

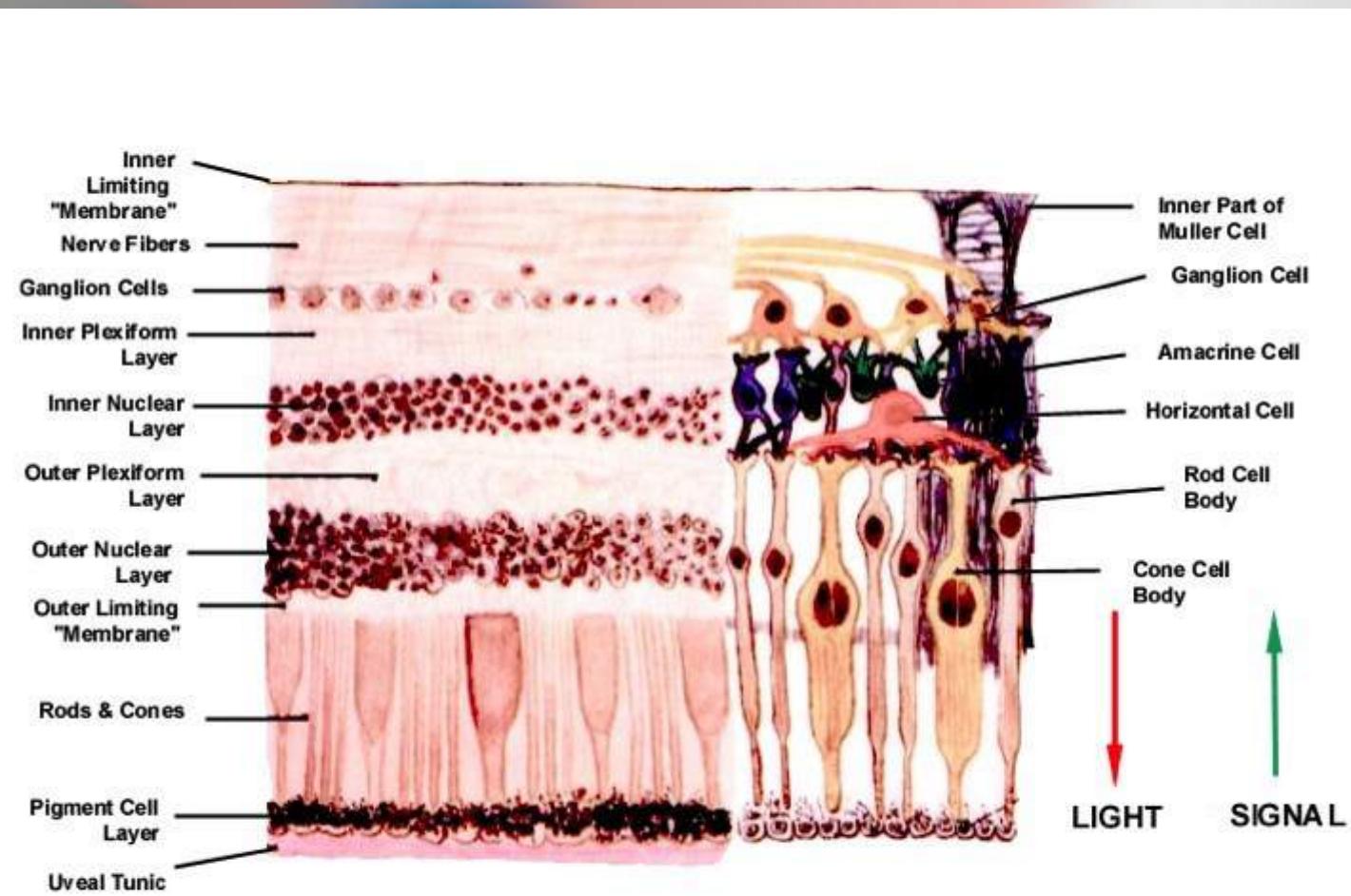
Getting Started With OCT

Julie Rodman OD, MSc, FAAO

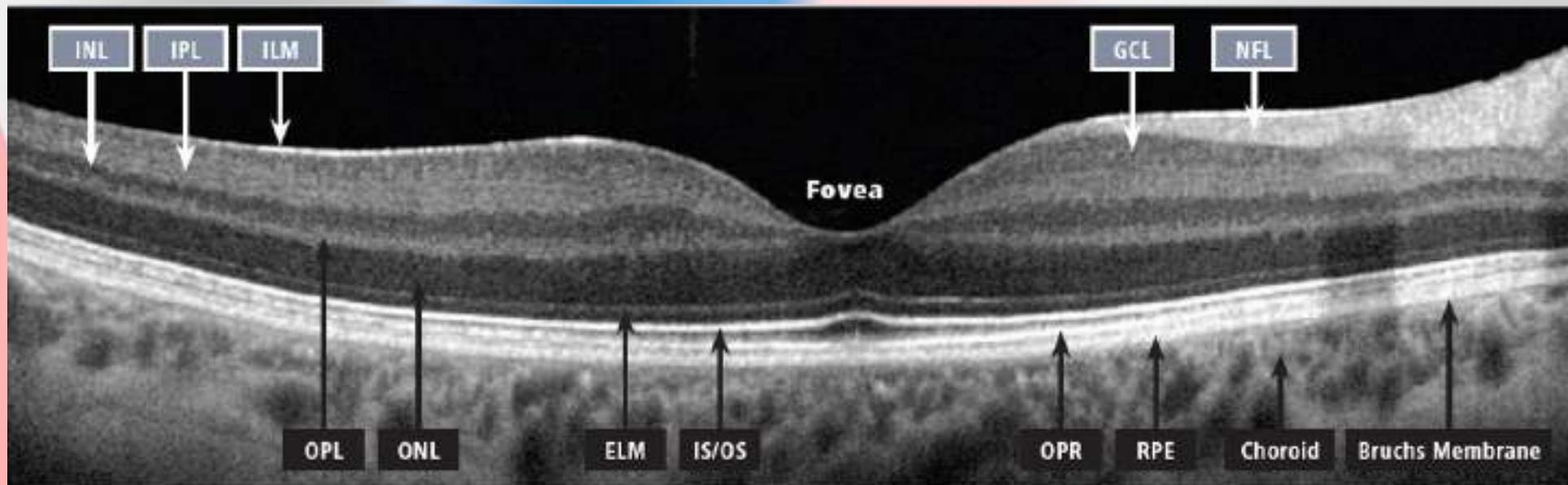
Professor, Nova Southeastern University
College of Optometry

