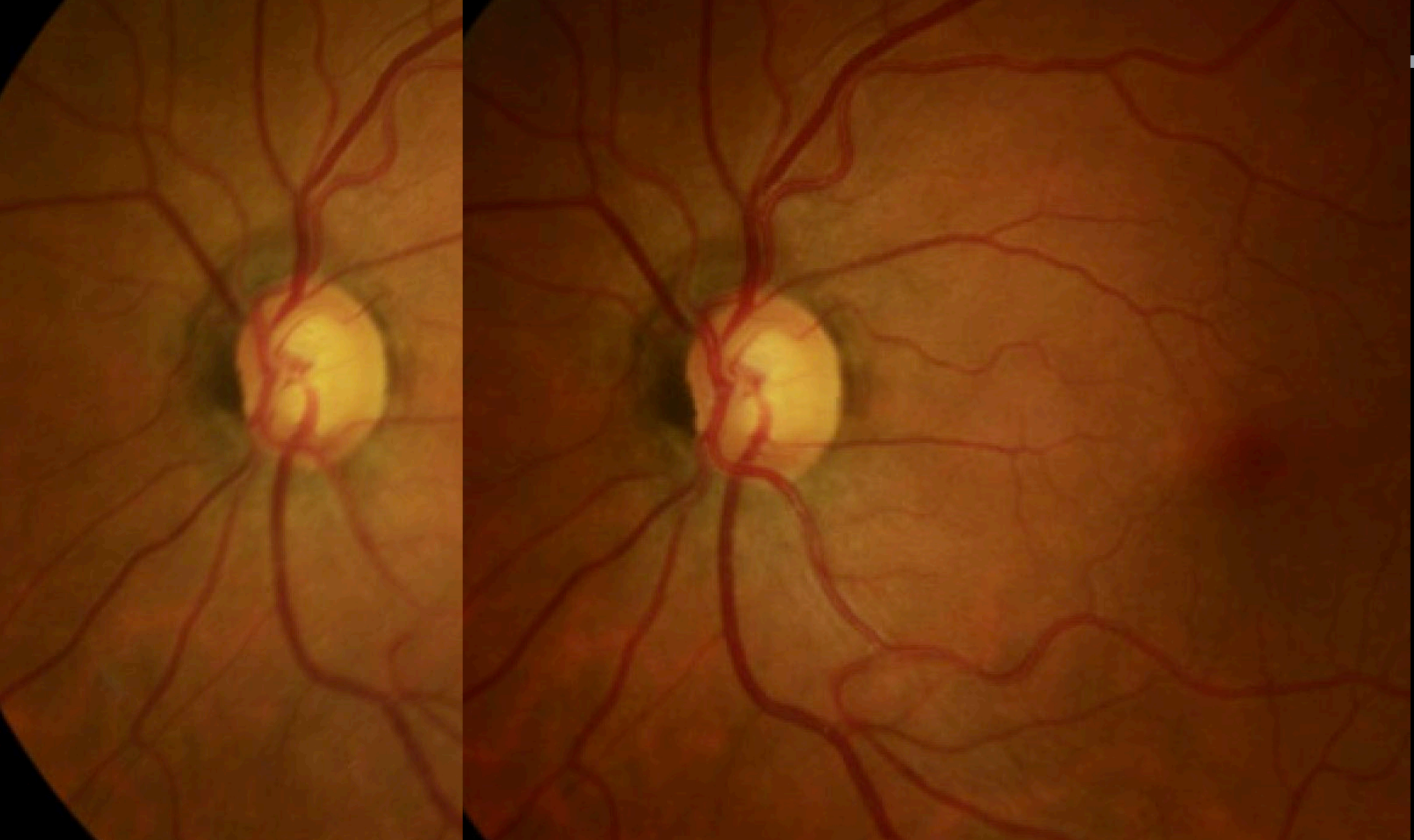


OS Horizontal B-Scan BScan: 67




2026


2019



57 year old female

Primary open angle glaucoma, left eye

Treatment options?

Primary SLT? Latanoprost 0.005% (BAK-preserved, preservative-free)

AMERICAN ACADEMY OF OPHTHALMOLOGY®

Efficacy of Repeat Selective Laser Trabeculoplasty in Medication-Naive Open-Angle Glaucoma and Ocular Hypertension during the LiGHT Trial

Selective laser trabeculoplasty versus eye drops for first-line treatment of ocular hypertension and glaucoma (LiGHT): a multicentre randomised controlled trial

*Gus Gazzard, Evgenia Konstantakopoulou, David Garway-Heath, Anurag Garg, Victoria Vickerstaff, Rachael Hunter, Gareth Ambler, Catey Bunce, Richard Wormald, Neil Nathwani, Keith Barton, Gary Rubin, Marta Buszewicz, on behalf of the LiGHT Trial Study Group**

No game-changing data; But did provide good quality evidence for what was already known

SLT: at target 93% of visits, 91.3% in the medication group (3 years)
What happens if one eye is drop-free, but the other isn't?

AMERICAN ACADEMY OF OPHTHALMOLOGY®

Laser in Glaucoma and Ocular Hypertension (LiGHT) Trial

Six-Year Results of Primary Selective Laser Trabeculoplasty versus Eye Drops for the Treatment of Glaucoma and Ocular Hypertension

Conclusions: Selective laser trabeculoplasty is a safe treatment for OAG and OHT, providing better long-term disease control than initial drop therapy, with reduced need for incisional glaucoma and cataract surgery over 6 years. *Ophthalmology 2023;130:139-151* *© 2022 by the American Academy of Ophthalmology. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).*

No difference in health-related quality of life scores: mobility, self-care, usual activities, pain or discomfort.

Minimal difference in Glaucoma Symptom Scale-did not translate to difference in HRQoL

AMERICAN ACADEMY
OF OPHTHALMOLOGY®

Six-Year Rate of Visual Field Progression in the Laser in Glaucoma and Ocular Hypertension Trial

Giovanni Montesano, MD, PhD,[1,2] *David P. Crabb, PhD,*[2] *David F. Garway-Heath, MD, FRCOphth,*[1] *David M. Wright, PhD,*[3] *Evgenia Konstantakopoulou, PhD,*[1,4] *Neil Nathwani, BSc (Hons), DipTp(IP),*[1] *Giovanni Ometto, PhD,*[1,2] *Gus Gazzard, MD, FRCOphth*[1]

Results: Data from 710 eyes (482 with OAG and 354 in the SLT-first arm) were analyzed. The 2 arms had similar baseline MD ($P = 0.7$). The average intraocular pressure (IOP) during follow-up was 16.1 [14.2–18.2] for the drops-first arm and 16.8 [14.6–18.6] in the SLT-first arm (median [interquartile range], $P = 0.057$). The mean [95% credible interval] MD rate was −0.37 [−0.43 to −0.31] decibels (dB)/year in the drops-first arm and −0.26 [−0.31 to −0.21] dB/year in the SLT-first arm ($P = 0.007$). When stratified by severity, this difference was significant only in mild OAG ($P = 0.035$, the largest sub-group). The secondary analyses largely confirmed the main results. The difference in MPD rate was also significantly slower in the SLT-first arm ($P < 0.001$).

26% of med-first eyes were fast-progressors vs. 15% in SLT-first

JAMA Ophthalmology | Original Investigation

Selective Laser Trabeculoplasty After Medical Treatment for Glaucoma or Ocular Hypertension

Evgenia Konstantakopoulou, PhD; Gus Gazzard, MA, MD, MBBChir; David Garway-Heath, MD; Mariam Adeleke, PhD; Gareth Ambler, PhD; Victoria Vickerstaff, PhD; Catey Bunce, DSc; Neil Nathwani, BSc; Keith Barton, MD; for the LiGHT Trial Study Group

Patients were randomized to SLT or medication first (LiGHT)-then after 3 years patients were allowed to have secondary SLT (to reduce medication load) or to escalate therapy if needed

65% of 320 taking drops chose to continue medical therapy!

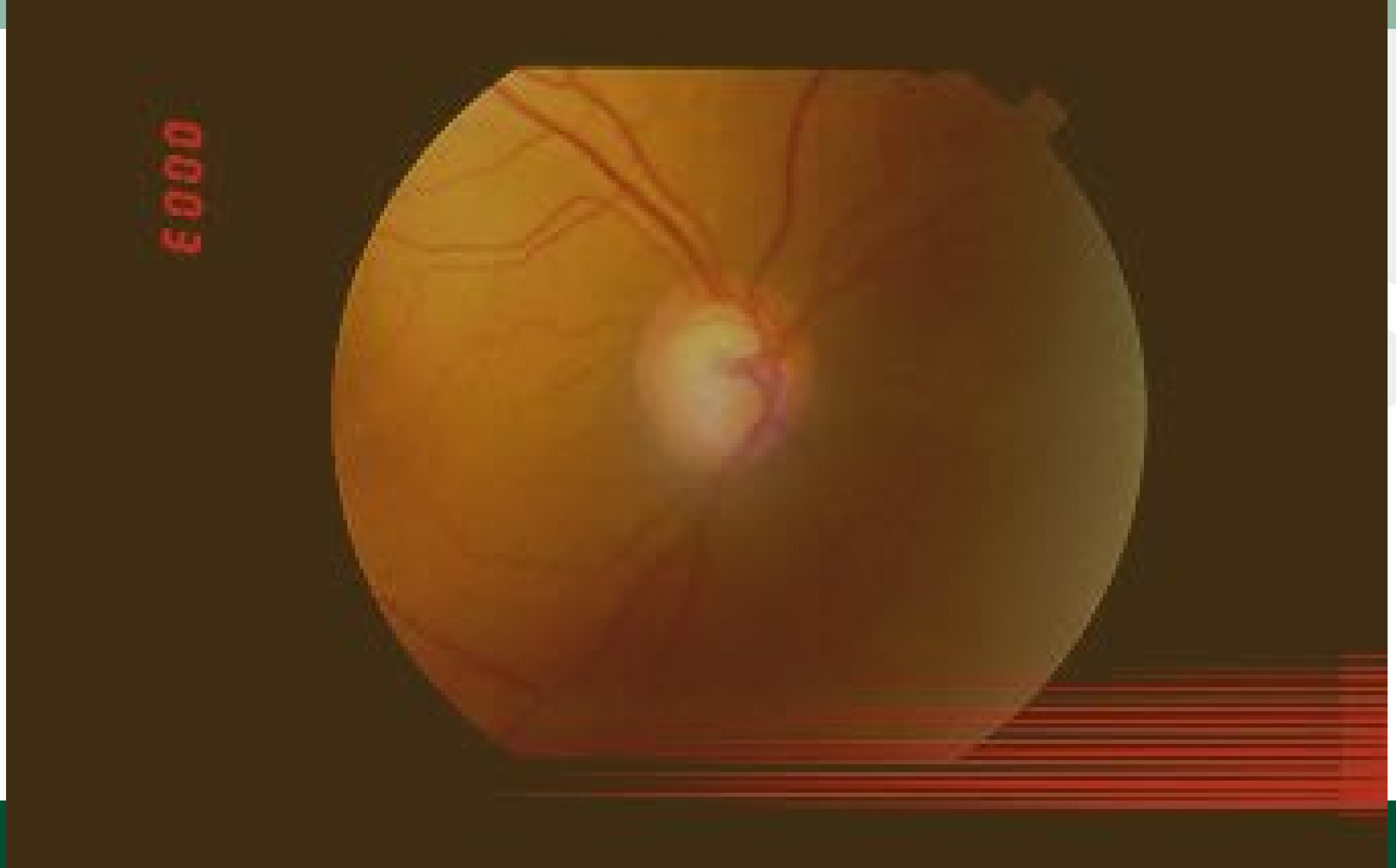
Patients "trust" eyedrops and prefer non-procedures—even though they don't take them as much as we would like…

57 year old female

Opts for preservative-free latanoprost 0.005%

Case 2 - A Tough Inheritance

- 62 y/o BF, (+) fam hx- treated for POAG for 6 years
- VA 20/20 OD, 20/20 OS
- Pachs – OD 490, OS 495
- No systemic meds
- IOP maintained around 18 OU on Lumigan QHS, AlphaganP OU TID, T1/2 OU BID
- Initial IOP 28 OD, 29OS
- Condition was stable but px developed hypersensitivity (After patient was switched to Brimonidine 0.15%)
- IOP 22 OU on Lumigan only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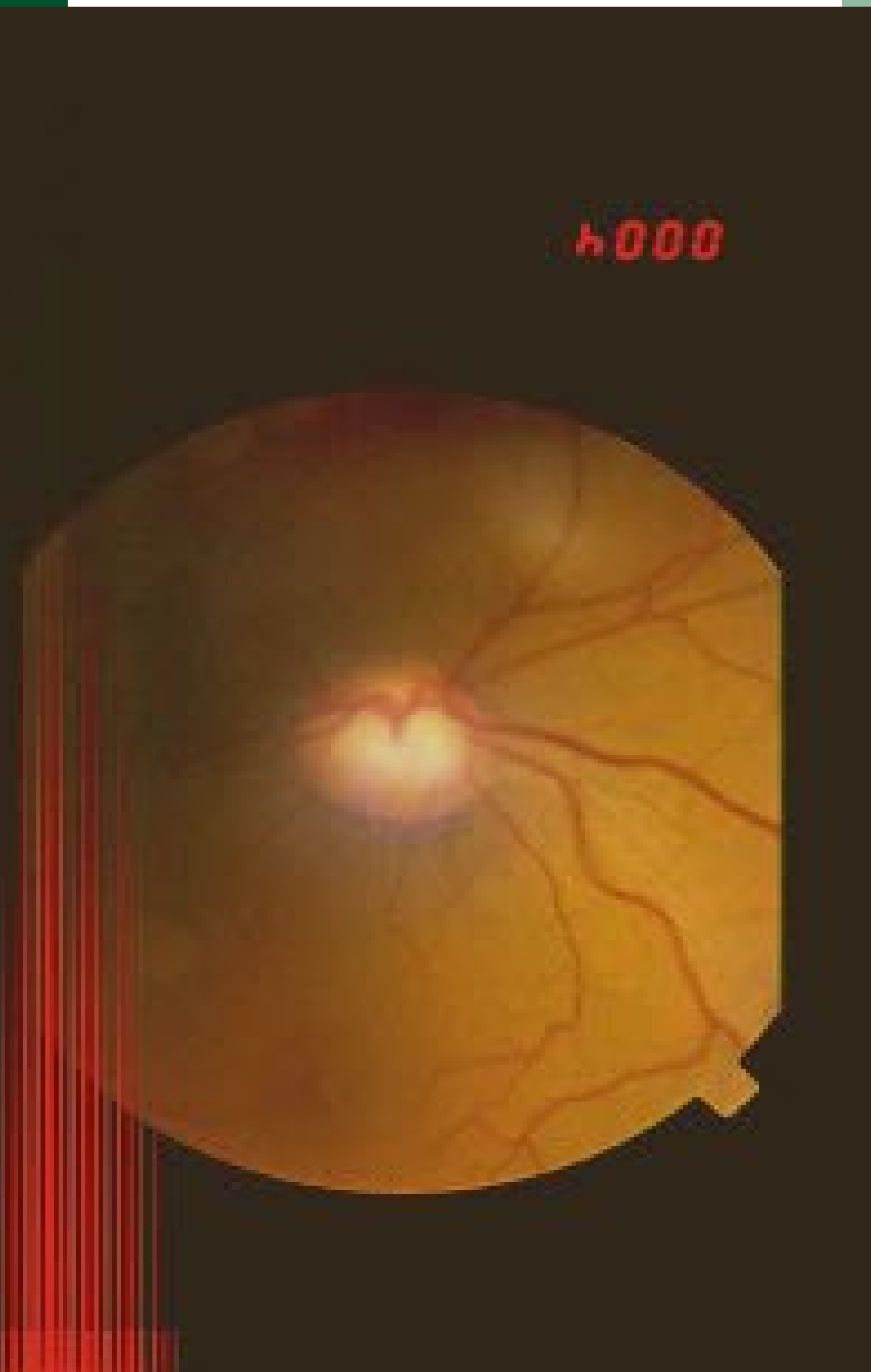

