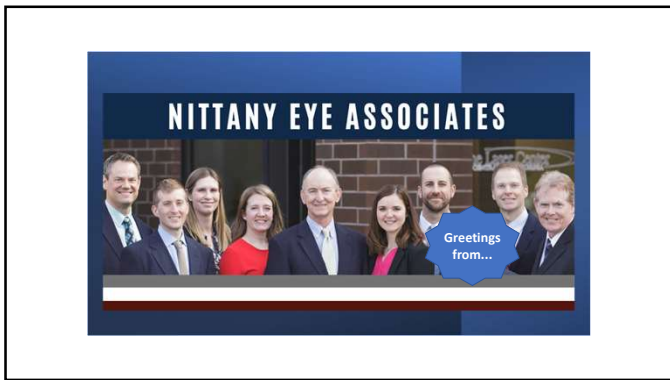


1



2



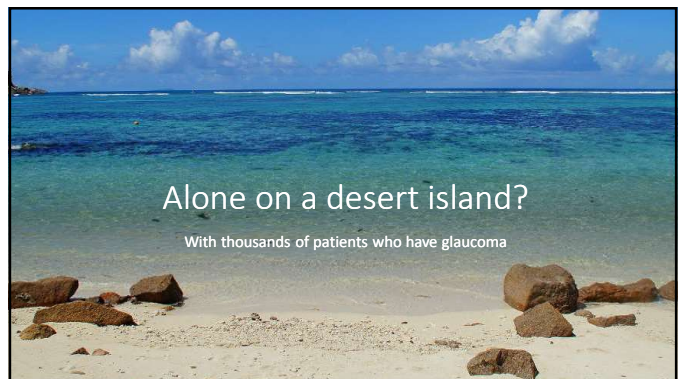
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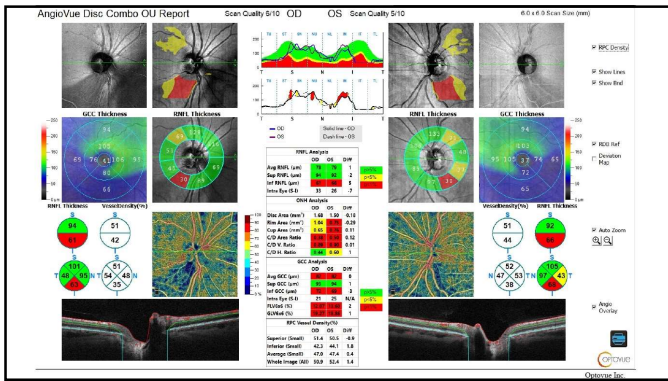


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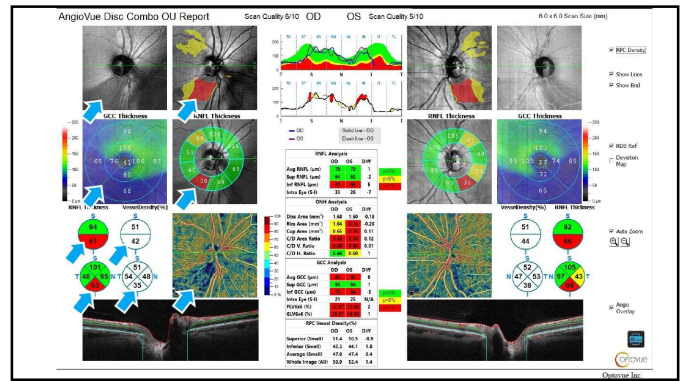


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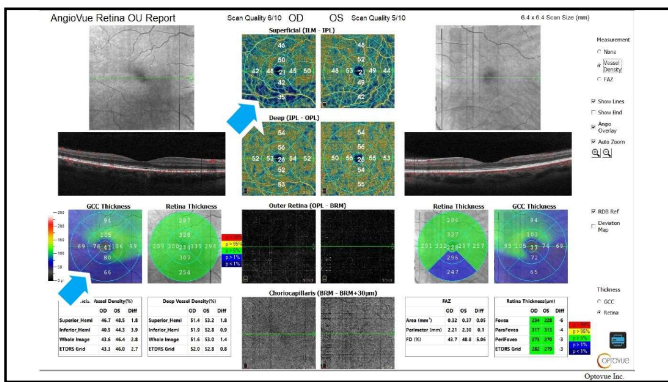




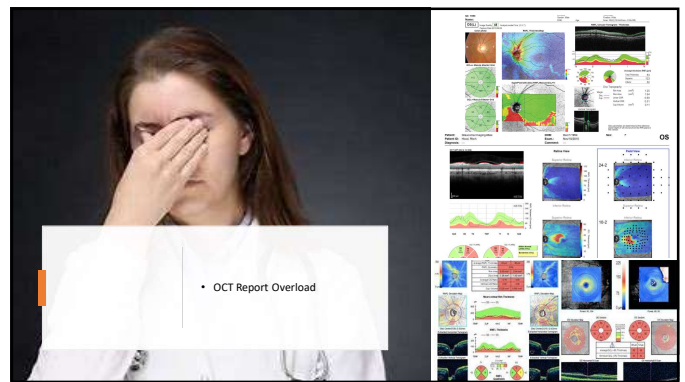
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16

