Retina Review & Re-New

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I have no financial disclosures

Agenda

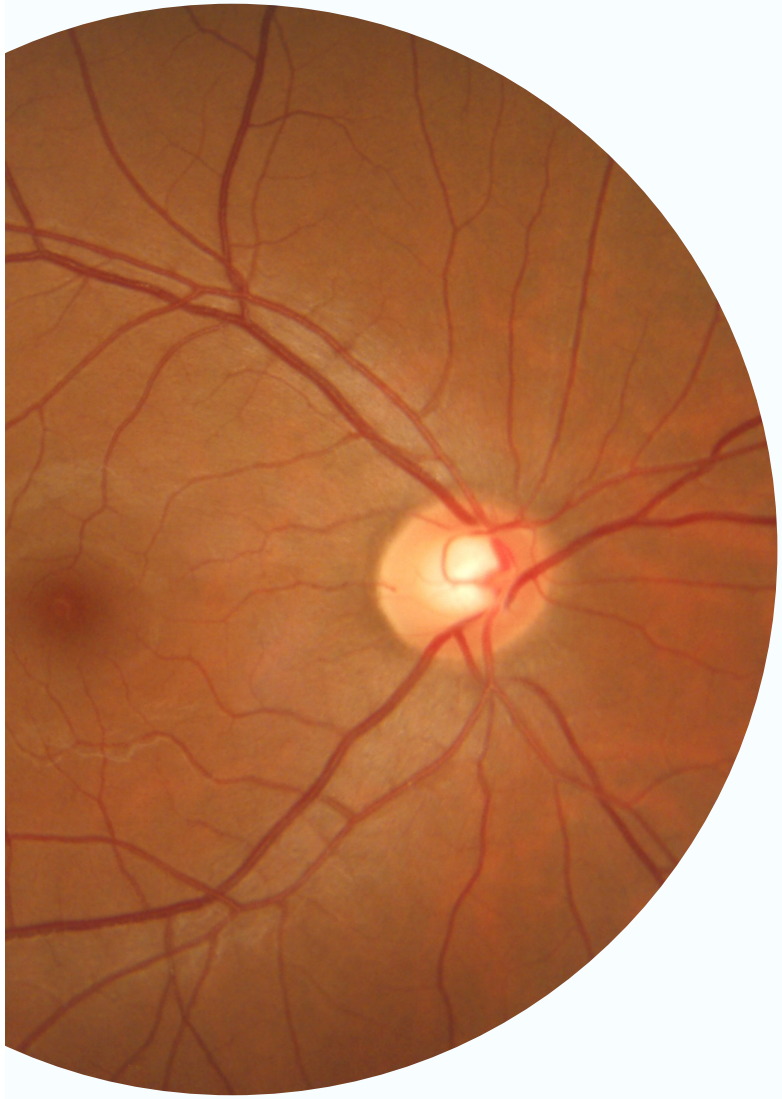
01 Why focus on the retina?

02 Age-Related Macular Degeneration

03 Hereditary Retinal Disease

04 Central Serous Chorioretinopathy

05 Final Take-aways & Future Directions



01

Why focus on the retina?

Why is retinal examination important?

- ## Retinal Vasculature

  This is a window into the health of the cardiovascular system

- ## Future developments

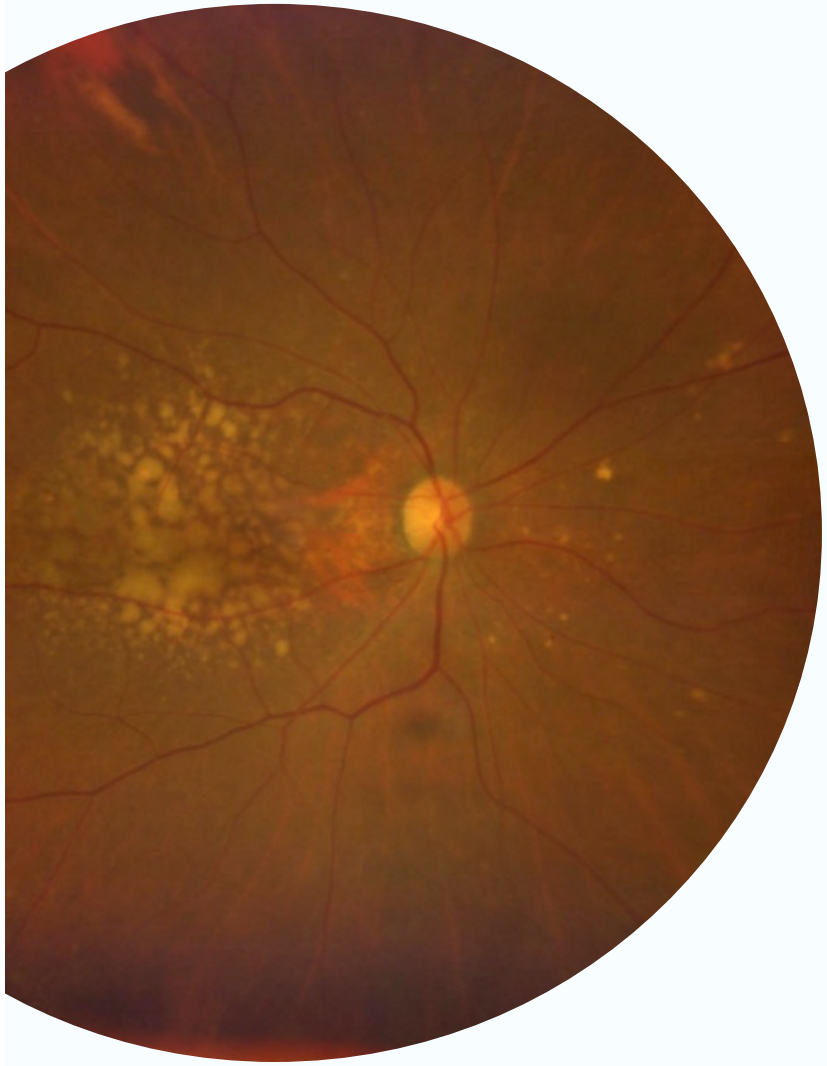
  Increasingly measurements of the retina have been associated with risk, diagnosis an staging of systemic diseases from Alzheimer's to

- ## Early intervention

  Alternative therapies include a range of treatments that are not considered part of conventional medical practice

- ## Visual health

  Retinal imaging has not yet advanced to the point where it replaces the value of a detailed peripheral retinal examination



02

Age-Related Macular Degeneration (AMD) - Review

Age-related macular Degeneration (AMD)

A disease characterized by alteration in the retina, the retinal pigment epithelium (RPE), Bruch's membrane and the choroidal complex

The Prevalence of Age-Related Macular Degeneration (AMD) in the United States in 2019

Approximately **one in 10** Americans ages **50 and older** have the early form of age-related macular degeneration

Prevent Blindness
Our Vision Is Vision.

PreventBlindness.org/amd-prevalence-vehss

This study was supported by funding from the U.S. Centers for Disease Control and Prevention vision Health Initiative (cooperative agreement U01DP006444, "Research to Enhance the US Vision and Eye Health Surveillance System for the Nation").

Source: Rein D, Wittenborn J, Burke-Conte Z, et al, Prevalence of Age-Related Macular Degeneration in the US in 2019, JAMA Ophthalmology. doi:10.1001/jamaophthalmol.2022.4401. Published online November 3, 2022.

The Prevalence of Age-Related Macular Degeneration (AMD) in the United States in 2019

Approximately **1 out of every 100** Americans ages **50 and older** have the vision threatening late form of age-related macular degeneration.

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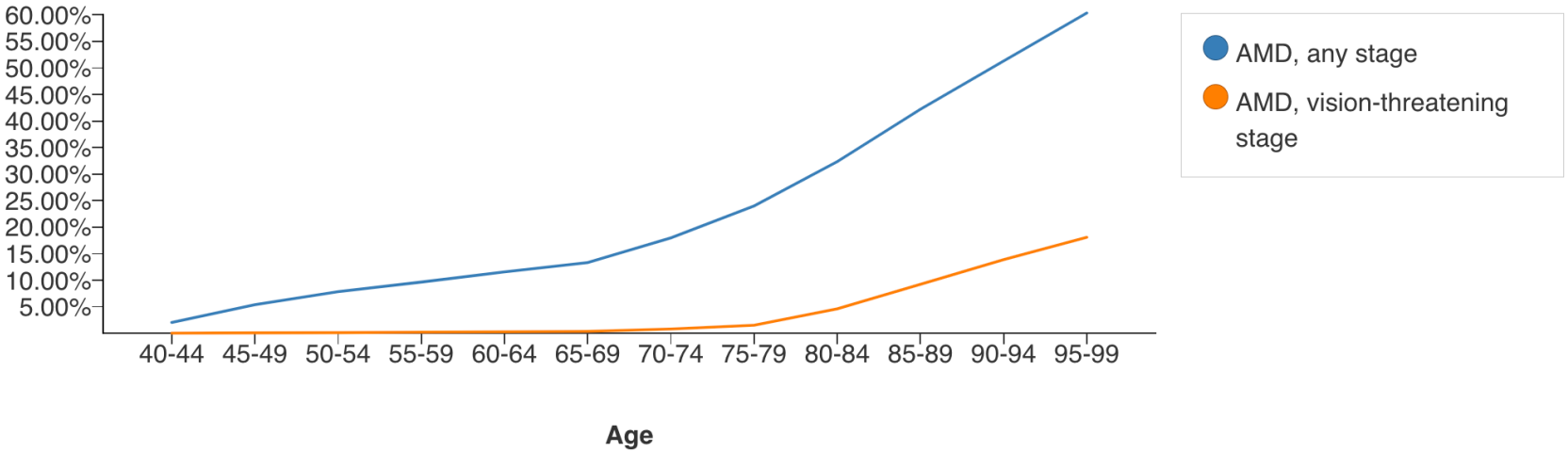
Demographics

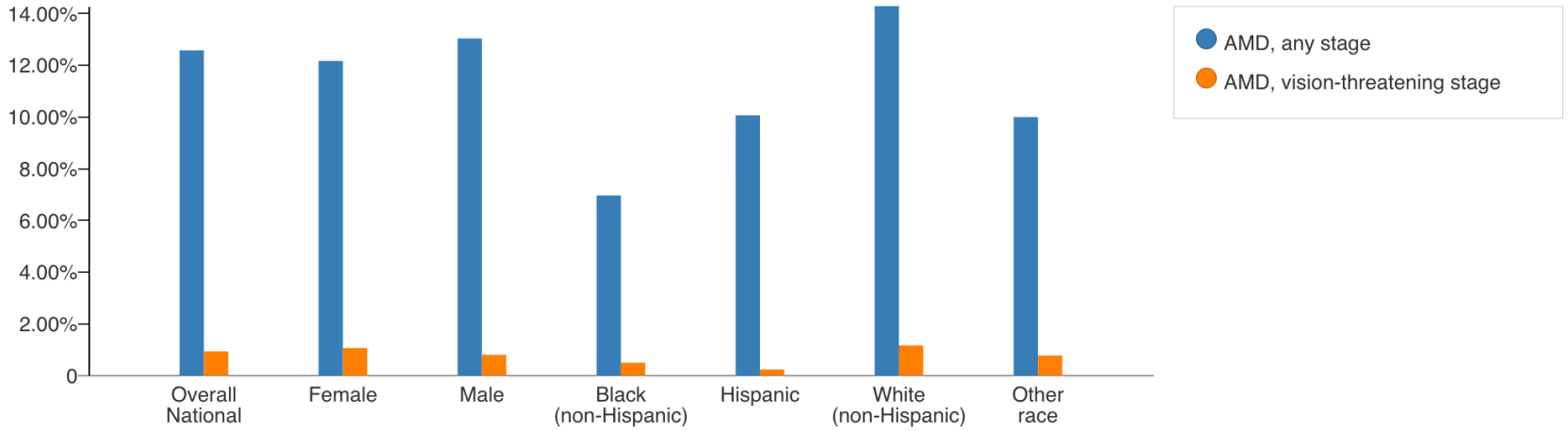
Figure 1. Percentage of 2019 US Resident Population With Age-Related Macular Degeneration, by Stage and Age Group



https://www.cdc.gov/vision-health-data/prevalence-estimates/amd-prevalence.html

Demographics

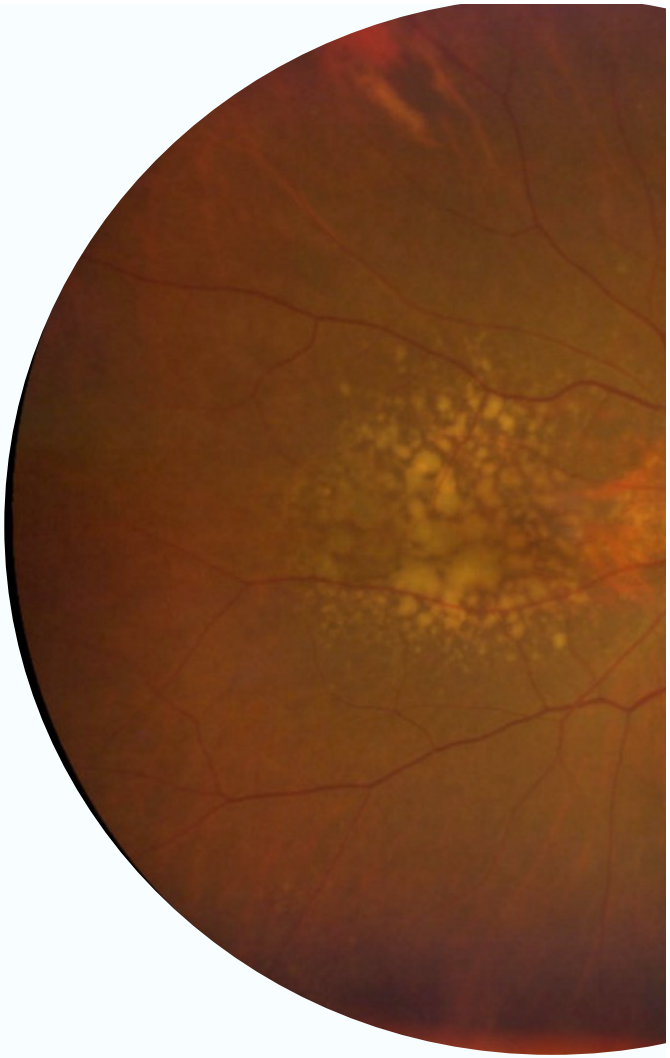
Figure 2. Percentage of 2019 US Resident Population with Age-Related Macular Degeneration, by Sex and Race/Ethnicity



https://www.cdc.gov/vision-health-data/prevalence-estimates/amd-prevalence.html

Risk Factors

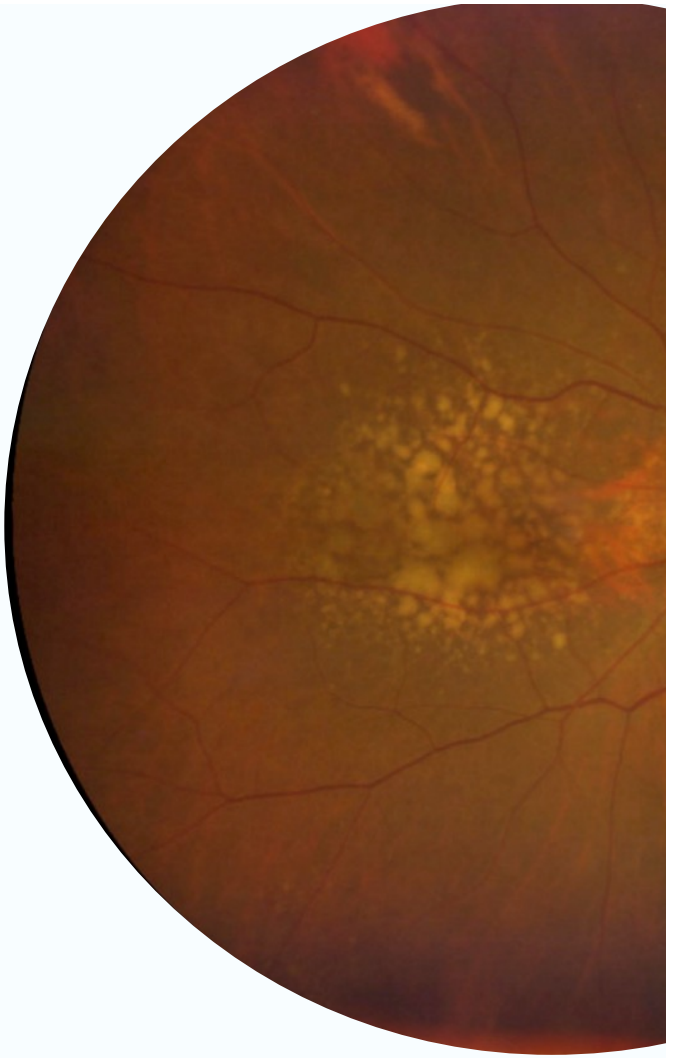
- Being 50 and older
- Smoking
- Systemic vascular conditions (HTN, DM, HLD)
- Sunlight/blue light exposure



Risk Factors

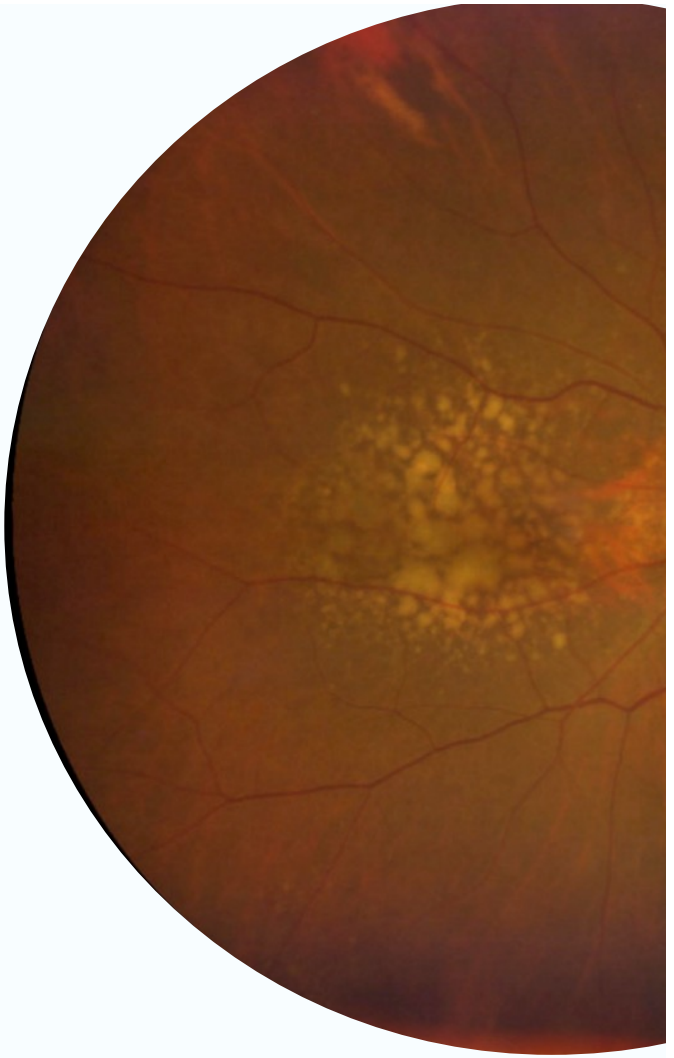
- Genetics
  - Age related maculopathy susceptibility 2 (ARMS2)
  - Complement factor H (CFH)

- Diets high in saturated fat

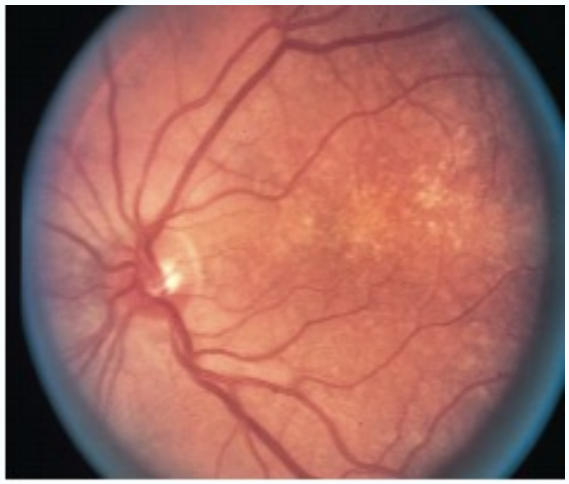


Risk Factors

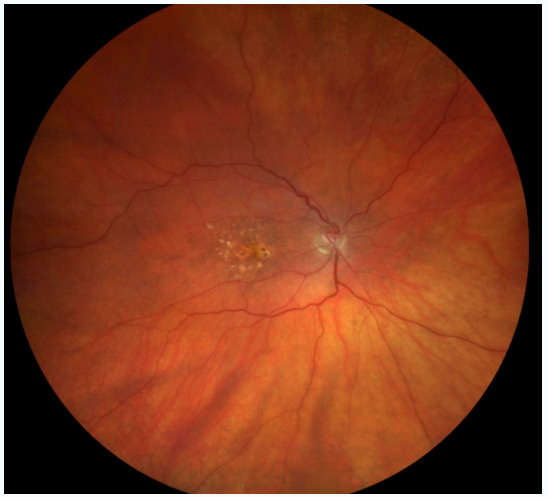
- Diets high in saturated fat
    - A 2020 study found that AMD was associated with eating a high glycemic diet, and that the Western diet was associated with increased risk of wet AMD



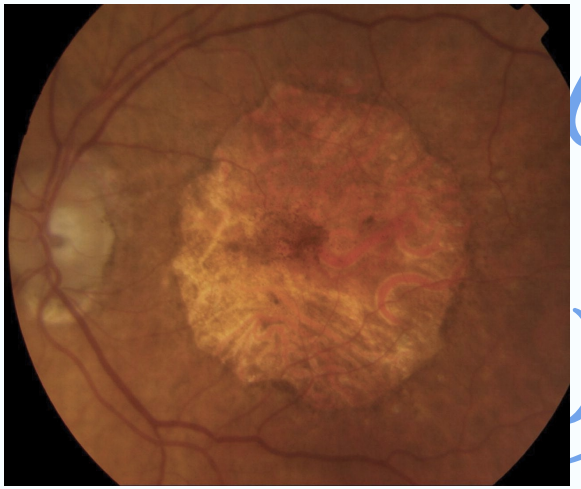
Dry (non-exudative/non-neovascular) AMD



- Drusen



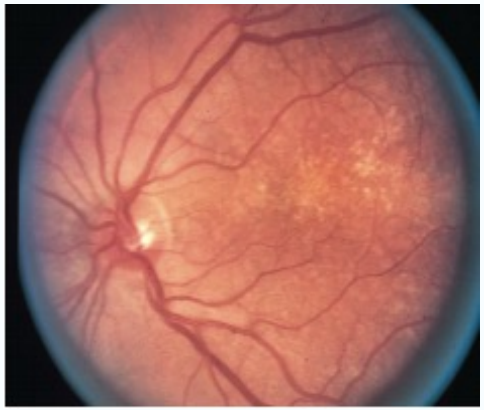
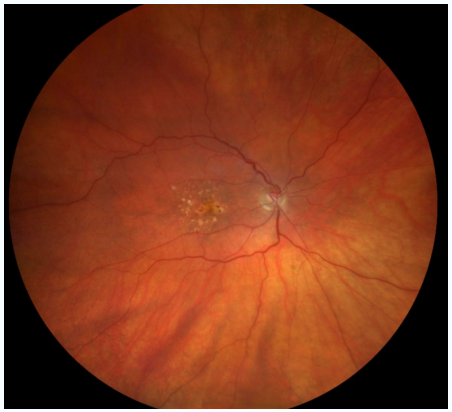
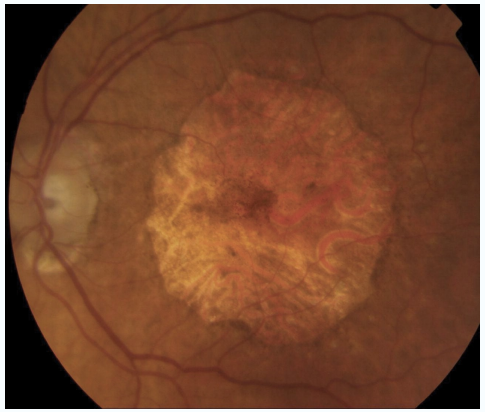
- RPE degeneration



