Role of OCT in the Management of DME, AMD and Diseases of the Vitreomacular Interface

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OCT in Vitreo-macular Diseases
Basics and Concepts

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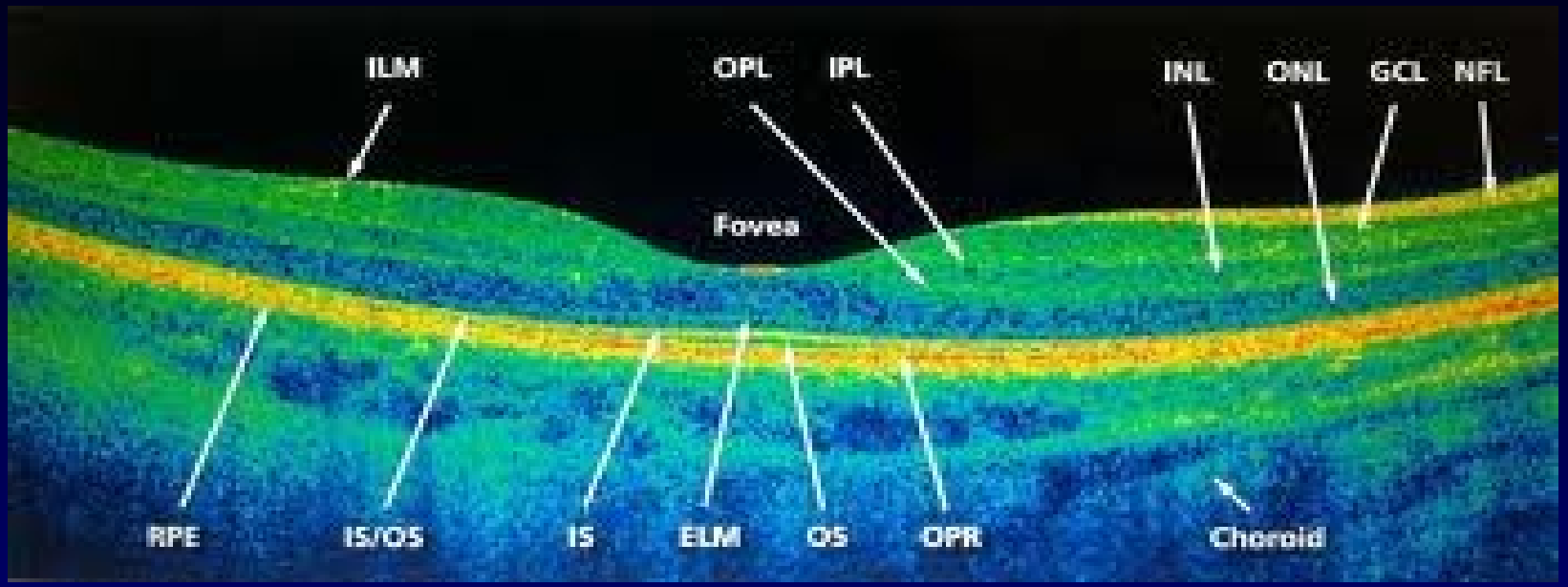
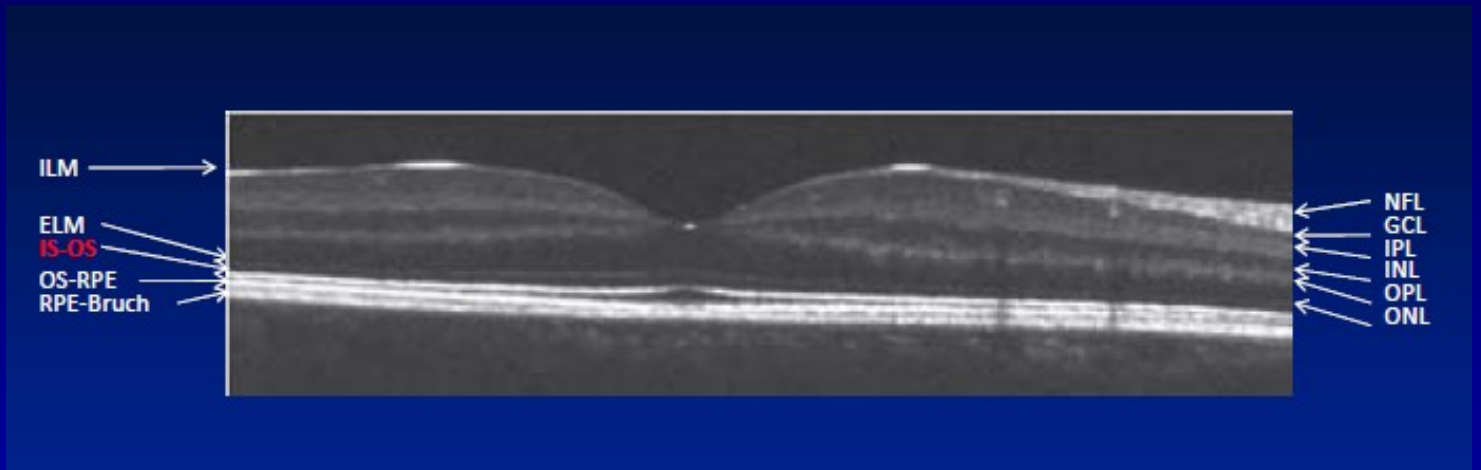
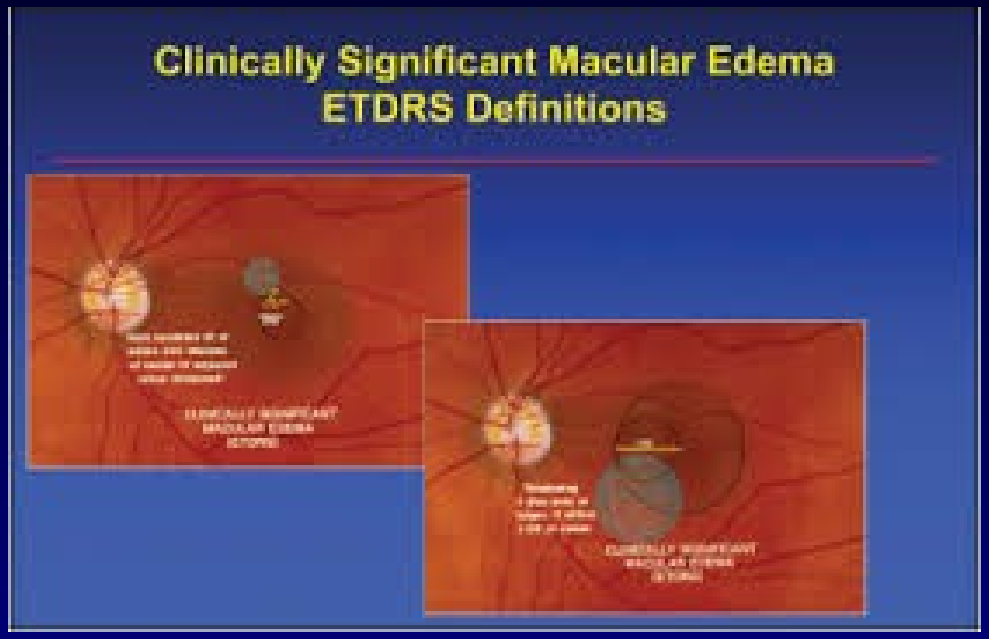
The Health Macula

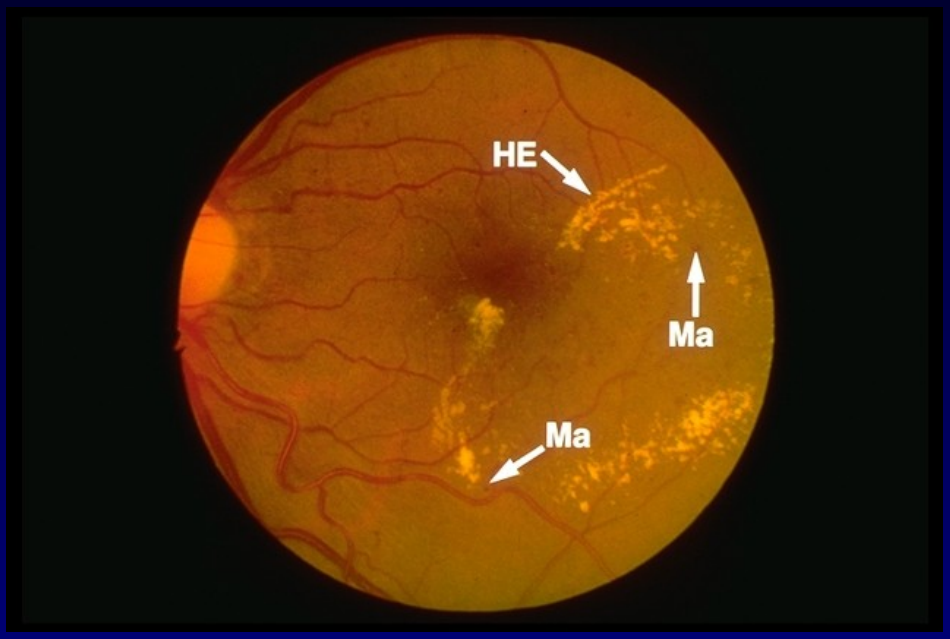




Diabetic Macular Edema-ETDRS Era

A Flashback (ETDRS Era)





Diabetic Macular Edema-FFA Era

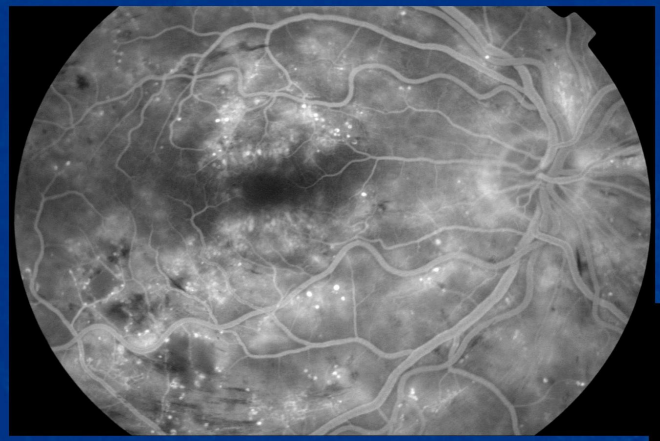
Focal Macular Edema

- A single or localized cluster of leakage sites
- Hard exudates common

Photographs courtesy of Baruch Kuppermann, MD, 2004.

Diabetic Macular Edema2-FFA Era

Diffuse Macular Edema

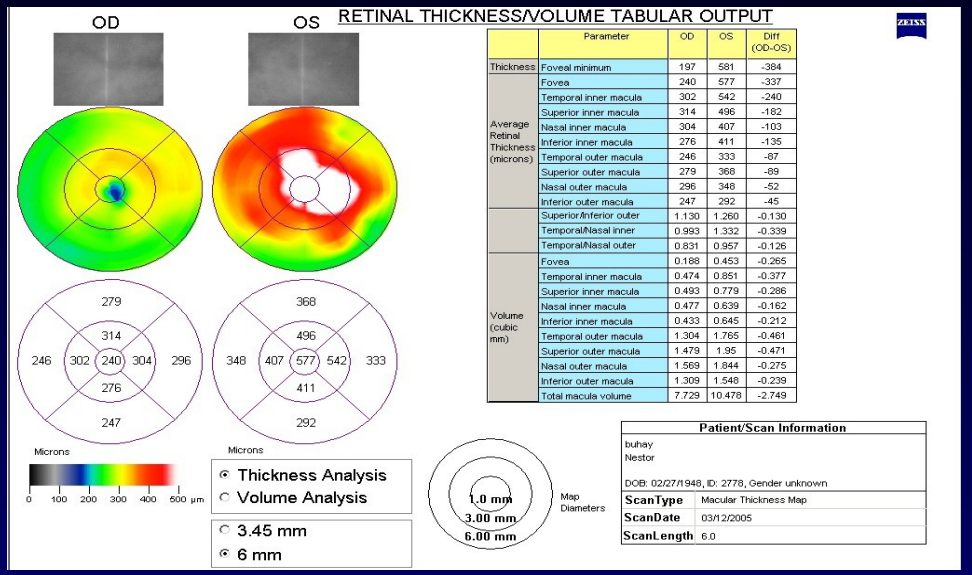


- Generalized breakdown of blood-retinal barrier with leakage from blood vessels throughout the posterior pole of the eye
- Hard exudates less common

Photographs courtesy of Baruch Kuppermann, MD, 2004.

Diabetic Macular Edema: The Era of OCT

- Advantages:
  - Mapping of thickness in 6 mm radius of the macular area
  - Generates numeric and topographic data on state of the macula
  - Helps guide the decision to treat and follow up

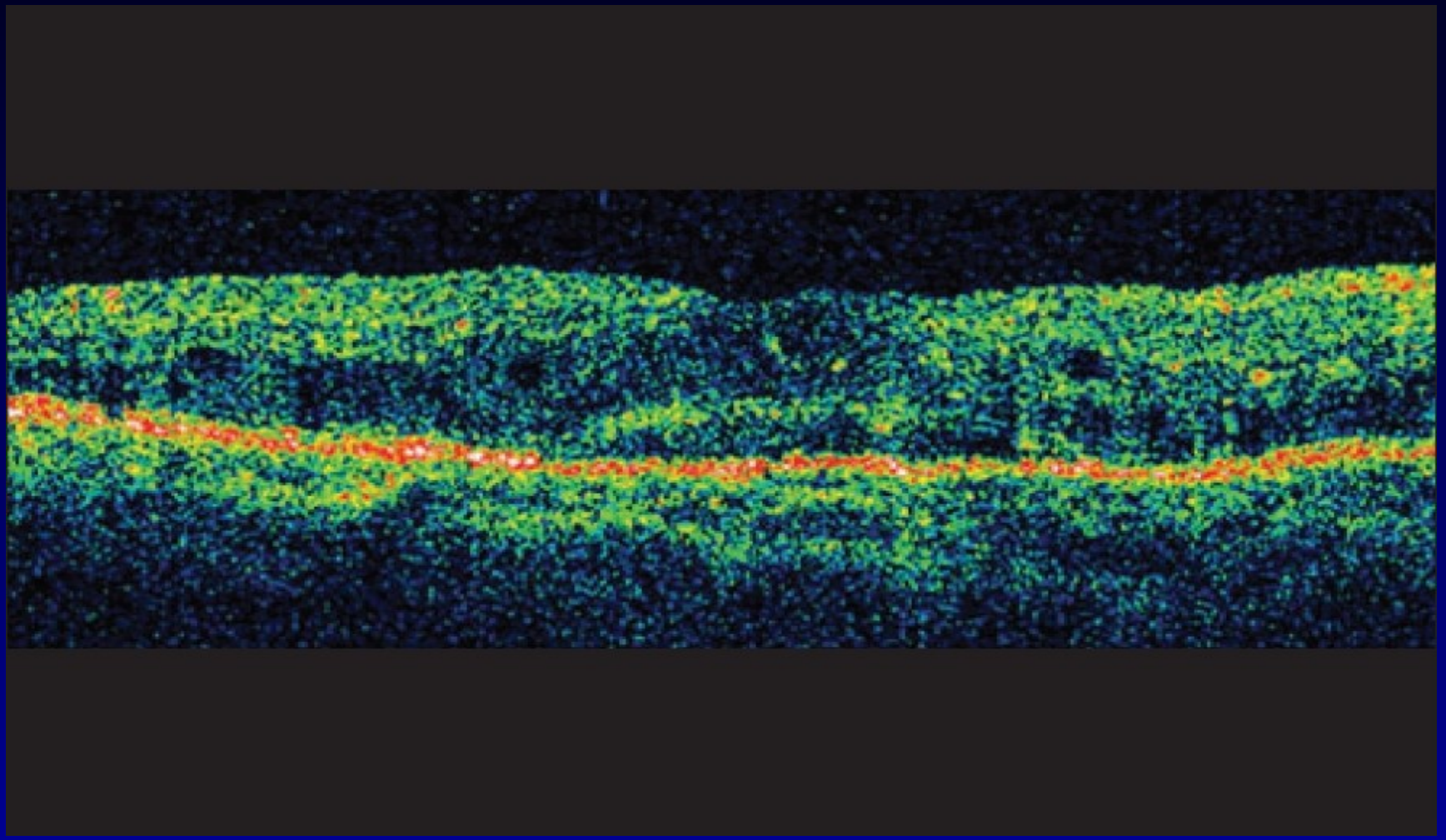


	Parameter	OD	OS	Diff (OD-OS)
Thickness	Foveal minimum	197	581	-384
Average Retinal Thickness (microns)	Fovea	240	577	-337
	Temporal inner macula	302	542	-240
	Superior inner macula	314	496	-182
	Nasal inner macula	304	407	-103
	Inferior inner macula	276	411	-135
	Temporal outer macula	246	333	-87
	Superior outer macula	279	368	-89
	Nasal outer macula	296	348	-52
	Inferior outer macula	247	292	-45
	Superior/Inferior outer	1.130	1.260	-0.130
	Temporal/Nasal inner	0.993	1.332	-0.339
	Temporal/Nasal outer	0.831	0.957	-0.126
Volume (cubic mm)	Fovea	0.188	0.453	-0.265
	Temporal inner macula	0.474	0.851	-0.377
	Superior inner macula	0.493	0.779	-0.286
	Nasal inner macula	0.477	0.639	-0.162
	Inferior inner macula	0.433	0.645	-0.212
	Temporal outer macula	1.304	1.765	-0.461
	Superior outer macula	1.479	1.95	-0.471
	Nasal outer macula	1.569	1.844	-0.275
	Inferior outer macula	1.309	1.548	-0.239
	Total macula volume	7.729	10.478	-2.749