Diagnosis

POAG – moderate stage OU

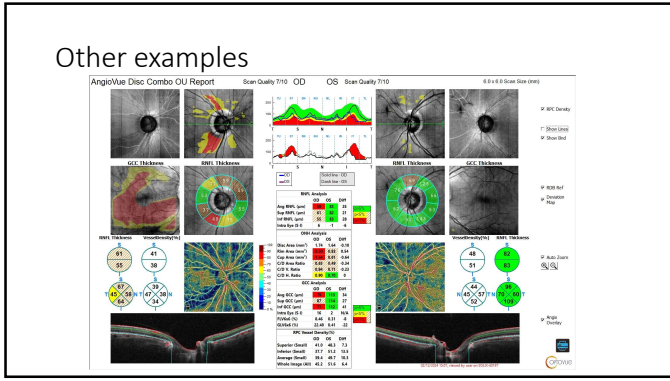
Hypertensive Retinopathy

Treatment - SLT

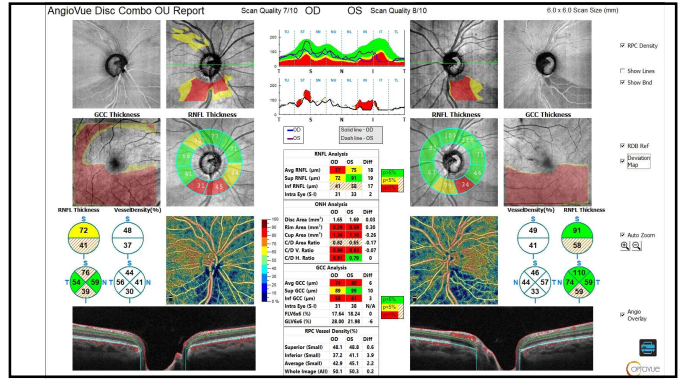
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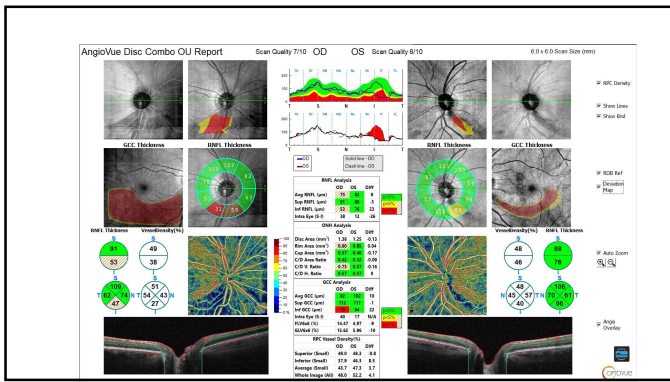
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19



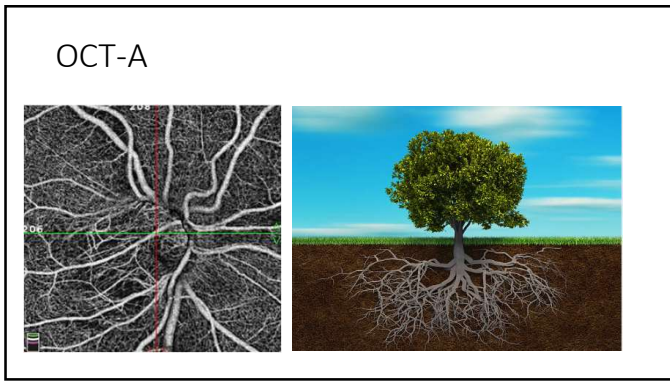
20



21

Best in class  
OCT-A with  
metrics

22




23

"I am skeptical about using OCT-A in the management of glaucoma"

- Heard at every optometric/ophthalmologic exhibit hall floor for the last 3 years

24

What does the American Academy of Ophthalmology have to say?



**Ophthalmic Technology Assessment**

**OCT Angiography for the Diagnosis of Glaucoma**

*A Report by the American Academy of Ophthalmology*

David WuDunn, MD, PhD,<sup>1</sup> Hans L. Tanigawa, MD,<sup>1</sup> Arthur J. Su, MD,<sup>2</sup> Julia A. Roskic, MD, PhD,<sup>3</sup> Susilo Luthiunandan, MD,<sup>4</sup> Anshika Hegde, MD,<sup>5</sup> Ying Han, MD, PhD,<sup>6</sup> Tessa C. Chen, MD<sup>7</sup>

**Purpose:** To review the current published literature on the use of OCT angiography (OCTA) to help detect changes associated with the diagnosis of primary open-angle glaucoma.


**Methods:** Searches of the peer-reviewed literature were conducted in Medline, Embase, Cochrane, and the PLoS ONE databases. Abstracts of 459 articles were screened to exclude irrelevant and non-English articles. After inclusion and exclusion criteria were applied, 79 articles were selected and the panel methodologist rated them for strength of evidence. Three articles were rated level I and 76 articles were rated level II. The 15 level II articles were excluded.

