21st Century Retina Care

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21st Century Retina Care

- Online notes
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- Email me
  - rctrevin@uiwtx.edu
- Disclosures
  - None

21st Century Retina Care

- Instrumentation
- Posterior Seg Disease
  - Clinical Features
  - How to Monitor
  - When to Refer

Self Assessment Quiz

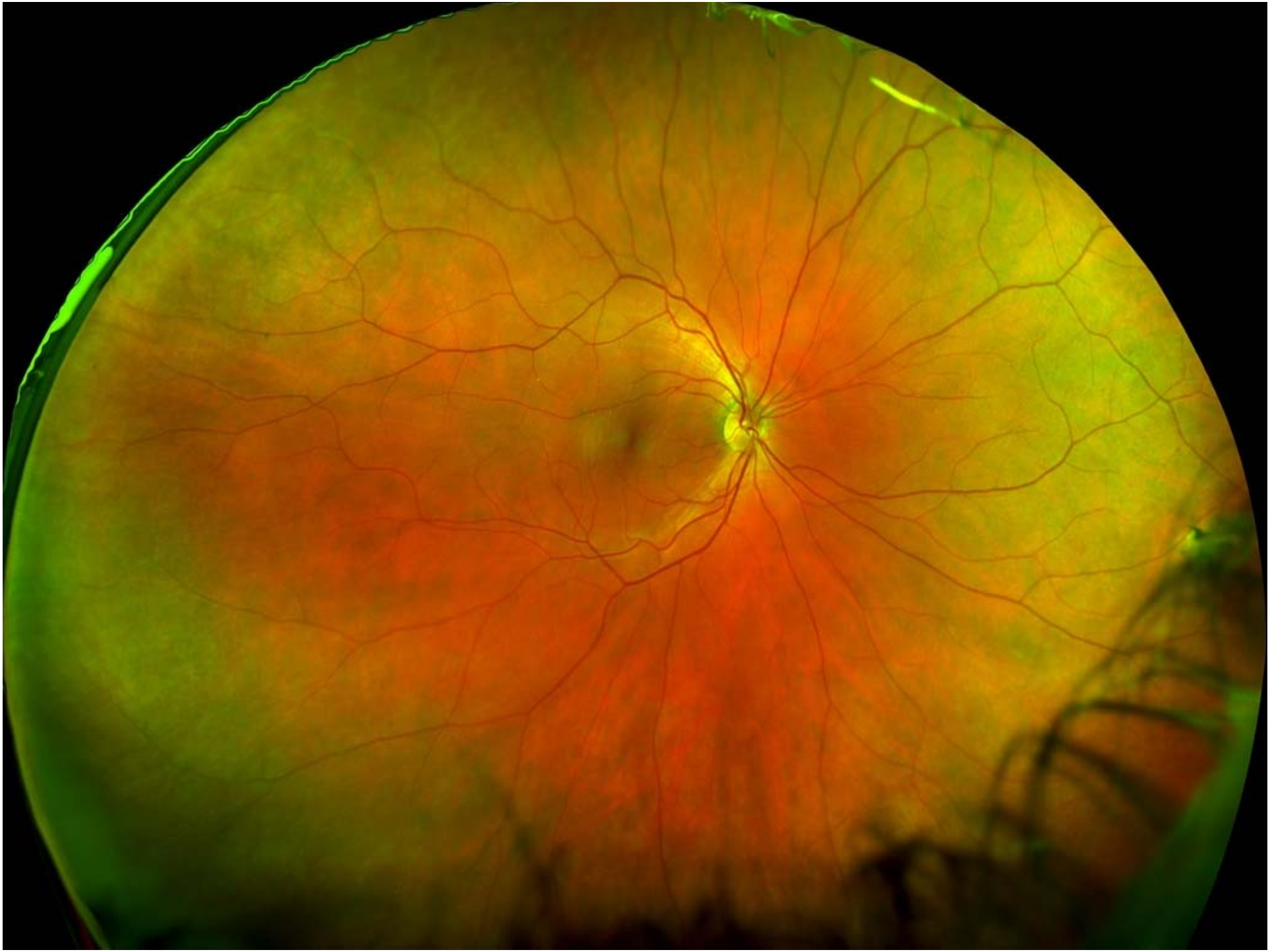
Are you attending this CE course?

- If so, award yourself 1 point
- If not, award yourself 0 points

Instrumentation

- Wide-angle Imaging
  - **Scanning laser ophthalmoscopy**
  - Features
    - 200° field of view (80% of the fundus)
    - Multi-modal imaging: Photography, Autofluorescence, Red-free, FA
  - Examples
    - Optos “Optomap”
    - Heidelberg SPECTRALIS & HRA2
    - Zeiss Clarus

Ultra-Wide Field Photography



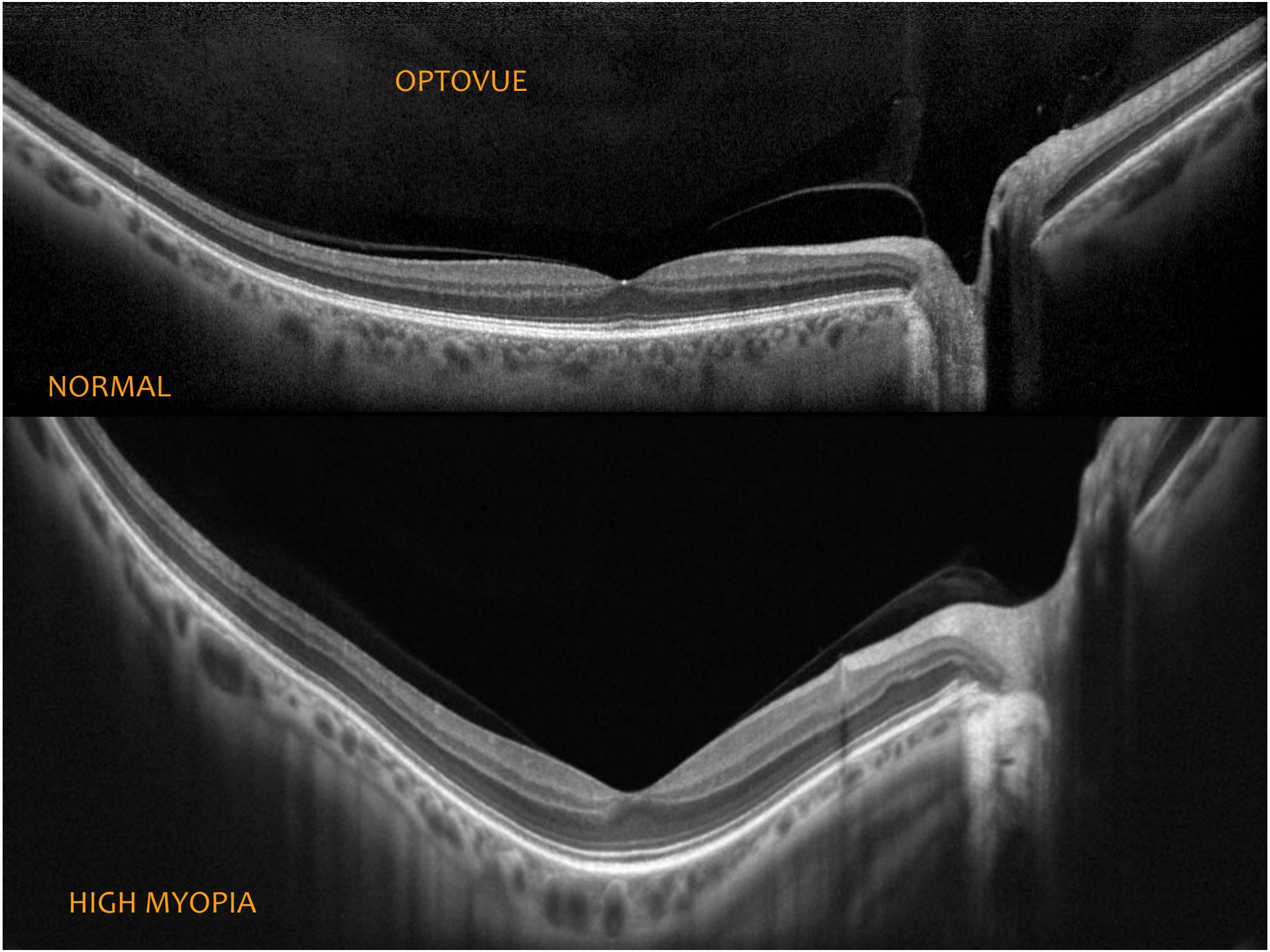
Is UWF imaging a substitute for DFE?

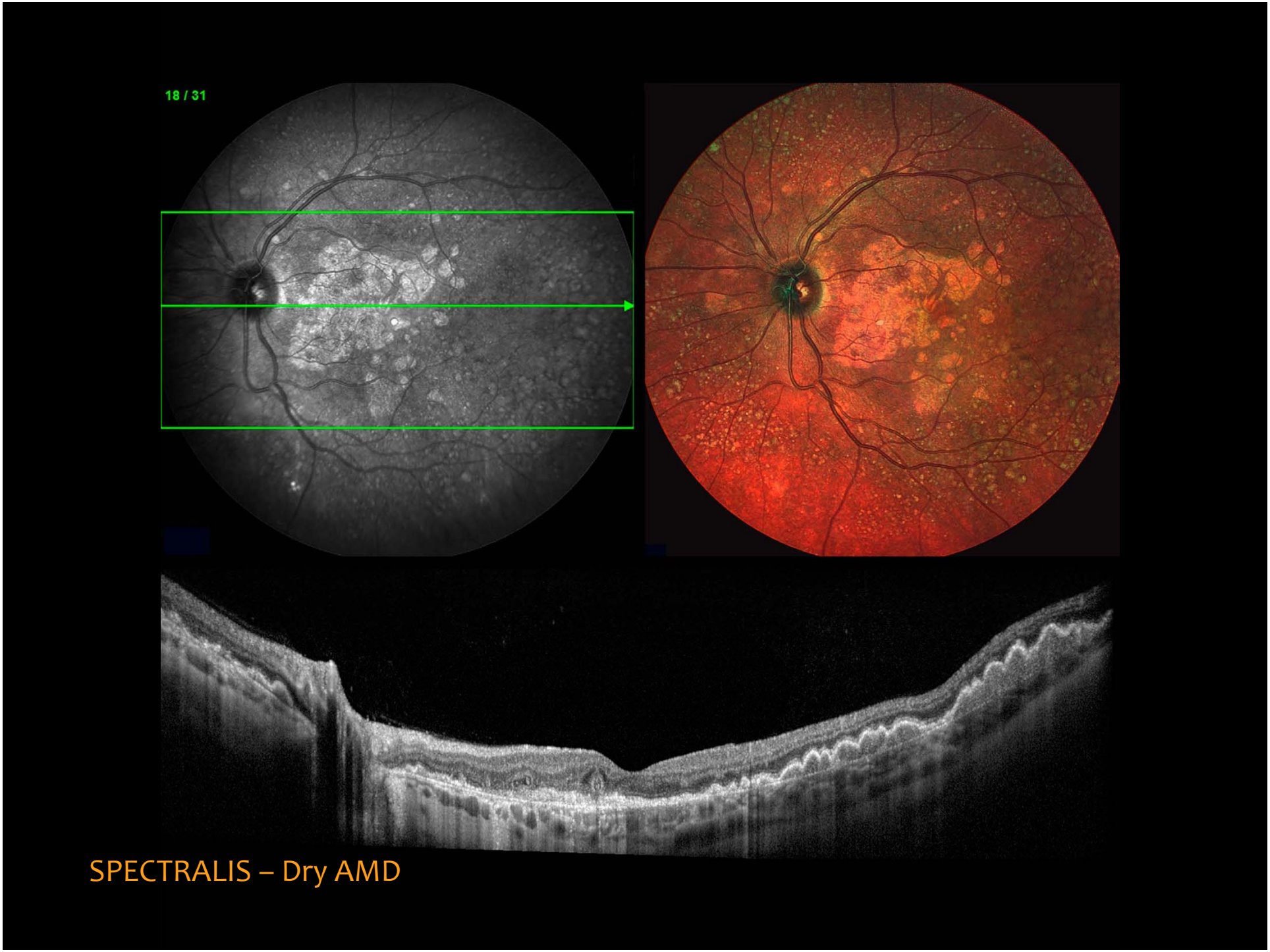
- No. CMS has declared that fundus photography is not a substitute for DFE
- Most insurance (incl Medicare) will not cover photography as a screening procedure
- Diabetic telemedicine studies comparing photos with DFE indicate good agreement, and superiority to undilated DO

NEW!

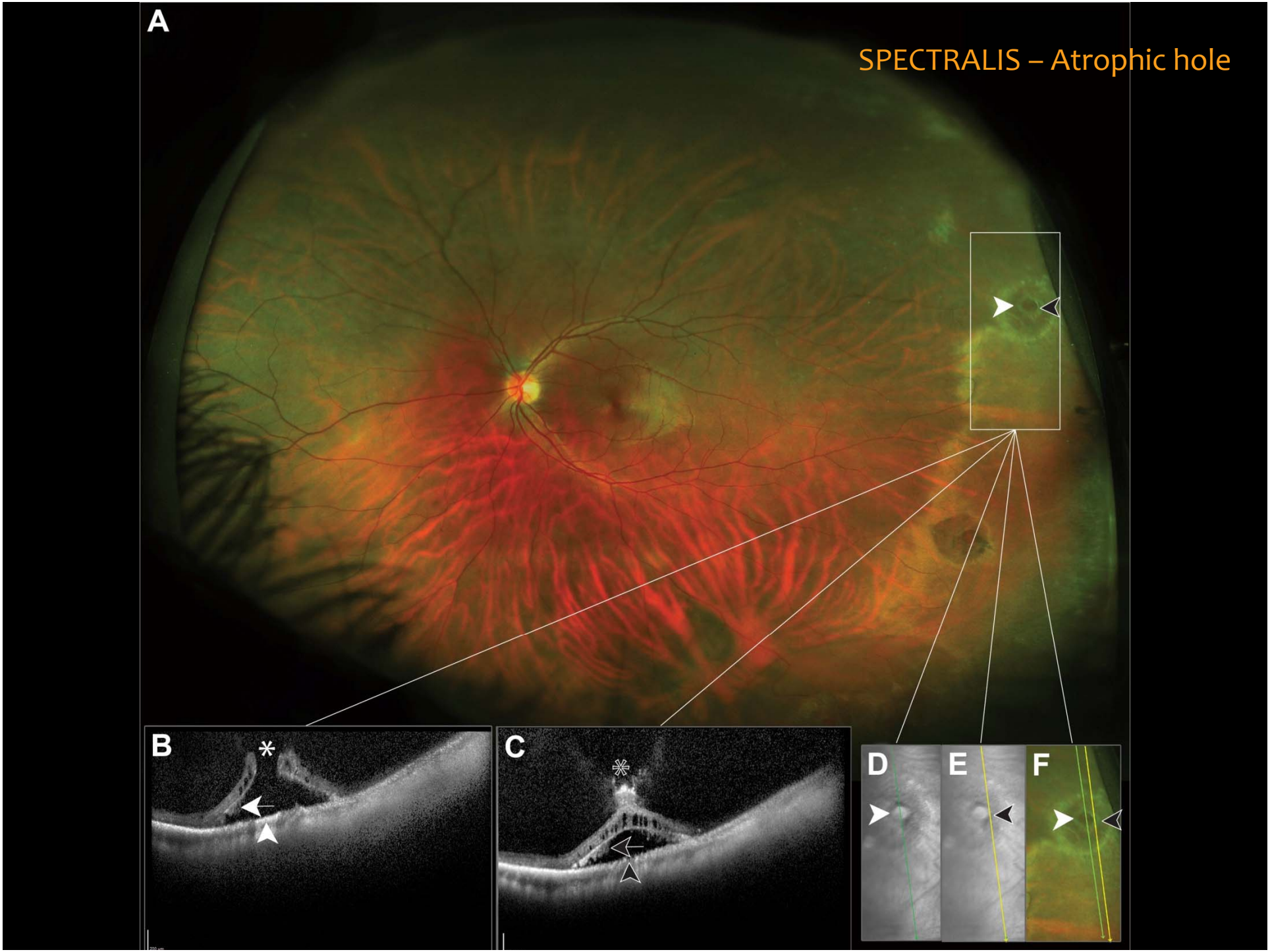
Instrumentation

- **Wide-angle OCT**
  - Features
    - Wide-angle and peripheral SD-OCT imaging
    - High-speed scanning. Similar time as standard scan
    - Image stabilization. High resolution images
  - Examples
    - Optovue Avanti (40°, 12mm)
    - Heidelberg Spectralis (55°)
    - Zeiss Plex Elite (56°)


OPTOVUE
NORMAL
HIGH MYOPIA



SPECTRALIS – Dry AMD

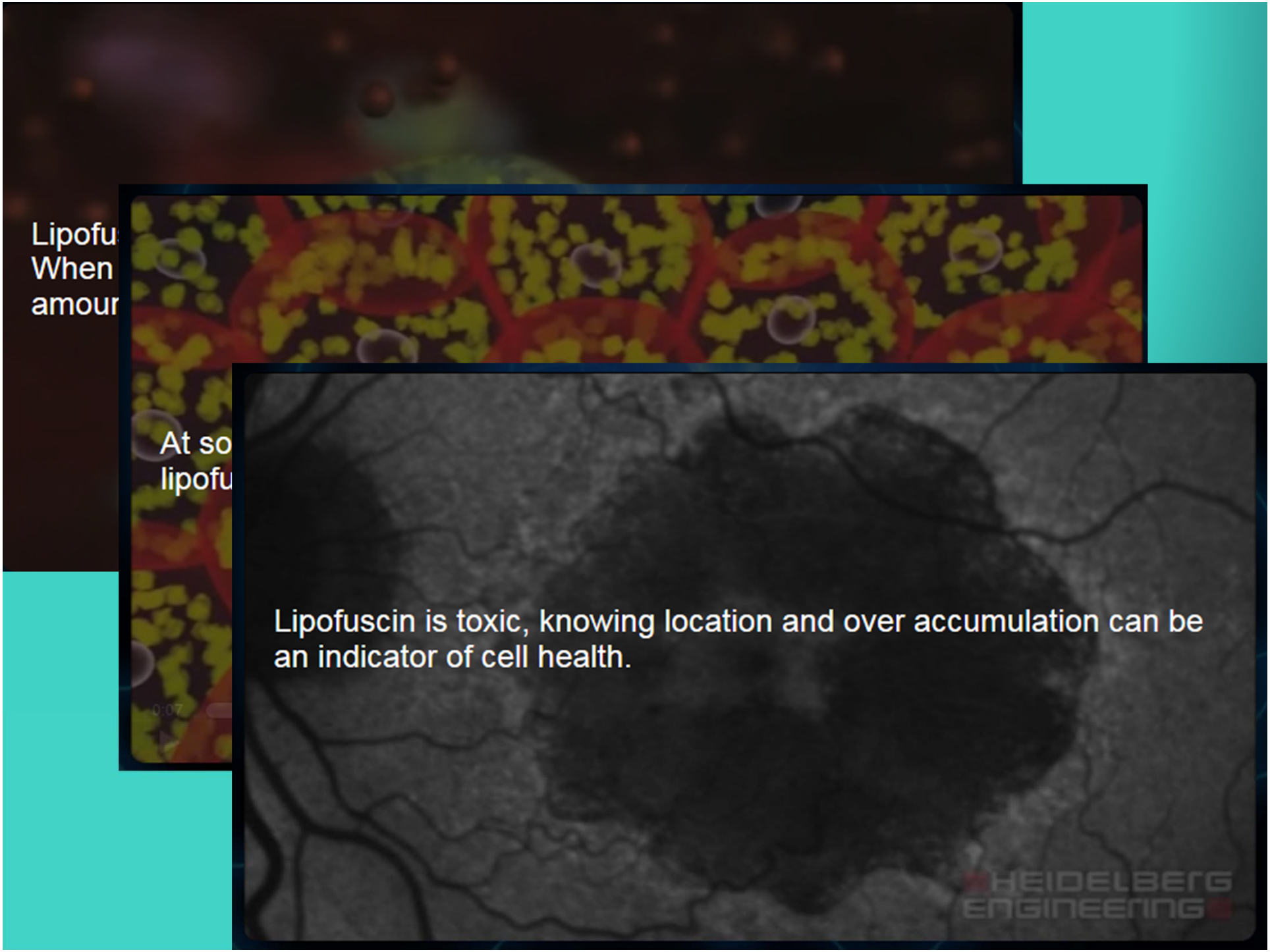

A
SPECTRALIS – Atrophic hole
B
C
D
E
F

Instrumentation

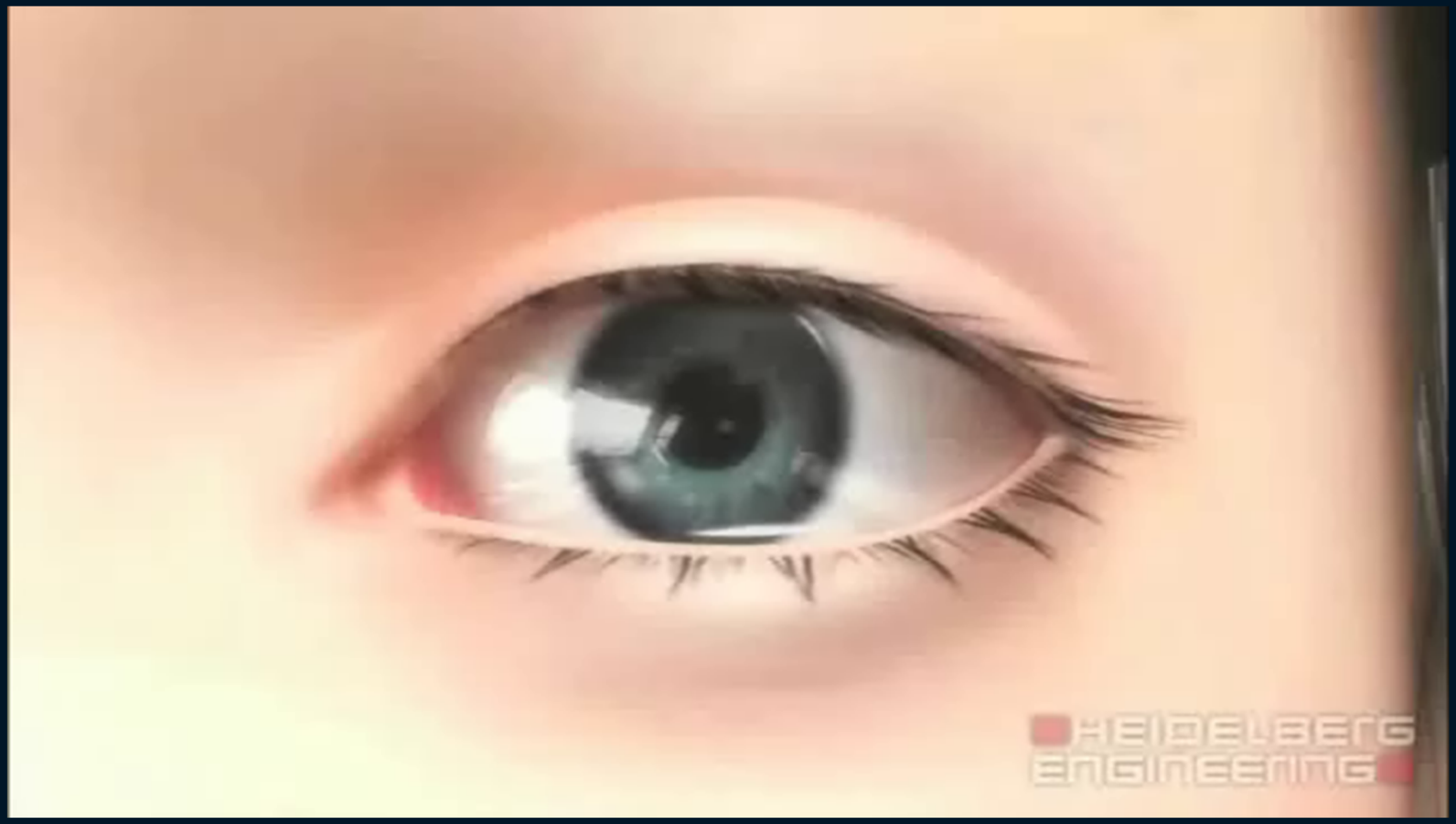
- **Fundus Autofluorescence**
  - Fluorescence of fundus pigments, especially lipofuscin
  - Lipofuscin is a toxin found in the RPE
  - **Hypofluorescence**: Non-functional RPE
  - **Hyperfluorescence**: Excessive lipofuscin

Fundus Autofluorescence

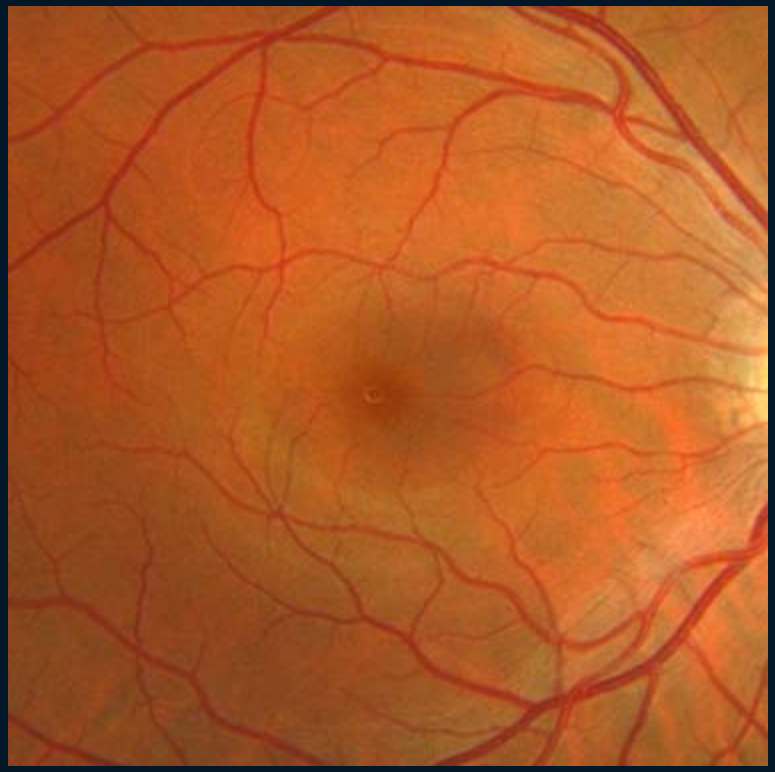
- Retinal dystrophies (RP, Stargart's, etc)
- AMD (especially geographic atrophy)
- Choroidal nevus vs melanoma
- Plaquenil screening
- ONH drusen
- Others (central serous chorioretinopathy, diabetes, MacTel-2, etc)

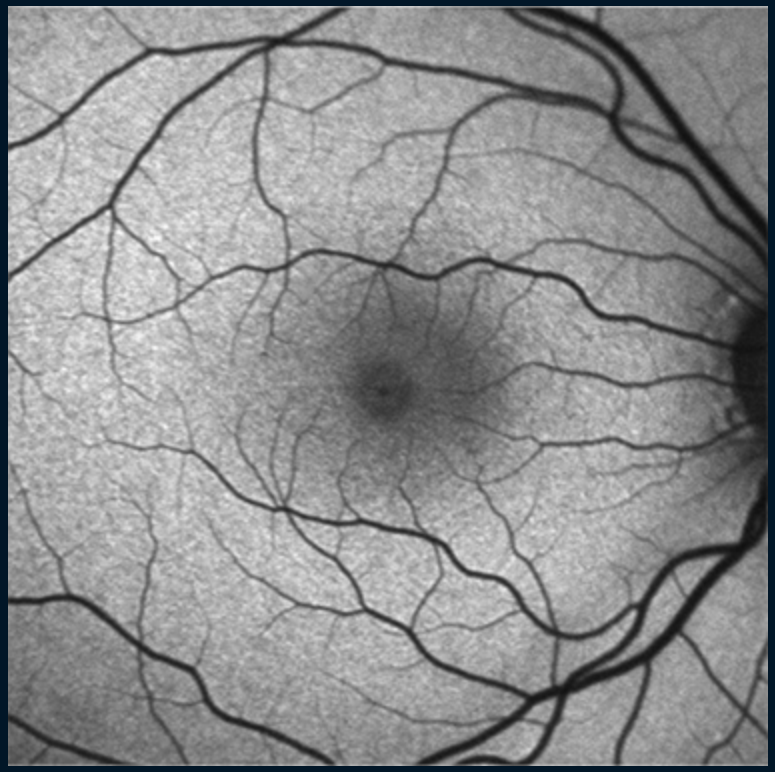

Lipofu
When
amour
At so
lipofu
0:07
Lipofuscin is toxic, knowing location and over accumulation can be an indicator of cell health.
HEIDELBERG
ENGINEERING

Fundus Autofluorescence

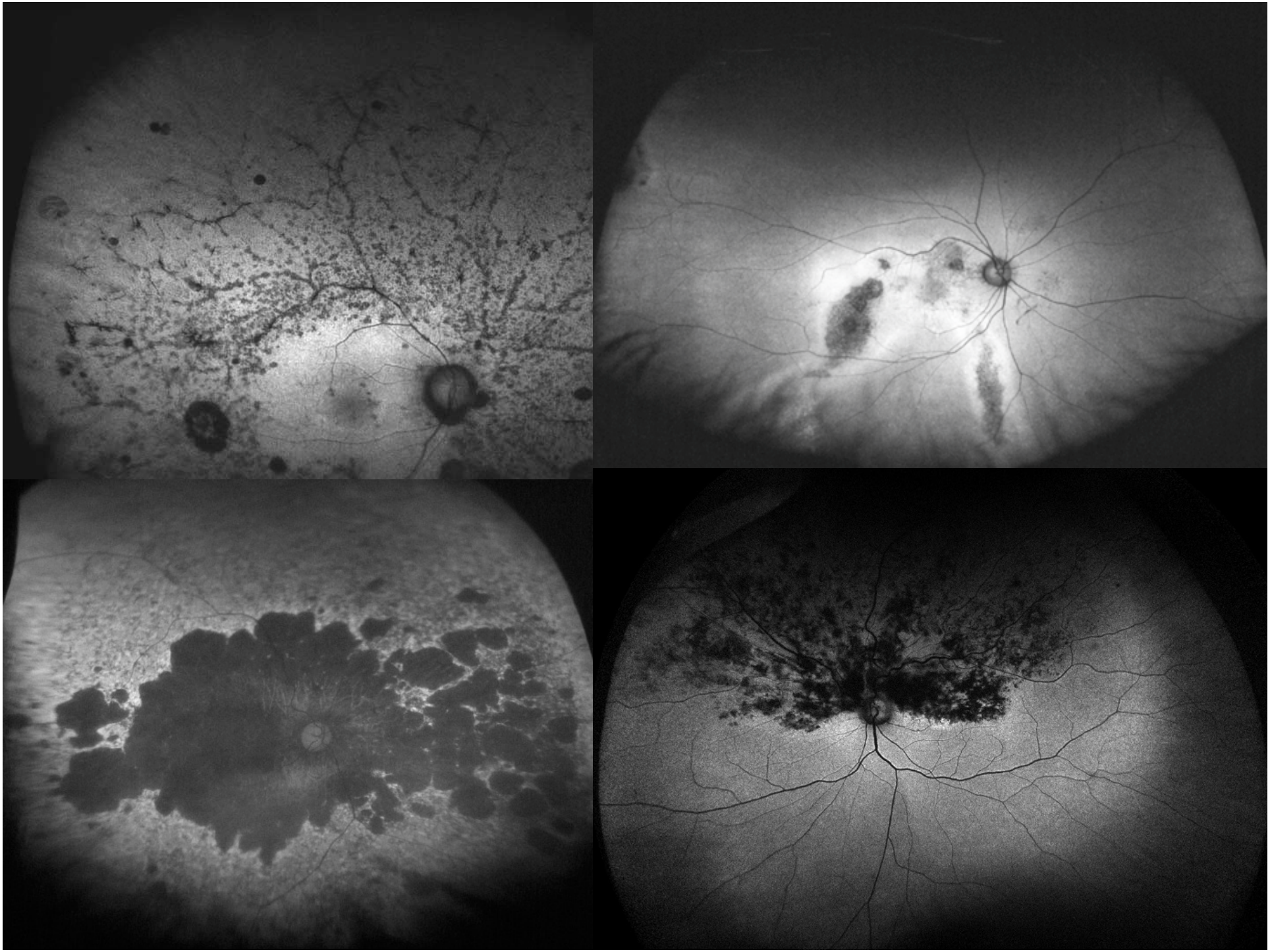


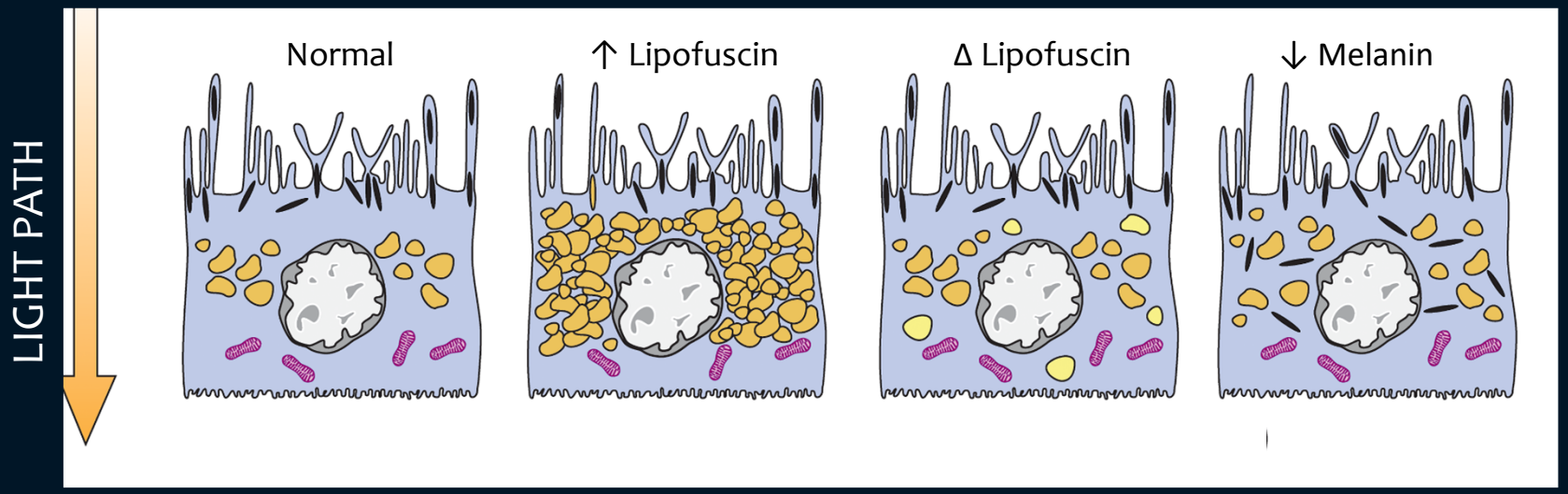
Normal FAF



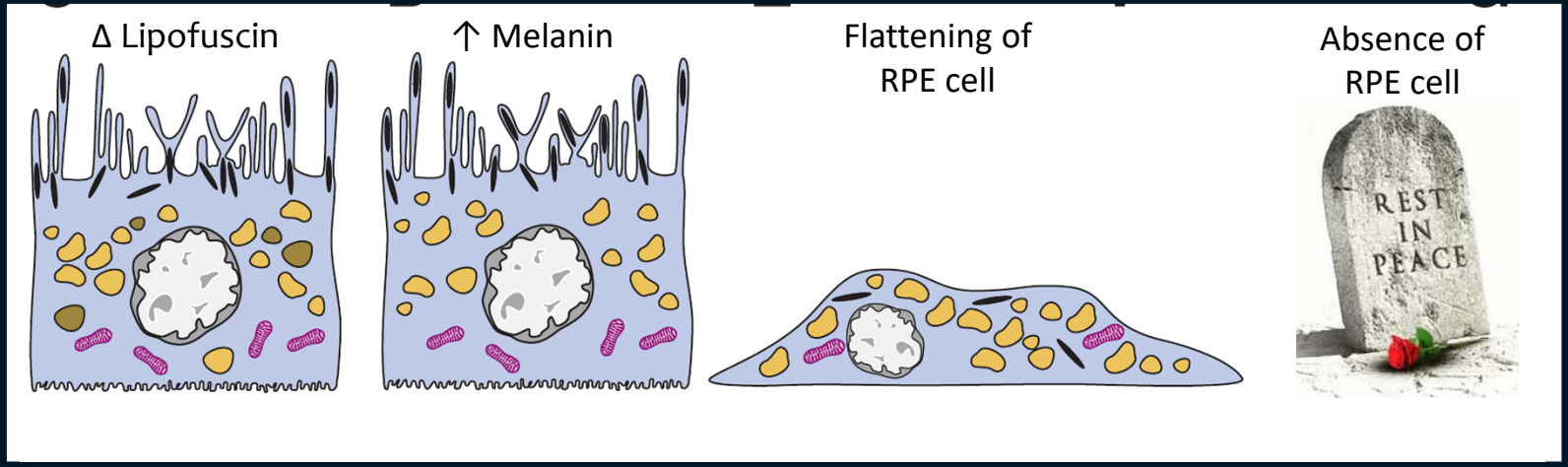



Retinitis pigmentosa





Potential causes of HYPERAUTOFLUORESCENCE



Potential causes of HYPOAUTOFLUORESCENCE

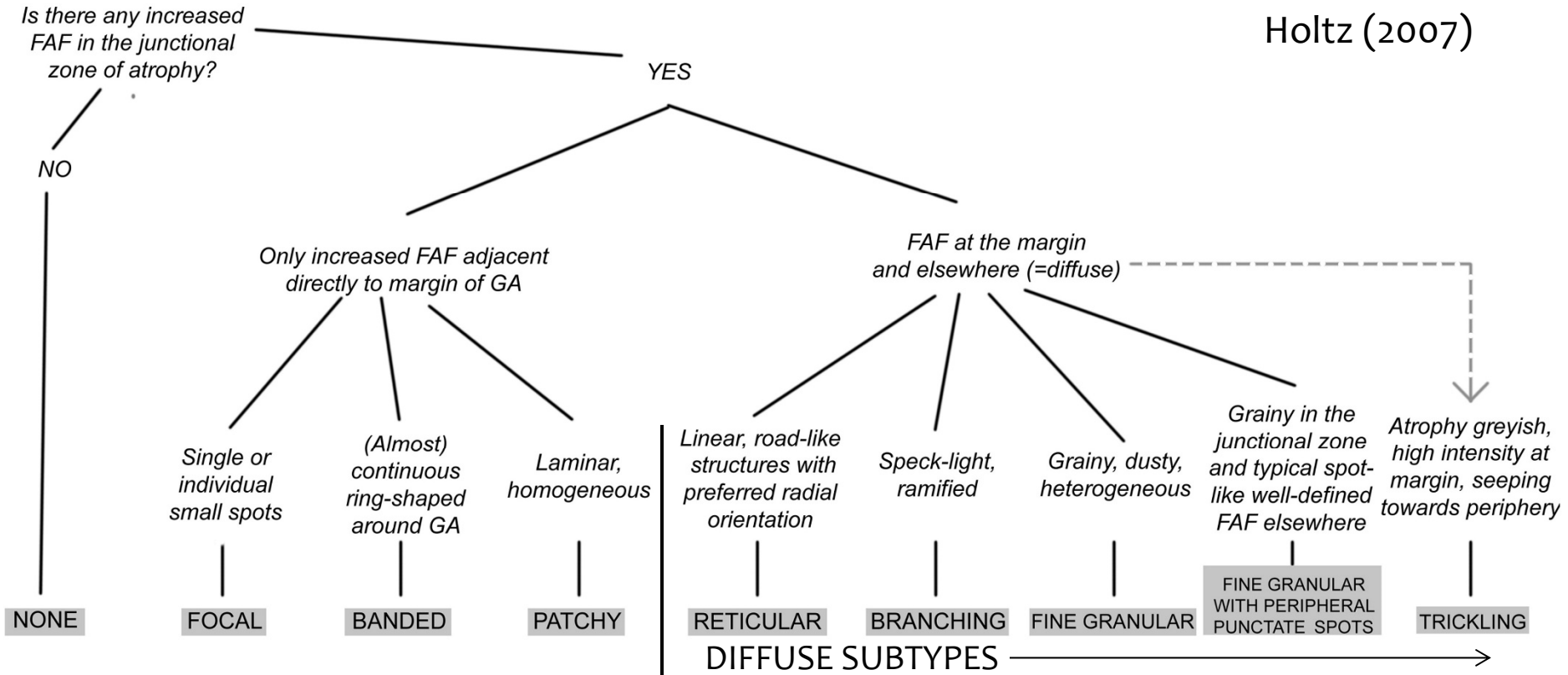
IOVS 2019; 60:2481

FAF in Dry AMD

- Holz (2007)
  - FAF patterns impact disease progression and may serve as a **prognostic indicator**
- Gain Study (2015)
  - FAF patterns represent different **stages of GA**.
  - As GA enlarges, the FAF pattern may change

Holz FG, et al. Am J Ophthalmol. 2007;143.
The GAIN Study. Am J Ophthalmol. 2015;160: 345–353.e5.

