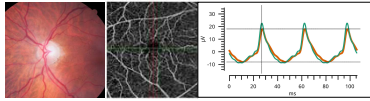


## Utilizing the latest diagnostic technology in the management of ocular disease

Michael Cymbor, OD, FAAO  
COPE 72419-PD



## Disclosure

- Key opinion leader and/or speaker for:
  - Visionix (Optovue)
  - Quidel
  - New World Medical
  - LKC Technologies
  - Allergan
  - Tarsus

1

2

## NITTANY EYE ASSOCIATES



Greetings from...

3

Fred H. Carlin,  
O.D. Community  
Vision Foundation

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## Ways to reach out



[www.mikecymbor.com](http://www.mikecymbor.com)

Handouts  
Webinars  
Useful glaucoma information



[mcymbor@nittanyeye.com](mailto:mcymbor@nittanyeye.com)



[www.nittanyeye.com](http://www.nittanyeye.com)



LinkedIn

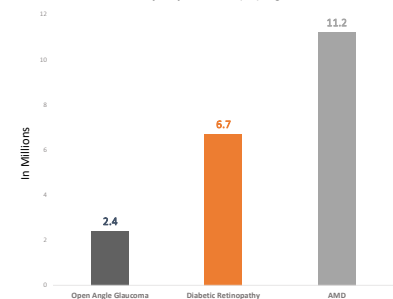


814-880-6210

5

## Cause of Legal Blindness in the US

Prevalence of Major Eye Diseases (US): Age 50 and Older



Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4540464/>

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NIH News Release

### Visual impairment, blindness cases in U.S. expected to double by 2050

*NIH-funded studies tease out trends by race, ethnicity and sex.*

With the youngest of the baby boomers hitting 65 by 2029, the number of people with visual impairment or blindness in the United States is expected to double to more than 8 million by 2050, according to projections based on the most recent census data and from studies funded by the National Eye Institute, part of the National Institutes of Health. Another 16.4 million Americans are expected to have difficulty seeing due to correctable refractive errors such as myopia (nearsightedness) or hyperopia (farsightedness) that can be fixed with glasses, contacts or surgery.

The researchers were led by Rohit Varma, M.D., director of the University of



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### Increased Demand for Medical Eye Care

20 million more routine and medical eye exams will be required in 2025 than were needed in 2015, and this number will continue to increase every year for the foreseeable future

The number of FTE optometrists will increase by 13% between 2015 and 2025

The number of FTE ophthalmologists will increase by 2.1% between 2015 and 2025

"The future of Optometry in America", Richard Edlow, OD. Modern Optometry March 2019


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Imbalance of supply/demand



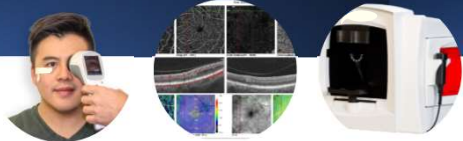
9

Our patient trying to get an appointment



10

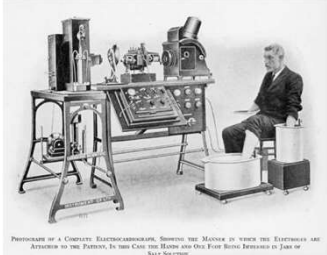
### Three Technologies



ERG      OCT-A      Dark Adaptation

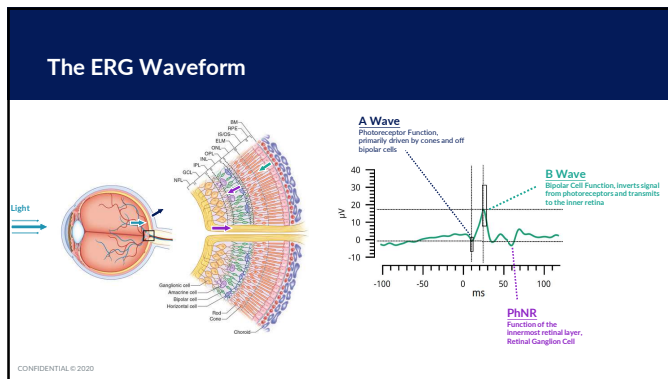
11

### Not Your Grandparents ERG

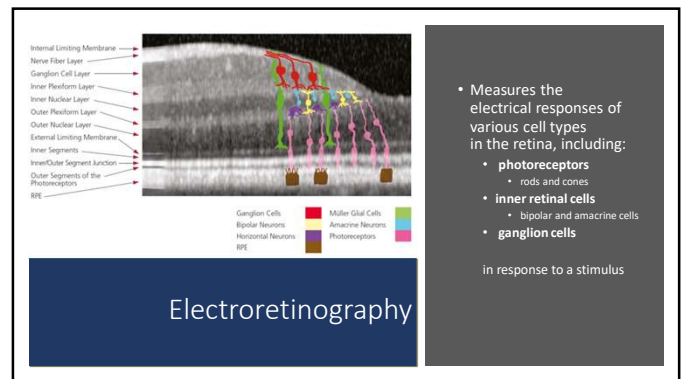


PHOTOGRAPH OF A COMPLETE ELECTRORETINOGRAM. SHOWN THE MACHINE BY WHICH THE ELECTRODES ARE ATTACHED TO THE PATIENT. IN THIS CASE THE BLIND AND ONE FOOT BOTTLE BATTERIES IN JUNE OF 1955.