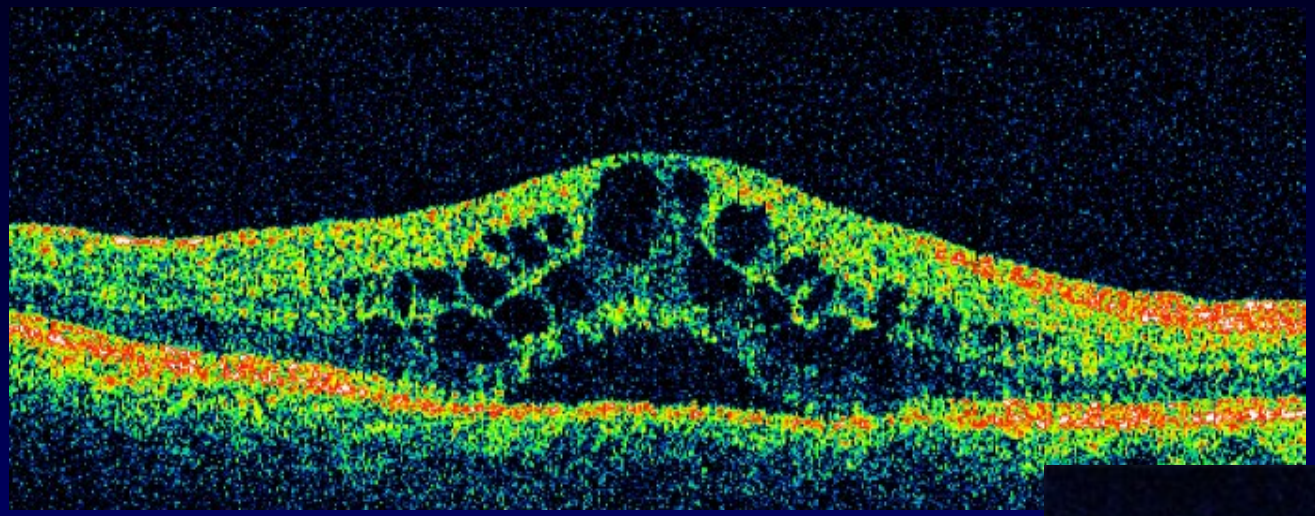
Patterns of DME on OCT

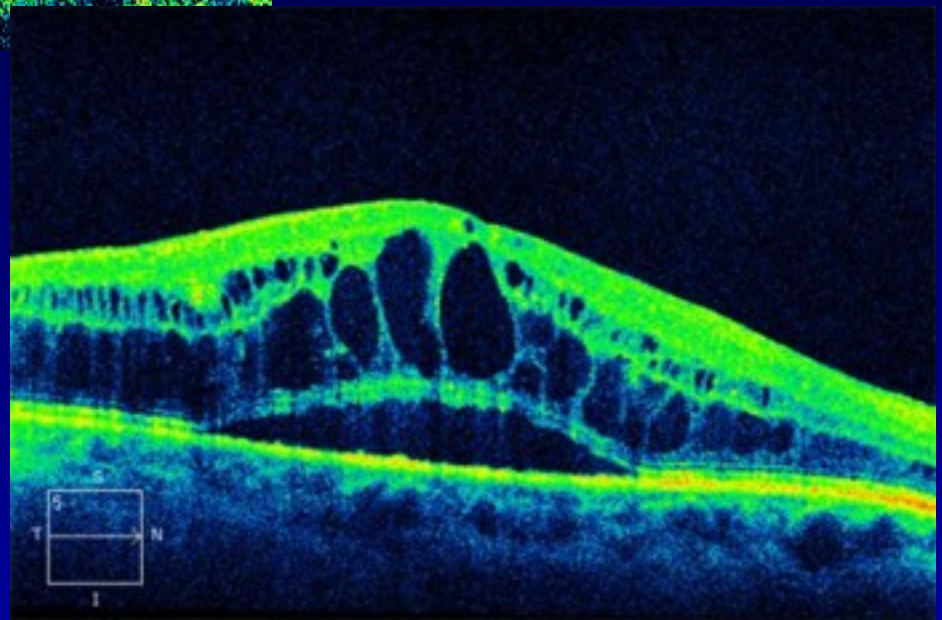
- At least 5 PATTERNS identified
- 1. Spongy-like Thickening of the retina
- 2. Cystoid Macular Edema
- 3. Subfoveal detachment without hyaloidal traction
  - Subretinal fluid, often not clinically evident
- 4. Tractional detachment of the fovea
- 5. Taught posterior hyaloidal membrane