Holtz (2007)



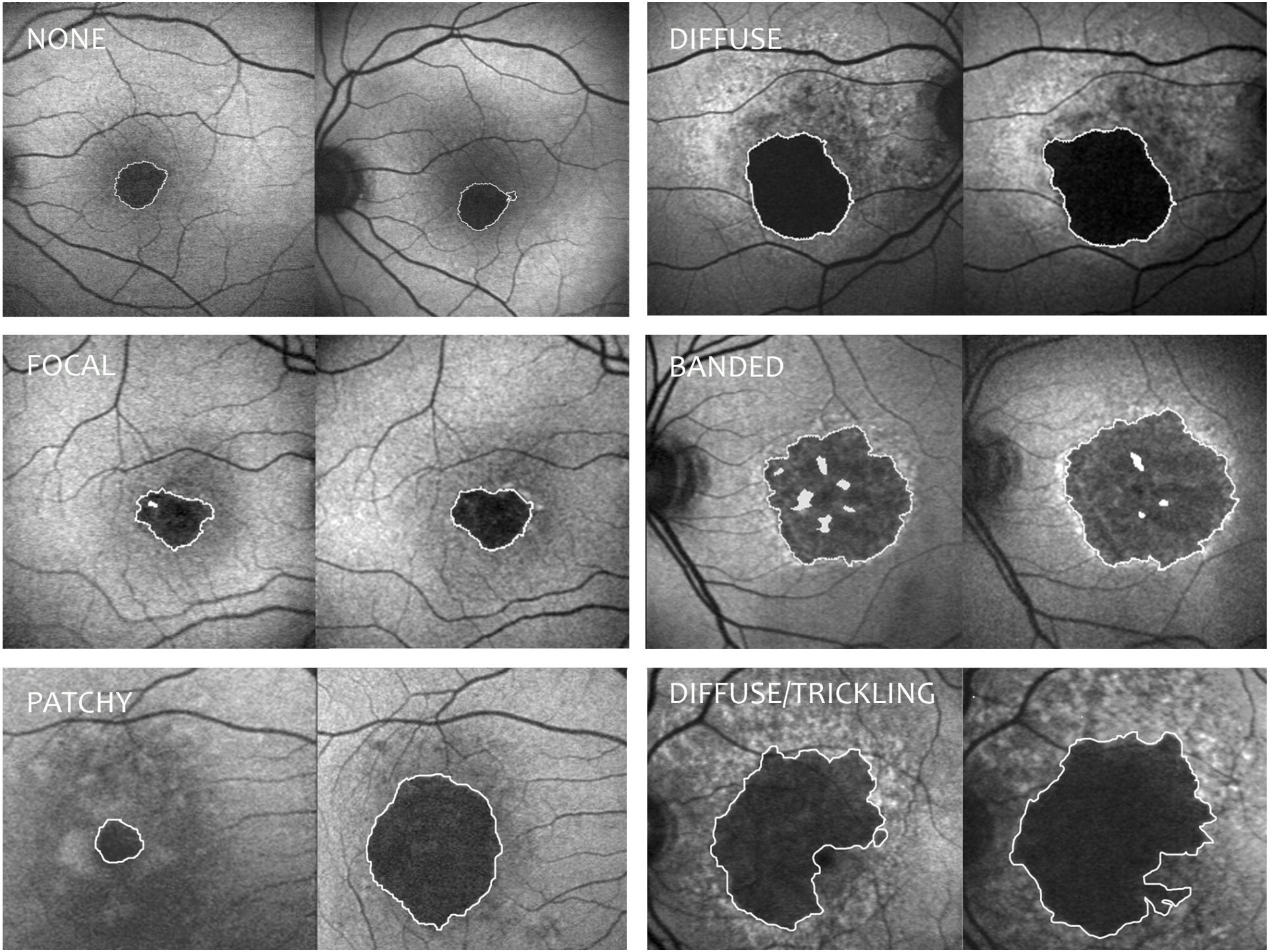
Small GA area

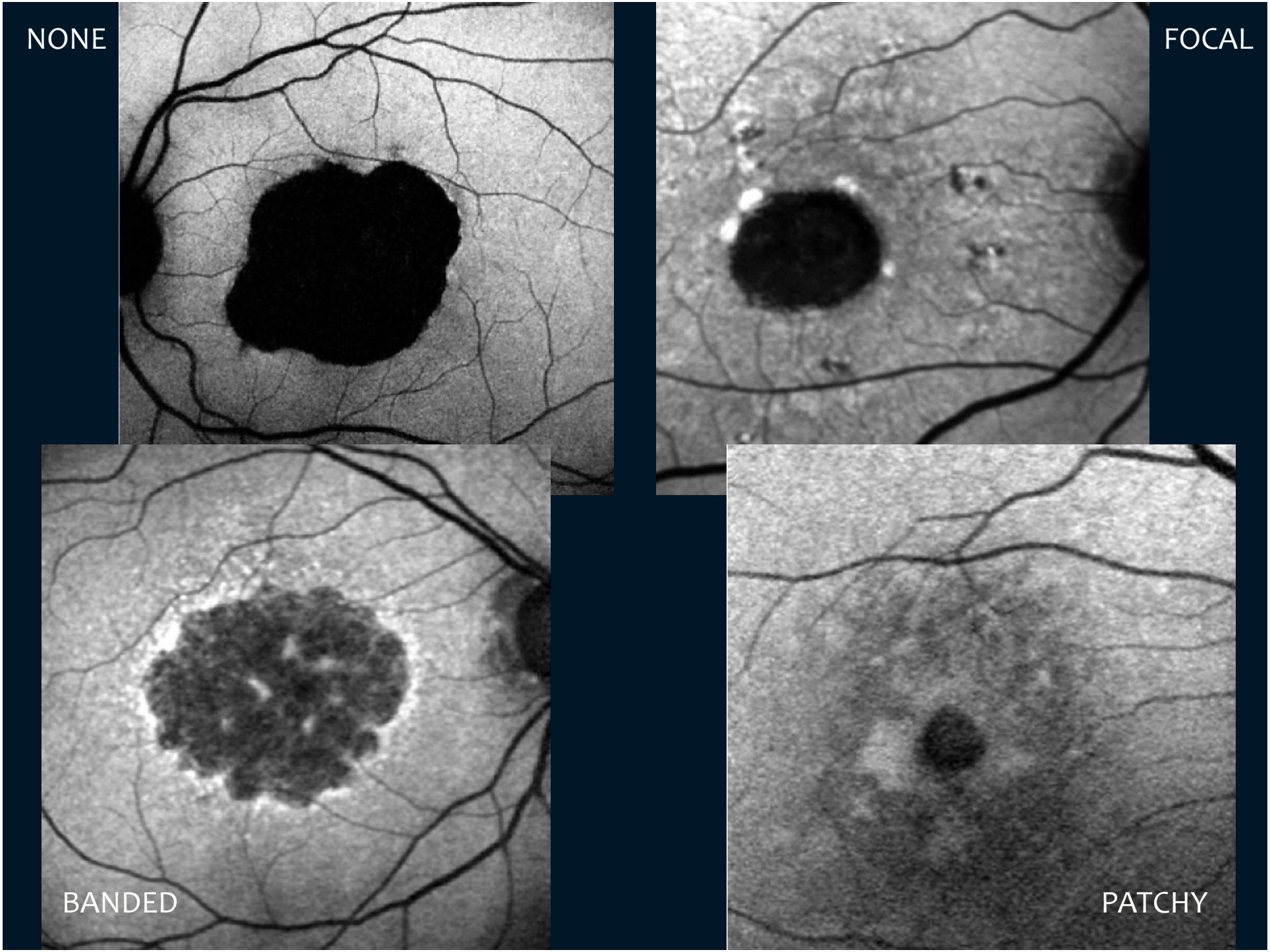
Slow progression

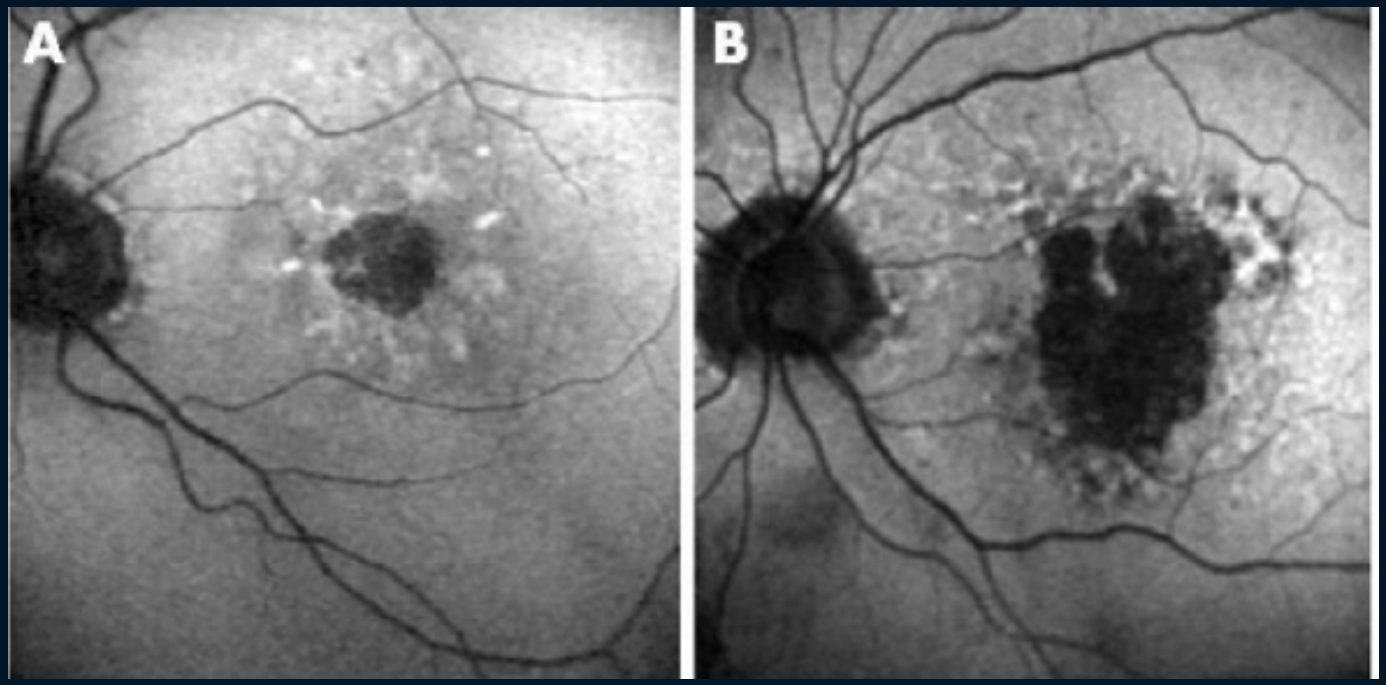
Large GA area

Rapid progression

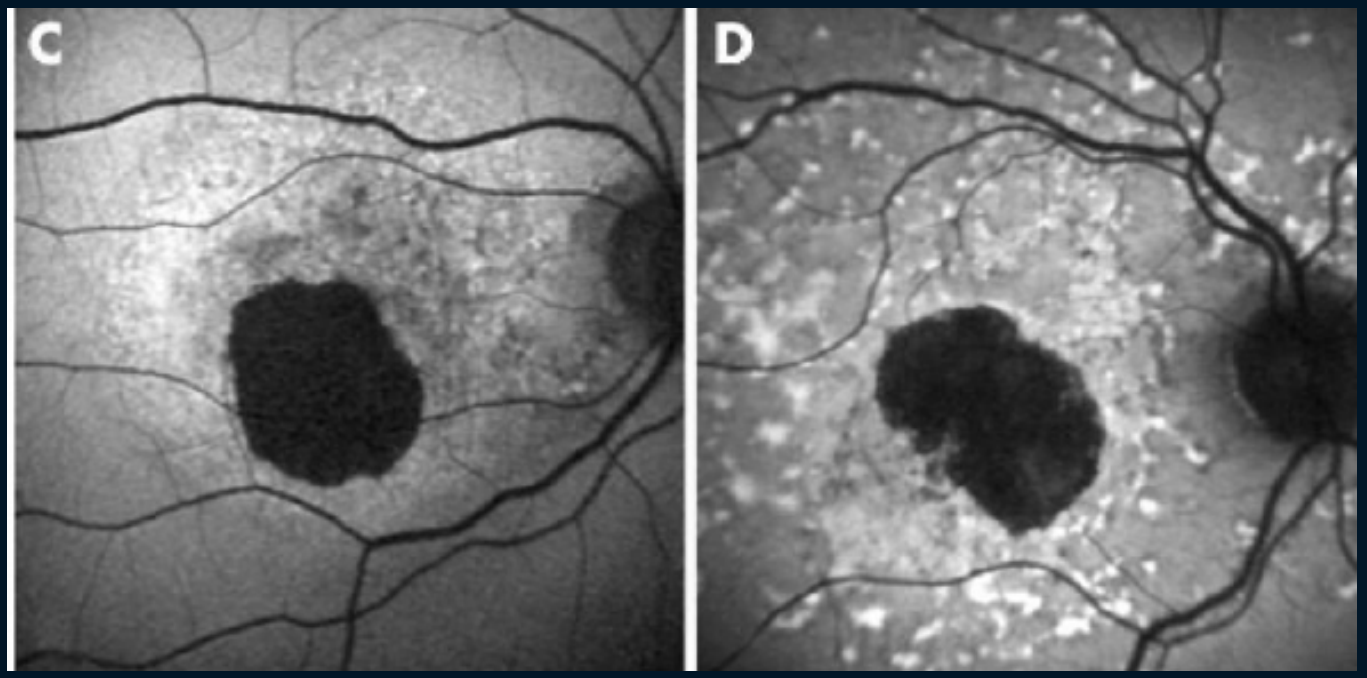
AJO. 2007;143:463-472


NONE
DIFFUSE
FOCAL
BANDED
PATCHY
DIFFUSE/TRICKLING


NONE
FOCAL
BANDED
PATCHY



DIFFUSE TYPES



FAF in Dry AMD

- Factors associated with faster rate of GA enlargement
  - GA arising in region of normal FAF
  - **Abnormal FAF surrounding GA**
  - GA size (faster for larger lesions)
  - Presence of reticular pseudodrusen

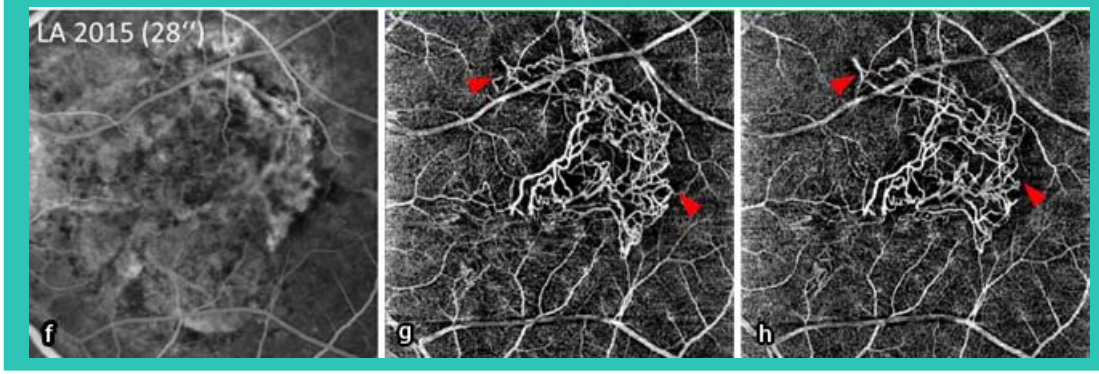
AREDS 2 Study, Report #18. Ophthalmol. Retina 2019 Apr 12

NEW!

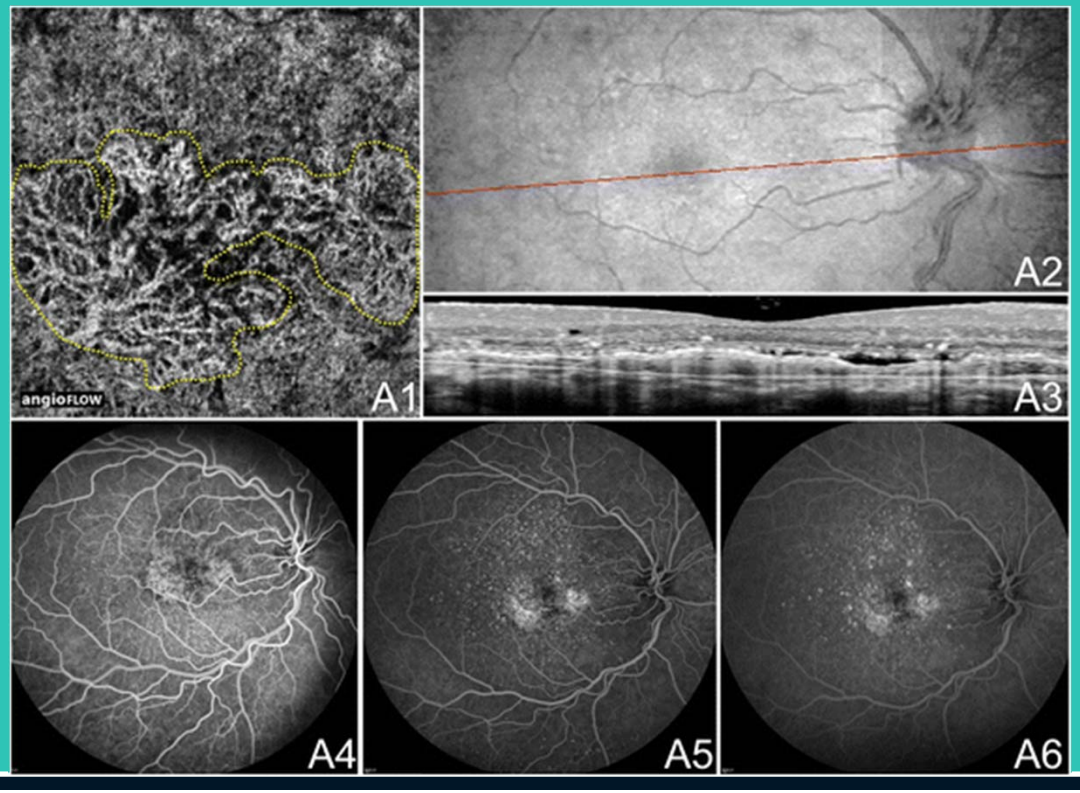
Instrumentation

- **OCT Angiography**
  - Non-invasive imaging of blood flow. No dye is used.
  - Software upgrade to some existing OCT devices
  - Does not replace need for fluorescein angiography in some patients (eg. cannot detect leakage or staining)

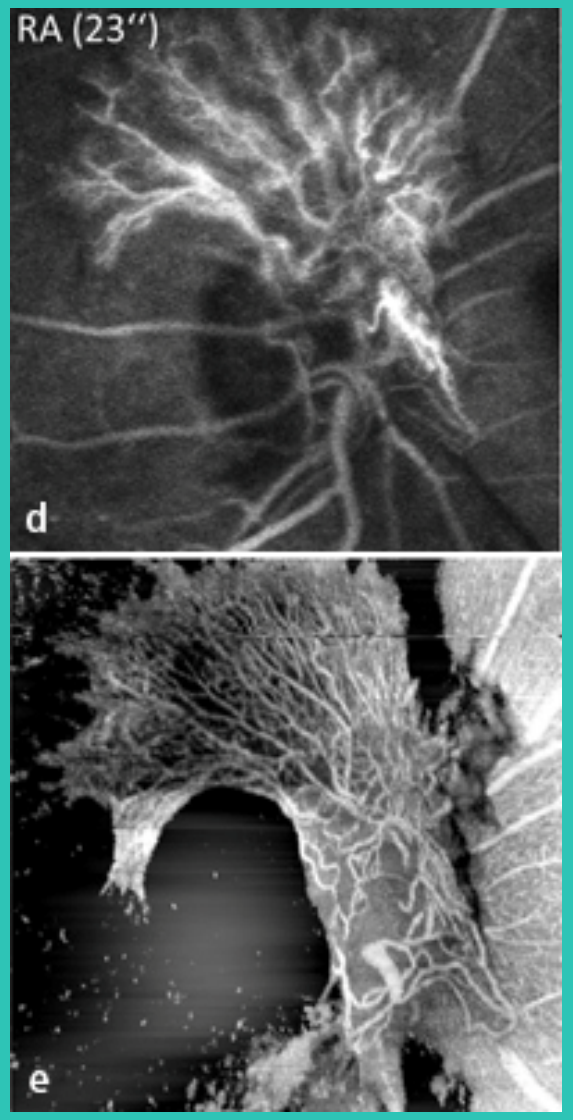
CLASSIC CNV



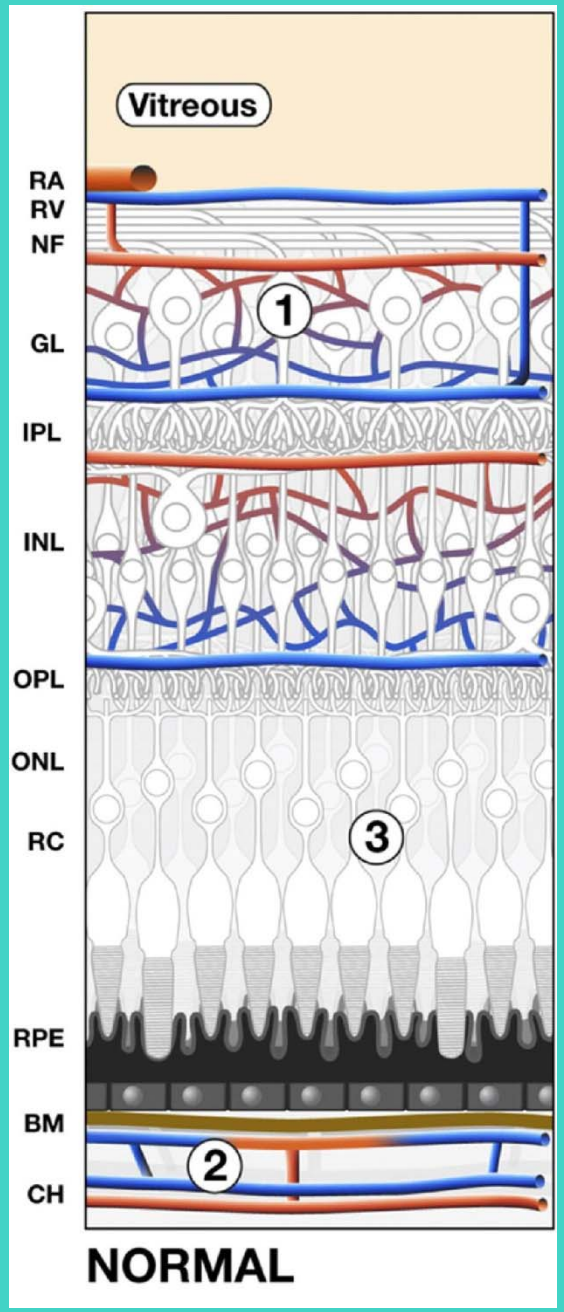
OCCULT CNV



PDR



Retinal Segmentation in OCTA



Superficial retinal vessels

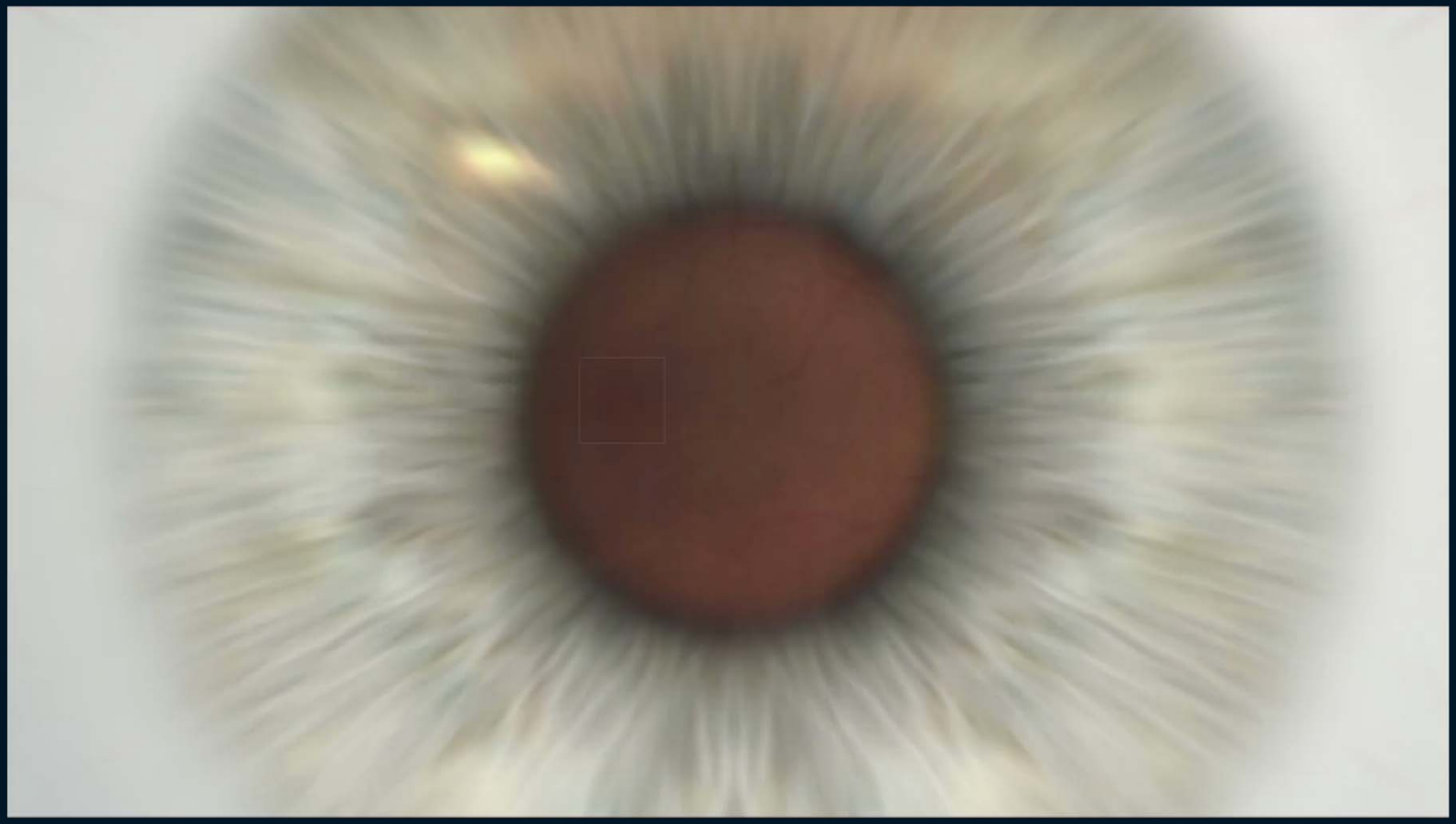
Deep retinal vessels

Outer retina

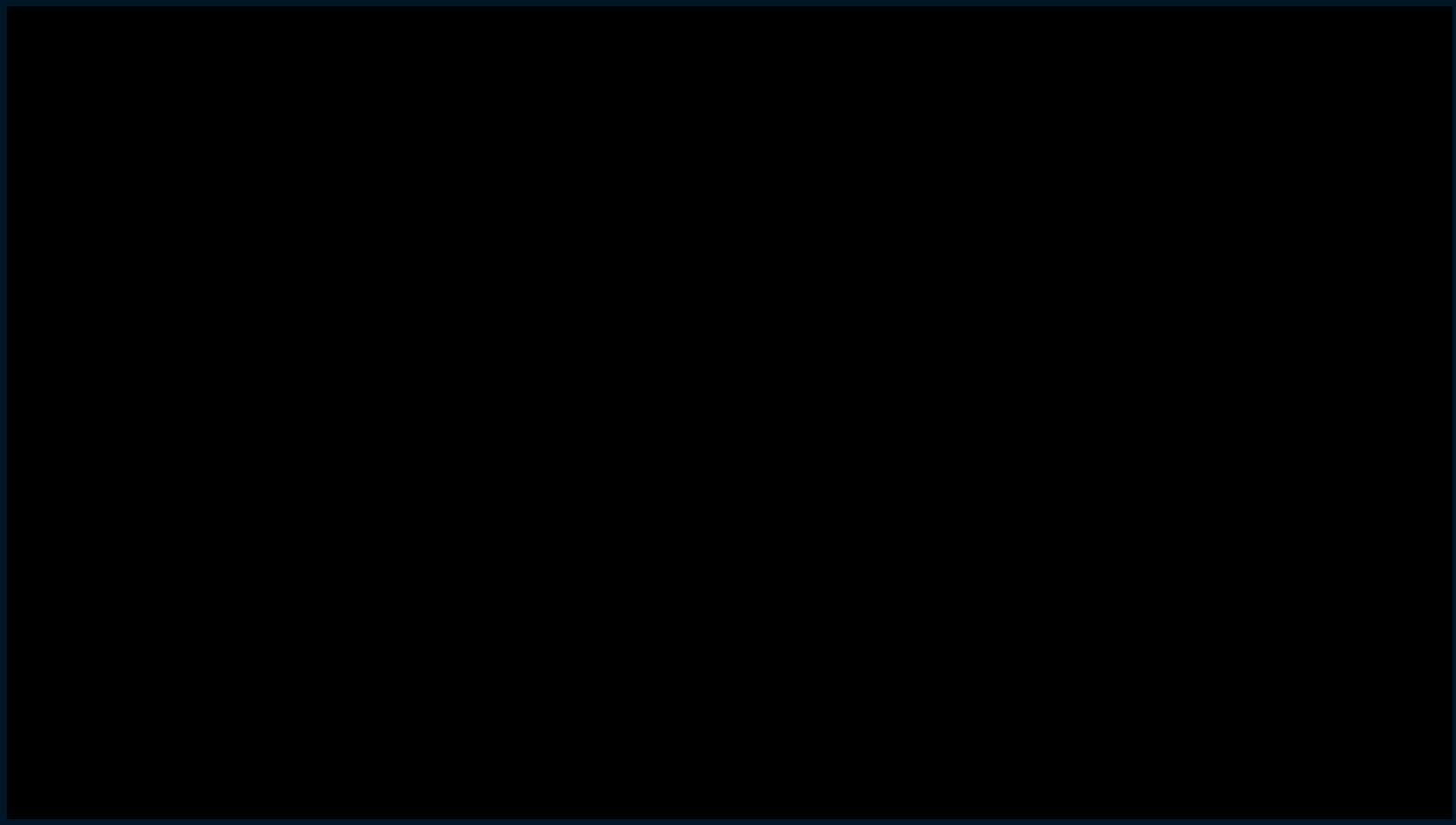
Choroid

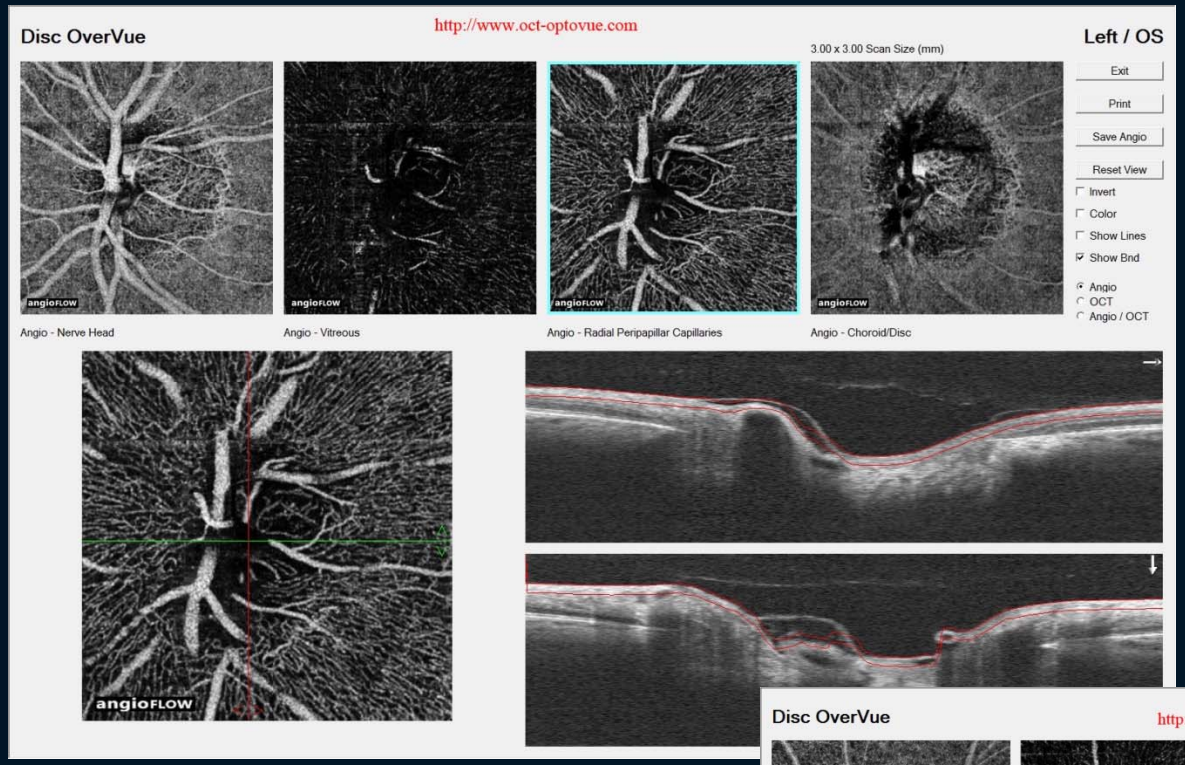
The ganglion cell layer and inner nuclear layer are vascularized, but the outer nuclear layer is normally avascular