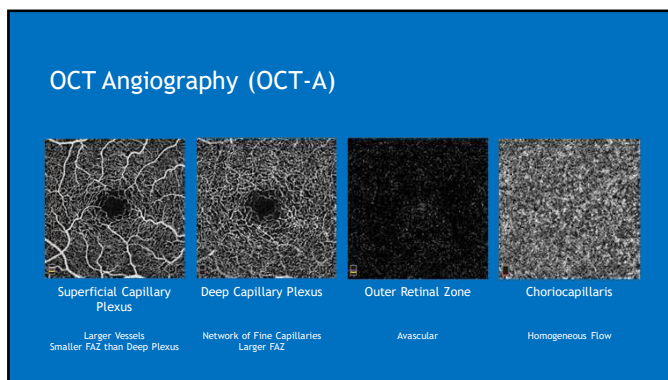
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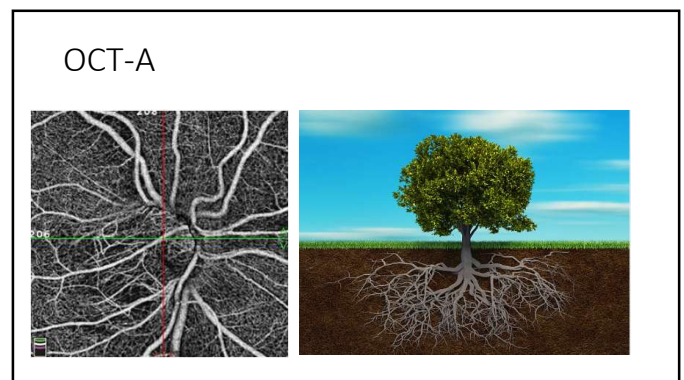
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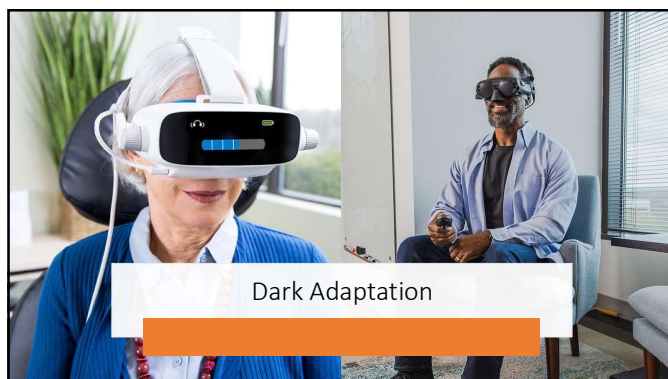
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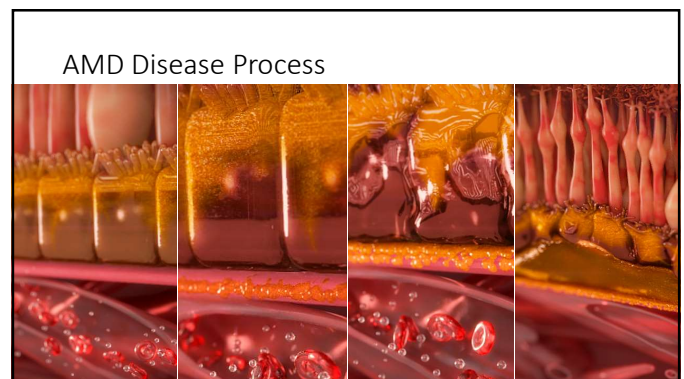
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## Three Ocular Disease States

|                 | Glaucoma      | Diabetic Retinopathy | AMD                         |
|-----------------|---------------|----------------------|-----------------------------|
| Structure       | Photos/OCT    | Photos/OCT           | Photos/OCT                  |
| Function        | Visual Fields | ?                    | ?                           |
| Early Diagnosis | ERG/OCT-A     | ERG/OCT-A            | Dark Adaptation/OCT-A (wet) |

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|                 | Glaucoma      |
|-----------------|---------------|
| Structure       | Photos/OCT    |
| Function        | Visual Fields |
| Early Diagnosis | ERG/OCT-A     |

20

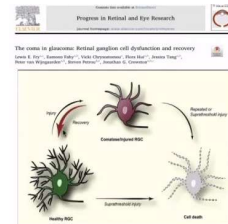
## Retinal Ganglion Cells



- There is a growing body of evidence suggesting that, prior to irreversible cell death, compromised retinal ganglion cells (RGCs) enter a dysfunctional state that may partially recover under certain conditions

21

## Retinal ganglion cells can recover



The Coma in Glaucoma

Fry LE, Fahy E, Chrysostomou V, Hui F, Tang J, van Wijngaarden P, Petrou S, Crowston JG. The coma in glaucoma: retinal ganglion cell dysfunction and recovery. Progress in retinal and eye research. 2018 Jul 1;65:77-92.