Disclosures:

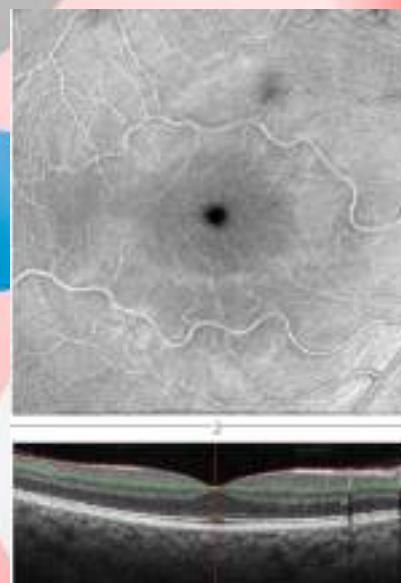
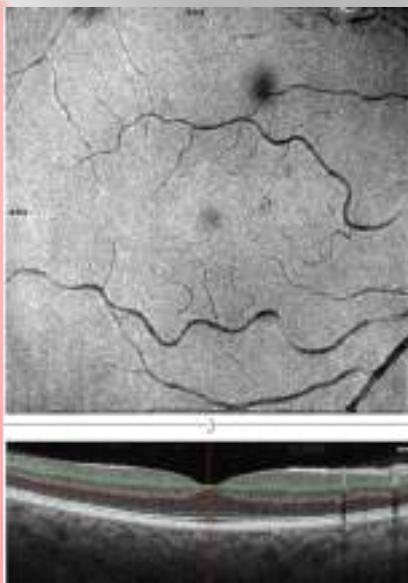
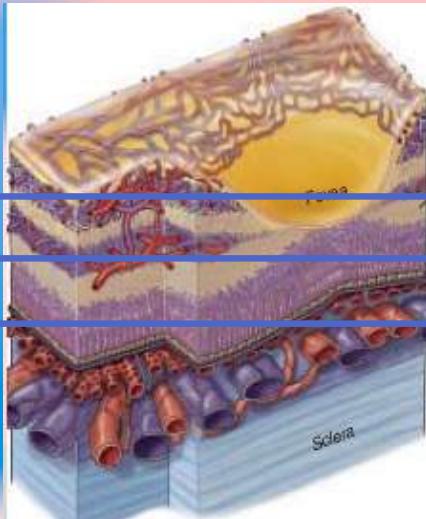
Speaker/Consultant: Visionix, iCare, Apellis, Iveric Bio, LKC