OCT Angiography

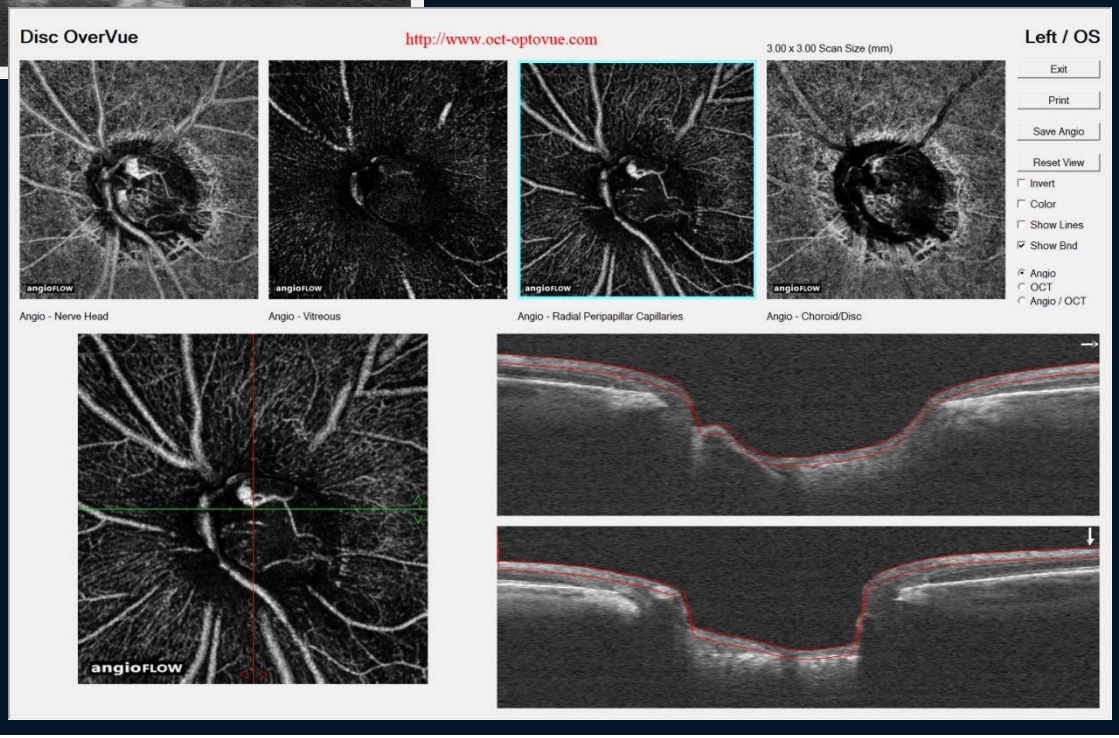


OCT Angiography





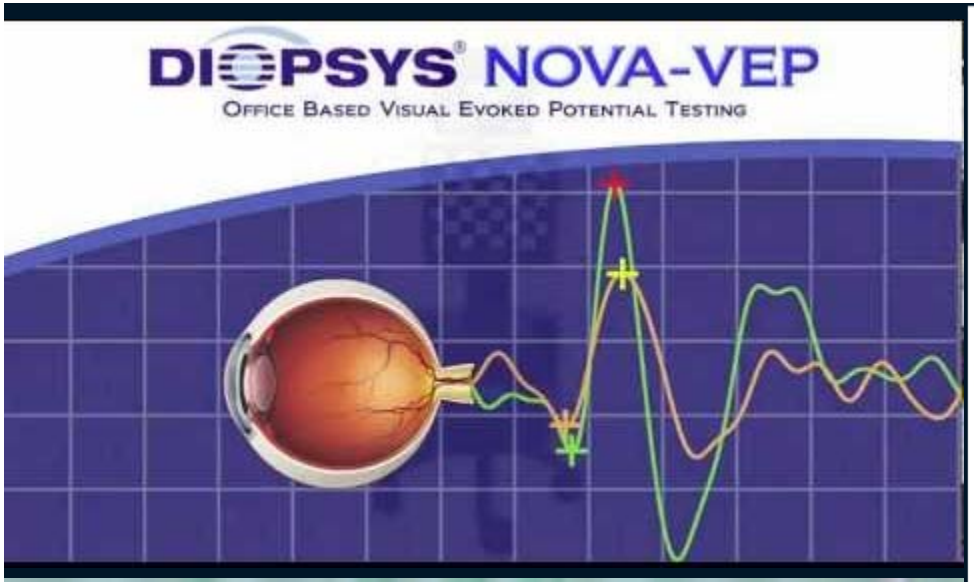
OCTA Normal Optic Disc



OCTA Glaucomatous Optic Disc

Instrumentation

- Electrodiagnostics (EDX)
  - **Visual Evoked Potential** (VEP): Assess integrity of visual pathway from ganglion cells to visual cortex
  - **Electroretinogram** (ERG): Assess integrity of various retinal elements (photoreceptors, ganglion cells)


DIOPSYS® NOVA-VEP
Office Based Visual Evoked Potential Testing

EvokeDX

Instrumentation

- VEP Applications
  - **Amblyopia**: Confirm diagnosis, predicting treatment outcome
  - **Optic neuropathy**: Increased latency in affected eye at all check sizes
  - **TBI**: Objective measure of functional impairment and track recovery
  - **Glaucoma**: Diagnosis and prognosis

Instrumentation

- ERG Applications
  - **Maculopathy:** Concentric test aids differentiation of local & diffuse abnormality
  - **Optic neuropathy:** Contrast test aids differentiation of retinal & optic nerve dx
  - **Glaucoma:** Diagnosis and prognosis

Self Assessment Quiz

You offer any of these in your practice:

Ultrawide Field Imaging (1 point)

Fundus Autofluorescence (1 point)

Electrodiagnostics (1 point)

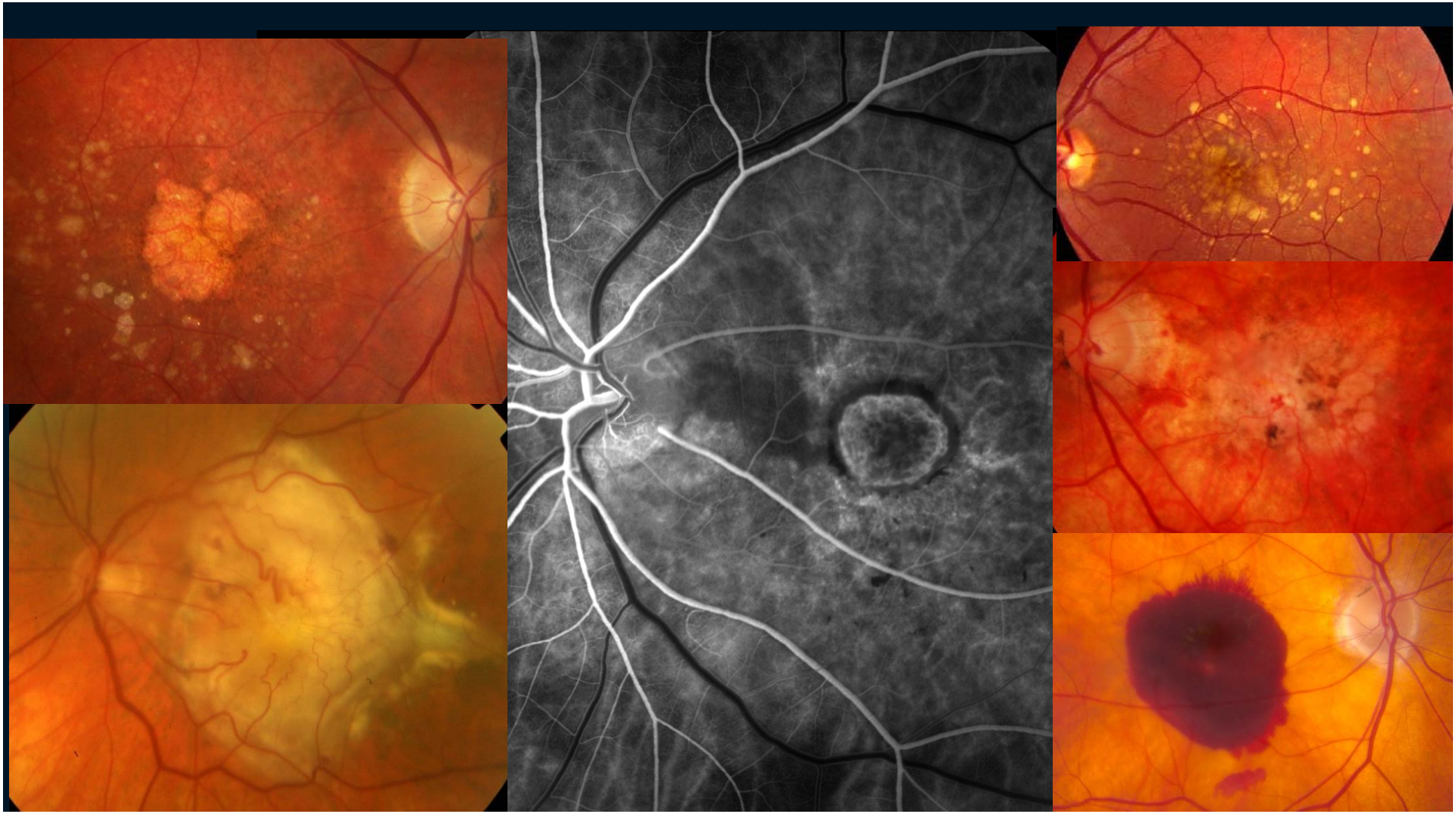
OCT Angiography (2 points)

- If so, award yourself points
- If not, award yourself 0 points

21st Century Retina Care

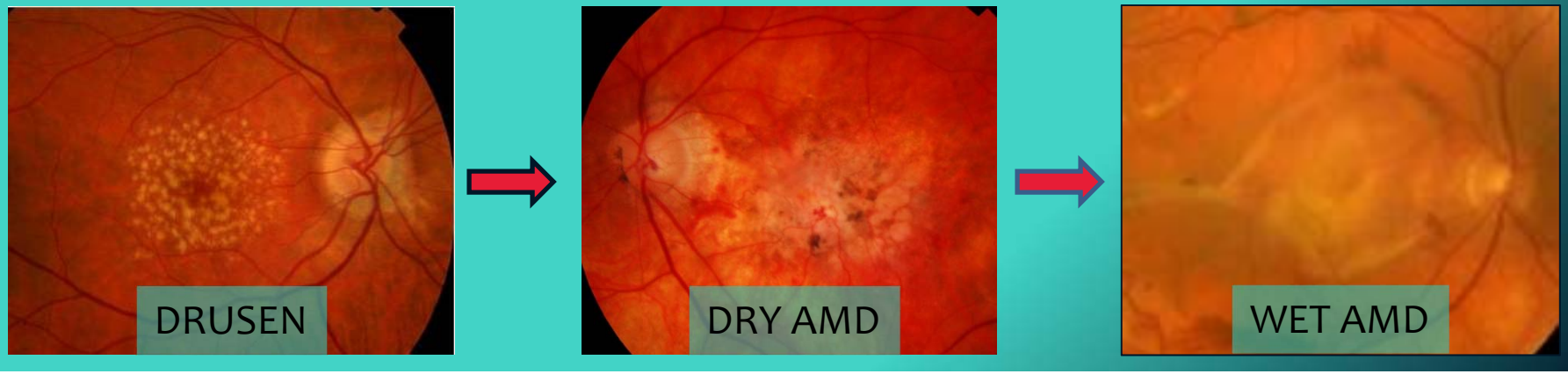
- Instrumentation
- Posterior Seg Disease
  - Clinical Features
  - How to Monitor
  - When to Refer

AMD



AMD

- Clinical Features
  - Idiopathic. Oxidative damage appears to incite an inflammatory reaction that promotes disease progression
  - **Atrophic phase**: Drusen, pigment atrophy
  - **Exudative phase**: RPE detachments, CNV



AMD

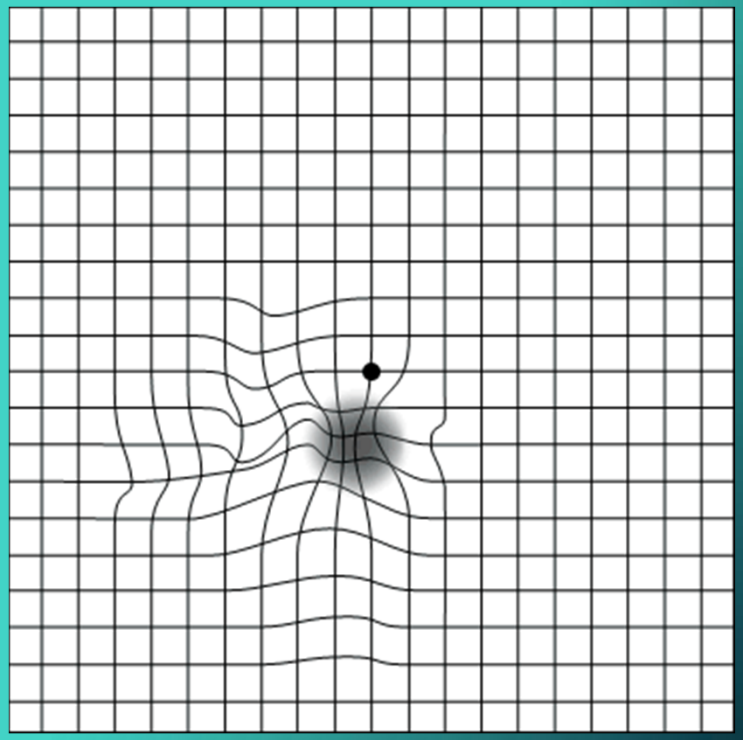
- **How to Monitor**
  - Visual function (VA, CS, Dark adaptation)
  - Smoking cessation, low vision care
  - Ophthalmoscopy, OCT
  - **Amsler grid (or alternatives)**
  - **Macular pigment testing**
  - **Nutraceuticals & dietary counseling**
  - **Genetic testing**

AMD

- **When to Refer**
  - Anti-VEGF therapy:
    - Evidence of exudation (OCT, ophthalmoscopy)
    - Unexplained change in vision (↓VA, ↑metamorphopsia)
  - Low vision
    - Functional challenges
    - Social services

AMD

- **Home Vision Monitoring**
  - Early detection of CNV
- Monitoring Options
  - Amsler grid
  - Environmental Amsler
  - Online vision tests
  - Home devices (PHP)
  - **Mobile apps (mVT)**



PERSPECTIVE

The Amsler chart: absence of evidence is not evidence of absence

Michael Crossland, Gary Rubin

Br J Ophthalmol 2007;**91**:391–393. doi: 10.1136/bjo.2006.095315

Early detection of the onset or progression of macular disease is likely to become increasingly important as new treatment modalities are introduced. Current best practice involves issuing patients with an Amsler chart for daily or weekly observation with the instruction to attend for immediate assessment should any new distortion be perceived. However the sensitivity of Amsler charts in detecting macular disease can be less than 50%, implying that presentation may be delayed in over half of patients with advancing disease relying on the Amsler chart to

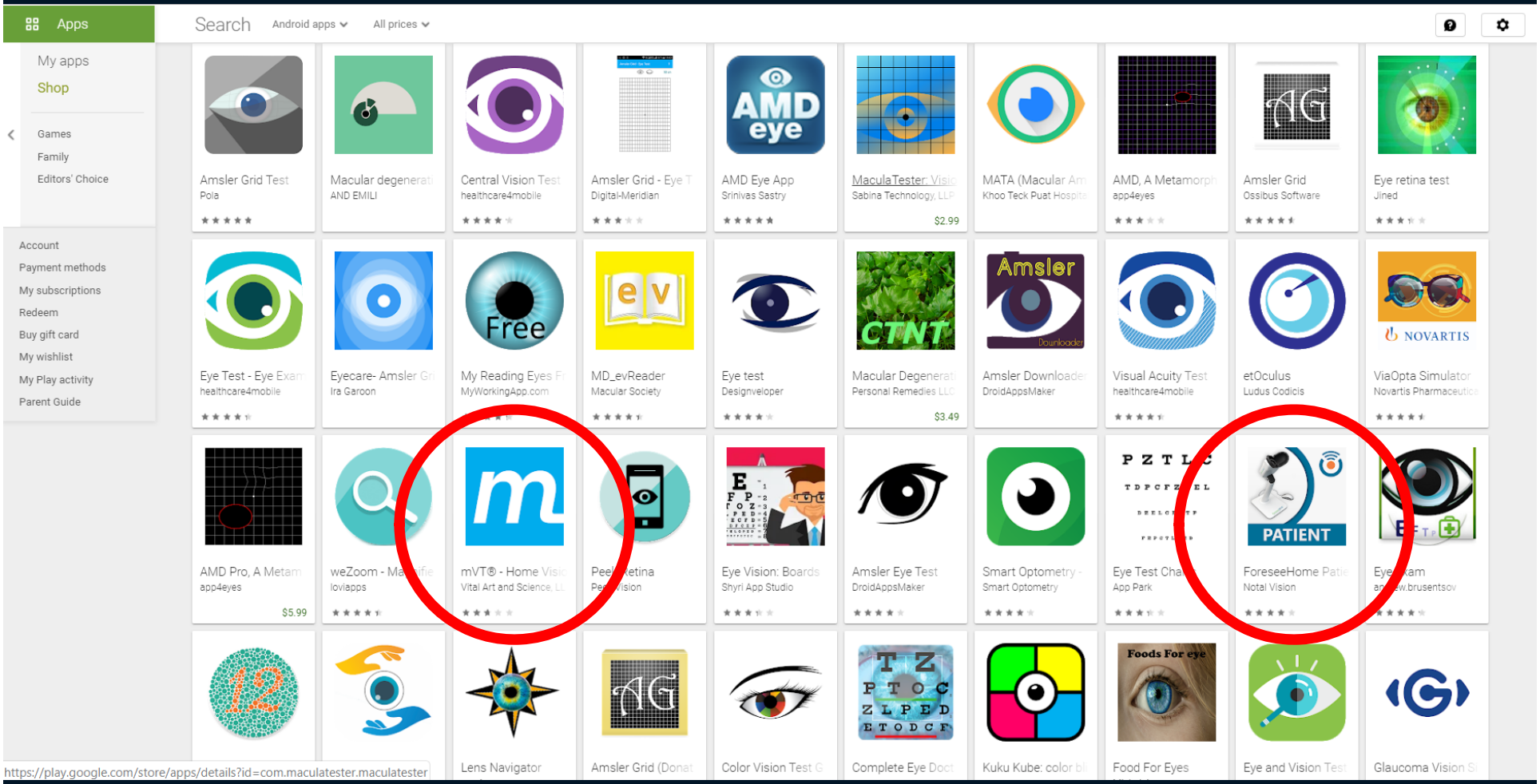
1874[7 8] and Amsler reports a paper from 1894 which consists of parallel lines to determine "metamorphoma".[9]

When viewed from the recommended distance of 30 cm, the Amsler chart subtends 20°, with each small square corresponding to one degree of visual angle. Patients are asked a series of structured questions whilst viewing the chart monocularly.

The complete set of Amsler charts consists of seven plates: the conventional white-on-black grid with and without diagonal lines to aid fixation; a red-on-black version; a version with dots in place

"A simple, cheap, easy to use screening test which patients can use in their own home, which is highly sensitive and specific for development or progression of AMD has yet to be developed."

Google Play Store Search: Macular Degeneration



mVT® - Home Vision Testing

Vital Art and Science, LLC Medical

★★★★★ 7

Everyone

Add to Wishlist Install

REVIEWS Review Policy

2.7

★★★★★

7 total

5
4
3
2
1

A Google user

★★★★★ January 13, 2019

1

The effect of this app is to REDUCE the income of a doctor. Seriously: mVT asks doctors to pay in order to equip patients with an app that helps avoiding visits. Don't believe it? Google for "multibit" and for the sentence ""The superior quality of the tests enables the app usage to replace many pat...

Full Review

Linda Langos

★★★★★ January 1, 2019

3

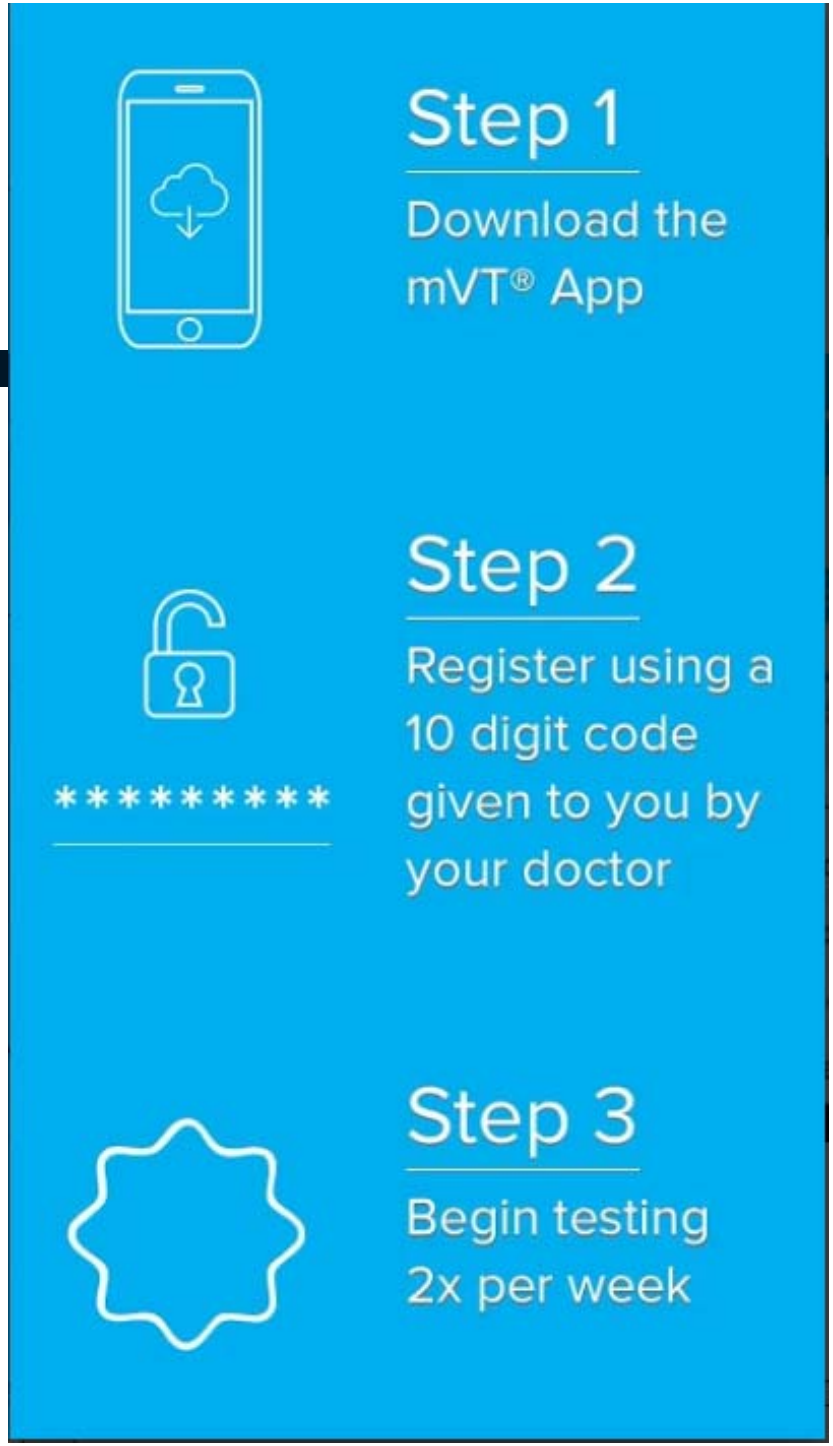
Instead of helping people they decided to make this test prescription only. For no reason at all, just to make it unavailable for the majority of people living on this planet in many countries, having macular degeneration and other retinal diseases. I wish many people give further negative reviews u...

Full Review

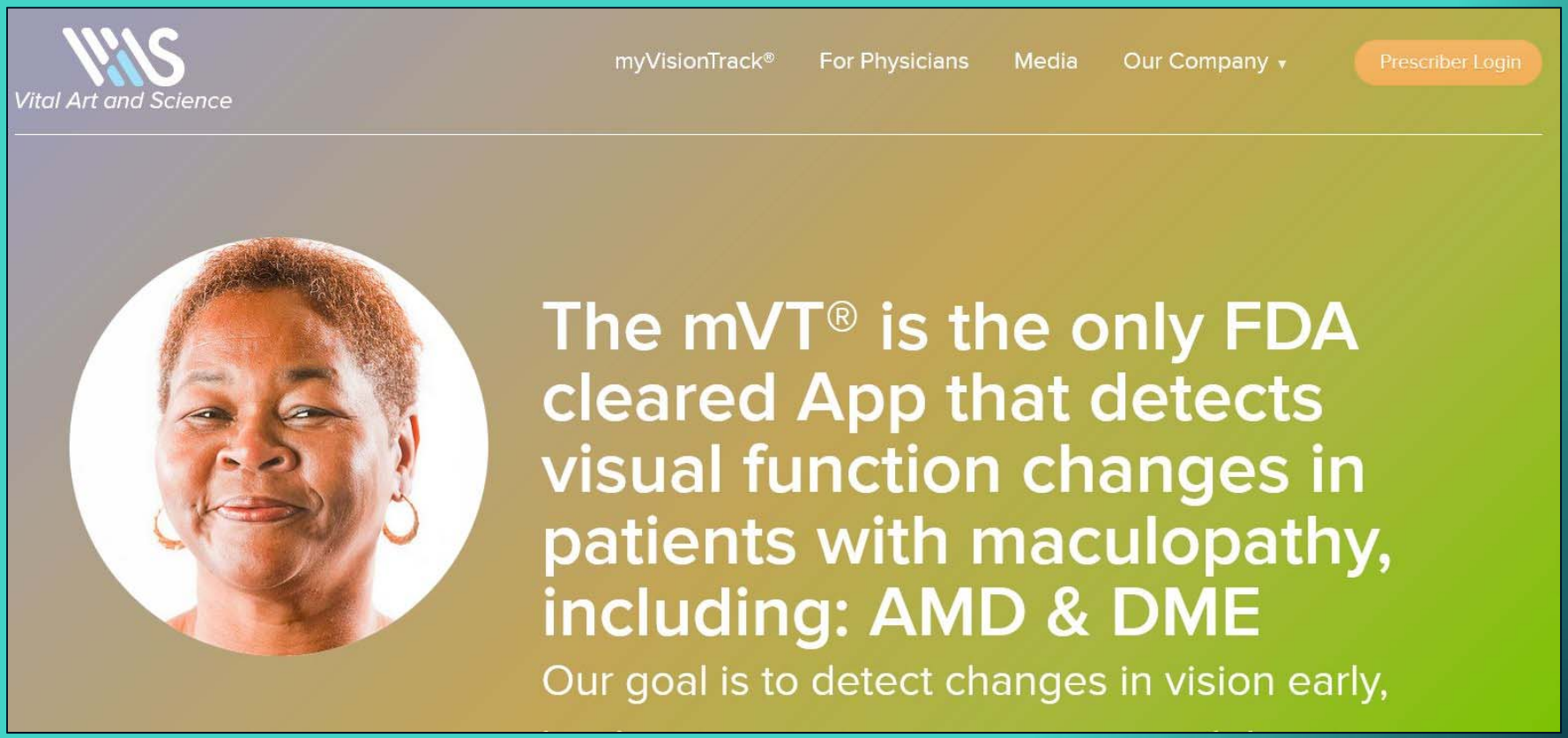
C Pitts

★★★★★ August 24, 2019

This App is out for the money requiring a script doctors have to pay for? They should have taken it to a non profit humanitarian company for funding to help people, or given it to the



AMD

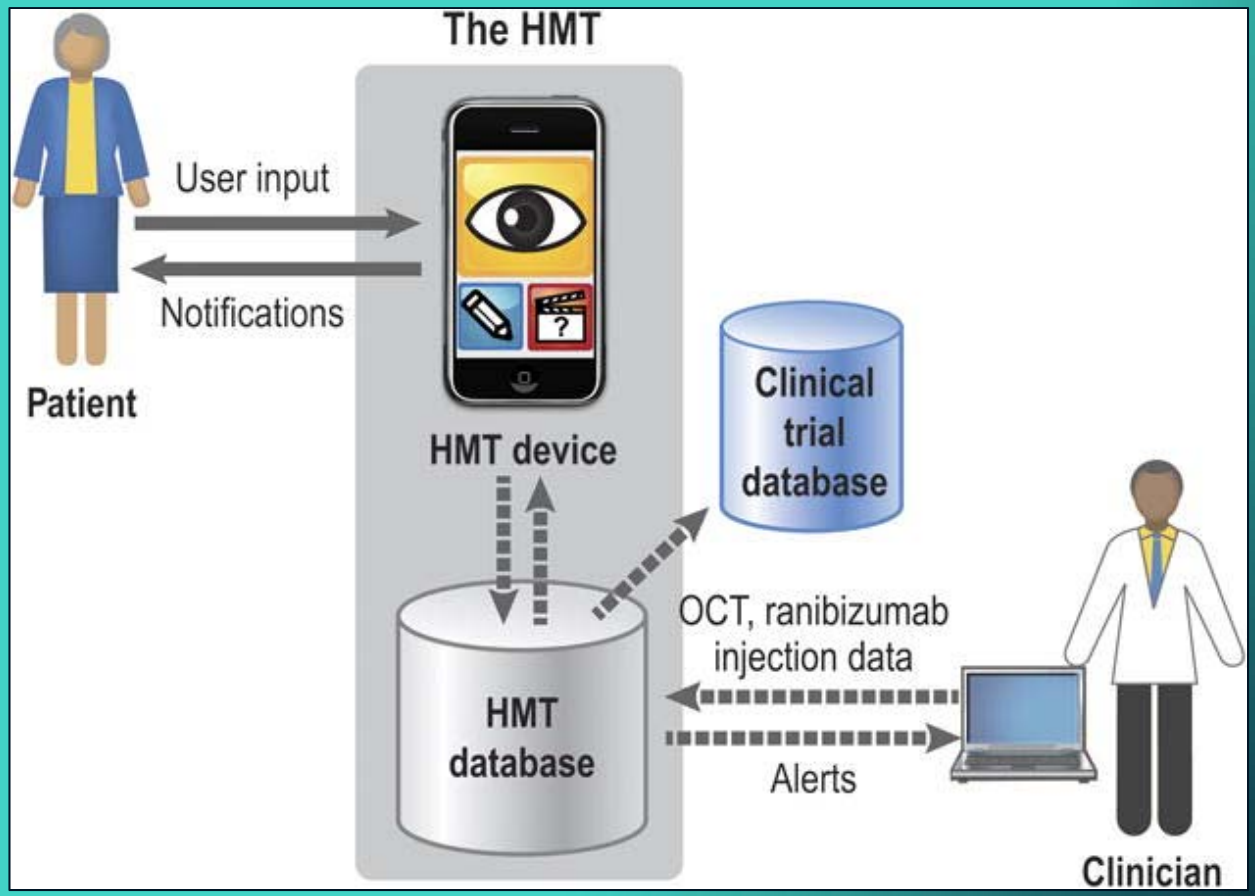


myvisiontrack.com

AMD

AMD

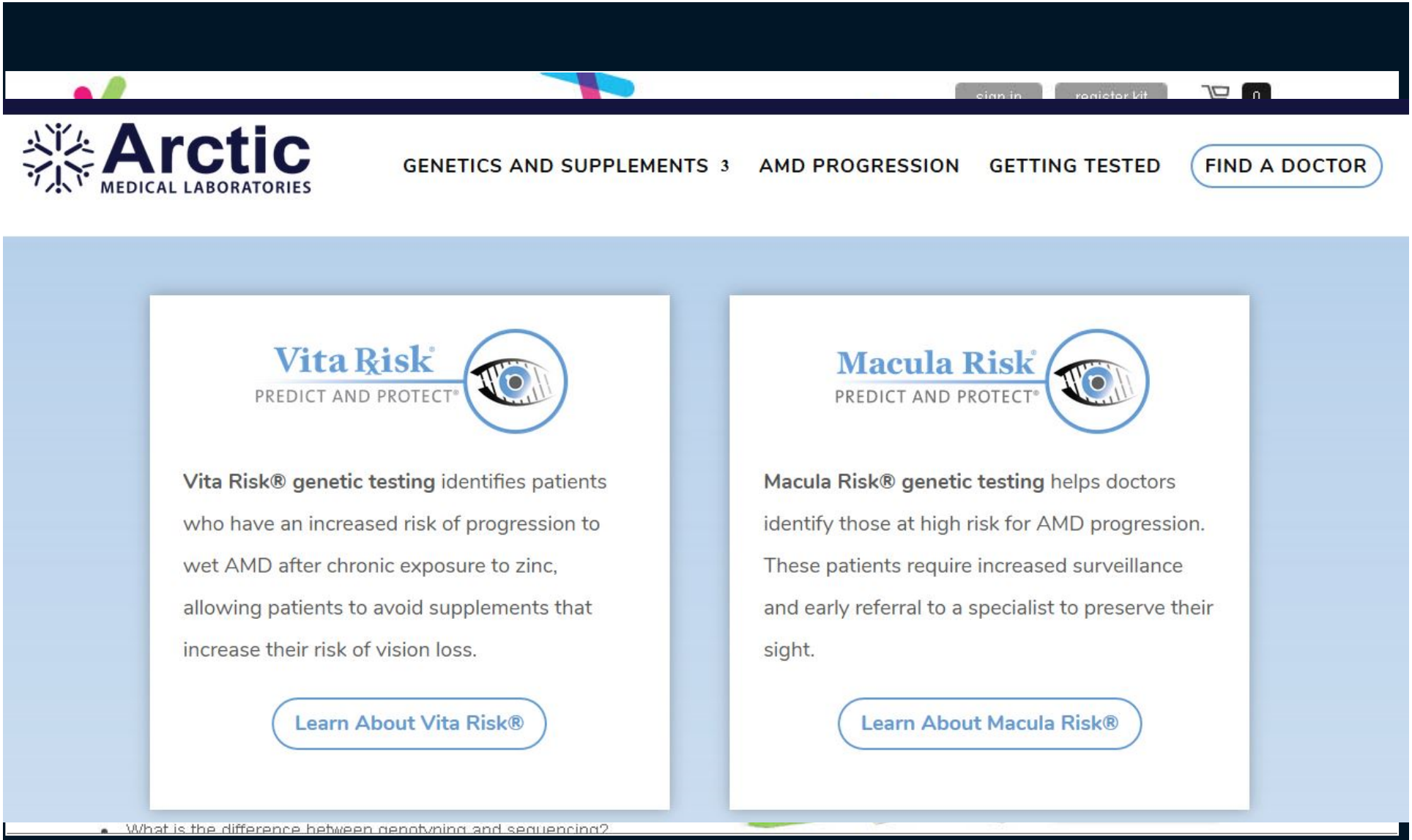
The prescribing physician receives an alert when a patient's test performance indicates a worsening of metamorphopsia. **The physician is responsible for following up on abnormal test results.**



Self Assessment Quiz

Do you educate AMD patients to self-monitor their vision in ways other than Amsler grid?

- If so, award yourself 1 point
- If not, award yourself 0 points



Genetic testing services use risk models to calculate your risk of contracting various disorders based on genotype

Clinical Review & Education

Special Communication

Genetic Testing for Age-Related Macular Degeneration Not Indicated Now

Edwin M. Stone, MD, PhD

Age-related macular degeneration is a very common condition that is caused by a complex interplay of genetic and environmental factors. It is likely that, in the future, genetic testing will allow physicians to achieve better clinical outcomes by administering specific treatments to patients based on their genotypes. However, improved outcomes for genotyped patients

Author Affiliations: Author affiliations are listed at the end of this article.

"The costs and risks of routine genetic testing currently outweigh the benefits for patients with AMD."