DME: 1. Spongy Thickening

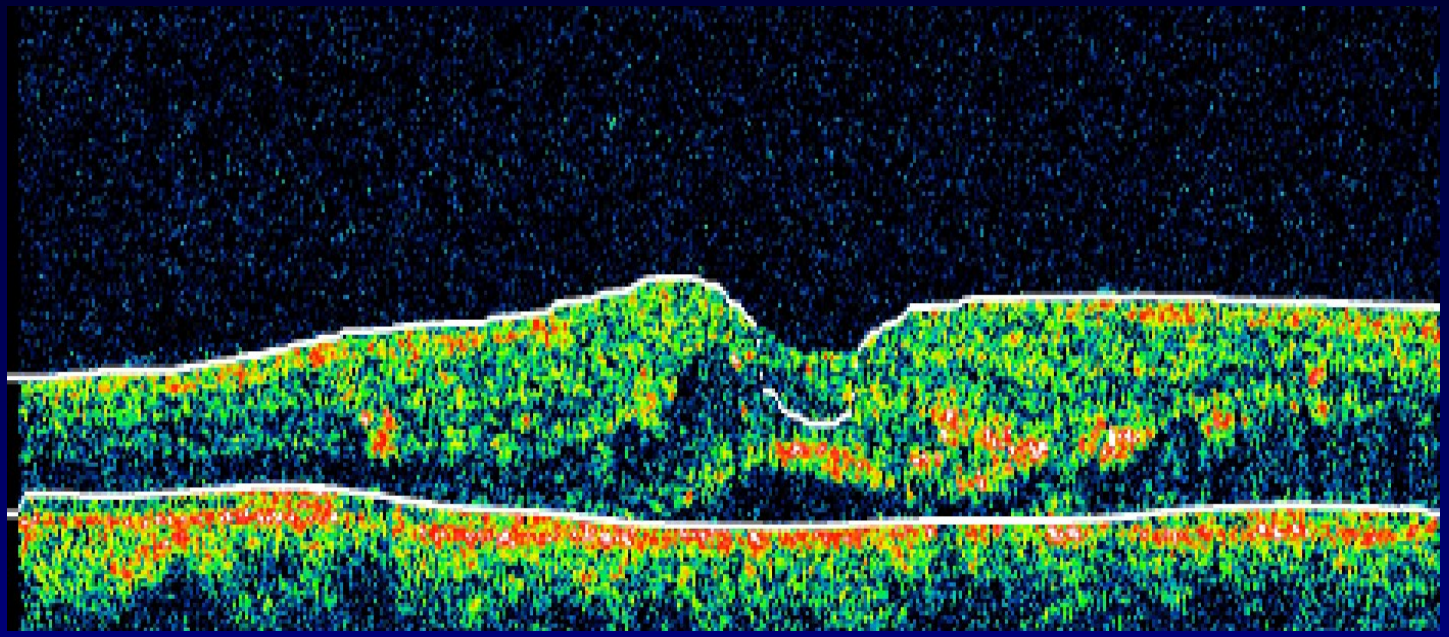


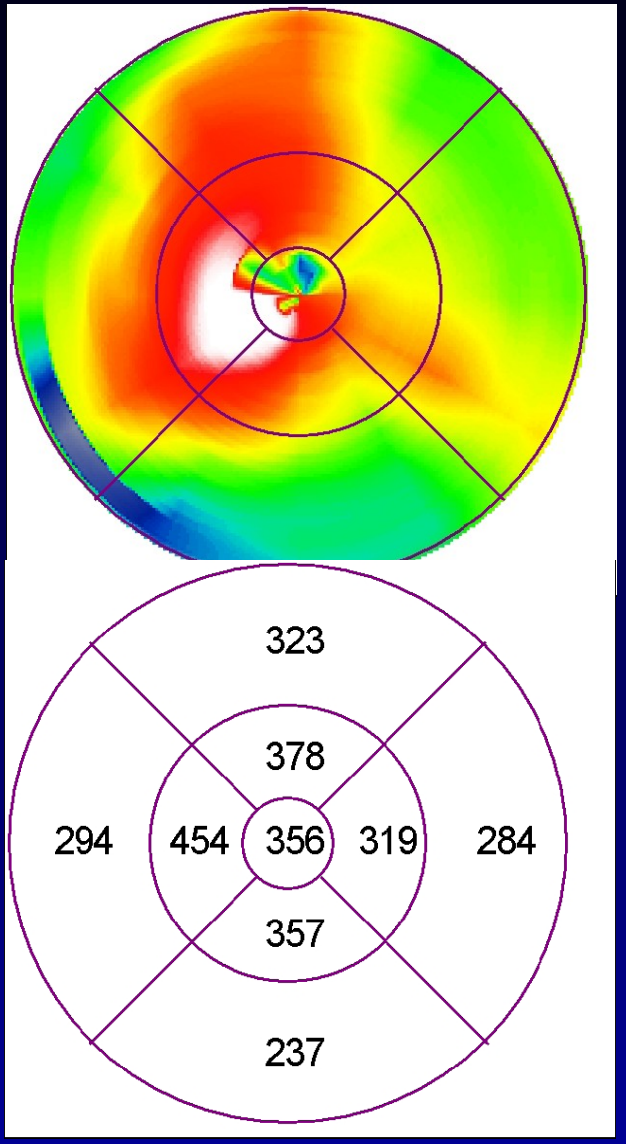
DME: 2. Cystoid Macular Edema



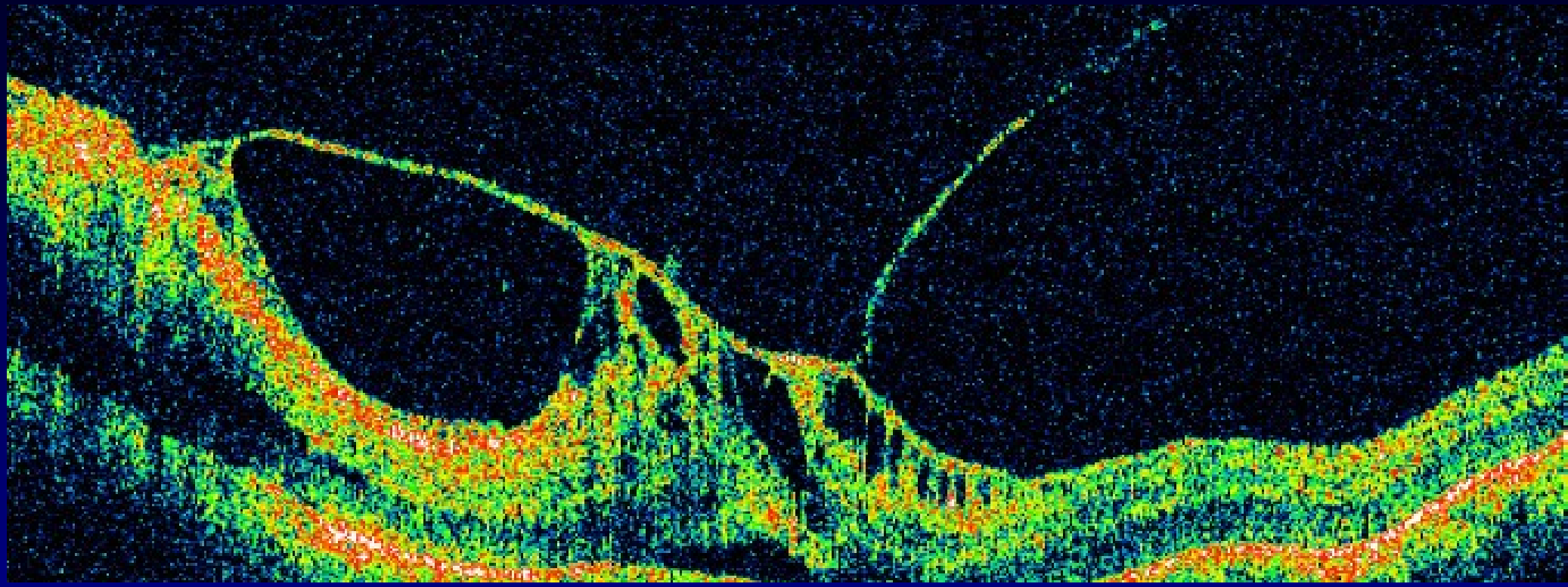


DME: 3. Sub-foveal Detachment without Traction

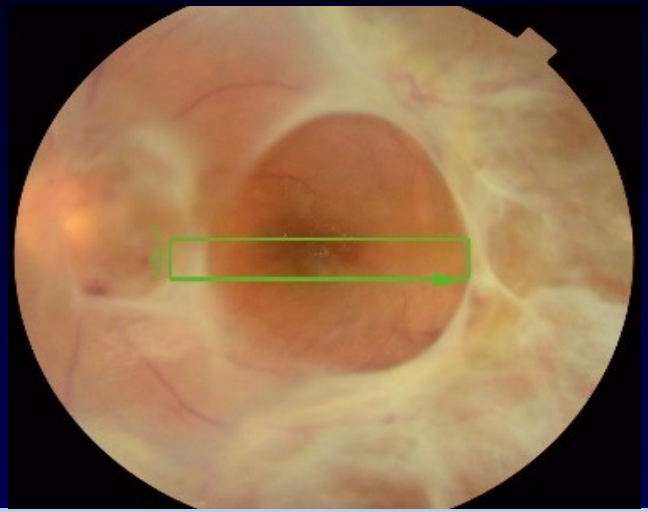


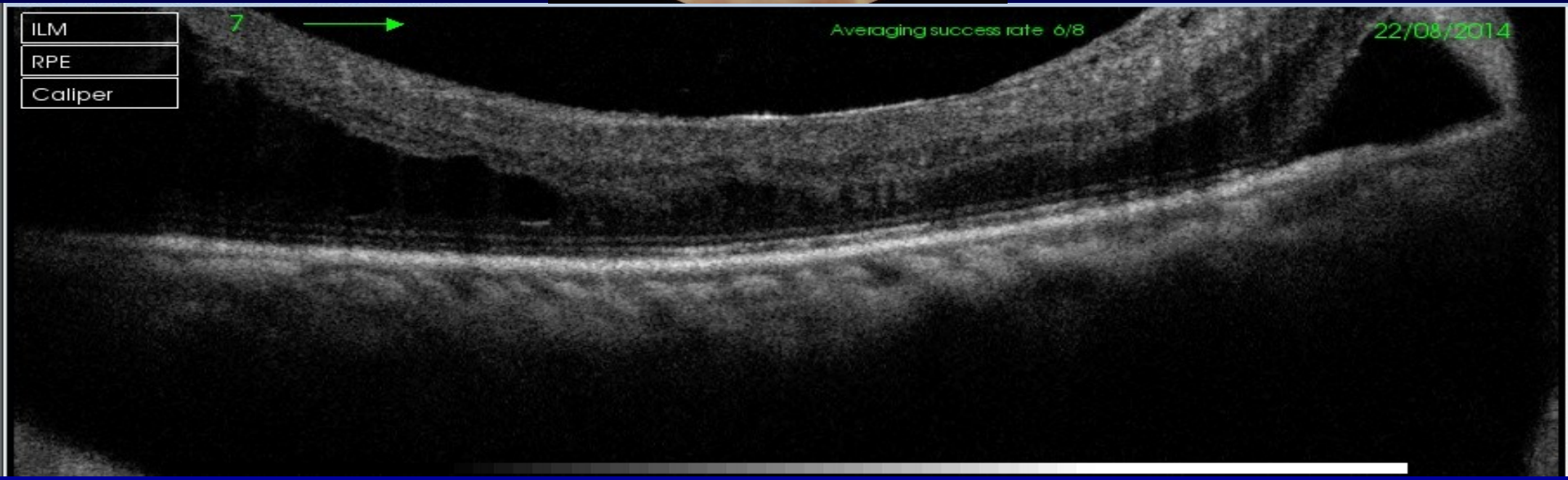


DME: 4. Subfoveal detachment with VMT



5. ADVANCED PDR+ POSTERIOR FVP+ TRD THREATENING MACULA

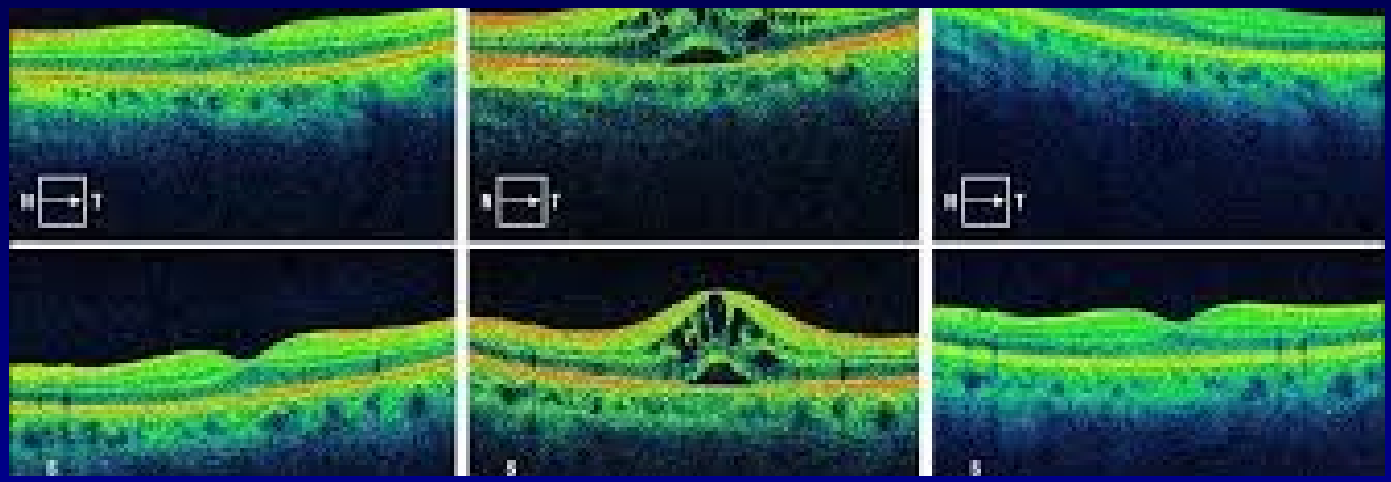




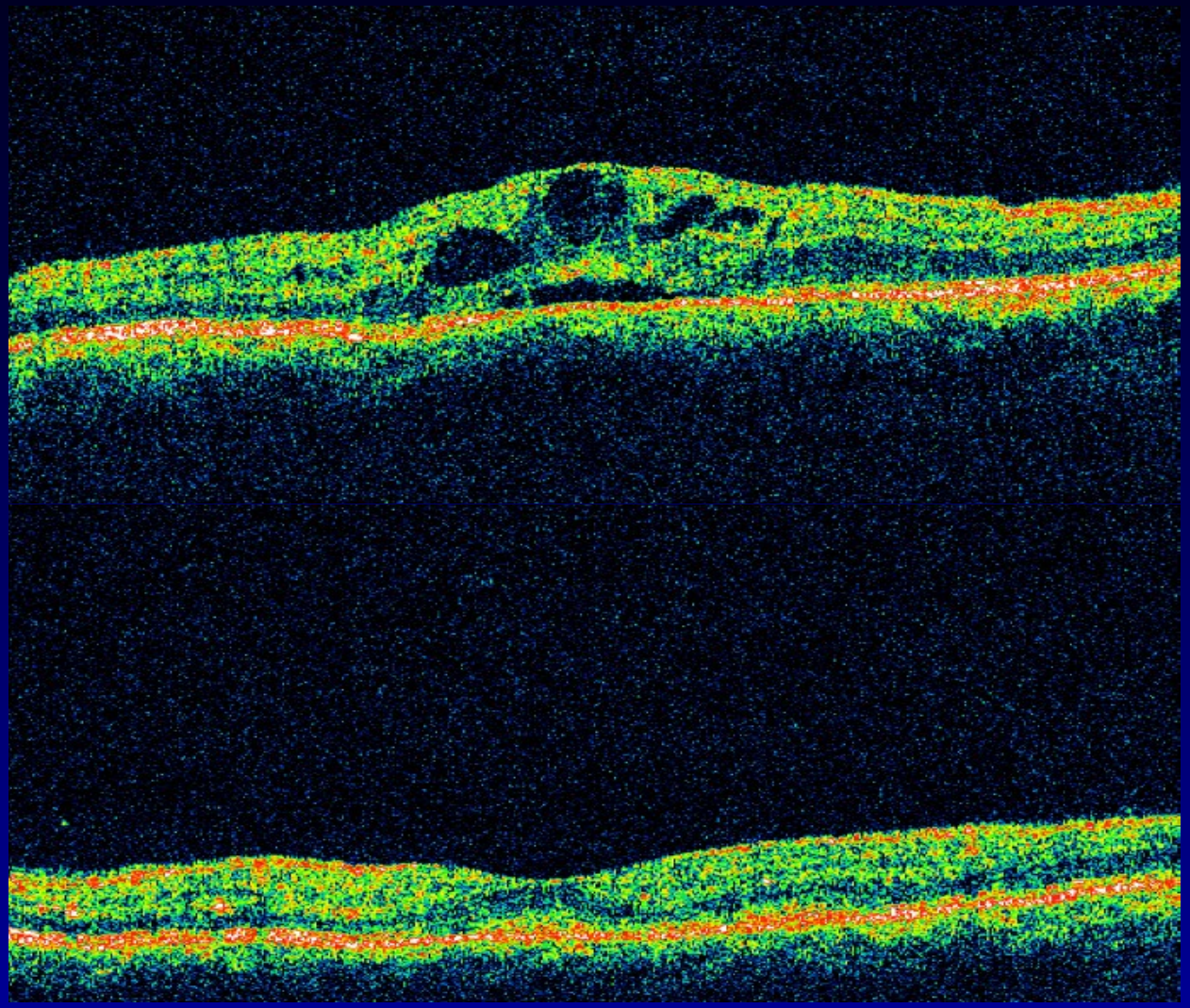
TREATMENT AND MONITORING

OCT SECTIONS (PRE AND POST TREATMENT) .

1. Better decision on treatment options
2. When to treat and when not to
3. Better follow up and decision to re-treat



RESOLUTION OF CYSTOID EDEMA AND SEROUS DETACHMENT FOLLOWING STEROID TREATMENT



Pre-Treatment

Post-Steroid Tr.

AGE-RELATED MACULAR DEGERATION

DRY, WET & GA

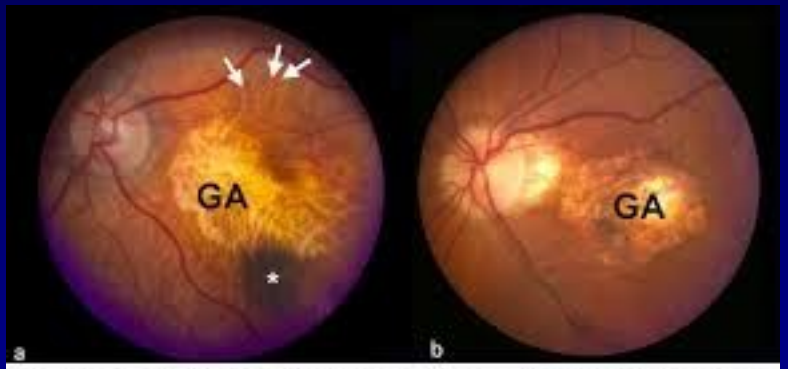
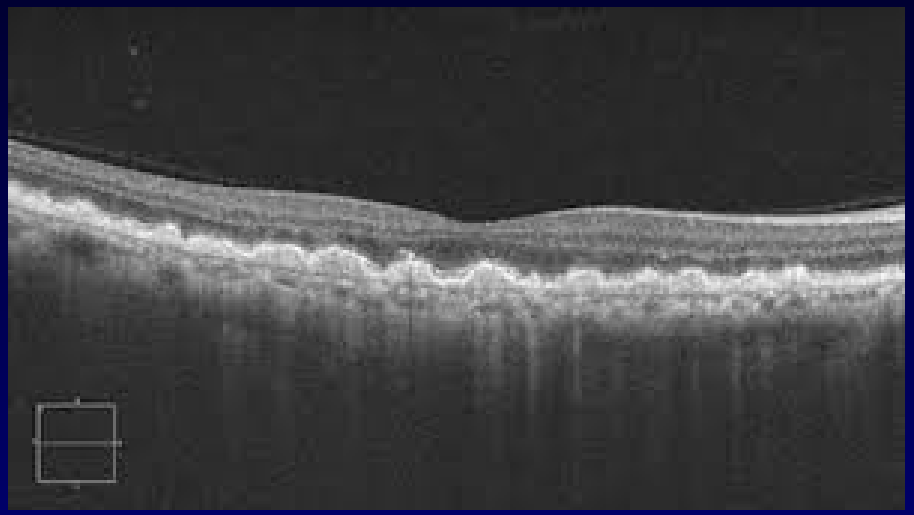
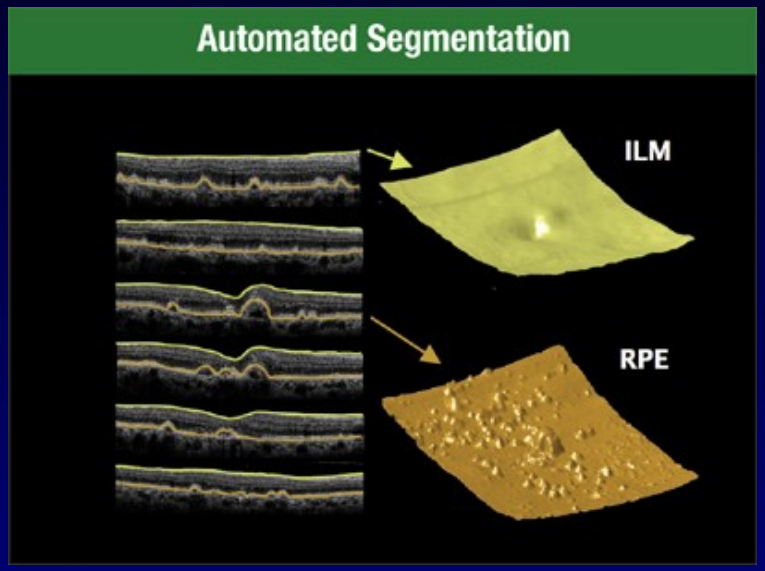
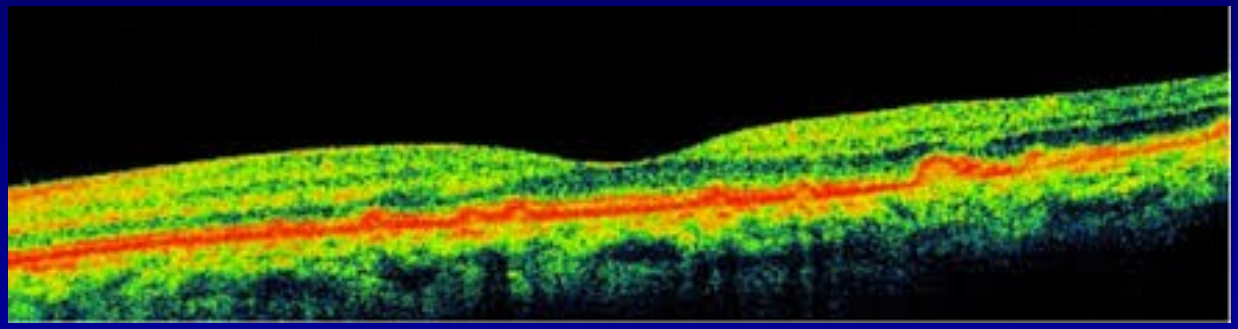


Fig. 7 Color fundus photograph from two patients (a and b) with macular geographic atrophy (GA). The margins of the regions of RPE atrophy are clearly delineated. Choroidal blood vessels (arrows) are more easily visualized in these regions of atrophy because of the loss and/or absence of the RPE pigment. A choroidal nevus (asterisk) is indicated in eye a. These eyes would be expected to have poor central vision due to the extensive atrophy

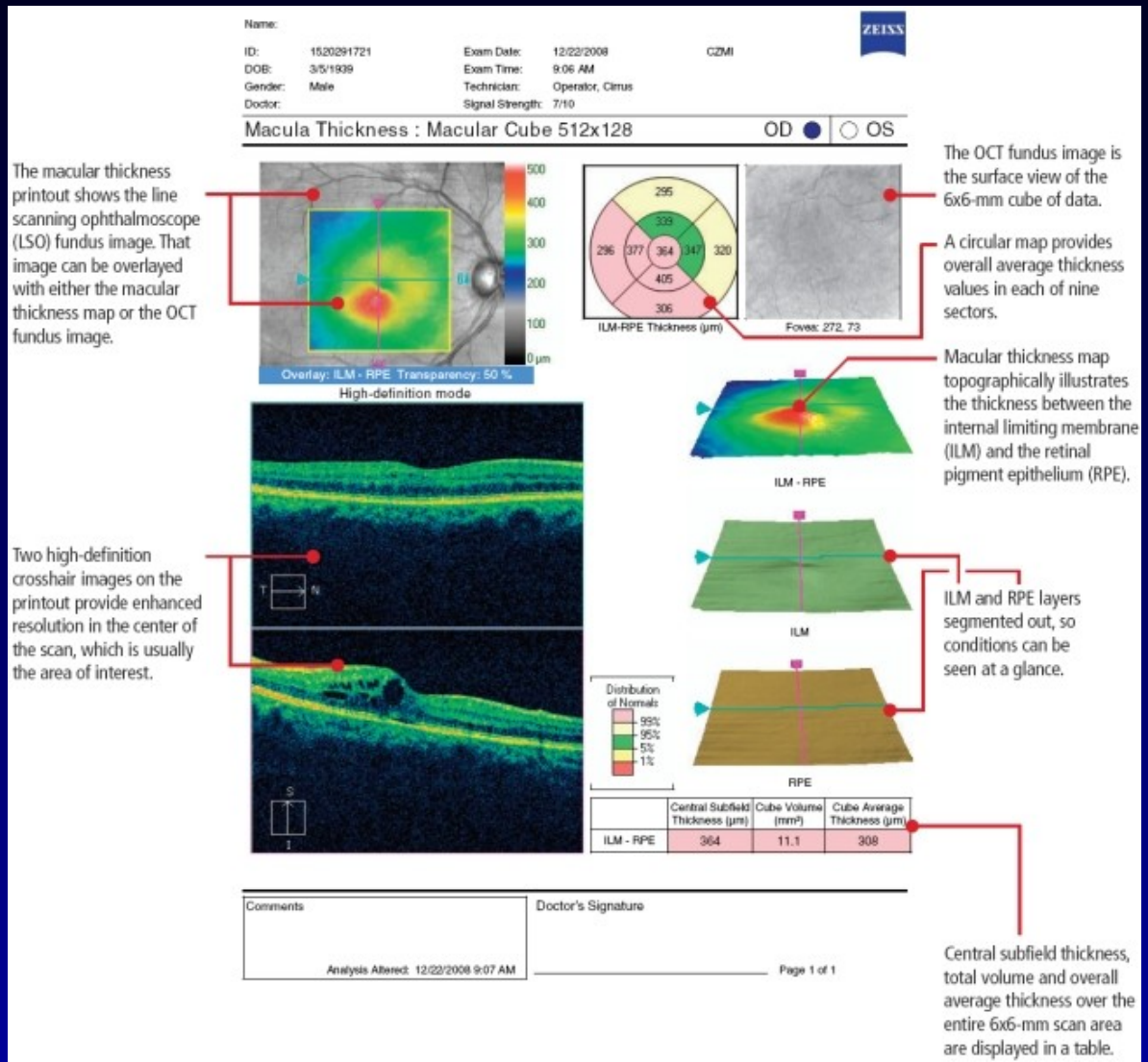
Dry AMD (ARM)