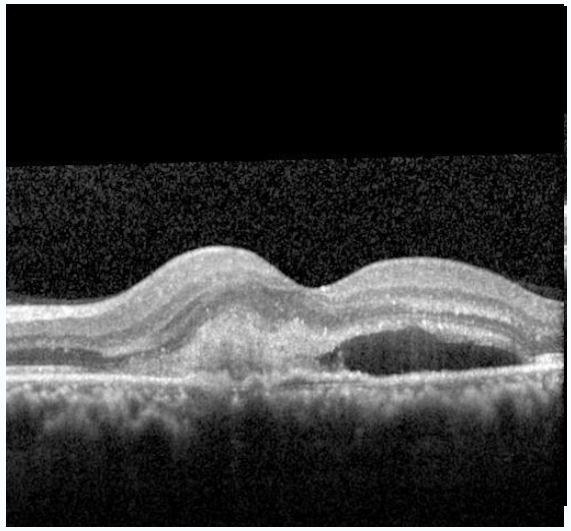
- Geographic Atrophy

Dry (non-exudative/non-neovascular) AMD

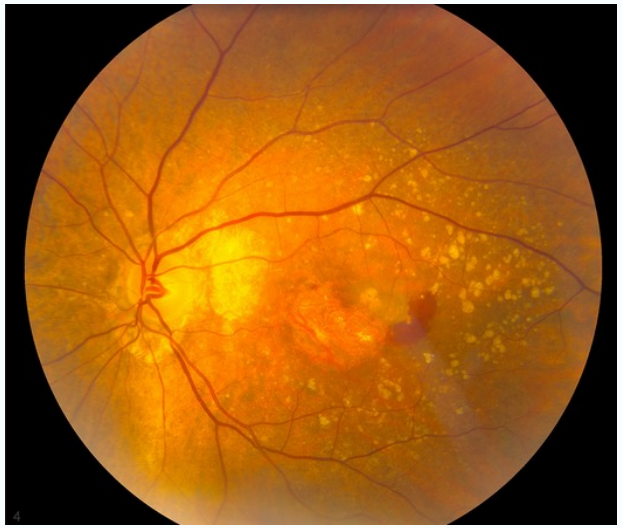
- Characterized by drusen, focal pigmentary changes, retinal pigment epithelium (RPE) degeneration and geographic atrophy of the RPE
- Accounts for 90% of cases of AMD

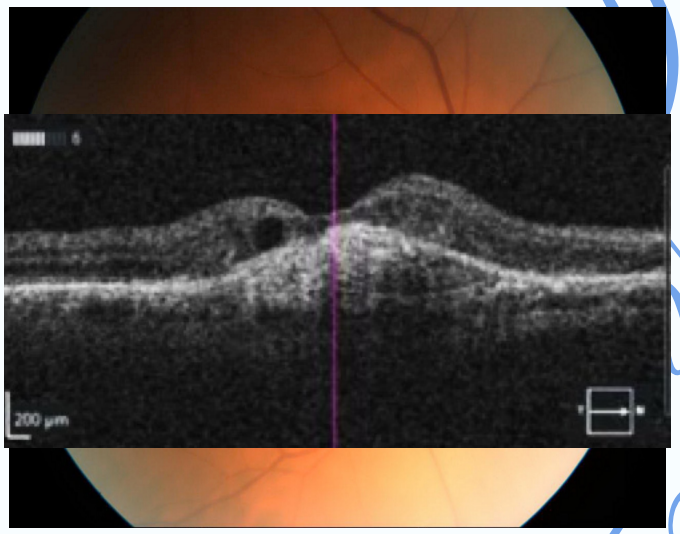
Wet (exudative/neovascular) AMD



- Choroidal neovascular membrane (CNVM)



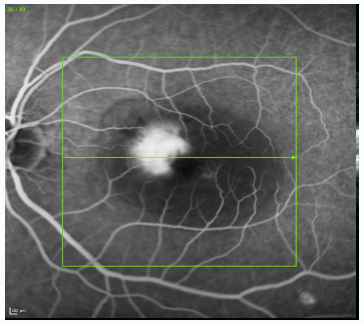
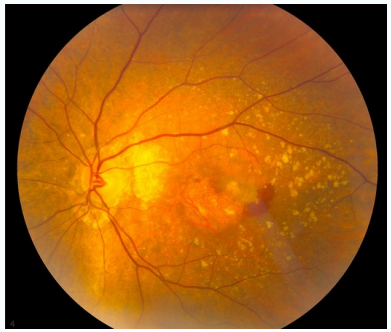
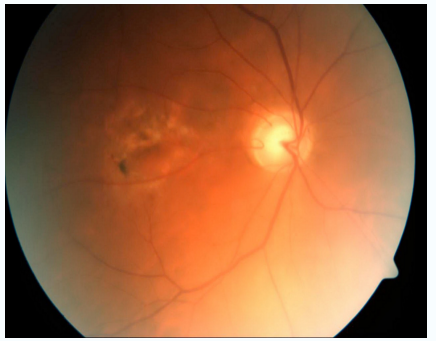
- Hemorrhages/ exudative changes



- Fibrotic scar (disciform scar)

Wet (exudative/neovascular) AMD

- Characterized by elements of dry AMD with the development of pigment epithelial detachments (PEDs), choroidal neovascular membranes, hemorrhagic changes and fibrotic scarring
- Accounts for 10% of cases of AMD, but **80%** of blindness from AMD

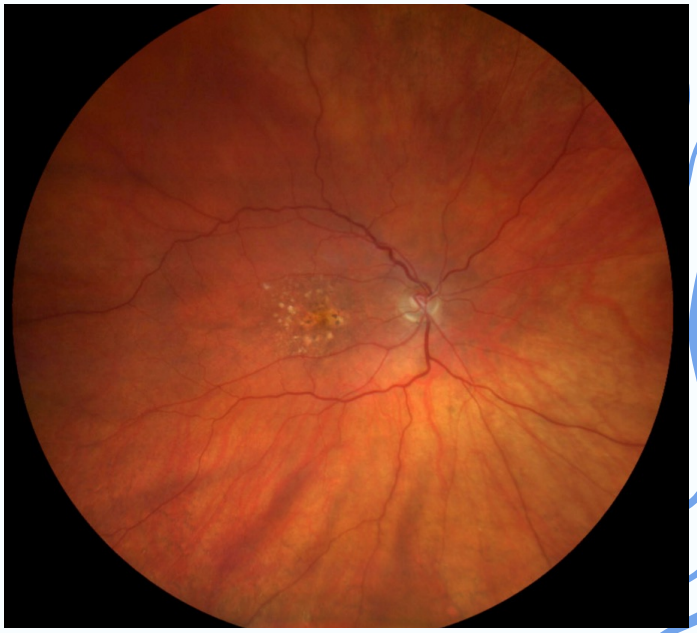
AMD Grading

Category		Characteristics
1	No AMD	Fewer than 5 small drusen (<63 microns)
2	Mild	Multiple small drusen or some intermediate sized drusen (63-124 microns)
3	Intermediate	Extensive intermediate drusen or more than one large drusen (>125 microns) OR Non-central geographic atrophy
4	Severe	Central geographic atrophy OR Neovascularization causing vision loss

Monitoring for Change

How to monitor for progression

- Assess visual symptoms
- Measure visual acuity
- Dilated fundus examination
- Diagnostic testing
    - Fundus photography
    - Macular OCT
        - Progression analysis
        - OCT Angiography (OCTA)

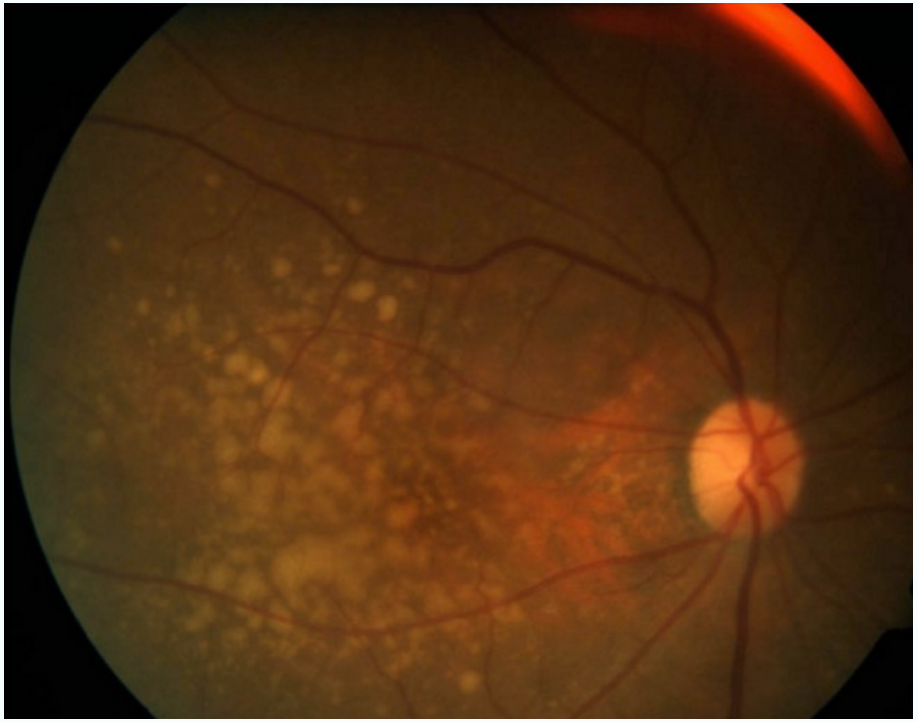


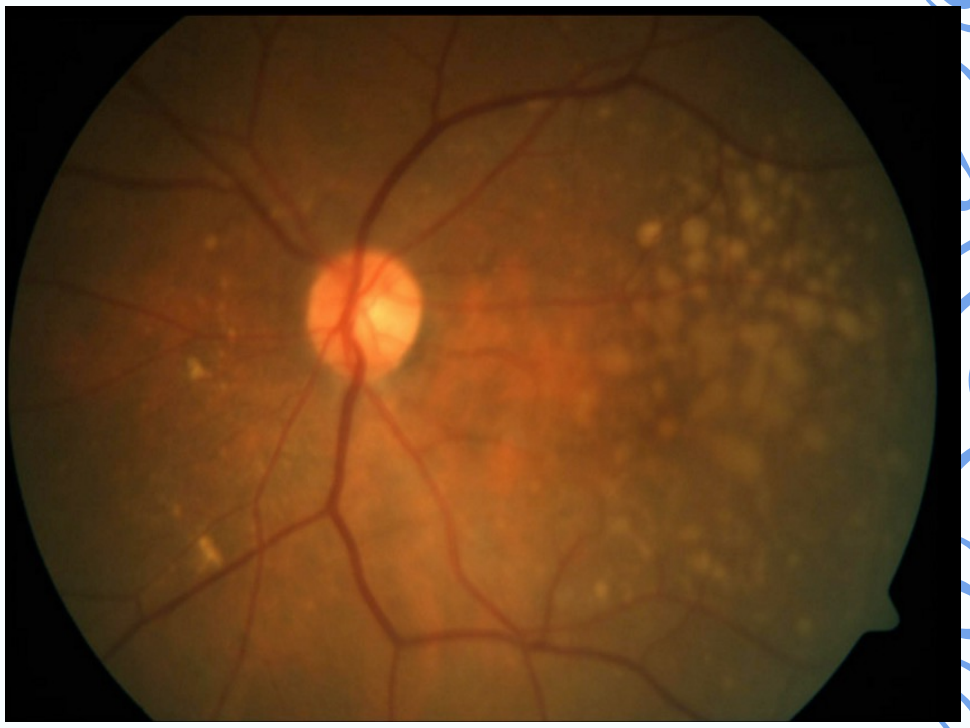
Sample Case

86 YO East Asian female

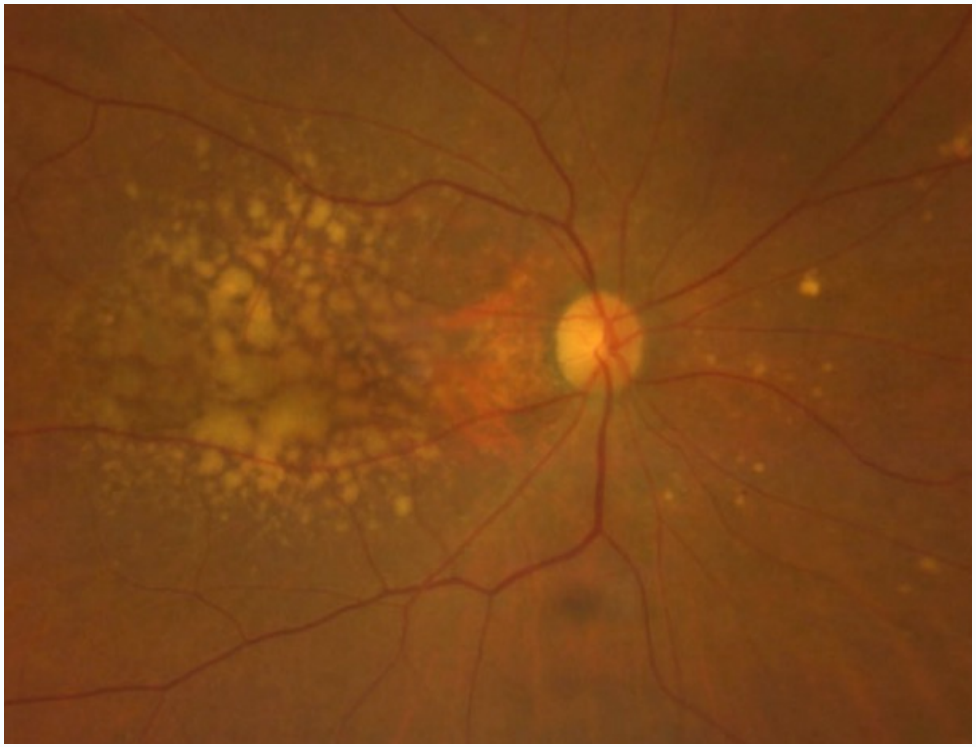
- Monitored at the University Eye Center (UEC) since 2006
- Diagnosed with dry AMD in 2016
- Ocular history
  - Compound myopic astigmatism OU
  - Dry eye OU
  - Cataracts OU
  - AMD OU
  - ERM OS
- Medical history
  - Hypertension (HTN)
  - Hyperlipidemia (HLD)
  - Type 2 DM
- Social history
  - Non-smoker