JAMA Ophthalmol. 2015;133:598-600

Only difference between AREDS-1 and AREDS-2 supplements: AREDS-2 substitutes L/Z for β-carotene. Both are equally effective

AREDS 1	AREDS 2
• Zinc • Copper • Vitamin C • Vitamin E • **β carotine**	• Zinc • Copper • Vitamin C • Vitamin E • **Lutein/Zeaxanthin**


AREDS 1 formula is still commercially available!
Compare vs. PreserVision AREDS 2
Oral Care
Apothecary
Denture Care
Toothpaste
BAUSCH+LOMB
PreserVision
Eye Vitamin & Mineral Supplement
AREDS 2
AREDS SOFT GELS
AREDS LUTEIN
Eye Health & Lutein
Nutrition for Eyes
Vision Shield
AREDS 2 +MULTI VITAMIN
$5.40
$24.84
$24.84
$17.97
$30.97
$18.95
$30.97
$8.85

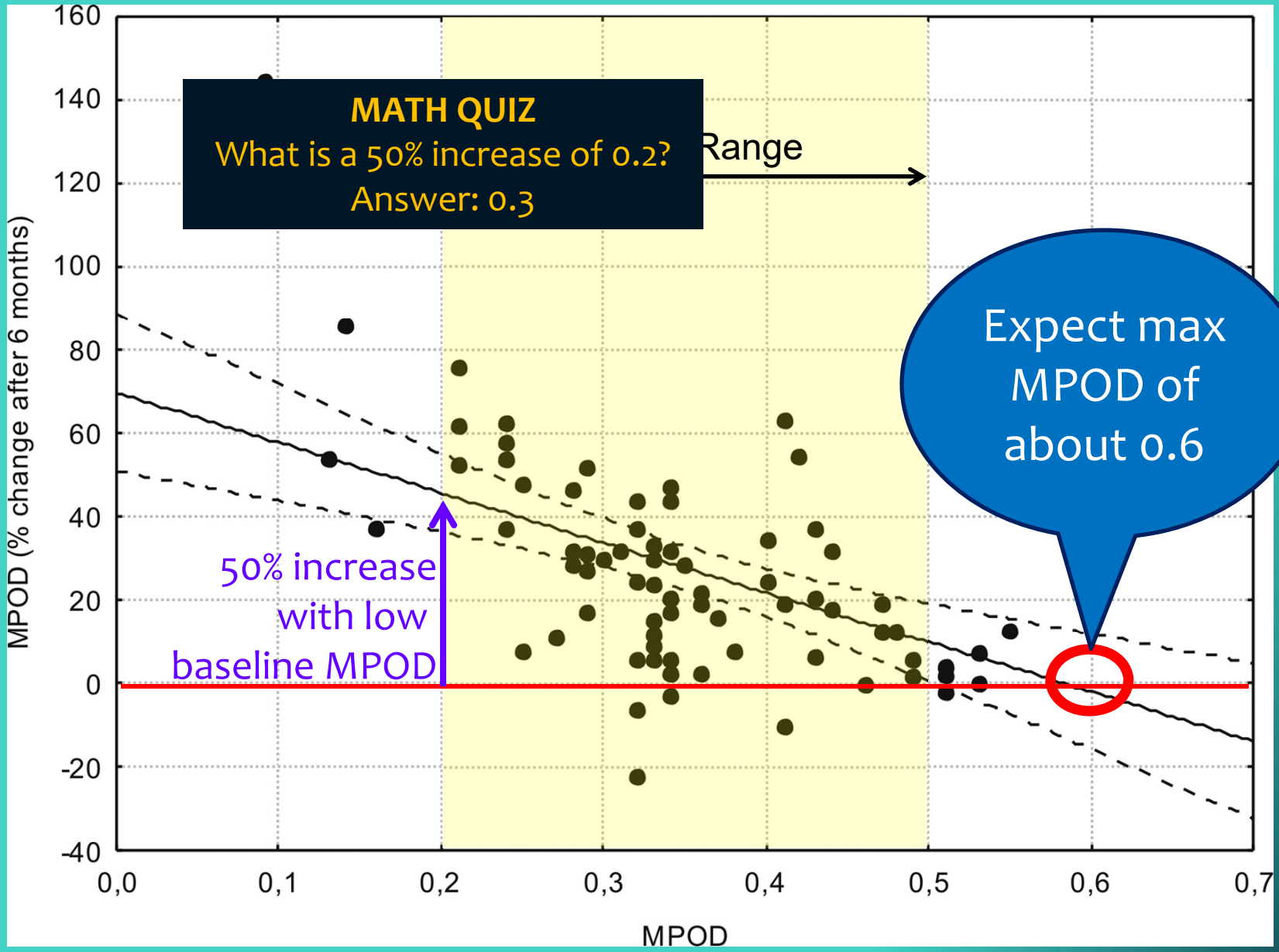
	AREDS 2	Store Brand
Vitamin C	250 mg	250 mg
Vitamin E	200 IU	**99 IU**
Zinc	40 mg	**10 mg**
Copper	1 mg	1 mg
Lutein	5 mg	5 mg
Zeaxanthin	1 mg	1 mg

Macular Pigment

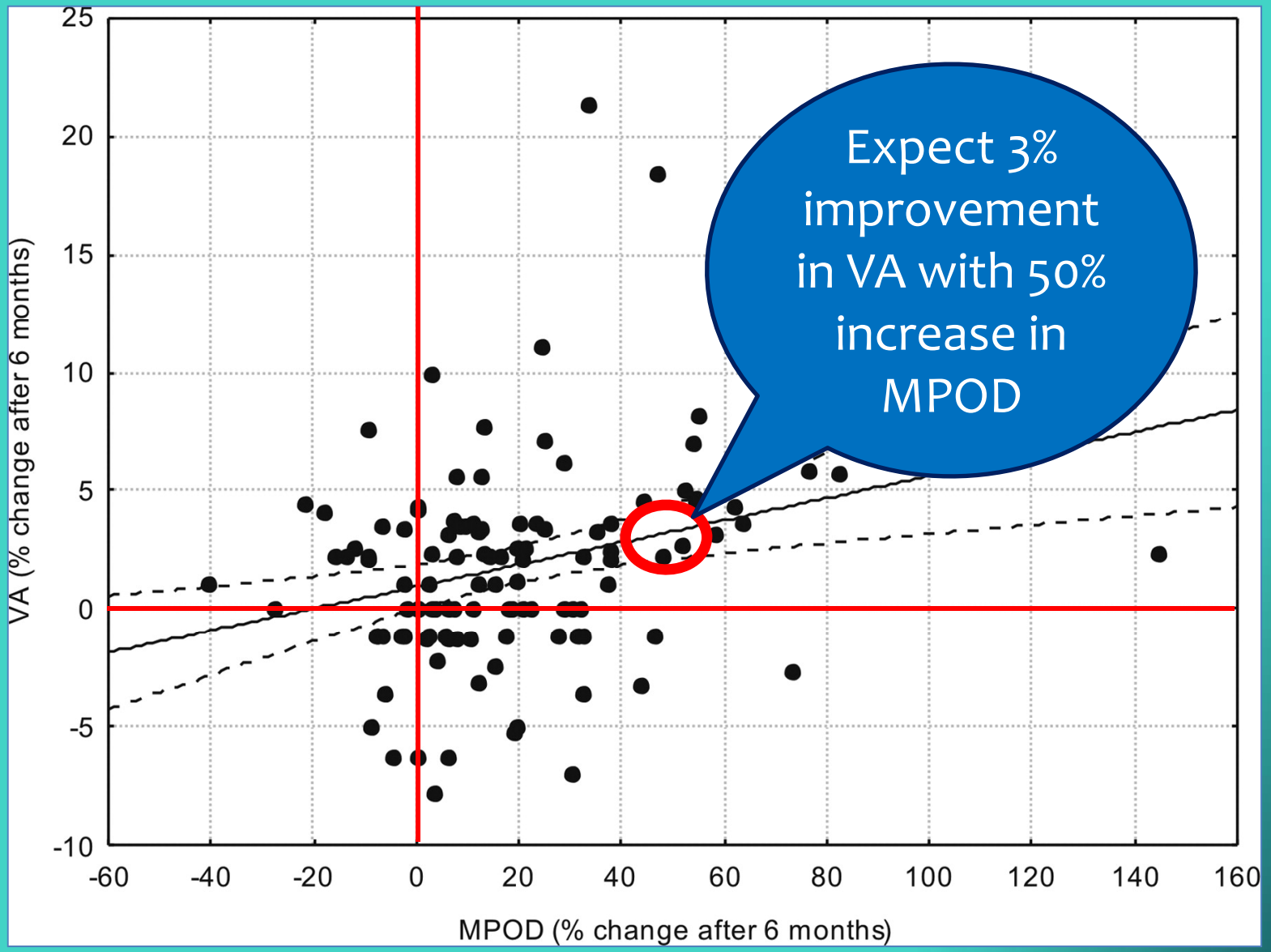
What is a Carotenoid?

AMD

- **MPOD and Lutein**
  - Low MPOD is a risk factor for AMD
  - Heterochromatic flicker photometry measures MPOD
  - Lutein supplements:
    - **Increase MPOD**
    - **Improving visual function**
    - **Decreasing AMD risk**



Weigert (2011): Correlation between MPOD at baseline and the change in MPOD after 6 months of lutein supplementation in 84 AMD patients.



Weigert (2011): Correlation between the change in MPOD and the change in VA after 6 months of lutein supplementation.

MPOD: Protecting the Eyes from Harmful Blue Light with Internal Sunglasses.

Zeaxanthin and Lutein increase Macular Pigment Optical Dens

THEORETICAL MAX

ful Blue Light Reaching Photor

VISION RISK
from harmful
blue light

Expect 50% g

100%

VISION
PROTECTION
from harmful
blue light

3%

300

300 - 40

UV RANG

Protect Cornea
with sun prote
sunglasse

800

ts

Cell
Phones

Tablets

** Ciulla, Ophthalmology 2001, 108: 730-737 Hammond, Recent Research Dev. Nutr. 2002 (5)

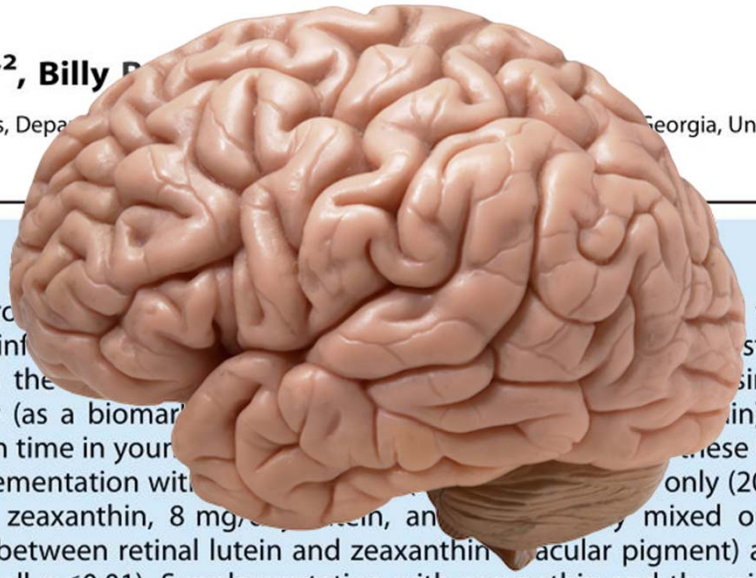
OPEN ACCESS Freely available online

PLOS ONE

A Double-Blind, Placebo-Controlled Study on the Effects of Lutein and Zeaxanthin on Neural Processing Speed and Efficiency

Emily R. Bovier[1], **Lisa M. Renzi**[1,2], **Billy R**

1 Vision Sciences and Human Biofactors Laboratories, Depa Georgia, United States of America, **2** Abbott Nutrition, Columbus, Ohio, United States of America



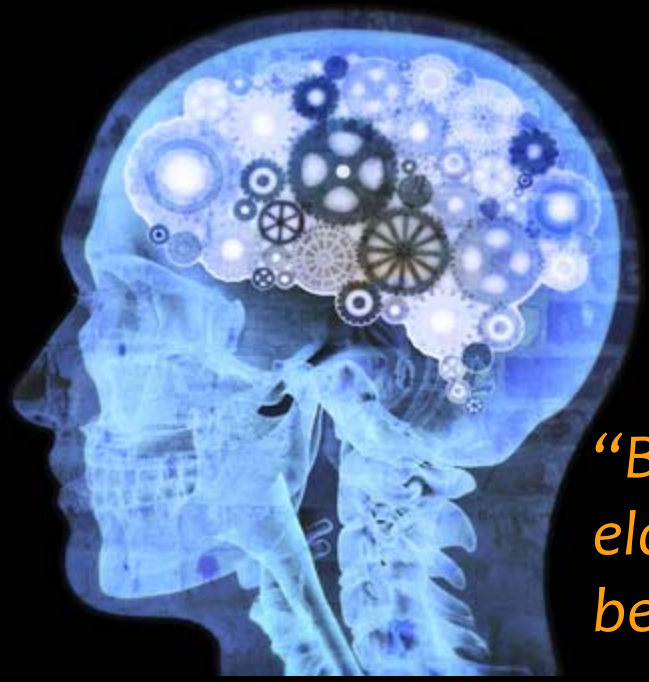
Abstract

Lutein and zeaxanthin are major carc visual pathways. It has been hypothesized that these pigments inf st-retina, and that increasing lutein and zeaxanthin levels within the sing speeds. To test this, we measured macular pigment density (as a biomar in), critical flicker fusion (CFF) thresholds, and visual motor reaction time in your ese outcome variables were also assessed after four months of supplementation wit only (20 mg/day; n = 29) or a mixed formulation containing 26 mg/day zeaxanthin, 8 mg/ in, an mixed omega-3 fatty acids (n = 25). Significant correlations were found between retinal lutein and zeaxanthin acular pigment) and CFF thresholds ($p<0.01$) and visual motor performance (overall $p<0.01$). Supplementation with zeaxanthin and the mixed formulation (considered together) produced significant ($p<0.01$) increases in CFF thresholds (~12%) and visual motor reaction time (~10%) compared to placebo. In general, increasing macular pigment density through supplementation (average increase of about

"Increasing macular pigment density through supplementation resulted in significant improvements in visual processing speed, even when testing young, healthy individuals who tend to be at peak efficiency."

PLOS One. 2014;9:1-6

Focus is Everything.



"Both young, healthy adults and the elderly population can gain cognitive benefits from L and Z supplementation."

J Ophthalmol. 2015;2015: 865179.

AMD

What about meso-zeaxanthin (MZ)?

- MZ is not found in significant quantities in the diet, but is produced by the retina
- Sabour-Pickett (2014)
  - Adding MZ to a lutein supplement resulted in **larger MPOD gains and greater improvement in contrast sensitivity than lutein & zeaxanthin alone**
  - 3 mg L, and 2 mg Z, 17 mg MZ

Retina. 2014;34:1757

Contents lists available at ScienceDirect

Progress in Retinal and Eye Research

journal homepage: www.elsevier.com/locate/prer

Lutein, zeaxanthin, and *meso*-zeaxanthin: The basic and clinical science underlying carotenoid-based nutritional interventions against ocular disease

Paul S. Bernstein [a, *, 1], Binxing Li [a, 1], Preejith P. Vachali [a, 1], Aruna Gorusupudi [a, 1], Rajalekshmy Shyam [a, 1], Bradley S. Henriksen [a, 1], John M. Nolan [b, 1]

[a] *Department of Ophthalmology and Visual Sciences, Moran Eye Center, University of Utah School of Medicine, 65 Mario Capecchi Drive, Salt Lake City, UT, 84132, USA*

[b] *Macular Pigment Research Group, Vision Research Centre, School of Health Science, Carriganore House, Waterford Institute of Technology West Campus, Carriganore, Waterford, Ireland*

"Recent studies suggest that supplementation with a formulation containing all three macular carotenoids (i.e. lutein, zeaxanthin, and meso-zeaxanthin) offers advantages over formulations not containing all three components of MP."

PRER. 2015;50:34–66

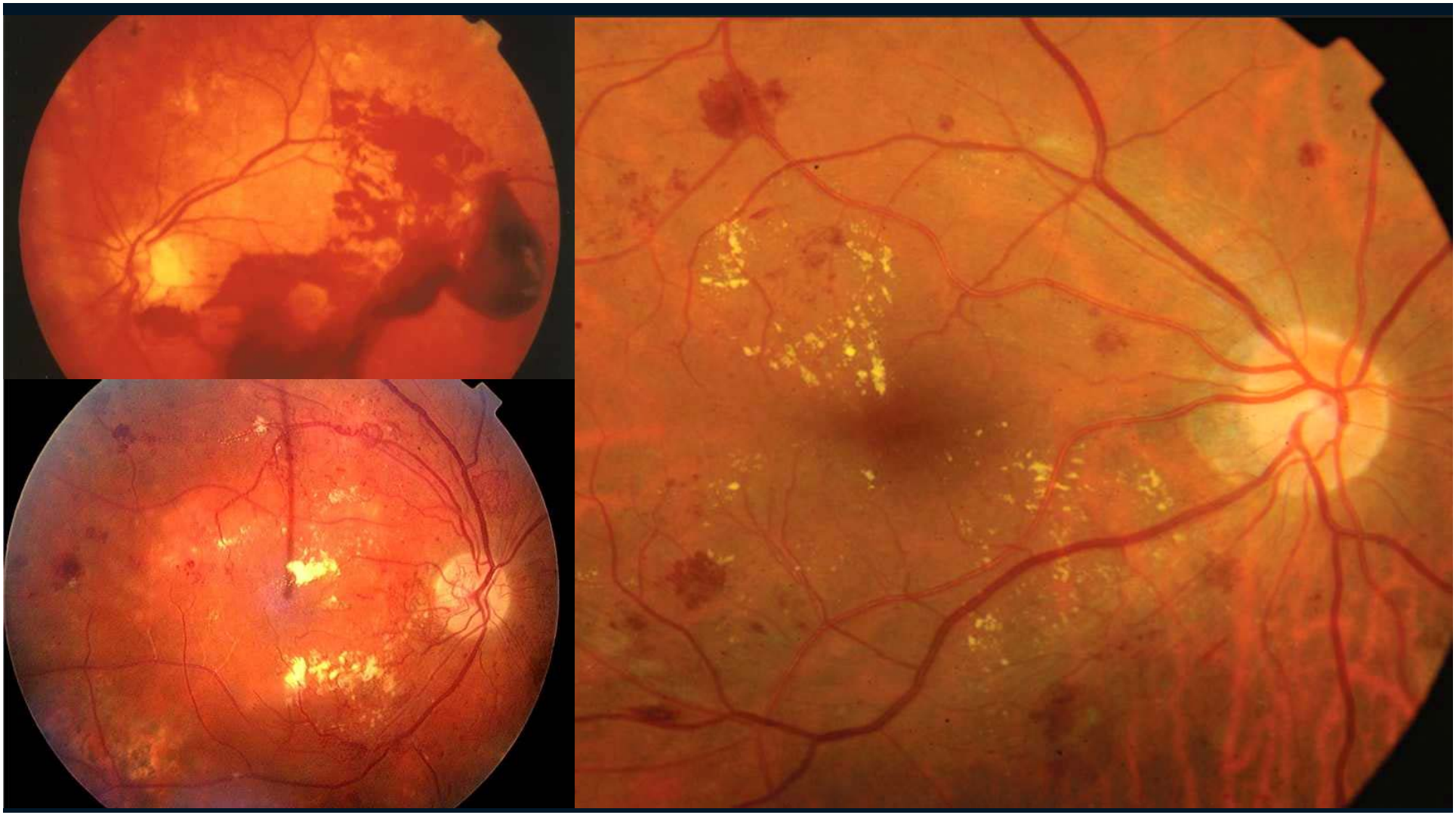

MacuHeal
With LMZ3
TRUST THE SCI
To maintain macular health
Pour l'entretien de la santé maculair
90 Gélules
90 Soft Gels
DIETARY SUPPL
Contains Meso-Zeaxanthin for macular health
Contient Meso-Zeaxanthin pour la santé maculaire
Shield
Food Supplement
thin for macular health
LMZ3 Formula
Active Ingredients
Meso-zeaxanthin 10mg
Lutein 10mg
Zeaxanthin 2mg
Inactive Ingredients
Sunflower Seed Oil 506mg
Vitamin E 3.75 IU
Beeswax & Fatty Acid 39mg
Beef Gelatin 37.5mg

Self Assessment Quiz

Do you prescribe lutein-containing supplements?

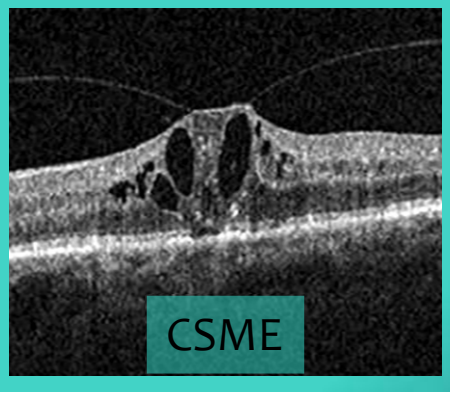
- If so, award yourself 1 point
- If not, award yourself 0 points
- BONUS: If you also test MPOD, award yourself 1 bonus point

Diabetic Retinopathy



Diabetic Retinopathy

- **Clinical Features**
  - Loss of pericytes leads to microaneurysms and breakdown of blood-retinal barrier
  - Background retinopathy (NPDR)
  - Diabetic macular edema (CSME)
  - Proliferative retinopathy (PDR)



Diabetic Retinopathy

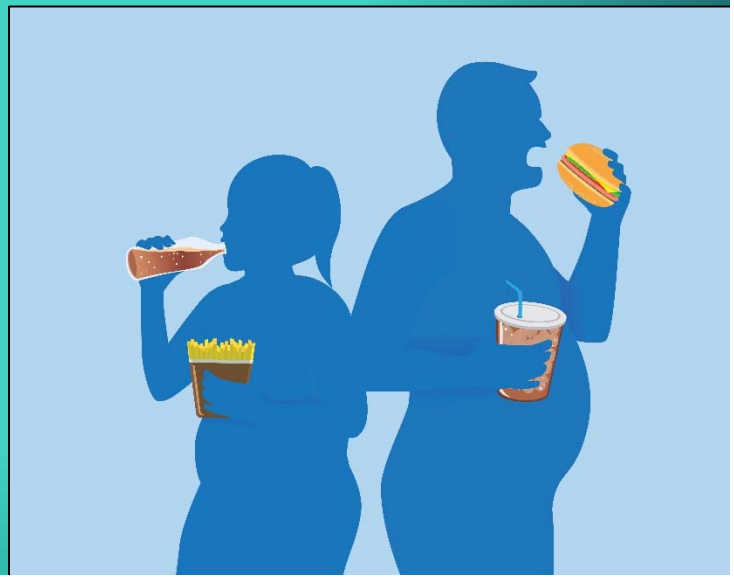
- **How to monitor**
  - **Systemic control** (HgA1C, HTN, cholesterol)
  - Routine dilated fundus exams
  - OCT to detect macular edema
  - OCTA: Macular ischemia & early neovasclarization
  - **Diet and Nutraceuticals**
  - Other ocular manifestations of diabetes
    - Rubeosis
    - Cranial nerve palsies
    - Ischemic optic neuropathy

Diabetic Retinopathy

- **When to Refer**
  - Patients needing Avastin
    - Center-involved macular edema
    - High risk patients (monocular, etc)
  - Patients needing PRP
    - PDR
    - Severe NPDR
    - Rubeosis

Diabetic Retinopathy

- Systemic Control
  - **Tight blood glucose control lowers risk of DR and its progression**
  - Address co-morbidities & lifestyle
    - Hypertension, Dyslipidemia, **Sleep apnea**
    - Obesity, exercise, smoking



Editorial

How Was Your Sleep? New Implications for Obstructive Sleep Apnea in Retinal Disease

It is not uncommon for patients to wonder how well rested their surgeon is; conversely, it is increasingly clear that we should be asking the same of our patients. Obstructive sleep apnea (OSA) is a highly prevalent sleep disorder that has been implicated as a risk factor for an increasing number of systemic and ophthalmic diseases. Consensus estimates place the prevalence of glaucoma was 2%, similar to the prevalence in the general population.[18] Similarly, a large multicenter study in France reviewed the records of nearly 10,000 patients and after elimination of confounders such as age, no relationship between glaucoma and OSA was found.[19]

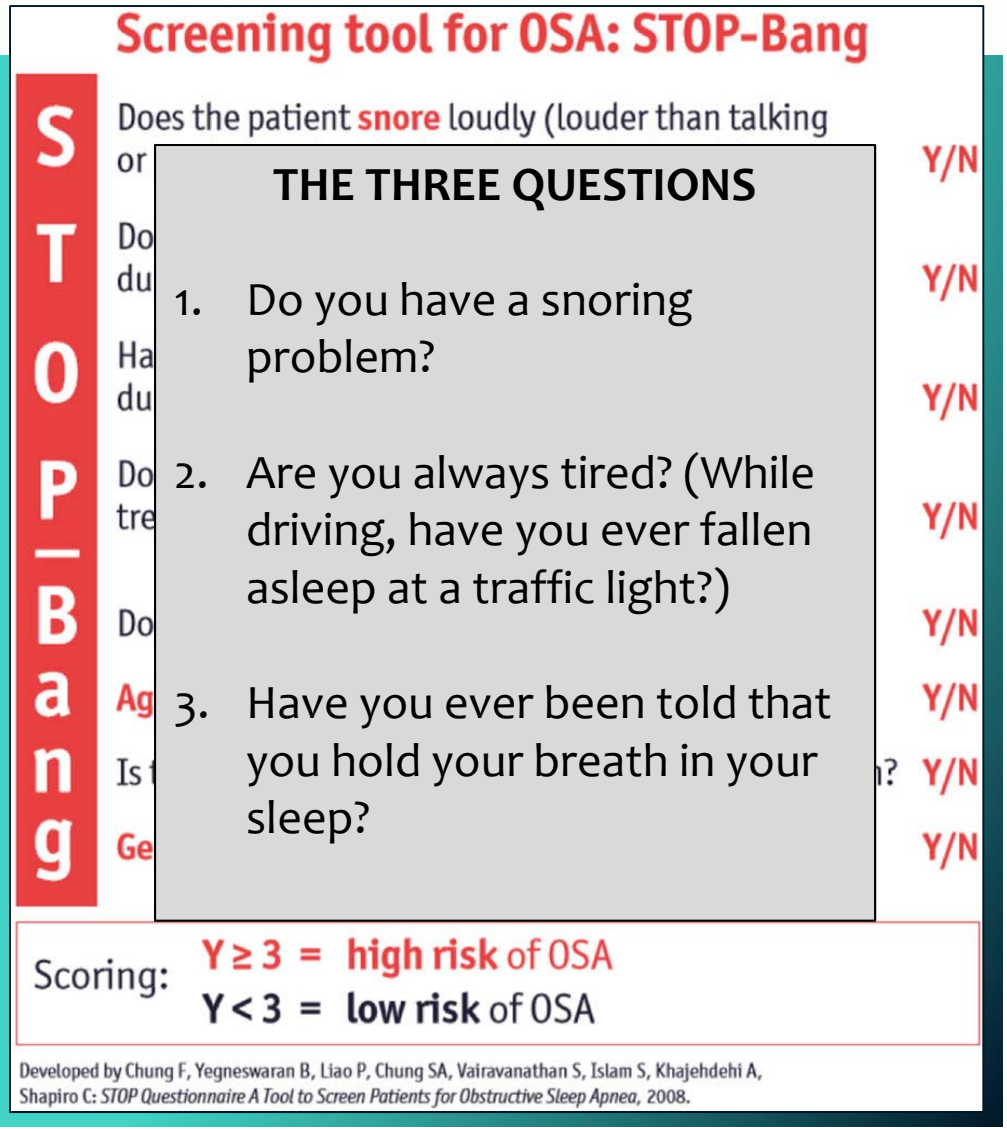
The role of OSA in diabetic retinopathy is becoming

"OSA is an independent risk factor for the development and progression of diabetic retinopathy. More than simply increasing the risk for ophthalmic disease, recent work suggests OSA might hamper the therapeutic benefits of anti-VEGF therapy."

Retina. 2016;36: 657–9.

Diabetic Retinopathy

- **Screening for OSA**
  - Sleepiness, snoring, neck circumference, BMI
  - **FES is highly specific for OSA**
    - 96% also have OSA
    - FES associated with more severe OSA



Screening tool for OSA: STOP-Bang

S T O P _ B a n g

Does the patient **snore** loudly (louder than talking or

Do du

Ha du

Do tre

Do

Ag

Is t

Ge

Y/N

Y/N

Y/N

Y/N

Y/N

Y/N

Y/N

THE THREE QUESTIONS

1. Do you have a snoring problem?
2. Are you always tired? (While driving, have you ever fallen asleep at a traffic light?)
3. Have you ever been told that you hold your breath in your sleep?

Scoring: **Y ≥ 3 = high risk** of OSA
Y < 3 = low risk of OSA

Developed by Chung F, Yegneswaran B, Liao P, Chung SA, Vairavanathan S, Islam S, Khajehdehi A, Shapiro C: *STOP Questionnaire A Tool to Screen Patients for Obstructive Sleep Apnea*, 2008.

Self Assessment Quiz

Do you screen for sleep apnea among your diabetic patients?

- If so, award yourself 1 point
- If not, award yourself 0 points

Diabetic Retinopathy

- How to delay DR and prevent vision loss
  - Earlier diagnosis of diabetes
  - Tighter metabolic control
  - Routine DFE (at least annually)
    - Photography
    - OCT of macula
  - **Nutraceuticals?**
  - Prompt treatment (laser, anti-VEGF, steroids) when indicated

OPEN ACCESS

The Diabetes Visual Function Supplement Study (*DiVFuSS*)

A Paul Chous,[1] Stuart P Richer,[2] Jeffry D Gerson,[3] Renu A Kowluru[4]

[1]Private Practice, Tacoma, Washington, USA
[2]Captain James A Lovell Federal Heath Care Center, North Chicago, Illinois, USA
[3]Private Practice, Olathe, Kansas, USA
[4]Kresge Eye Institute, Wayne State University, Detroit, Michigan, USA

Correspondence to
Dr A Paul Chous, FAAO,

ABSTRACT

Background Diabetes is known to affect visual function before onset of retinopathy (diabetic retinopathy (DR)). Protection of visual function may signal disruption of mechanisms underlying DR.

Methods This was a 6-month randomised, controlled clinical trial of patients with type 1 and type 2 diabetes with no retinopathy or mild to moderate non-proliferative retinopathy assigned to twice daily consumption of placebo or a novel, multi-component formula containing xanthophyll pigments, antioxidants and selected

the risk of DR and its progression, evidence shows that there is no level of average blood glucose (as reflected by glycosylated haemoglobin) that is totally protective against DR. The current clinical algorithm for delaying DR and preventing STR is earlier diagnosis of diabetes, tighter metabolic control, routine dilated retinal examinations and treatment (laser photocoagulation, intravitreal injections of anti-vascular endothelial growth factor (VEGF) agents and corticosteroids) if/when DR progresses to a level that threatens vision.

"This [study] suggests that the DiVFuSS formula positively influences the pathogenesis of diabetes-induced retinal dysfunction… independent of tight or improved blood glucose control."

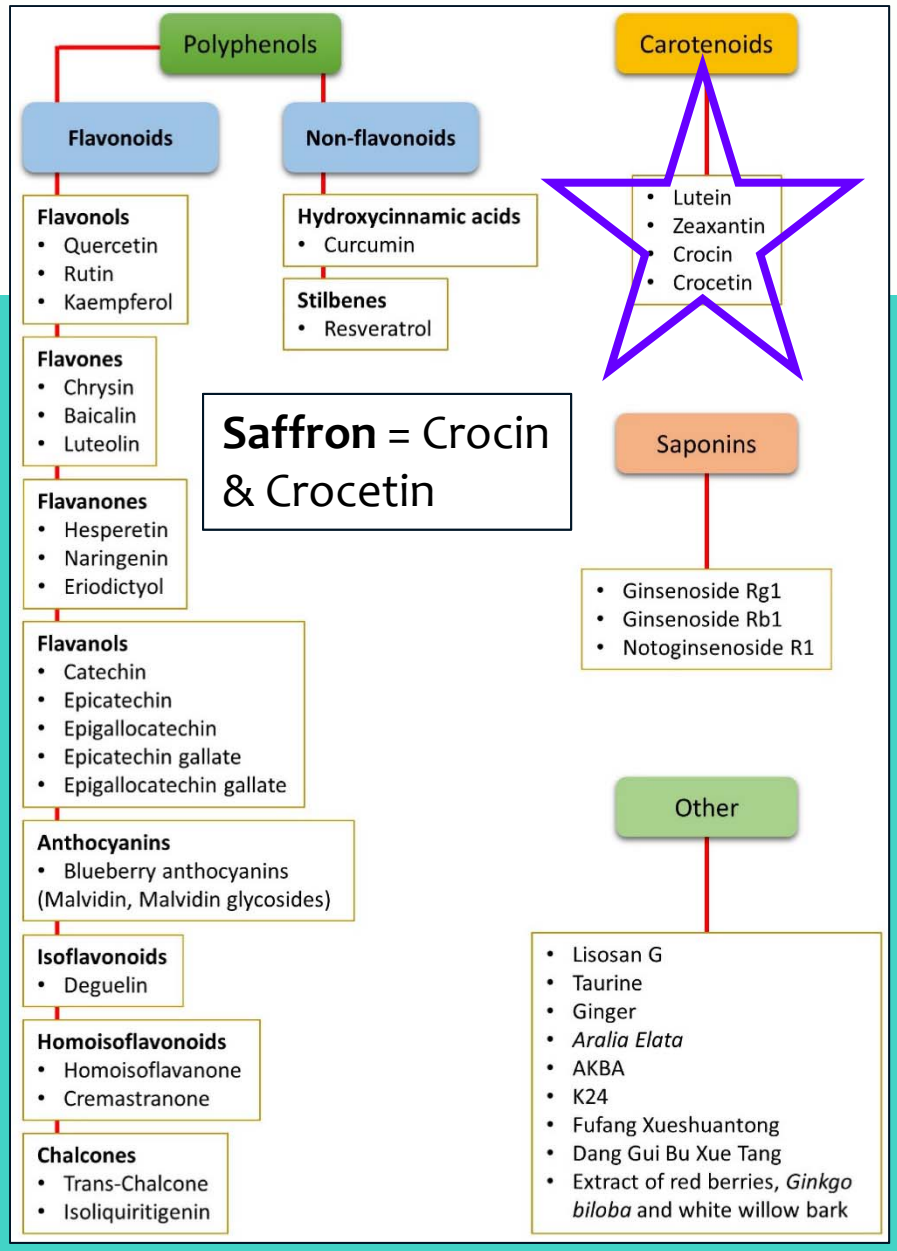
Br J Ophthalmol. 2016;100:227-34

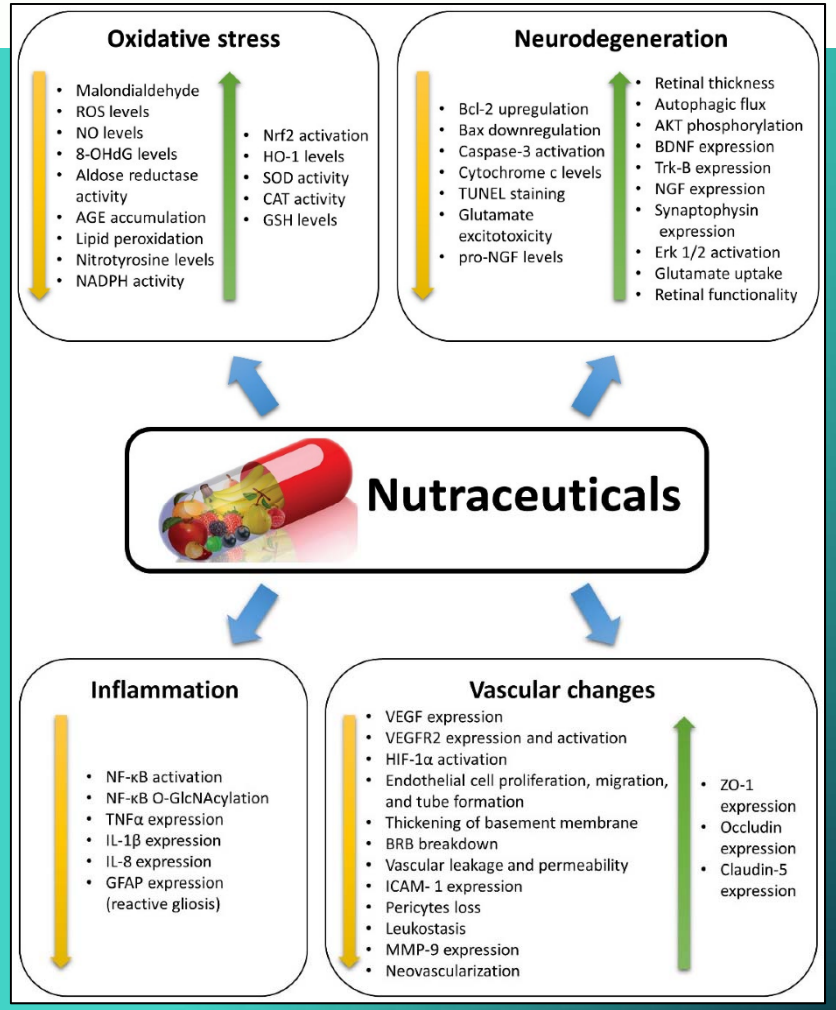
DiVFuSS Constituents	Mitigates DR in animal models	Blocks capillary cell apoptosis	Improves retinal capillary fragility	Reduces VEGF	Reduces oxidative stress	Reduces AGE activity	Reduces Polyol activity	Reduces PKC activity	Reduces NF-Kβ
Alpha-Lipoic Acid	•		•	•	•				•
Benfotiamine	•	•				•	•	•	
Vitamins C/E	•				•		•		•
Curcumin	•			•	•	•			•
Vitamin D3	•			•					
DHA/EPA	•	•			•				
Grape Seed Extract		•			•	•			
Resveratrol	•	•			•				
Green Tea Extract				•					
N-Acetyl Cysteine	•			•	•				
CoQ10					•				
Zinc	• (in AREDS)								
Pycnogenol	•		•		•				•
Lutein/Zeaxanthin	•			•	•				•

DiVFuSS Constituents	Improves visual function in humans	Reduces retinal edema in humans	Improves endothelial dysfunction in humans	Improves retinal blood flow in humans	Reduces HbA1c in humans	Improves Dyslipi-demia in humans	Reduces blood pressure in humans	Reduces DPN symptoms in humans
Alpha-Lipoic Acid			•	•				•
Benfotiamine			•			•		•
Vitamins C/E			•	•		•		
Curcumin	•	•		•				
Vitamin D3					•	•		
DHA/EPA			•			•	•	
Grape Seed Extract								
Resveratrol			•		•			
Green Tea Extract			•			•	•	
N-Acetyl Cysteine								
CoQ10			•					
Zinc						•		
Pycnogenol	•	•		•	•	•	•	
Lutein/Zeaxanthin	•	•						

Note: Suggested improvements marked by • include published evidence in animal and/or cell models, except as specifically noted, but do not reflect grading of that evidence.