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CENTRAL 24-2 THRESHOLD TEST

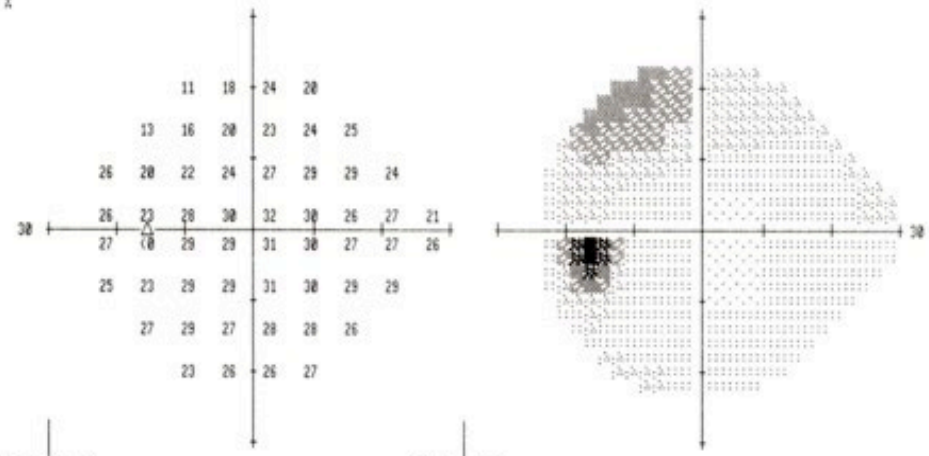
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 1/15
FALSE POS ERRORS: 2 %
FALSE NEG ERRORS: 1 %
TEST DURATION: 05:37

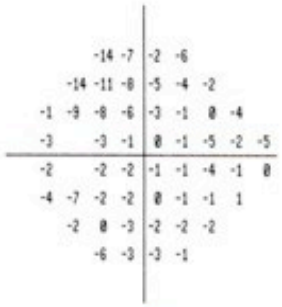
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-STANDARD

PUPIL DIAMETER:
VISUAL ACUITY:
RX: +4.75 OS DC X

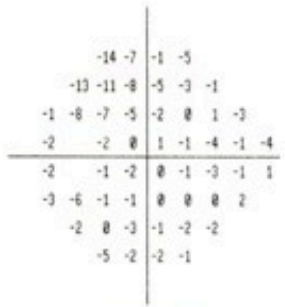
DATE: 11-08-2016
TIME: 9:07 AM
AGE: 75

FOVEA: OFF





TOTAL DEVIATION



PATTERN DEVIATION

GHT
OUTSIDE NORMAL LIMITS

VFI 95%

MD -2.85 DB P < 2%
PSD 3.00 DB P < 2%

:: < 5%
▯ < 2%
▩ < 1%
■ < 0.5%

BLADEN EYE CENTER
ERIC SCHMIDT, O.D. /M. SUTTON SCHILAWSKI
409 E. BROAD ST
ELIZABETHTOWN NC 28337
910.862.4268

ID: 100105

CENTRAL 24-2 THRESHOLD TEST

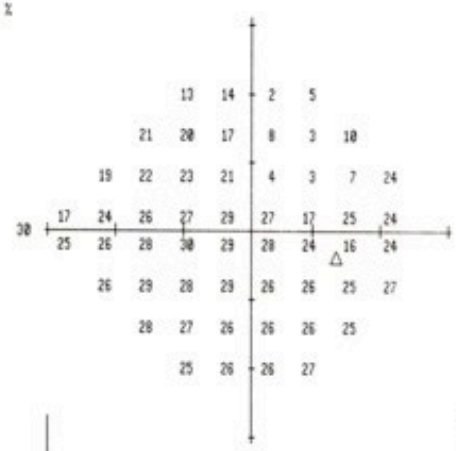
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 4/16 XX
FALSE POS ERRORS: 1 %
FALSE NEG ERRORS: 4 %
TEST DURATION: 07:23

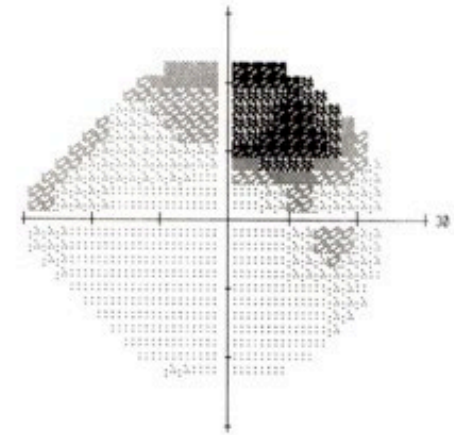
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-STANDARD

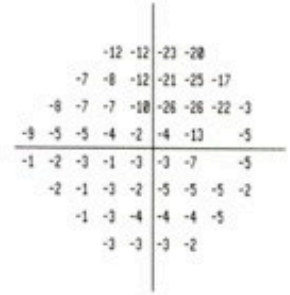
PUPIL DIAMETER:
VISUAL ACUITY:
RX: +4.00 DS DC X

DATE: 11-08-2016
TIME: 8:54 AM
AGE: 75

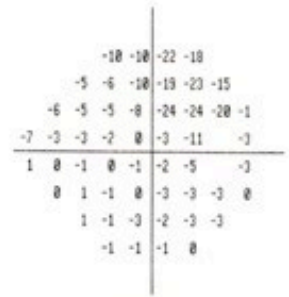
FOVEA: OFF







TOTAL DEVIATION



PATTERN DEVIATION

+++ LOW TEST RELIABILITY +++

GHT
OUTSIDE NORMAL LIMITS

VFI 84%

MD -6.69 DB P < 0.5%
PSD 7.12 DB P < 0.5%

:: < 5%
▯ < 2%
▩ < 1%
■ < 0.5%

BLADEN EYE CENTER
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409 E. BROAD ST
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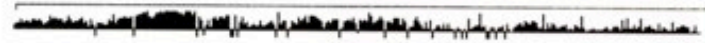

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Physician: Schmidt, Eric E
Operator:
Disease: POAG

Gender: Female
ID:

DOB(age): 03/02/1941 (78)
Ethnicity: African Descendant
Algorithm Ver: A3, 2, 1, 8

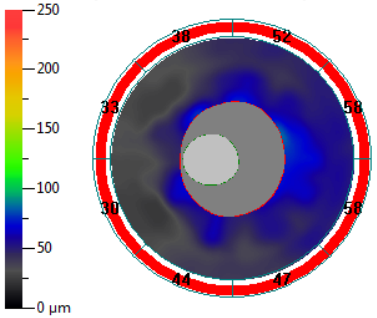
Right / OD — Nerve Fiber ONH/GCC OU Report — Left / OS

Right / OD

Exam Date:2015-12-08 09:49:33

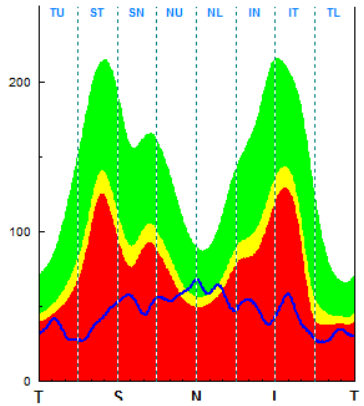
Scan Quality Index: Good 64

Optic Nerve Head Map

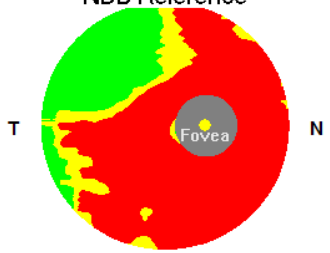


RNFL Analysis (µm)	OD	OS	Inter Eye Diff
Avg RNFL Thick...	45	89	-44
Avg Superior R...	45	88	-43
Avg Inferior RNFL	45	90	-45
Intra Eye Diff (S...	0	-2	N/A

ONH Analysis	OD	OS	Inter Eye Diff
Area C/D	0.24	0.06	0.18
V. C/D	0.46	0.50	-0.04
H. C/D	0.53	0.12	0.41
Rim Area (mm²)	2.97	3.15	-0.18
Disc Area (mm²)	3.90	3.36	0.54
Cup Vol (mm³)	0.012	0.000	0.012



NDB Reference



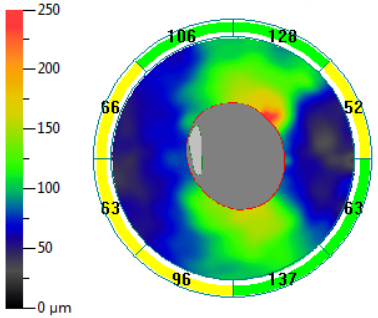
Exam Date:2015-12-08 09:47:18

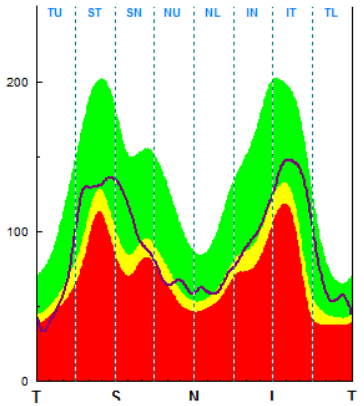
Left / OS

Exam Date:2015-12-08 09:52:58

Scan Quality Index: Good 60

Optic Nerve Head Map





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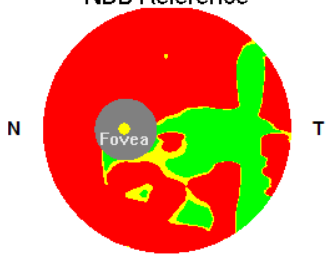
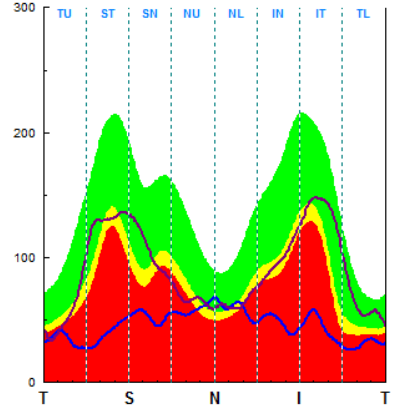


Exam Date:2015-12-08 09:52:07



Within Normal
Borderline
Outside Normal

GCC Avg Thickness (µm)	OD	OS	Inter Eye Diff
Total	69	52	17
Superior	72	44	28
Inferior	65	61	4
Intra Eye Difference (...	7	-17	N/A
FLV (%)	6.651	33.2...	-26.596
GLV (%)	25.6...	44.9...	-19.291

Scan Quality Index: Good 76

Good 81

Report Date: Tuesday 09/24/2019 13:58:40

Software Version: 3.2.1.8

Comment:

Signature:

Attendance Question

- What is the target IOP?
  - 1.~18
  - 2. ~15
  - 3. ~12

What would you recommend?

- 1. Switch to Rocklatan
- 2. SLT OU 180
- 3. Add Azopt OU BID
- 4. add Timoptic ½ OU BID
- 5. Trabeculectomy
- 6. d/c Lumigan, try Travatan Z OU QHS
- 7. Cosopt OU BID
- 8. Combigan OU BID

SLT OU IOP 19 OD, 20 OS

- What would you do now?

How Do You Know if the IOP needs to be lower?

- What are the risk factors for progression?
  - Age
  - IOP at diagnosis
  - Neuroretinal rim tissue
  - Disk hemes
  - Corneal hysteresis
- Is she progressing?