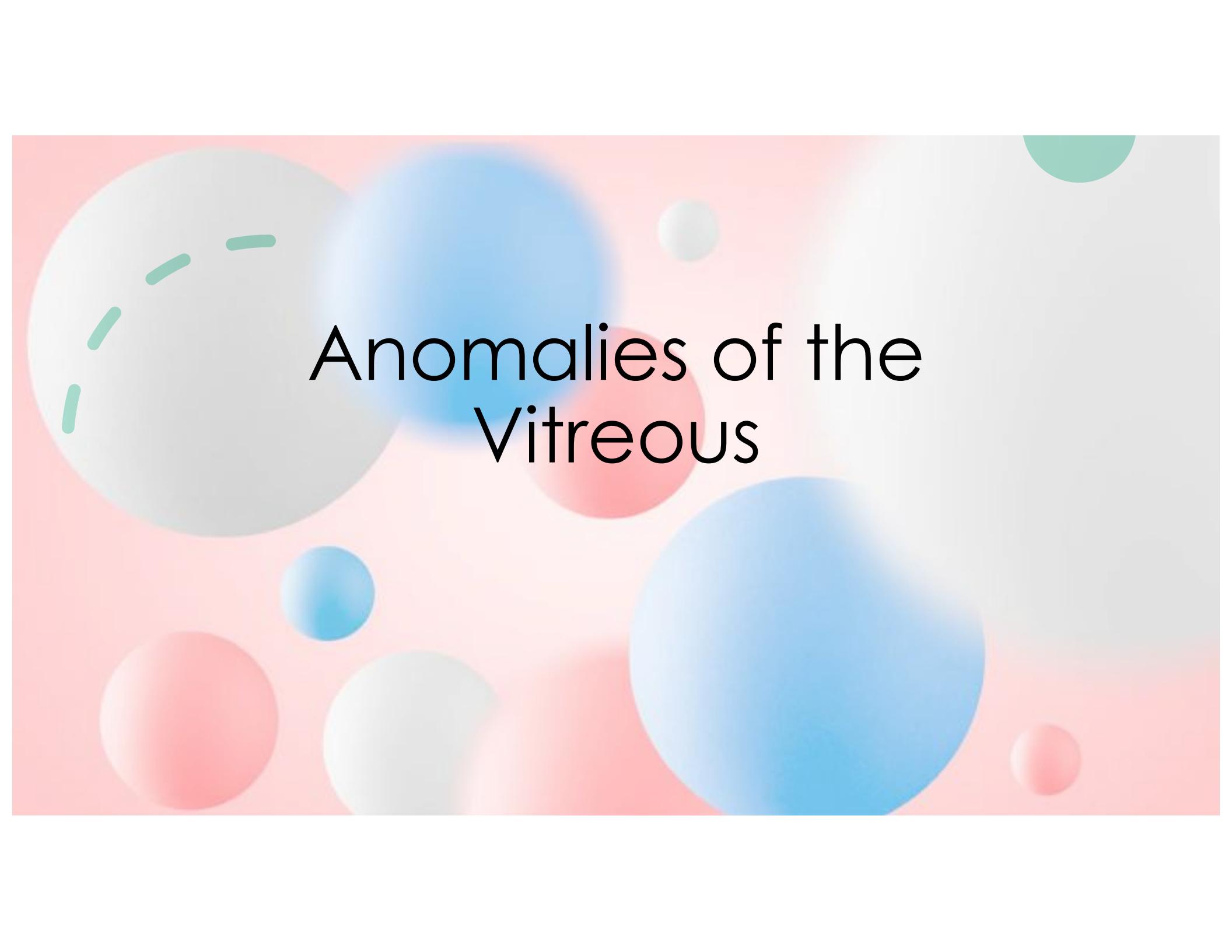


OCT B-Scan Layers

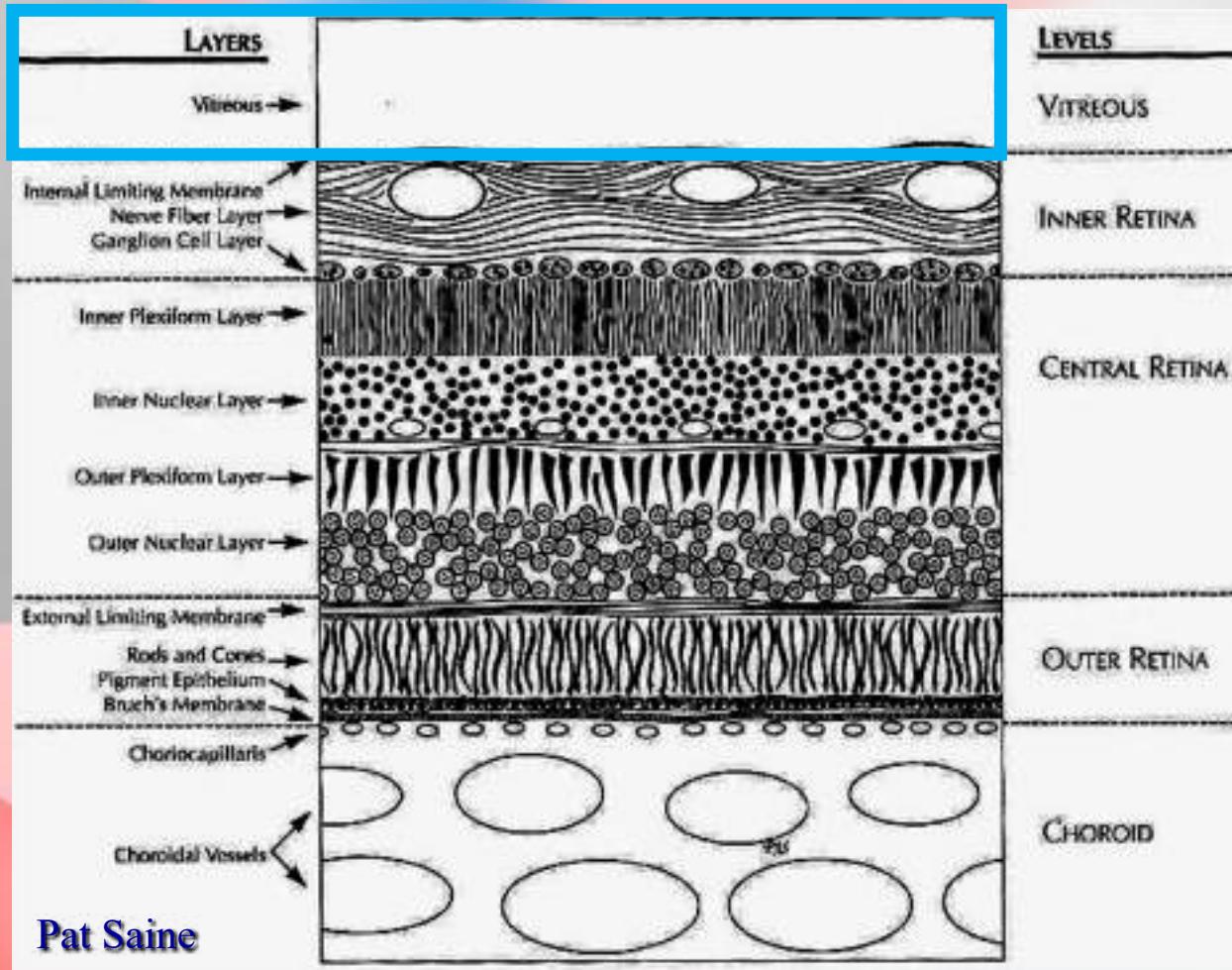


En Face Structural Visualization of Layers Based on Retinal Anatomy



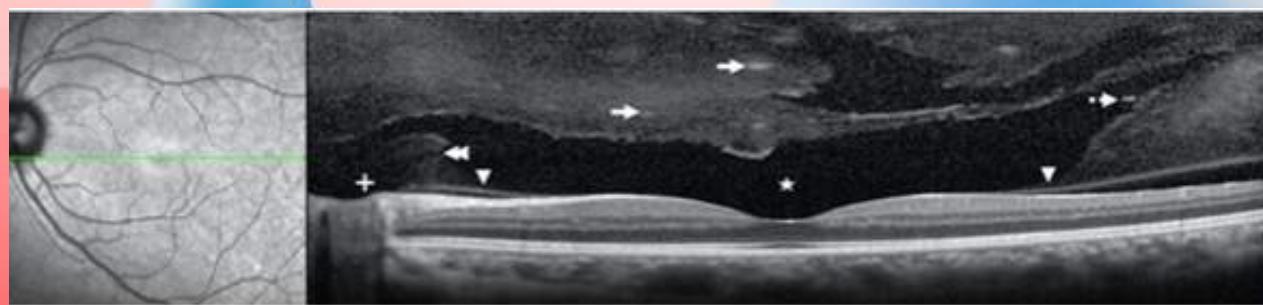
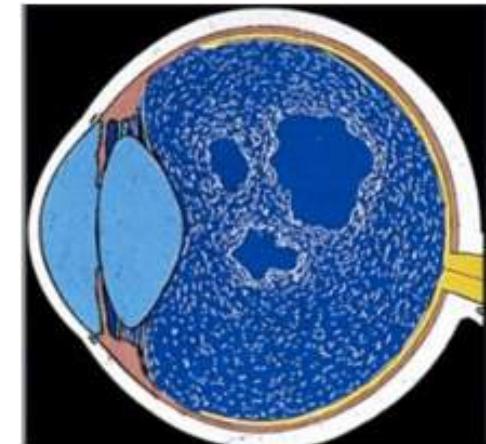