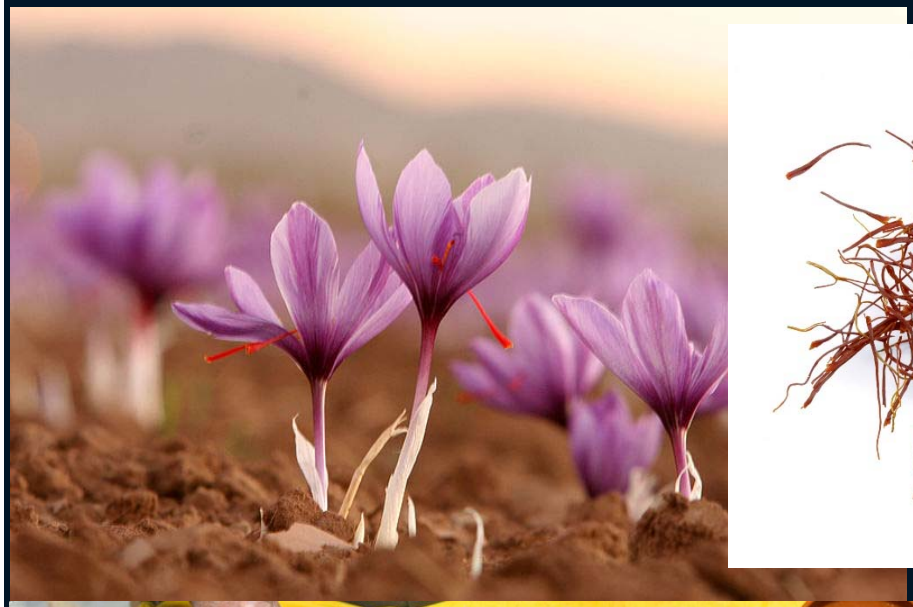
Nutraceuticals & DR

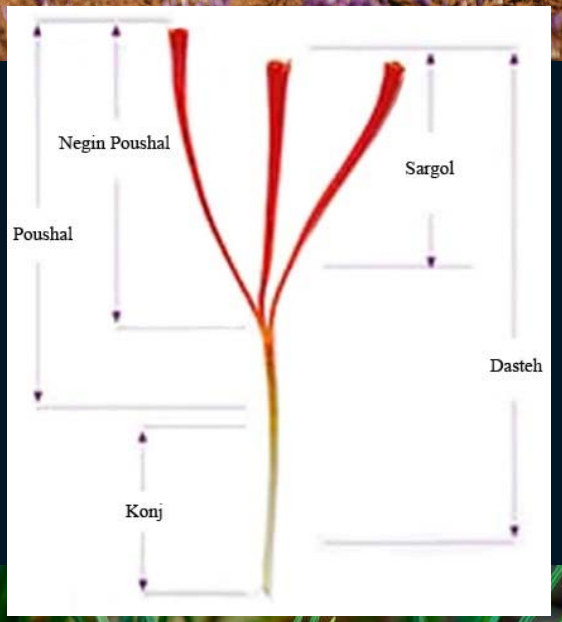




Rossino & Casini. Nutrients 2019;11:771

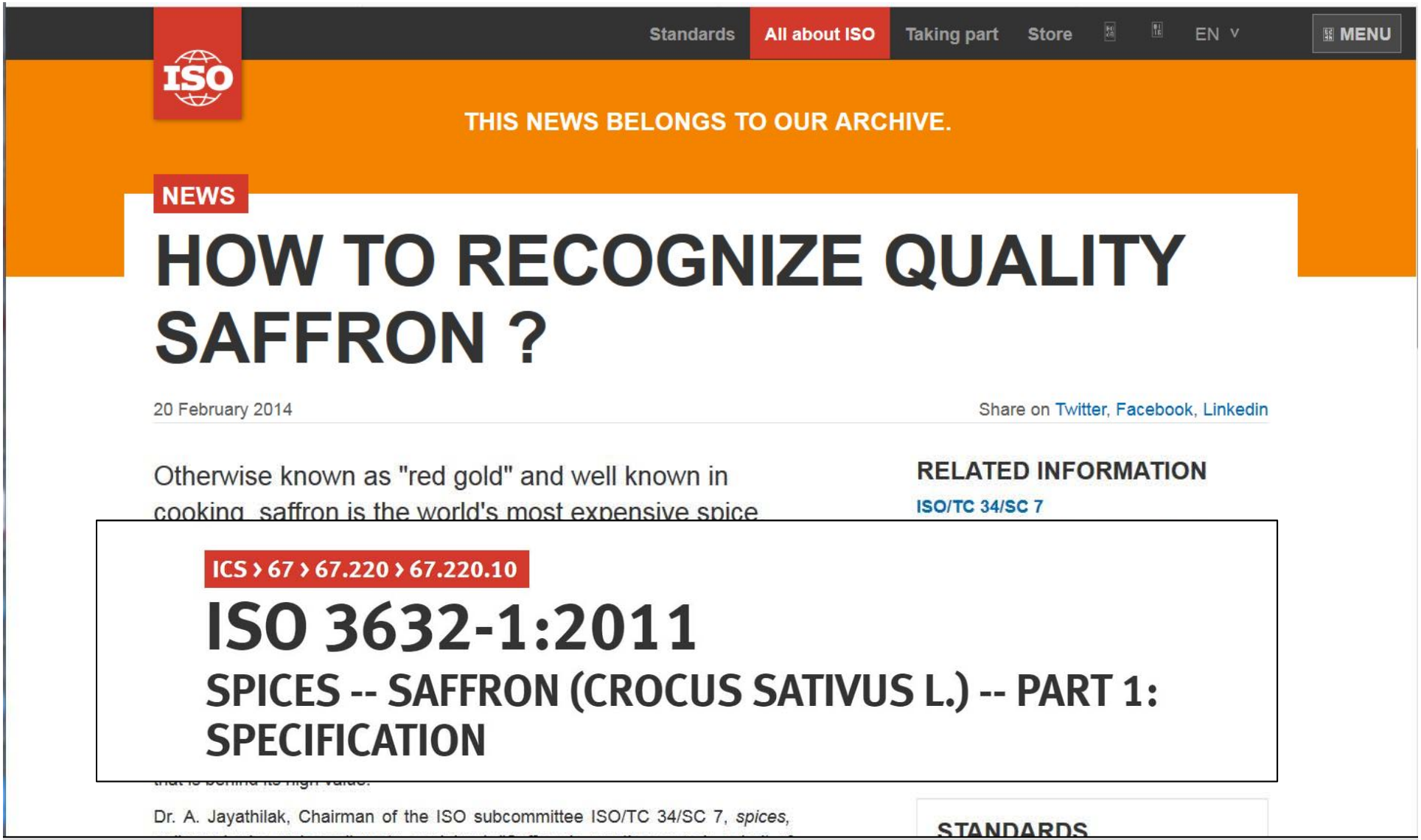
What is saffron?



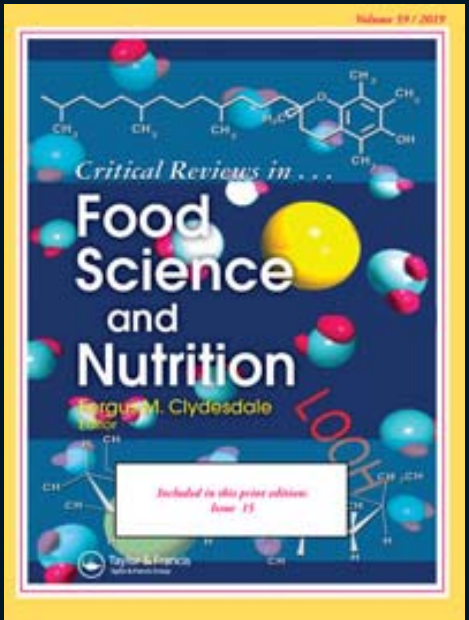


Saffron is unarguably the most expensive spice you can find on the planet. It's usually sold in a few grams or even ounces, just a few red threads of this delicate and exquisite tasting plant make up a few grams.

On the market, premium quality saffron costs around $4000 for 1 kilogram (or $1800 a pound)! That's why it's commonly referred to as "red gold."



"It's high value has made saffron the object of frequent adulteration." International Standards Organization



Critical Reviews in Food Science and Nutrition

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/bfsn20

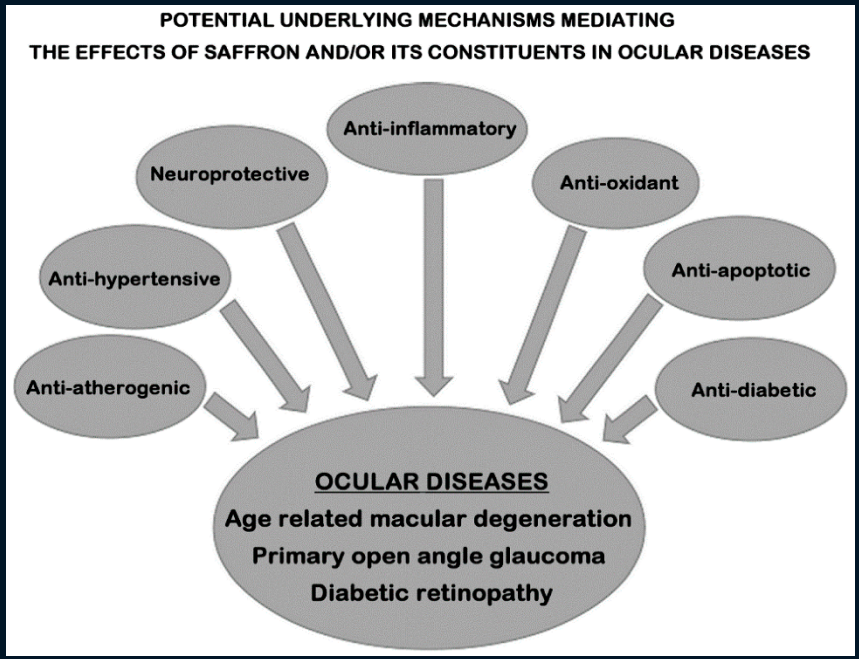
Efficacy and Safety of Saffron Supplementation: Current Clinical Findings

G. K. Broadhead[a], A Chang[a], J Grigg[a] & P McCluskey[a]

[a] Save Sight Institute, The University of Sydney, Sydney, Australia

Accepted author version posted online: 15 Apr 2015.

Saffron [30 mg/day], and its constituents such as crocetin and crocin, are effective in reducing damage mediated by reactive-oxygen species. There is evidence from clinical trials that this research translates into measurable clinical benefits.



NEW!

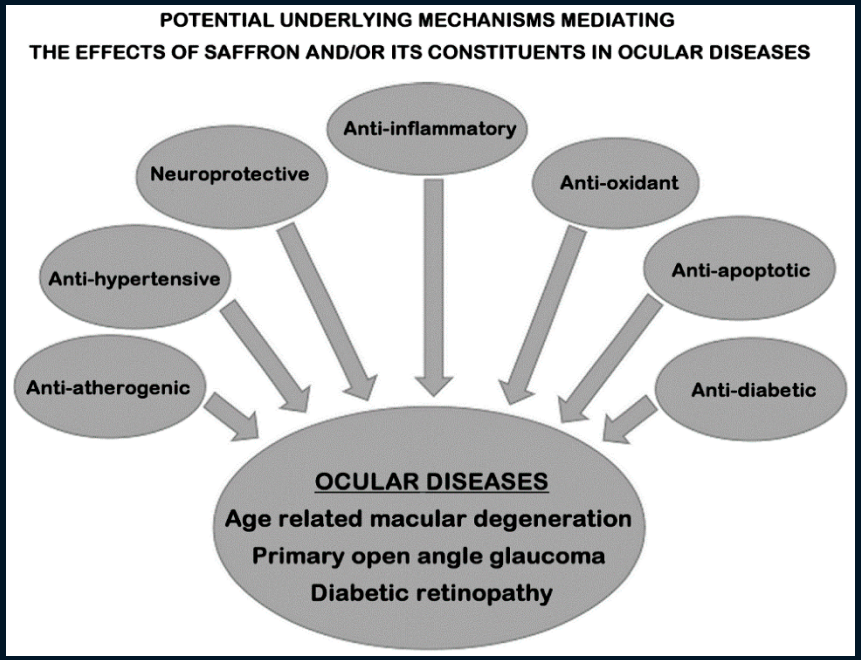
nutrients

MDPI

Review

Saffron (*Crocus sativus* L.) in Ocular Diseases: A Narrative Review of the Existing Evidence from Clinical Studies

Rebekka Heitmar [1,*], James Brown [1] and Ioannis Kyrou [2,3,4]



Saffron supplementation appears to have promising potential as an effective and safe adjunct therapy in certain ocular diseases. [There is a need for] RCTs in order to form evidence-based recommendations for the potential therapeutic role of oral saffron supplementation in ocular diseases.

Nutrients. 2019;11:649

Saffron 2020-PRO Eye Supple

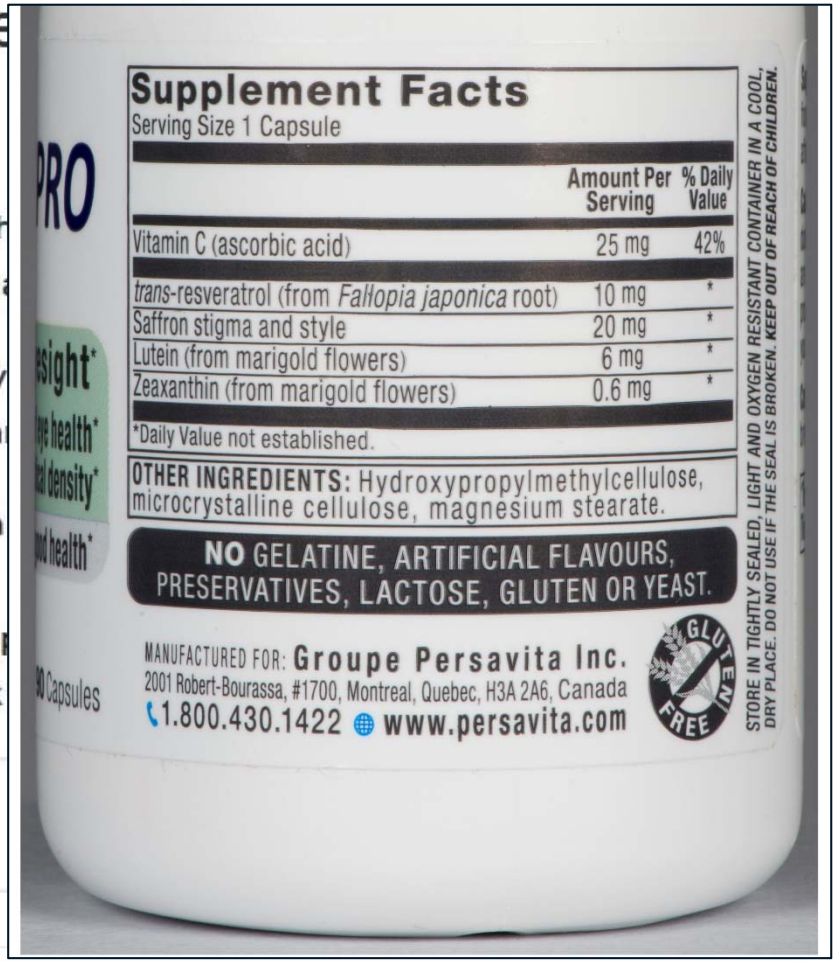
$84.97

Saffron eye h
and helps ma

Approved by
Without vita

With saffron
eye health.
90 capsules
Money-Back

1



NEW!

Nutrients

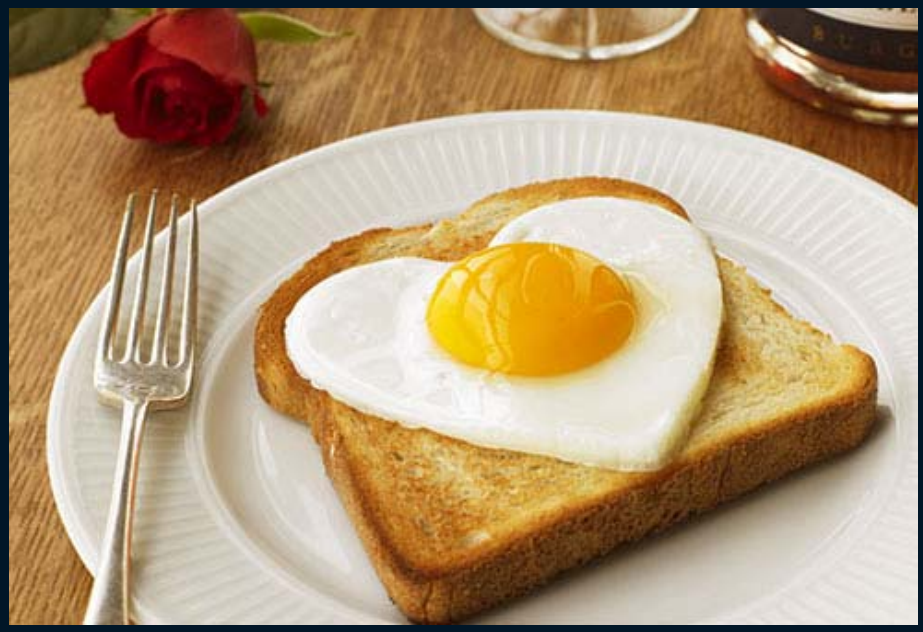
MDPI

Review

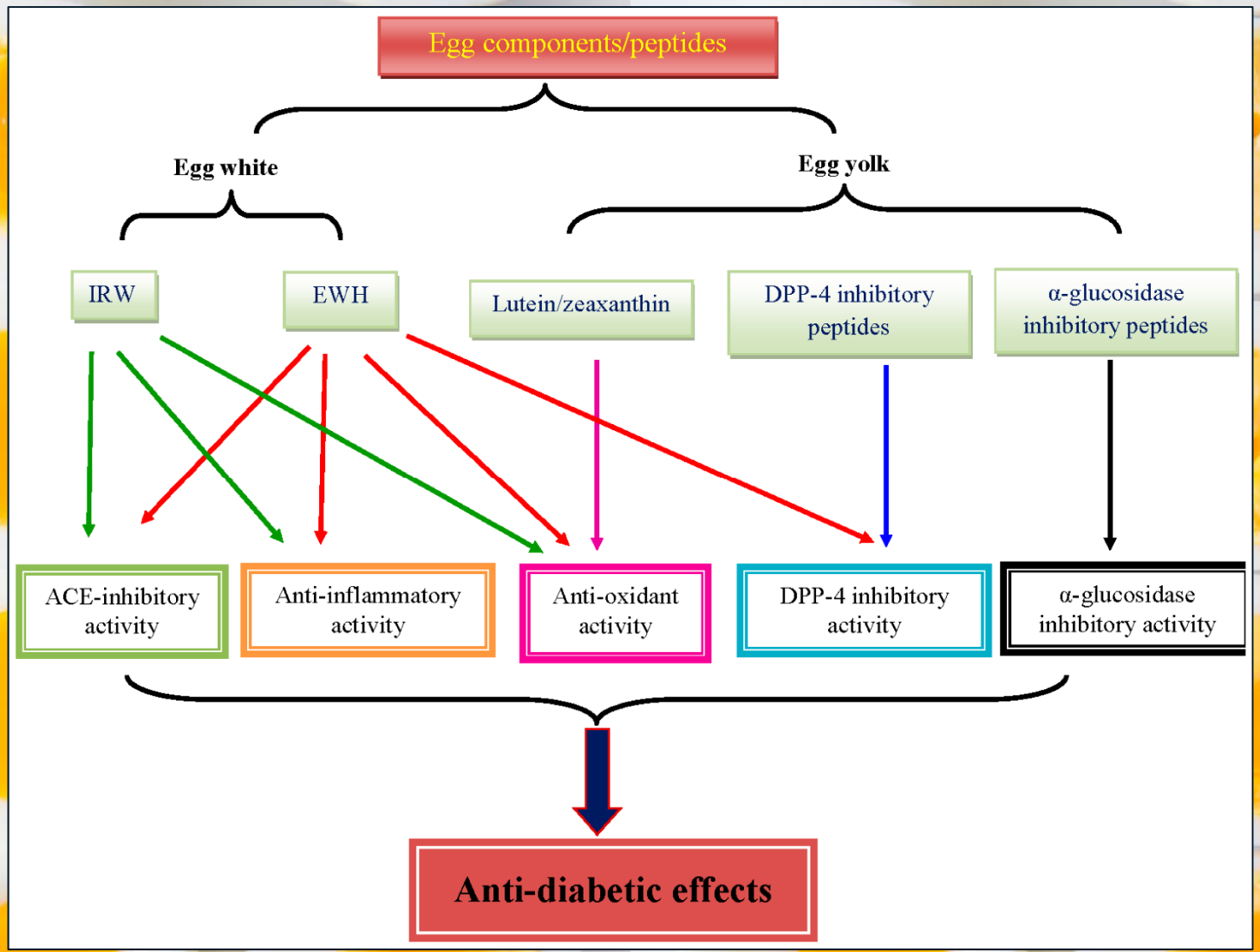
Mechanism and Potential of Egg Consumption and Egg Bioactive Components on Type-2 Diabetes

Xiaofeng Wang [1], Myoungjin Son [1], Chalamaiah Meram [1] and Jianping Wu [1,2,*]

There is association between higher egg consumption and improved blood lipid profile, insulin sensitivity, and glucose response in interventional clinical trials.

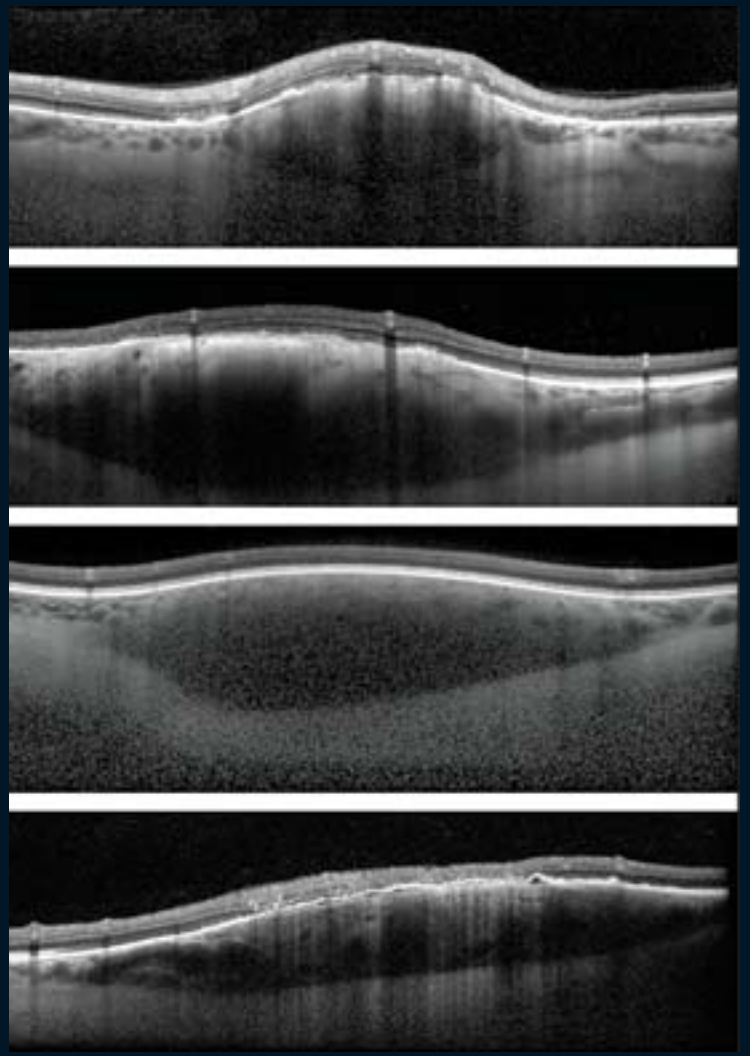


Nutrients. 2019;11:357



Nutrients. 2019;11:357

Choroidal Nevus

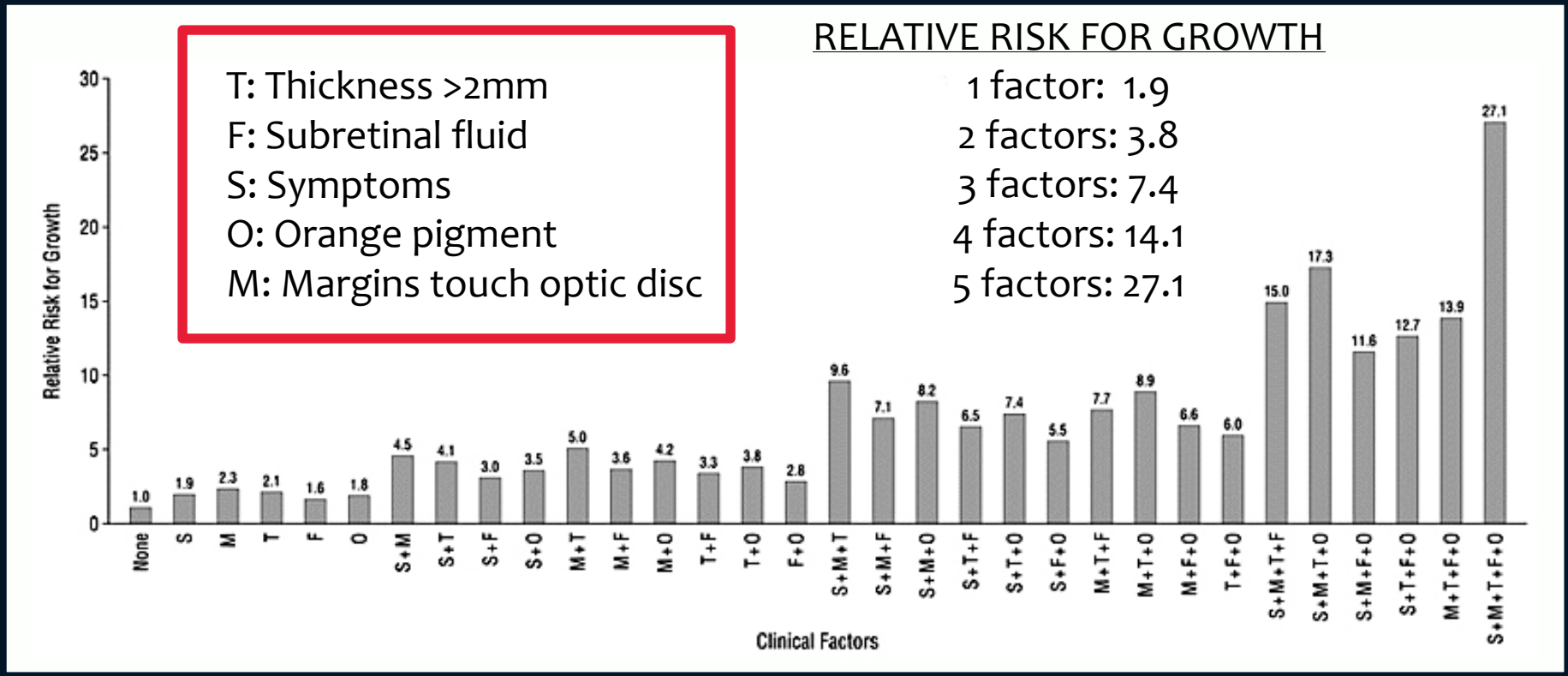


Choroidal Nevus

- **Clinical Features**
  - Clinically indistinguishable from melanoma
  - Documented growth is best evidence of malignancy
  - Other features suggestive of malignancy:

    To **F**ind **S**mall **O**cular **M**elanomas

  - **T**hickness, **F**luid, **S**ymptoms, **O**range, **M**argin
  - Risk of transformation: 1 in 8,845



Relationship between number of risk factors and documented growth of 1287 small melanocytic tumors (≤3 mm thickness) over an average 51mo follow-up period.

Arch Ophthalmol. 2000;100:360-364

This 37yoWF had photopsia and a 1.7-mm-thick choroidal pigmented mass touching the optic disc. Note the prominent orange pigment and subtle subretinal fluid. This patient had 4 of 5 risk factors for tumor growth, including symptoms, orange pigment, SRF, and margin touching the optic disc. In keeping with traditional management in 1985, serial observation was advised. Left: Baseline photograph (1985). Right: Follow-up photograph (1986). Growth was documented in base and in thickness 1 year later. Enucleation was performed. Eight years later, she died from metastatic melanoma.

NEW!

CHOROIDAL NEVUS IMAGING FEATURES IN 3,806 CASES AND RISK FACTORS FOR TRANSFORMATION INTO MELANOMA IN 2,355 CASES

The 2020 Taylor R. Smith and Victor T. Curtin Lecture

CAROL L. SHIELDS, MD, LAUREN A. DALVIN, MD, DAVID ANCONA-LEZAMA, MD,
MICHAEL D. YU, BS, MAURA DI NICOLA, MD, BASIL K. WILLIAMS, JR., MD,
J. ANTONIO LUCIO-ALVAREZ, MD, SU MAE ANG, BS, SEAN MALONEY, BS, R. JOEL WELCH, MD,
JERRY A. SHIELDS, MD

To Find Small Ocular Melanoma Doing IMaging

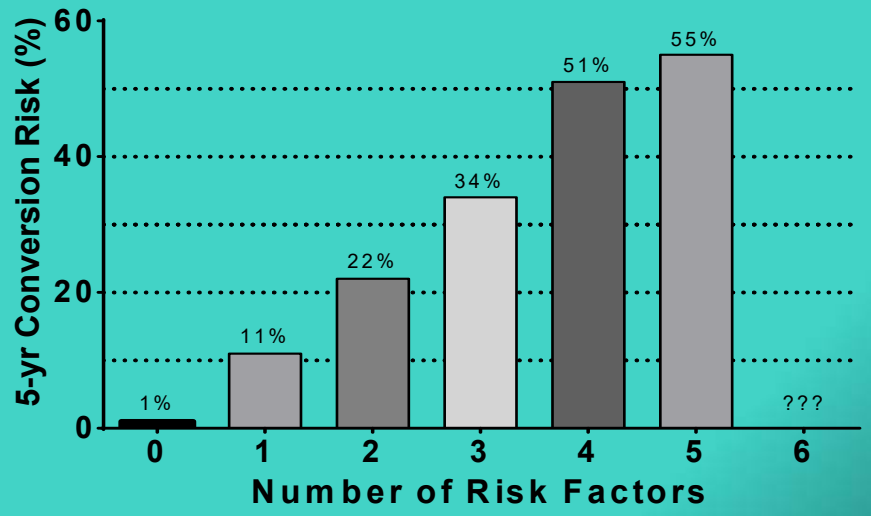
TFSOM-DIM

Retina. 2018 Dec 31.

NEW!

Choroidal Nevus

- **Imaging features associated with malignant transformation**
  - Thickness >2 mm (US) ←Ultasound – not OCT
  - Fluid subretinal (OCT)
  - Symptoms & vision loss (VA 20/50 or worse)
  - Orange pigment (FAF)
  - Melanoma hollow (US) ←No longer "Margin touching ONH"
  - DIaMeter >5mm (photography) ←NEW!

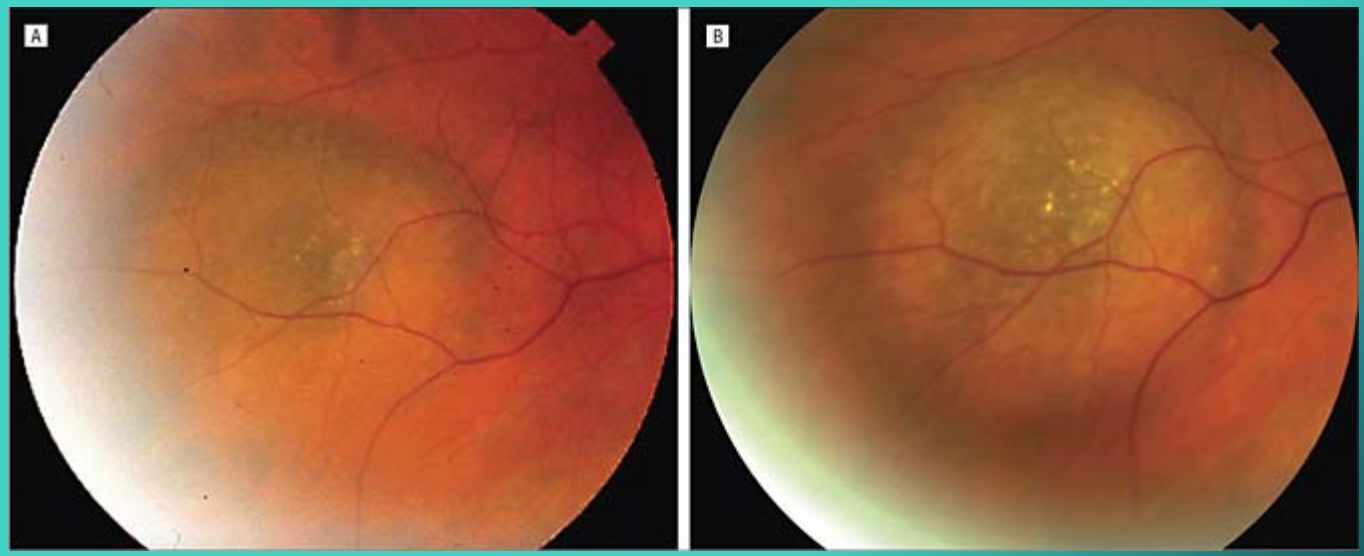


Choroidal Nevus

- How to Monitor
  - **NEVER monitor a nevus with even a single high-risk feature**
  - Annual exams with DFE
  - **Photographs:** 2 disc diam ≈ 5mm, growth
  - **FAF:** Orange pigment
  - **OCT:** Subretinal fluid, thickness, growth
  - Document TFSOM-DIM evaluation in chart

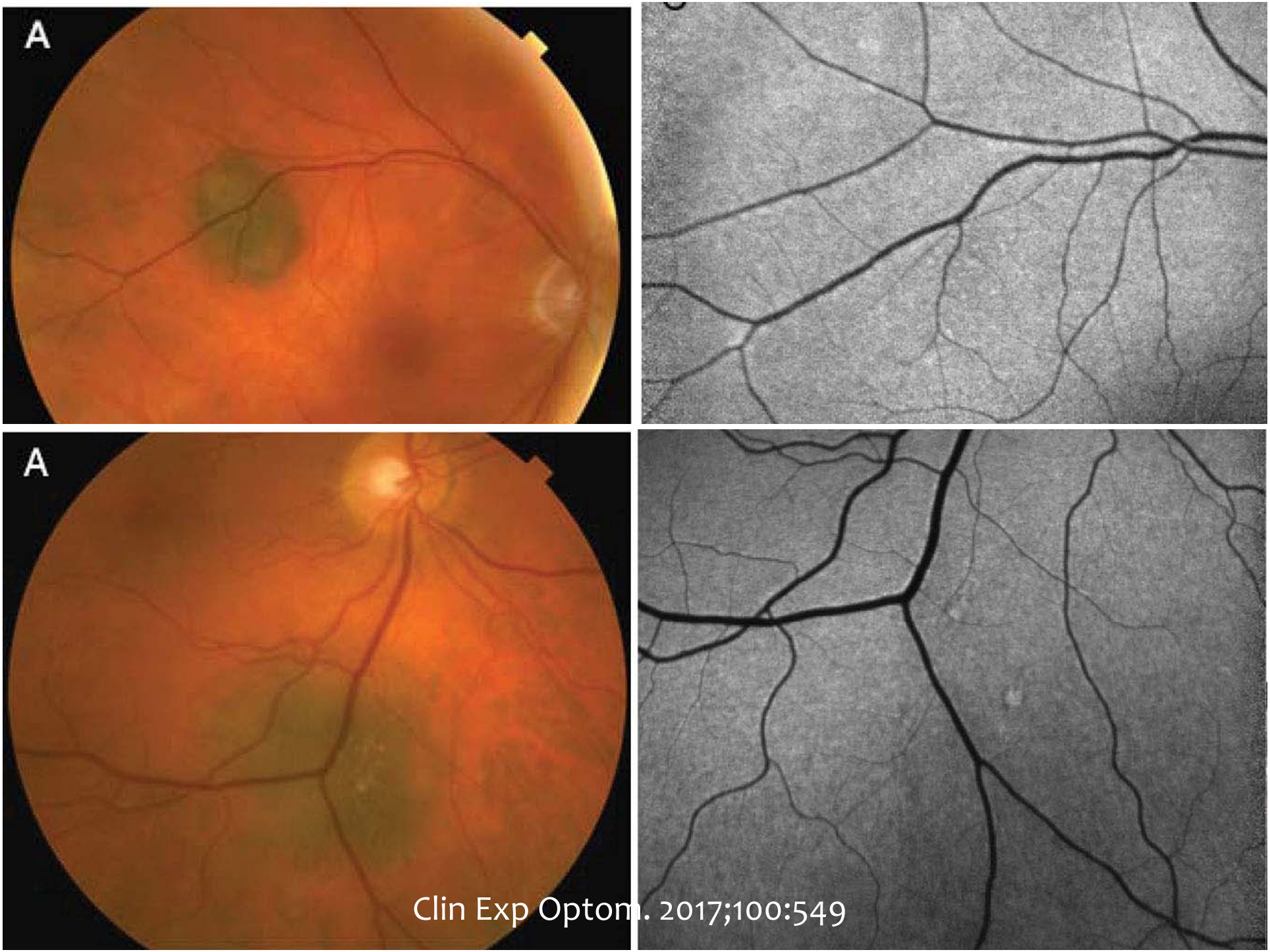
Choroidal Nevus

- **When to Refer**
  - **Any** high-risk features (TFSOM-DIM)
  - Documentation of **growth**