22

## This is where ERG comes in

- The full-field PhNR amplitude provides a potentially reversible measure of inner retinal function that improves after IOP lowering
- Niyadurupola N, Luu CD, Nguyen DQ, Geddes K, Tan GX, Wong CC, Tran T, Coote MA, Crowston JG. Intraocular pressure lowering is associated with an increase in the photopic negative response (PhNR) amplitude in glaucoma and ocular hypertensive eyes. Investigative ophthalmology & visual science. 2013 Mar 1;54(3):1913-9.

23

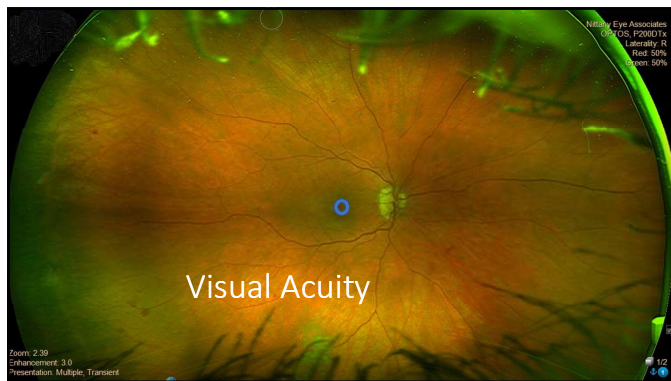
## Good Correlation between FF ERG, VF, and OCT

- "RETeval (ERG)...correlated well with VF MD and the established global OCT thickness parameters, both in the total glaucoma severity spectrum and in moderate-to-advanced glaucoma"
- Kita Y, Holló G, Saito T, Momota Y, Kita R, Tsunoda K, Hirakata A. RETeval Portable Electroretinogram Parameters in Different Severity Stages of Glaucoma. Journal of glaucoma. 2020 Jul 8;29(7):572-80.

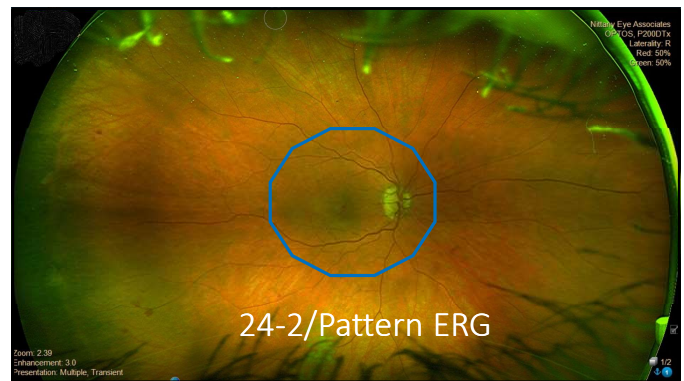
24







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32



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Does diabetic retinal damage precede diabetic retinopathy?

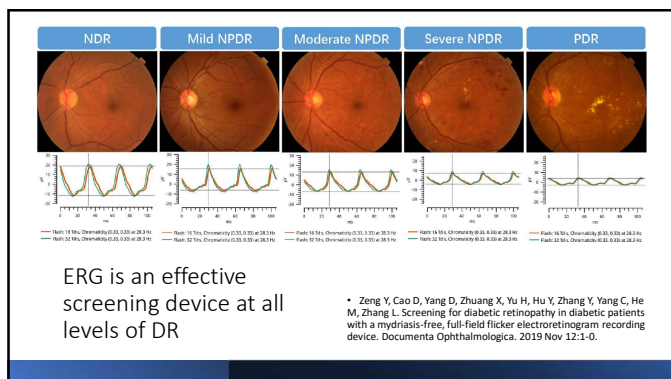
"Our data provide structural and functional evidence to support the hypothesis of neuronal damage in DM, prior to clinically evident vascular changes"

"Our data also confirm that a simple measurement of BCVA might be insufficient to fully characterize the changes in visual function"

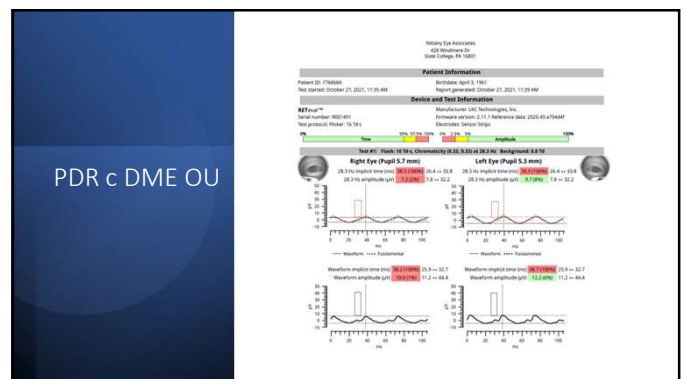
- Raza Shah, MD, retinal specialist
- Retinal damage occurs earlier than we currently realize or seem to admit
- We will need to either change definitions or treatment criteria

Montesano G, Ometto G, Higgins BE, Das R, Graham KW, Chakravarthy U, McGuiness B, Young IS, Kee F, Wright DM, Crabbe DP. Evidence for Structural and Functional Damage of the Inner Retina in Diabetes With No Diabetic Retinopathy. *Investigative ophthalmology & visual science*. 2021 Mar 5;62(3):35.