Physician: Schmidt, Eric E
Operator:
Disease: POAG

Gender: Female
ID:

DOB(age): 03/02/1941 (78)
Ethnicity: African Descendant
Algorithm Ver: A3, 2, 1, 8

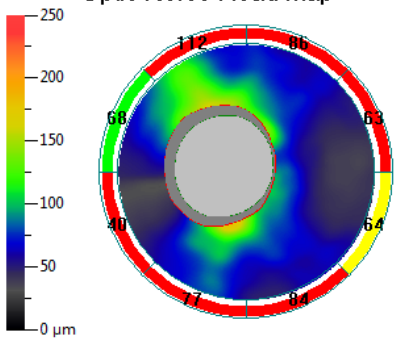
Right / OD — Nerve Fiber ONH/GCC OU Report — Left / OS

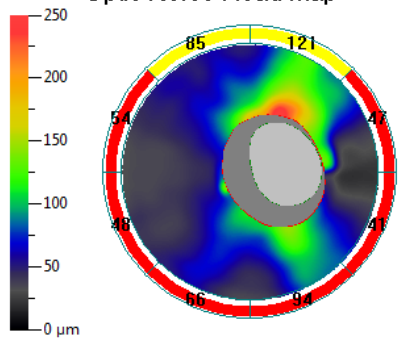
Exam Date:2019-01-30 08:19:20

Good 51 Scan Quality Index Good 54

Exam Date:2019-01-30 08:20:53

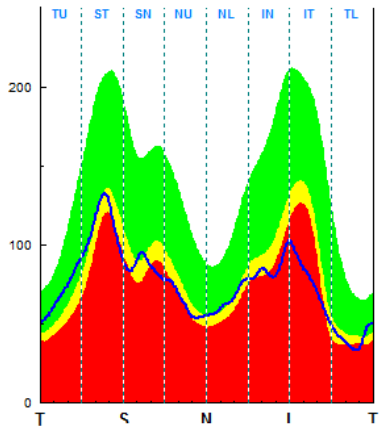
Optic Nerve Head Map

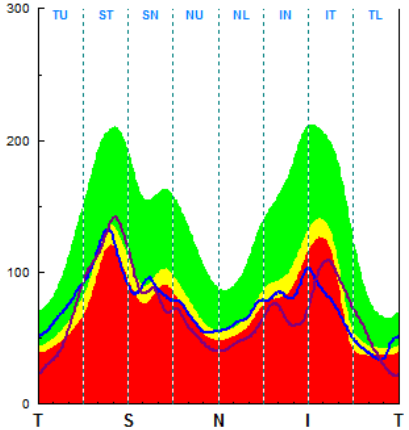


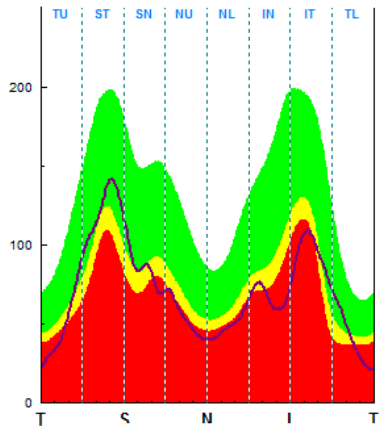


RNFL Analysis (µm)	OD	OS	Inter Eye Diff
Avg RNFL Thick...	74	70	4
Avg Superior R...	82	77	5
Avg Inferior RNFL	66	62	4
Intra Eye Diff (S...	16	15	N/A

ONH Analysis	OD	OS	Inter Eye Diff
Area C/D	0.74	0.53	0.21
V. C/D	0.89	0.76	0.13
H. C/D	0.90	0.70	0.20
Rim Area (mm^2)	1.03	1.56	-0.53
Disc Area (mm^2)	3.94	3.31	0.63
Cup Vol (mm^3)	1.348	0.229	1.119

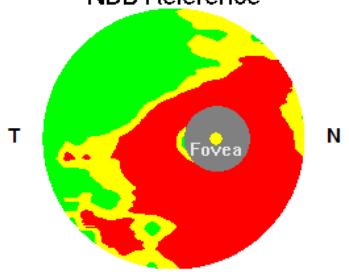


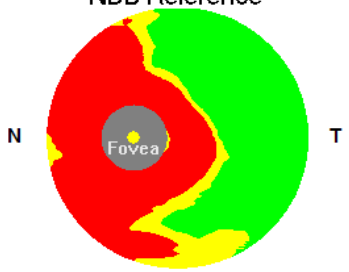




Within Normal
Borderline
Outside Normal

NDB Reference





GCC Avg Thickness (µm)	OD	OS	Inter Eye Diff
Total	74	75	-1
Superior	78	77	1
Inferior	70	73	-3
Intra Eye Difference (...	8	4	N/A
FLV (%)	6.150	11.2...	-5.115
GLV (%)	19.9...	18.6...	1.281

Exam Date:2019-01-30 08:18:19

Good 65 Scan Quality Index Good 76

Exam Date:2019-01-30 08:20:01

Report Date: Tuesday 09/24/2019 14:00:02 Software Version: 3.2.1.8

Comment:

Signature:

Operator:
Disease: POAG

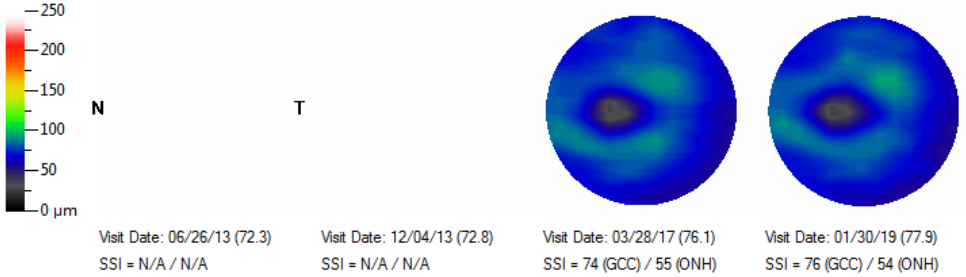
Gender: Female
ID:

Ethnicity: African Descendant
Algorithm Ver: A3, 2, 1, 8

Nerve Fiber ONH/GCC Change Analysis

Left / OS

GCC Thickness Map



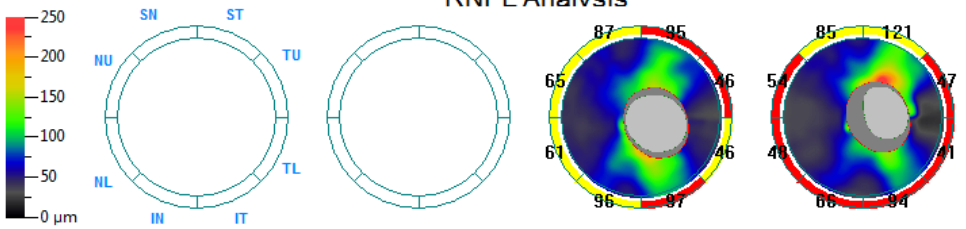
Within Normal
Borderline
Outside Normal

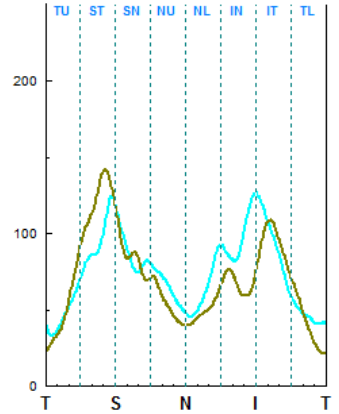
06/26/13
12/04/13
03/28/17
01/30/19

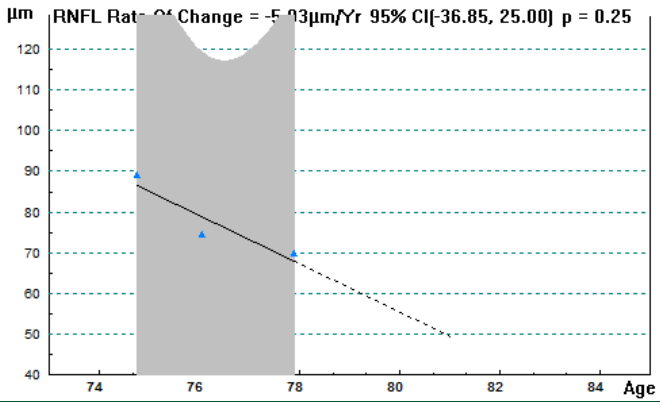
Comparison to NDB

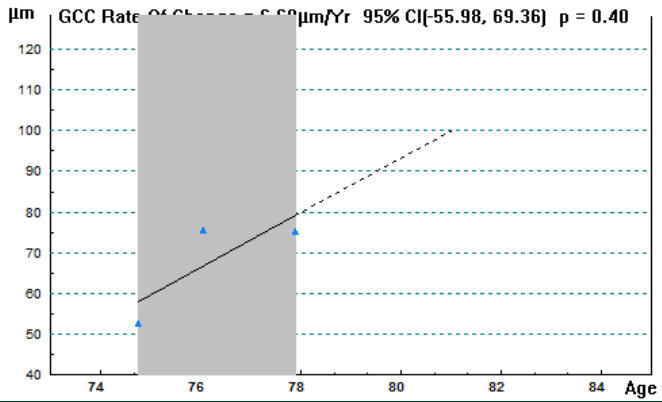
GCC Avg Thic...	06/...	01/...
Total	N/A	75
Superior	N/A	77
Inferior	N/A	73
FLV (%)	N/A	11.2...
GLV (%)	N/A	18.6...
RNFL Paramet...	**06/...**	**01/...**
Average_R...	N/A	70
Sup_RNFL	N/A	77
Inf_RNFL	N/A	62
H. C/D	N/A	0.70
V. C/D	N/A	0.76
Rim Area	N/A	1.56

RNFL Analysis









Report Date: Tuesday 09/24/2019 14:01:16
Software Version: 3.2.1.8

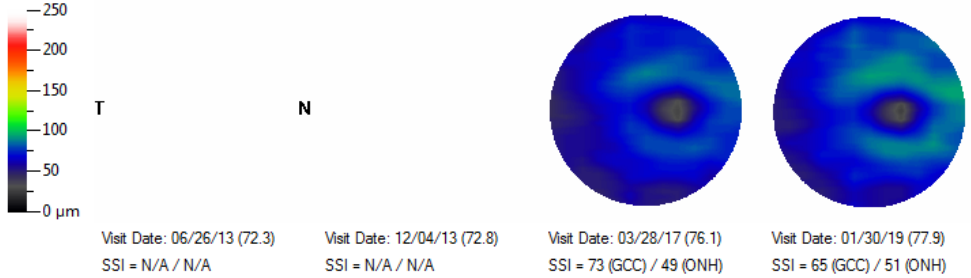
Comment:

Operator:
Disease: POAG
Gender: Female
ID:
Ethnicity: African Descendant
Algorithm Ver: A3, 2, 1, 8

Nerve Fiber ONH/GCC Change Analysis

Right / OD

GCC Thickness Map



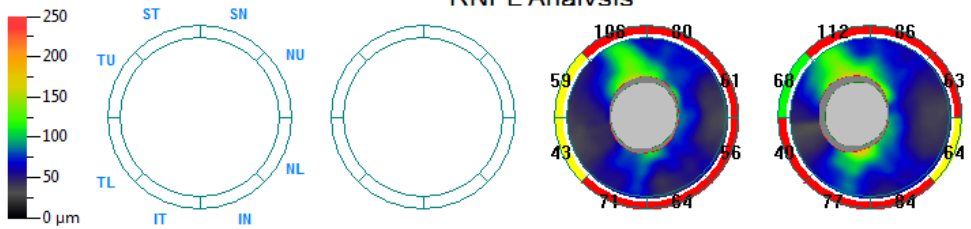
Within Normal
Borderline
Outside Normal

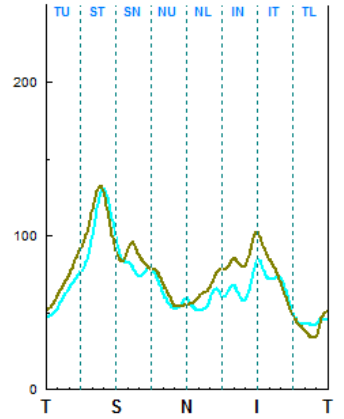
06/26/13
12/04/13
03/28/17
01/30/19

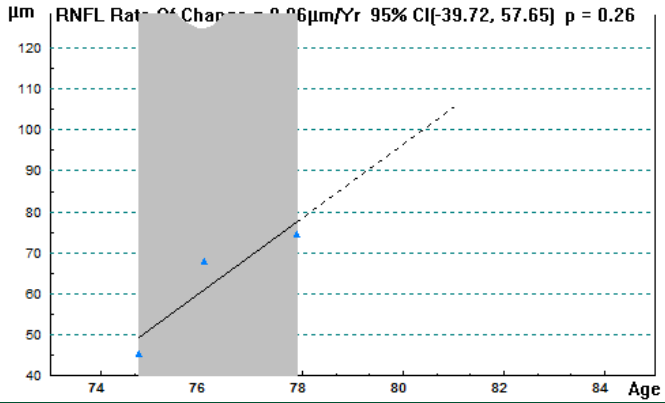
Comparison to NDB

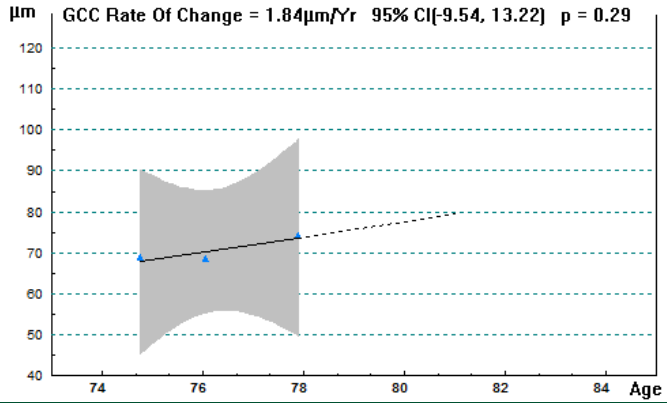
GCC Avg Thic...	06/...	01/...
Total	N/A	74
Superior	N/A	78
Inferior	N/A	70
FLV (%)	N/A	5.150
GLV (%)	N/A	19.9...
RNFL Paramet...	**06/...**	**01/...**
Average_R...	N/A	74
Sup_RNFL	N/A	82
Inf_RNFL	N/A	66
H. C/D	N/A	0.90
V. C/D	N/A	0.89
Rim Area	N/A	1.03

RNFL Analysis









Report Date: Tuesday 09/24/2019 14:00:45
Software Version: 3.2.1.8

Comment:

NAME: MCALLISTER MATTIE DOB: 03-02-1941
ID: 100105

CENTRAL 24-2 THRESHOLD TEST

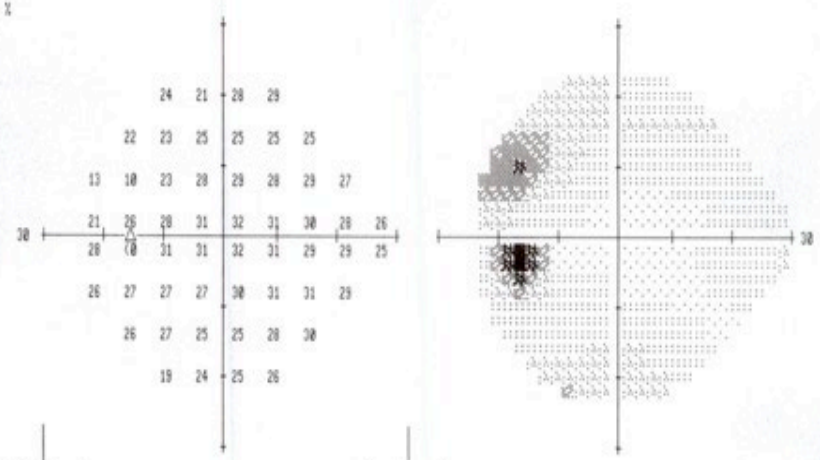
FIXATION MONITOR: BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 0/10
FALSE POS ERRORS: 0 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 03:32

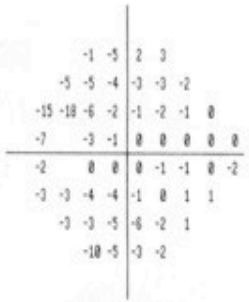
FOVEA: OFF

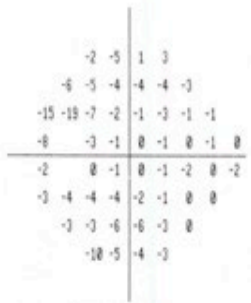
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-FAST