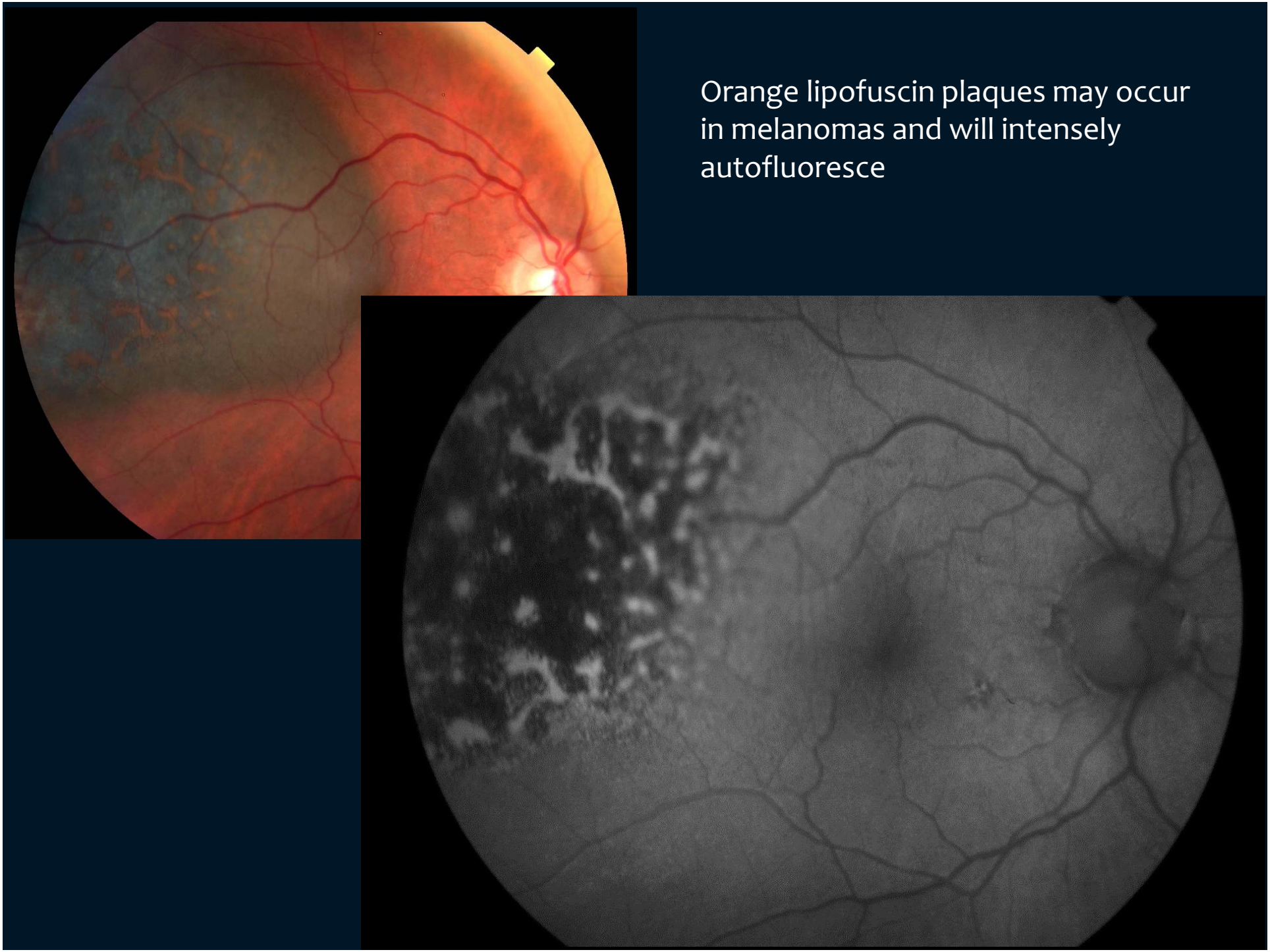
Choroidal Nevus

- **FAF features of choroidal nevus**
  - Hypo-autofluorescence (56%) – RPE degeneration
  - Hyper-autofluorescence (25%) – Drusen
  - Normal autofluorescence (19%) – No change
- **FAF features of choroidal melanoma**
  - Tumor itself is not autofluorescent
  - Autofluorescence of lipofuscin and SRF



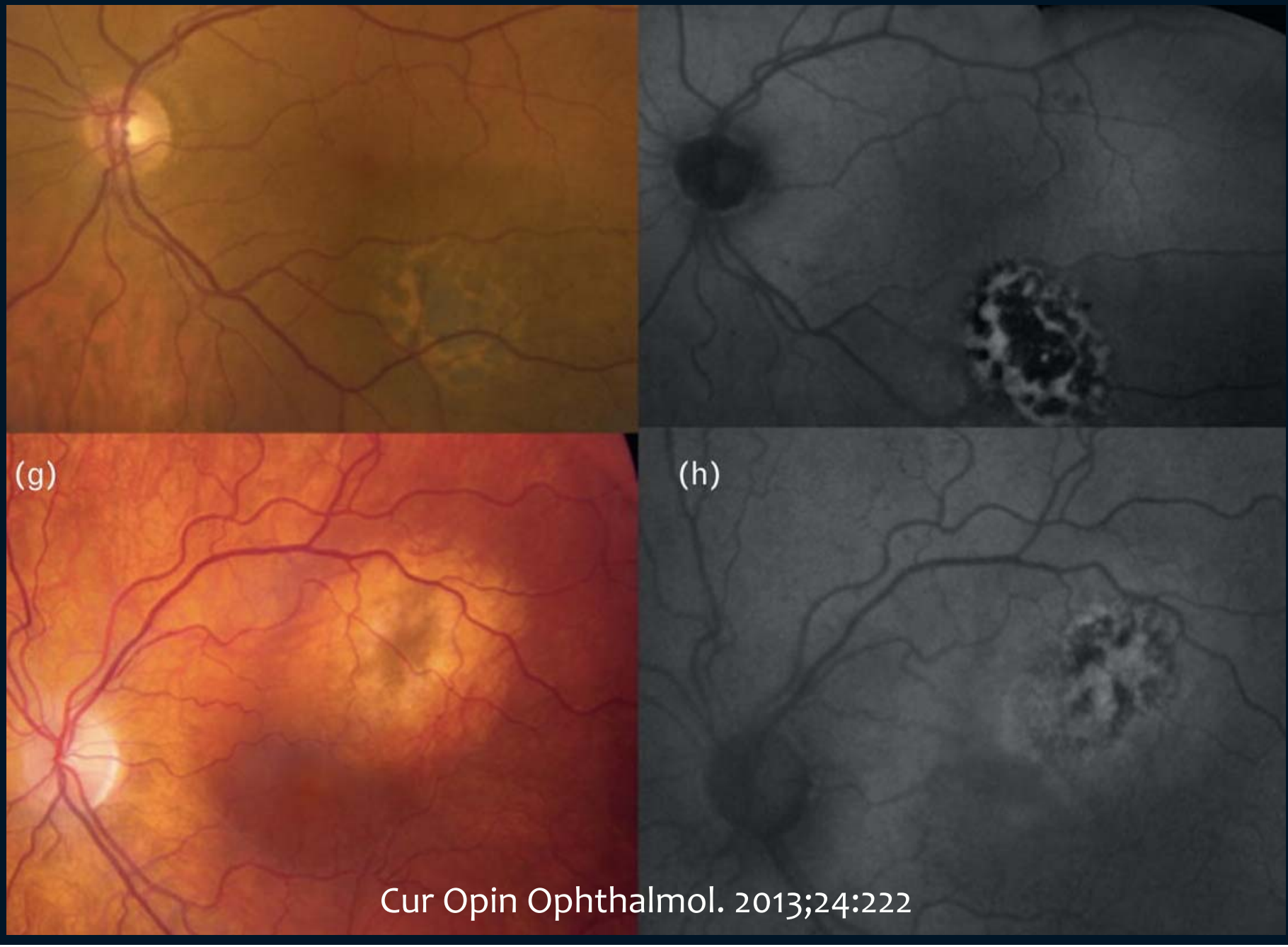
Clin Exp Optom. 2017;100:549

Acta Ophthalmol. 2018;96:102



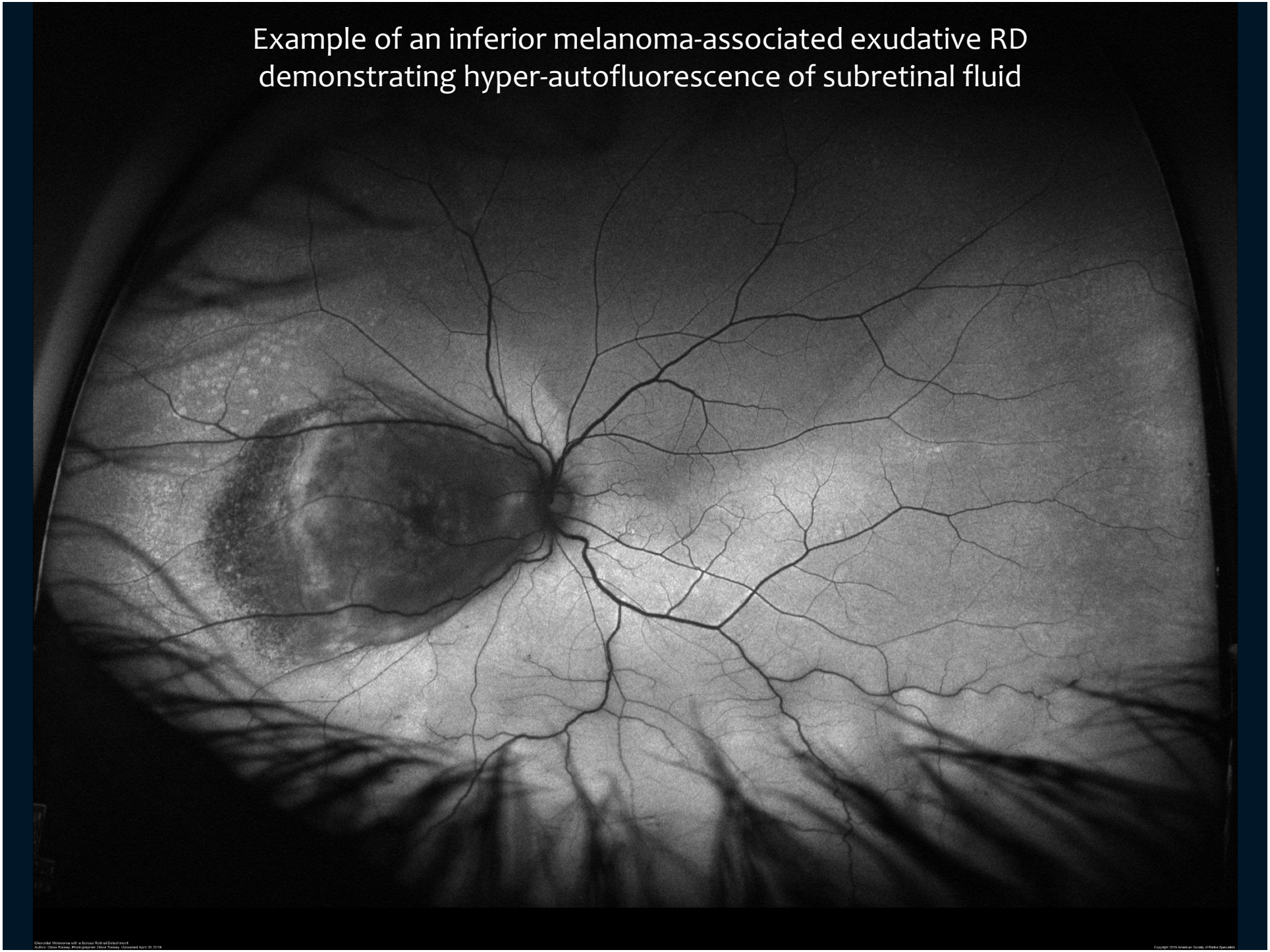
Orange lipofuscin plaques may occur in melanomas and will intensely autofluoresce

Examples of small melanomas associated with hyperautofluorescent lipofuscin pigment

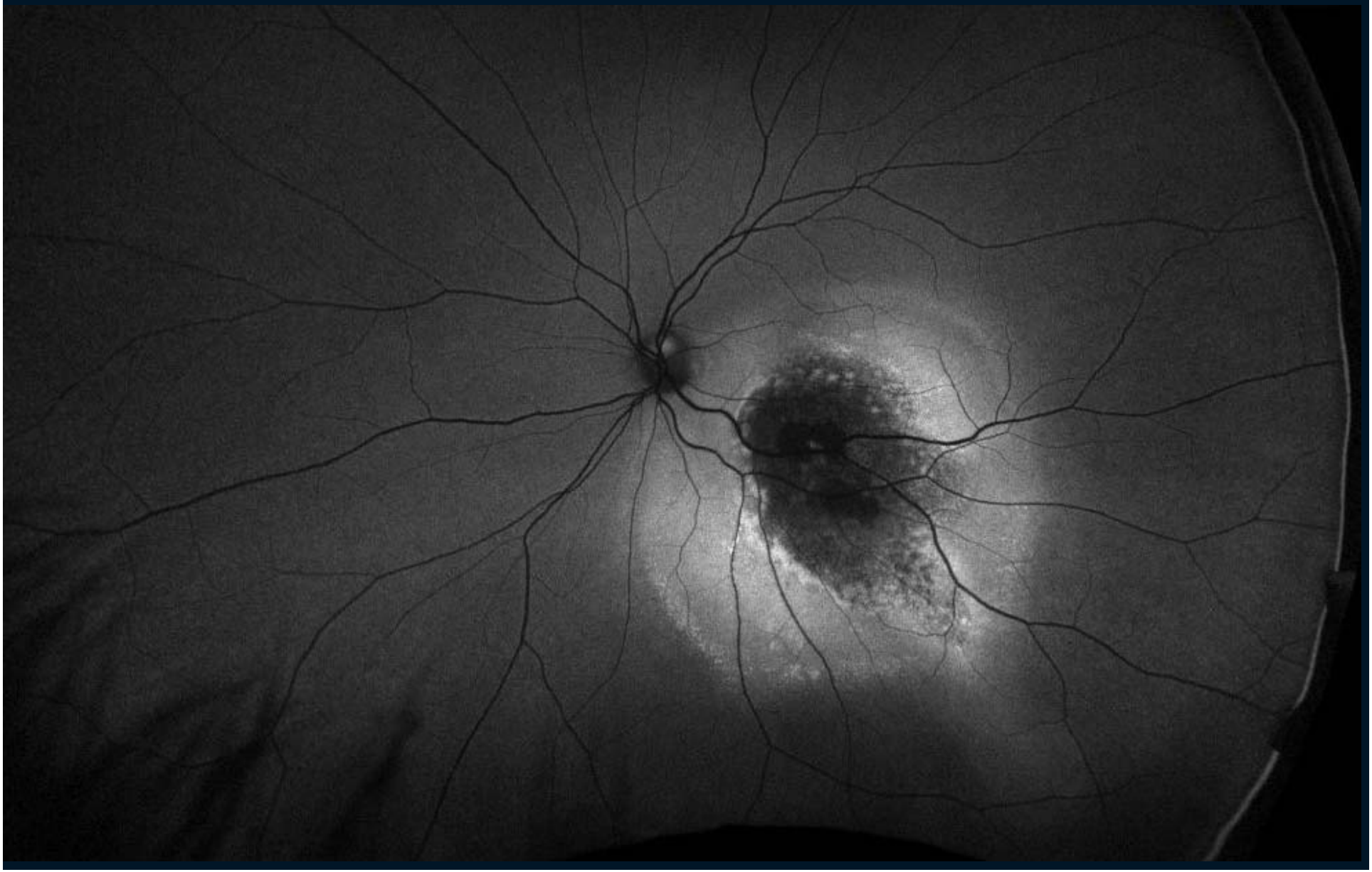


Cur Opin Ophthalmol. 2013;24:222

Example of an inferior melanoma-associated exudative RD demonstrating hyper-autofluorescence of subretinal fluid

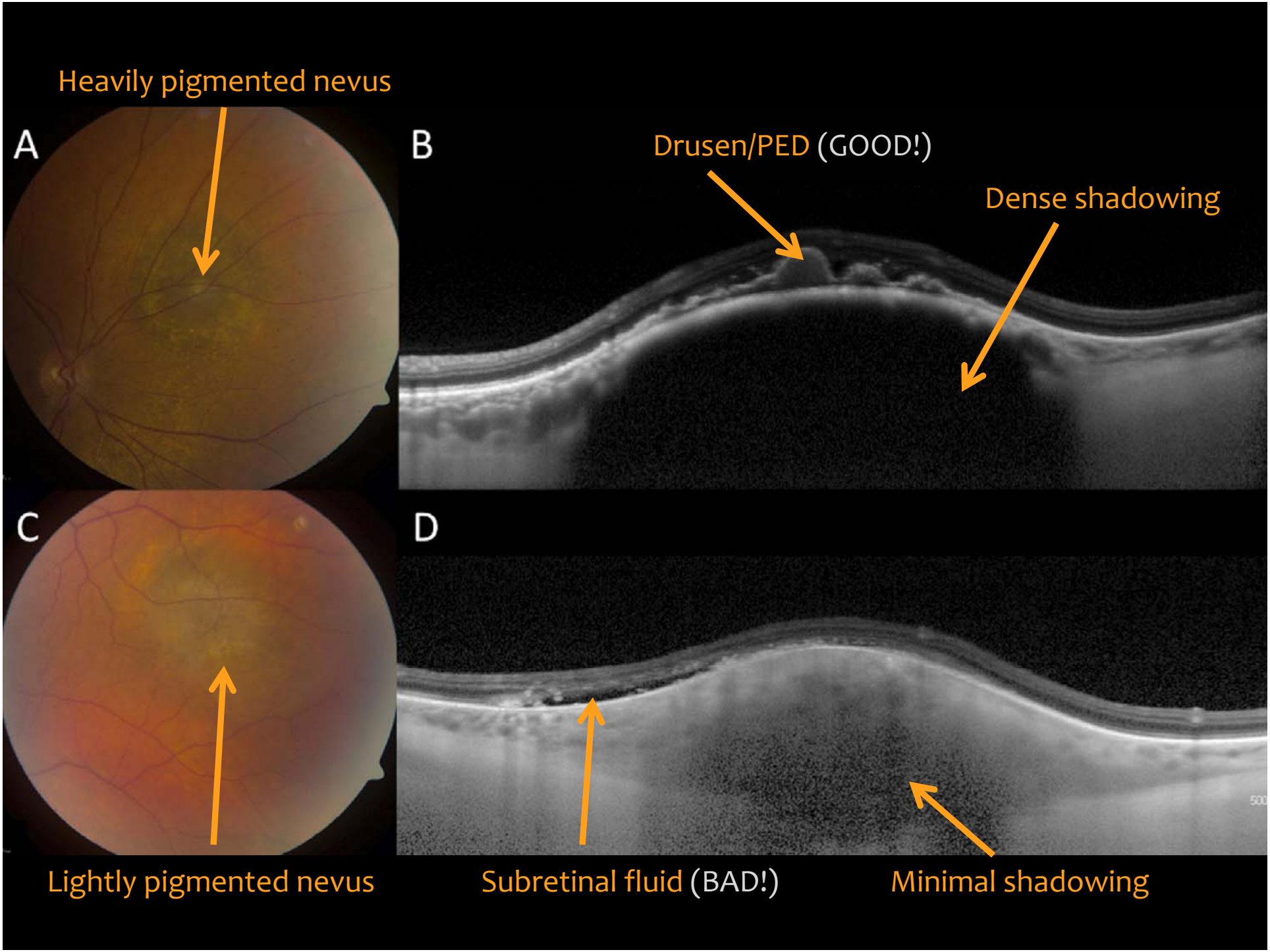


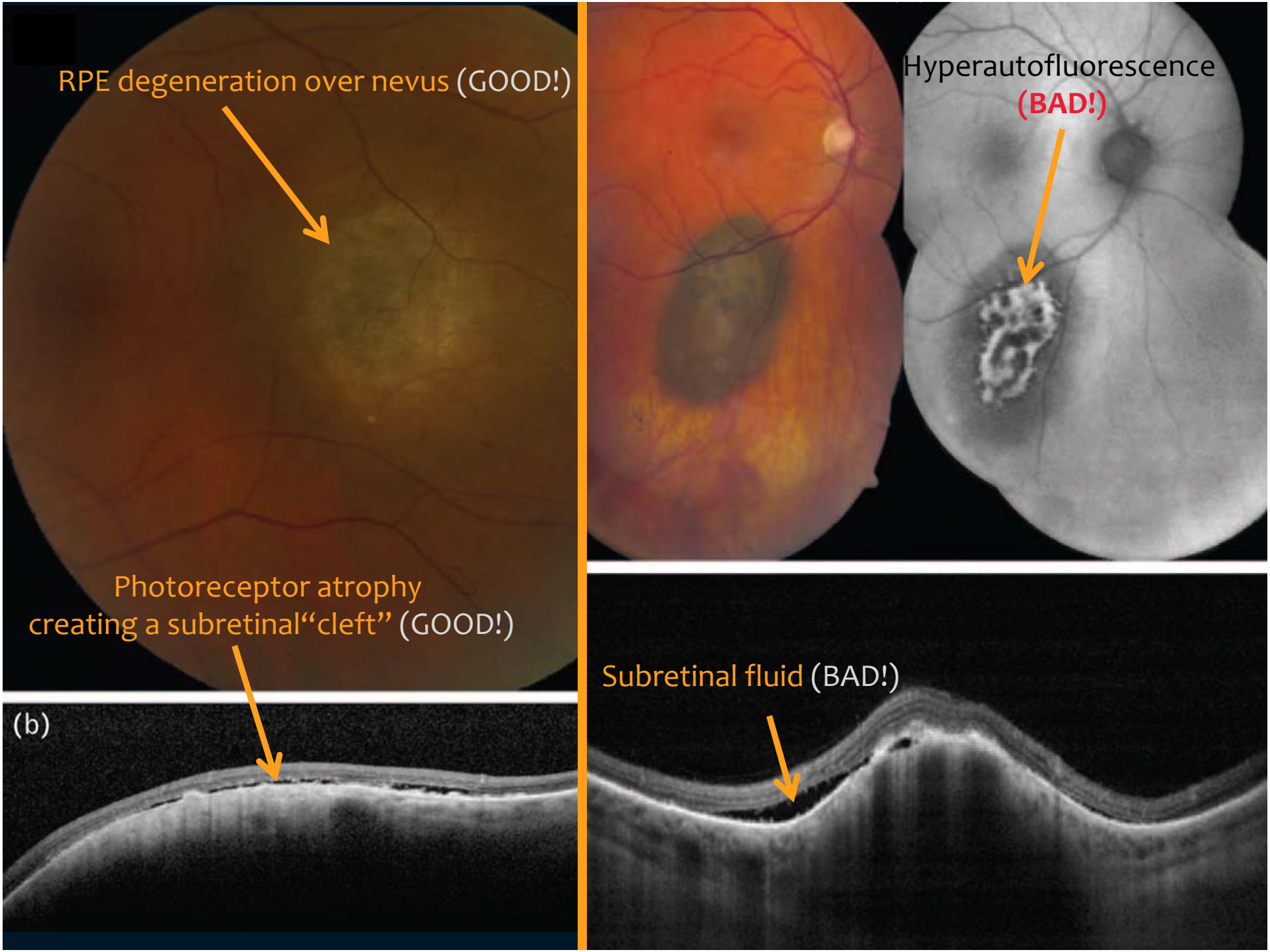
Example of hyper-autofluorescence of subretinal fluid surrounding a melanoma

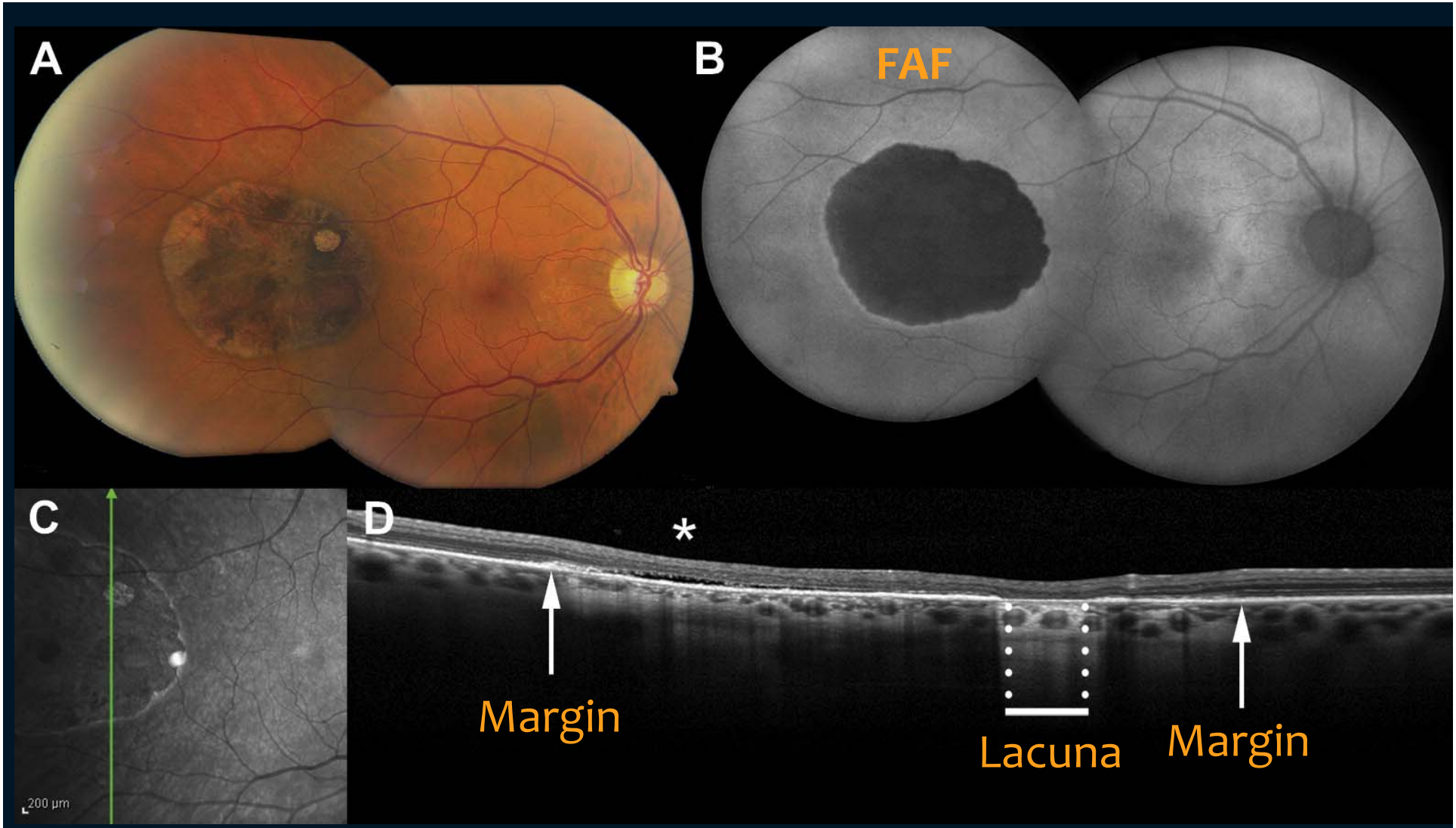


Choroidal Nevus

- **OCT features of choroidal nevus**
  - Gently sloping smooth surface
  - Overlying RPE and retinal degeneration
  - Choroidal shadowing varies with pigment
  - Absence of exudation
  - **Lesion thickness**
    - <2mm = nevus
    - 2-3mm = suspicious for melanoma
    - ≥3mm = melanoma

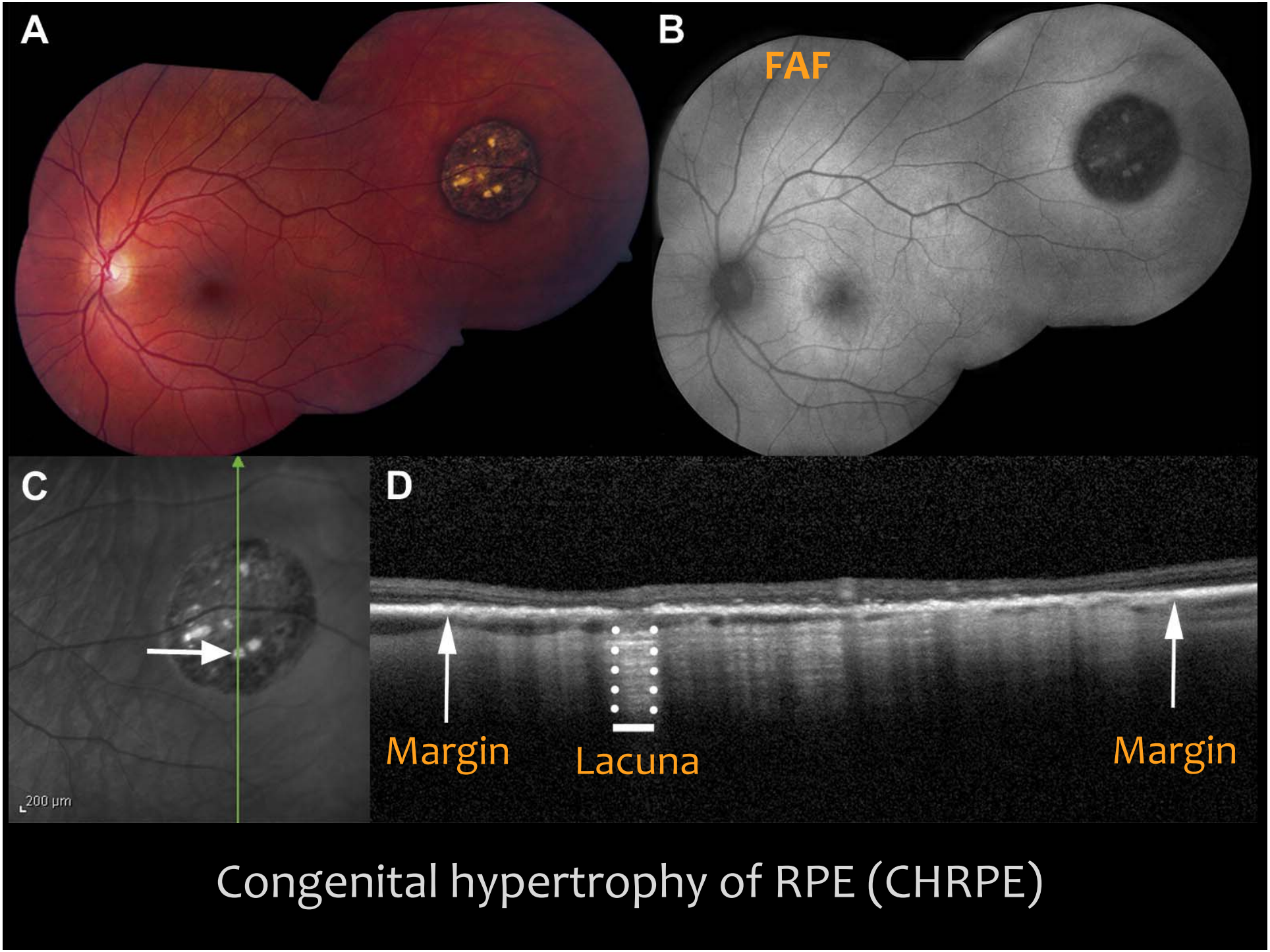

Heavily pigmented nevus
A
B
Drusen/PED (GOOD!)
Dense shadowing
C
D
Lightly pigmented nevus
Subretinal fluid (BAD!)
Minimal shadowing


RPE degeneration over nevus (GOOD!)
Hyperautofluorescence
(BAD!)
Photoreceptor atrophy
creating a subretinal“cleft” (GOOD!)
(b)
Subretinal fluid (BAD!)



Congenital hypertrophy of RPE (CHRPE)

Both choroid and retina is thinned within the margins of the lesion. Lacunae are window defects that permit light transmission through the lesion. * marks intraretinal cleft caused by photoreceptor atrophy.



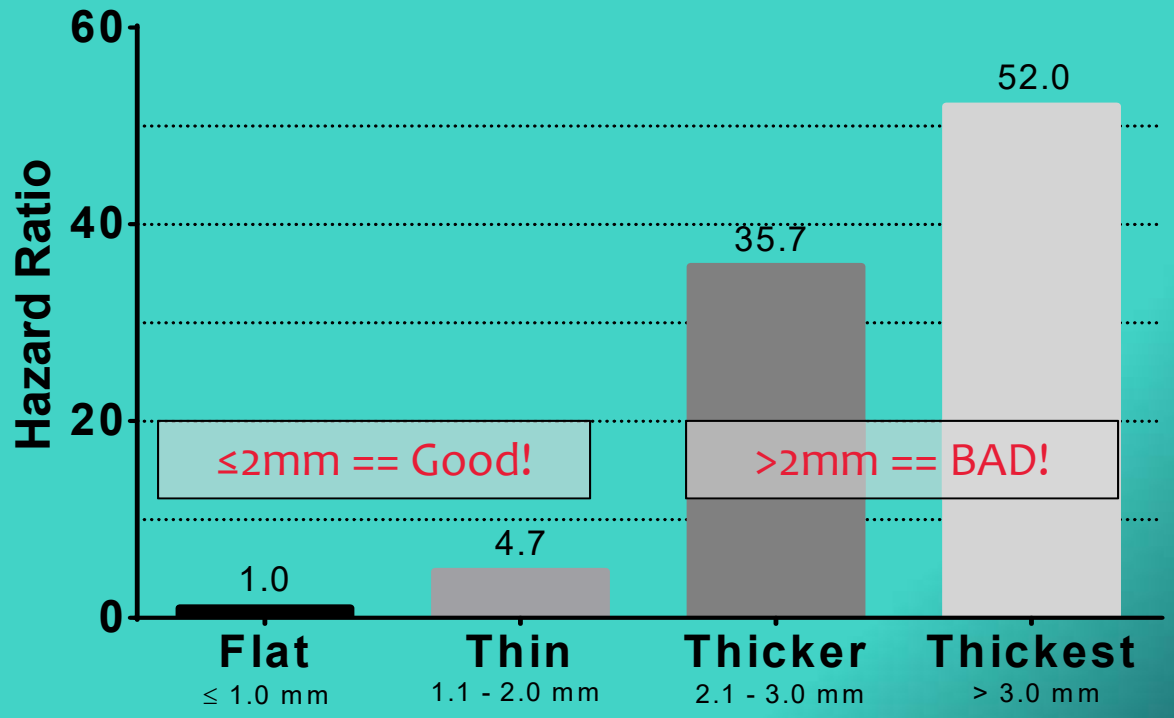
Congenital hypertrophy of RPE (CHRPE)

NEW!

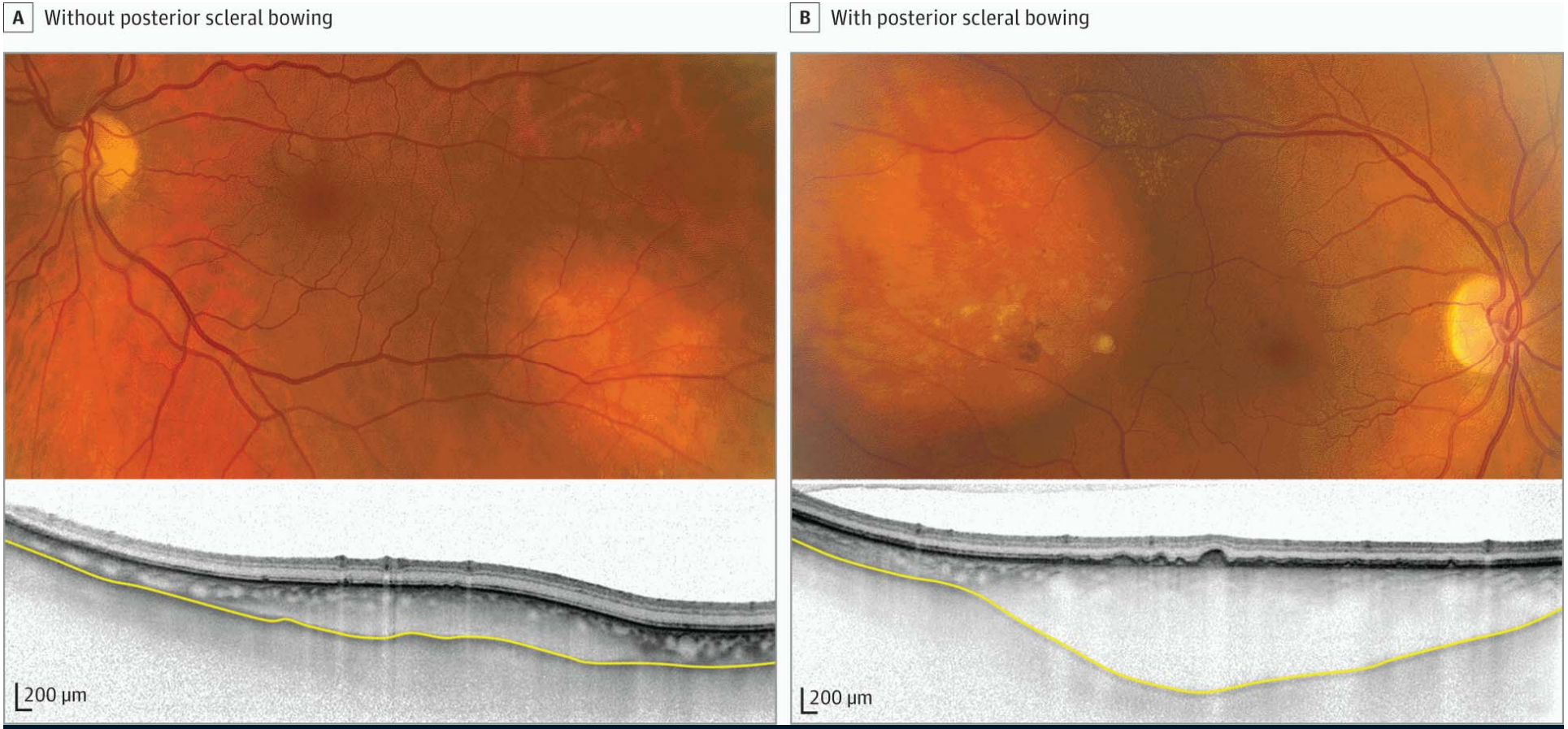
Choroidal Nevus

Importance of lesion thickness

– Higher risk of malignant transformation for nevi >2.0 mm compared with those ≤2.0 mm



Retina. 2019 Mar 15.