**Results:** OCT angiography can detect decreased capillary vessel density within the peripapillary nerve fiber layer (level II) and macula (level I and II) in patients with suspected glaucoma, preperimetric glaucoma, and perimetric glaucoma. The degree of vessel density loss correlates significantly with glaucoma severity both overall and topographically (level II) for differentiating glaucoma from healthy eyes. Some studies found the peripapillary and macular vessel density measurements by OCTA show a diagnostic ability (area under the receiver operating characteristic curve) that is comparable with structural OCT retinal nerve fiber and ganglion cell thickness measurements, whereas other studies found that structural OCT measurements perform better. Choroidal or deep-layer microvasculature dropout as measured by OCTA is also associated with glaucoma damage (level I and II). Lower peripapillary and macular vessel density and choroidal microvasculature dropout are associated with faster rates of disease progression (level I and II).

25

## Conclusions 2021


- The Good
  - OCT angiography can detect decreased capillary vessel density within the peripapillary nerve fiber layer and macula in patients with **suspected glaucoma, preperimetric glaucoma, and perimetric glaucoma.**
  - The **degree** of vessel density loss correlates significantly with **glaucoma severity**
  - **Choroidal or deep-layer microvasculature dropout** as measured by OCTA is also associated with glaucoma damage.
  - Lower peripapillary and macular vessel density and choroidal microvasculature dropout are associated with **faster rates of disease progression.**



26

## The Bad

- For differentiating glaucomatous from healthy eyes, some studies found that peripapillary and macular vessel density measurements by OCTA show a diagnostic ability (area under the receiver operating characteristic curve) that is comparable with structural OCT retinal nerve fiber and ganglion cell thickness measurements, whereas other studies found that structural OCT measurements perform better.




27

## And the Ugly

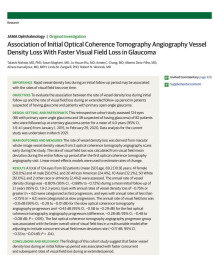
**Artifacts and Image Quality:** The report notes that OCTA is prone to motion artifacts and can be sensitive to patient movement, which may affect image quality. This limitation needs to be considered when interpreting OCTA results.

**Lack of Longitudinal Data:** While OCTA shows promise, the report highlights the need for more longitudinal studies to fully understand its utility in long-term glaucoma management.



28

## OCT-A may be more helpful than OCT in determining fast progressors



- **Faster VD loss during the initial follow-up period was associated with faster concurrent and subsequent rates of VF loss during the extended period.**
- **The association was stronger for the OCTA model than for the OCT model.**

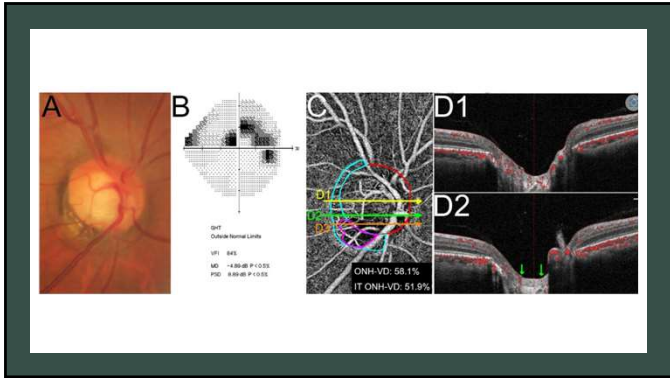
• Nishida T, Moghimi S, Wu JH, Chang AC, Davis-Filko A, Kamalipour A, Zangwill LM, Weinreb RN. Association of initial optical coherence tomography angiography vessel density loss with faster visual field loss in glaucoma. JAMA ophthalmology. 2022 Apr 1;140(4):319-26.

29

## Choroidal Microvascular Dropout




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### Does choroidal microvasculature dropout occur in high myopia and high myopia with glaucoma?

- Choroidal MvD was observed in 44 of the 45 (97.8%) POAG eyes with high myopia, while none of the control eyes showed a choroidal MvD.
- This study has demonstrated the usefulness of choroidal OCTA images in detecting glaucomatous damage in highly myopic eyes

Na, Hyun-Min; Lee, Eun Ji; Lee, Seung-Hyeon; Kim, Tae-Woo. Journal of Glaucoma 2011;39:45. January 2010. doi: 10.1097/JG5.0b000000000001408

32

"There Is No Such Thing as the Unknown, Only Things Temporarily Hidden."

33

### OD CODER

Computer ophthalmic imaging optic nerve 92133

- \$34.04
- Written order and report
- Bilateral
  - Unilateral RT or LT with 52 modifier (reduced services)
- 2x/year for all glaucoma severities
- Pathologies
  - Hundreds
  - Visual distortion of shape and size\* H53.15
  - Scotomas and visual field defects\* H53.411-483
- Mutually exclusive with 92250\*\*

34

### Advanced Glaucoma and the floor effect

35

### Superficial vessel density

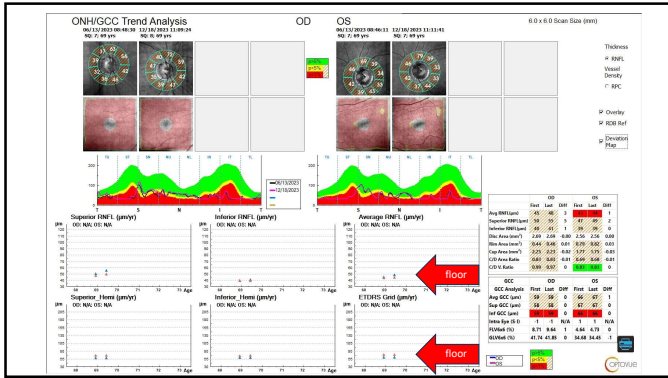
✓ Shows progressive changes even in advanced glaucoma

How low can you go?