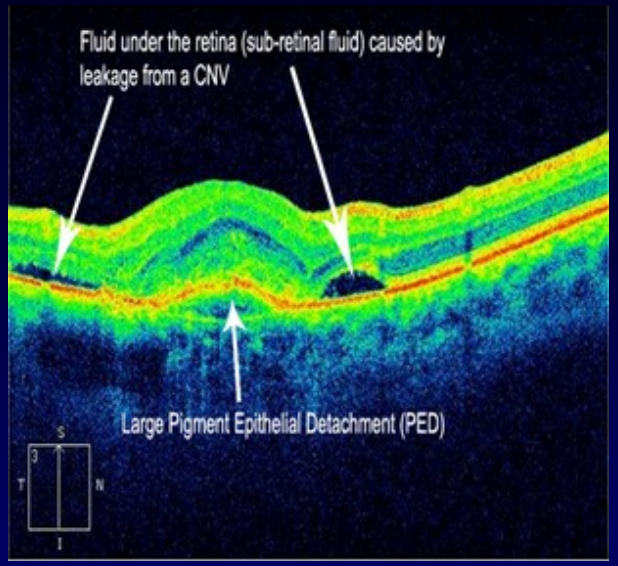


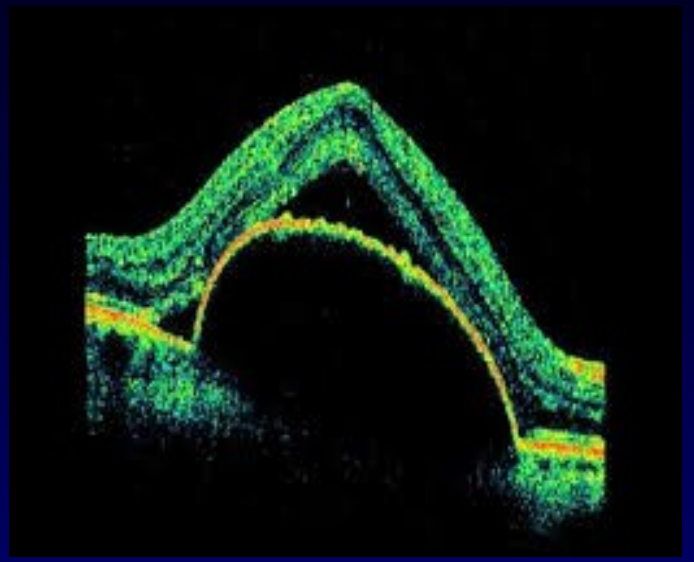


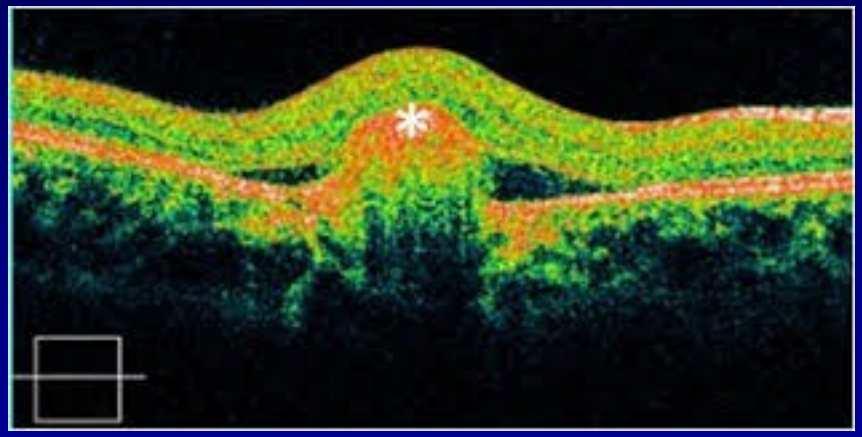
OCT Segmentation Map

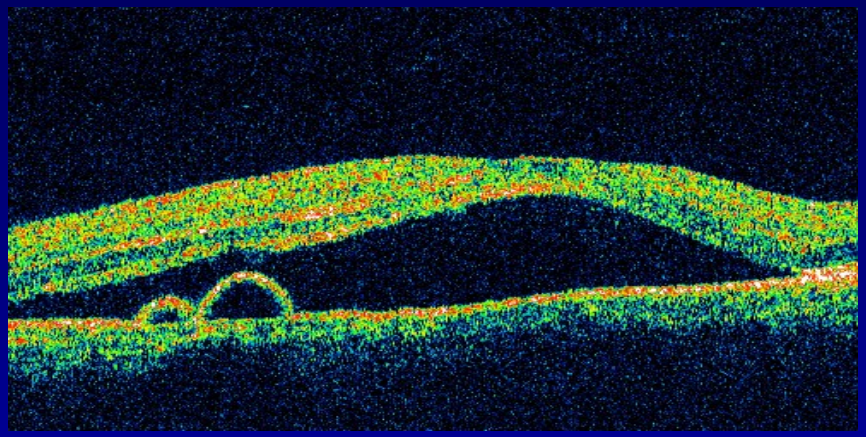


wAMD

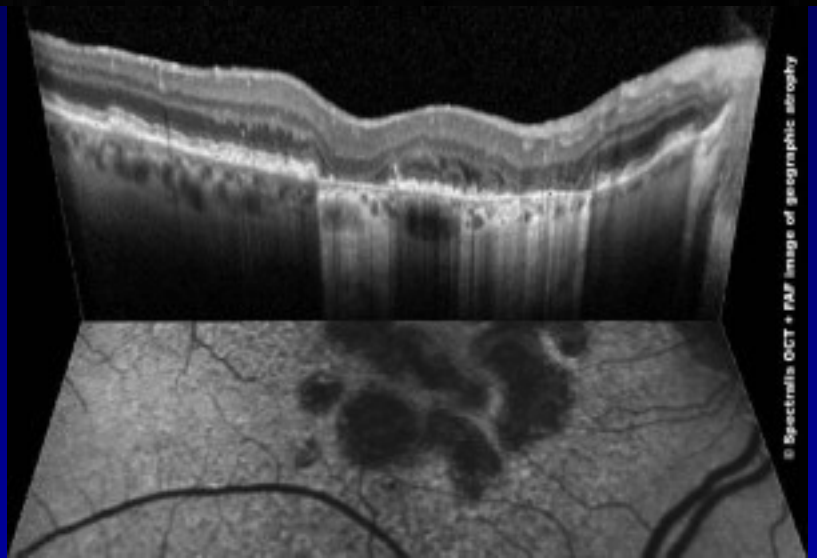

Fluid under the retina (sub-retinal fluid) caused by leakage from a CNV
Large Pigment Epithelial Detachment (PED)
S
T
N
I







OCT Features of Geographic Atrophy



THE NEW VMI CLASSIFICATION SYSTEM

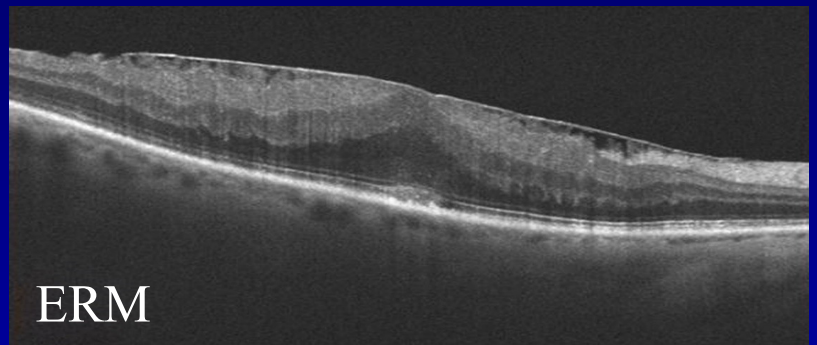
VMI Diseases

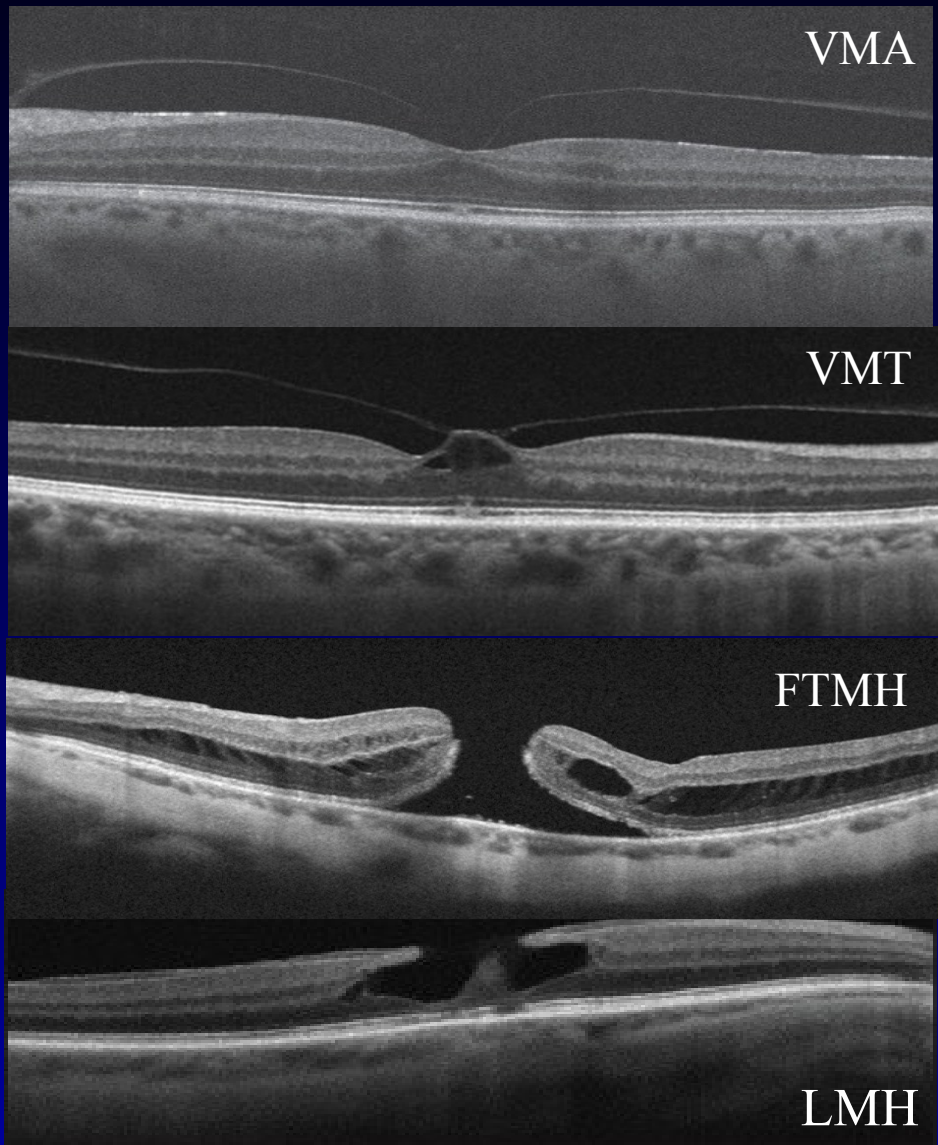
International Classification of Diseases of the Vitreomacular Interface (VMI)

- International panel convened in 2012 to devise a new classification system for VMI disease
- Strictly Anatomic – OCT based
  - Objective
  - Not based on clinical findings
  - Not based on symptoms
- Simple, easy to use, predictive of surgical (PPV and pharmacological) outcomes

VMI Classification System: One Finding. Five Diseases

- "Finding":
  - Vitreomacular Adhesion (VMA)
- Diseases:
  - Vitreomacular Traction (VMT)
  - Full Thickness Macular Hole FTMH)
  - Lamellar Macular Hole (LMH)
  - Epiretinal Membrane (ERM)



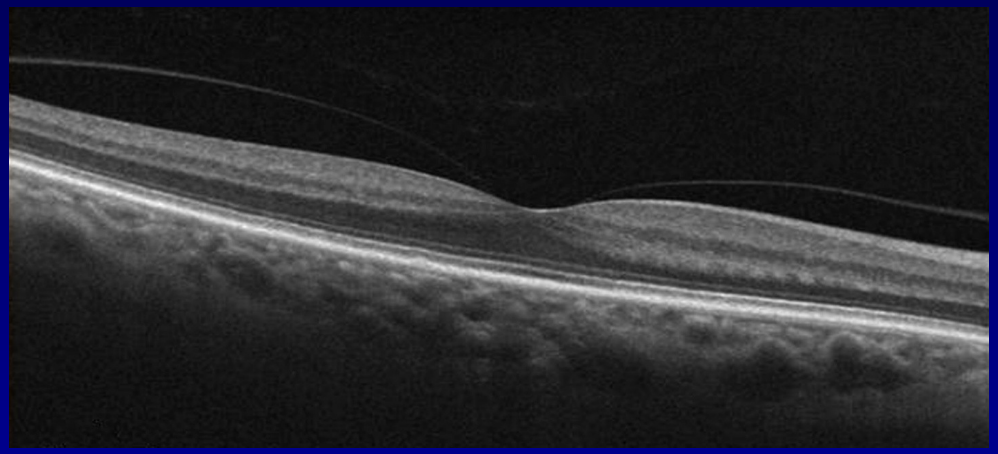


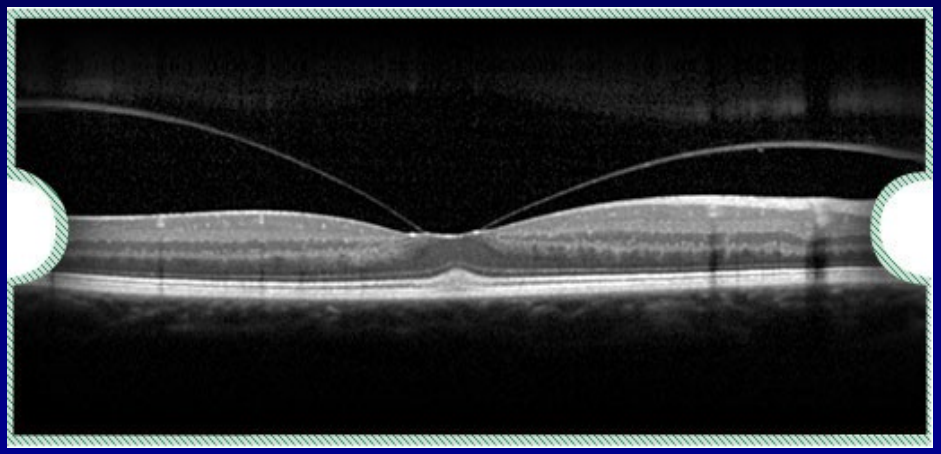
VMI Classification

Vitreomacular Adhesion (VMA)

1. Vitreomacular Adhesion (VMA)

- Vitreous adhesion to central macula (3mm of fovea) with no demonstrable anatomic change
- Previous classification: Stage-0 Macular Hole if fellow eye has FTMH