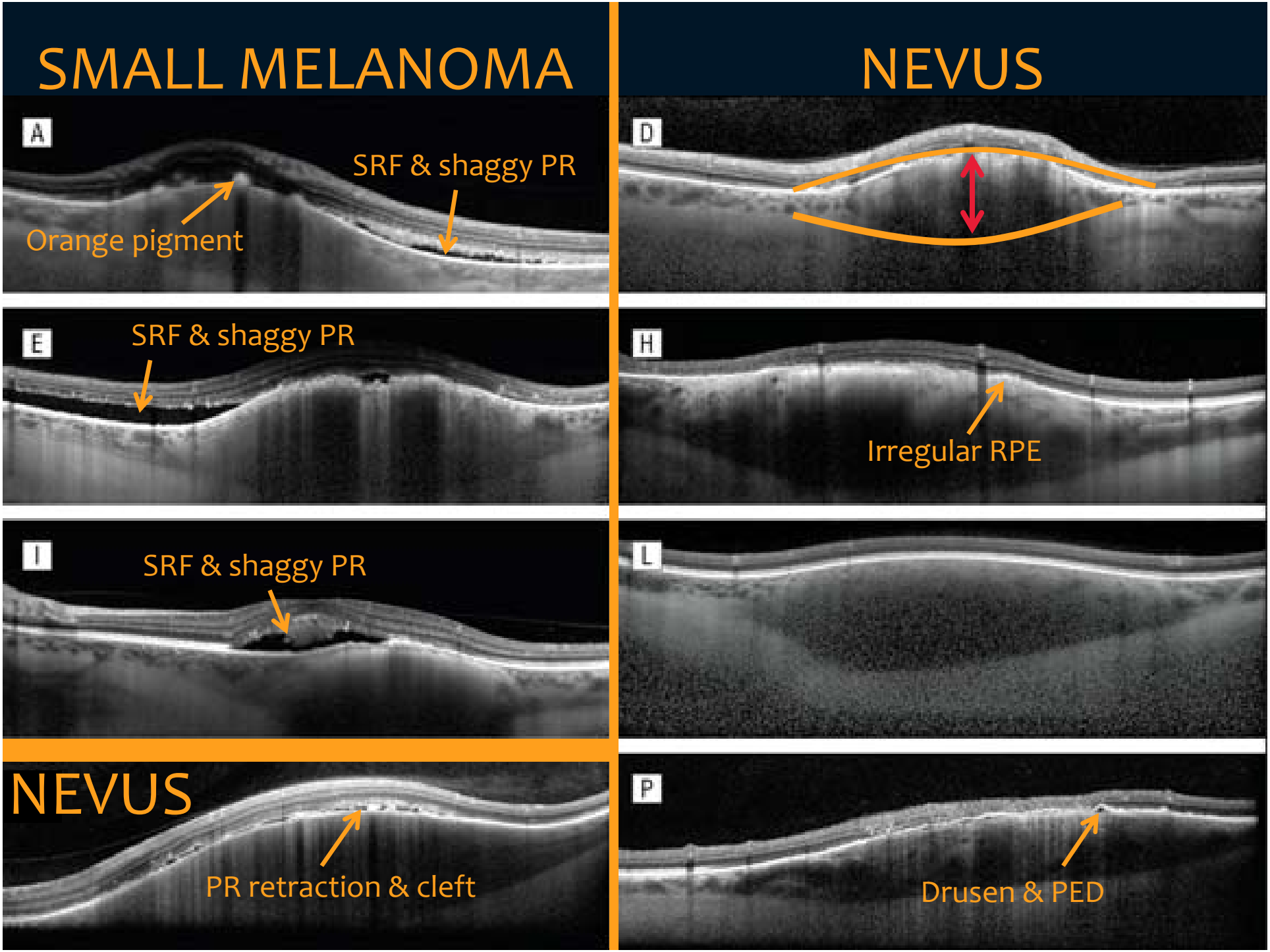
Nevi typically extend inwardly, elevating the retina (LEFT). Sometimes they extend outwardly, causing bowing of the sclera and little or no elevation of the retina (RIGHT).

JAMA Ophthalmol. 2015;133:1165-70

Choroidal Nevus

- **Importance of subretinal fluid**
  - Choroidal nevus
    - Retinal degeneration & photoreceptor death
    - Photoreceptor loss → subretinal **"cleft"**
  - Choroidal melanoma
    - Fluid leakage creates a "puddle" at lesion margin
    - Photoreceptors shed outer segment discs, which appear **"shaggy"** on OCT

Arch Ophthalmol. 2012;100:360-364

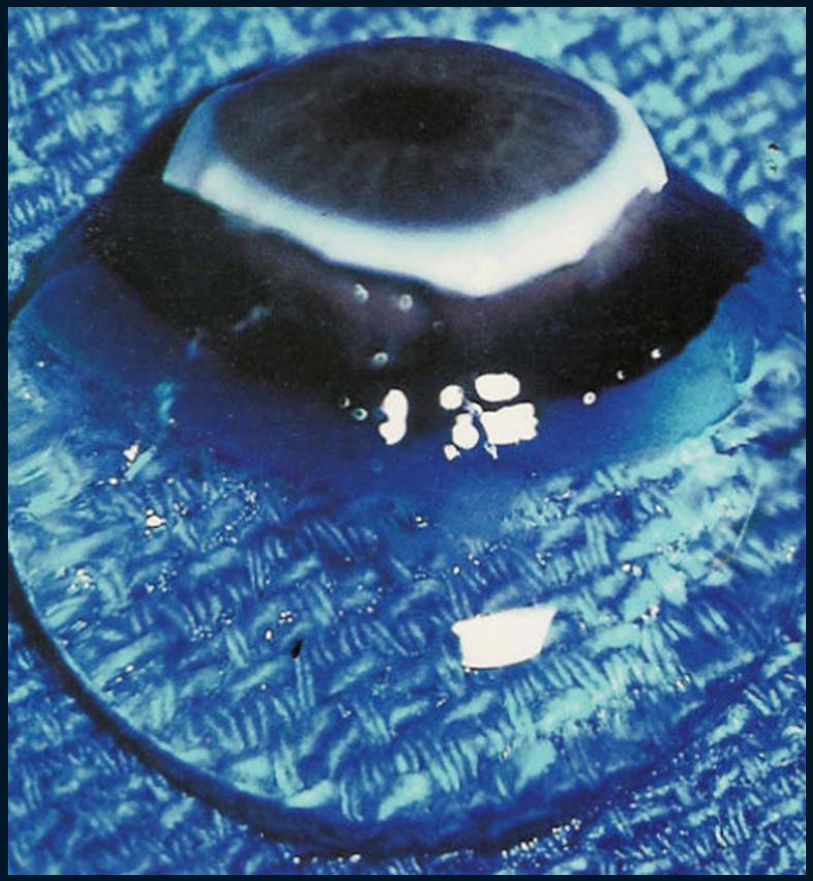

SMALL MELANOMA
NEVUS
A
Orange pigment
SRF & shaggy PR
D
E
SRF & shaggy PR
H
Irregular RPE
I
SRF & shaggy PR
L
NEVUS
PR retraction & cleft
P
Drusen & PED

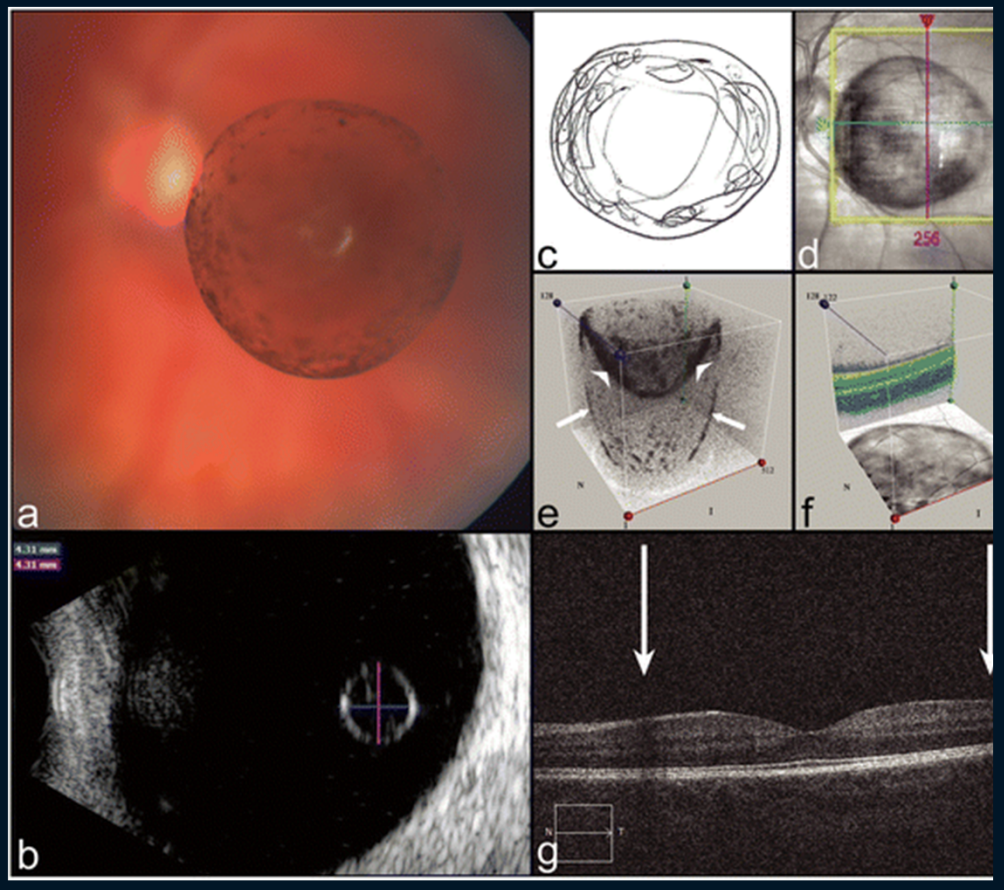
Self Assessment Quiz

You obtain OCT and photographs of all choroidal nevi.

- If so, award yourself 1 point
- If not, award yourself 0 points

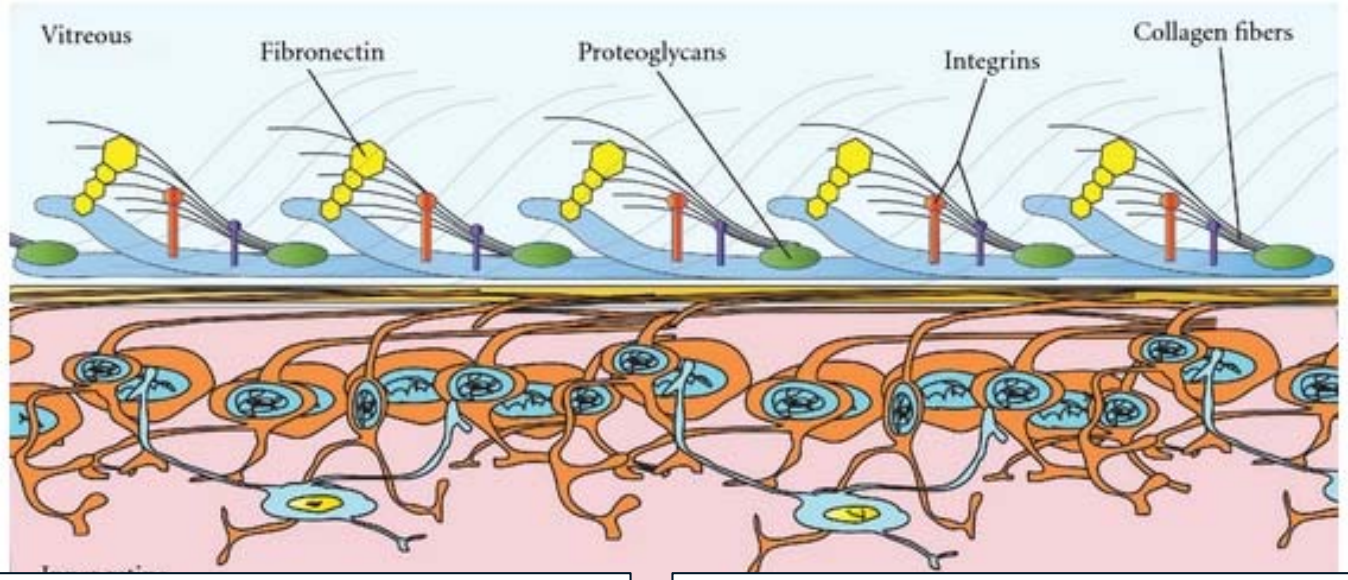
Posterior Vitreous Detachment

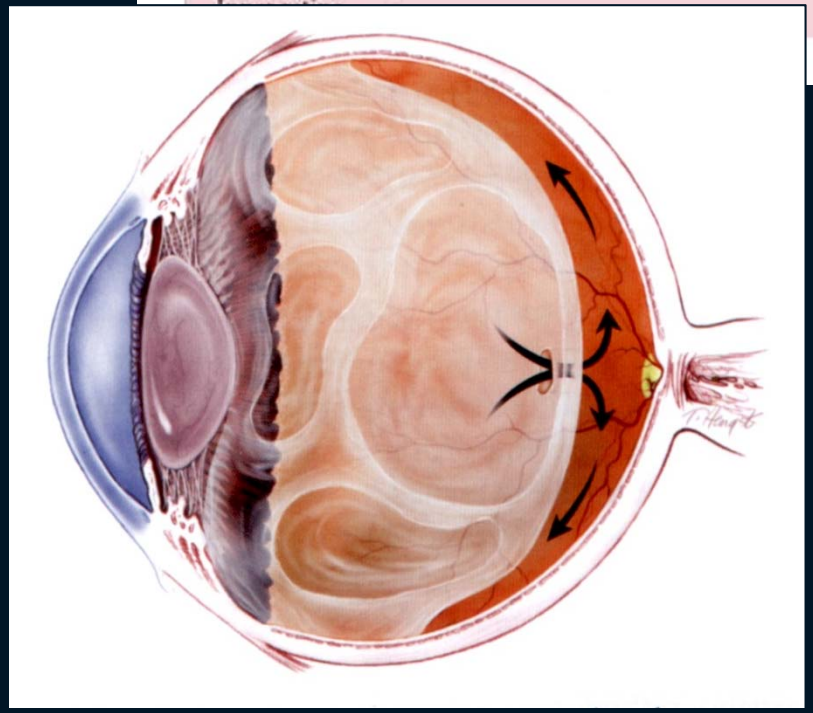


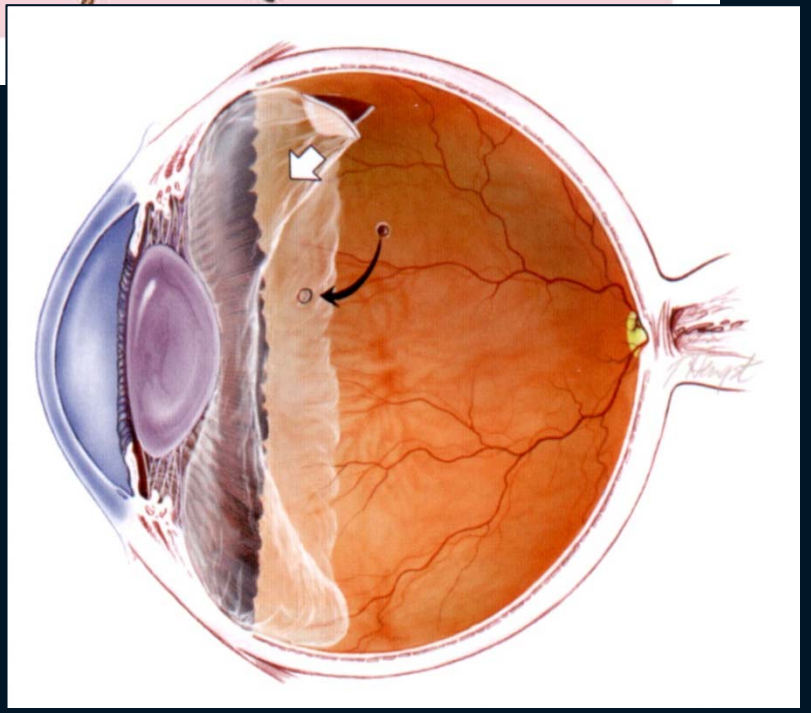


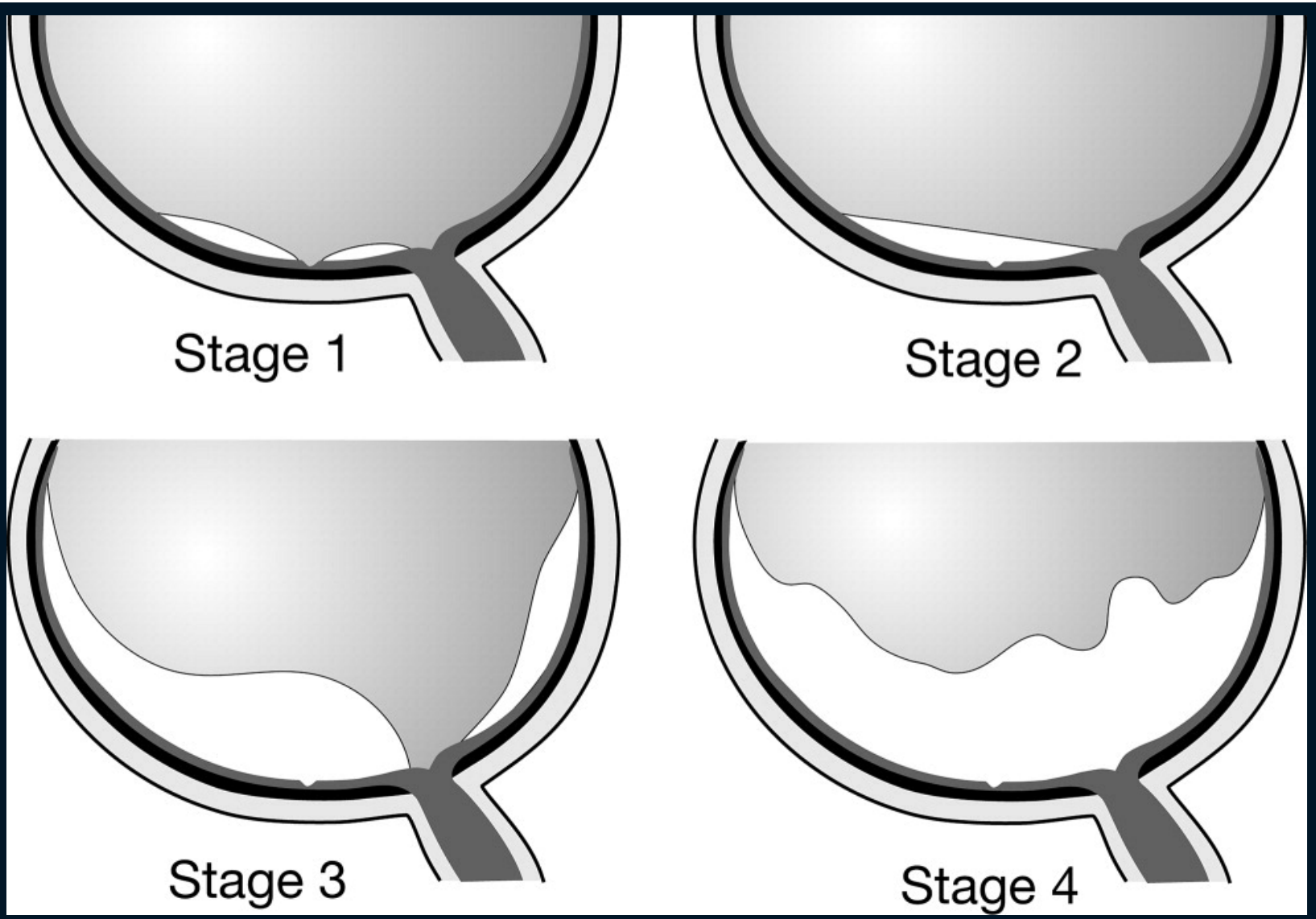
Posterior Vitreous Detachment

- **Clinical Features**
  - Vitreous shrinkage & separation from the retina
  - Requires **weakening of vitreoretinal adhesions**
  - Inadequate weakening of vitreoretinal adhesions may lead to complications (eg. retinal tears, maculopathy, vitreous hemorrhage)
  - **Floaters & photopsia** are a normal consequence of vitreous detachment

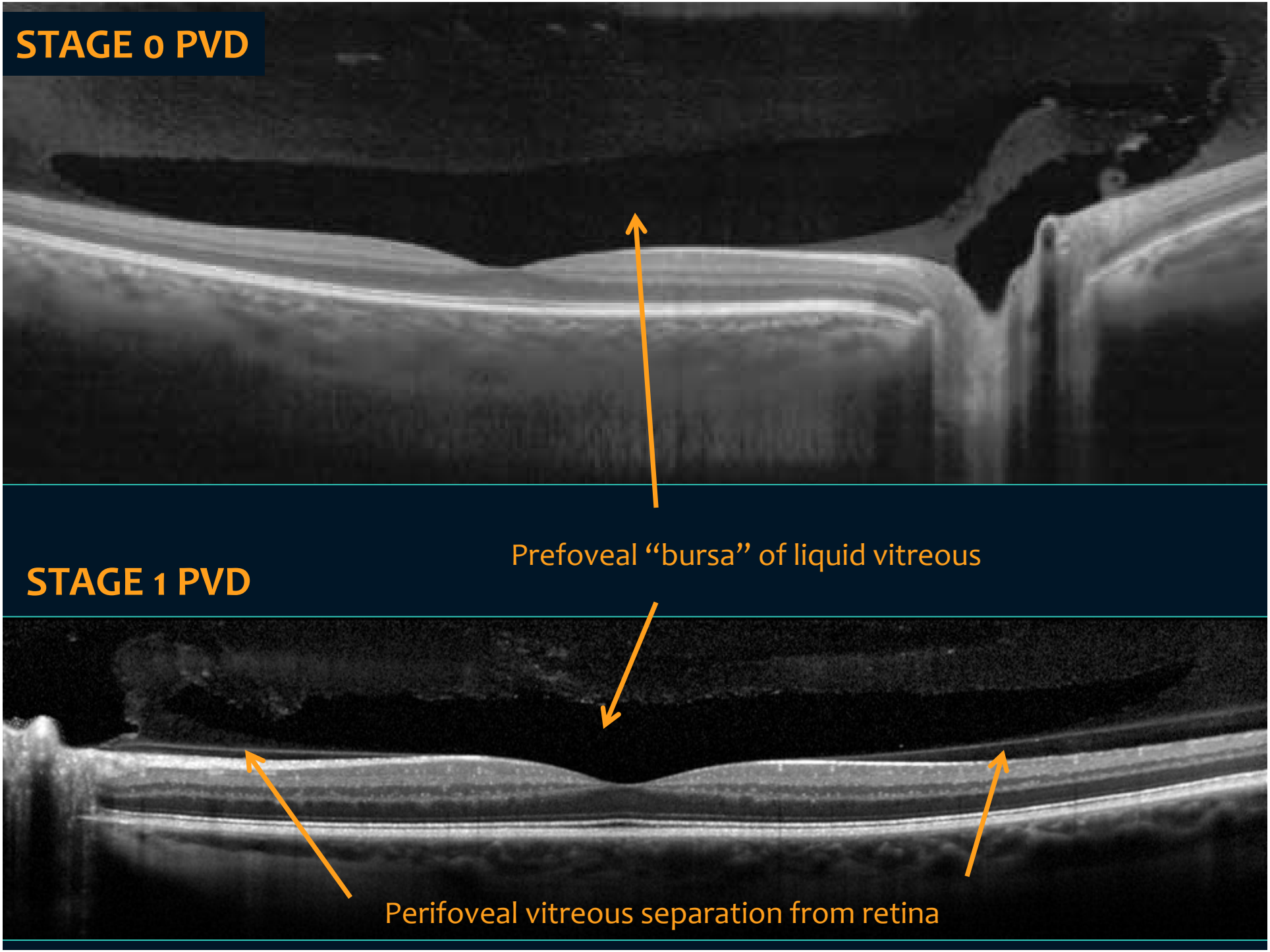

Vitreous
Fibronectin
Proteoglycans
Integrins
Collagen fibers

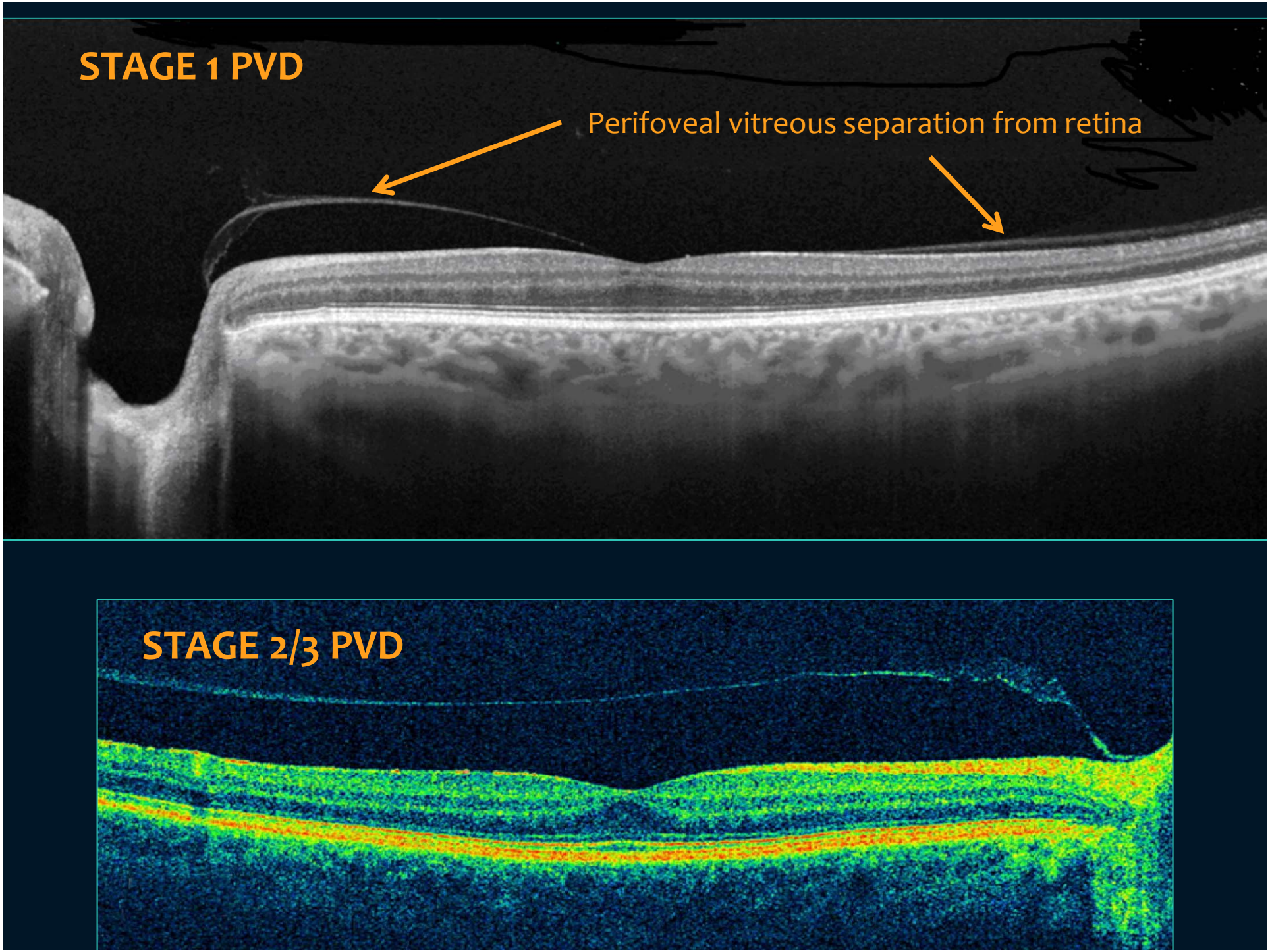




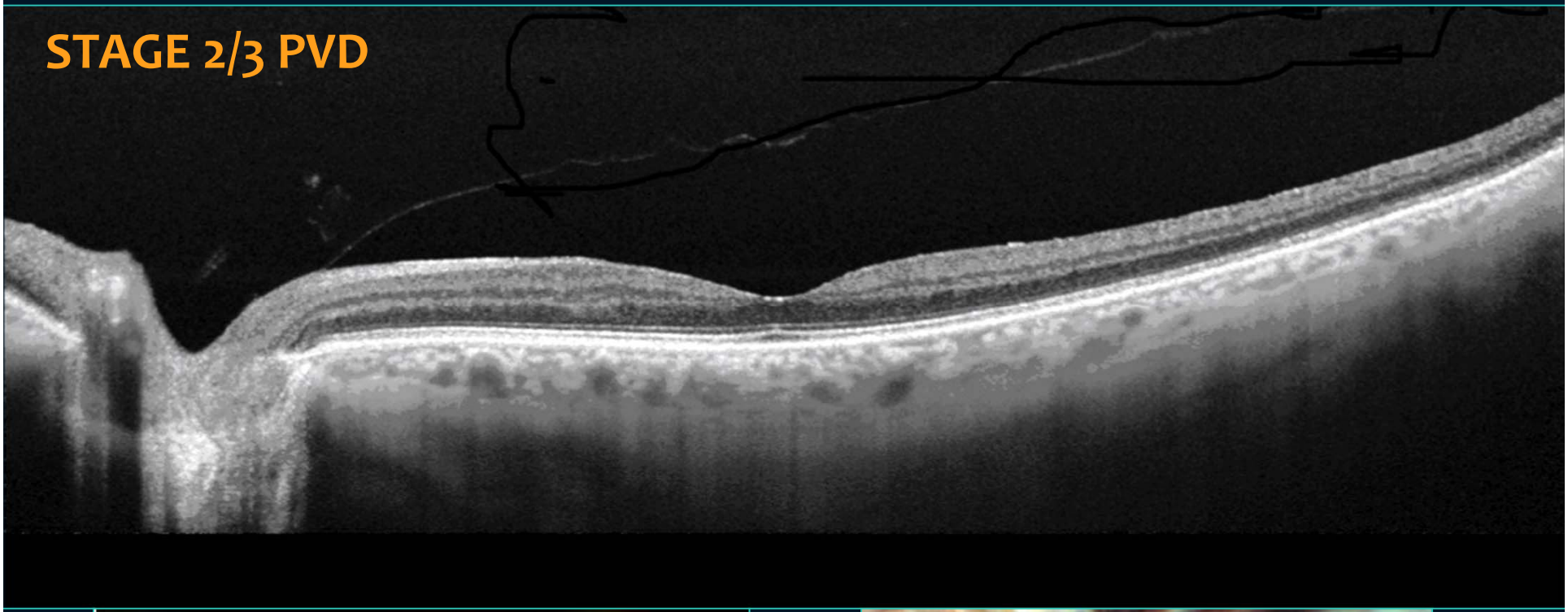


Stage 1: Perifoveal vitreous detachment with vitreofoveal adhesion
Stage 2: Perifoveal vitreous detachment with no vitreofoveal adhesion
Stage 3: Complete PVD except for vitreopapillary adhesion
Stage 4: Complete PVD

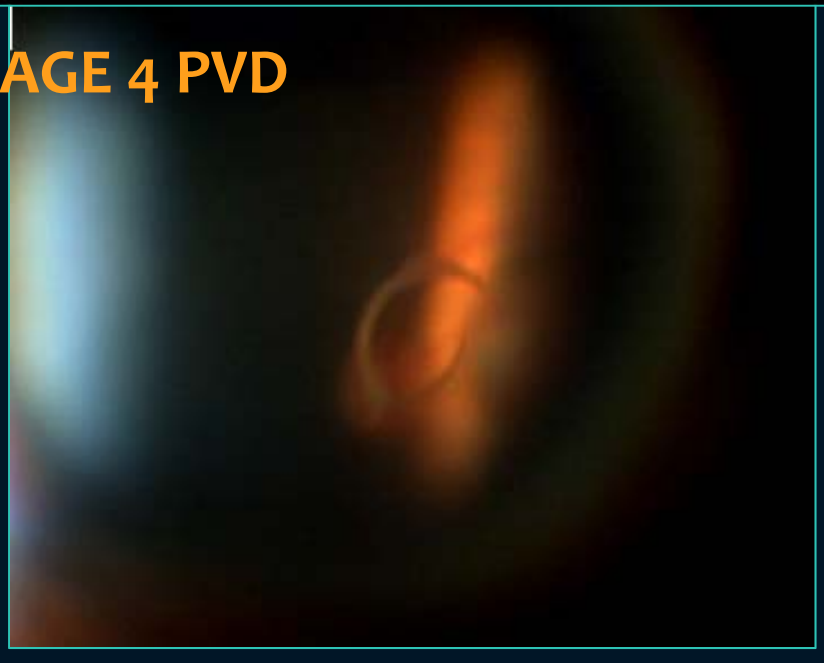

STAGE 0 PVD
Prefoveal “bursa” of liquid vitreous
STAGE 1 PVD
Perifoveal vitreous separation from retina

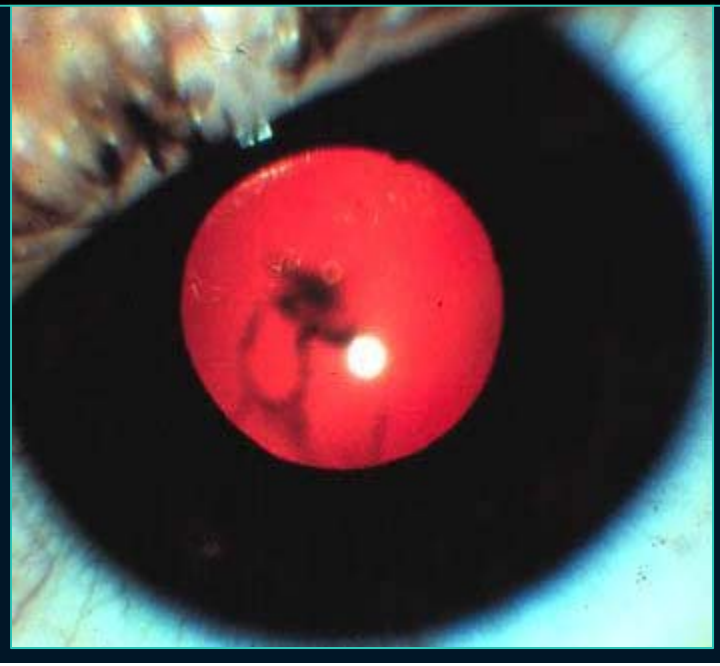

STAGE 1 PVD
Perifoveal vitreous separation from retina
STAGE 2/3 PVD

STAGE 2/3 PVD



STAGE 4 PVD





Posterior Vitreous Detachment

- Symptoms of acute PVD: **Photopsia**
  - Due to vitreoretinal traction
  - Last < 1 second in duration (95% eyes)
  - **Lightning streak** or flash (94% eyes)
  - Located in the **temporal periphery** (86% eyes)

Ophthalmology 2015;122:2084-94

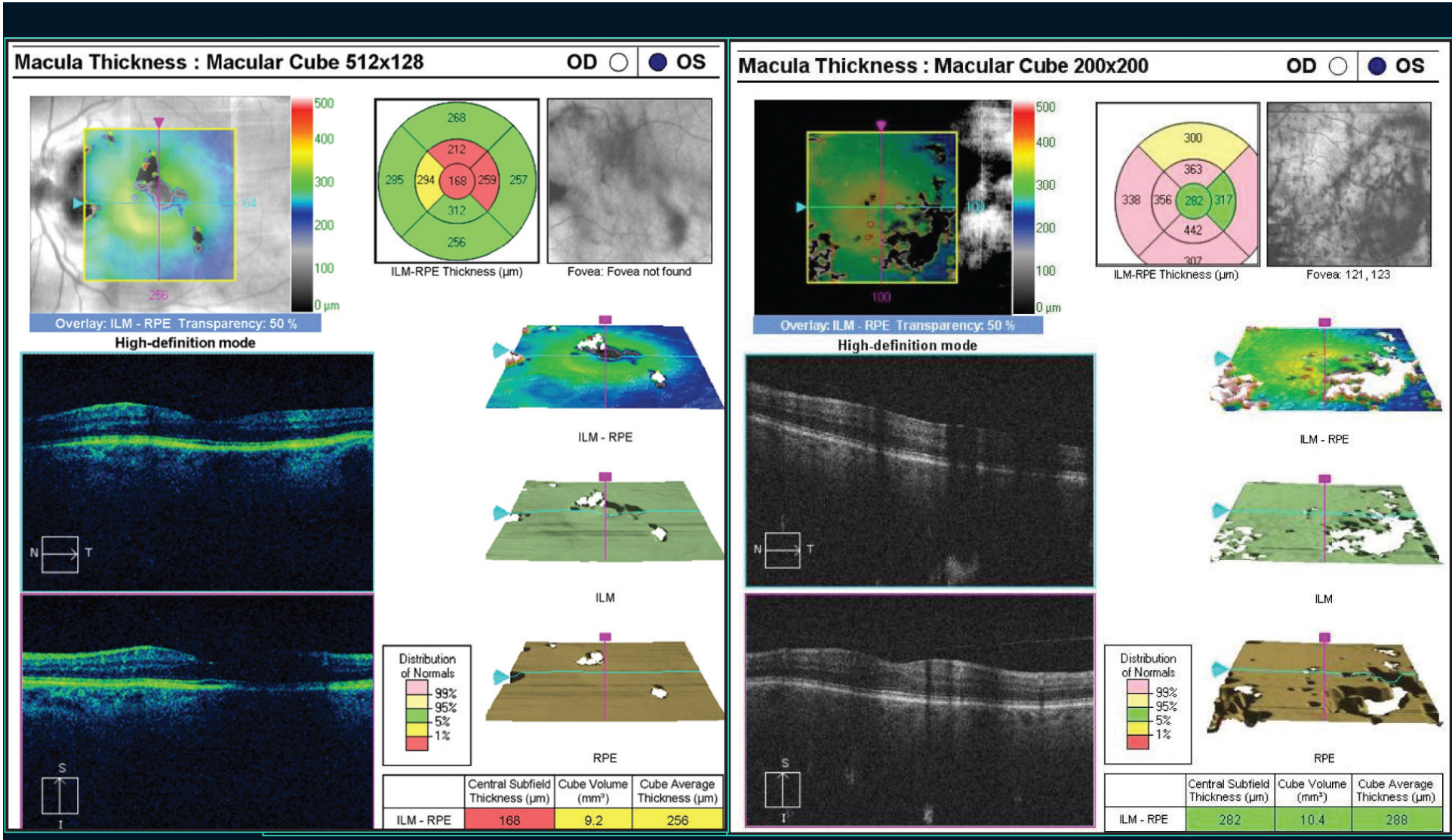
Posterior Vitreous Detachment

- Other Causes of Photopsia
  - **Migraine**
    - Central blind spot surrounded by photopsias
    - Constant, lasting average of 15 min
    - Commonly travels across the visual field
  - **Neovascular maculopathy**
    - Central (80% eyes)
    - Several seconds or longer (76% eyes)
    - Twinkling, pinwheels, strobes, or circles (96% eyes)