PUPIL DIAMETER:
VISUAL ACUITY:
RX: +4.00 DS DC X

DATE: 04-02-2019
TIME: 9:27 AM
AGE: 78





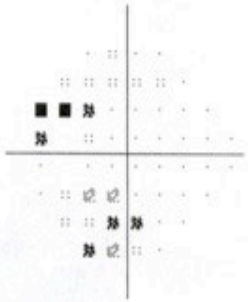


GHT
OUTSIDE NORMAL LIMITS

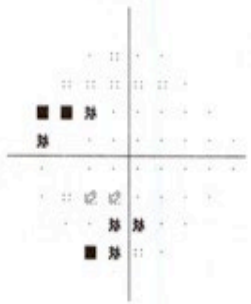
VFI 94%

MD -2.38 DB P < 5%
PSD 3.71 DB P < 0.5%

TOTAL DEVIATION



PATTERN DEVIATION



:: < 5%
∅ < 2%
▒ < 1%
■ < 0.5%

BLADEN EYE CENTER
ERIC SCHMIDT, O.D. /M. SUTTON SCHILAWSKI
409 E. BROAD ST
ELIZABETHTOWN NC 28337
910.862.4268

NAME: MCALLISTER MATTIE DOB: 03-02-1941
ID: 100105

CENTRAL 24-2 THRESHOLD TEST

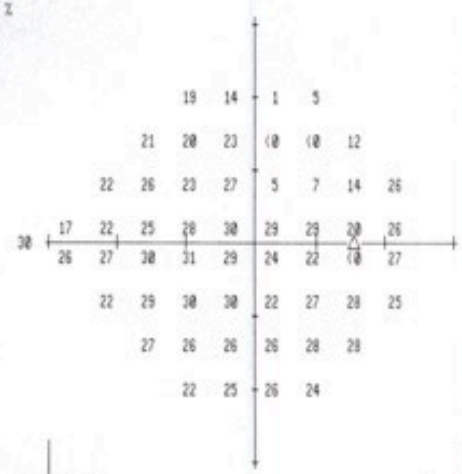
FIXATION MONITOR: GAZE/BLIND SPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 4/12 XX
FALSE POS ERRORS: 0 %
FALSE NEG ERRORS: 2 %
TEST DURATION: 04:01

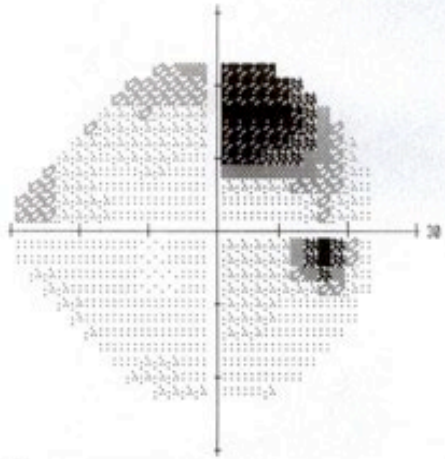
FOVEA: OFF

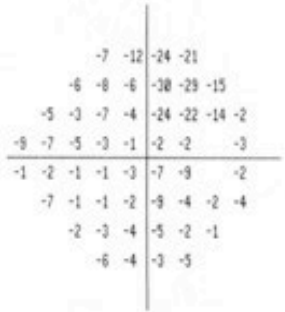
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-FAST

PUPIL DIAMETER:
VISUAL ACUITY:
RX: +3.75 DS DC X

DATE: 04-02-2019
TIME: 9:21 AM
AGE: 78







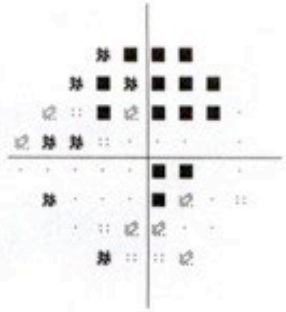
*** LOW TEST RELIABILITY ***

GHT
OUTSIDE NORMAL LIMITS

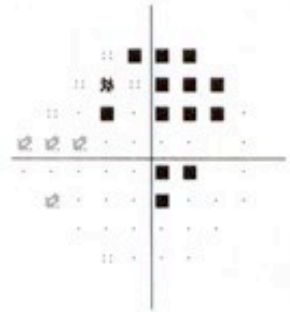
VFI 83%

MD -6.29 DB P < 0.5%
PSD 7.33 DB P < 0.5%

TOTAL DEVIATION



PATTERN DEVIATION



:: < 5%
∅ < 2%
▒ < 1%
■ < 0.5%

BLADEN EYE CENTER
ERIC SCHMIDT, O.D. /M. SUTTON SCHILAWSKI
409 E. BROAD ST
ELIZABETHTOWN NC 28337
910.862.4268

So Let’s Talk About Compliance

Adherence to IOP-Lowering Therapy

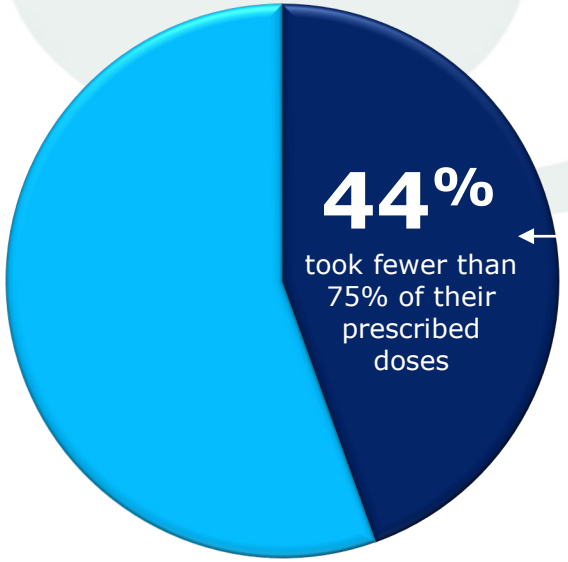
A complex and multifaceted problem[1,2]

- Includes both persistency and compliance issues

Factors related to adherence[1-3]

- Problems tolerating therapy
- Safety issues
- Inadequate efficacy
- Convenience factors, eg, access, cost, dosing
- Patient/situational factors, eg:
  - Competing activities
  - Forgetfulness
  - Poor disease knowledge and health literacy

Over 3 months in a study of 196 patients with glaucoma taking an IOP-lowering medication in one or both eyes[2,4]:



Despite instruction, free medication, once-daily administration, use of a dosing aid, and electronic monitoring of adherence

IOP=intraocular pressure.

1. Muir K, Lee P. *Arch Ophthalmol*. 2011;129(2):243-245. 2. Prum BE, et al. AAO PPP: POAG. Available at https://www.aao.org/Assets/77dc248e-f025-4b65-a016-14491633d7a4/636621550399270000/primary-open-angle-glaucoma-2015-pdf. 3. Reardon G, et al. *Am J Ophthalmol*. 2004;137:S3-S12. 4. Okeke CO, et al. *Ophthalmology*. 2009;116:191-199.

Predictors of Poor Adherence – Friedman 2019

- Gaps In Visits
- Patients Don’t Understand Severity Of Disease
- Cost of Drops (25%)
- Those who Travel A Lot
- Younger Pxs and Very Old Pxs
- African-Americans
- Those In Poor Health
  - These drop adherence to <60%

Ways To Improve Compliance

- See Pxs more frequently… especially early in treatment
- Improve tracking system – better identify no shows
- Call/email appointment reminders
- Reminders to pxs to take their drops
- Change Dr/Patient intervention

- G pxs ask 3.2 questions at visit whereas in other chronic diseases pxs ask ~ 6 questions/visit

Choosing Therapy: Switch or Add?

- Target IOP should be reached with minimal number of medications
- Build strongest foundation prior to adjunctive therapy
- Switching to a more effective medication may be best course of action
- Differences within medication classes exist
- Potential benefits of monotherapy
  - Improved patient compliance
  - Decreased cost
  - Reduced cumulative exposure to benzalkonium chloride

Estimating the Lead Time Gained by Optical Coherence Tomography in Detecting Glaucoma before Development of Visual Field Defects

Tammy M. Kuang, MD,[1,2,3] Chunwei Zhang, MD,[1,4] Linda M. Zangwill, PhD,[1] Robert N. Weinreb, MD,[1] Felipe A. Medeiros, MD, PhD[1]

- At 95% specificity, up to **35% of eyes had abnormal average RNFL thickness** 4 years before development of visual field loss and **19% of eyes had abnormal results 8 years before field loss**.
- **Conclusions:** Assessment of RNFL thickness with OCT was able to detect glaucomatous damage before the appearance of VF defects on SAP. In many subjects, significantly large lead times were seen when applying OCT as an ancillary diagnostic tool.

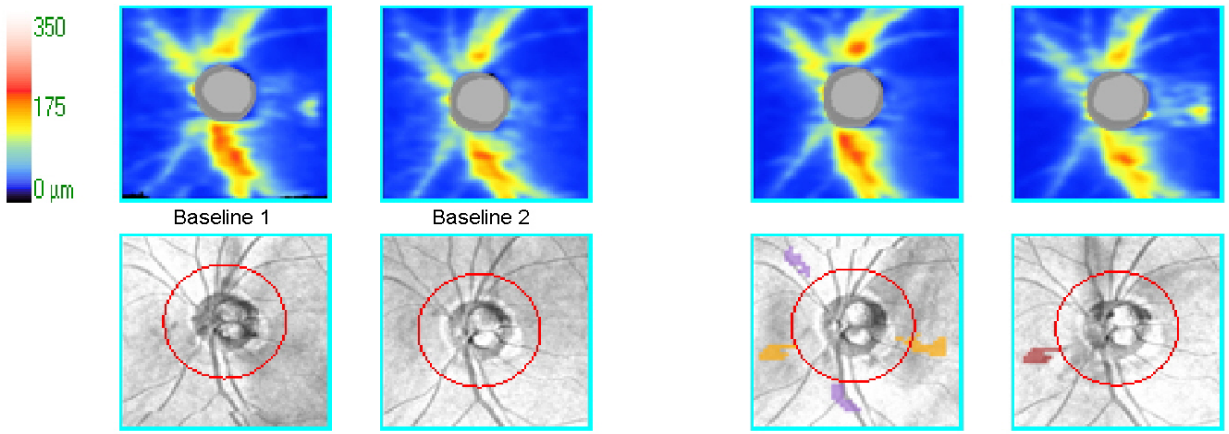
So using an OCT;
How do we tell if they are getting worse?

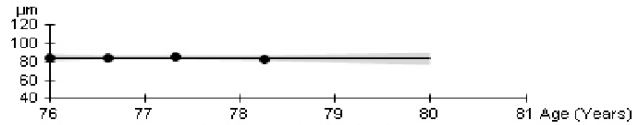
- Progression Analysis Software!!!!!!

Guided Progression Analysis: (GPA™)

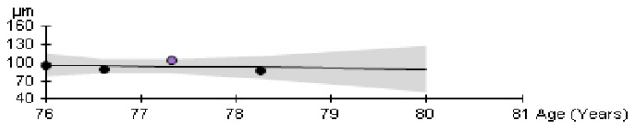
OD ○ | ● OS

	Baseline 1	Baseline 2	Exam 3	Exam 4
	4/5/2011 1:41:45 PM	1/30/2012 10:40:21 AM	10/17/2012 2:42:17 PM	9/18/2013 10:55:19 AM
	4000-4695	4000-4695	4000-4695	4000-4695
	SS: 8/10	R1 SS: 8/10	R1 SS: 8/10	R1 SS: 7/10
	Average Thickness: 85	Average Thickness: 84	Average Thickness: 86	Average Thickness: 83

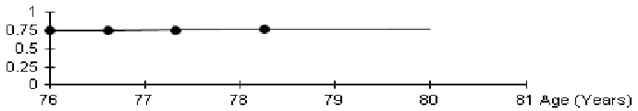




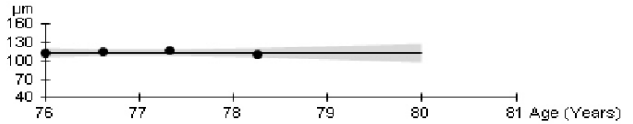
Average RNFL Thickness
Rate of change: -0.24 +/- 3.83 µm/Year



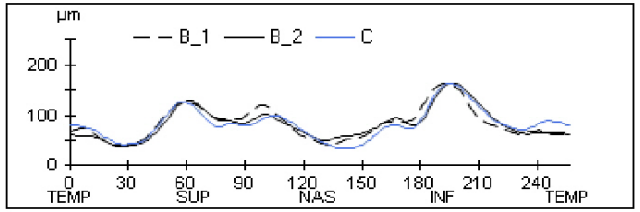
Superior RNFL Thickness
Rate of change: -1.58 +/- 22.45 µm/Year



Average Cup-to-Disc Ratio
Rate of change: 0.01 +/- 0.01 /Year



Inferior RNFL Thickness
Rate of change: -0.03 +/- 8.84 µm/Year



RNFL Thickness Profiles

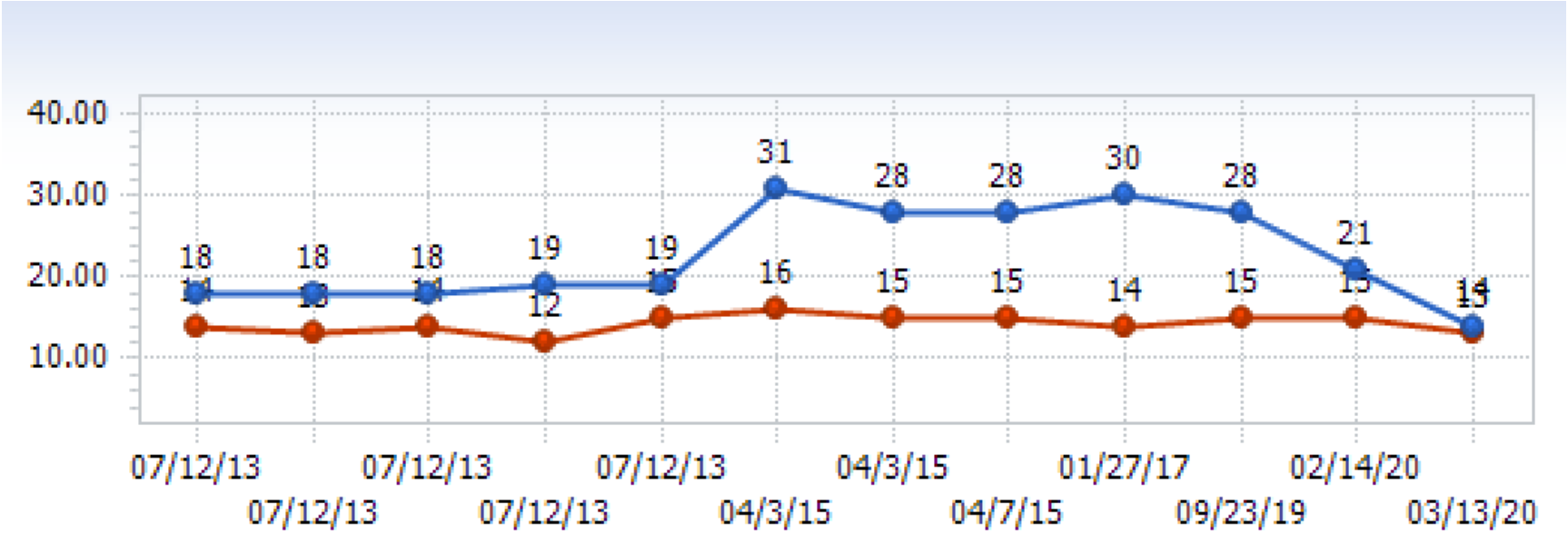
A NEW LOOK AT GLAUCOMA PROGRESSION

- WHY DO SOME PATIENTS PROGRESS AND SOME DON’T?
- WHY DO SOME PROGRESS AT A FASTER RATE?