Anomalies of the Vitreous



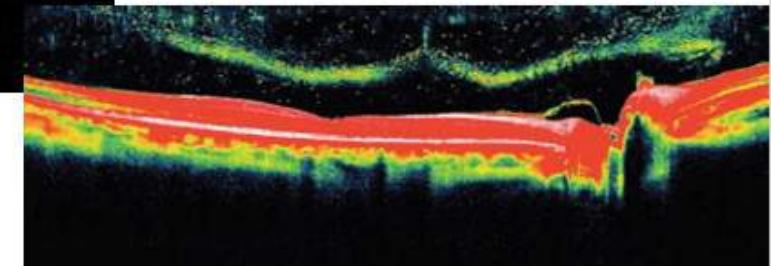
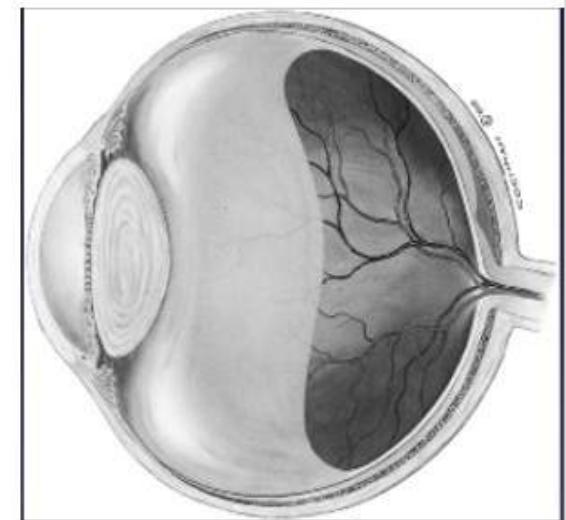
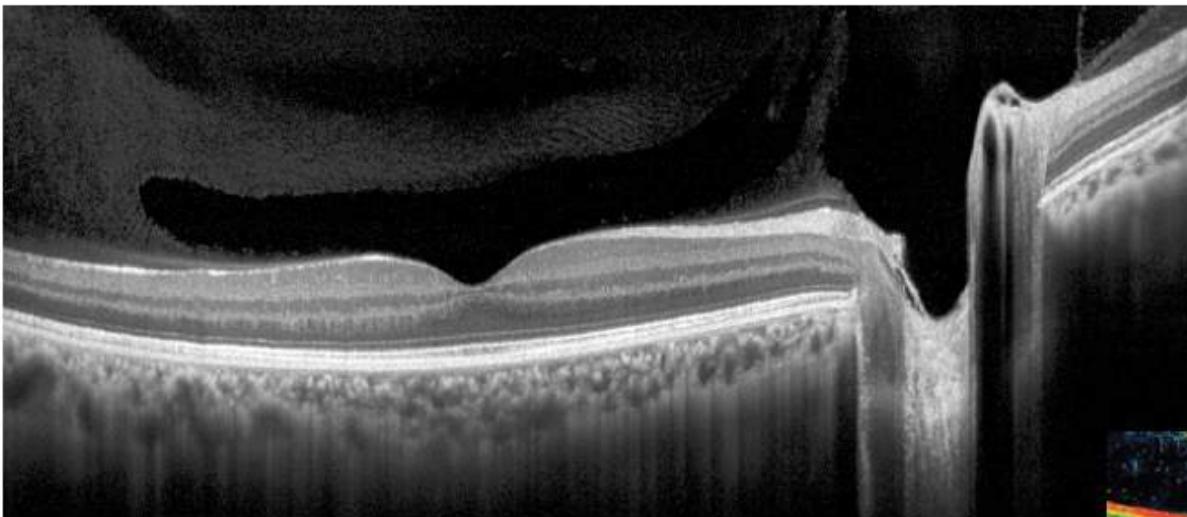
Aging of the Vitreous: Two Processes

Synchysis (liquefaction of the vitreous gel)



Aging of the Vitreous: Two Processes

Syneresis (Contraction of the Vitreous Gel)

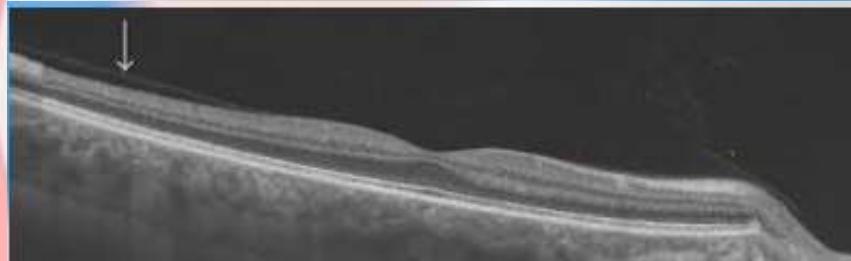


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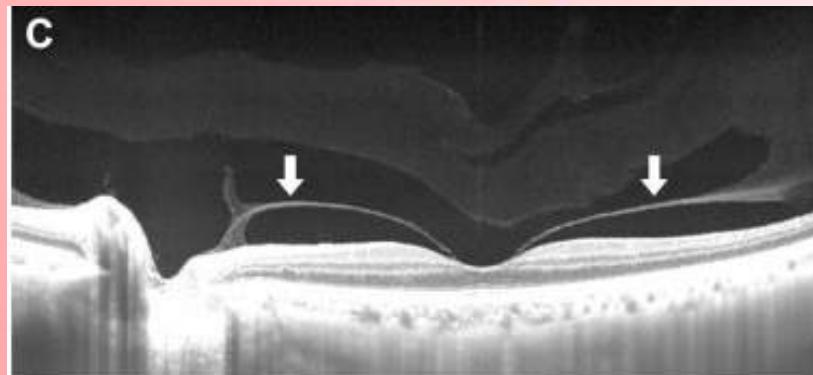


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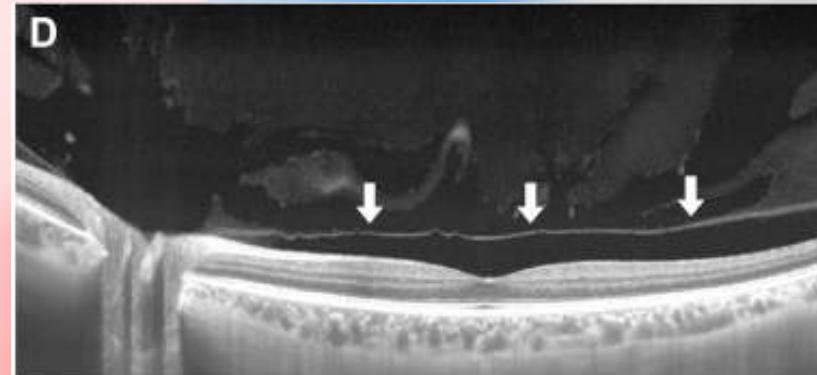
Stages of PVD