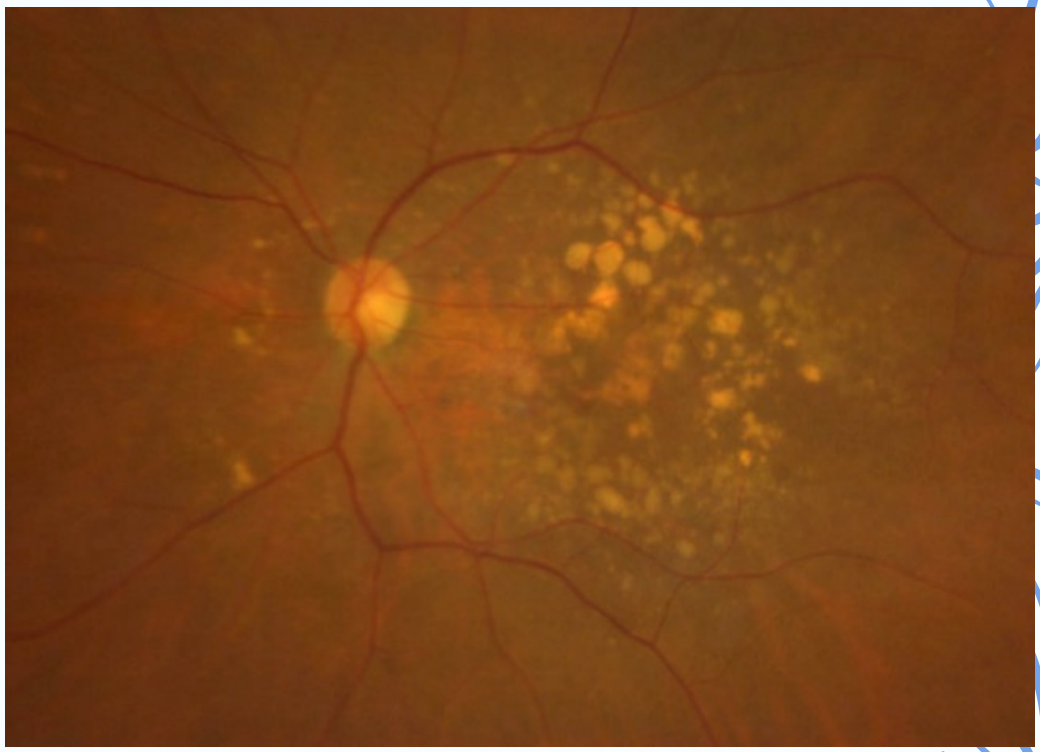
2017-2018 – Fundus photography



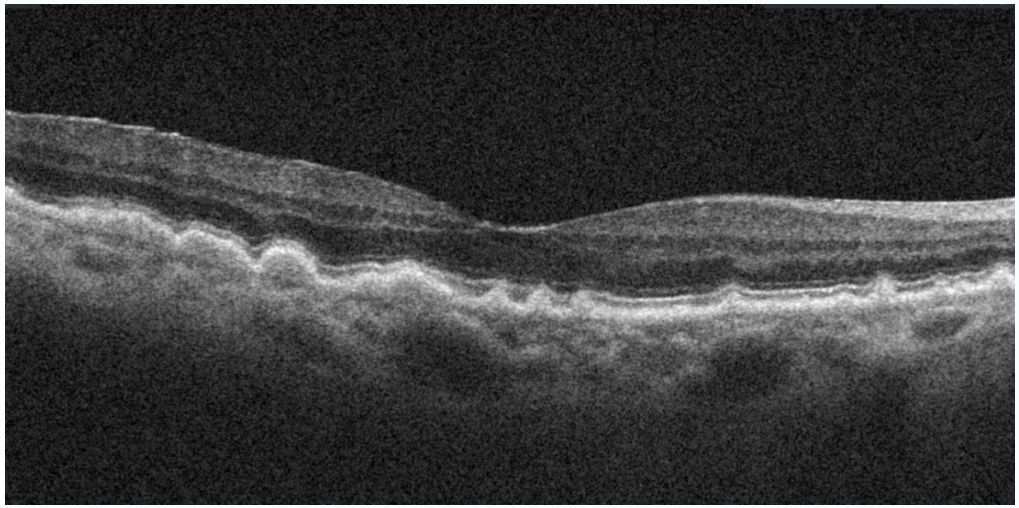


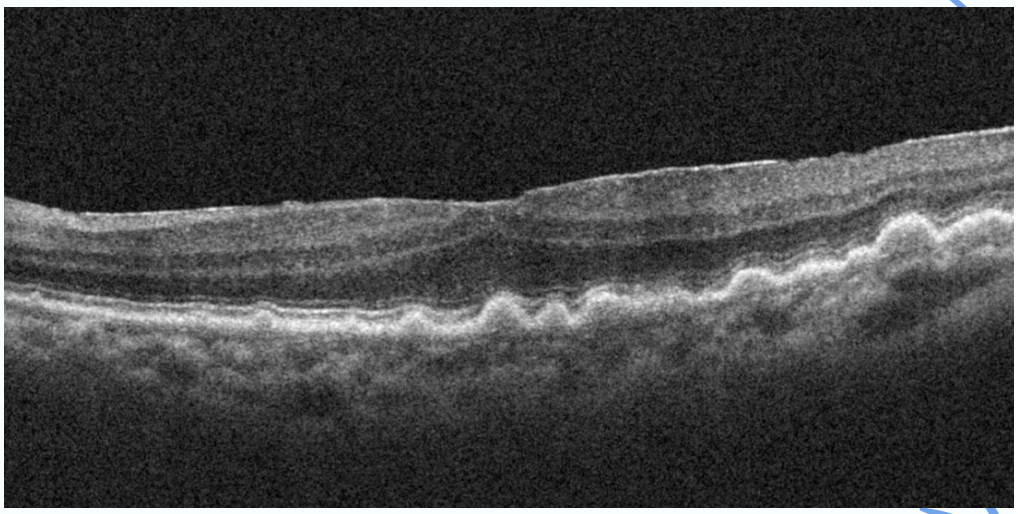
2023 – Fundus photography



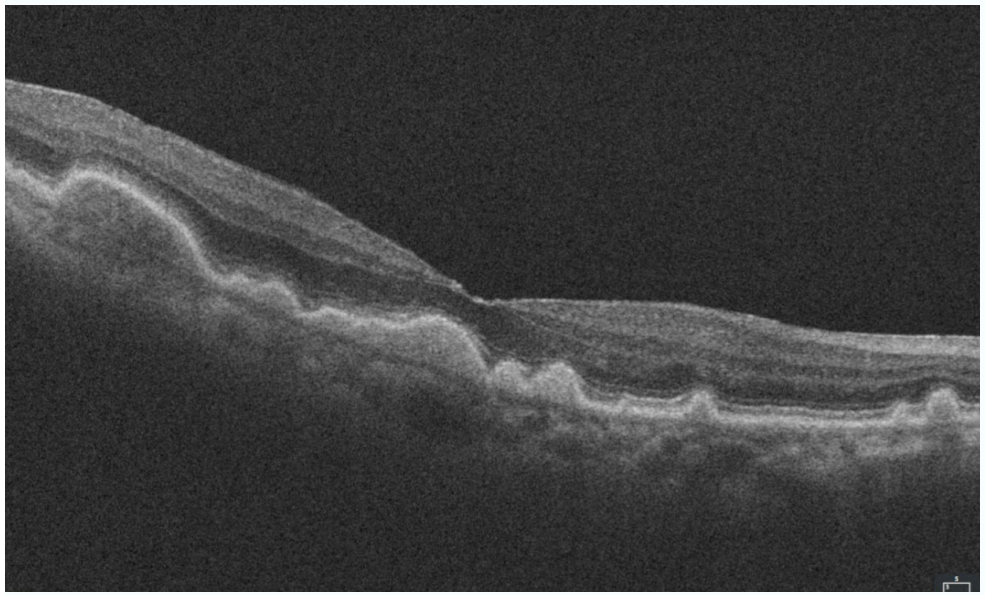


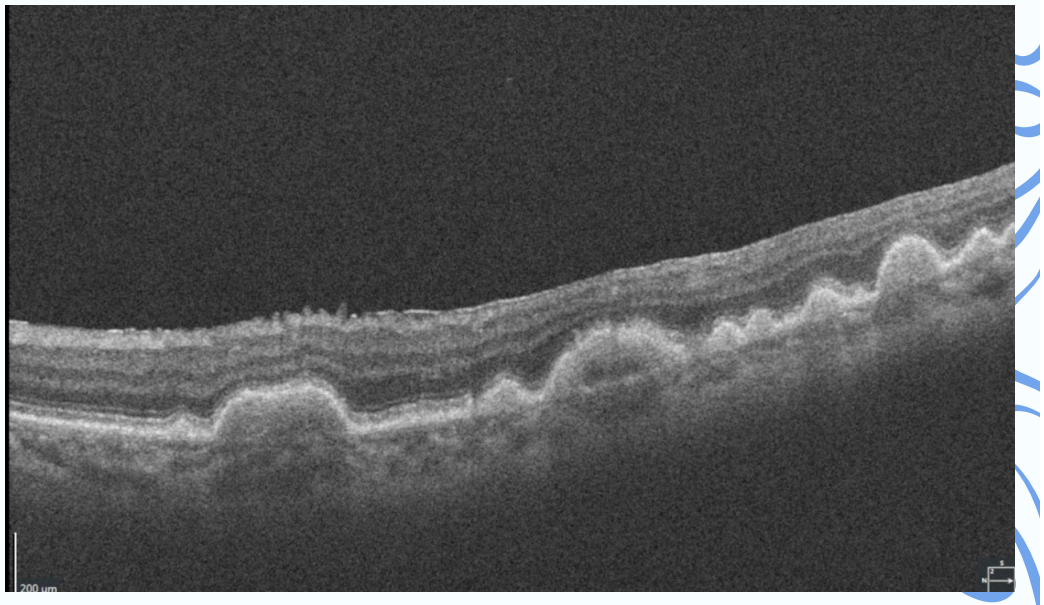
Macular OCT - 2017





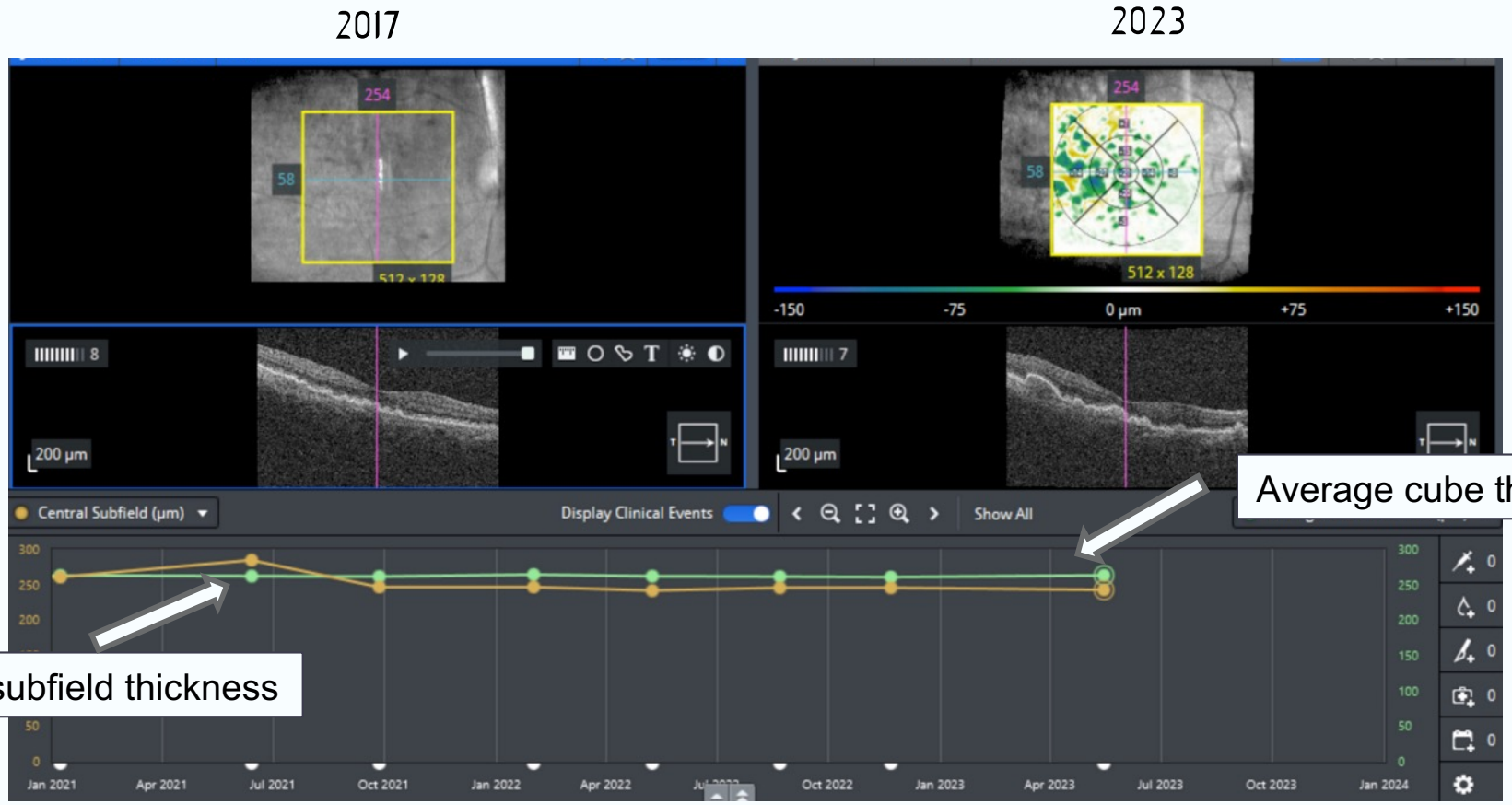
Macular OCT - 2023





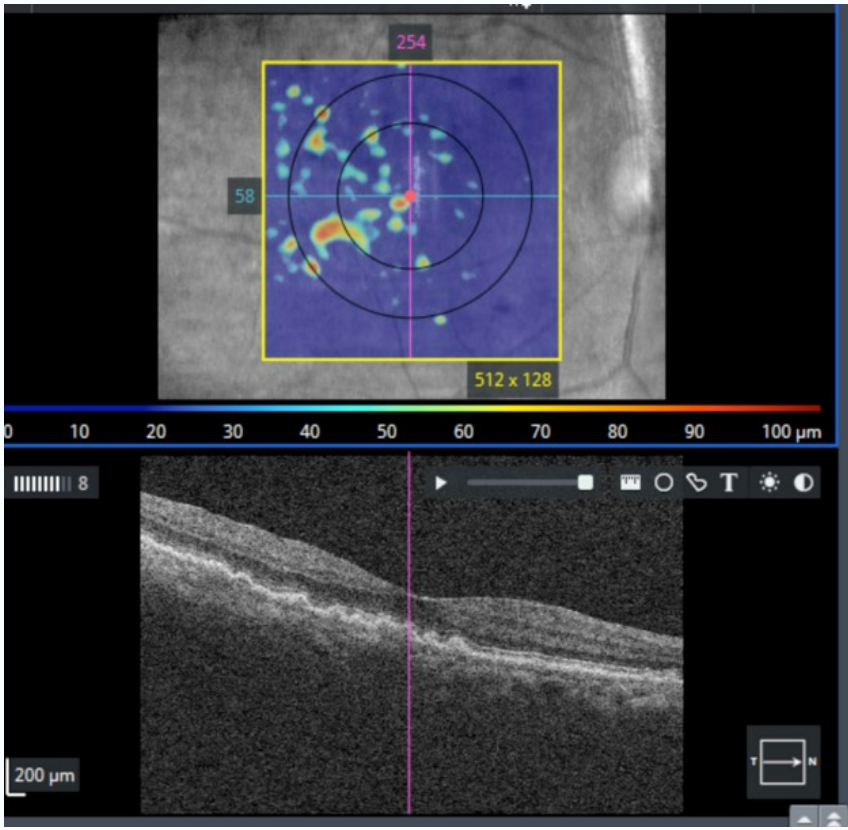
Macular OCT – Progression Analysis

Average thickness

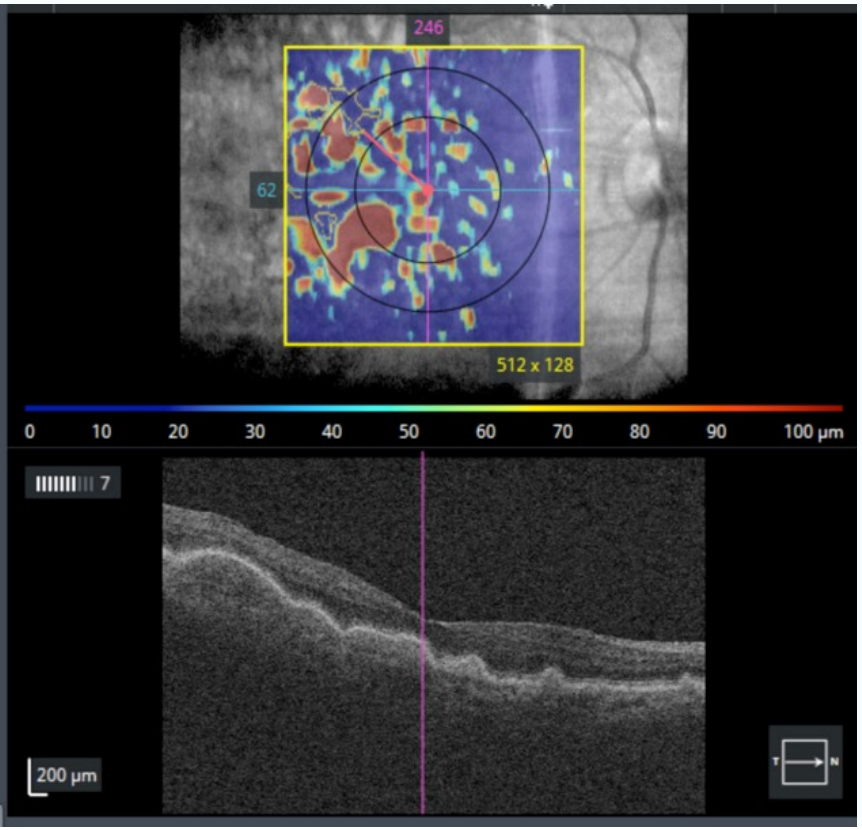


Macular OCT – Progression Analysis

2017

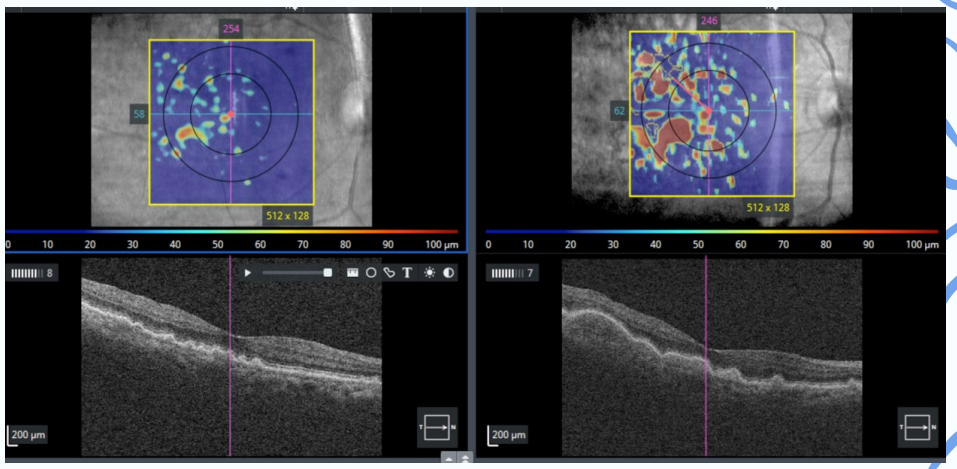


2023



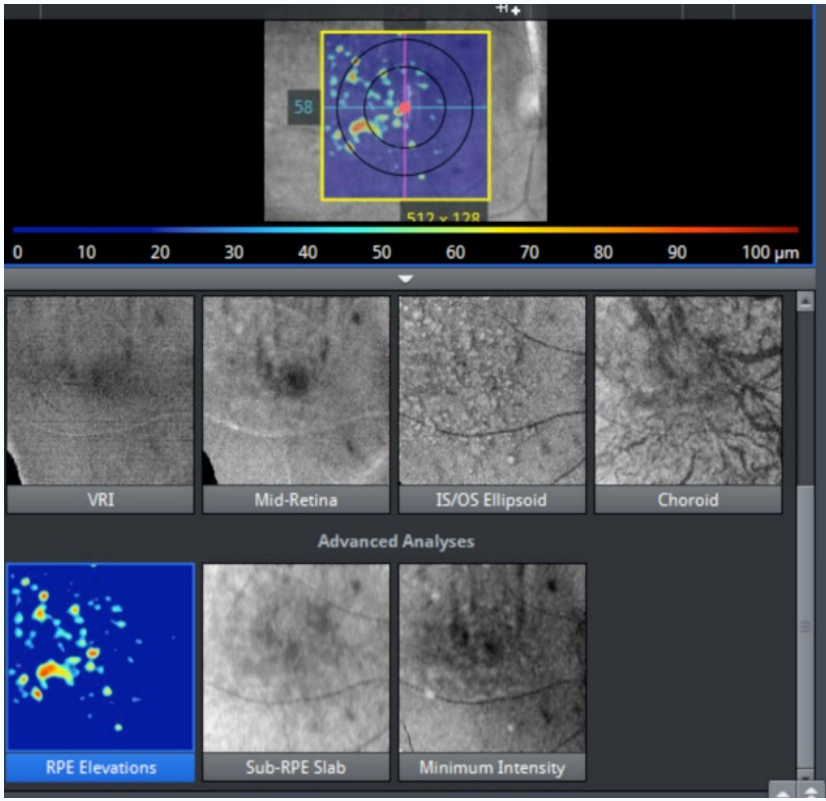
Macular OCT – Advance RPE Analysis
RPE Elevation Map

- A map overlaid on the fundus image to show elevations in the RPE
- RPE elevations identify drusen
- Circles are 3mm and 5mm centered on the fovea

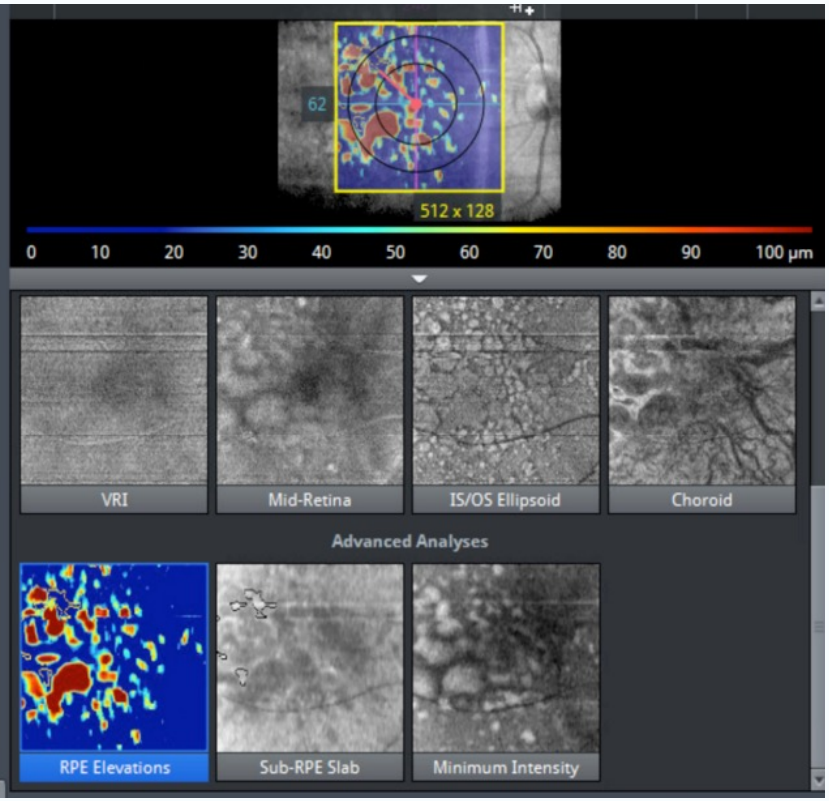


Macular OCT – Advance RPE Analysis
RPE Profile

2017



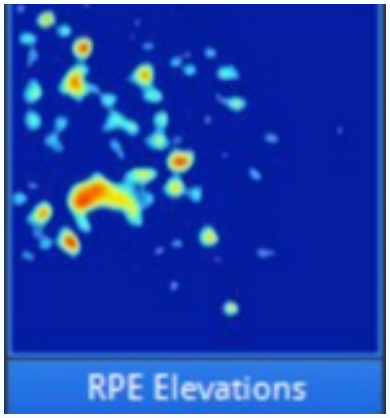
2023



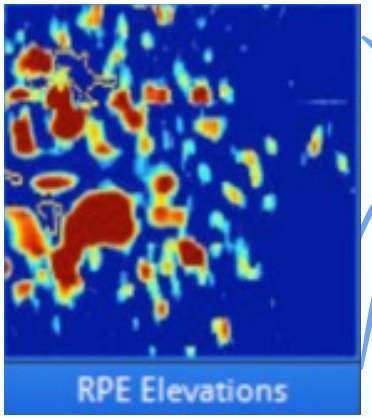
Macular OCT – Advanced RPE Analysis
RPE Profile – Qualitative

- Combines the RPE elevation map and the areas of sub-RPE illumination
- RPE elevation identifies drusen
- Sub RPE illumination identifies geographic drusen regression and geographic atrophy

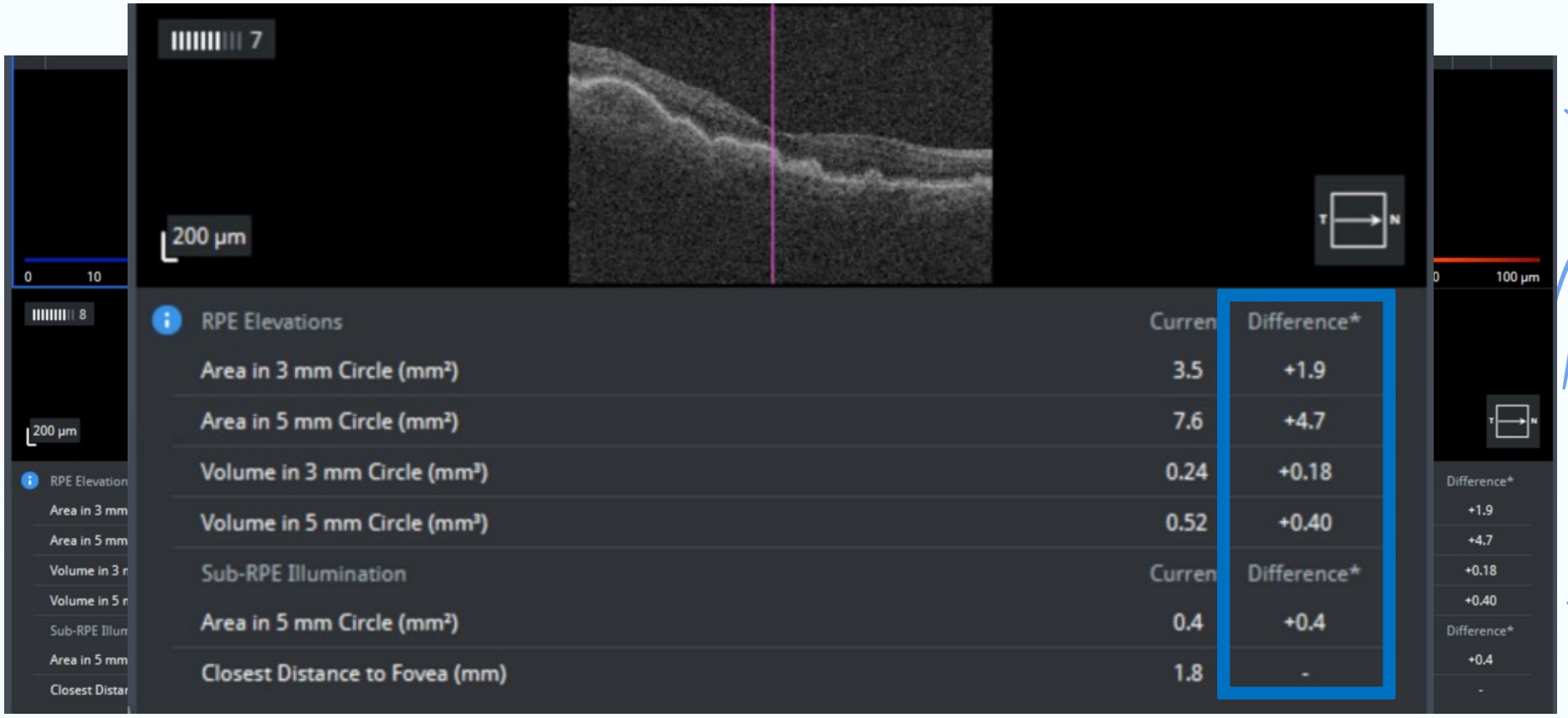
2017



2023

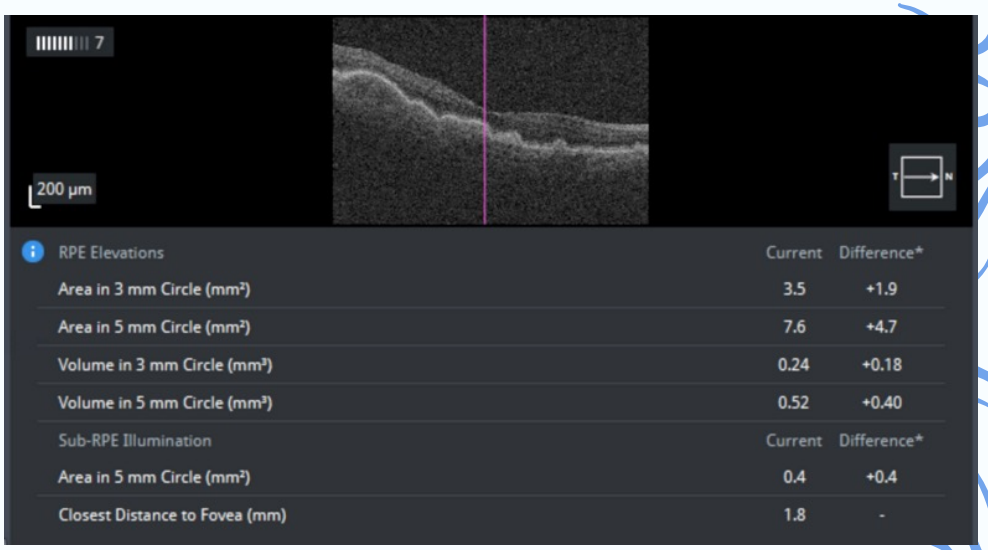


Macular OCT – Advanced RPE Analysis Table of Values

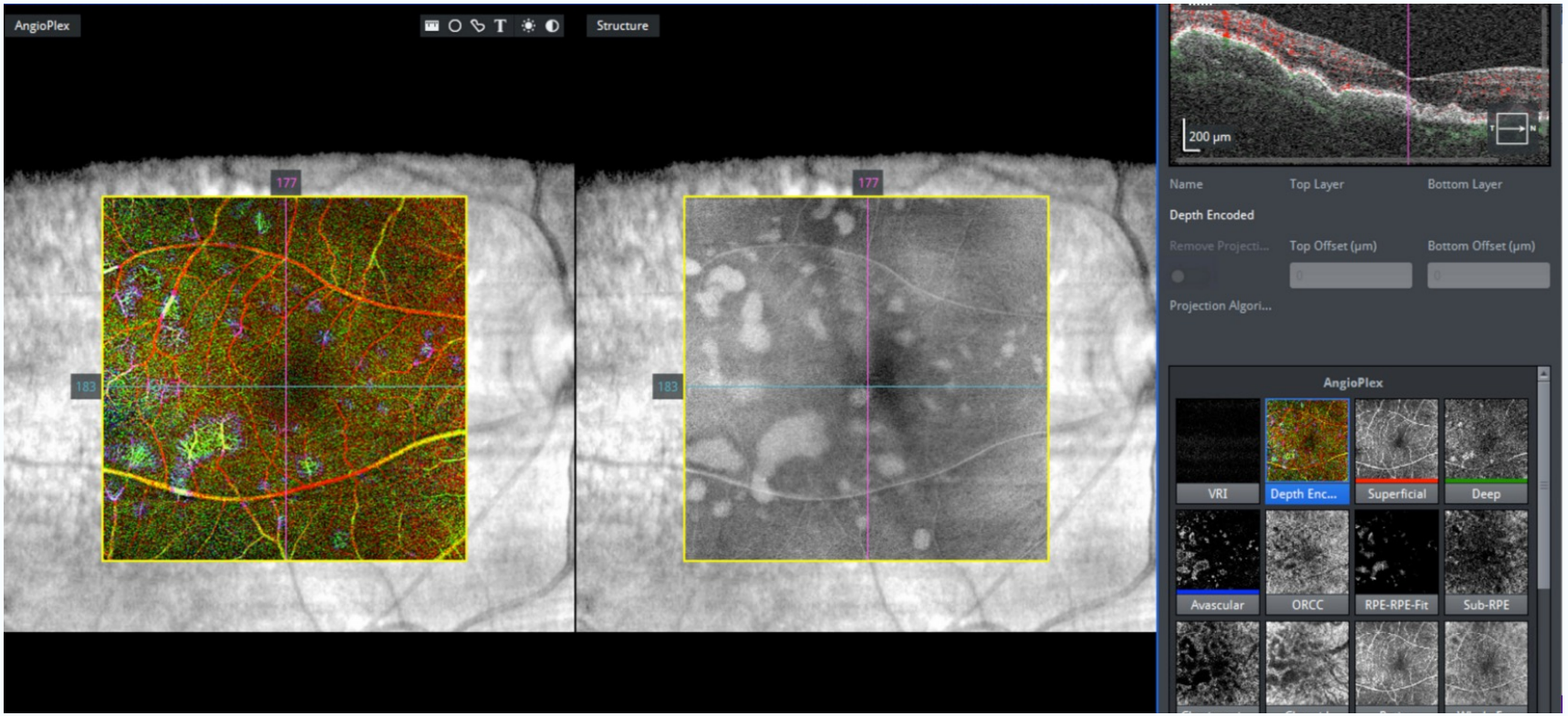


Macular OCT – Advanced RPE Analysis Table of Values - Quantitative

- Assessment of the change in area and volume of the RPE layer in the 3mm and 5mm circle