34



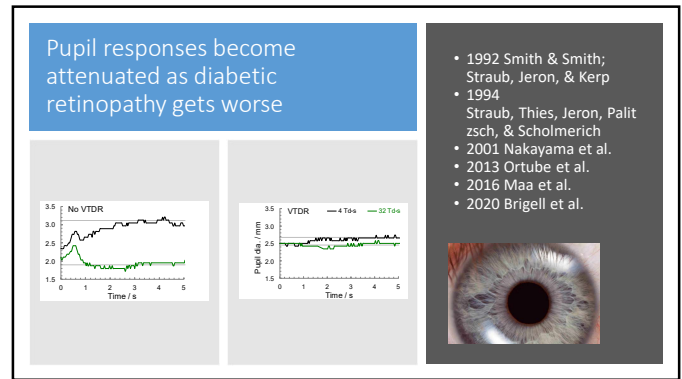
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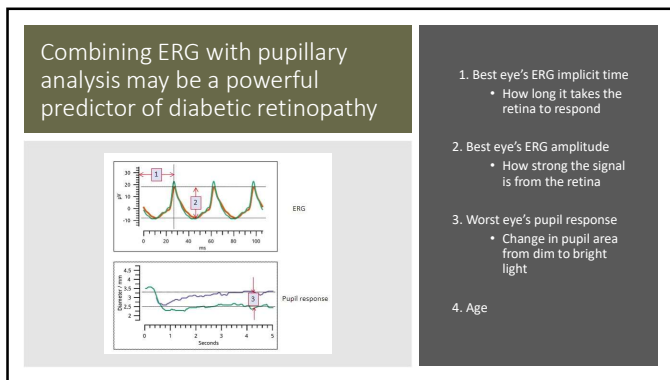
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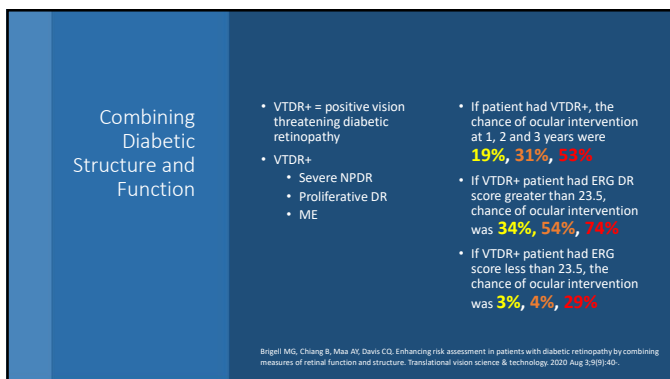
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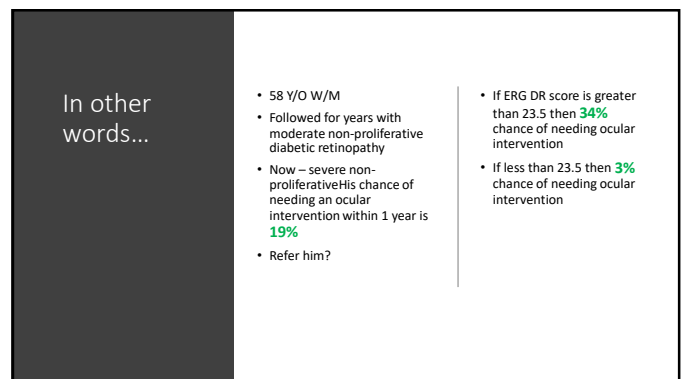
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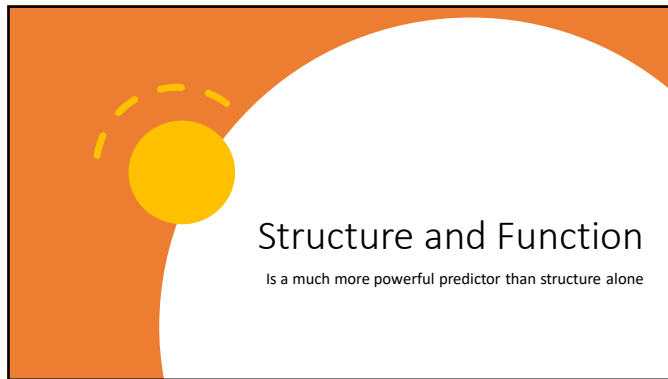


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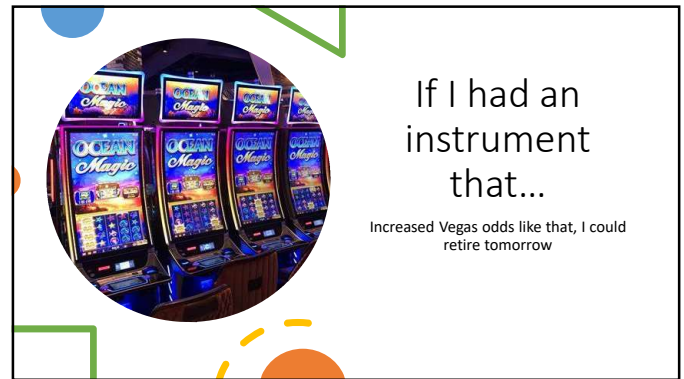