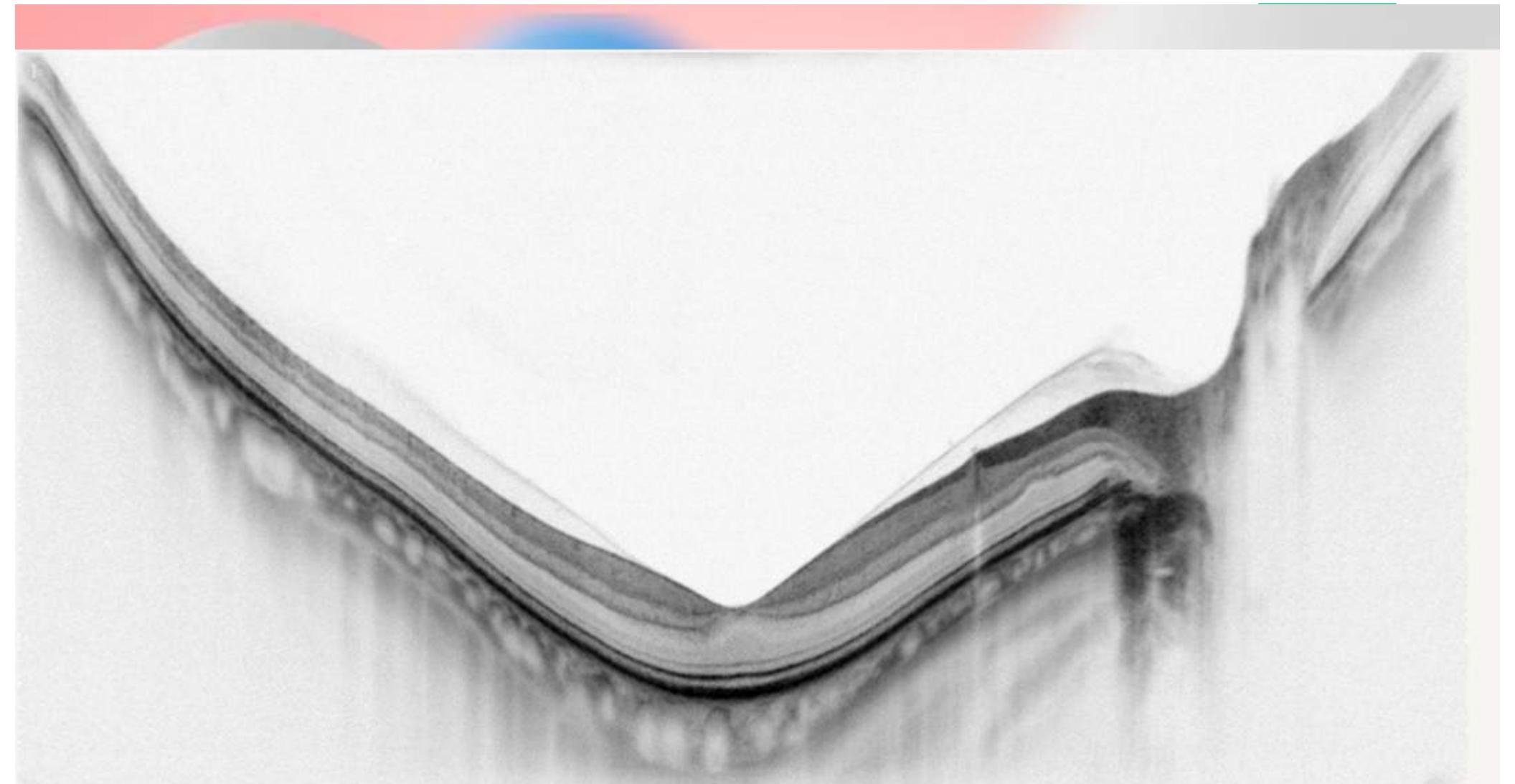
Stage 1: Single quadrant of perifoveal detachment



Stage 2: 360 degrees perifoveal detachment



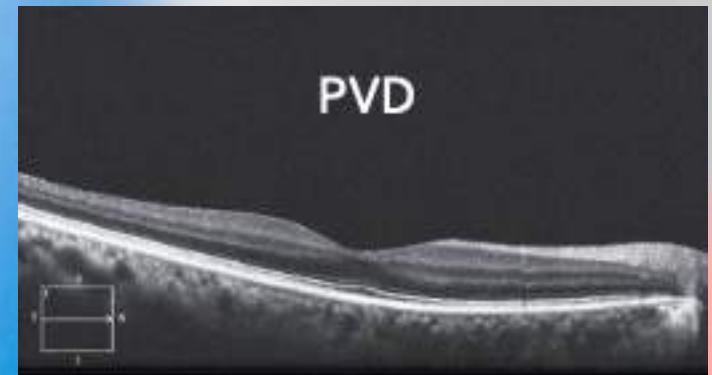
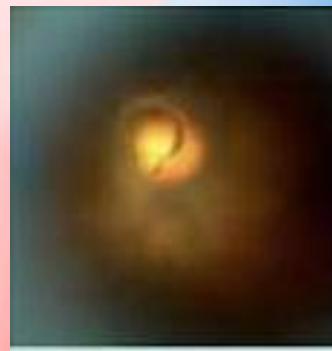
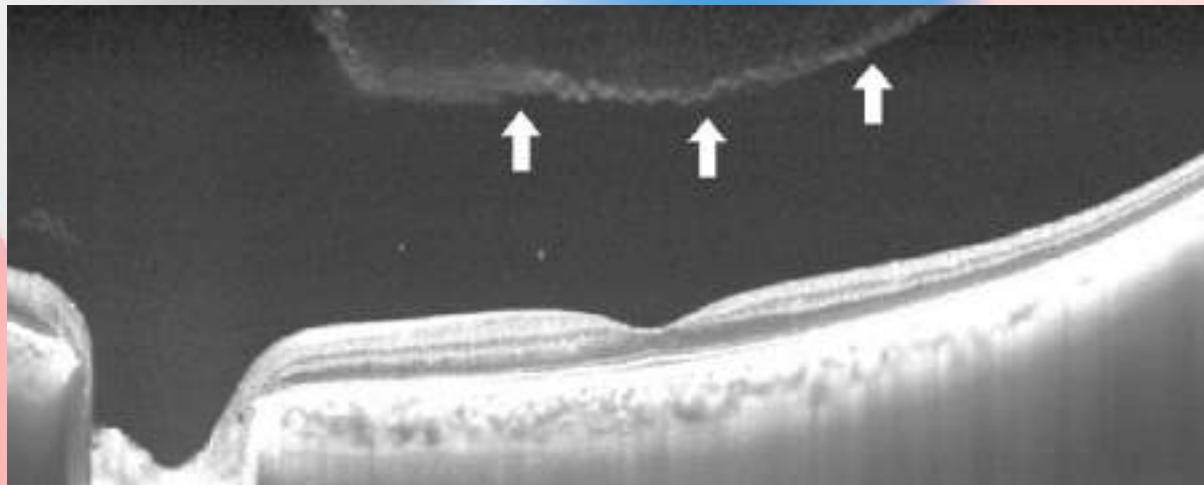
Stage 3: Vitreofoveal separation with adhesion at ONH