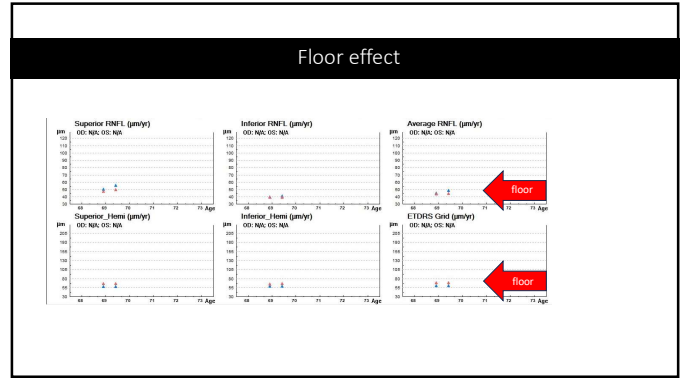
"The only time I see the 'see see, is for 'llaho'."

- Moghimi S, Bowd C, Zangwill LM, Penteado RC, Hasenstab K, Hou H, Ghahari E, Manalastas PJ, Proudfoot J, Weinreb RN. Measurement floors and dynamic ranges of OCT and OCT angiography in glaucoma. Ophthalmology. 2019 Jul 1;126(7):980-8.

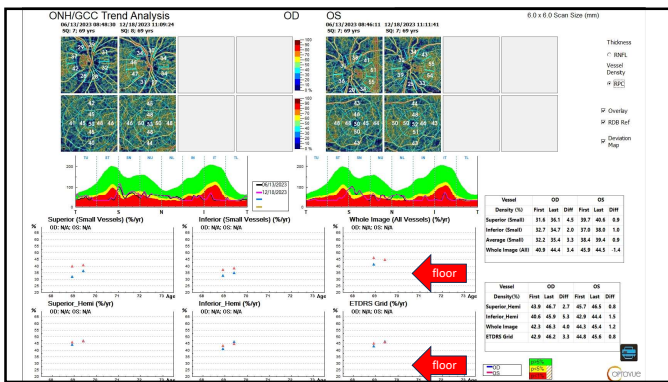
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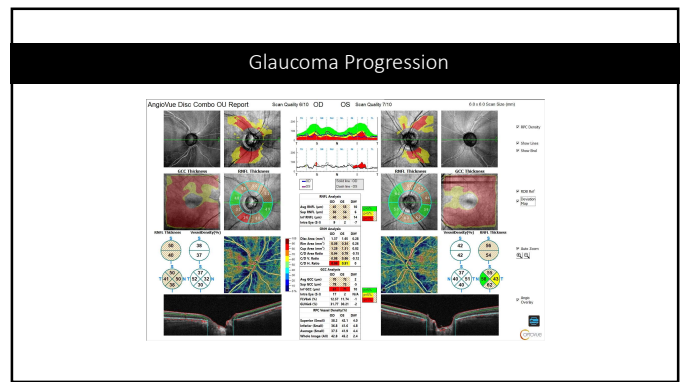
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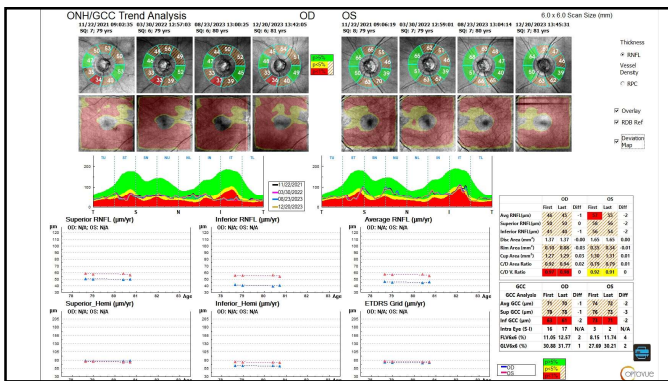
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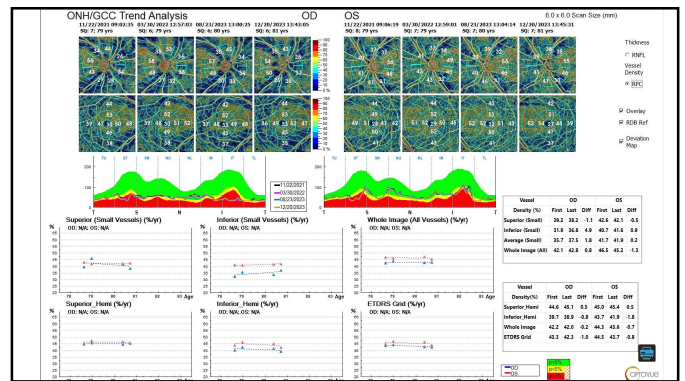