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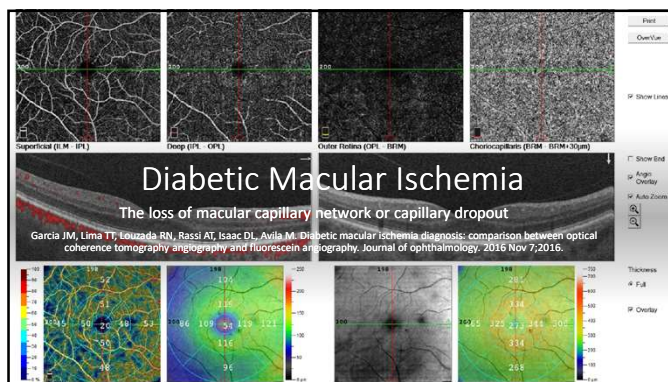




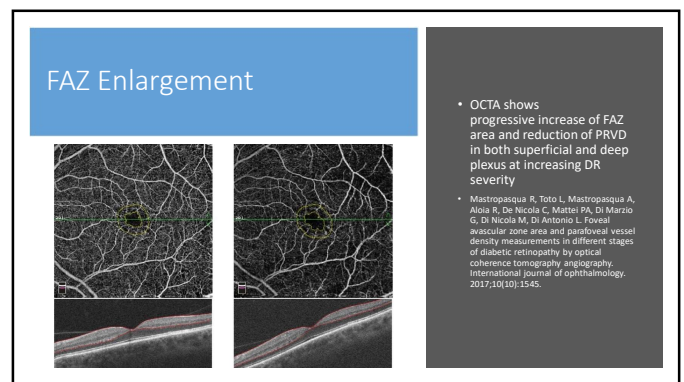
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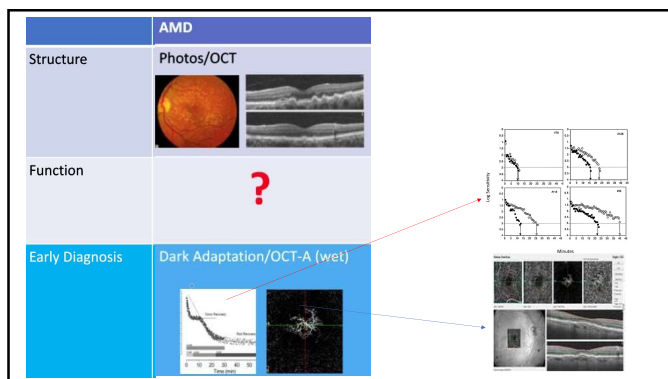
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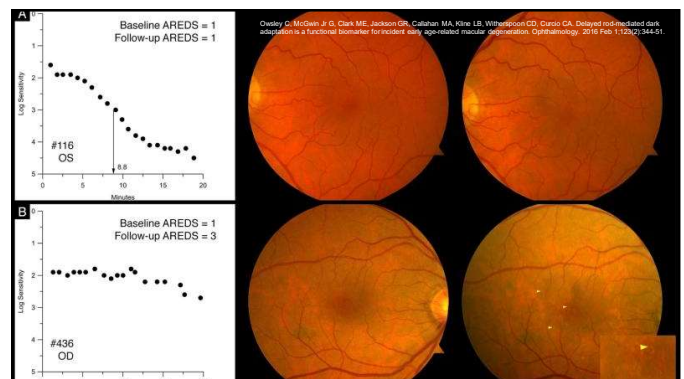
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## Recent Systematic Literature Review

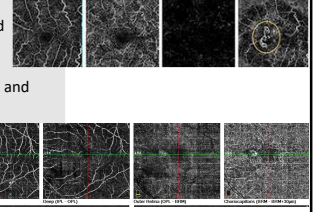
- This systematic review indicates **overwhelming** evidence of reasonable quality for an association between impaired DA and AMD
- Data on the repeatability and reproducibility of DA measurement are sparse
- Higgins BE, Taylor DJ, Binns AM, Crabb DP. Are current methods of measuring dark adaptation effective in detecting the onset and progression of age-related macular degeneration? A systematic literature review. *Ophthalmology and therapy*. 2021 Feb 9:1-8.

49

## OCT-A shows SRNV in AMD

- Can differentiate between SRNV type 1 and 2

- Type 1
  - New vessels located **BELOW** RPE and ABOVE Bruch's membrane
- Type 2
  - New vessels located **ABOVE** the RPE and ABOVE Bruch's membrane



Ma J, Desai R, Neigam P, Gil M, Fawzi A, Skondra D. Optical coherence tomographic angiography imaging in age-related macular degeneration. *Ophthalmology and eye diseases*. 2017 Feb 22:9:11791721166860715.