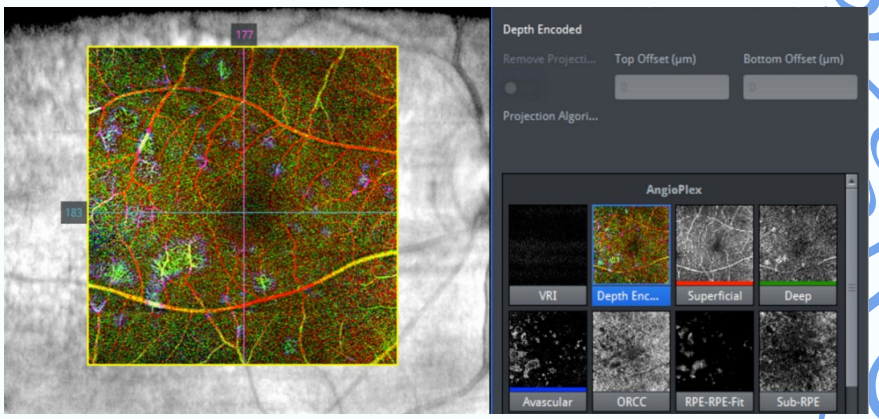


OCTA - 2023


AngioPlex
Structure
177
183
177
183
200 µm
Name
Top Layer
Bottom Layer
Depth Encoded
Remove Projecti...
Top Offset (µm)
Bottom Offset (µm)
Projection Algori...
AngioPlex
VRI
Depth Enc...
Superficial
Deep
Avascular
ORCC
RPE-RPE-Fit
Sub-RPE

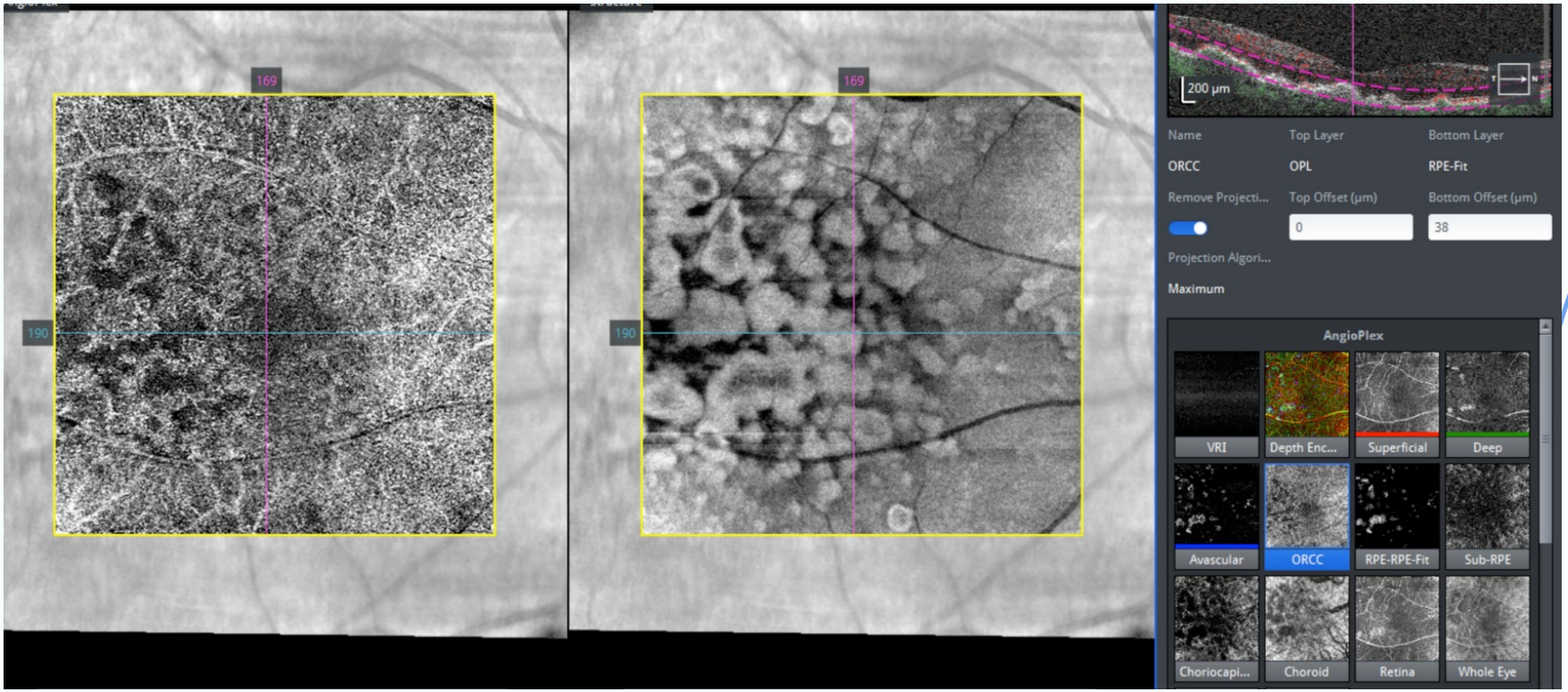
OCTA

- Displays temporal changes in reflection behavior between the layers of the retina
- The changes reflect moving particles such as erythrocytes in blood vessels
- This is useful to detect vascular anomalies (i.e. CNVM)



OCTA –Layers to examine

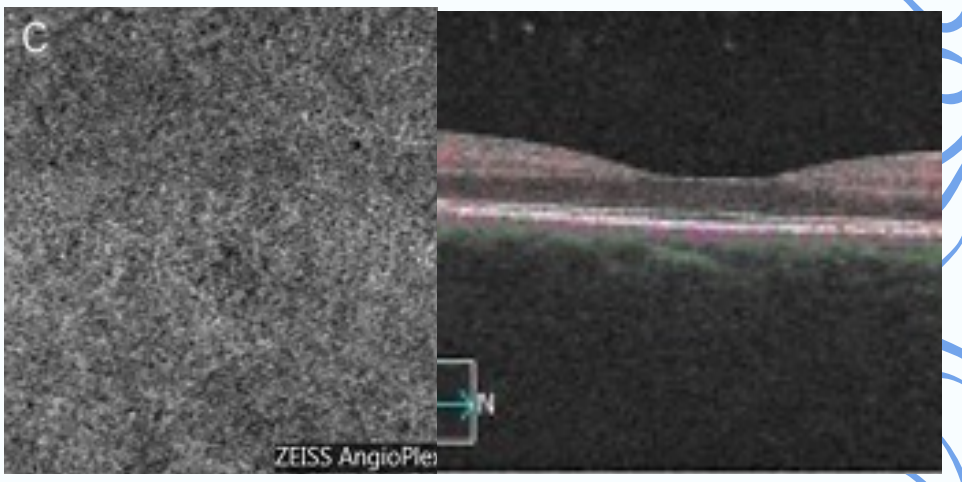
Outer Retina – Choriocapillaris (ORCC)



OCTA –Layers to examine

Outer Retina – Choriocapillaris (ORCC)

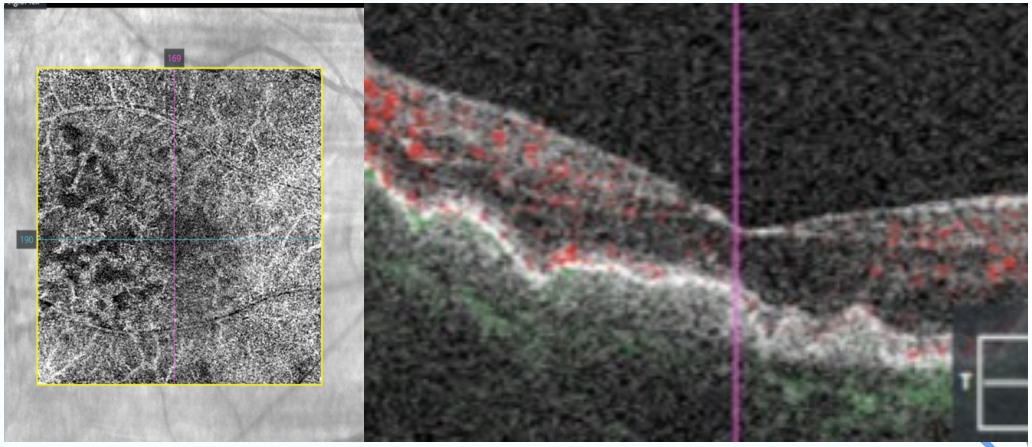
- Normal: regular, homogenous netlike vascular pattern



OCTA –Important for AMD

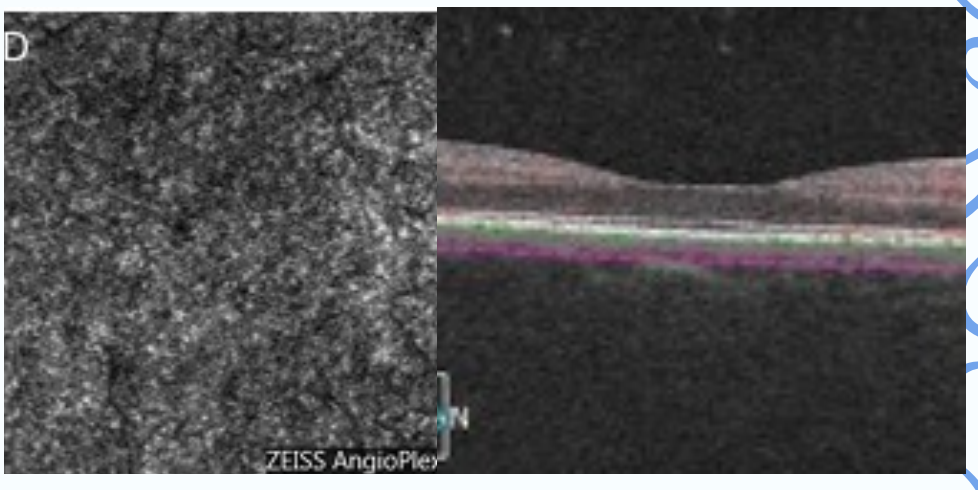
Outer Retina – Choriocapillaris (ORCC)

- Pathological changes: deviations from homogenous pattern, neovascular structures



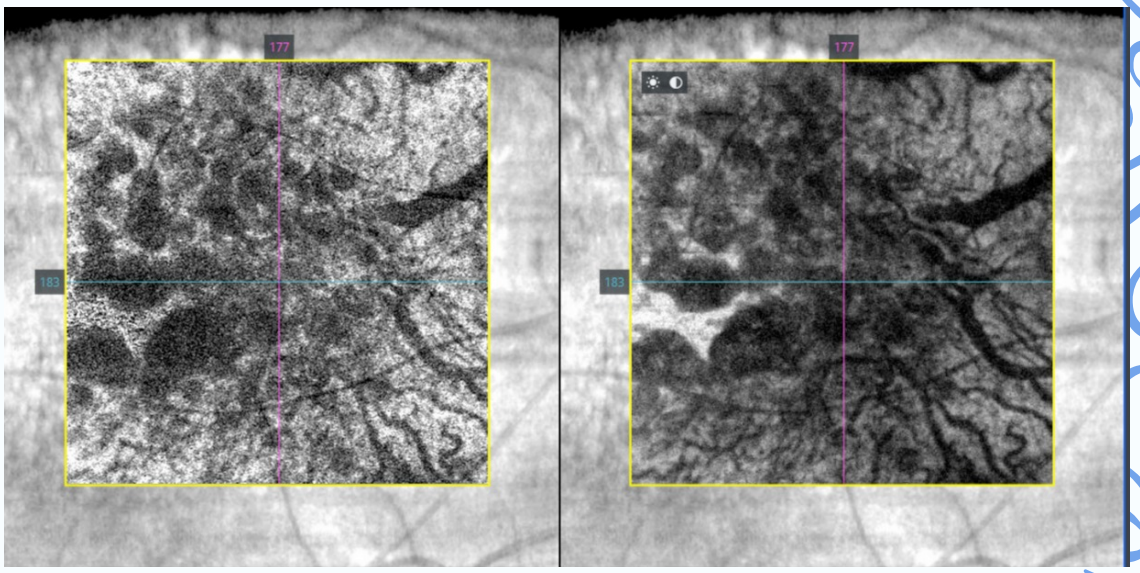
OCTA – Layers to examine Choroid

- Normal: regular, homogenous dense vascular pattern



OCTA – Layers to examine Choroid

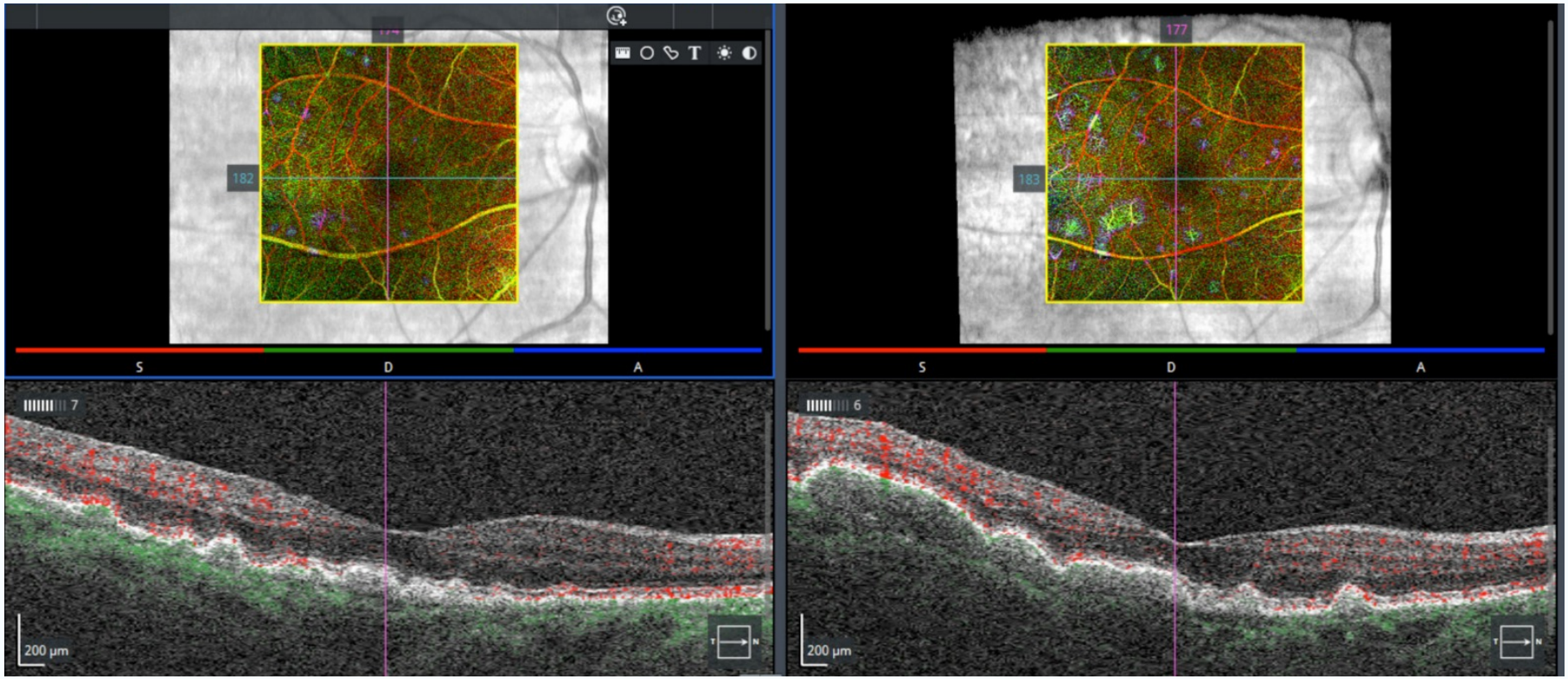
- Pathological: Deviations from normal pattern, neovascular structures



OCTA – Progression Analysis

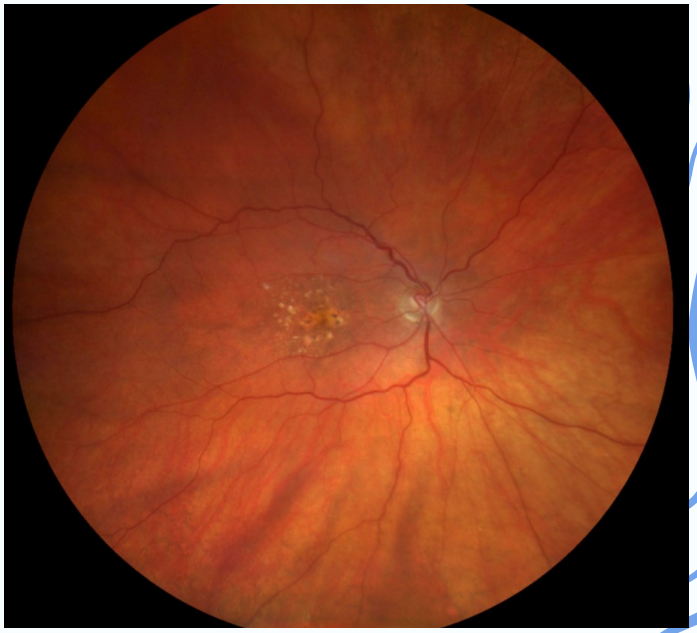
2017

2023



How to monitor for progression

- Assess visual symptoms
- Measure visual acuity
- Dilated fundus examination
- Diagnostic testing
- Genetic testing?



AMD – Genetic Testing

Macula Risk Test

- Suggests a specific type of supplementation based on presence or absence of complement factor H (CFH) and age-related maculopathy susceptibility 2 (ARMS 2)

- Sorts patients into one of five Macula Risk categories (MR1-MR5) based on 10-year risk of progression
  - Considerations: age, gender at birth, smoking history, BMI, AMD status, genetic test results
  - Identifies people with increased risk allowing for closer monitoring (MR3, MR4, MR5)

AMD – Genetic Testing – Reliability?

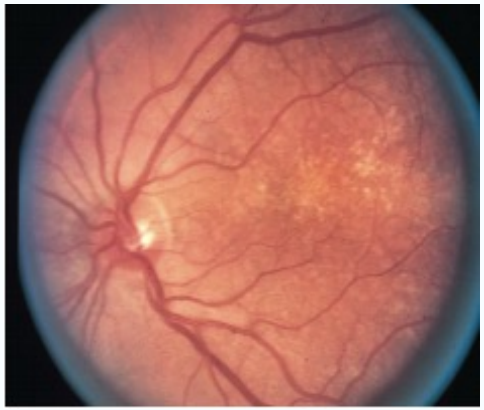
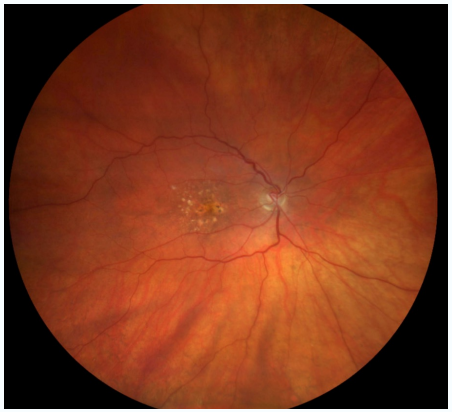
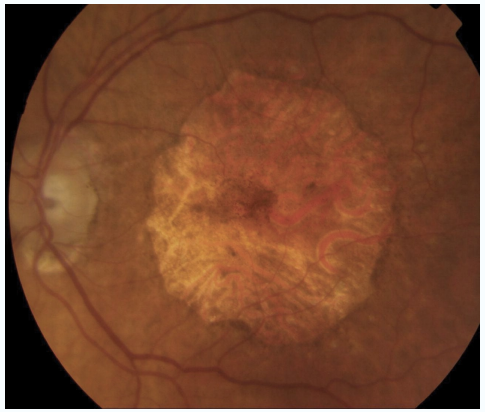
Macula Risk Test

- **The American Academy of Ophthalmology Preferred Practice Patterns (2019)**
  - Statistical analysis found errors in the data used to support an association and bias in the in analysis used to support genetic testing
  - Routine use of genetic testing is not supported by existing literature and not recommended at this time

Treatment & Management

Dry (non-exudative/non-neovascular) AMD

- Observation
- **Syfovre (pegcetacoplan injection)
- Izervay (avacincaptad pegol)

Syfovre (pegcetacoplan)

Treatment for Geographic Atrophy

- The first FDA approved treatment for geographic atrophy secondary to AMD
- Delivered as an injection administered every 25 to 60 days
- Reduced rate of growth geographic atrophy 16-36% in two clinical trials
- Has not been shown to have any effect on vision

Syfovre (pegcetacoplan)

Treatment for Geographic Atrophy (GA)

- Potentially covered by certain insurances if GA secondary to AMD is confirmed using fundus autofluorescence (FAF) imaging:
  - Total GA size between 1 and 7 disk areas
  - If GA is multifocal, at least 1 focal lesion of 0.5-disc area
  - Presence of any pattern of hyperautofluorescence in the junctional zone of GA

Izervay (avacincaptad pegol)

Treatment for Geographic Atrophy

- The second FDA approved treatment for geographic atrophy secondary to AMD
- Delivered as an injection administered monthly for up to 12 months
- Reduced rate of growth geographic atrophy by 18-35% in two clinical trials
- Has not been shown to have any effect on vision

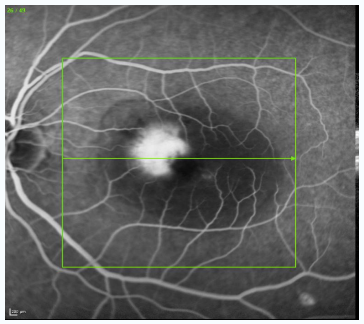
Izervay (avacincaptad pegol)

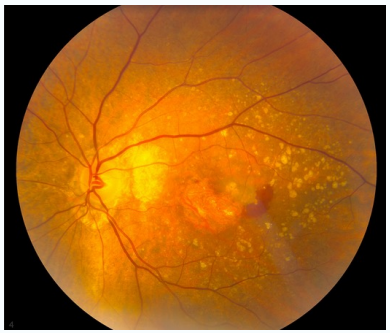
Treatment for Geographic Atrophy

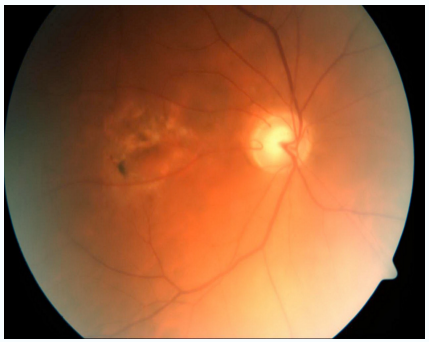
- Potentially covered by certain insurances if:
  - Baseline assessment including BCVA, FAF imaging and OCT
  - Patient has GA diagnosis with 1 or more zones of well demarcated RPE or choriocapillaris atrophy
  - Disease is secondary to AMD

Wet (exudative/neovascular) AMD

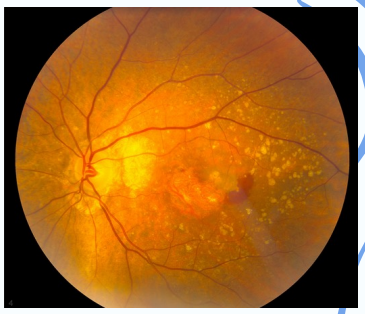
- Anti-VEGF injections
  - Classic:
    - Lucentis (~$1900)
    - Avastin (~$50 – must be prepare by compounding pharmacy
    - Eylea (~$1850)