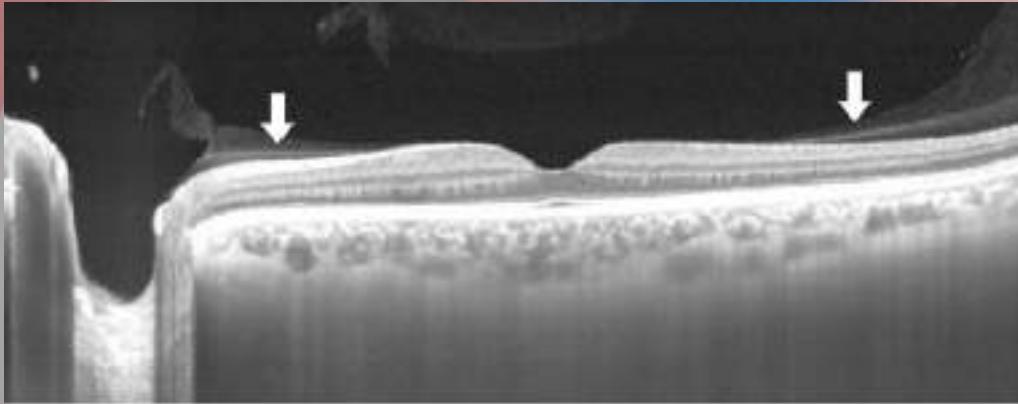


Vitreous behavior in a high myope

Adil Maftouhi

Posterior Vitreous Detachment





Vitreomacular Adhesion:
Paramacular PVD:

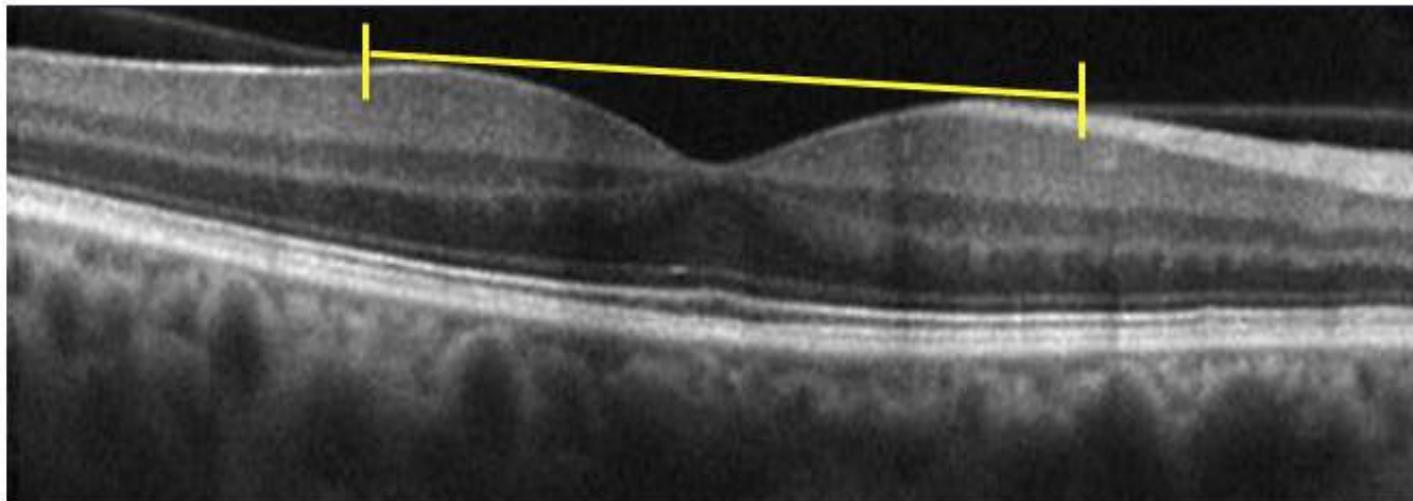
How do we
classify
Vitreomacular
Adhesion?