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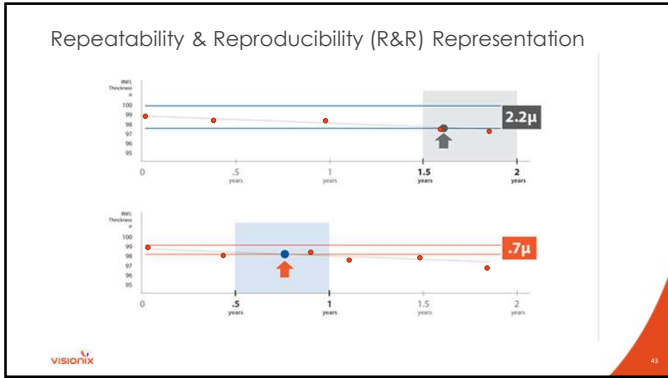
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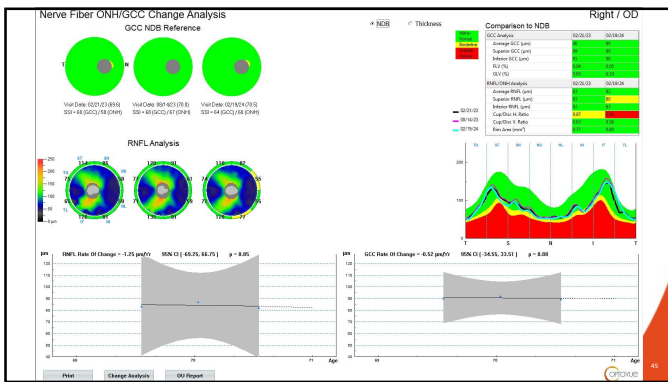
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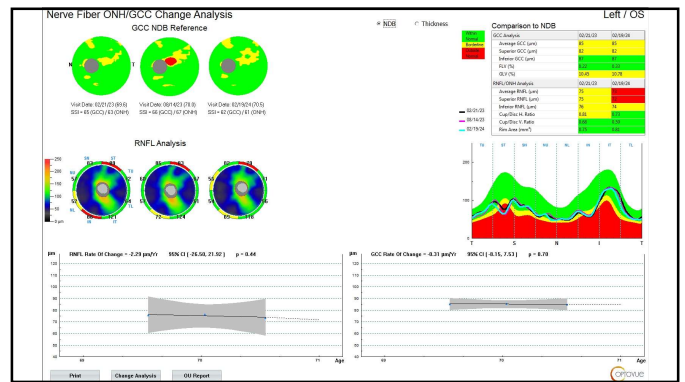
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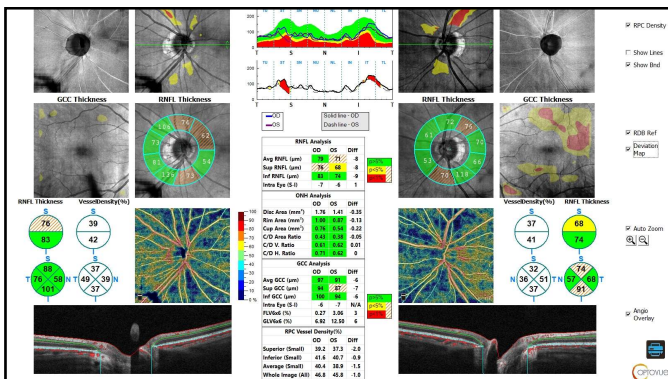
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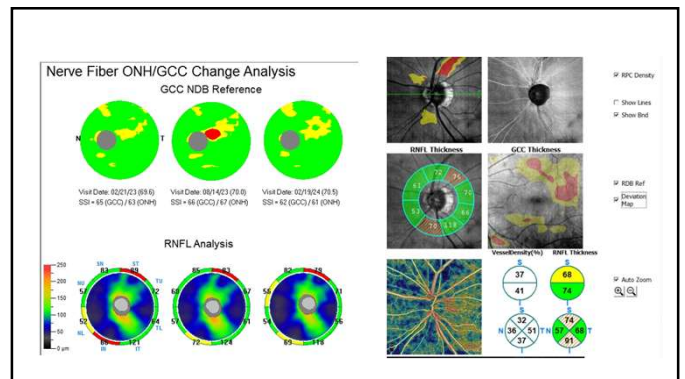
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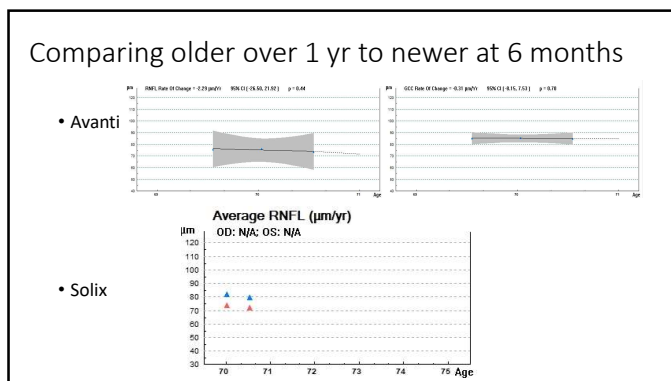