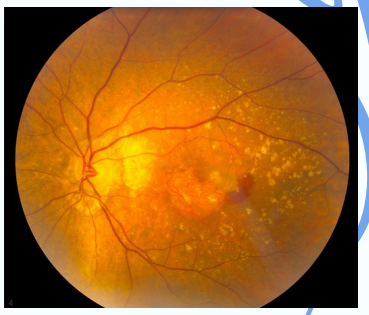


Wet (exudative/neovascular) AMD

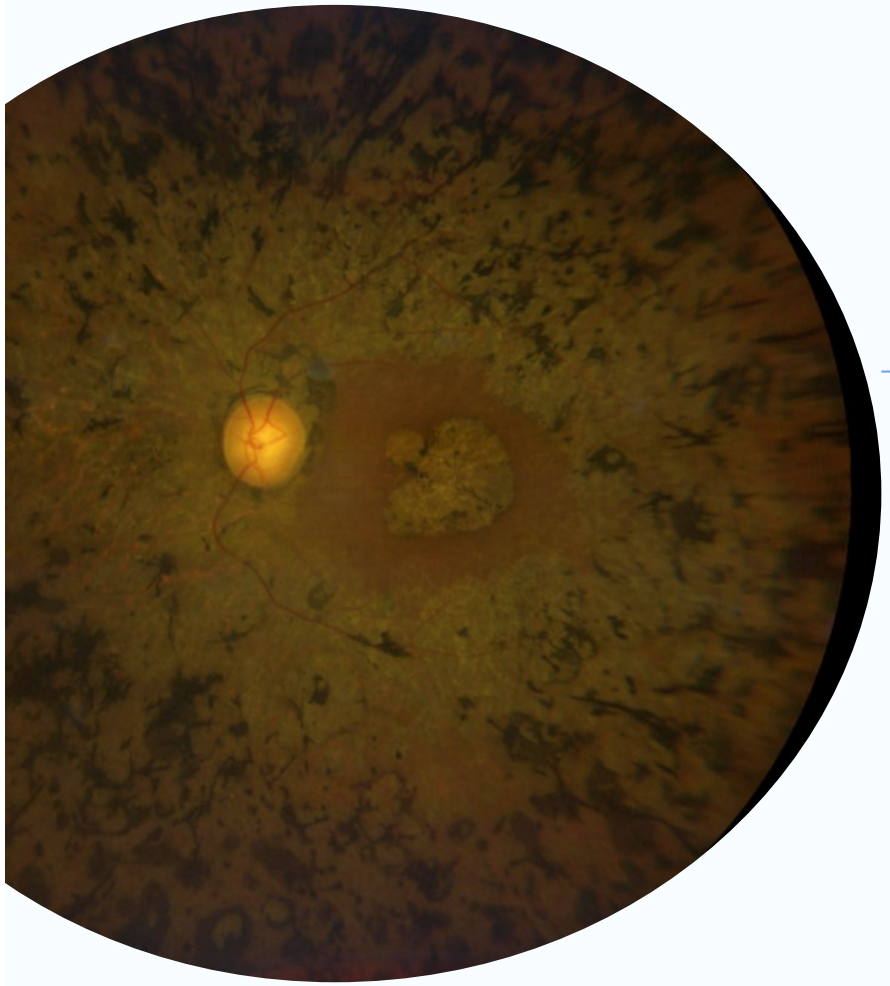


- Anti-VEGF injections
  - New generation – less frequent dosing
    - Eylea HD – higher dose (~$2625)
      - Treatment every 2-4 months
    - Beovu – ($1850)
      - Treatment every 25-31 days for the first three doses then every 8-12 weeks

Wet (exudative/neovascular) AMD



- Anti-VEGF injections
  - New generation – less frequent dosing
    - Vabysmo (~$2300)
      - Treatment every 4 weeks for first 4 doses then potentially every 4 months
    - Susvimo
      - Surgically implanted port to continuously deliver Lucentis to the eye
      - Potentially only 2 treatments/year



03

Hereditary Retinal Disease

Hereditary/Inherited Retinal Disease

A group of diseases caused by at least one gene not working as it should; they can cause severe vision loss or blindness

Inherited Retinal Diseases (IRD) Most Common

- Retinitis Pigmentosa
  - A group of complex diseases resulting from a degeneration of the rods
- Leber's Congenital Amaurosis (LCA)
  - Progressive autosomal recessive disease that causes severe vision loss from birth
- Stargardt's Disease
  - An autosomal recessive disease that involves flecks of lipofuscin in the retinal

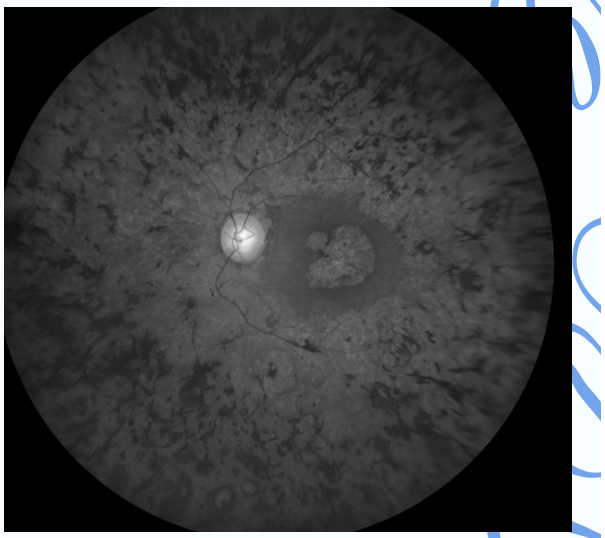
When should you suspect a HRD?

- Symptoms
  - Unexplained visual complaints
    - Since birth
    - Gradual over time
  - Night vision complaints

- Signs
  - Symmetric appearance to fundus
  - Symmetric diagnostic testing results

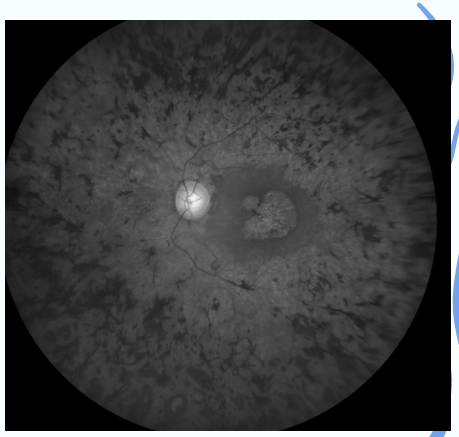
HRD – Evaluation

- Detailed case history including
  - Timeline of visual complaints
  - Trouble seeing at night?
  - Family history (consider constructing a pedigree)
- Color vision testing
- Dilated fundus exam
- Diagnostic testing
  - Fundus photography
  - Fundus autofluorescence (FAF)
  - OCT
  - Electrodiagnostic testing
  - Genetic Testing



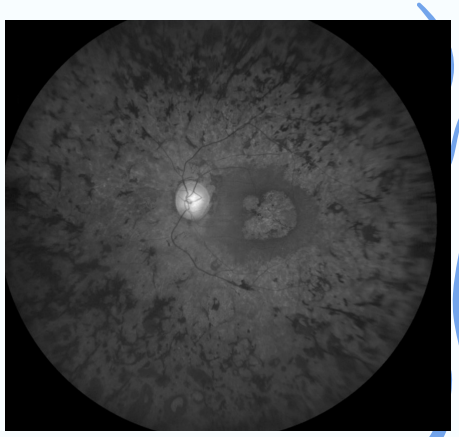
HRD – Genetic Testing

- Consider testing:
  - To help make a diagnosis
  - To help confirm a diagnosis
  - To provide patient with information on potential disease course and heritability



HRD – Genetic Testing

- Eligible diagnoses include:
  - Achromatopsia
  - Best disease
  - Cone dystrophy
  - Rod dystrophy
  - Cone-rod dystrophy
  - Congenital stationary night blindness
  - Leber's congenital amaurosis
  - Retinitis pigmentosa
  - Stargardt's disease
  - Usher syndrome



Testing Process

- Test kits can be ordered from a variety of labs
  - Buccal swab in office
  - Saliva sample in office
- Cost
  - Insurance billing
  - Out of pocket costs: $100 - $2000
  - Several no-cost options (i.e., My retina tracker genetic testing program)

Labs with Retinal Dystrophy Panels

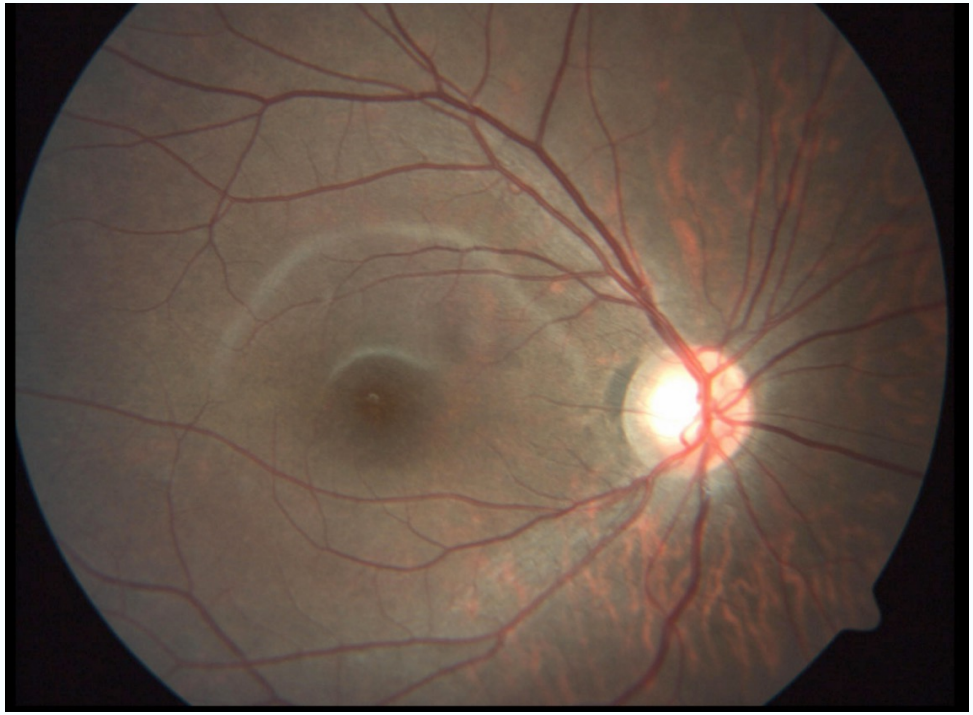
- Invitae
- My Retina tracker genetic testing program
- Baylor genetics
- BluePrint Genetics
- GeneDx
- Molecular Vision Lab
- PreventionGeentics

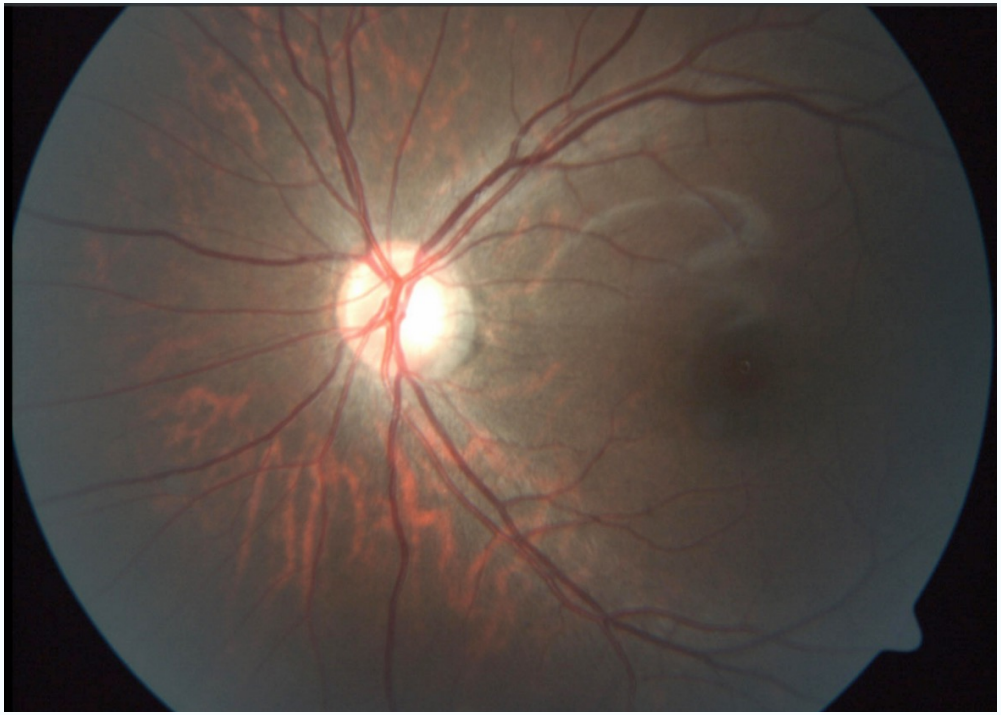
Sample Case

11 YO Black F

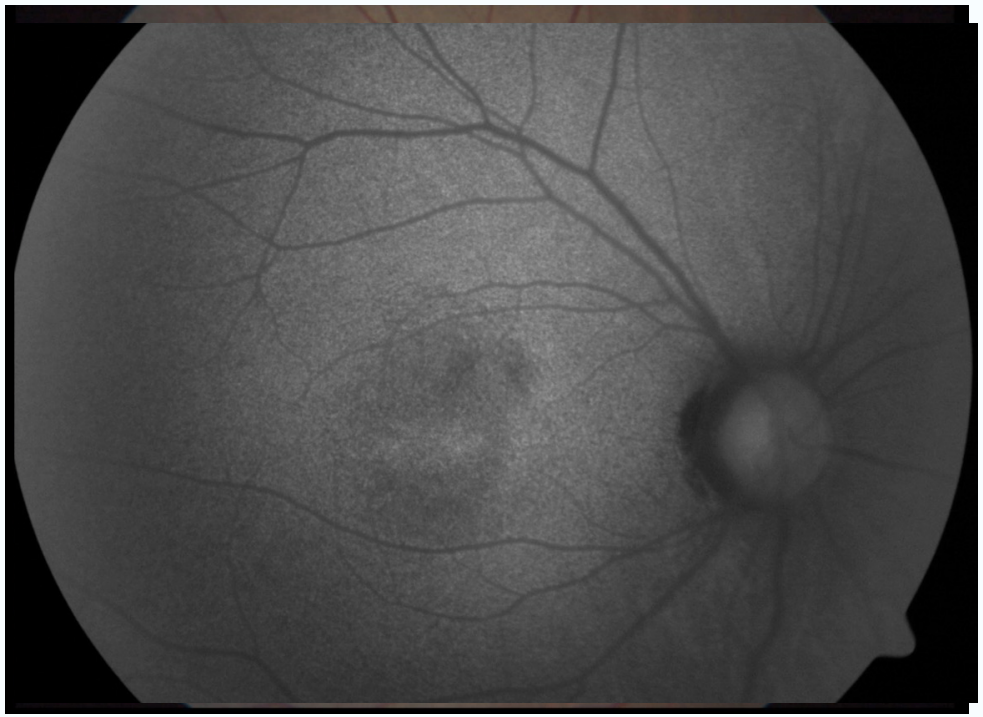
- First examined at the UEC in 2009
- Unexplained vision loss initially thought to be secondary to high myopia
- Pohx: unremarkable
- PMHx: unremarkable
- BCVA: 20/80, 20/80

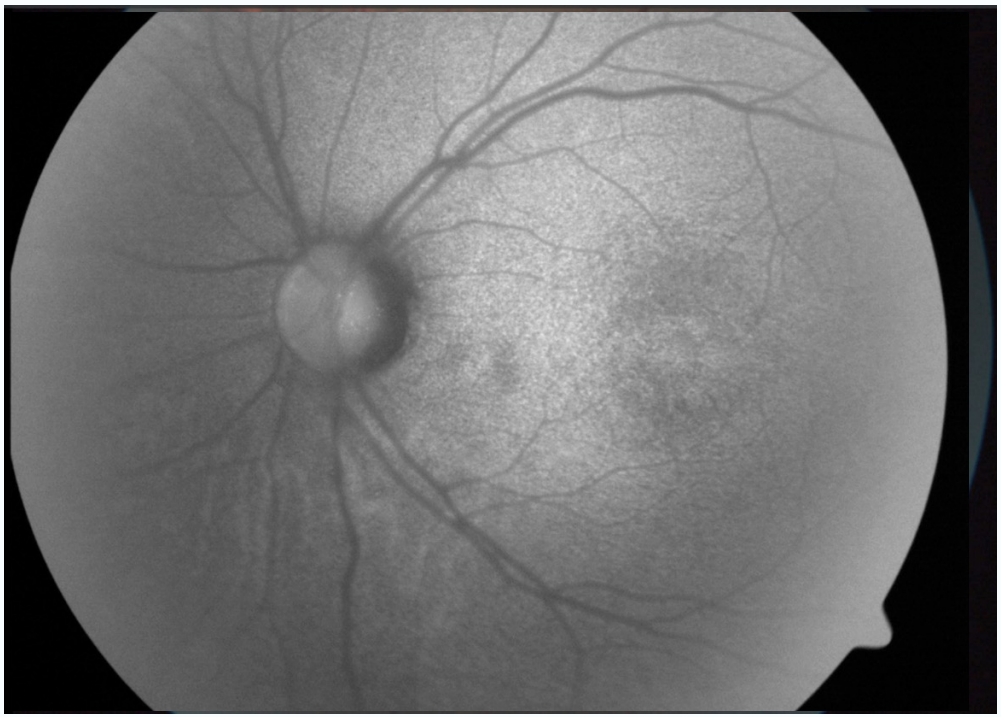
Fundus Photo - 2009





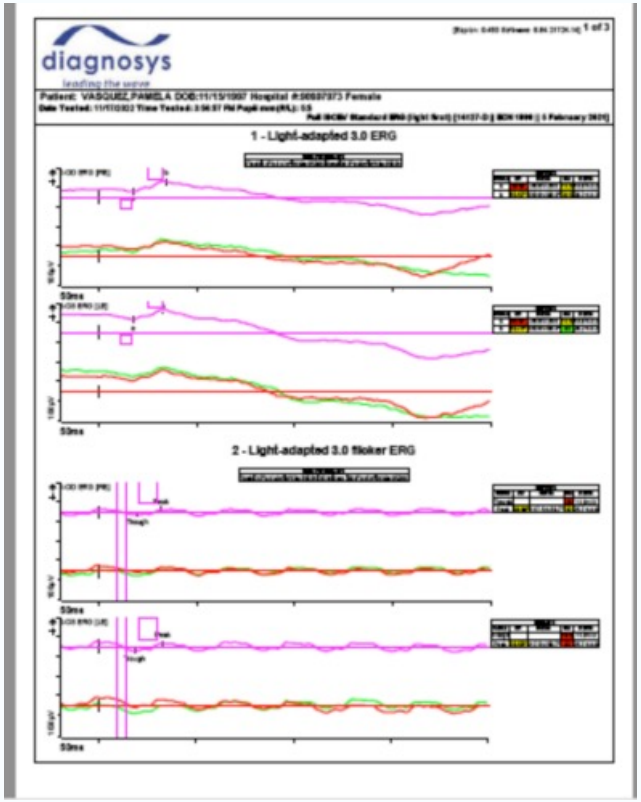
FAF - 2009



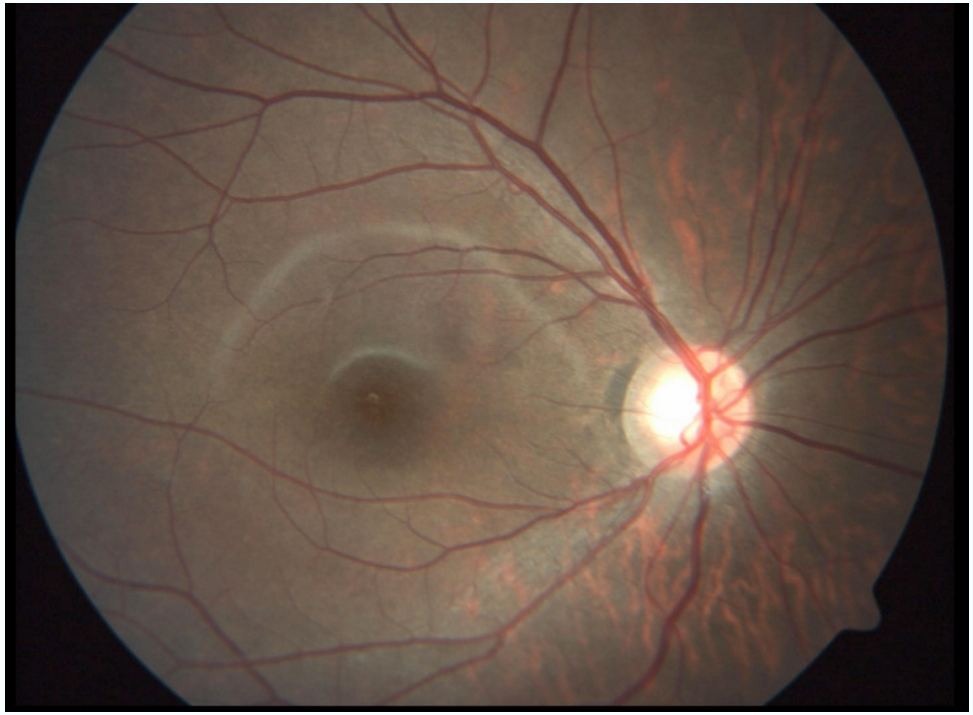


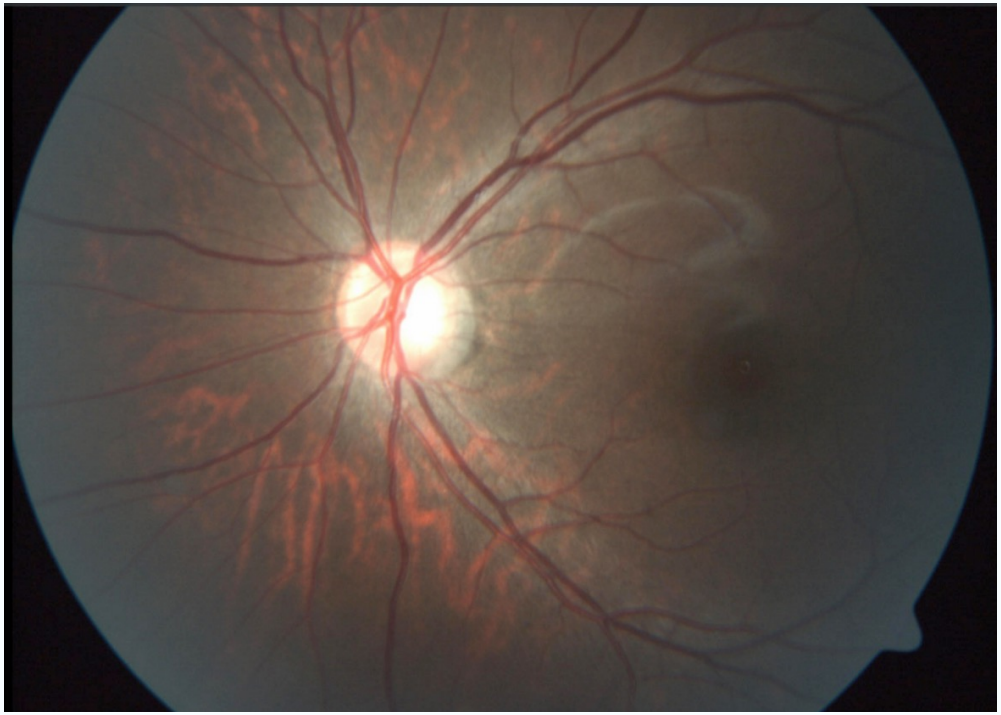
Electrodiagnostic Testing – Full Field ERG