Focal VMA: <1500 μ m

< 1500 = focal

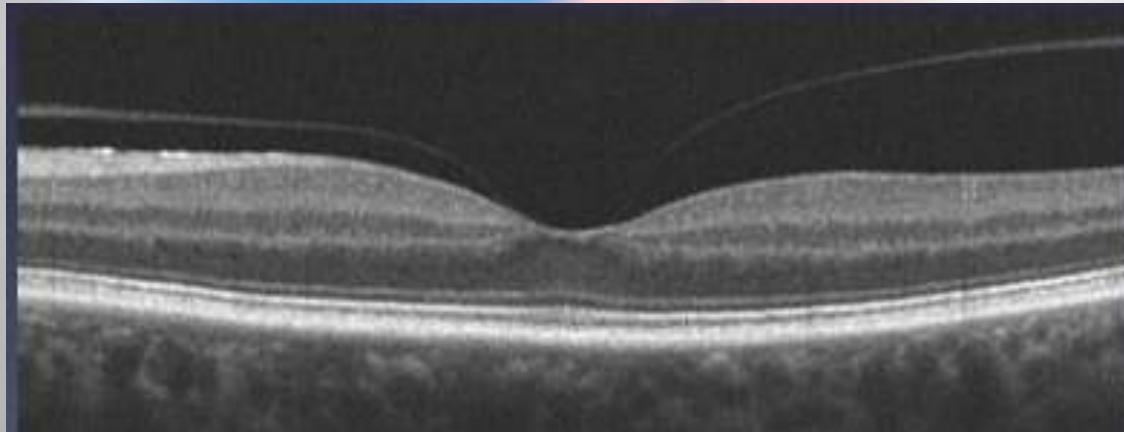
= 1500 microns

Broad VMA: >1500 μm

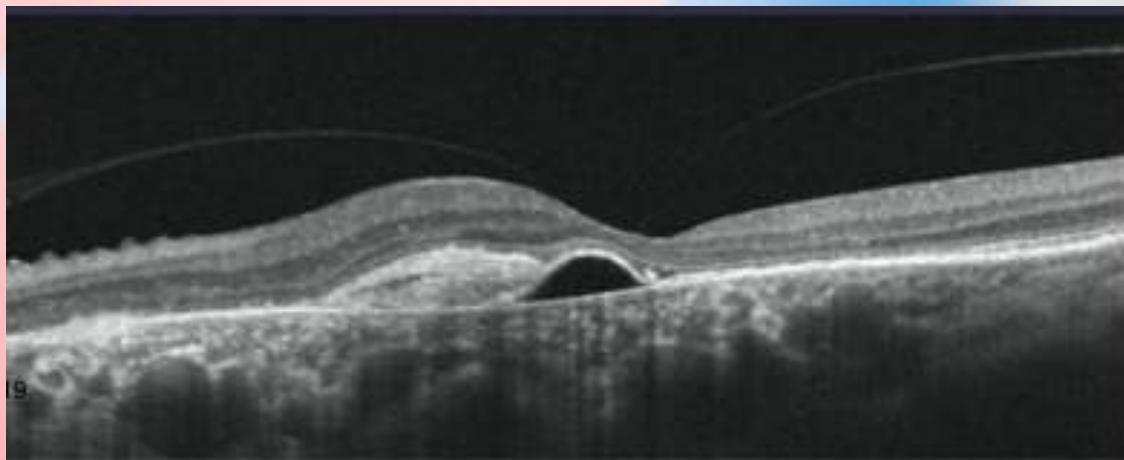


Isolated versus Concurrent

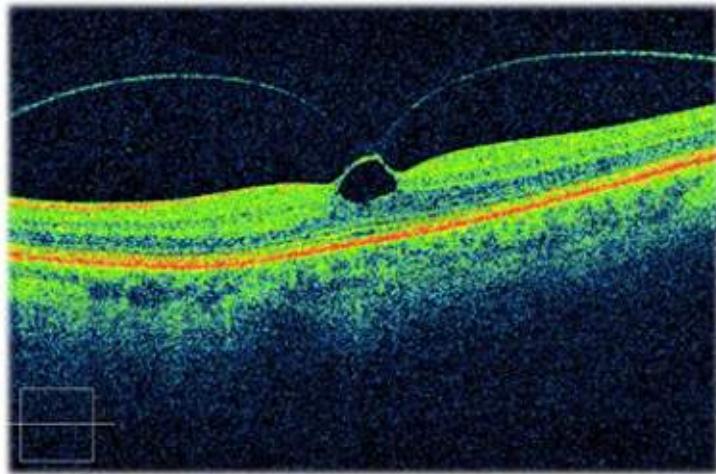
Isolated



Concurrent

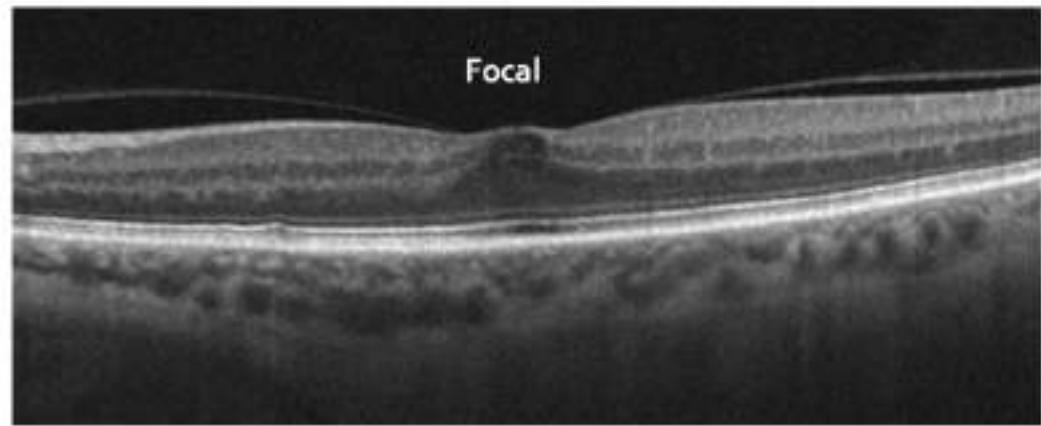
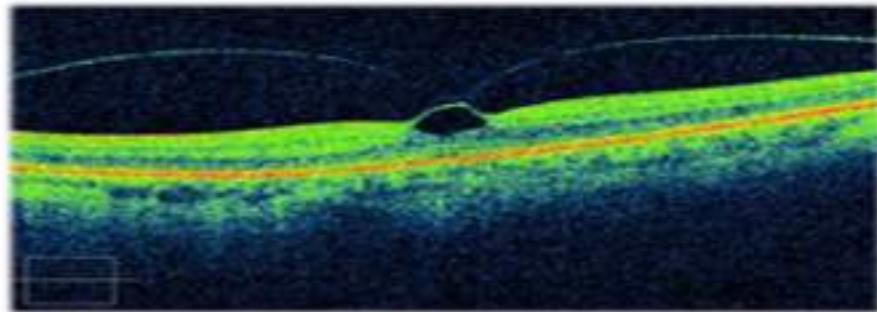