50

## Billing/Coding

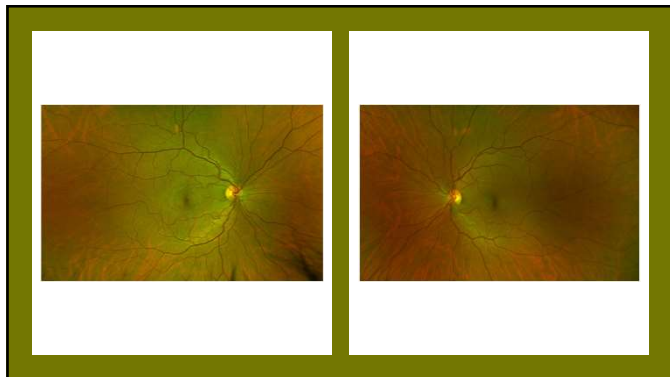
| Description                                    | CPT Code | Average Medicare Reimbursement |
|--|----------|--------------------------------|
| ERG with interpretation and report             | 92273    | \$133                          |
| Dark adaptation with interpretation and report | 92284    | \$61                           |
| OCT with interpretation and report             | 92134    | \$41                           |

51

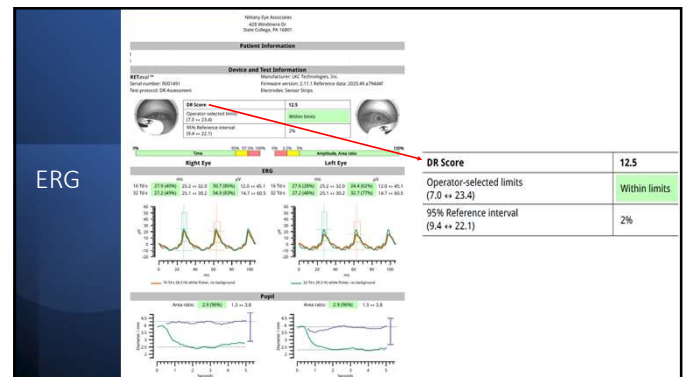
## Case

- 46 Y/O W/F
- Type 2 Diabetes x 5 years, HTN x 5 years
  - Metformin
  - Last A1C 6.8