- Revealed reduced cone responses
- Likely diagnosis: Cone Dystrophy

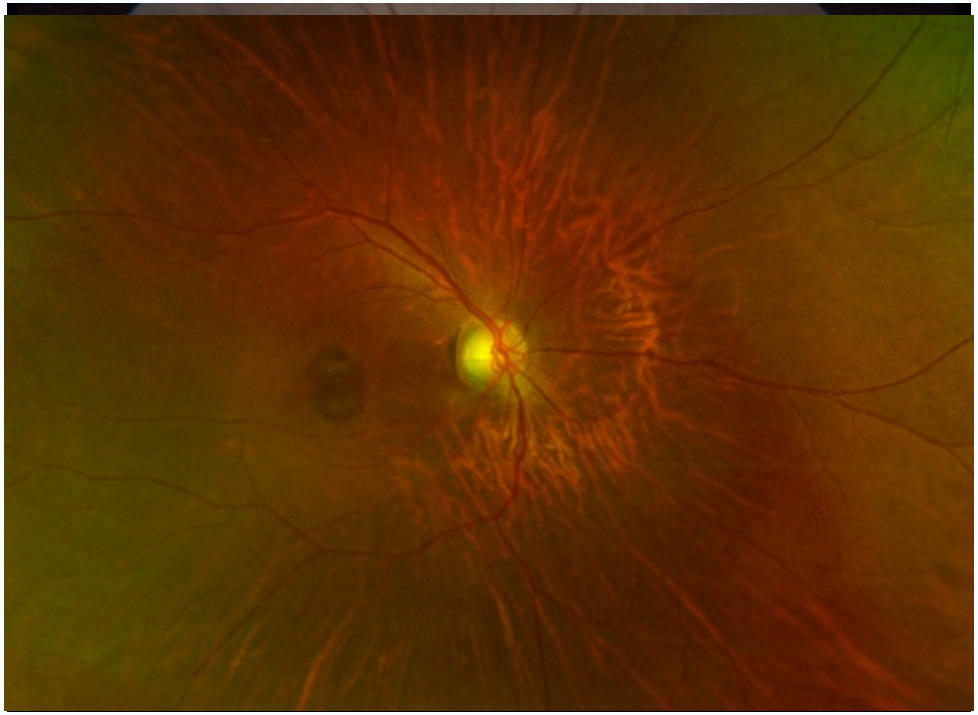


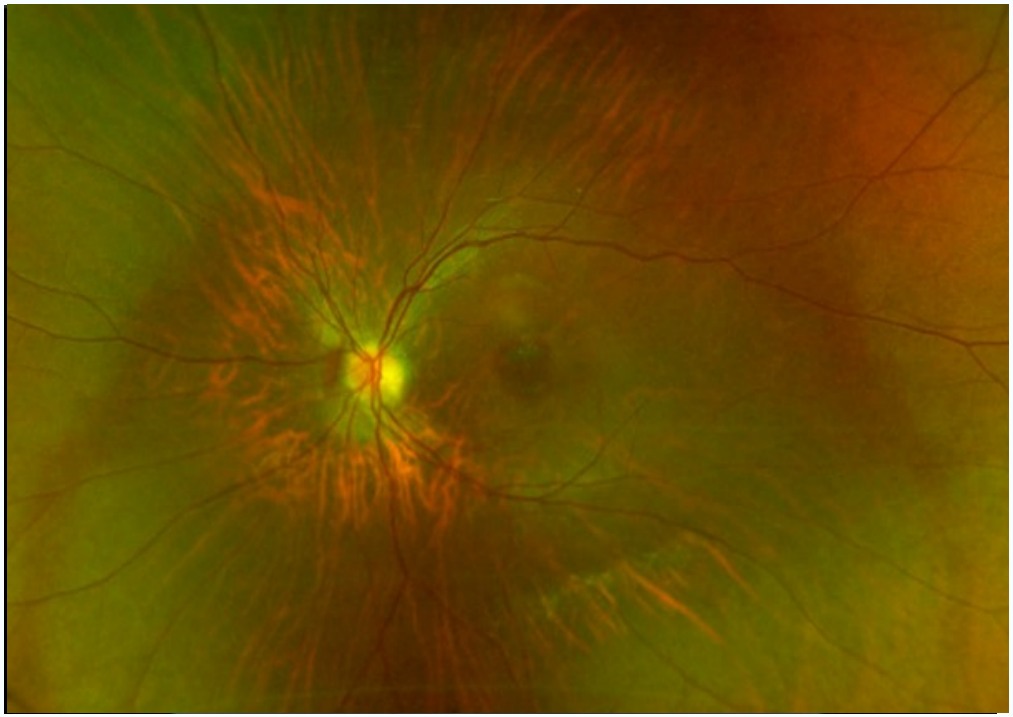
Fundus Photo - 2009



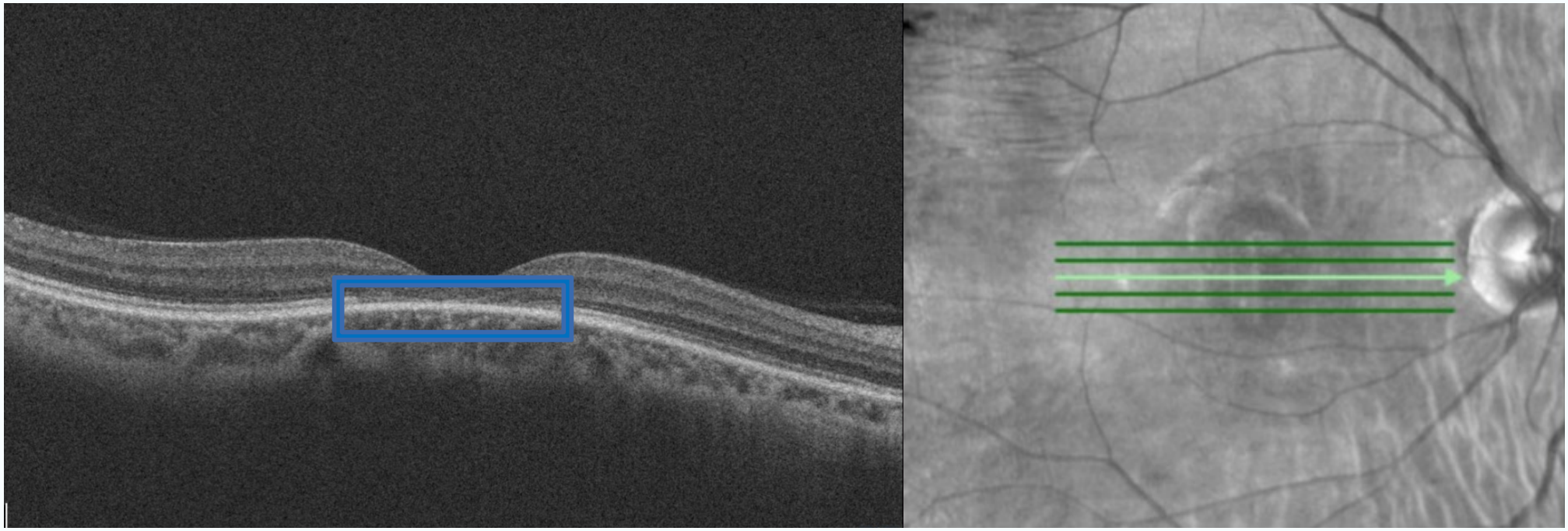


Fundus Photo - 2023

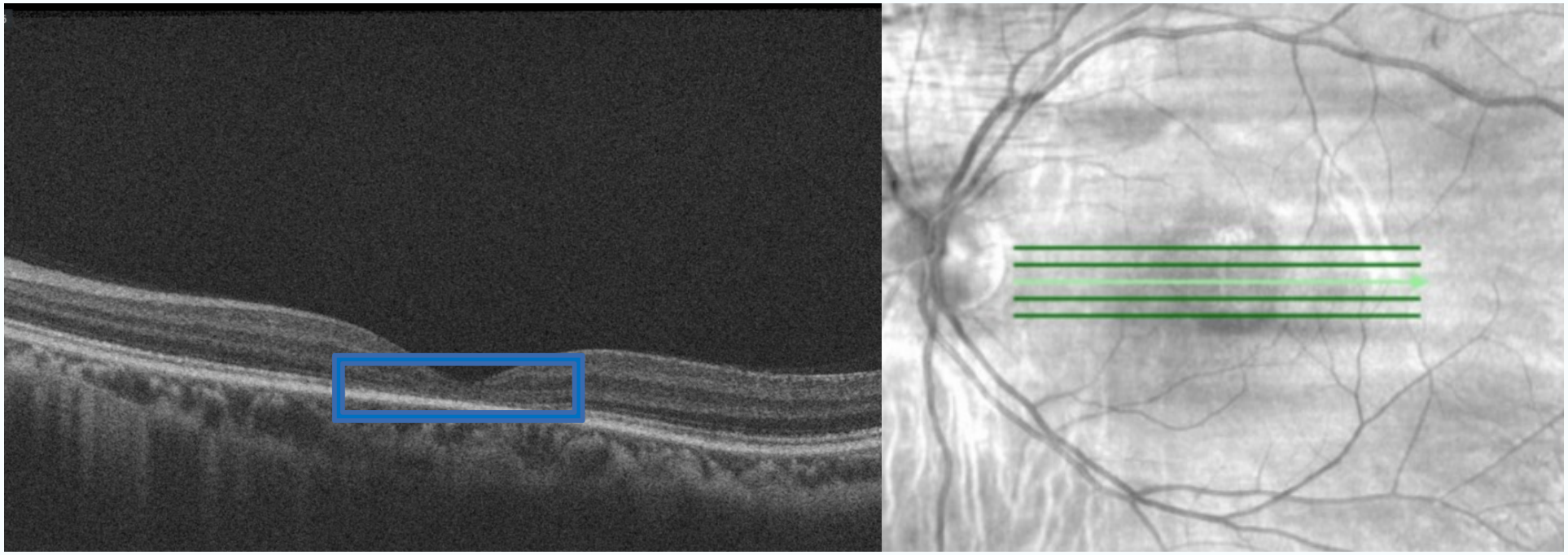




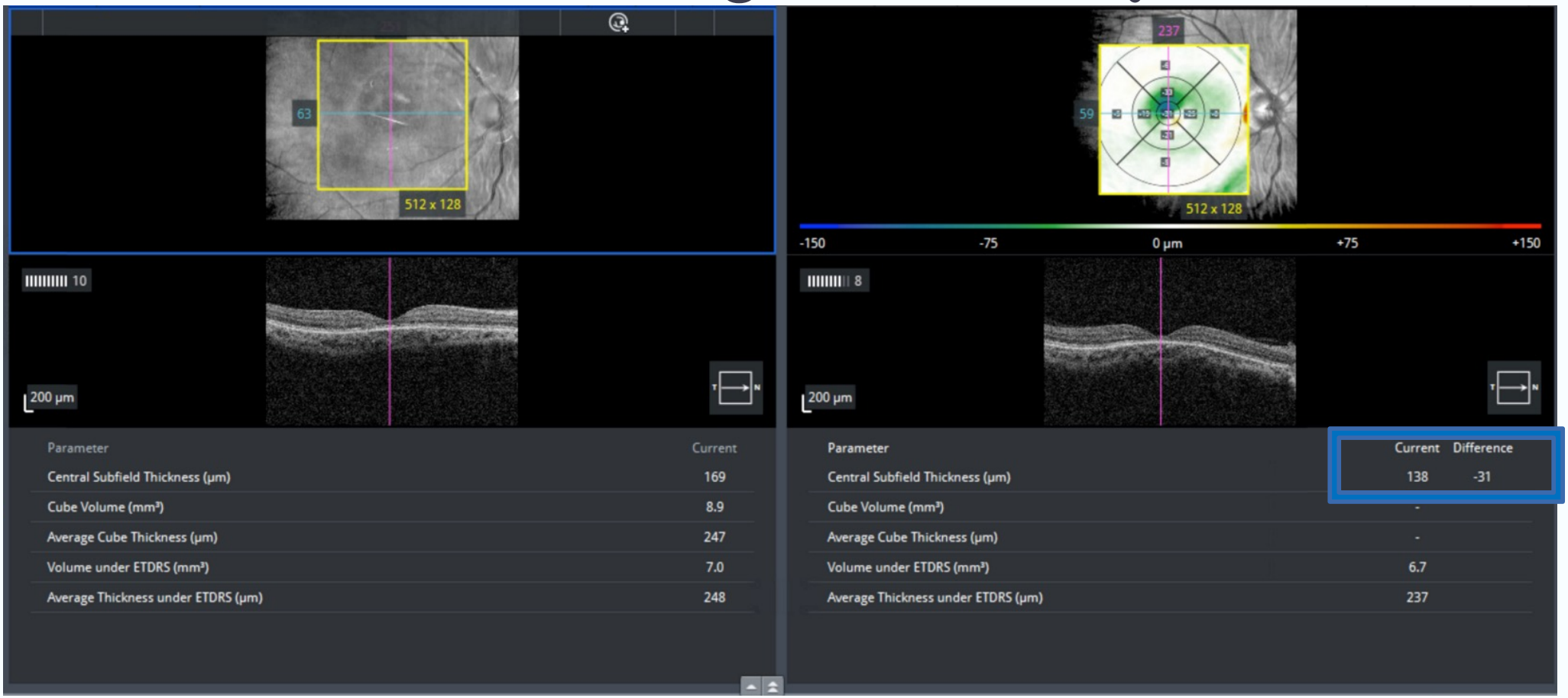
Macular OCT – 2023 - OD



Macular OCT – 2023 - OD



Macular OCT – Progression Analysis - OD



Parameter	Current
Central Subfield Thickness (µm)	169
Cube Volume (mm³)	8.9
Average Cube Thickness (µm)	247
Volume under ETDRS (mm³)	7.0
Average Thickness under ETDRS (µm)	248

Parameter	Current	Difference
Central Subfield Thickness (µm)	138	-31
Cube Volume (mm³)	-	
Average Cube Thickness (µm)	-	
Volume under ETDRS (mm³)	6.7	
Average Thickness under ETDRS (µm)	237	

Macular OCT – Progression Analysis - OS

Parameter	Current
Central Subfield Thickness (µm)	155
Cube Volume (mm³)	8.6
Average Cube Thickness (µm)	239
Volume under ETDRS (mm³)	7.0
Average Thickness under ETDRS (µm)	247

Parameter	Current	Difference
Central Subfield Thickness (µm)	135	-20
Cube Volume (mm³)	-	
Average Cube Thickness (µm)	-	
Volume under ETDRS (mm³)	6.7	
Average Thickness under ETDRS (µm)	236	

Genetic Testing - 2023

RESULT: POSITIVE

Two Pathogenic variants and one Variant of Uncertain Significance identified in KCNV2. KCNV2 is associated with autosomal recessive retinal cone dystrophy.

Additional Variant(s) of Uncertain Significance identified.

GENE	VARIANT	ZYGOSITY	VARIANT CLASSIFICATION
KCNV2	c.531T>A (p.Cys177*)	heterozygous	PATHOGENIC
KCNV2	c.778A>T (p.Lys260*)	heterozygous	PATHOGENIC
KCNV2	c.420C>A (p.Asp140Glu)	heterozygous	Uncertain Significance
CHM	c.1217G>A (p.Cys406Tyr)	heterozygous	Uncertain Significance

About this test

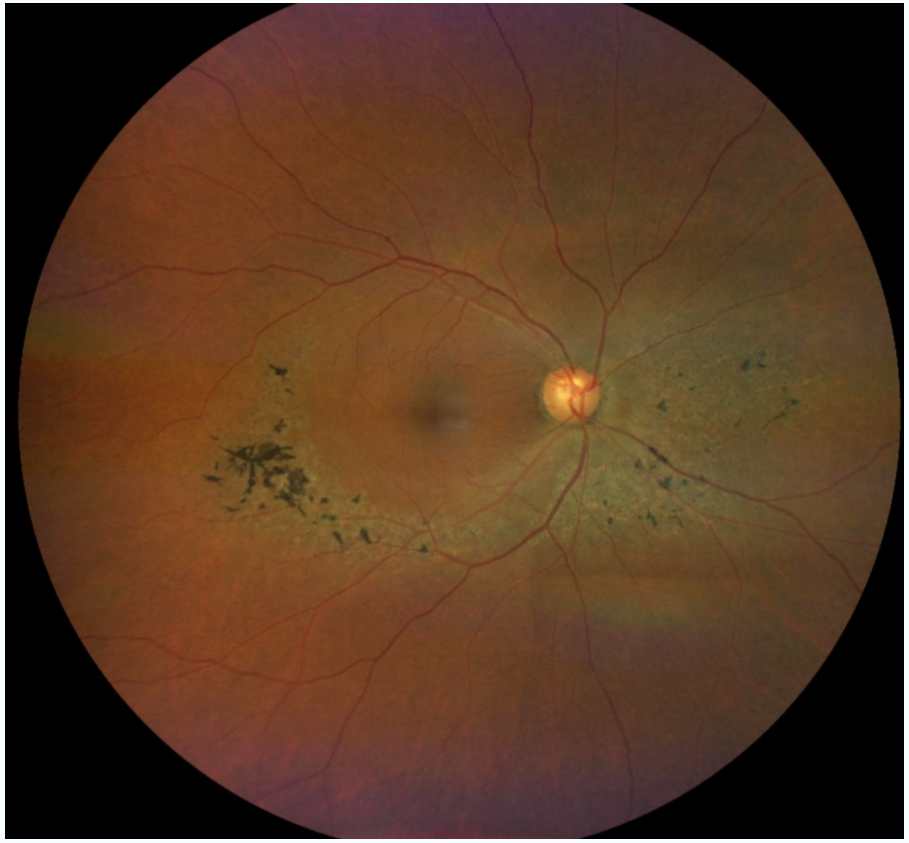
This diagnostic test evaluates 330 gene(s) for variants (genetic changes) that are associated with genetic disorders. Diagnostic genetic testing, when combined with family history and other medical results, may provide information to clarify individual risk, support a clinical diagnosis, and assist with the development of a personalized treatment and management strategy.

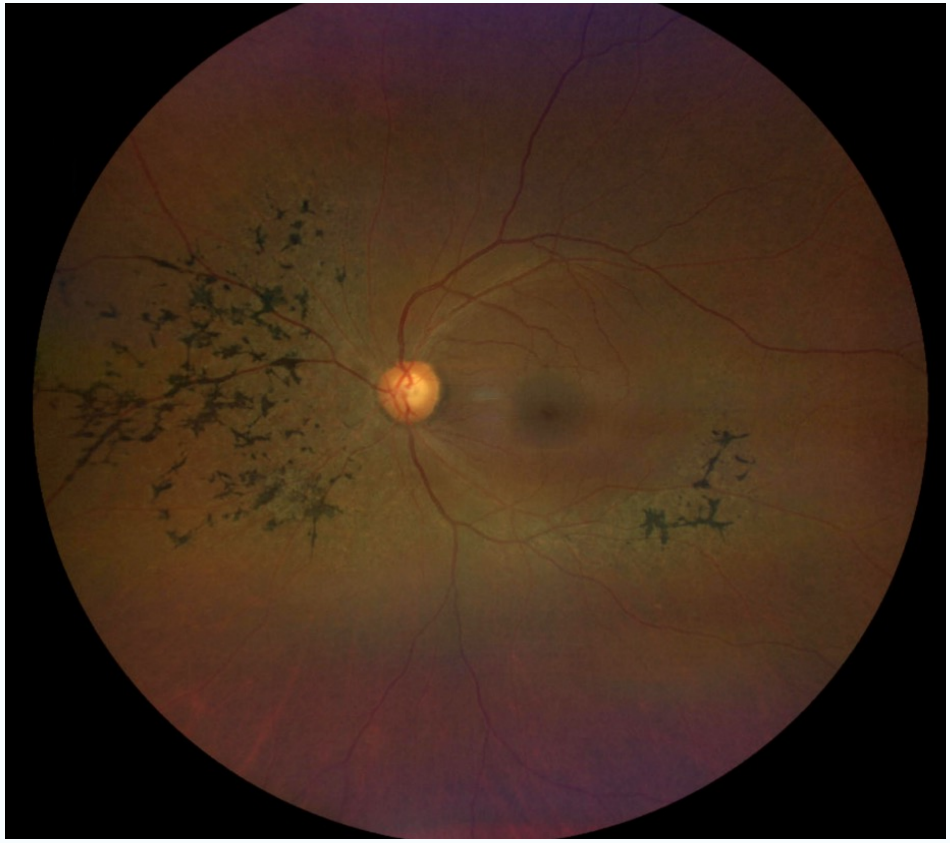
Sample Case

53 YO Black F

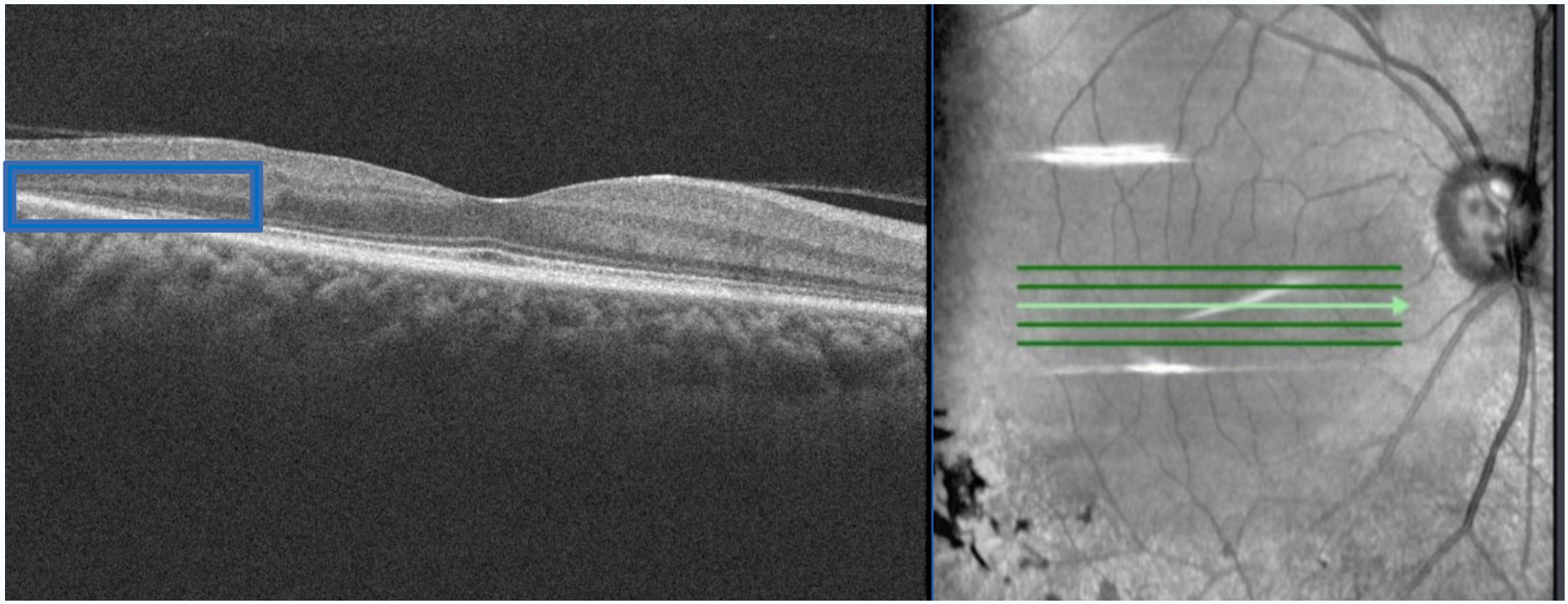
- First examined at the UEC in 2022
- No visual complaints. Referred by a provider due to retinal findings
- Pohx: unremarkable
- PMHx: unremarkable
- BCVA: 20/20, 20/20

Fundus Photos

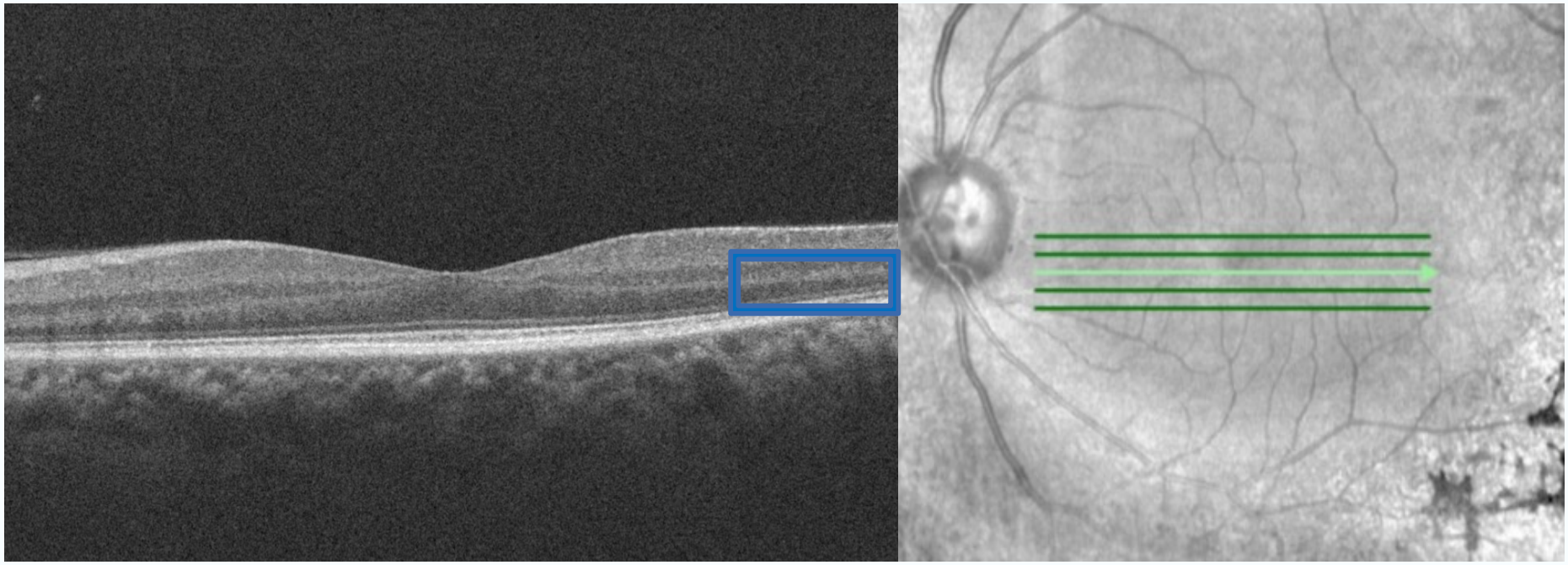




Macular OCT - OD

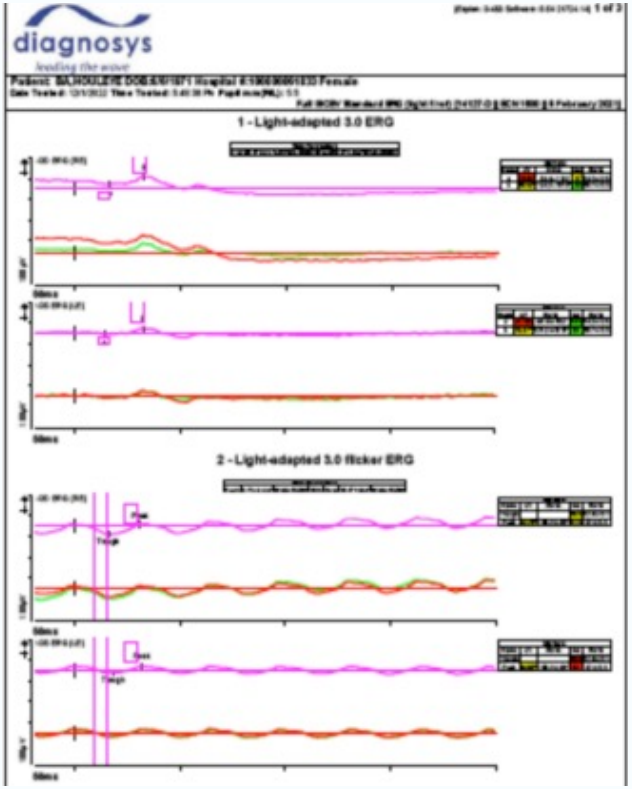


Macular OCT - OS



Electrodiagnostic Testing – Full Field ERG

- Revealed photopic responses reduced more than scotopic responses
- Possible diagnosis: Sectoral RP or Serpingenous Chorioretinopathy



Genetic Testing - 2023

RESULT: UNCERTAIN

Variant(s) of Uncertain Significance identified.