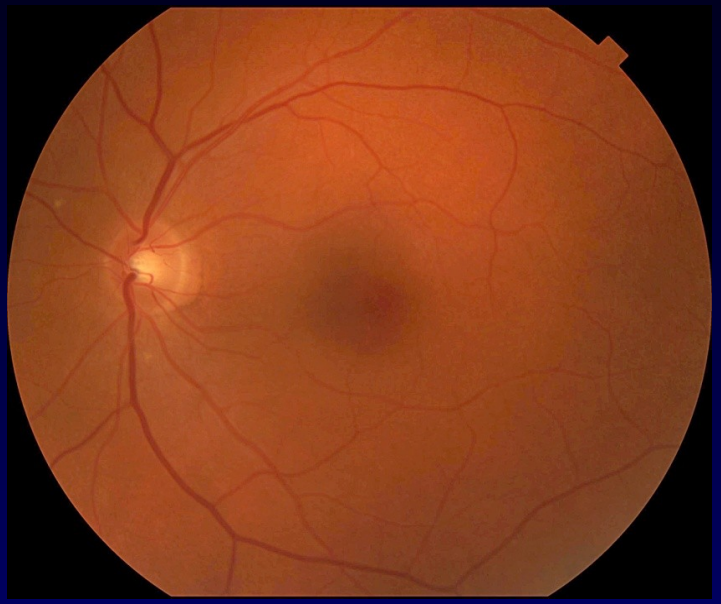
VMI Classification

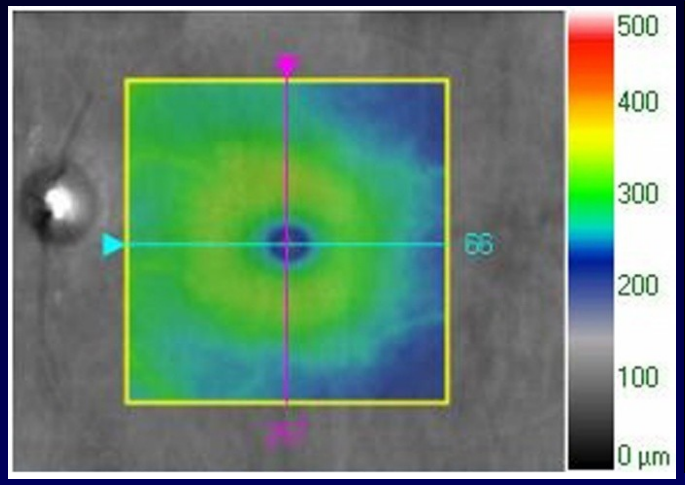
Two VMA Subclassifications

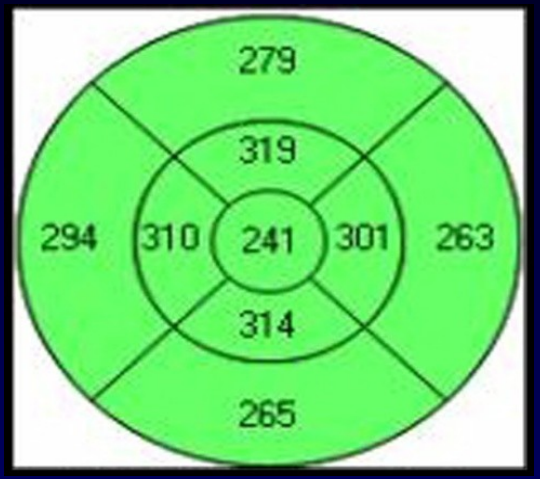
- FOCAL vrs BROAD
  - Focal attachment ≤1500 microns
  - Broad attachment >1500 microns
- ISOLATED vrs CONCURRENT
- Isolated: Finding on OCT without any posterior segment disease
- Concurrent: With other macular disease.

- Note: VMA may resolve, persist, or go on to VMT

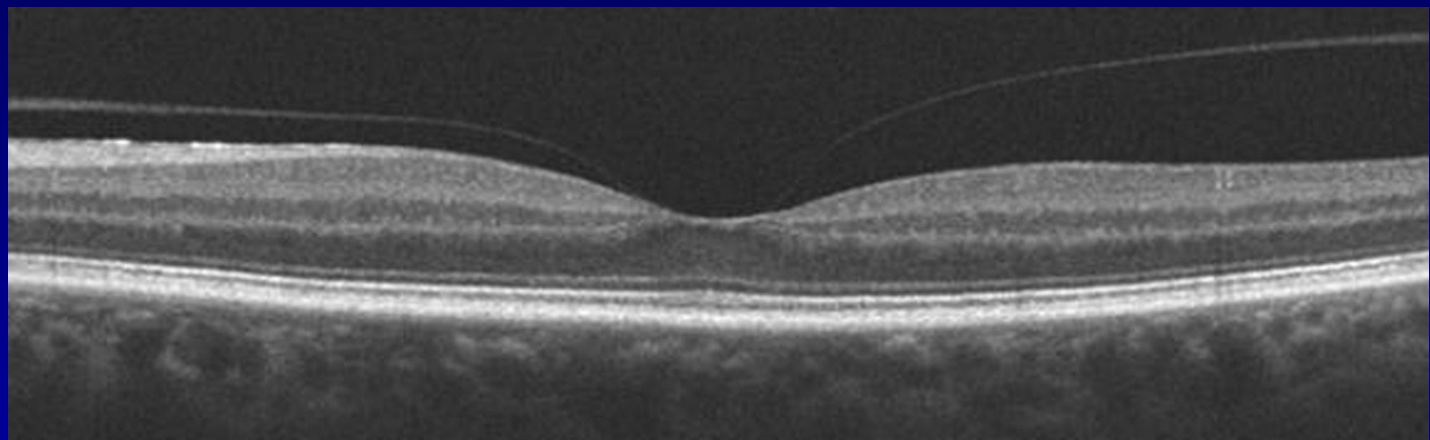
FOCAL VMA



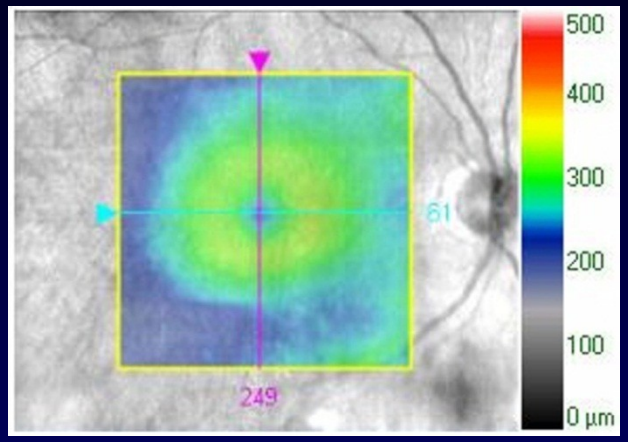




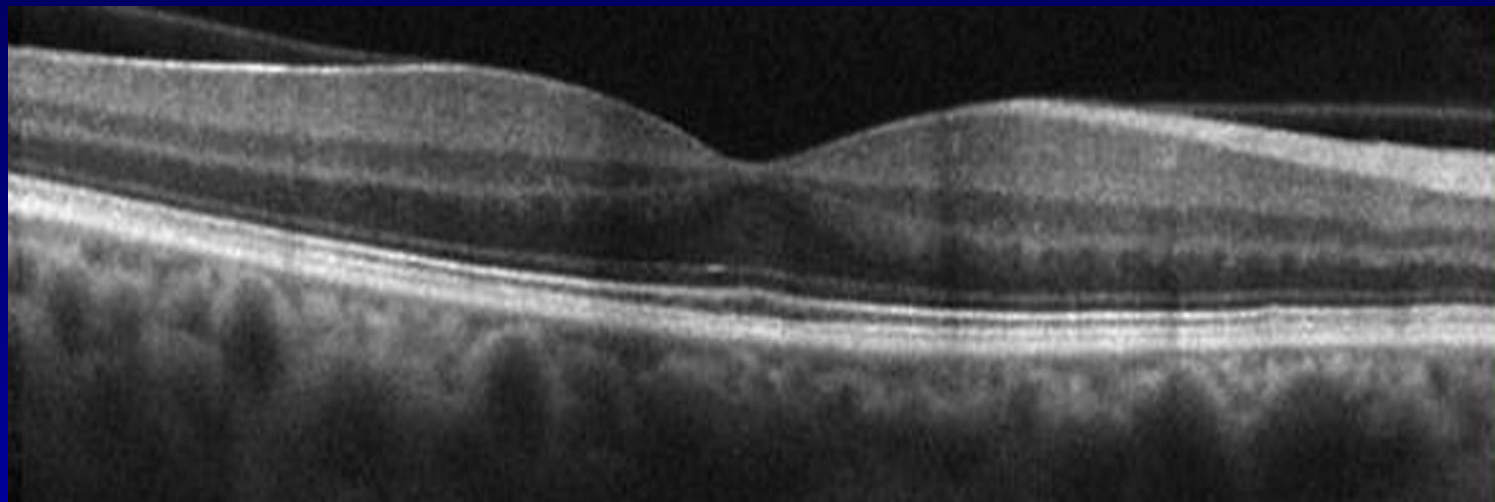
Focal VMA



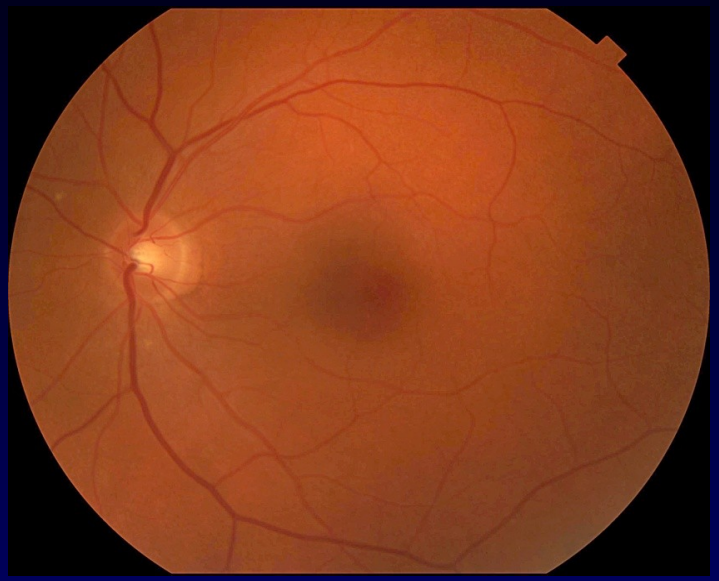
BROAD VMA



Broad VMA



ISOLATED VMA



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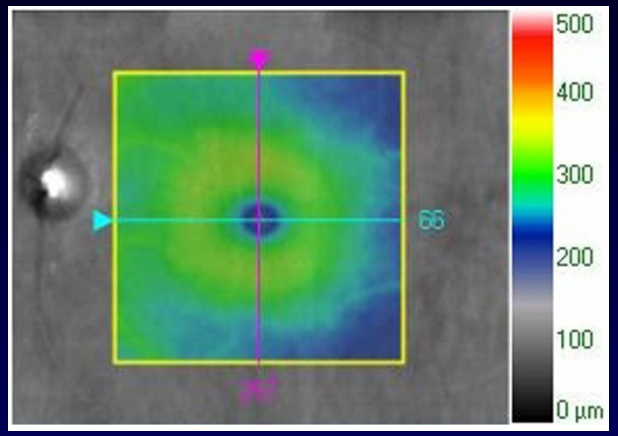
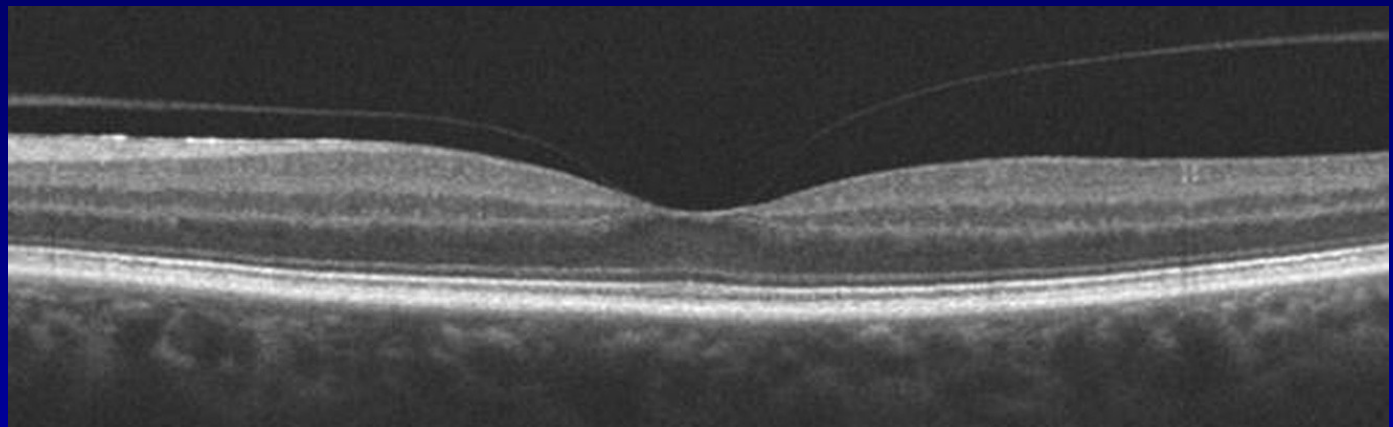


Otherwise normal macula
= Isolated focal VMA



CONCURRENT VMA

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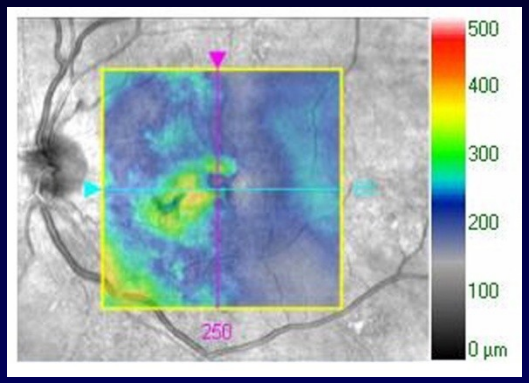
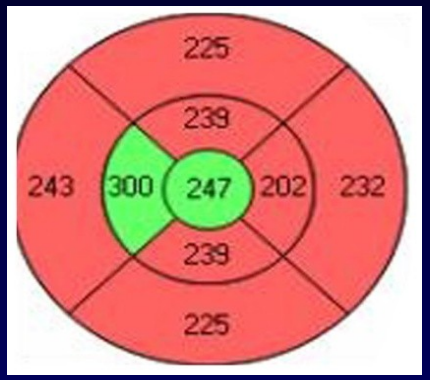
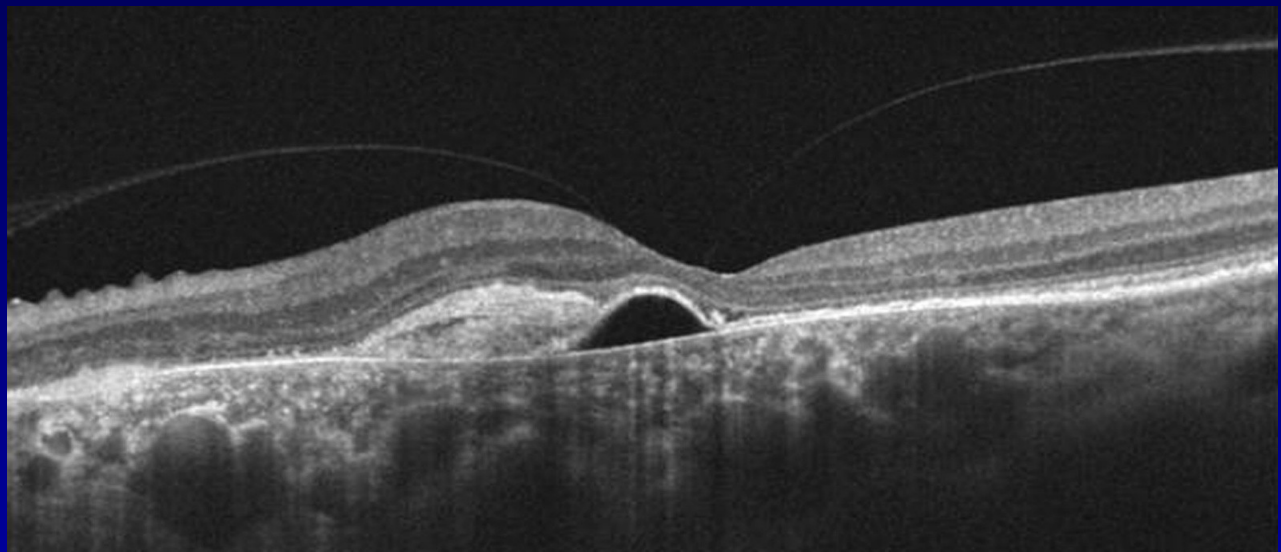




Concurrent focal VMA (associated with CSCR)



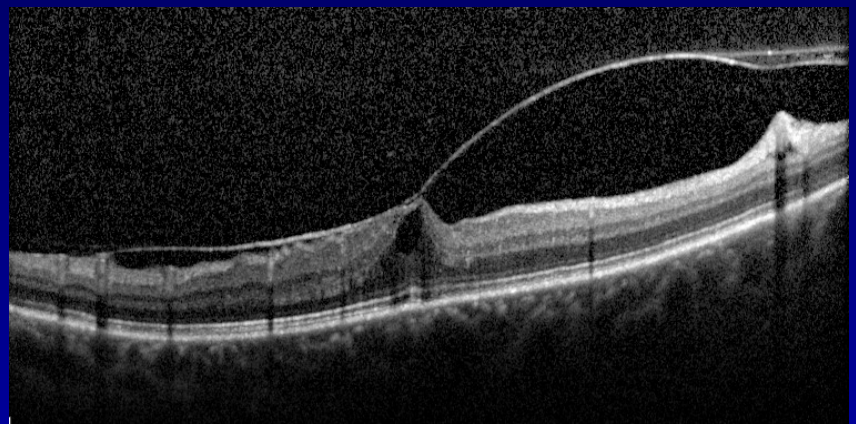
VMI Classification

VMA Usually Spontaneously Resolves… But When It Doesn't….