Choosing Therapy: Switch or Add?

- Target IOP should be reached with minimal number of medications
- Build strongest foundation prior to adjunctive therapy
- Switching to a more effective medication may be best course of action
- Differences within medication classes exist
- Potential benefits of monotherapy
  - Improved patient compliance
  - Decreased cost
  - Reduced cumulative exposure to benzalkonium chloride

67 year old female

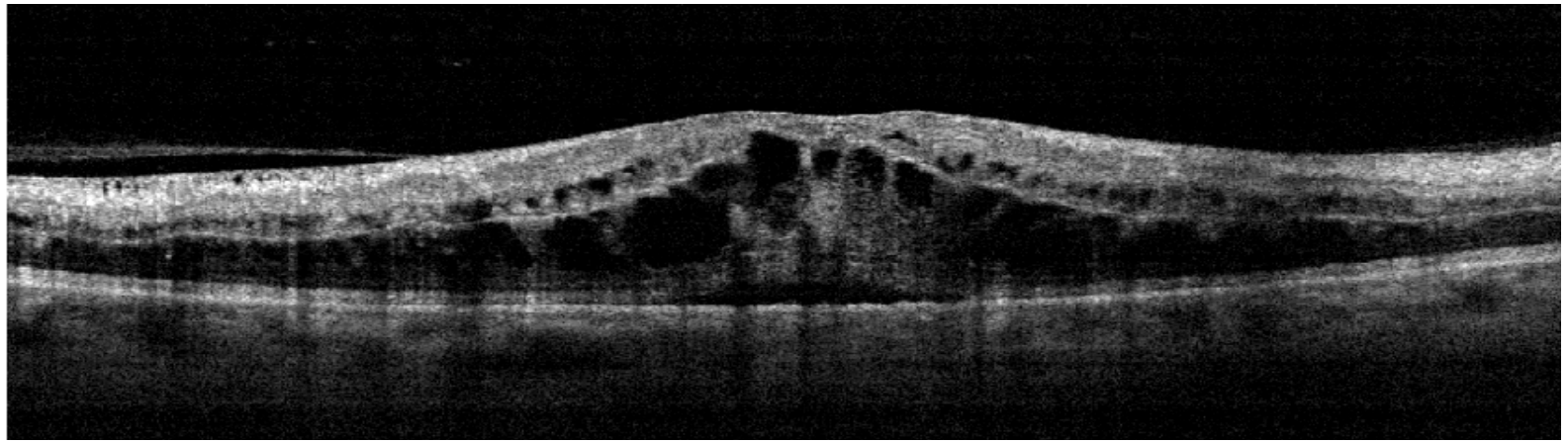


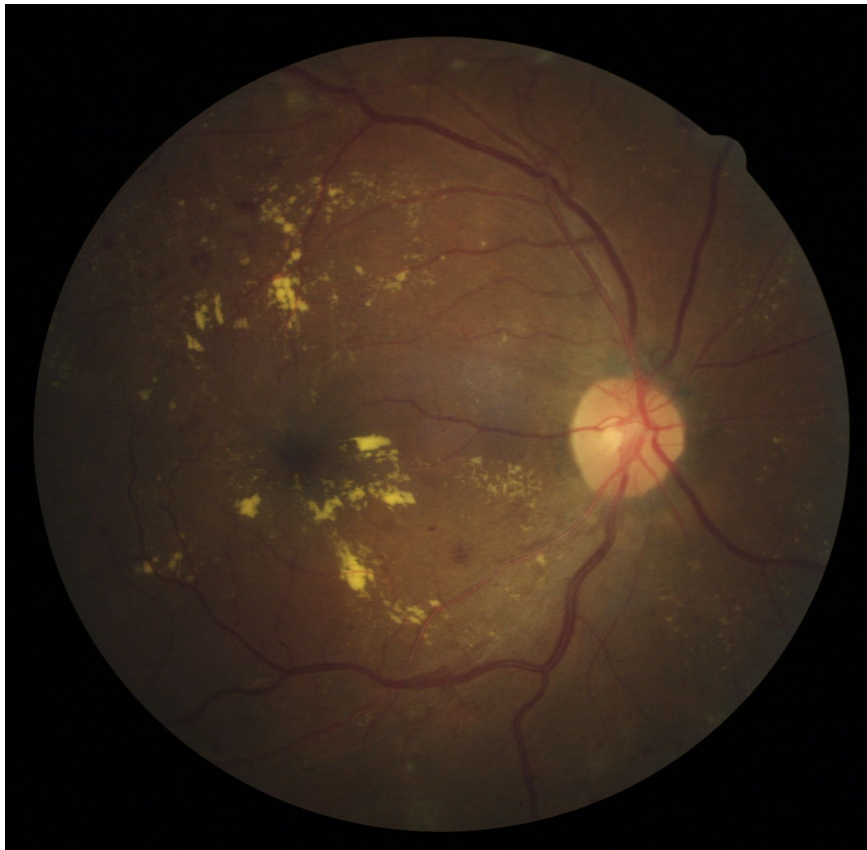
- **What changed?**
  - Multiple IVI (approximately 6-9 per year) between 2014 and 2016 for macular edema secondary to CRVO
    - Bevacizumab, dexamethasone intravitreal implant 0.7mg

HOW *COULD* IVI AND VITRECTOMY CAUSE ELEVATED IOP?!

- Widening indications for vitrectomy
- Anti-VEGF injections are the cornerstone of medical retinal treatment

- **Long and short term IOP rise possible**
- Development of OAG & progression of OAG





SHORT TERM

- We tend to think about the greatest risk of IVI to be endophthalmitis (1/2659)
- Immediately after injection: IOP rise to up to **87mmHg**
  - Most patients increase approximately 20mmHg-35mmHg
  - *Do most surgeons measure IOP after injections?*
- How does this happen?!
  - Increased intravitreal volume
    - 4-4.4mL average volume; most injections 0.05mL; FDA-approved GA therapeutics 0.1mL

E. Y. Hur, J. E. Kim, A. Mantravadi; Intraocular Pressure Changes Following Intravitreal Injections in the Office. *Invest. Ophthalmol. Vis. Sci.*2007;48(13):292.

CJO JCO

Original Article

Transient vision and intraocular pressure changes following anti-vascular endothelial growth factor injection

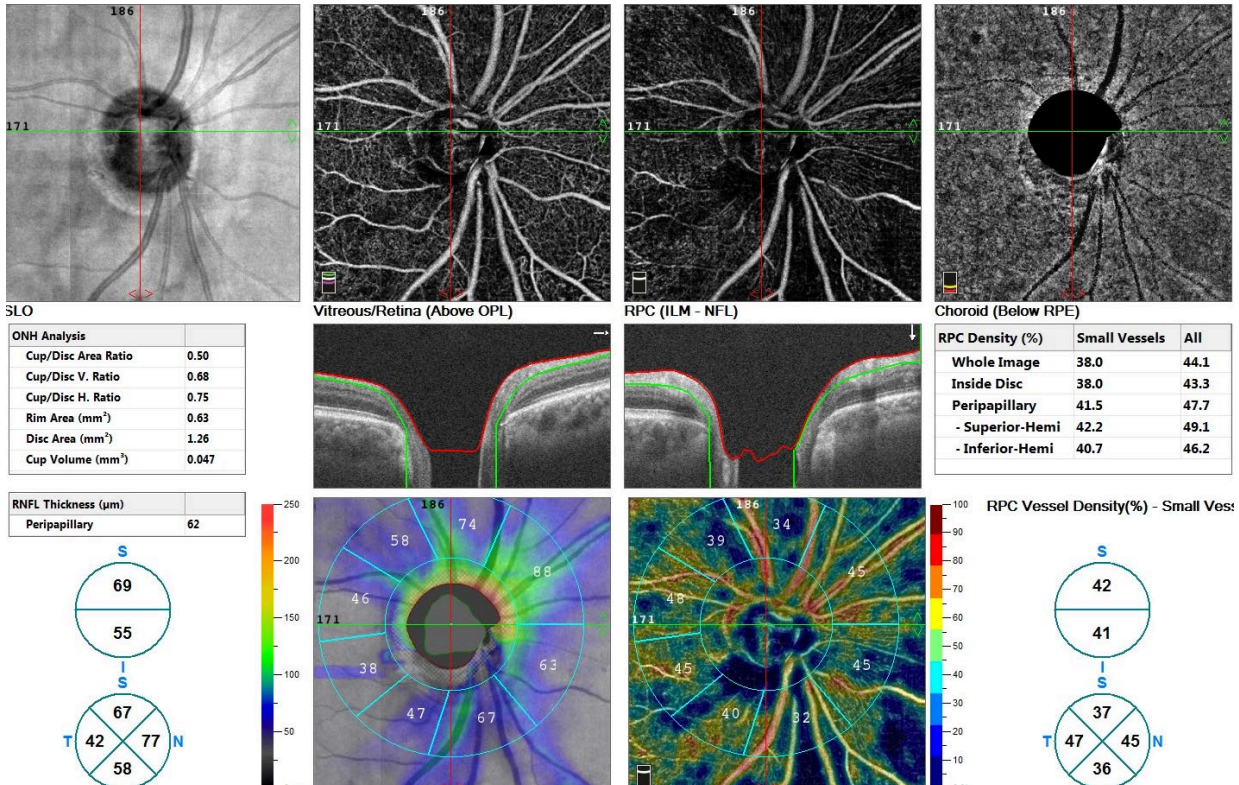
Khaldon Abbas,*,† Amy Basilious,*,† Julie Duncan,* Thomas Sheidow,*,† Philip Hooper,*,† John Gonder*,†

At 1 minute after intravitreal injection (IVI), VA worsened significantly from a baseline of 0.29 ± 0.21 to 0.76 ± 0.65 logMAR ($p < 0.001$), while IOP rose from 14.34 ± 4.39 mm Hg to 54.53 ± 20.21 mm Hg ($p < 0.001$). VA progressively improved over time, with 43% of eyes returning to baseline at 1 minute, 67% at 10 minutes, 83% at 20 minutes, and 89% at 30 minutes. The Spearman correlation coefficient for VA and IOP was statistically significant at 1-minute follow-up after IVI at 0.244 ($p = 0.014$) but not at later follow-ups. Eyes returning to baseline VA at 1 minute exhibited lower IOP than those not at baseline ($p = 0.0004$). Logistic regression revealed no significant predictors of delayed VA recovery.

Abbas K, Basilious A, Duncan J, Sheidow T, Hooper P, Gonder J. Transient vision and intraocular pressure changes following anti-vascular endothelial growth factor injection. Can J Ophthalmol. 2025 Oct 8:S0008-4182(25)00378-3.

WELL THAT CAN'T BE GOOD

- Risk of retinal artery occlusion (as high as 1/1389 Gao et al 2019)
- Repeated, sudden, **significant** IOP spike and temporary loss of perfusion



HOW CAN WE FIX THIS?

- **Treatment for elevated IOP vs. IOP spike-prevention**
  - Role of pre-procedure IOP lowering medication
  - Paracentesis
    - 32 gauge needle
    - Fluid balance

Anterior chamber paracentesis during intravitreal injections in observational trials: effectiveness and safety and effects

Sandeep Saxena[1], Timothy Y. Lai[2], Hideki Koizumi[3], Michel E. Farah[4], Daniela Ferrara[5], David Pelayes[6], Tomohito Sato[7], Carsten H. Meyer[8*], Timothy Murray[9] and for the International Pharmacokinetic Collaboration

Saxena *et al. Int J Retin Vitr* (2019) 5:8
https://doi.org/10.1186/s40942-019-0157-z

International Journal of Retina and Vitreous

ALL ABOUT OUTFLOW

- Reduced trabecular outflow:
  - ~~1) Direct toxicity of medication~~
  - 2) Inflammation
    - Trabeculitis
  - 3) Aggregation of particles
    - Silicone, protein in the TM
  - 4) Nitric oxide reduction

SILICONE?