GENE	VARIANT	ZYGOSITY	VARIANT CLASSIFICATION
ADGRA3	c.3814G>A (p.Val1272Ile)	heterozygous	Uncertain Significance
DHX32	c.1344C>G (p.Asn448Lys)	heterozygous	Uncertain Significance
RP1	c.1180A>T (p.Met394Leu)	heterozygous	Uncertain Significance
RP2	c.697G>A (p.Asp233Asn)	heterozygous	Uncertain Significance
SAG	c.209G>A (p.Arg70His)	heterozygous	Uncertain Significance

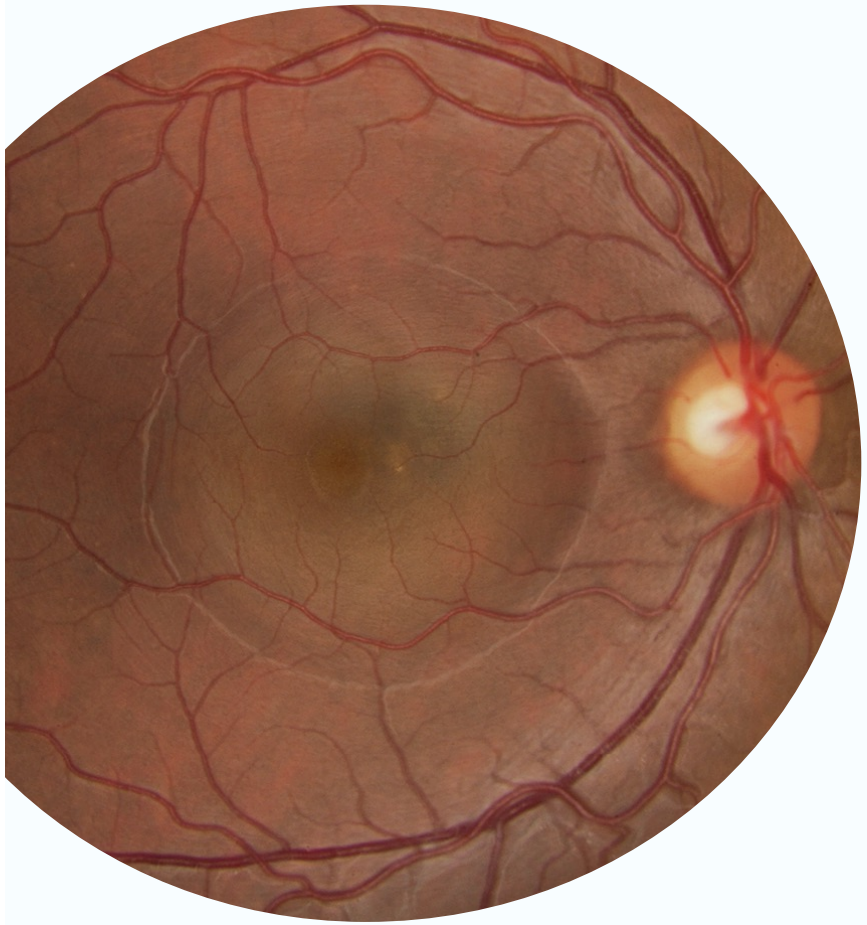
About this test

This diagnostic test evaluates 330 gene(s) for variants (genetic changes) that are associated with genetic disorders. Diagnostic genetic testing, when combined with family history and other medical results, may provide information to clarify individual risk, support a clinical diagnosis, and assist with the development of a personalized treatment and management strategy.

Treatment & Management

Treatment & Management

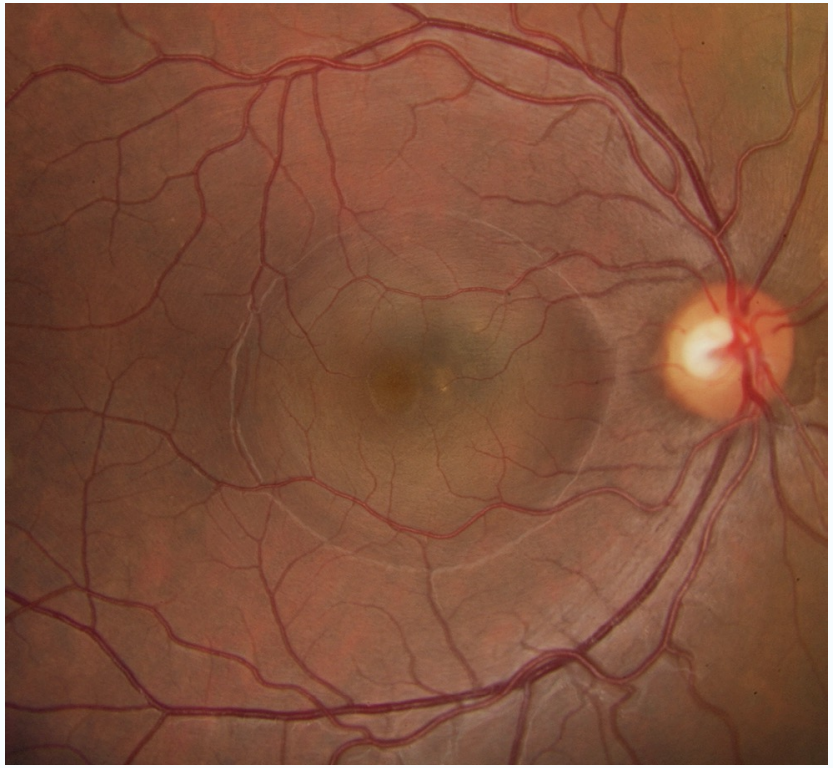
- Observation
- Referrals
  - Low vision
  - Social work
  - Mobility training
- Luxturna
  - Gene therapy medication that is FDA approved for treatment of Leber's congenital amaurosis



04

Central Serous Chorioretinopathy

Description

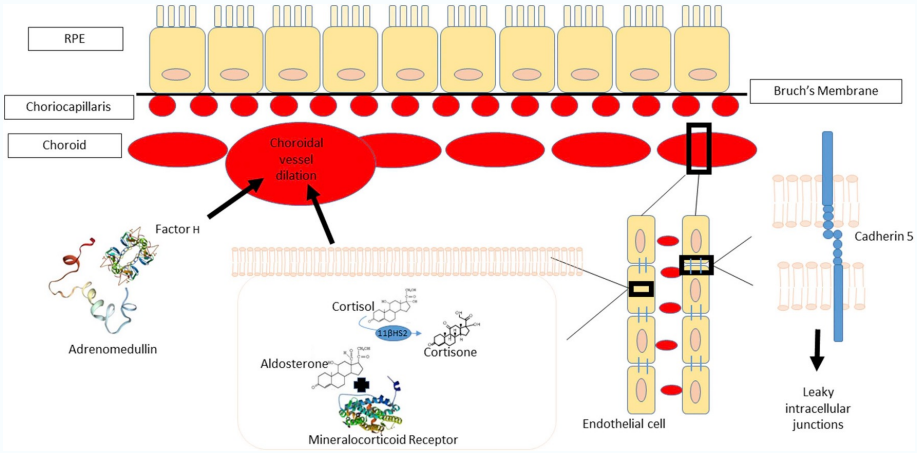


- An acquired macular condition characterized by a neuroretinal detachment due to the presence of subretinal fluid
- Part of the pachychoroid disease spectrum

Primary pathophysiology:

- Unclear and disputed in the literature

Potential Pathophysiology



- Due to choroidal vascular hyperpermeability with or without pigment epithelial leaks or detachments
- Dysfunction of RPE ion pumping in which the movement of fluid is reversed
- Activation of a mineralocorticoid receptor in choroidal endothelial cells which promotes choroidal vascular dilation

Kaye, R., Chandra, S., Sheth, J., Boon, C., Sivaprasad, S., & Lotery, A. (2020). Central serous chorioretinopathy: An update on risk factors, pathophysiology and imaging modalities. *Progress in retinal and eye research*, *79*, 100865

CSC – Classification

Acute CSC (aCSC)

- Acute-onset, dome-shaped serous detachment of the neuroretina
- Complete resolution 3-6 months
- Good visual prognosis

Risks for prolonged duration

- Subfoveal choroidal thickness >500 um
- PED height > 50 um
- Patients >= 40 years
- Photoreceptor atrophy + granular debris in subretinal fluid (SRF) on OCT

Wang, et al., 2005. Clinical characteristics of subretinal deposits in central serous chorioretinopathy. Acta Ophthalmol. Scand. 83, 691–696.

CSC – Classification

Chronic CSC (cCSC)

- Serous detachment of the retina with either small or more extensive area of serous detachment of RPE
- Atrophic changes to the outer retinal and retinal pigment epithelium(RPE)
- Persistent serous detachment(s) for longer than 4-6 months

** very few chronic CSC patients have a history of acute CSC**

Wang, et al., 2005. Clinical characteristics of subretinal deposits in central serous chorioretinopathy. Acta Ophthalmol. Scand. 83, 691–696.

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Editorial

Multimodal Imaging-Based Central Serous Chorioretinopathy Classification

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On behalf of the Central Serous Chorioretinopathy International Group

Central serous chorioretinopathy (CSCR) is a common disorder encountered by retinal specialists. Eyes with CSCR demonstrate focal detachments of the neurosensory retina, retinal pigment epithelium (RPE), or both occurring over areas of thickened and dysfunctional choroid in one or both eyes.[1,2] Commonly, CSCR is classified as either acute or chronic based on the duration of serous retinal detachment (SRD); eyes with SRD persisting for more than 3 to 6 months are described as having chronic CSCR. This duration is based on prior observations that most new or reproducibility would inform current clinical decisions regarding CSCR management, would aid in our understanding of CSCR pathophysiologic features, and would enhance prospective studies of CSCR treatments.

Multimodal imaging including fluorescein angiography, indocyanine angiography, fundus autofluorescence, and OCT play an important role in CSCR diagnosis and classification. Fluorescein angiography identifies focal leaks through RPE defects, serous RPE detachment (pigment epithelial detachment), and other RPE alter-

Chhablani et. al. Multimodal Imaging-Based Central Serous Chorioretinopathy Classification, Ophthalmology Retina, Volume 4, Issue 11, 2020, Pages 1043-1046

CSC – Classification

Major criteria (patient must have both for diagnosis)

1. Presence or evidence of prior sub retinal detachment (SRD) documented on OCT involved the posterior pole unrelated to another disease process

2. At least 1 area of RPE alteration on fundus autofluorescence, spectral domain OCT or infrared imaging

Chhablani et. al. Multimodal Imaging-Based Central Serous Chorioretinopathy Classification, Ophthalmology Retina, Volume 4, Issue 11, 2020, Pages 1043-1046

CSC – Classification

Minor criteria (patient must at least 1)

1. Mid-phase hyperfluorescent placoid areas on indocyanine angiography (ICG)
2. 1 or more focal leaks on fluorescein angiography
3. Subfoveal choroidal thickness of 400 um or more

Chhablani et. al. Multimodal Imaging-Based Central Serous Chorioretinopathy Classification, Ophthalmology Retina, Volume 4, Issue 11, 2020, Pages 1043-1046

CSC - Risk factors

- Male gender
  - Men are 2.7-8x more likely to develop CSC compared to women
- Hyperopia
- Corticosteroid Use
  - Includes intranasal, inhalation, extra-ocular application
- Type A Personality

Haimovici, R., Koh, S., Gagnon, D.R., Lehrfeld, T., Wellik, S., 2004. Risk factors for central serous chorioretinopathy: a case-control study. Ophthalmology 111, 244–249.

CSC - Psychosocial Associations

- Intense, sustained drive to achieve self motivated goals
- Desire for recognition
- Impulsiveness
- Stressful life event
- Shift work
- Poor sleep quality
- Disturbances in circadian rhythm
- Higher anxiety

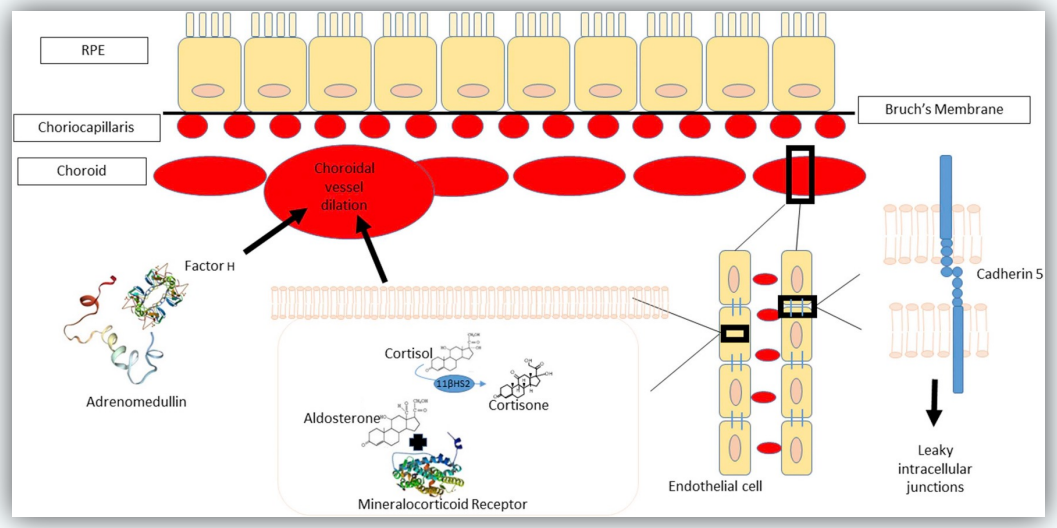
van Rijssen et.al. (2019). Central serous chorioretinopathy: Towards an evidence-based treatment guideline. *Progress in retinal and eye research*, *73*, 100770

CSC - Risk Factors – under review

- Pregnancy
- Hypoxia and obstructive sleep apnea
- Helicobacter pylori (H.pylori)
- Cardiovascular disease (i.e. hypertension)
- Endocrinological abnormalities (i.e. Cushings Syndrome)

Haimovici, R., Koh, S., Gagnon, D.R., Lehrfeld, T., Wellik, S., 2004. Risk factors for central serous chorioretinopathy: a case-control study. Ophthalmology 111, 244–249.

CSC – Risk Factors - Genetics

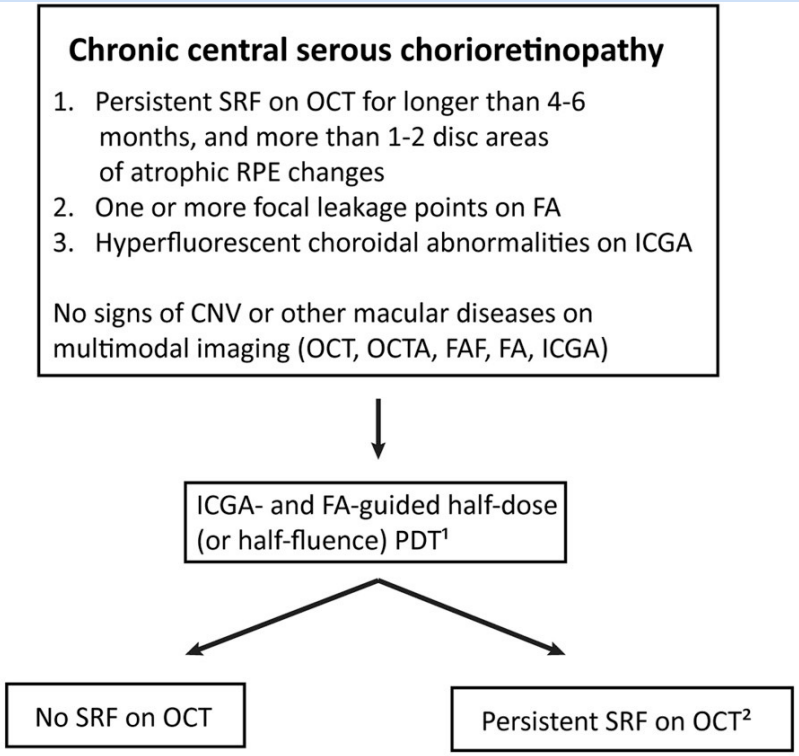


- Complement factor H (CFH)
  - This binds to adrenomedullin which has a vasodilatory effect and could contribute to choroidal vasodilation

- Cadherin-5 (CDH5)
  - An important protein in endothelial cells for cohesion and organization of intercellular junctions

Haimovici, R., Koh, S., Gagnon, D.R., Lehrfeld, T., Wellik, S., 2004. Risk factors for central serous chorioretinopathy: a case-control study. Ophthalmology 111, 244–249.

Treatment & Management Flowchart



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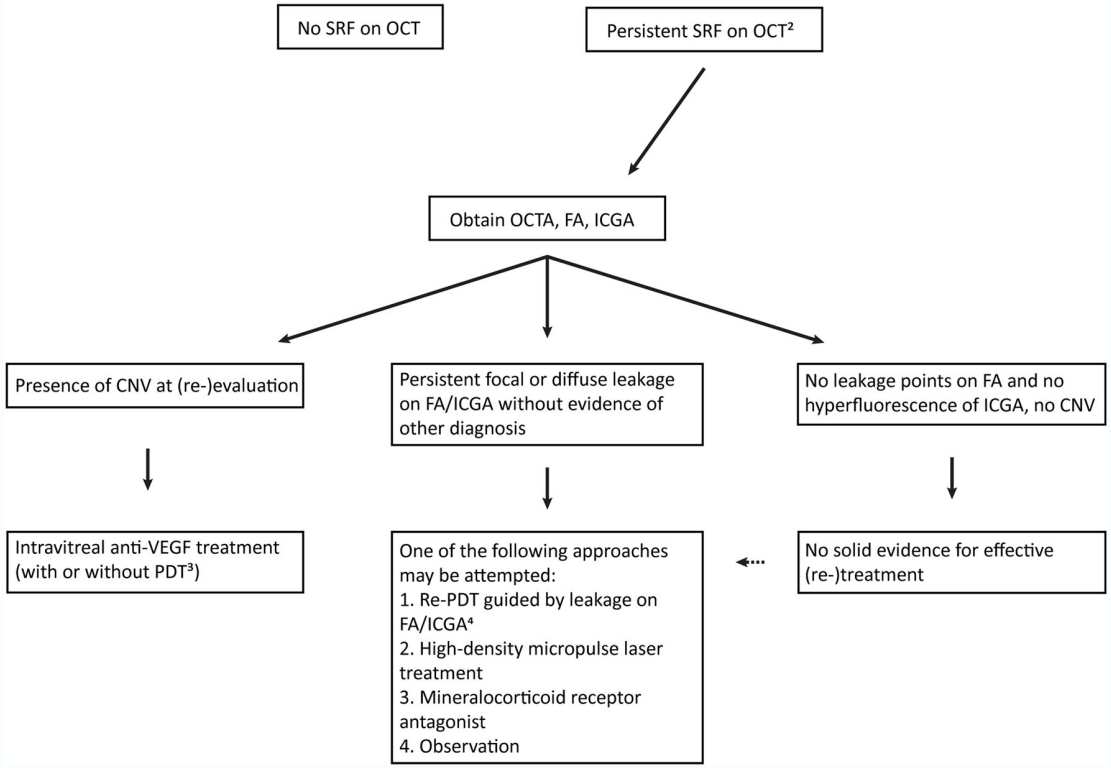
Treatment & Management Flowchart



van Rijssen et.al. (2019). Central serous chorioretinopathy: Towards an evidence-based treatment guideline. *Progress in retinal and eye research*, *73*, 100770

Case #1

46 YO M

- CC: Eye irritation and discomfort in the right eye for the last 5 days
  - Worse in the morning
  - (+)burning, itching, redness, tearing
  - (-)pain/light sensitivity
  - History of tx with antibiotic ointment

Hx	
Ocular	None
Medical	Sleep apnea
Medications / Allergies	Neomycin-polymyxin B ophthalmic ointment NKDA

Case #1 – Examination

Pertinent Findings	
BCVA	OD: 20/50 PH: 20/25 OS: 20/20-1
Confrontations	PERRL (-)APD CVF: full to red light EOMS: FULL
Anterior Segment (pertinent)	Cornea: - OD: epithelial defect with microcystic edema, map-dot changes - OS: map-dot changes
IOP (iCare	- OD: 12mmHg - OS: 15mmHg

Case #1

Assessment & Plan

- Corneal erosion OD
  - Apply bandage contact lens to right eye
  - RTC in 1 day for follow up
- Epithelial basement membrane dystrophy (EBMD) OU
  - Will start ocular lubricants as maintenance when acute event is resolved
- Follow up 1-3
  - Bandage CL removed
  - START preservative free artificial tears qid OU
  - START Muro 128 oph ung tid OD
  - Follow up for refraction and dilated fundus exam

Case #1

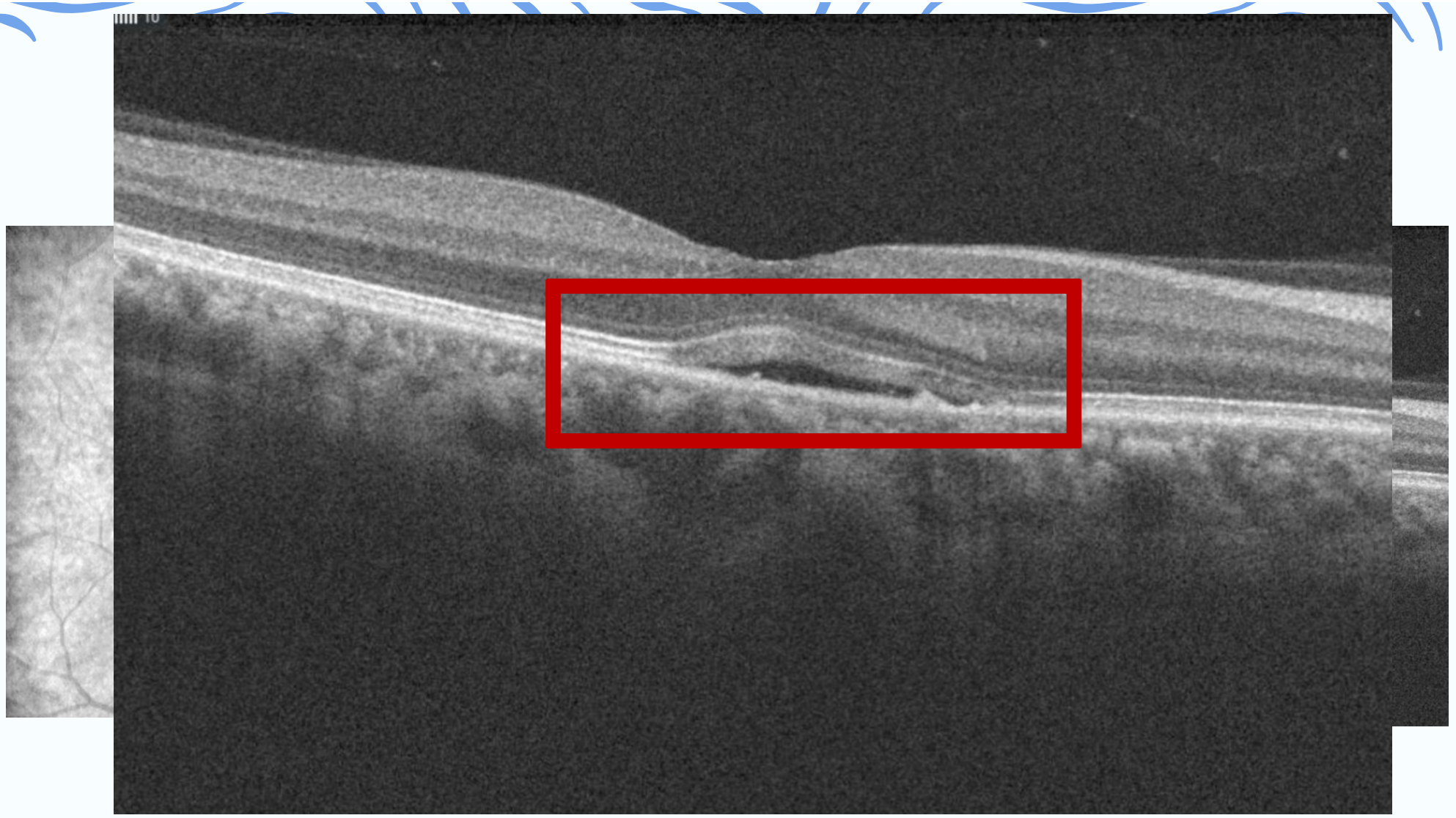
46 YO M

- CC: Distance and near vision blur OD/OS – longstanding
  - Pt requests new glasses rx
  - Mild foreign body sensation OD
  - Significant improvement in symptoms
  - Current tx: preservative free artificial tears qid OU, Muro 128 oph ung tid OD