Vitreomacular Traction (VMT)

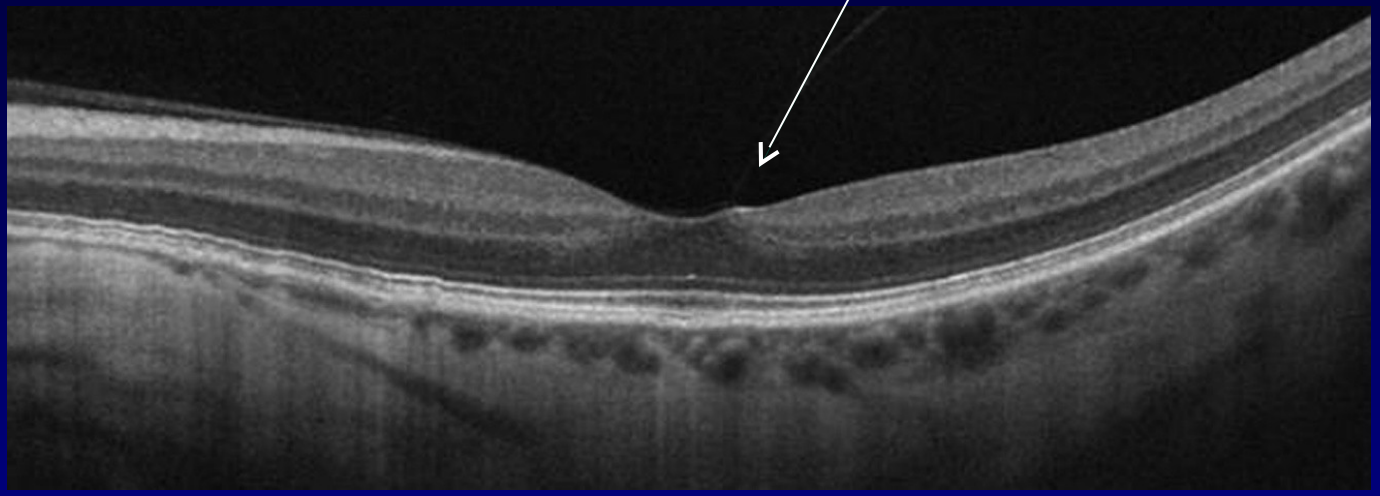
VITREOMACULAR TRACTION -VMT-

- Definition = VMT is VMA with ANY abnormal macular retinal architecture
- Anatomic retinal changes on OCT
- ALWAYS pathological
- May or may not be symptomatic



VMI Classification

Vitreomacular Traction (VMT) – very mild, no symptoms



TWO SUB-CLASSIFICATIONS

- FOCAL vrs BROAD
  - Focal attachment < 1500 microns or less
  - Broad attachment > 1500 microns

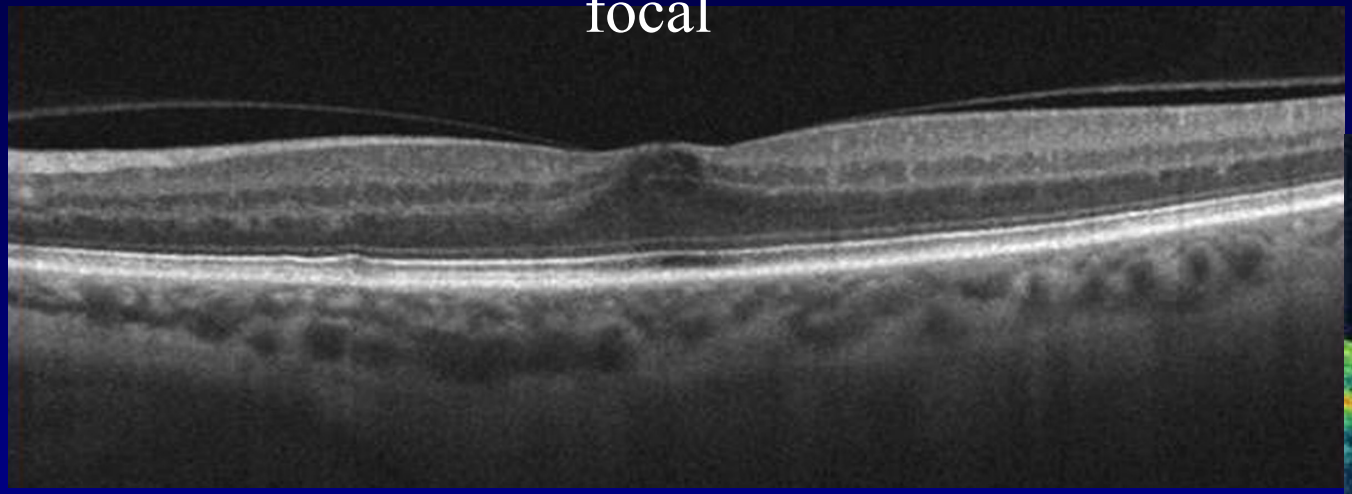
- ISOLATED vrs CONCURRENT(with other macular disease)

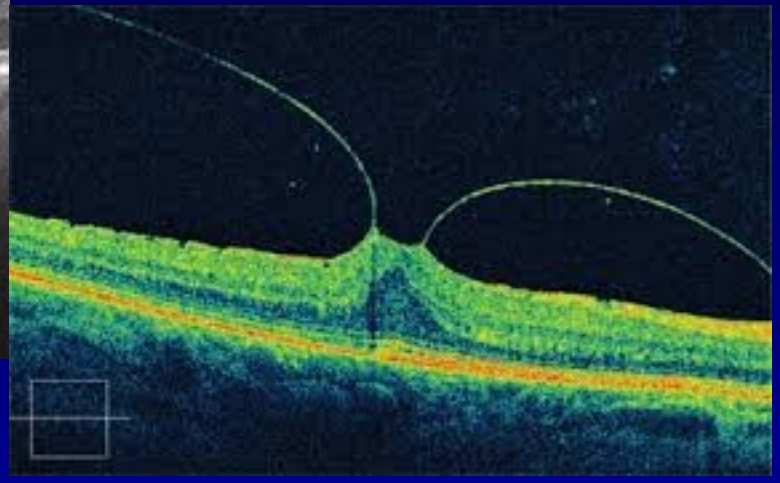
VMI Classification

Vitreomacular Traction (VMT)

- VMT = VMA with retinal architectural changes

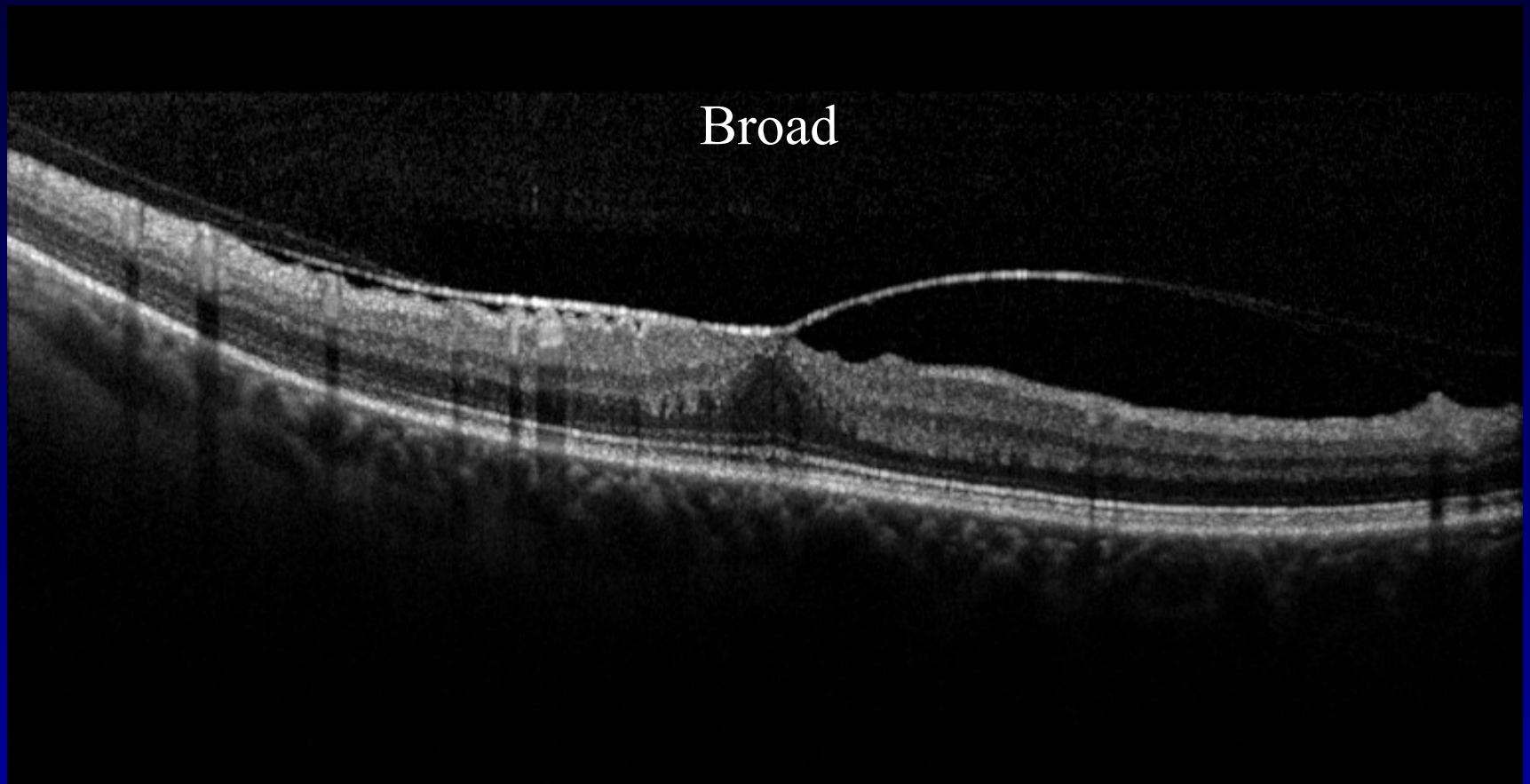
focal





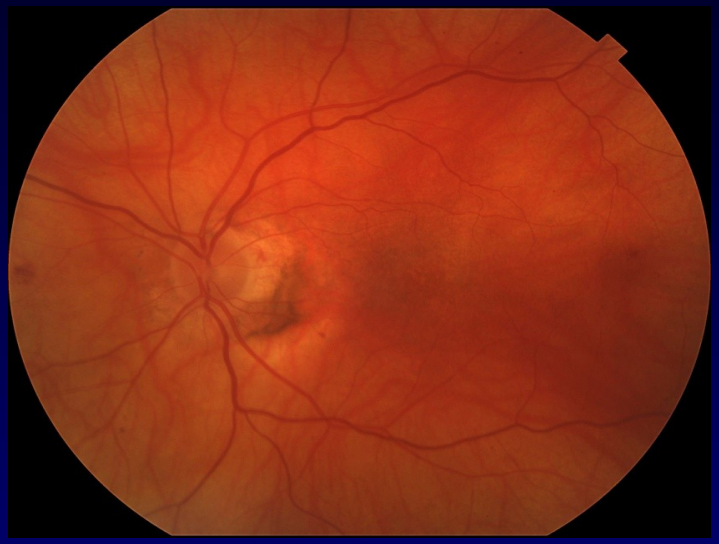
VMI Classification

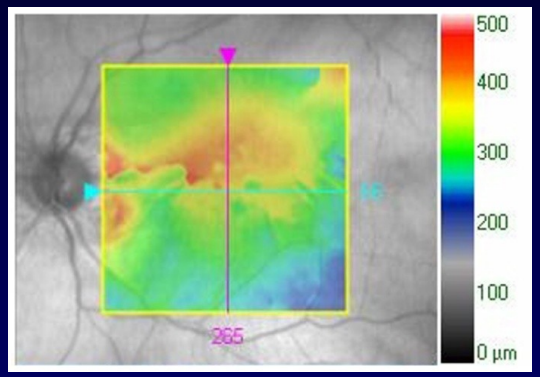
Isolated Broad VMT



VMI Classification

AMD With Concurrent VMT

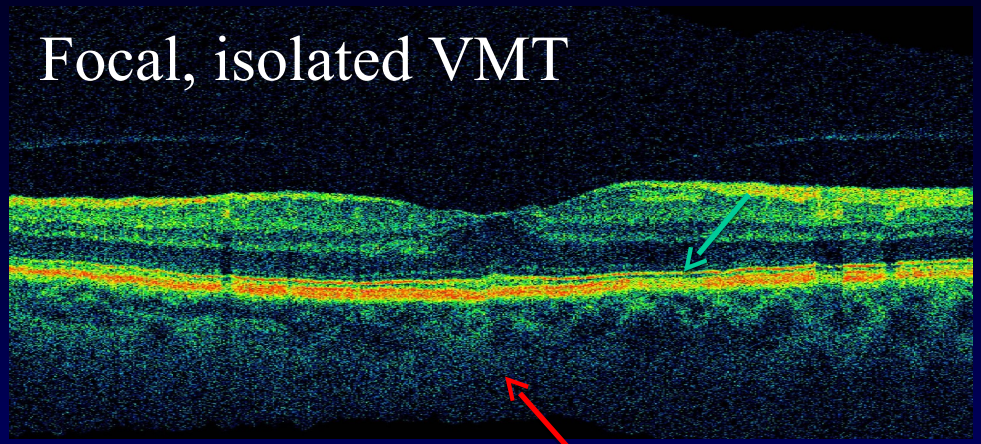




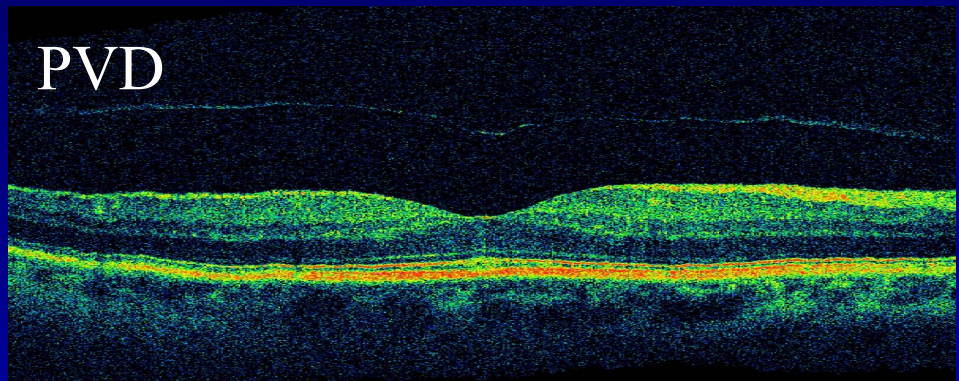
Secondary Broad
VMT in AMD

VMT COURSE

- Spontaneous PVD
  - Usually with regression of symptoms
- Stability
- Progression
  - Severe retinal anatomic distortion
  - LMH
  - FTMH