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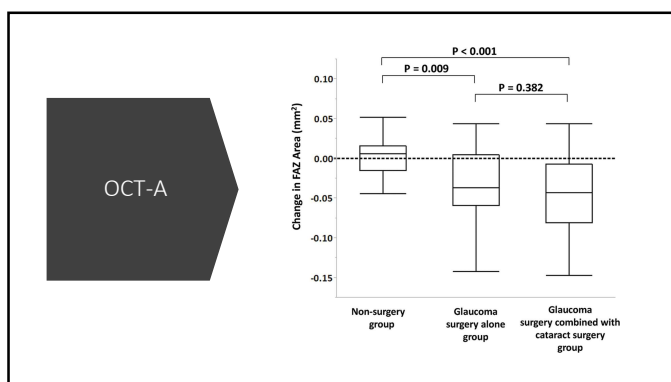


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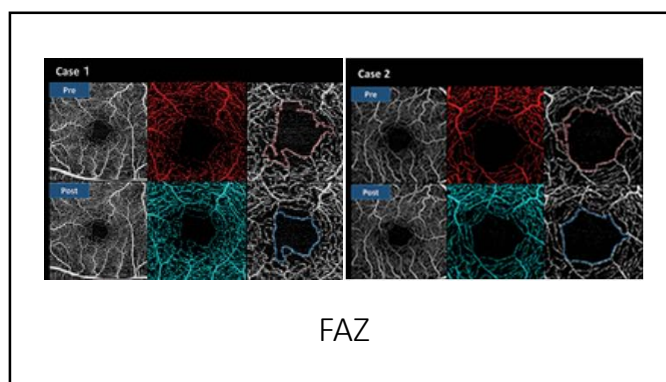
### OCT-A, FAZ and Glaucoma

- Eyes underwent IOP-lowering glaucoma surgery and their fellow (non-surgical) eyes were included.
- OCTA of the macula was performed in both eyes before glaucoma surgery and 3 months postoperatively
- The FAZ area is decreased with IOP-lowering surgery in patients with POAG, and change in the FAZ area was significantly correlated with both preoperative foveal sensitivity and change in IOP.
- Shoji T, Kanno J, Weinreb RN, Yoshikawa Y, Mine I, Ishii H, Ibuski H, Shinoda K. OCT angiography measured changes in the foveal avascular zone area after glaucoma surgery. *British Journal of Ophthalmology*. 2022 Jan 1;106(1):80-6.

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52

### OCT-A, Macular Vessel Density and Glaucoma

- 139 eyes (23 healthy eyes, 36 pre-perimetric glaucoma eyes, and 80 POAG eyes) of 94 patients who had at least 3 visits. The mean follow-up was 2.0 years for healthy eyes, 2.6 years for pre-perimetric glaucoma eyes, and 2.6 years for POAG eyes
- In POAG eyes, macula vessel density decrease was faster than GCC thinning and associated with severity of disease.
- Hou H, Moghimi S, Proudfoot JA, Ghahari E, Penteado RC, Bowd C, Yang D, Weinreb RN. Ganglion cell complex thickness and macular vessel density loss in primary open-angle glaucoma. *Ophthalmology*. 2020 Aug 1;127(8):1043-52.

53

### Improved Blood Flow/Glaucoma Reversible?

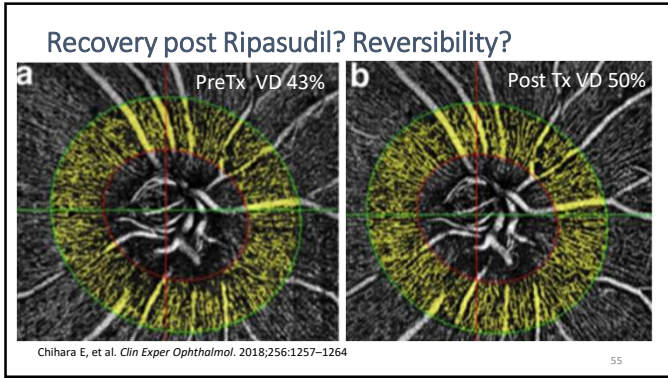
Increase in the OCT angiographic peripapillary vessel density by ROCK inhibitor ripasudil instillation: a comparison with brimonidine

Etsuo Chihara<sup>1</sup>, Galina Dimitrova<sup>2</sup>, Tomoyuki Chihara<sup>1,3</sup> <https://www.spotern.com/>

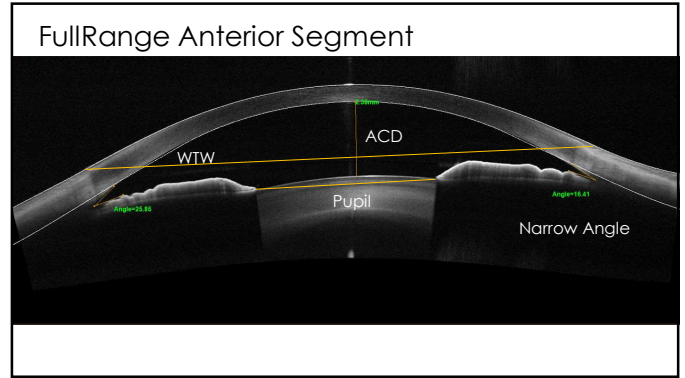
- ROCK inhibitors decrease outflow resistance, vasodilate vessels, and may improve microcirculation to the ONH/have neuroprotective activity<sup>1,2</sup>
- Netarsudil is a ROCK/Norepinephrine transporter inhibitor<sup>2</sup>
- Netarsudil additionally reduces aqueous production and lowers EVP<sup>2</sup>
- Prospective study-Ripasudil enhanced peripapillary VD in POAG and OH<sup>1</sup>
- Brimonidine did NOT<sup>1</sup>
- Study on Tafluprost and Tafluprost/Timolol showed no change to VD<sup>3</sup>