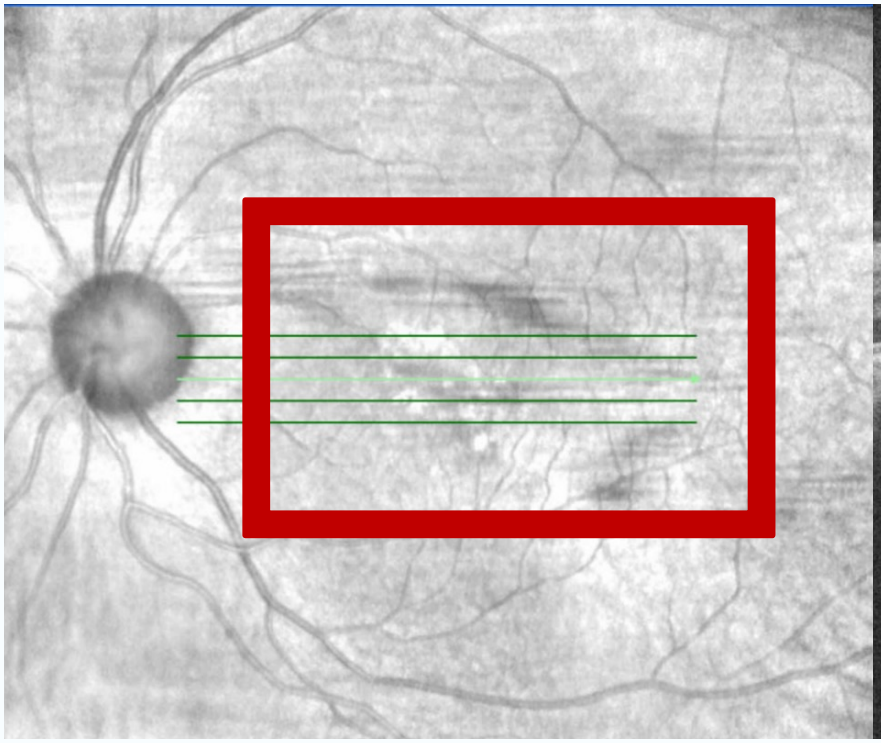
Hx	
Ocular	None
Medical	Sleep apnea
Occupational	Owns a gas station
Medications/ Allergies	Neomycin-polymyxin B ophthalmic ointment NKDA

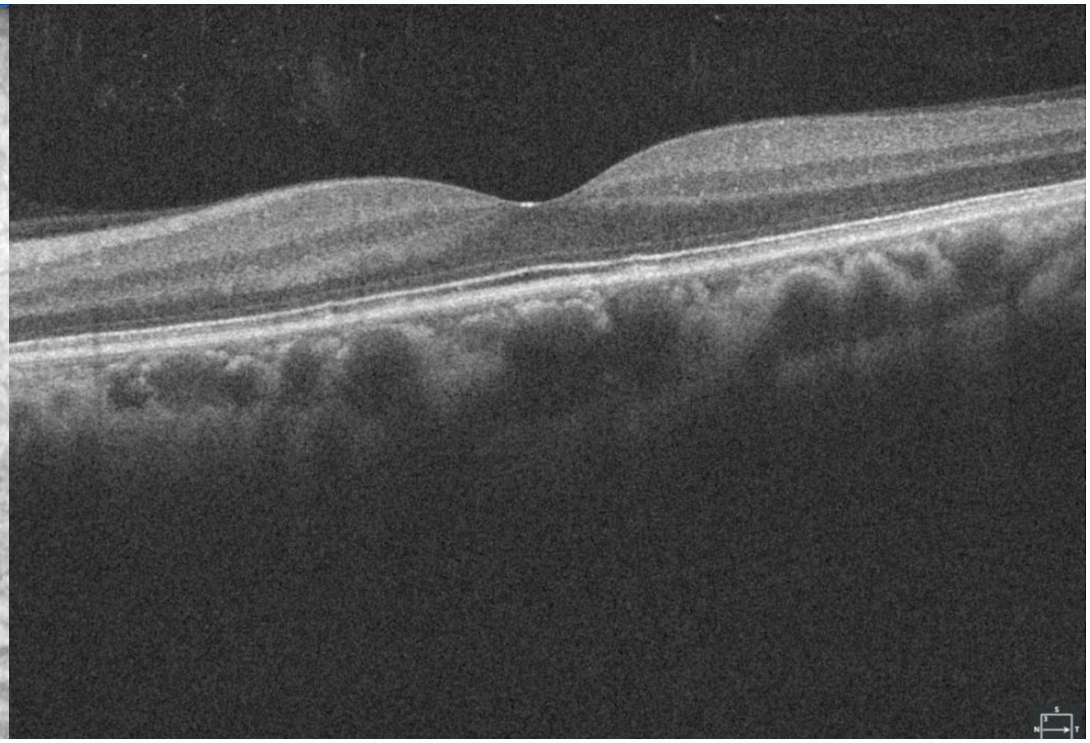
Case #1 – Examination

Pertinent Findings	
BCVA	OD: 20/20 OS: 20/20
Confrontations	PERRL (-)APD CVF: full to red light EOMS: FULL
Anterior Segment (pertinent)	Cornea: - OD: map-dot changes (-)epi defect - OS: map-dot changes
IOP (iCare	- OD: 14mmHg - OS: 12mmHg
Posterior segment (pertinent)	Macula: - OD/OS: central mottled appearance



Macular OCT - OS





Case #1

Assessment & Plan

- Chronic CSC OU with PED OD
  - Dispensed Amsler grid
  - RTC in 102 months for follow up

- EBMD OU
  - Continue present medications

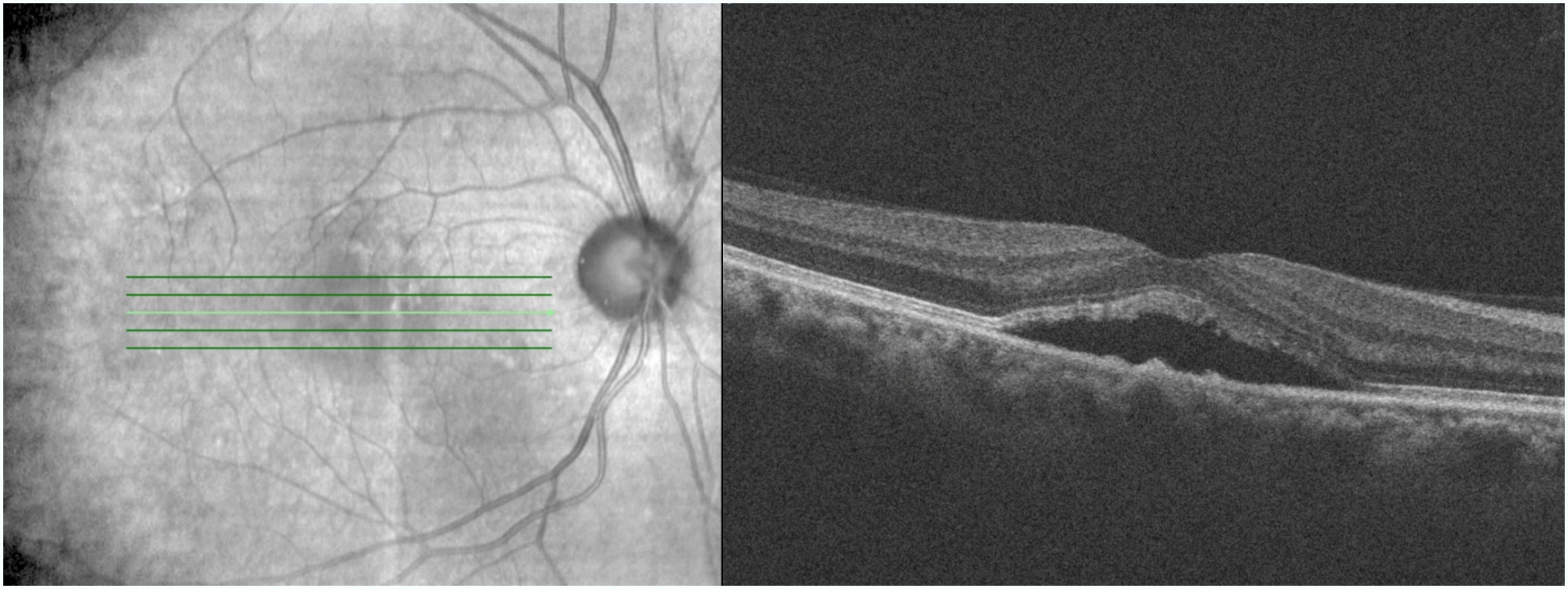
Case #1 – follow up

- CC: Foggy vision OD/OS at all distances
  - Worse in the morning
  - Concerned that ointment is making eyes blurry
  - Mild eye pain that gets better throughout the day
  - (-)burning/itching/tearing
  - Does not report use of Amsler grid
  - Current tx: preservative free artificial tears tid OU, Muro 128 oph ung qhs

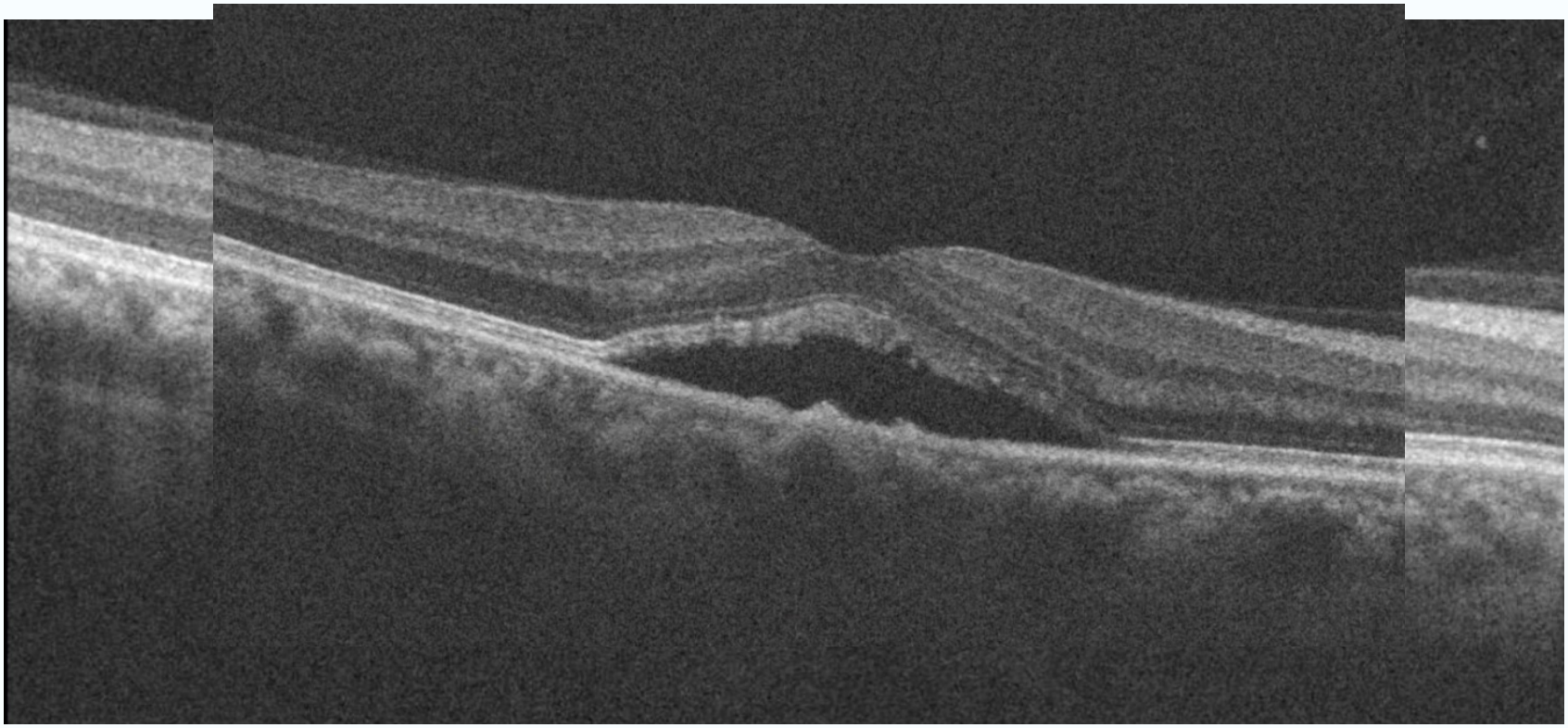
Case #1 – Examination

Pertinent Findings	
BCVA	OD: 20/60 PH: 20/25-1 OS: 20/20
Confrontations	PERRL (-)APD CVF: full to red light EOMS: FULL
Anterior Segment (pertinent)	Cornea: - OD: map-dot changes; mild haze inferior/central (-)epi defect - OS: map-dot changes
IOP (iCare	- OD: 16mmHg - OS: 14mmHg

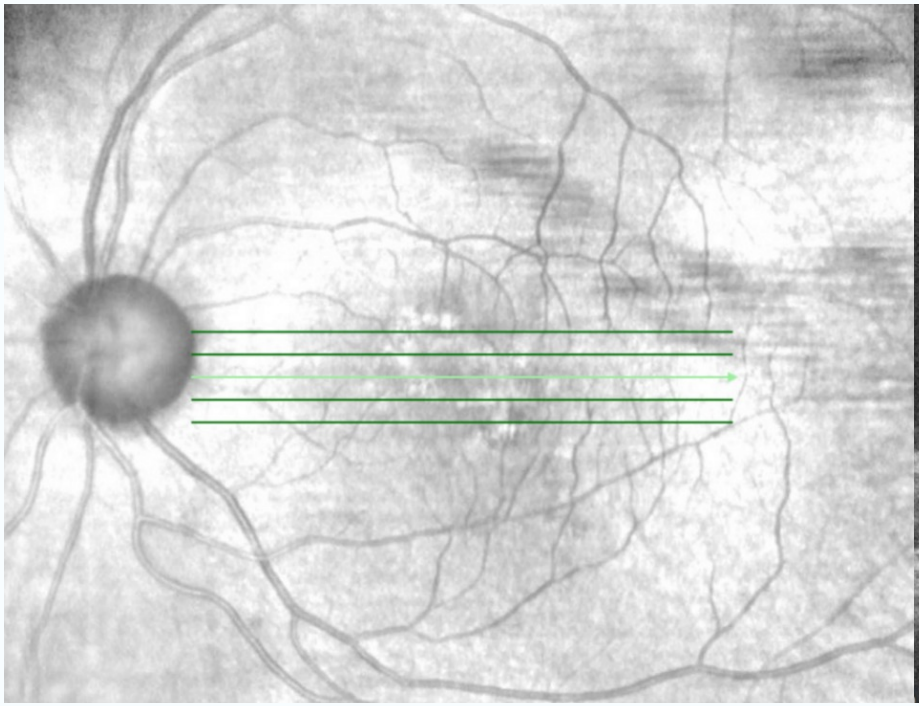
Macular OCT - OD

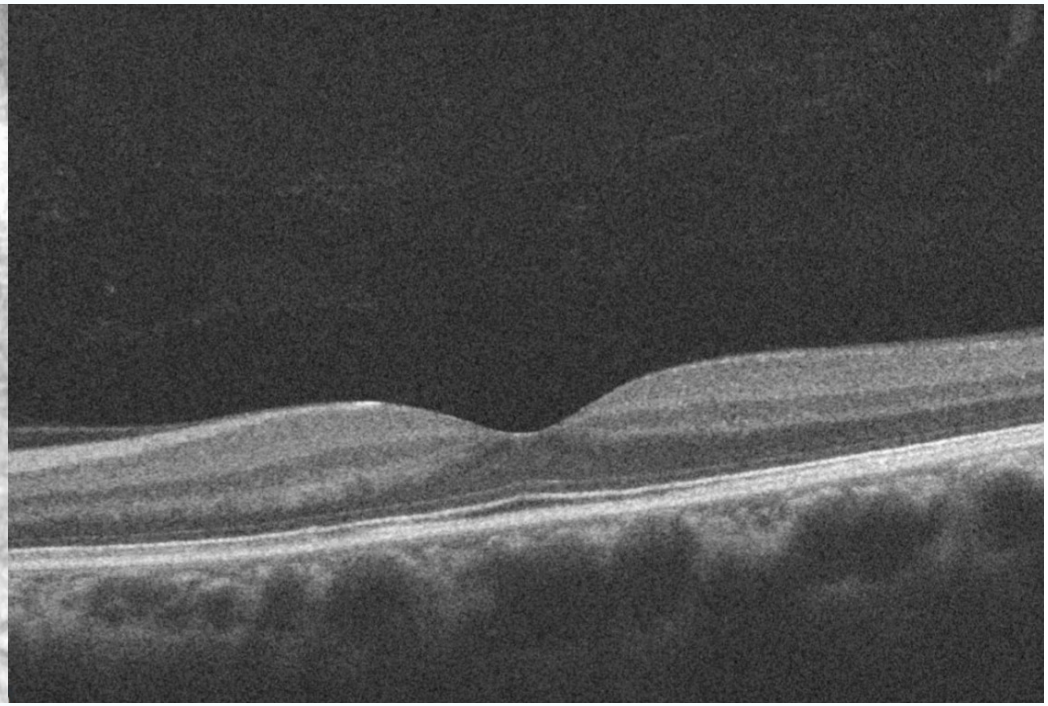


Macular OCT - OD



Macular OCT - OS





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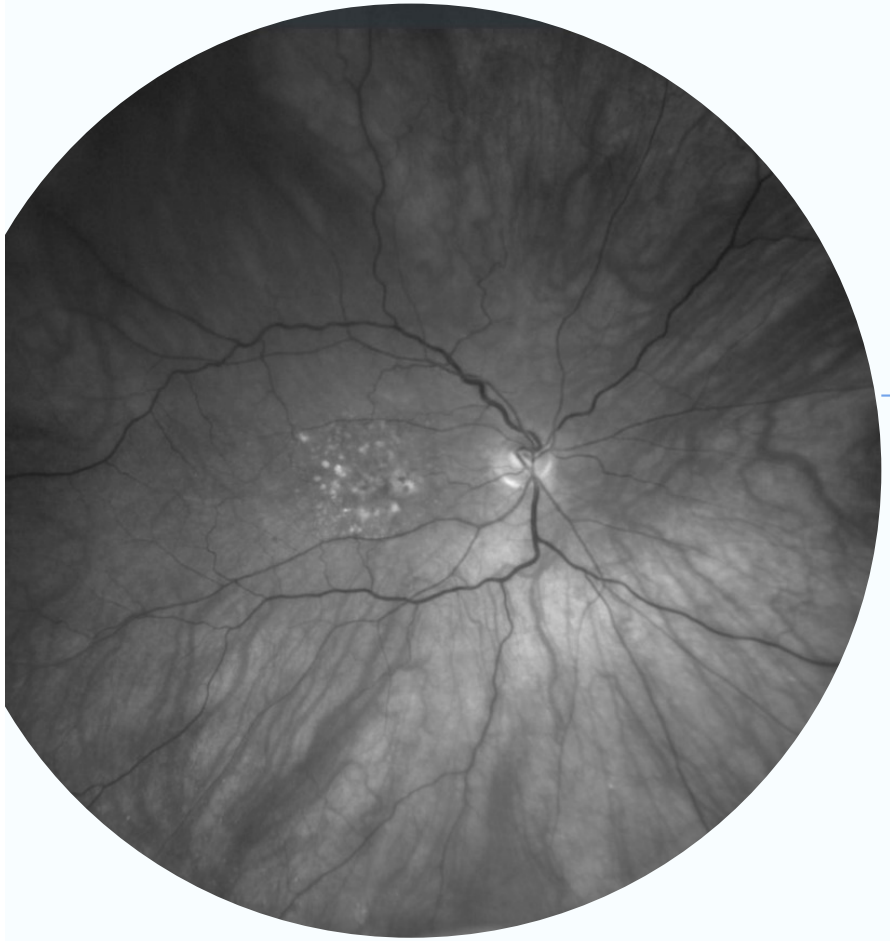
IOP (iCare	- OD: 16mmHg - OS: 14mmHg

Case #1

Assessment & Plan

- Chronic CSC OU with PED OD
  - Increase in subfoveal fluid OD with reduction in vision
  - Pt symptomatic
  - Refer for retinal consult; consider treatment
- Epithelial basement membrane dystrophy (EBMD) OU
  - Continue present medications



05

A Look into the Future

What is the future of retinal disease management?

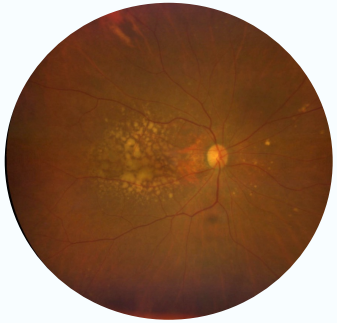
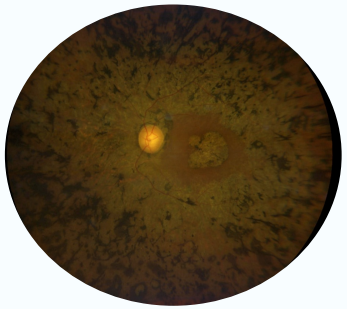
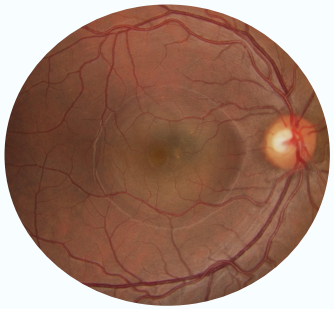
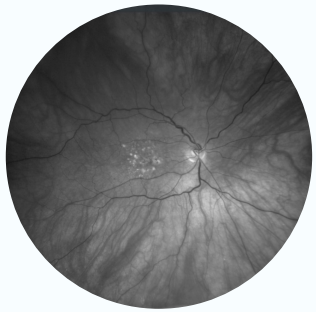
- Retinal imaging to predict systemic disease
- AI and retinal image analysis
- New medication delivery systems for the posterior segment

- Mass Eye and Ear physician-researchers show that retinal imaging can help predict a person's risk of developing ocular, cardiac, pulmonary, metabolic, and neuropsychiatric diseases.
- The team also identified genetic loci associated with retinal thinning, which could help develop personalized treatment plans and future therapies for eye diseases such as glaucoma and macular degeneration.

The retina is said to provide a window into a person's systemic health. In a new study published January 24th in *Science Translational Medicine*, physician-researchers from Mass Eye and Ear, a member of Mass General Brigham, and the Broad Institute of MIT and Harvard combined retinal imaging, genetics and big data to estimate how likely a person is to develop eye and systemic diseases in the future. They found significant associations between the thinning of different retinal layers and increased risk of developing ocular, cardiac, pulmonary, metabolic, and neuropsychiatric diseases and identified genes that are associated with retinal layer thickness.

Final Take-Aways

- New treatments, management and imaging techniques are changing how we diagnose, treat and manage diseases of the retina; examples include
  - Treatment for geographic atrophy
  - Genetic testing for retinal disease
  - New classification systems for pachychoroid disease
- Keeping up with new developments will lead to more timely, accurate and holistic care

Thanks

Do you have any questions?

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