- Medical grade silicone oil droplets
  - Barrel of the syringe
  - Hub of the needle
  - Tip of the plunger
  - Stopper of the medication vial
- *Silicone oil has the potential to be pro-inflammatory*

NITRIC OXIDE

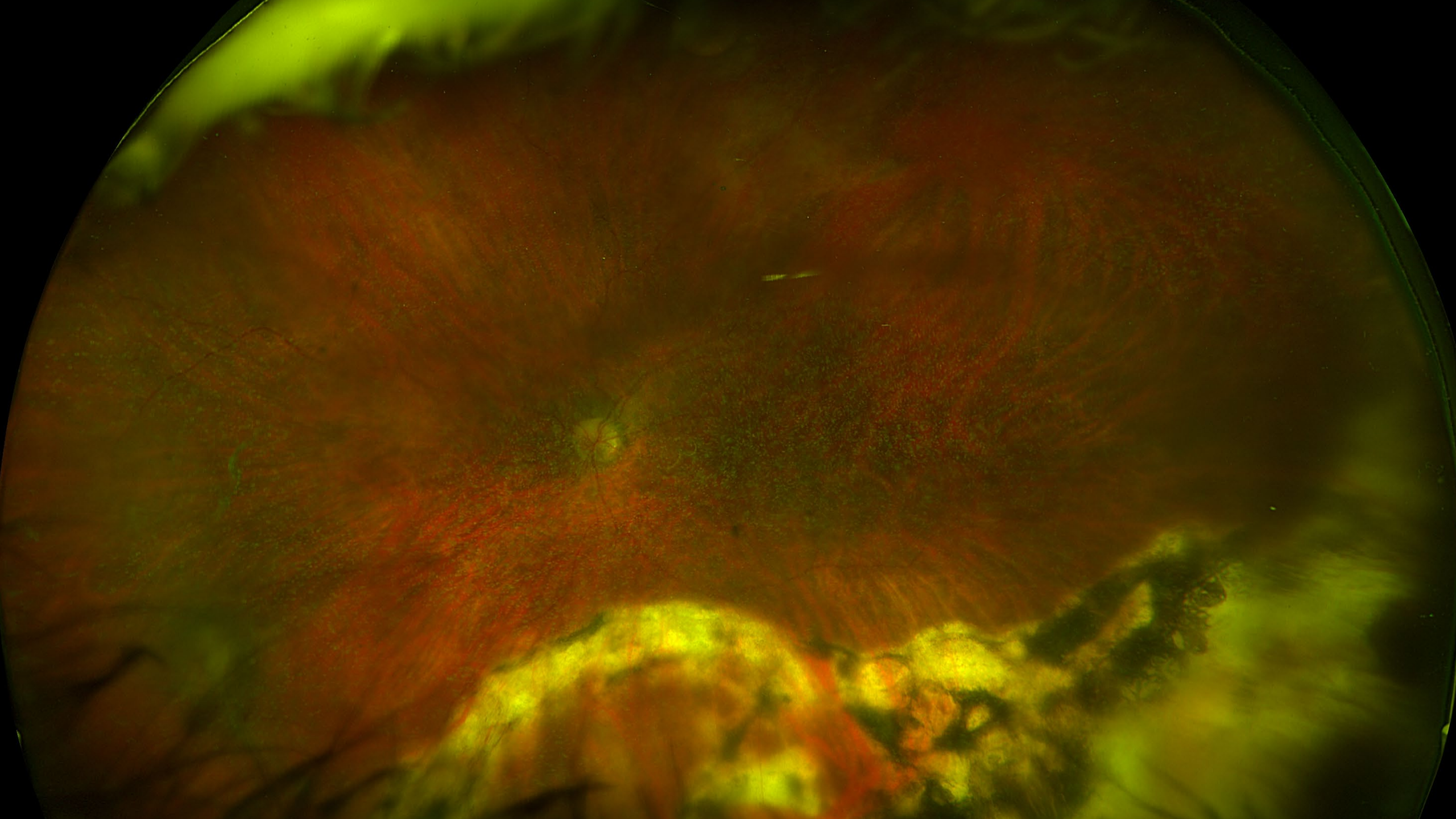
- Nitric oxide is involved in the signaling pathway which leads to relaxation of trabecular beams
  - Leads to increased trabecular outflow
    - Latanoprostene bunod
      - Latanoprost acid + butanediol monohydrate
        - NO is a gas, so must be attached to another molecule
- VEGF upregulates nitric oxide synthase = increased nitric oxide
- *Effect of **anti-VEGF** medications?*

SO WHO IS MOST AT RISK?

- Greater number of injections (20+)
- Higher frequency of injections (7/year +)

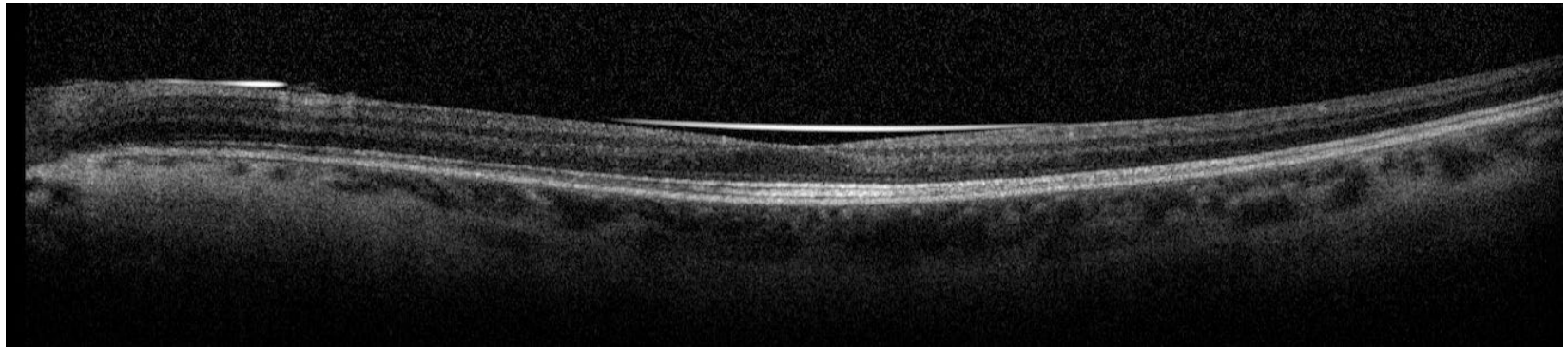
- Younger patients
- Patients with shorter axial length

Eadie BD, Etminan M, Carleton BC, Maberley DA, Mikelberg FS. Association of Repeated Intravitreous Bevacizumab Injections With Risk for Glaucoma Surgery. *JAMA Ophthalmol.* 2017;135(4):363–368



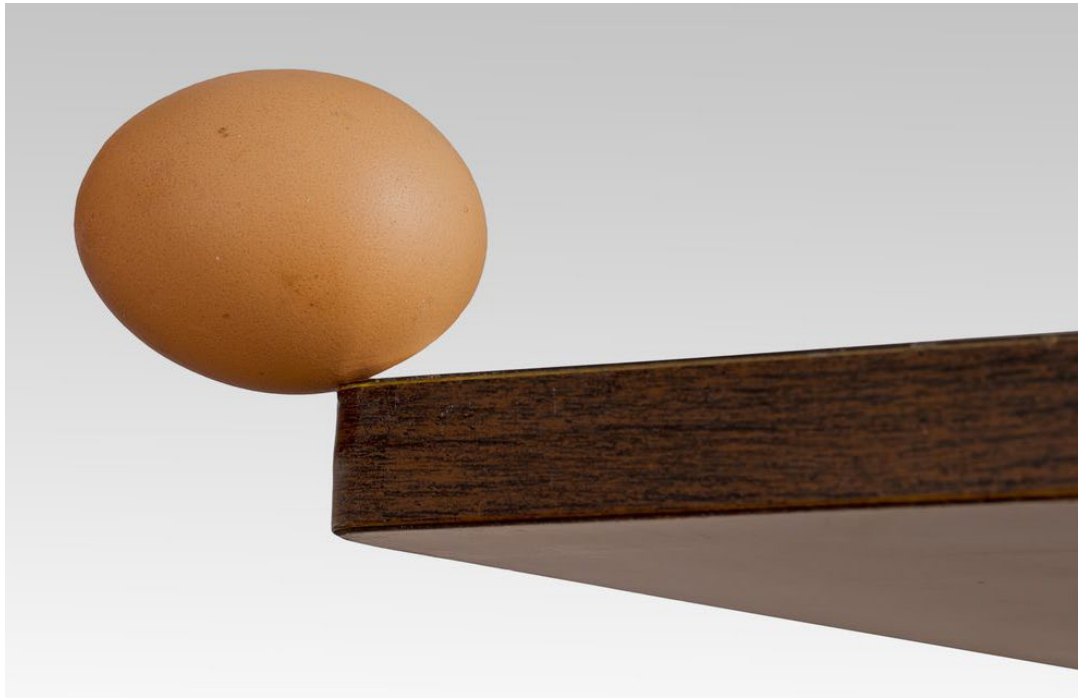
VITRECTOMY & TAMPONADE AGENTS

- Long term potential for IOP rise
  - Oxidative stress-fluid/air exchange
- Tamponade agents
  - Sulfur hexafluoride (SF_6)
  - Perfluoropropane (C_3F_8)
  - Silicone oil-greatest risk of IOP elevation-as high as 40%



BOTTOM LINE

- **Monitor intraocular pressure in patients undergoing IVI or who have a history of PPV**



A CLASSIC CASE

- 68 Y/O AFRICAN AMERICAN MALE
- PMH: HBP, HYPERCHOLESTEROLEMIA
- FMH: MOTHER POAG
- INITIAL PRESENTATION:

  BCVA: 20/20 OD, OS

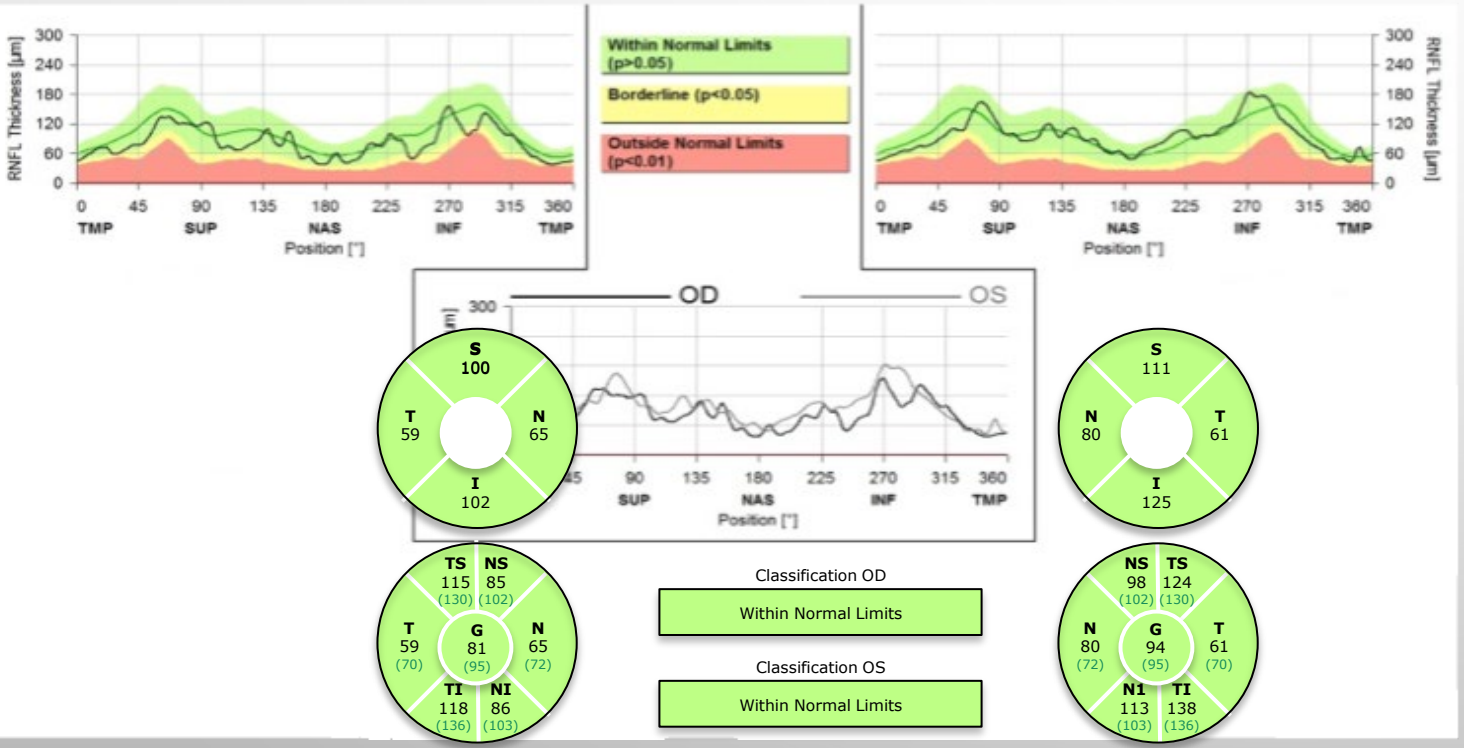
  IOP: OD 21MM HG, OS 22MM HG

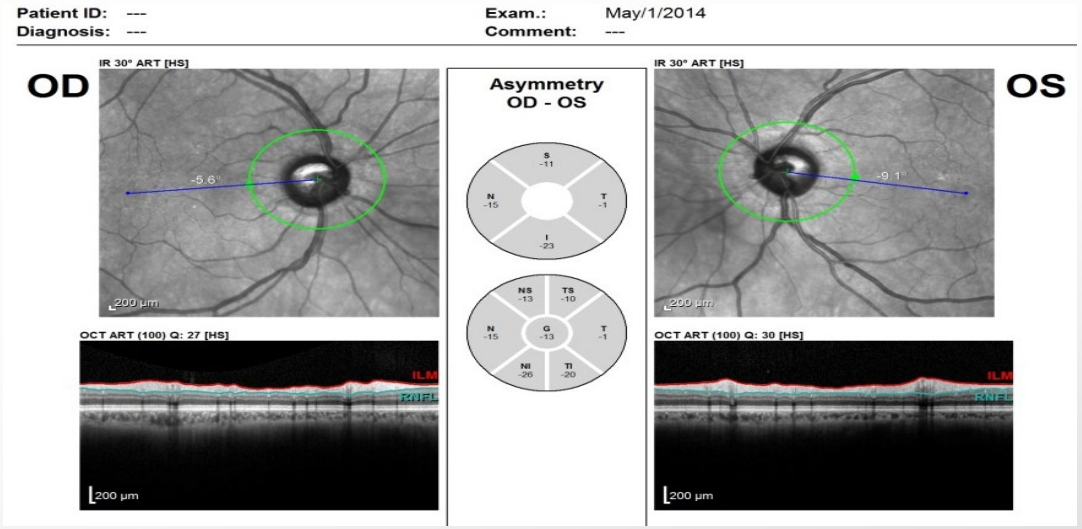
  C/D: 0.6/0.6 OD, 0.6/0.6 OS

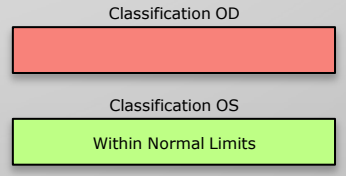
SO WHAT NOW???

OCT 2017

2017







OCT=optical coherence tomography.

CASE 1 (CONT)

- FP TAKEN
- VF – WNL
- PACHYMETRY – OD 505, OS 510
- HYSTERESIS- OD 8 OS 9

- TO TREAT OR NOT TO TREAT – THAT IS THE QUESTION!!