1)Chihara E, et al. *Clin Exp Ophthalmol*. 2018;256:1257-1264 2)Tanna A, Johnson M. *Ophthalmology*;2018;125:1741-1756 3)Kuryshcheva NI. *Taiwan J Ophthalmol*. 2019;9:93-99

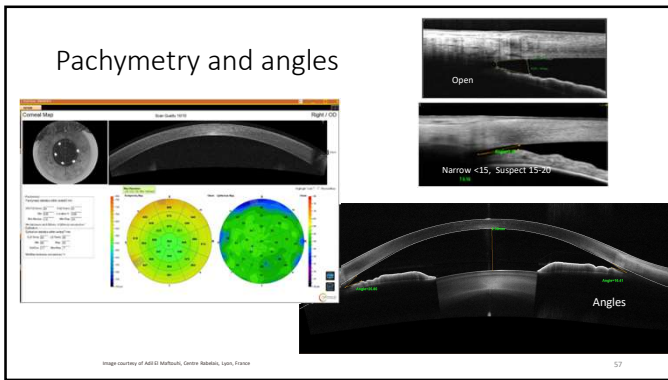
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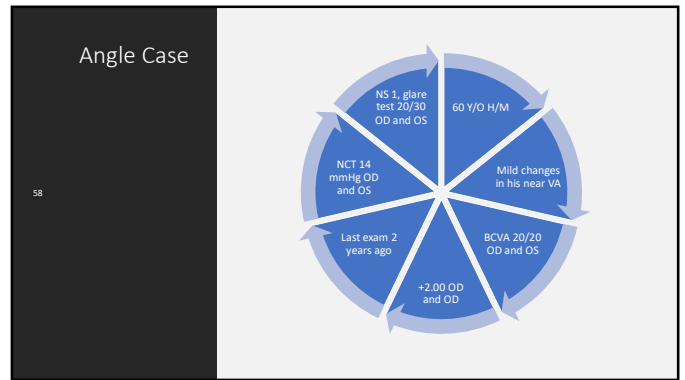
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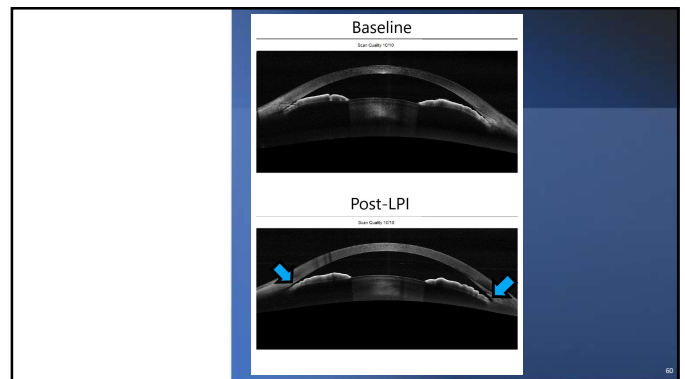
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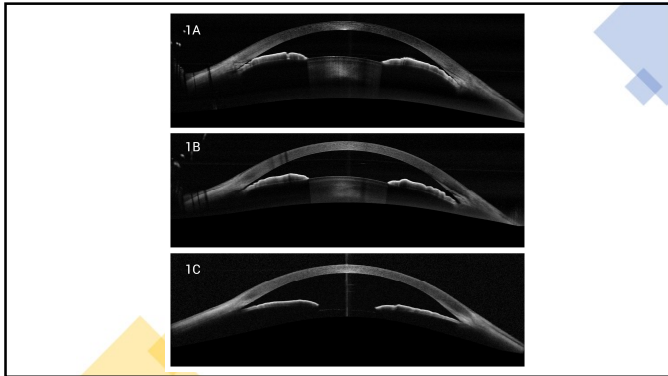
58



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61

Review Optometric Business PRODUCTS & TREATMENTS PRACTICE MANAGEMENT DIGITAL STRATEGIES PATIENT EXPERIENCE RESOURCES