3 weeks later

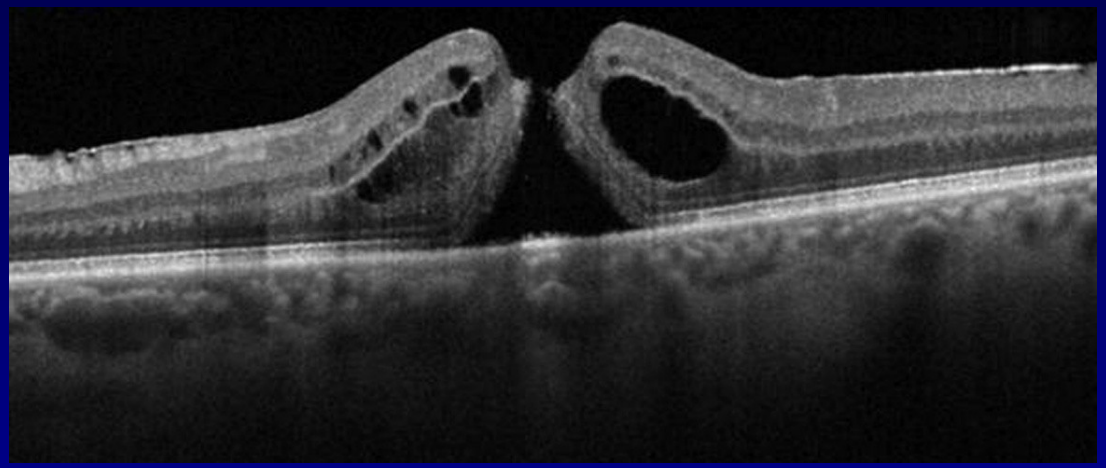


Full Thickness Macular Hole (FTMH)
New OCT Based Classification System

Full Thickness Macular Hole (FTMH)

Definition

- Full thickness retinal defect involving the fovea
- OCT best way to diagnose



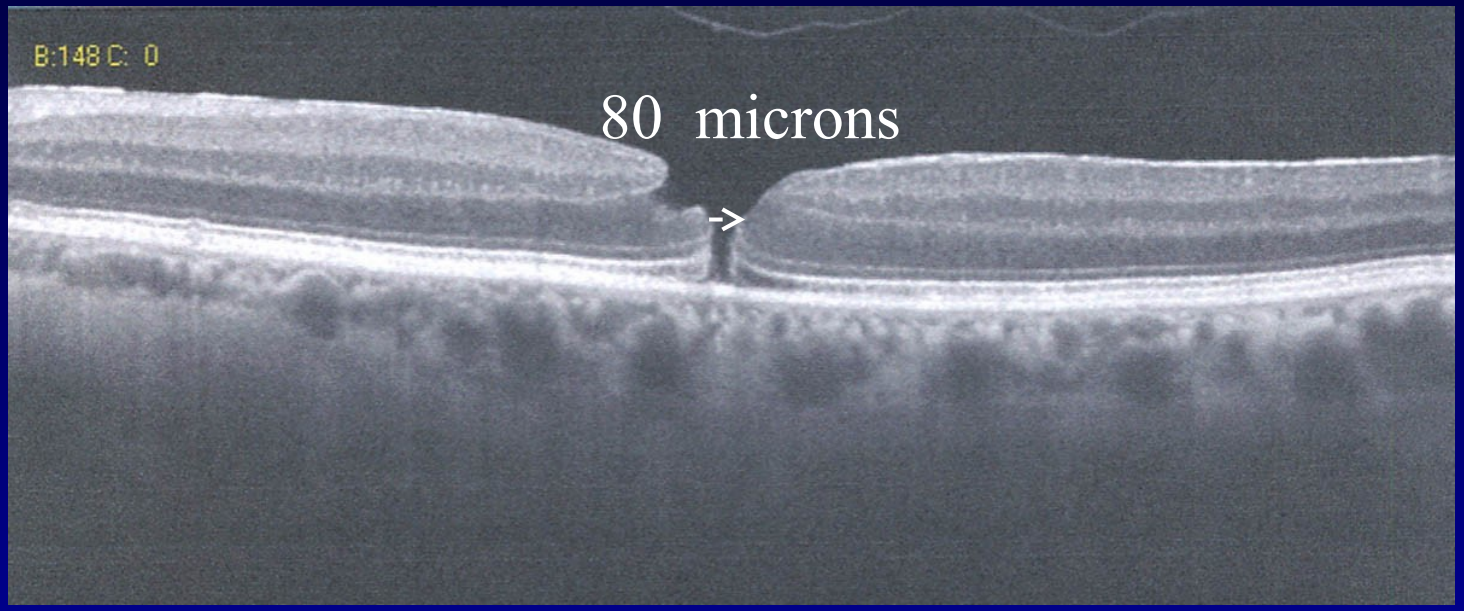
FTMH

Anatomy and Outcome-Based Classification System: 3 Factors

- 1. Size of defect
- 2. VMT = present or absent
- 3. Primary or secondary
- Note:
  - Not a "staging" system
  - No longer an "idiopathic" condition = Primary. Due to VMA ⊆ VMT

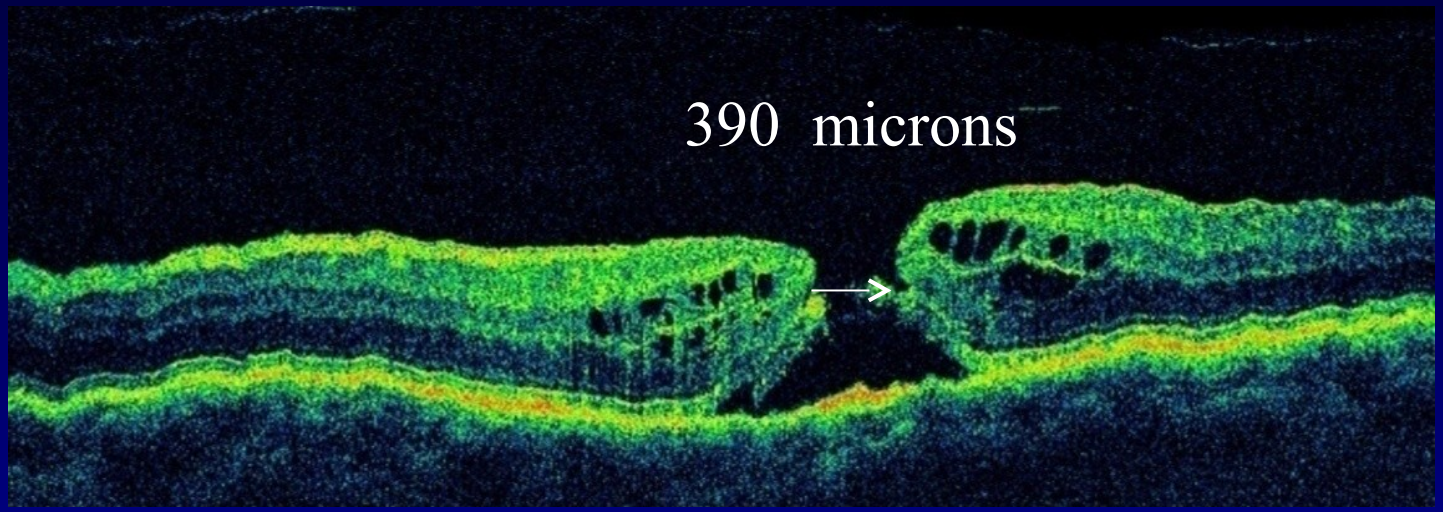
1. FTMH Subclassification
Size of Aperture

Small (≤ 250 microns)



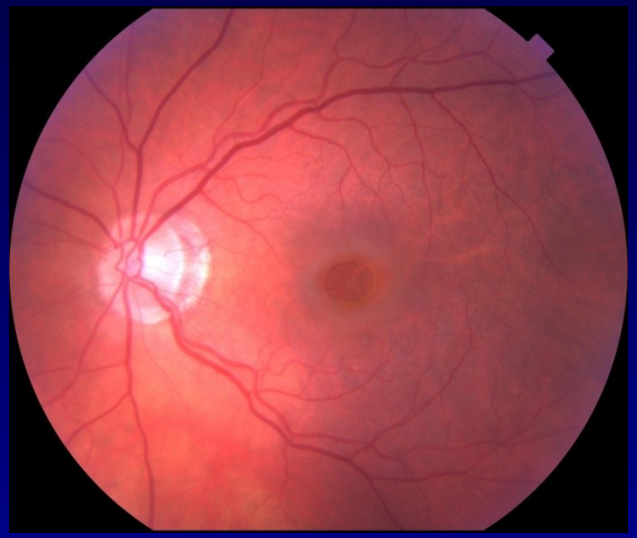
1. FTMH Subclassification
Size of Aperture

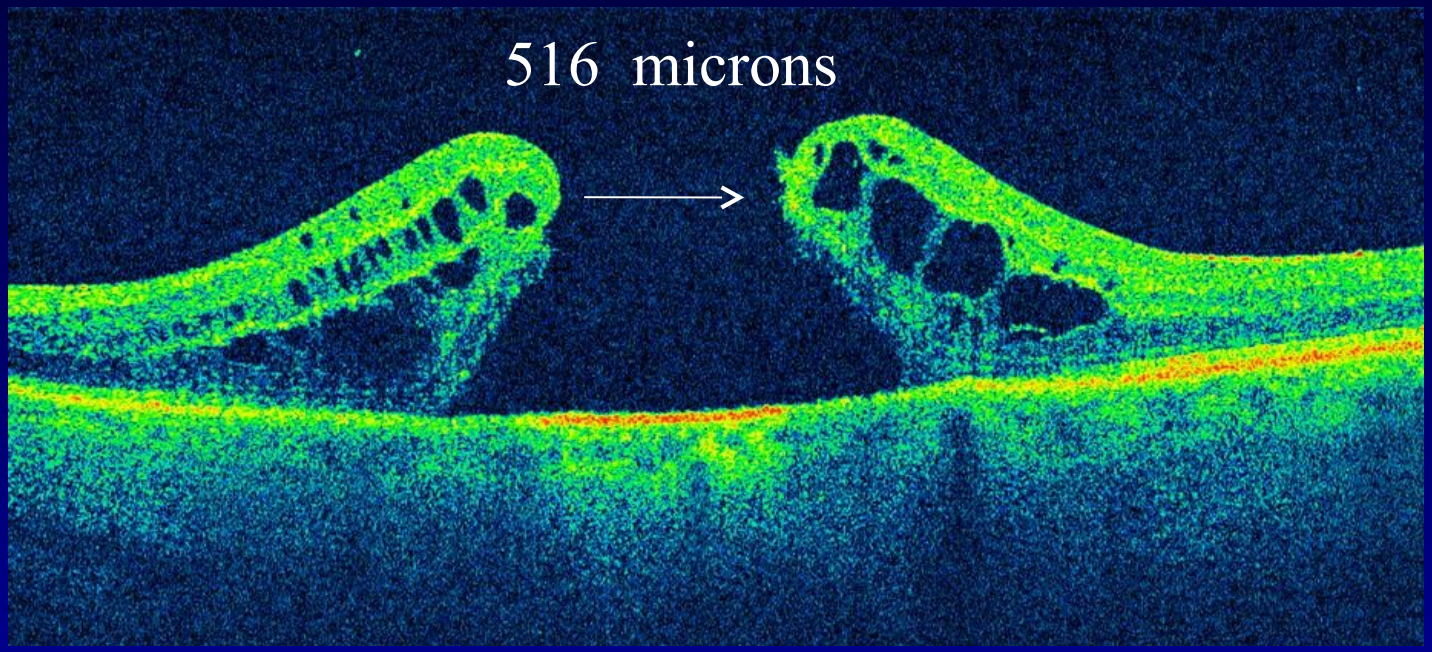
Medium (251 – 400 microns)



1. FTMH Subclassification
Size of Aperture

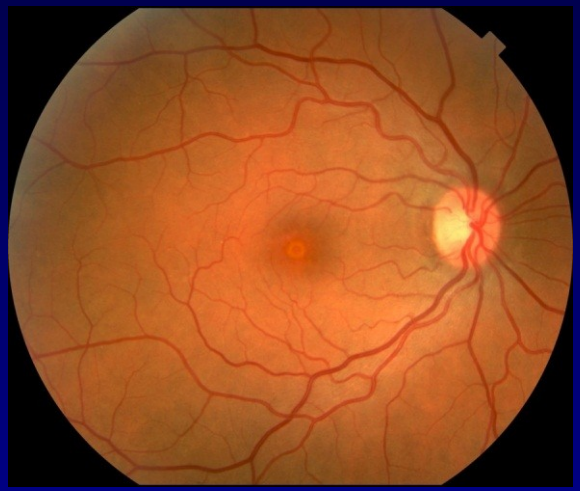
Large (> 400 microns)

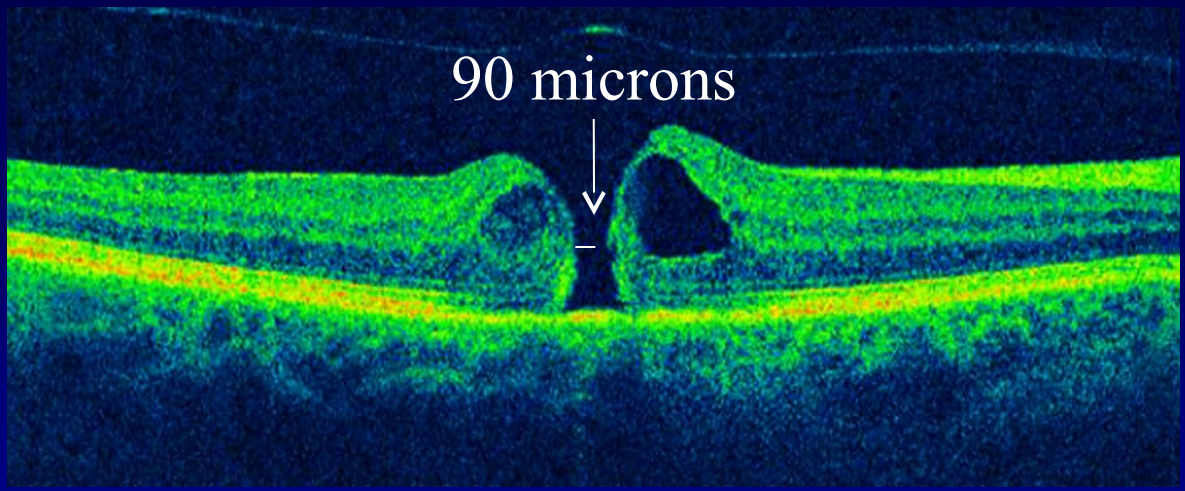




2. FTMH Subclassification Presence or Absence of VMT

- FTMH with VMT present
- FTMH with VMT released
  - Under Gass classification – this would have been a stage 4 macular hole regardless of size