52



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## Case

62 Y/O W/M

POAG OU, Mild OD and Moderate OS

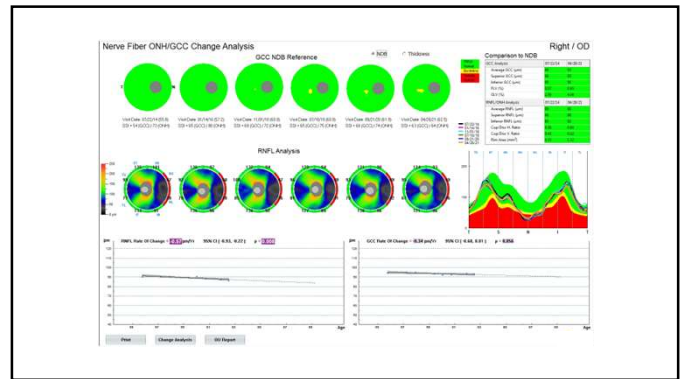
On Vyzulta and Rhopressa, both qhs OU

Reports good compliance

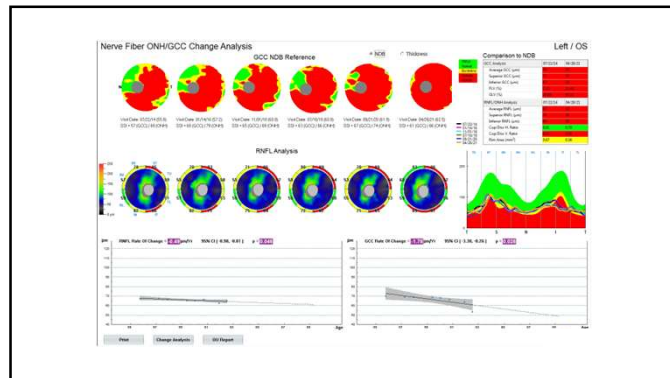
CciOP 12.3 OD and 16.7 OS

CH 10.8 and 9.9, Pachs 521 and 520

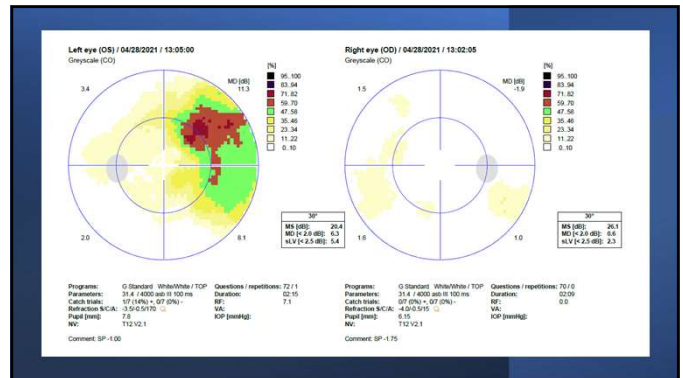
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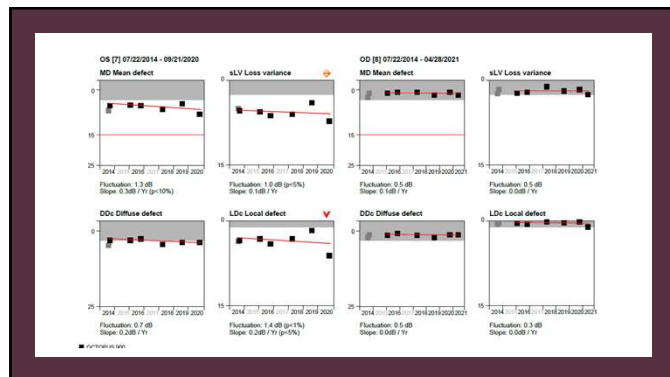
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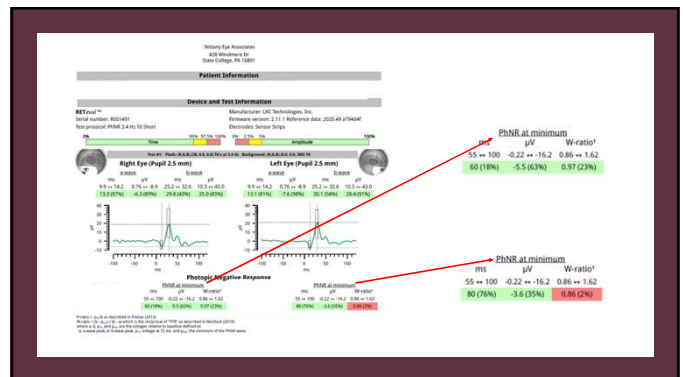
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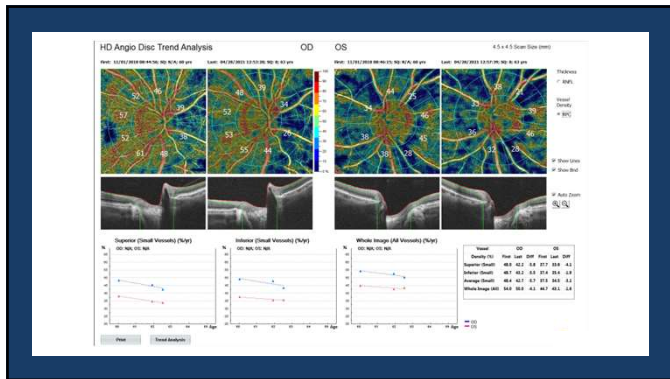


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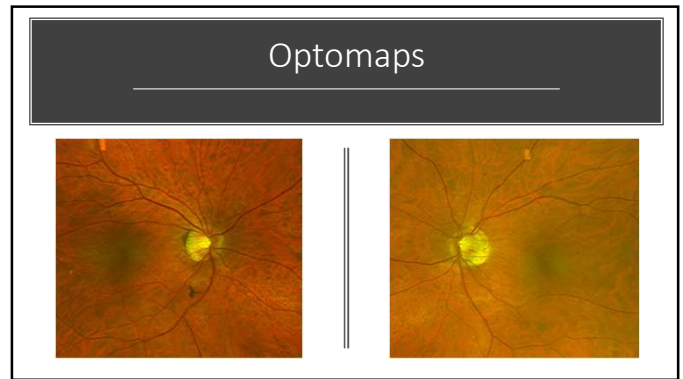


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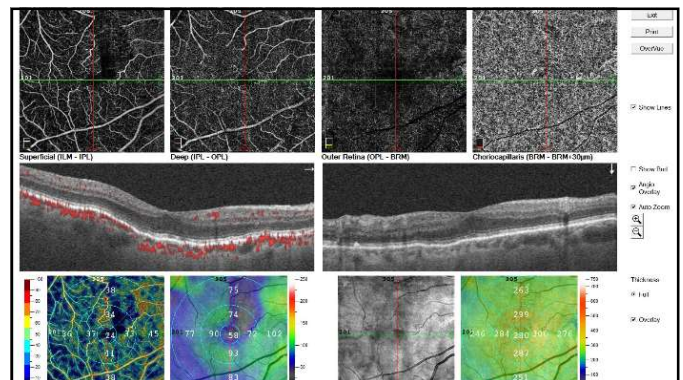


74

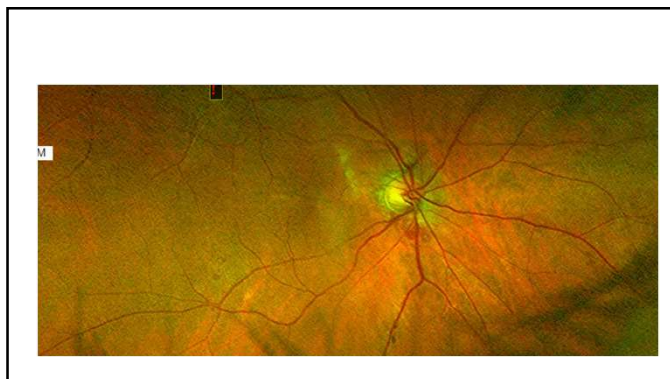
## Case

- 92 Y/O W/F
- Type 2 Diabetes x 15 years
- Last HbA1c 7.3
- Entering Va 20/30 and 20/50 ph to 20/25 and 20/30
- Previous cataract surgery
- Moderate NPDR OU