**Embrace your edge** New names, new look, and new opportunities for more patients, profits, and support.

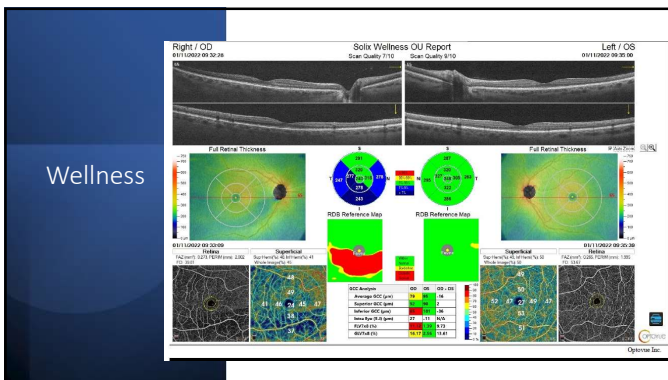
DIAGNOSTIC INSTRUMENTATION

**The OCT that Grew a Wellness Program & Generates \$12,000+ Monthly**

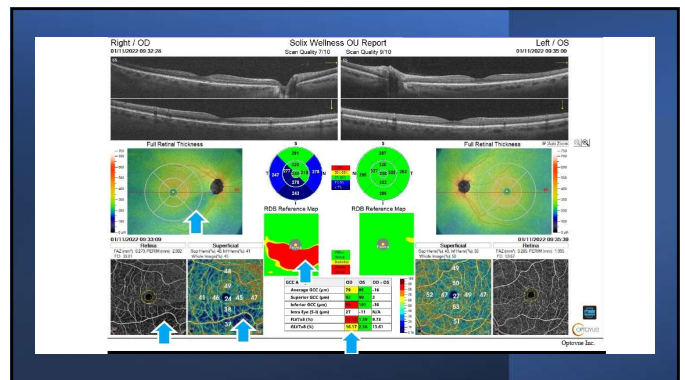
By Michael Cymbor, OD, FAAO

Print/PDF

62



63



64

Thank You

mcymbor@nittanyeye.com

MIKECYMBOR.COM

65



66

**Case**

56 Y/O W/F

Sent by OD to ophthalmologist 6 months ago because of ocular hypertension OD – “monitor”

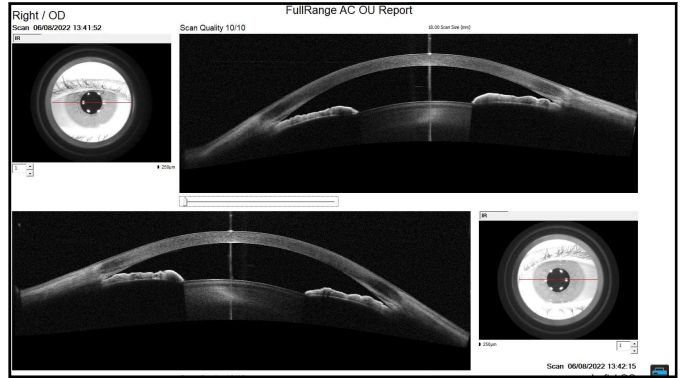
Patient requested a second opinion

CcIOP OD 23.3 and 19.3

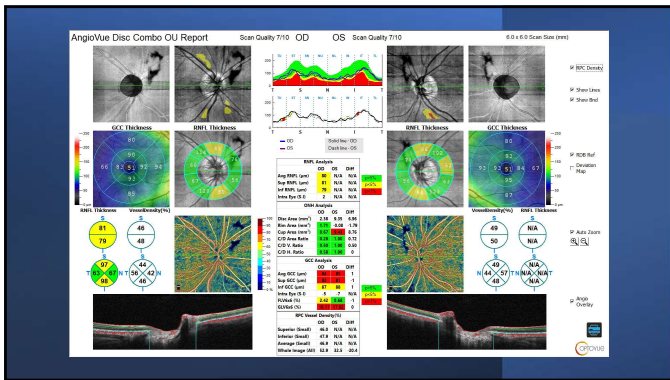
Refraction OD +0.50-1.00x20 and OS +1.25-1.00x170

Fields, OCTs all unremarkable

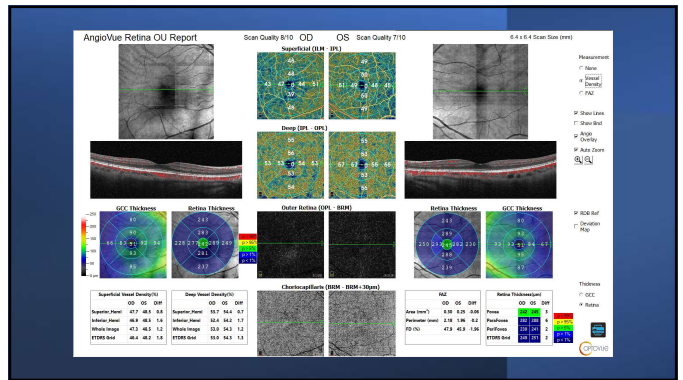
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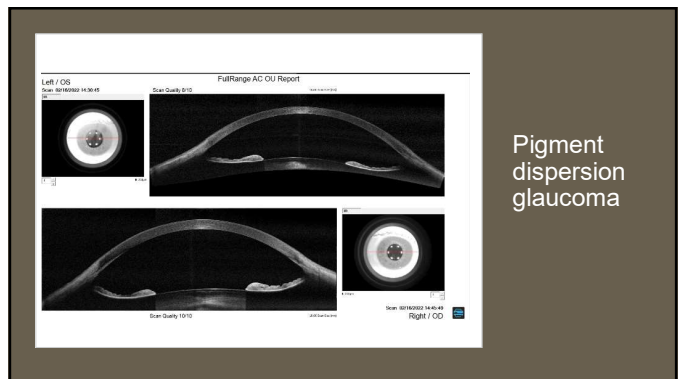
70

**Diagnosis**

Primary Angle Closure (PAC)

Treatment: YAG PI

71



72

Pigment dispersion glaucoma