ARS QUESTION1

- BASED ON THE EVIDENCE AT HAND, WOULD YOU

    1. INITIATE TREATMENT
    2. SEE PATIENT IN 1 MONTH
    3. SEE PATIENT IN 3 MONTHS
    4. SEE PATIENT IN 6 MONTHS
    5. SEE PATIENT IN 12 MONTHS

2 YEARS LATER – NO TREATMENT

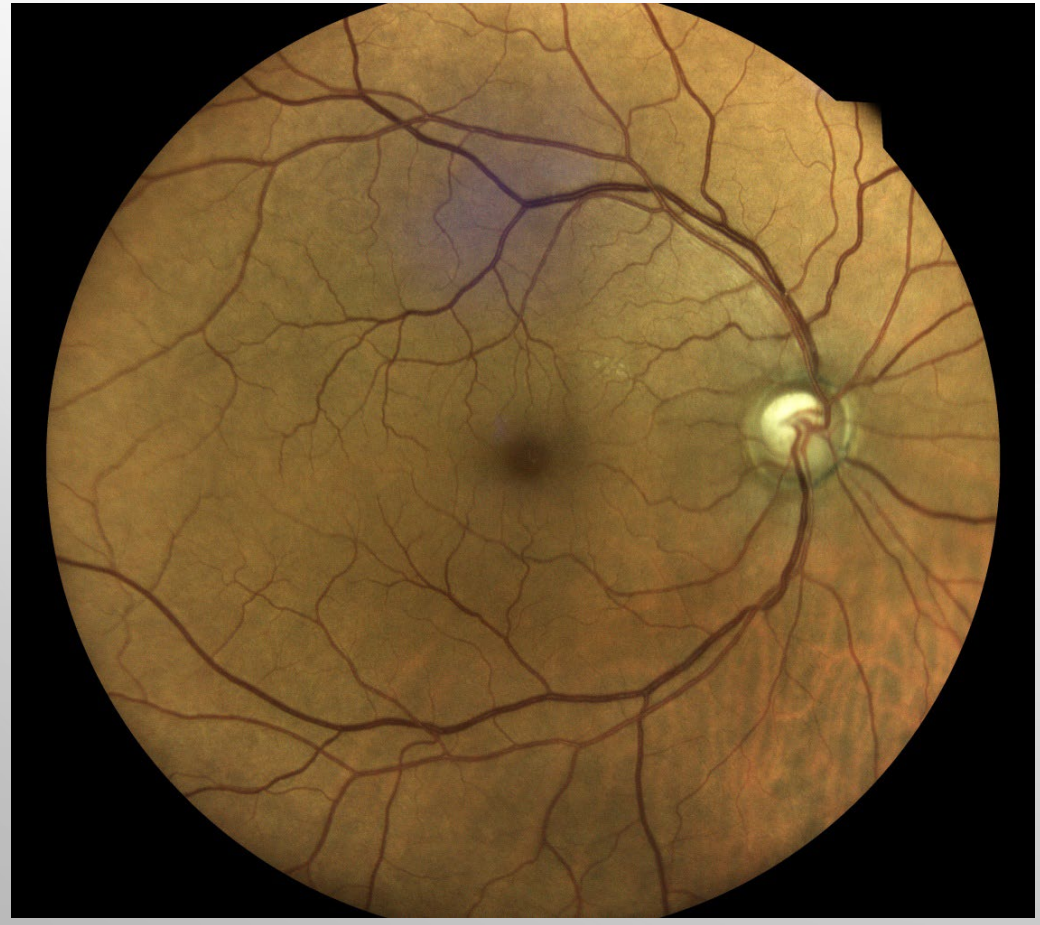
2019 – IOP: 20mm Hg OD, 21mm Hg OS

Followed for 2 years w/out tx

IOP ranged 19-23mm Hg (5 readings)

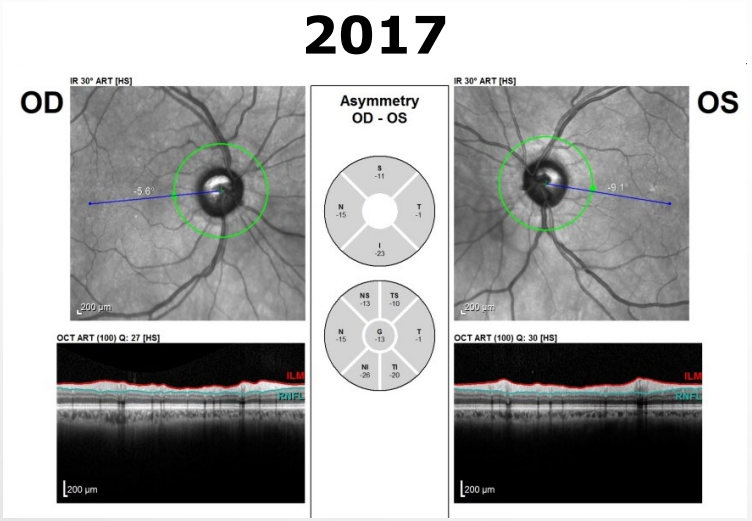
OPTIC NERVE HEAD PHOTO- 2019
VF – WNL OU

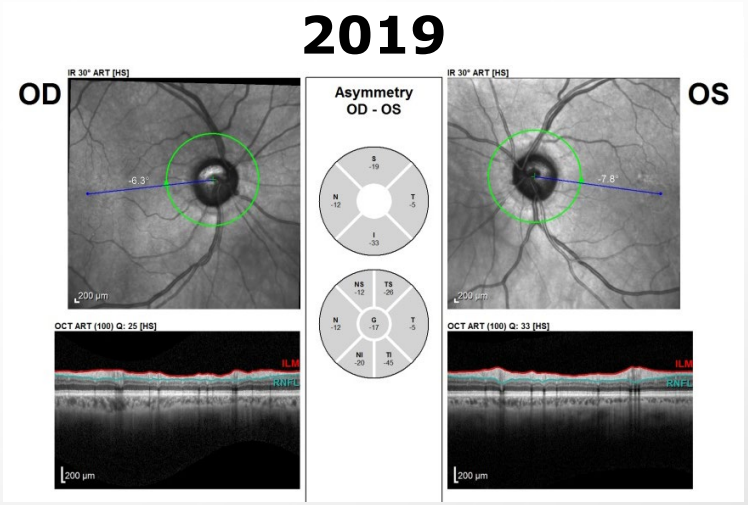
OD

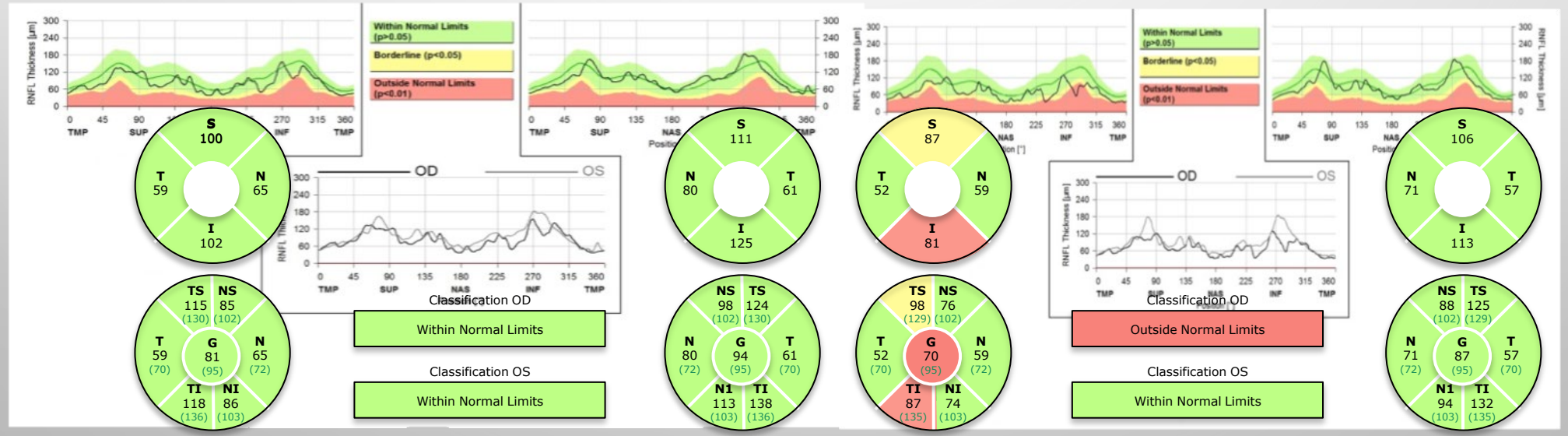


OS

OCT 2017 VS 2019

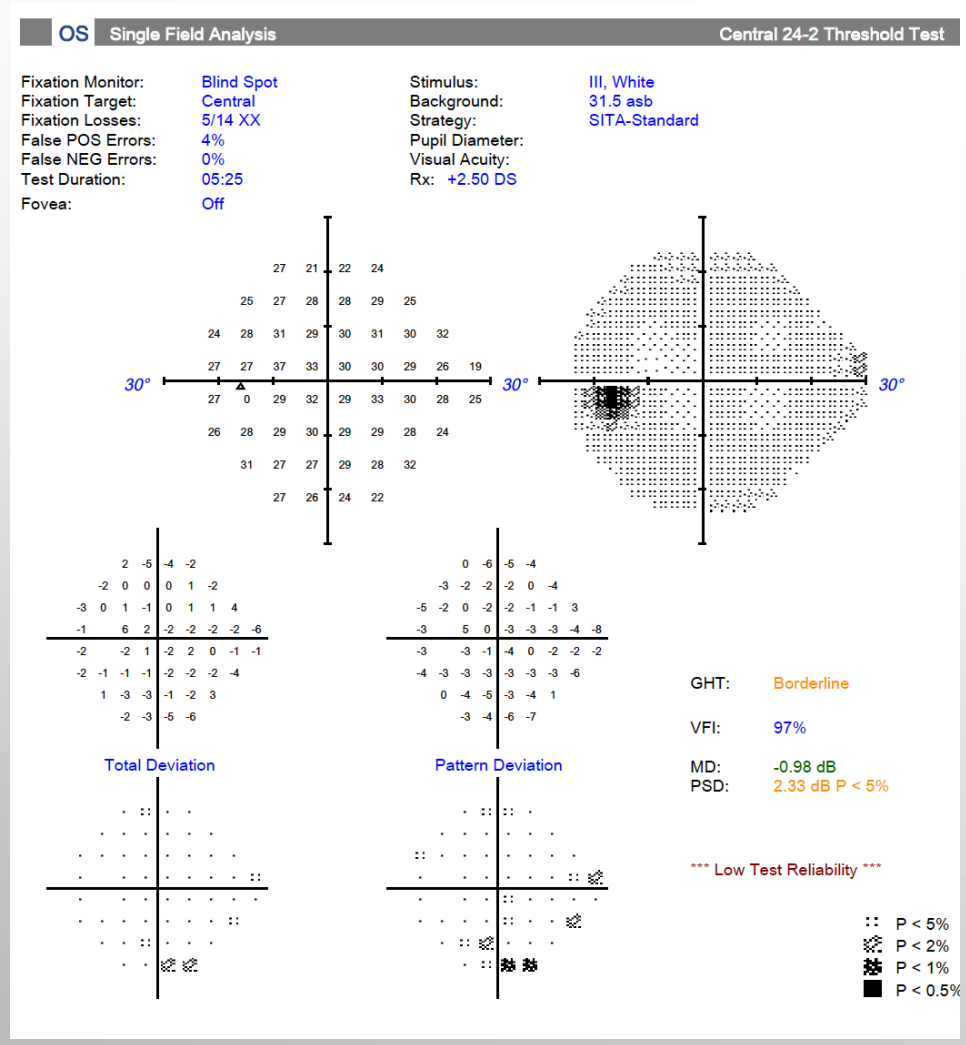


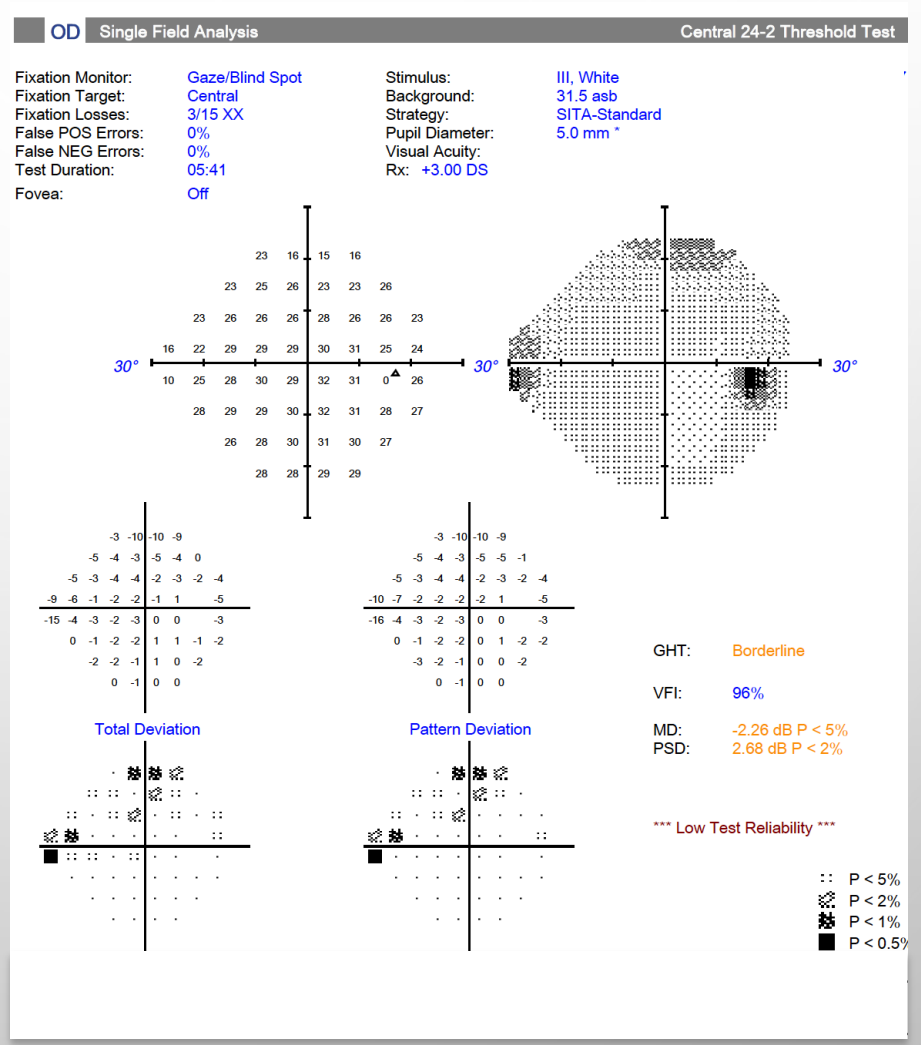




OCT=optical coherence tomography.