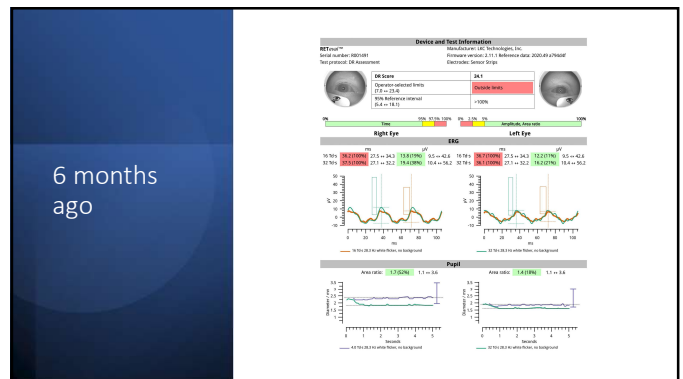
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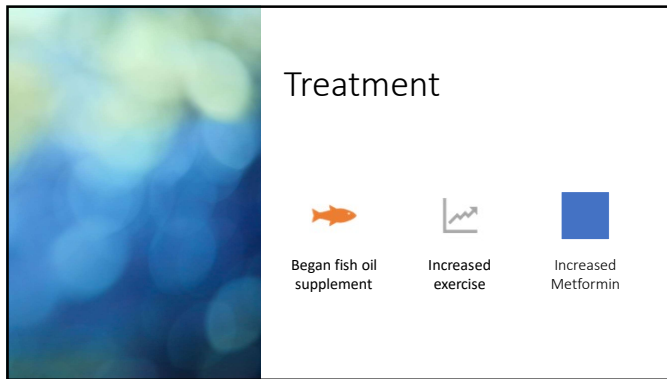
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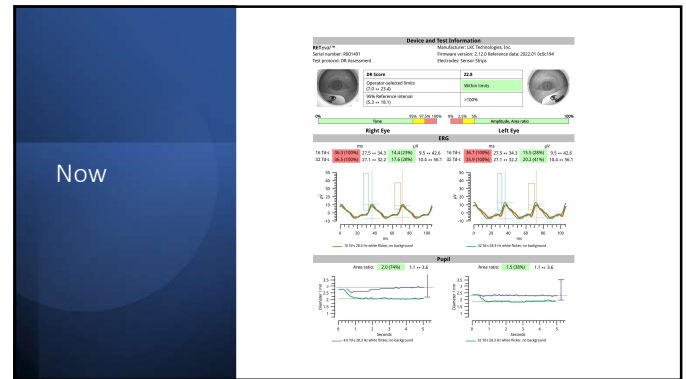
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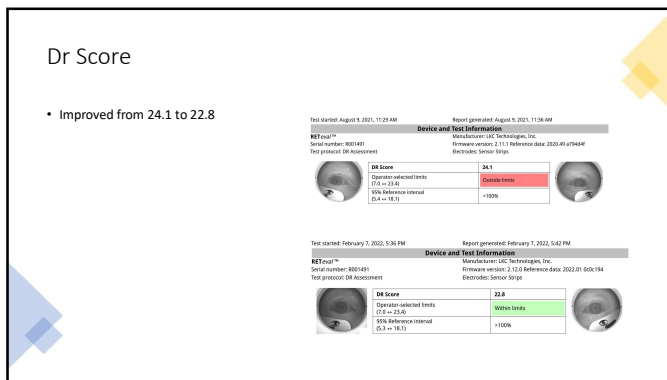
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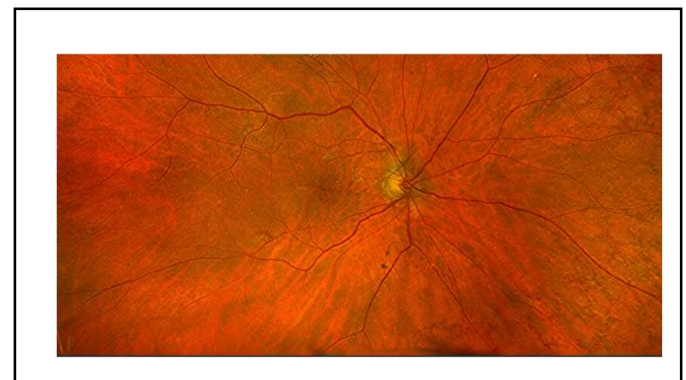
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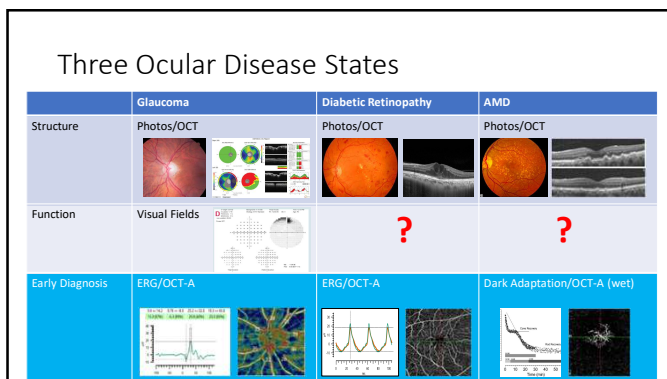
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Thank You

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 LinkedIn