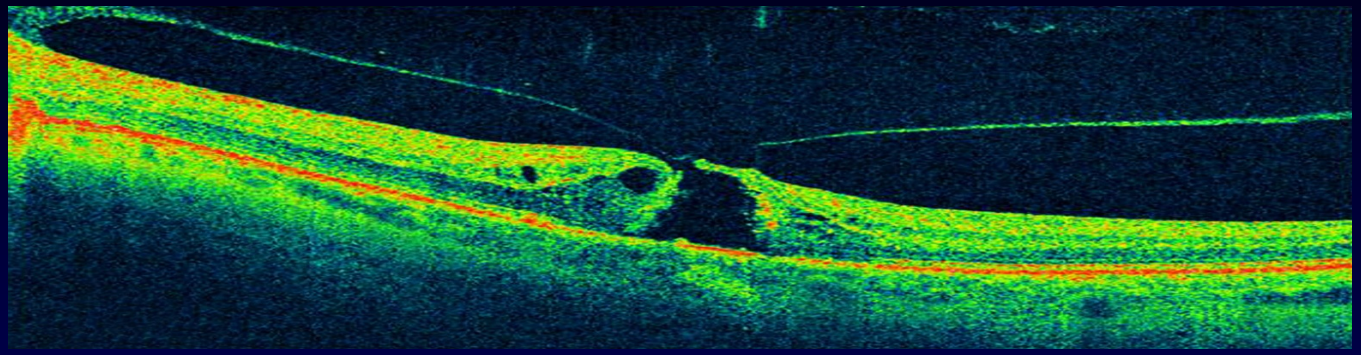




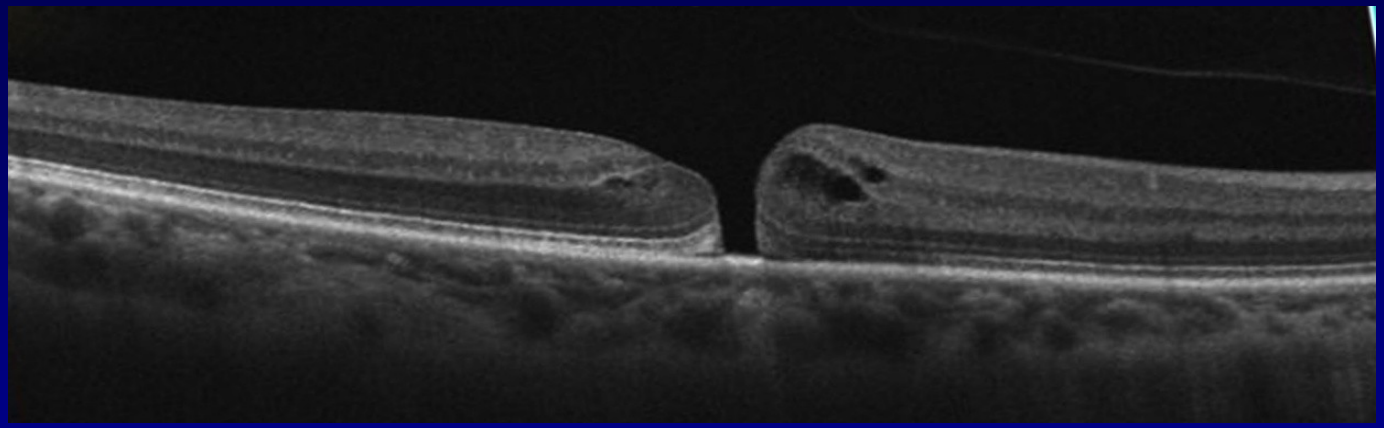
Small FTMH – VMT released

2. FTMH – VMT Present or Absent

Small FTMH – VMT present



Small FTMH – VMT released

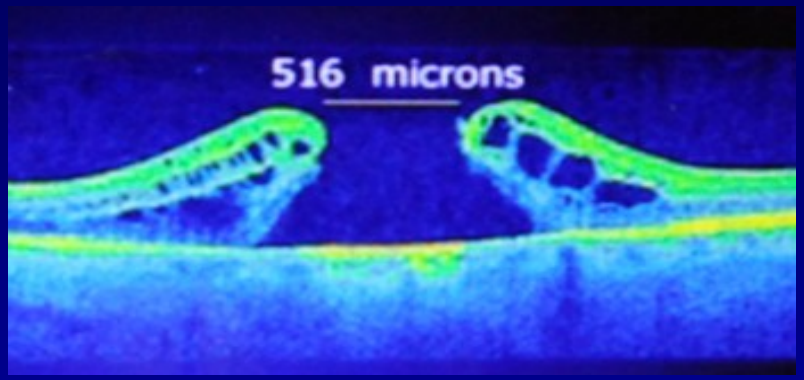


3. FTMH Subclassifications – Primary vs Secondary

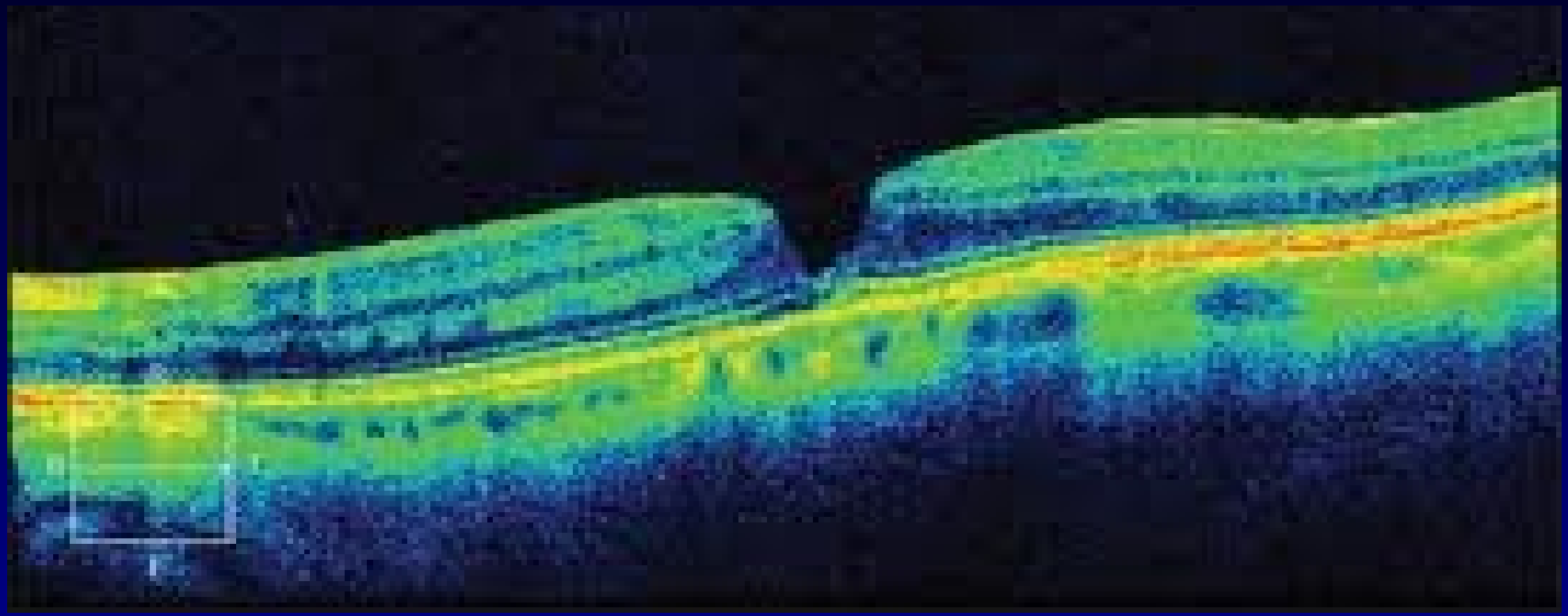
- *Primary* = due to VMT (formerly "idiopathic" macular hole
- *Secondary*
  - Not initiated by VMA or VMT
  - Secondary to preexisting or concurrent condition or disease
    - Trauma
    - High Myopia
    - Macular Schisis
    - ERM
    - CNV

OCT IN MACULAR HOLE

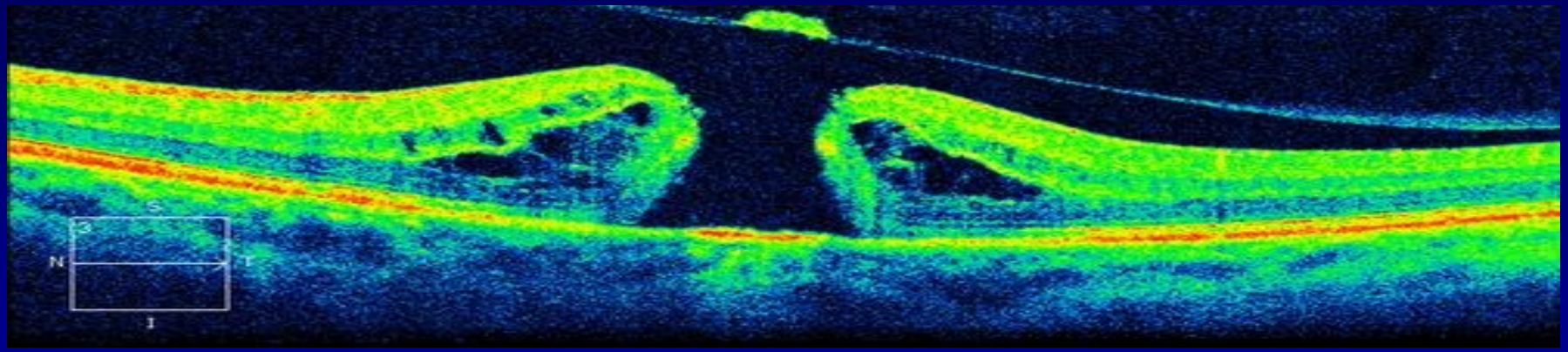
- **Helps in differentiating lamellar from FTMH.**
- **R/O VMT in fellow eye**
- **Monitor Progression**
- **Quantitative information in planning MH surgery**



LAMELAR HOLE

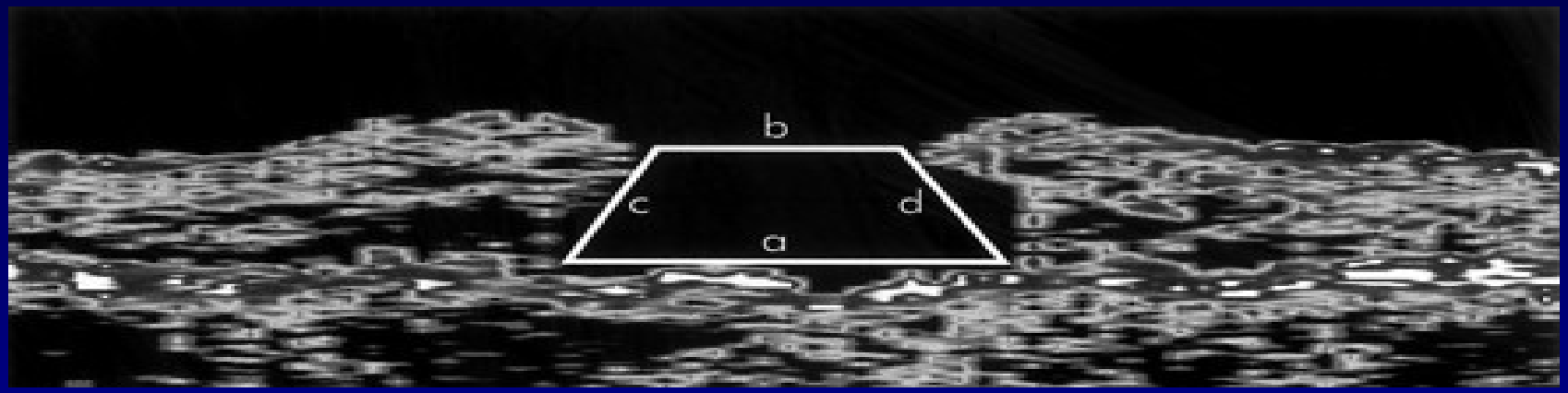


FULL THICKNESS RETINAL DEHISCENCE



OCT IN MAC. HOLE SURGERY

- **Add important anatomic information for surgical planning and follow –up.**
- **Prognosis:**
  - **MINIMUM DIAMETER**
  - **HOLE FORM FACTOR(HFF): c+d/a:**
    - **Values <0.5 POOR SURGICAL CLOSER.- MIN DIA HOLE**

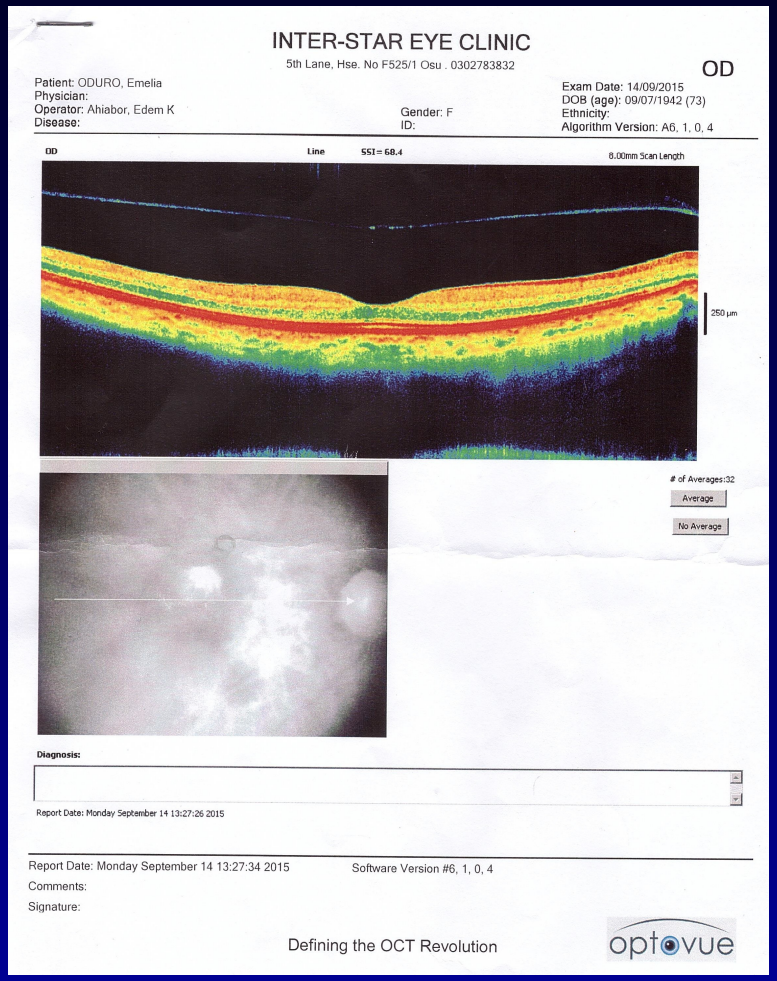


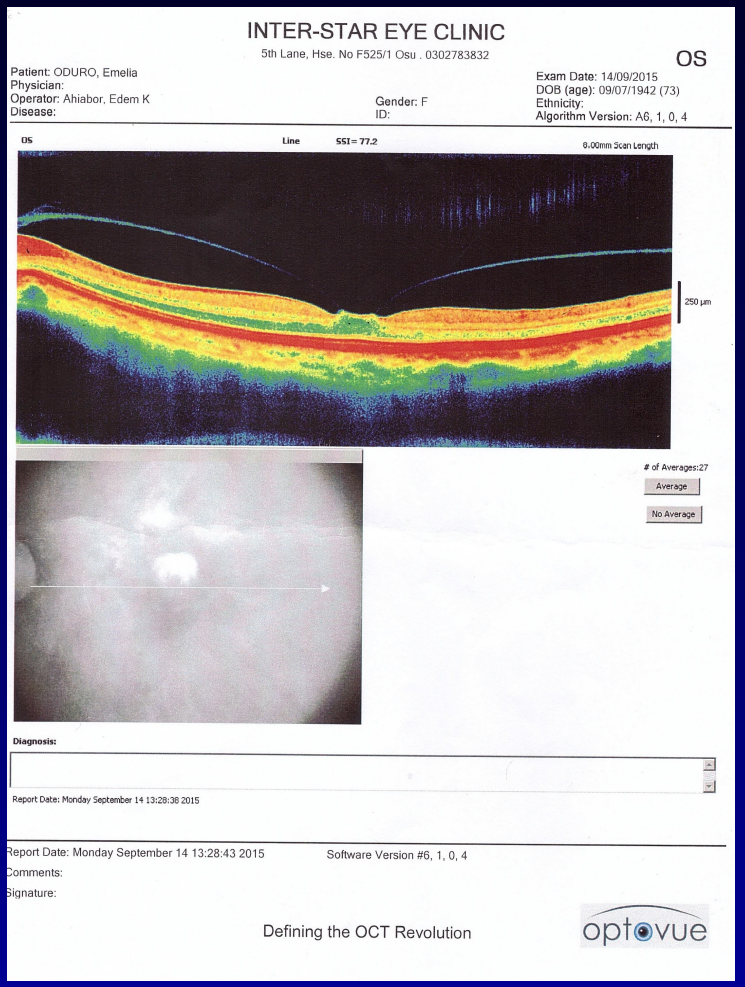
In one recent review 100% all cases with HFF ≥0.9 had closure with 1 surgery while HFF<0.5 had only 67% .

Case 1:Focal VMT

- 73 yo single eye patient
- Referred by after oncers of visual disturbances
- BCVA 6/9 with minimal lens changes

Case 2: VMT Released





THANK YOU