VF RESULTS-2019

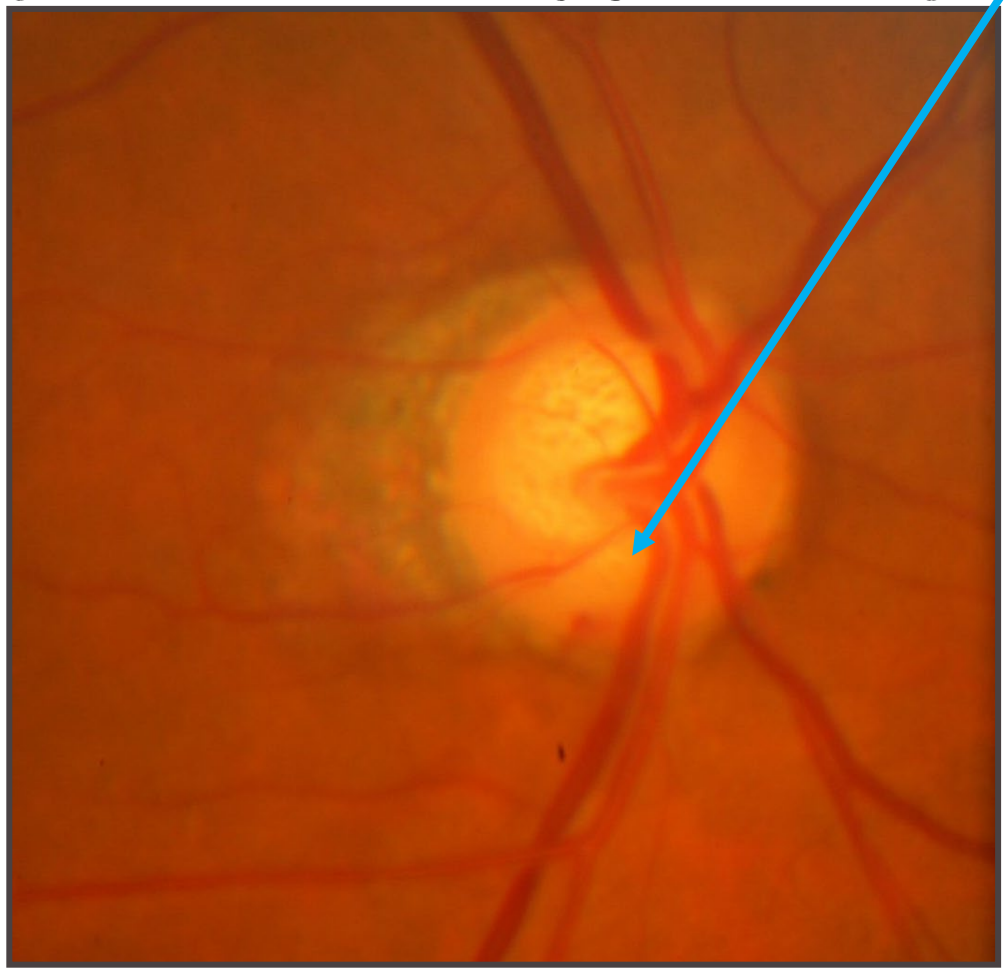




DEFINITELY POAG

- WERE THERE ANY CLUES THAT MAY HAVE LED US TO TREAT EARLIER??
- WHAT IS THE SIGNIFICANCE OF THE DISK HEMORRHAGES??
- WHAT IS THE SIGNIFICANCE OF THIN CORNEAS??
- WAS THE OCT REALLY NORMAL?:
- TIME FOR A COFFEE TALK!!!

DID YOU SEE THE DISC HEMORRHAGE?



Detection and Prognostic Significance of Optic Disc Hemorrhages during the Ocular Hypertension Treatment Study

Donald L. Budenz, MD, MPH,[1] Douglas R. Anderson, MD,[1] William J. Feuer, MS,[1] Julia A. Beiser, MS,[2] Joyce Schiffman, MS,[1] Richard K. Parrish II, MD,[1] Jody R. Piltz-Seymour, MD,[3] Mae O. Gordon, PhD,[2] Michael A. Kass, MD,[2] Ocular Hypertension Treatment Study Group

Main Outcome Measures: Incidence of optic disc hemorrhages and POAG end points.

Results: Median follow-up was 96.3 months. Stereophotography-confirmed glaucomatous optic disc hemorrhages were detected in 128 eyes of 123 participants before the POAG end point. Twenty-one cases (16%) were detected by both clinical examination and review of photographs, and 107 cases (84%) were detected only by review of photographs ($P<0.0001$). Baseline factors associated with disc hemorrhages were older age, thinner corneas, larger vertical cup-to-disc ratio, larger pattern standard deviation index on perimetry, family history of glaucoma, and smoking status. The occurrence of a disc hemorrhage increased the risk of developing POAG 6-fold in a univariate analysis ($P<0.001$; 95% confidence interval, 3.6–10.1) and 3.7-fold in a multivariate analysis

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- Disc hemorrhages detected in 128 eyes of 123 participants
- 21 cases detected by both doctor and photos
- **107 cases (84%) were detected only by a review of photography**

DISK HEMORRHAGES AND RATE OF PROGRESSION (MEDEIROS ET AL)

- Cohort of the DIGS
- Pxs followed for 8 years for VF progression (using the VFI)
- 20% had disk hemorrhage
- Eyes with disk heme had more than double the rate of VF loss
- Eyes w/ more than 1 disk heme showed an even higher rate of VF progression
- Persons with disk heme in general had a more severe glaucoma

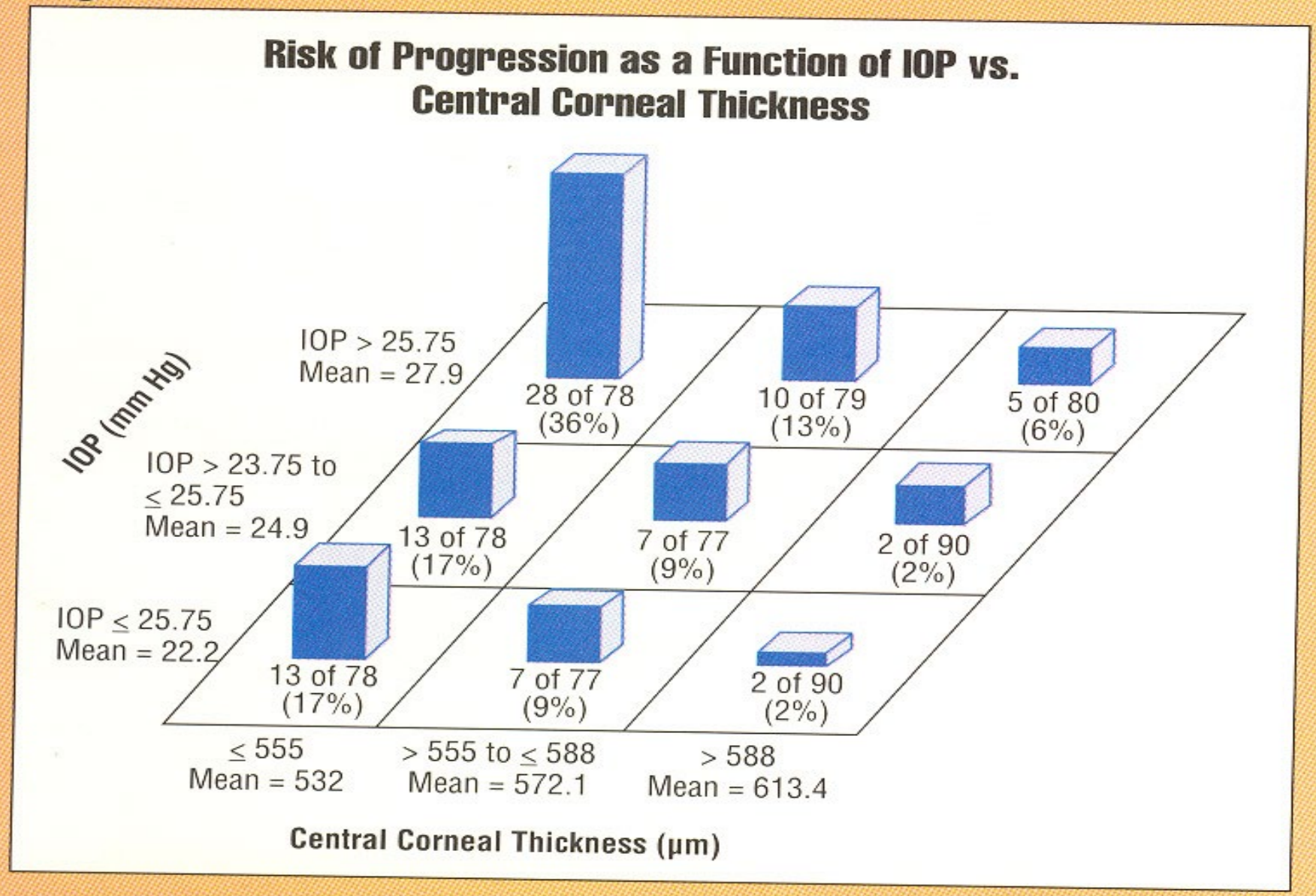
SPEAKING OF OPTIC DISK HEMORRHAGES

- BUDENZ ET AL, (OHTS GROUP) – AJO 2/17
- 13 YEAR DATA

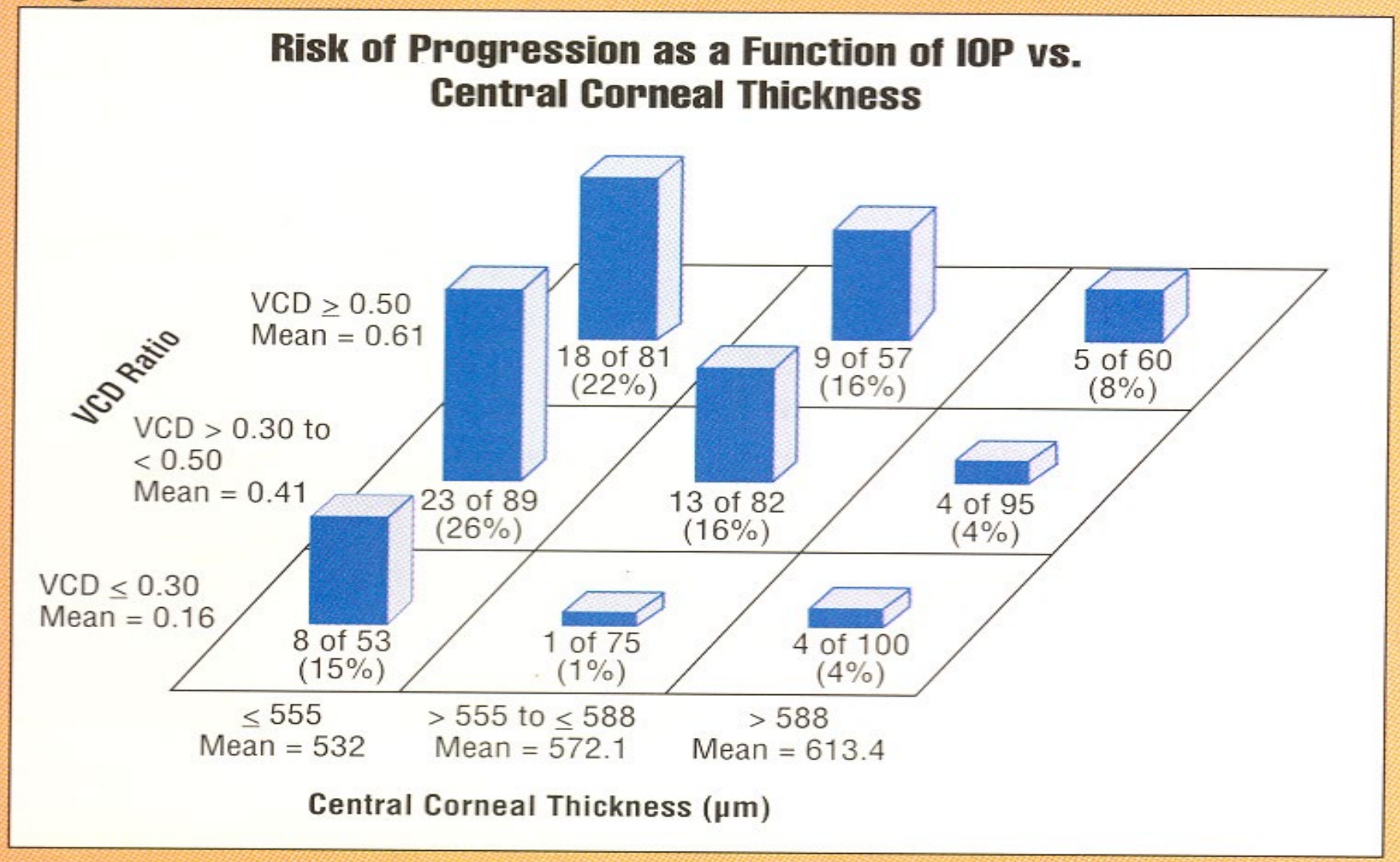
- ODH ARE AN INDEPENDENT PREDICTOR FOR POAG
- ODH ARE PREDICTIVE OF PROGRESSION
- PREDICTIVE FACTORS FOR ODH ARE SIMILAR TO THOSE FOR POAG (IN OHT PXS)
  - Thin corneas
  - Thinner rims
  - Higher IOP
  - Older age

THE PACHYMETRY ISSUE

- JUICY DATA
  - 36% OF PXS W/ IOP >25.75 AND K THICKNESS < 555 MICRONS DEVELOPED POAG
  - 6% OF PXS W/ SAME IOP BUT K THICKNESS > 588 CONVERTED TOPOAG
- JUICY DATA II
  - 15% PXS W/ C/D .3/.3 AND K THICKNESS < 555 MICRONS CONVERTED BUT
  - 4% OF PXS W/ SAME DISK PARAMETERS AND K THICKNESS> 588 MICRONS CONVERTED



The percentage of participants in the observation group who developed primary open-angle glaucoma grouped by baseline IOP and by CCT measurements.



The percentage of participants in the observation group who developed primary open-angle glaucoma grouped by vertical cup:disc ratio and by CCT measurements.[5]

(Figures: Arch Ophthalmol. *2002;120:714-720.*
Copyright © 2002, American Medical Association.)

IOP 30mmHg, CCT 600µ

Glaucoma Risk Estimator

Age 70	RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
	1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure *(mm Hg)*	30	30	30	30	30	30
Central Corneal Thickness *(microns)*	600	600	600	600	600	600
Vertical Cup to Disc Ratio by Contour	0.55			0.55		
Pattern Standard Deviation (◉ Humphrey *(dB)* ○ Octopus loss variance *(dB)*)	1.0	1.0		1.0	1.0	

Print | Reset

9.1%

The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

Glaucoma risk is 9.1%

IOP 20mmHg, CCT 500µ

Glaucoma Risk Estimator

Age 70	RIGHT EYE MEASUREMENTS			LEFT EYE MEASUREMENTS		
	1st	2nd	3rd	1st	2nd	3rd
Untreated Intraocular Pressure *(mm Hg)*	20	20	20	20	20	20
Central Corneal Thickness *(microns)*	500	500	500	500	500	500
Vertical Cup to Disc Ratio by Contour	0.55			0.55		
Pattern Standard Deviation (◉ Humphrey *(dB)* ○ Octopus loss variance *(dB)*)	1.0	1.0		1.0	1.0	

Print | Reset

20.7%

The patient's estimated 5-year risk (%) of developing glaucoma in at least one eye.

Glaucoma risk is 20.7%

So a man walks into his optometrist’s office…

- He is diagnosed with glaucoma,
- What is your initial treatment??