Ophthalmology 2015;122:2084-94

Posterior Vitreous Detachment

- Symptoms of acute PVD: **Floaters**
  - Onset of 1-2 large floaters is typical
  - May appear without concurrent photopsia
  - Onset of many small floaters ("pepper shaker") is suggestive of **vitreous hemorrhage**



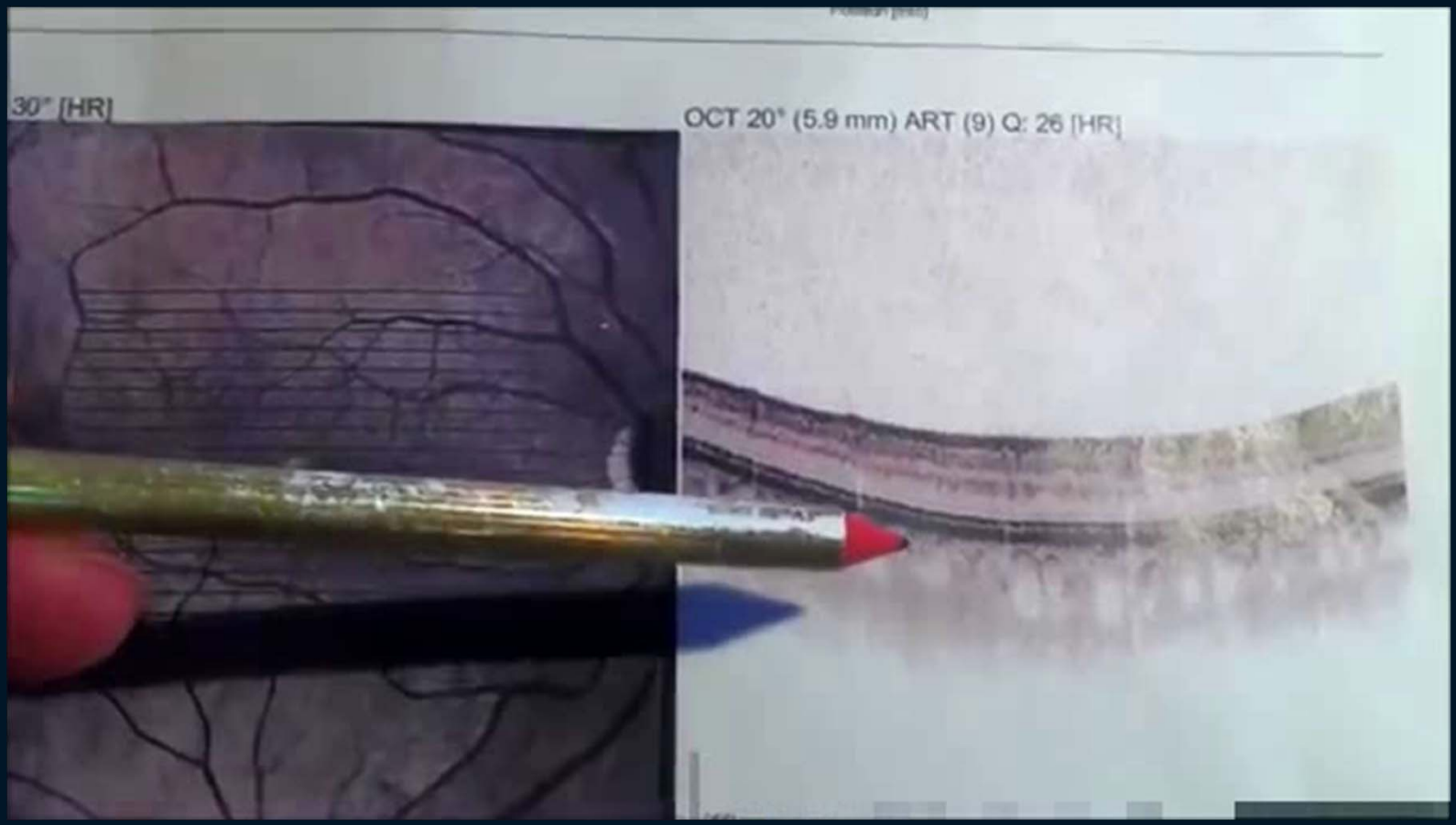
OCT can be used to document symptomatic vitreous floaters

Ophthalmic Surg Lasers Imaging Retina. 2013;44:415-418

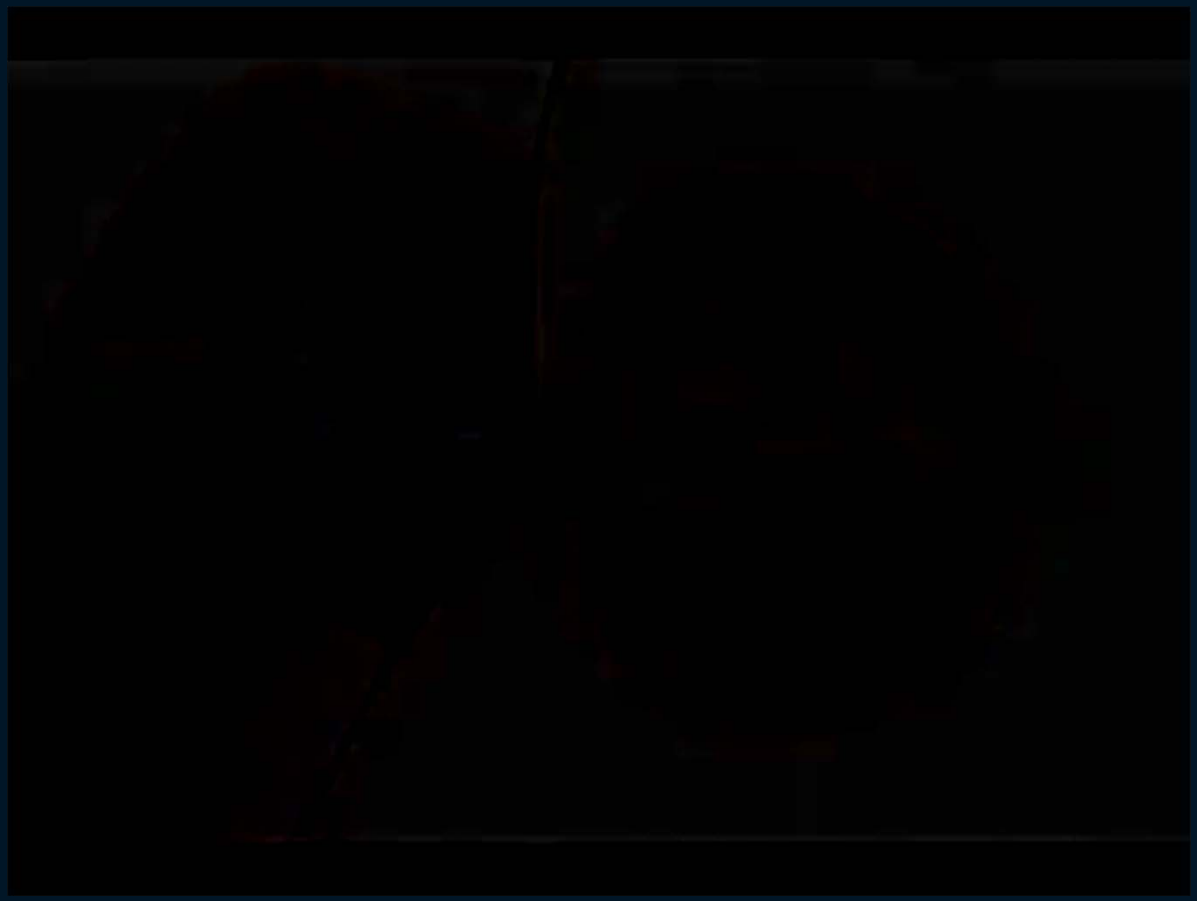
OCT can be used to document symptomatic vitreous floaters

Posterior Vitreous Detachment

- Floater Treatment Options
  - **Observation**
    - May become less bothersome over time
  - **Floater-Only Vitrectomy**
    - "Gold standard" therapy, 95% success rate
    - Potential for severe complications
  - **YAG Vitreolysis**
    - Few studies, Variable efficacy, Potential risk?



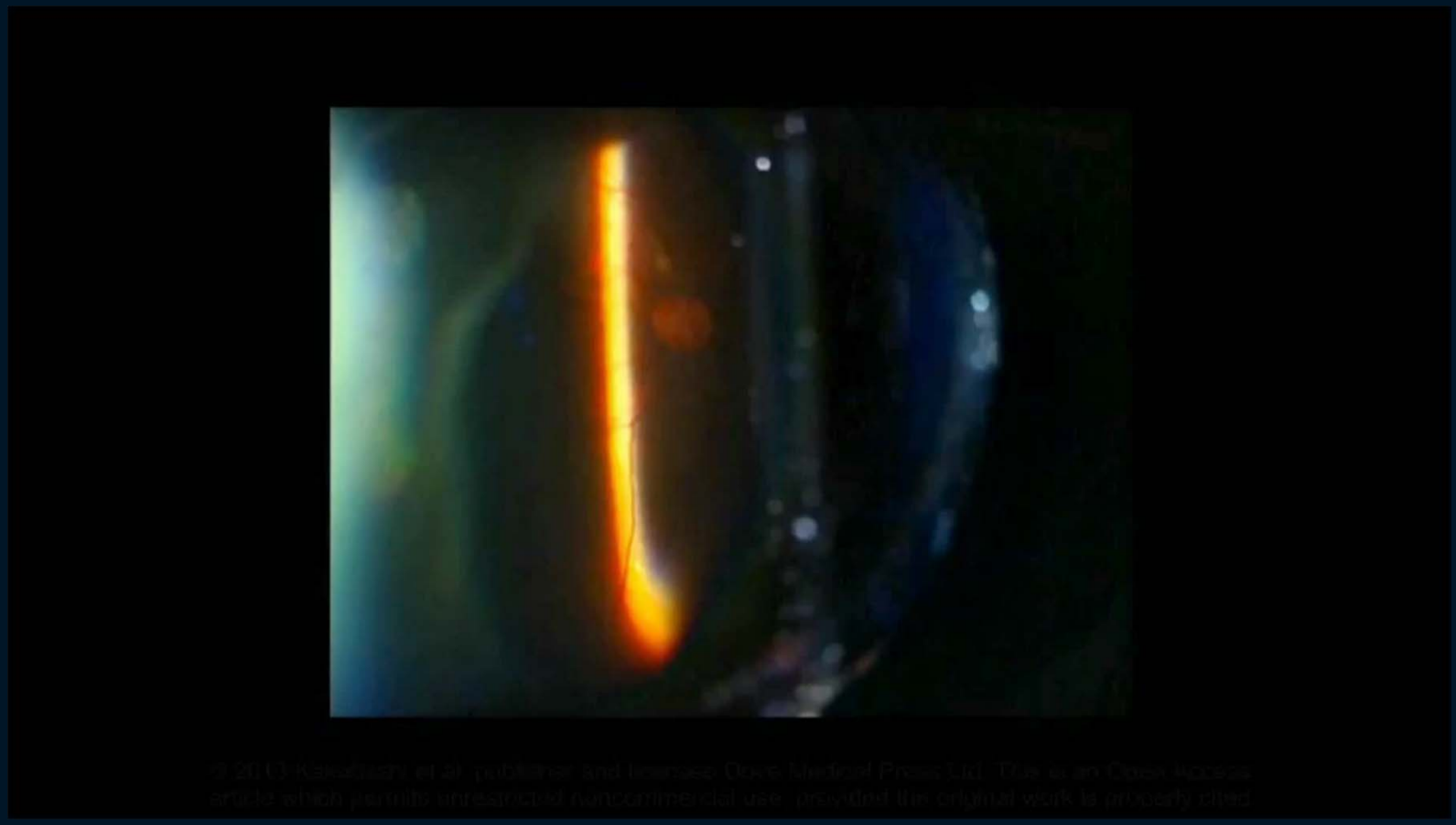
https://www.youtube.com/watch?v=XMJ8P3FC0BI



https://www.youtube.com/watch?v=uTNLt_pmUB0

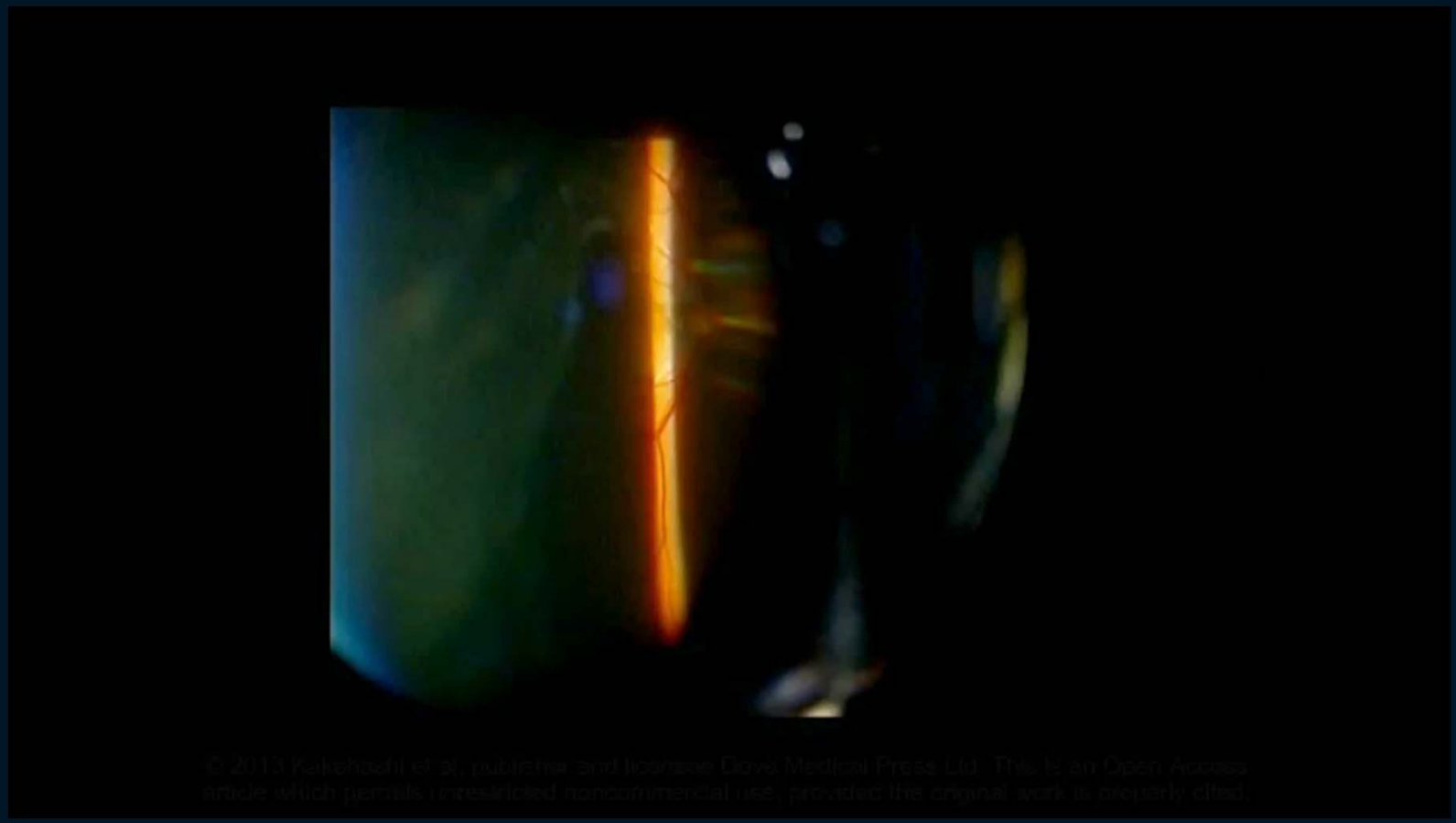
Posterior Vitreous Detachment

- **How To Monitor**
  - Initial assessment
    - History of photopsia and floaters
    - **Detailed DFE including scleral depression**
    - Slitlamp exam of vitreous including 78/90D lens
    - **OCT posterior vitreous and macula**
  - 4-6 week follow-up, sooner PRN
    - Search for delayed onset retinal tears



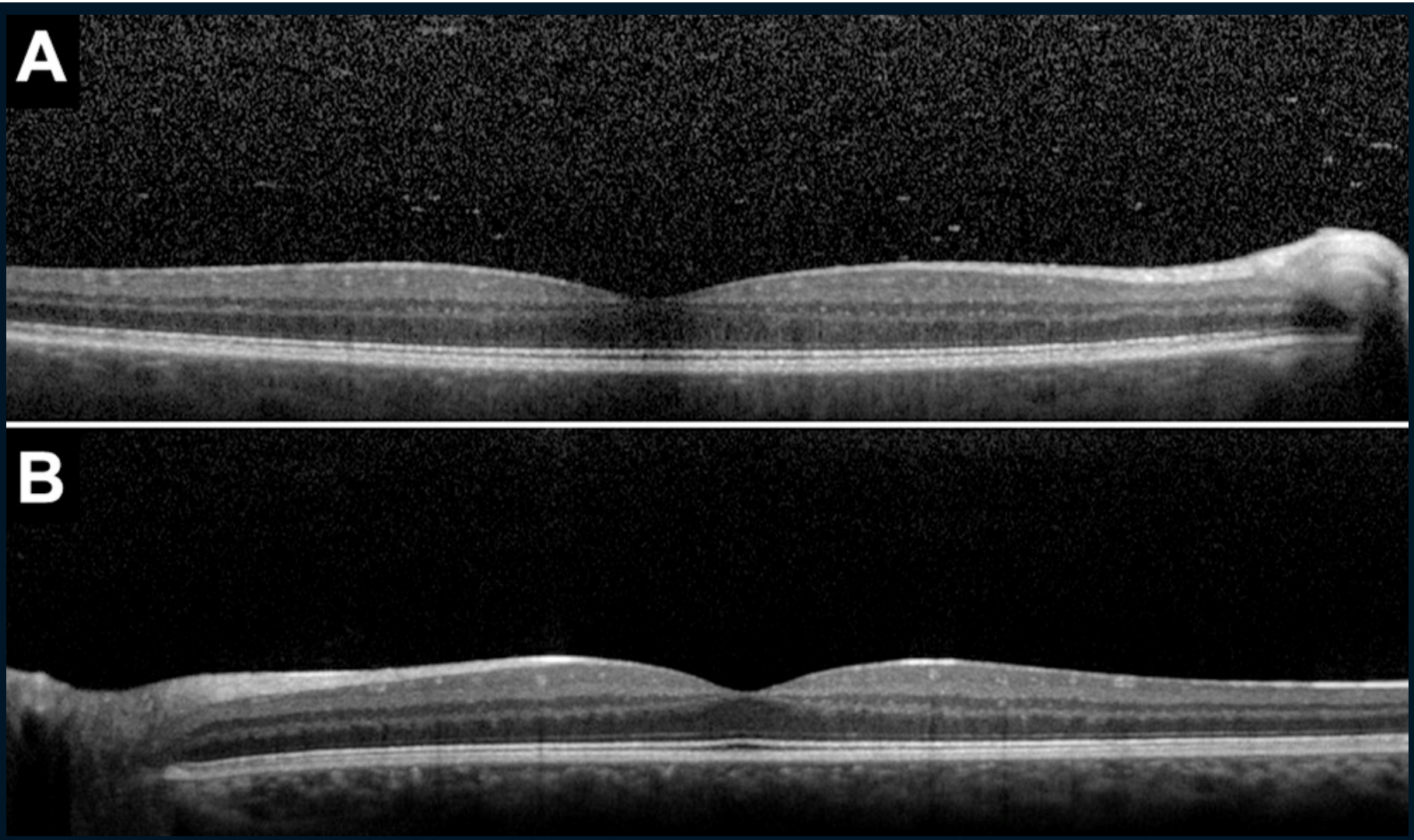
Volk 90D exam of complete (stage 4) PVD (inverted image)

Clin Ophthalmol 2014;8:1-10



Volk 90D exam of partial (stage 3) PVD (inverted image)

Clin Ophthalmol 2014;8:1-10



Enhanced vitreous imaging in spontaneous acute posterior vitreous detachment for a patient (A) with a retinal tear and associated hyper-reflective dots ("falling ash" sign) in the vitreous and subhyaloid region and for a patient (B) without a retinal tear with absence of hyper-reflective dots in the vitreous/subhyaloid region

Ophthalmology. 2015;122: 1946–1947.

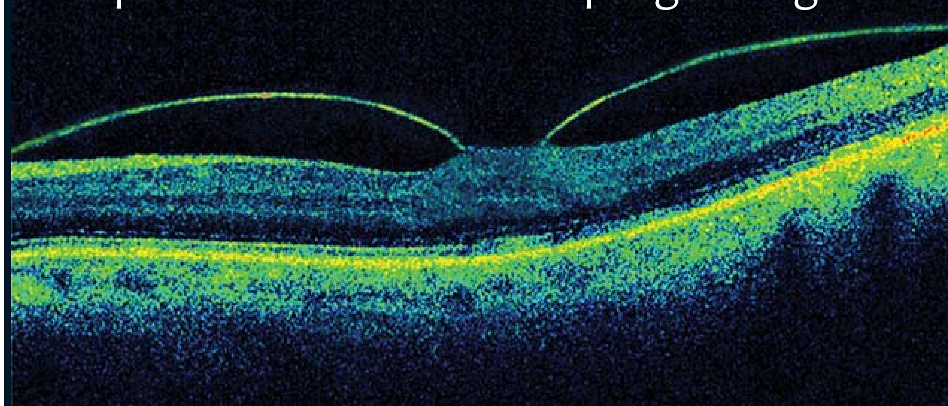
Posterior Vitreous Detachment

- **When to Refer**
  - Acute PVD
    - Vitreous hemorrhage or pigment
    - Retinal tears and detachments
    - Predisposing degenerations (eg. lattice)
  - Floaters
    - Chronic impairment of quality of life
  - **Vitreomacular Traction**
    - Visual acuity loss
    - Evidence of macular hole development

GRADE 1

Retinal anatomy intact

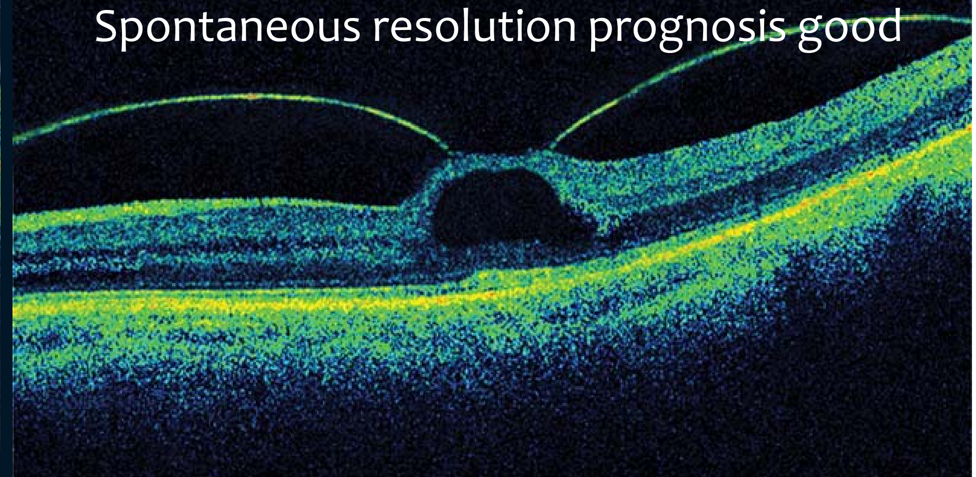
Spontaneous resolution prognosis good



GRADE 2

Intraretinal cleft

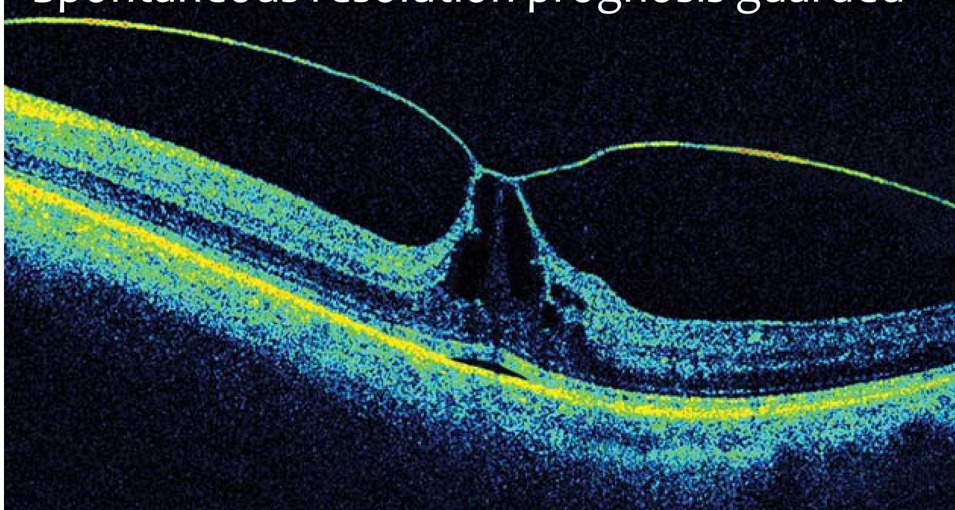
Spontaneous resolution prognosis good

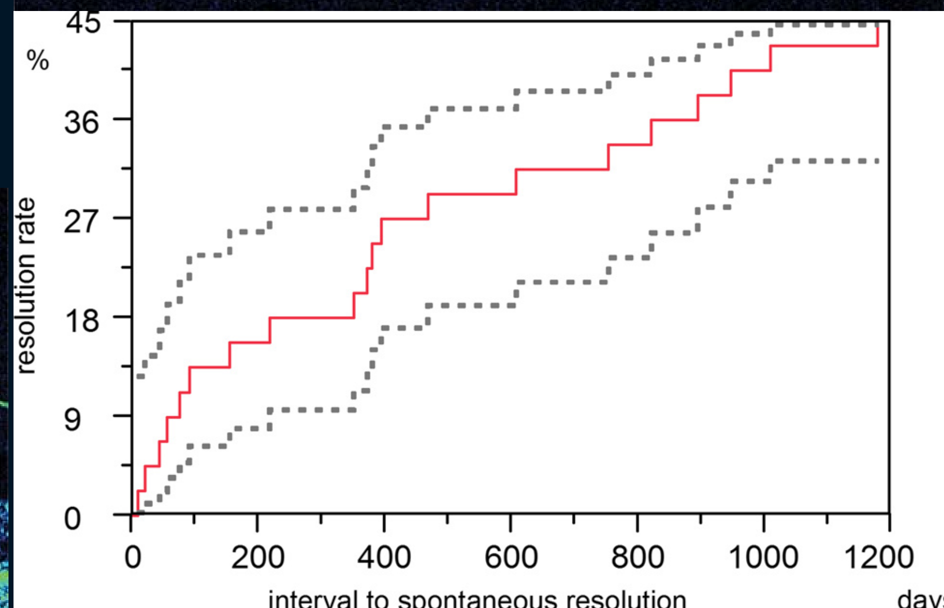


GRADE 3

Subretinal fluid

Spontaneous resolution prognosis guarded

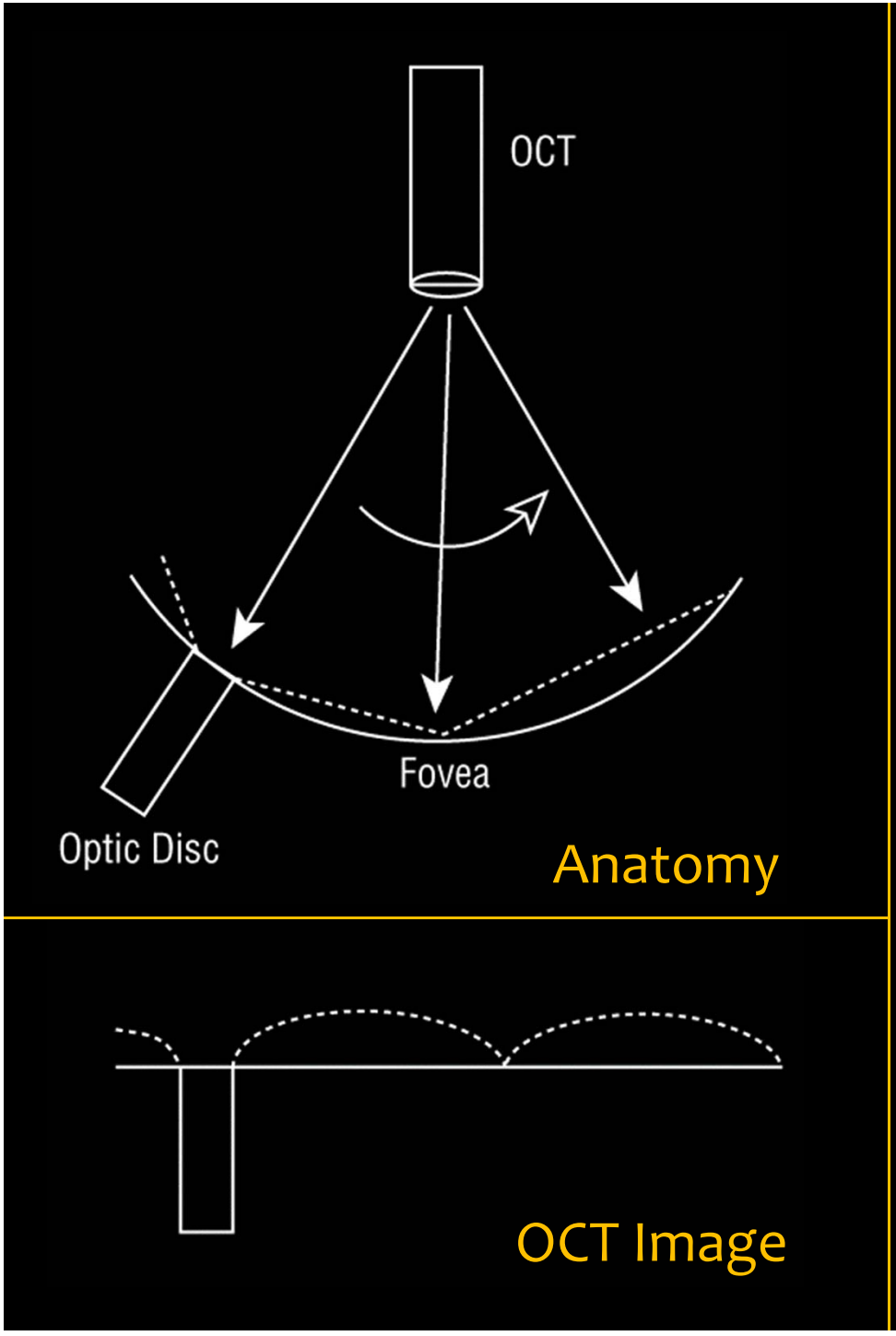




Worse: Progression to higher grade, macular hole or surgery

Most cases resolve after the first 6 months

Retina. 2014;34:442



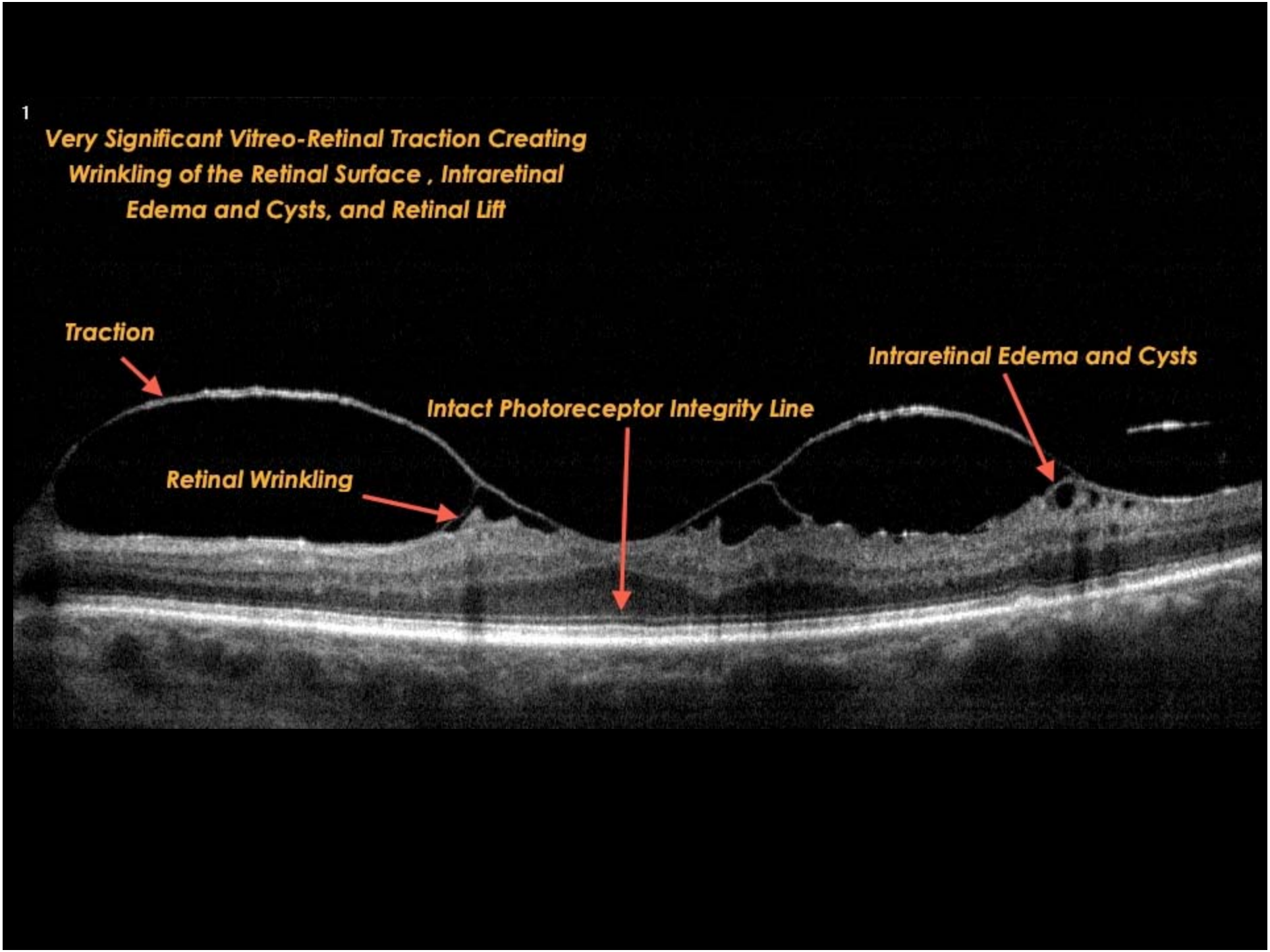
Explanation of the double-convex OCT signal

TOP: The OCT beam (straight arrows) is scanned across the posterior pole.

BOTTOM: Most points on the concave retinal surface are equidistant from the OCT, thus appearing flat on the image obtained. Those on a partially detached posterior vitreous face (dotted line) are not, resulting in an artifactual convexity.

1

Very Significant Vitreo-Retinal Traction Creating Wrinkling of the Retinal Surface , Intraretinal Edema and Cysts, and Retinal Lift



NEW!

American Journal of Ophthalmology Case Reports 14 (2019) 61–63

Contents lists available at ScienceDirect

American Journal of Ophthalmology Case Reports

journal homepage: www.elsevier.com/locate/ajoc

Case report

Focal vitreomacular traction: Resolution after ocular massage

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ARTICLE INFO

Keywords:
Vitreomacular traction
Adhesion
OCT

ABSTRACT

Purpose: Vitreomacular traction (VMT) is a relatively common ocular disorder that may distort the foveal structure causing visual symptoms. The influence of ocular massage (OM) on this condition has not been considered yet. We aim to report clinical and OCT features of VMT release associated with OM.

"OM was performed placing the two index fingertips on the nasal and temporal side of the eyeball, with the eyelid of the patient shut, and pressing alternatively with both fingers. The patient was instructed to perform the same OM (1 minute, moderate intensity massage) every 8 hours at home"

AJO Case Reports. 2019;14:61

Posterior Vitreous Detachment

- Management of VMA
  - **Observation**
    - Spontaneous release in ≈30% of cases over 18mos
  - **Pneumatic vitreolysis**
    - High success (≈80%) with few complications
  - Enzymatic vitreolysis
    - Risk of adverse effects & 20% still require surgery
  - Vitrectomy
    - Gold standard, risks of intraocular surgery

Ophthalmology 2015;122:2084-94

Self Assessment Quiz

Have you paid attention to what I was saying for the past 10 min?

- +1 point if you know what I was talking about
- -10 points if you were sleeping for the past 10 minutes

Self Assessment Quiz

SCORE

0-2	1980's
3-5	1990's
6-8	Early 2000's
>8	I need a new OD, are you accepting new patients?

THANK YOU!