Vitreomacular Traction

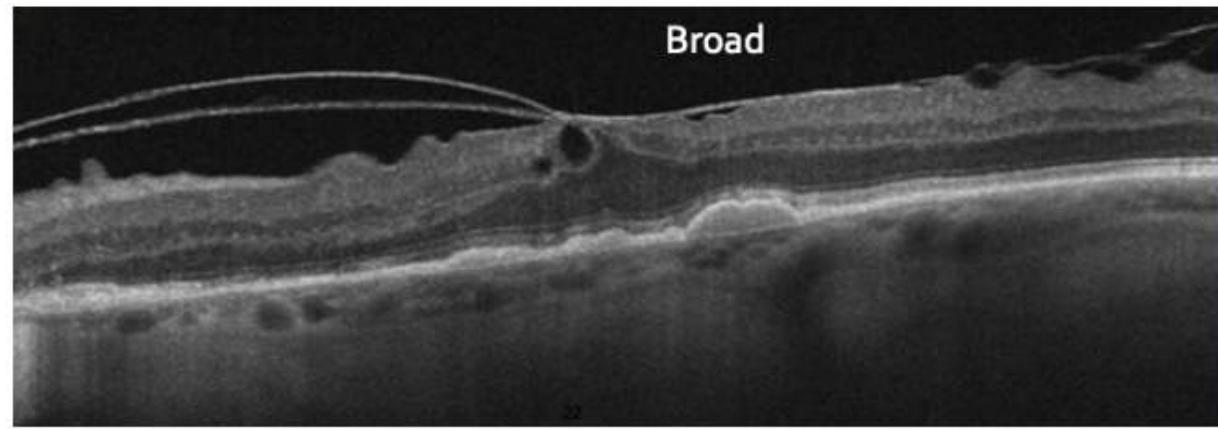
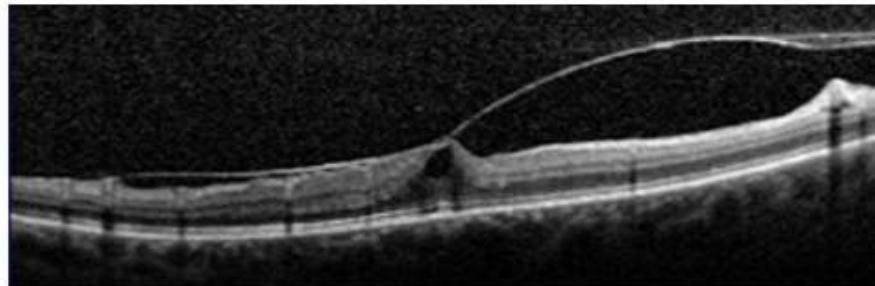


Attachment of the vitreous cortex to the macula within a 3 mm radius of the fovea resulting in distortion of the foveal surface

Focal VMT: <1500 um

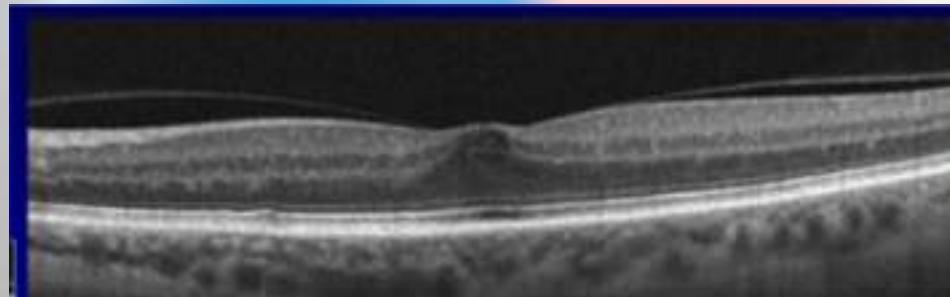


Broad VMT: >1500 um

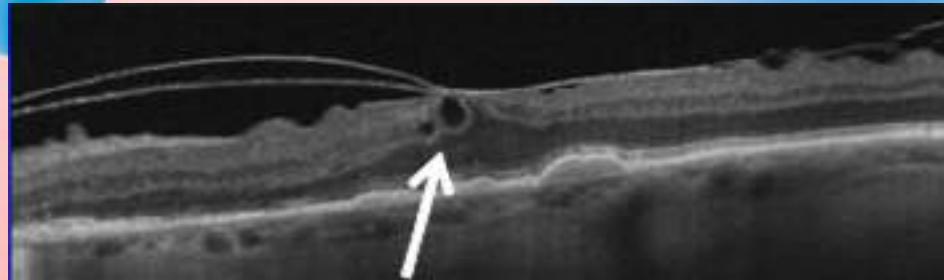


Isolated versus Concurrent

Isolated

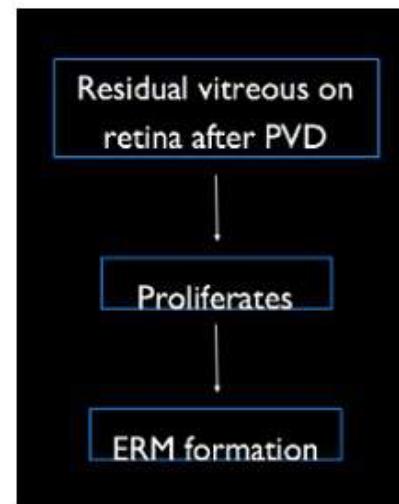
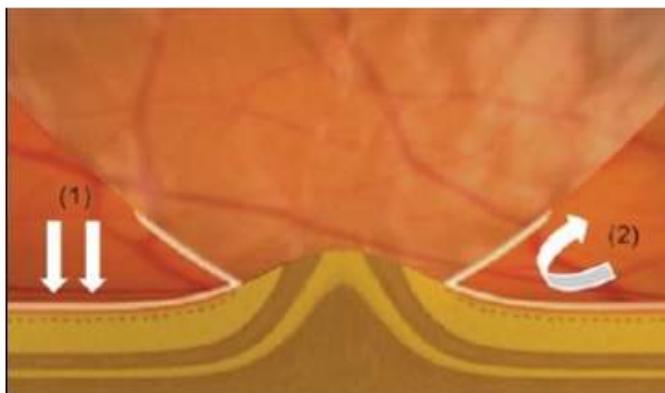


Concurrent

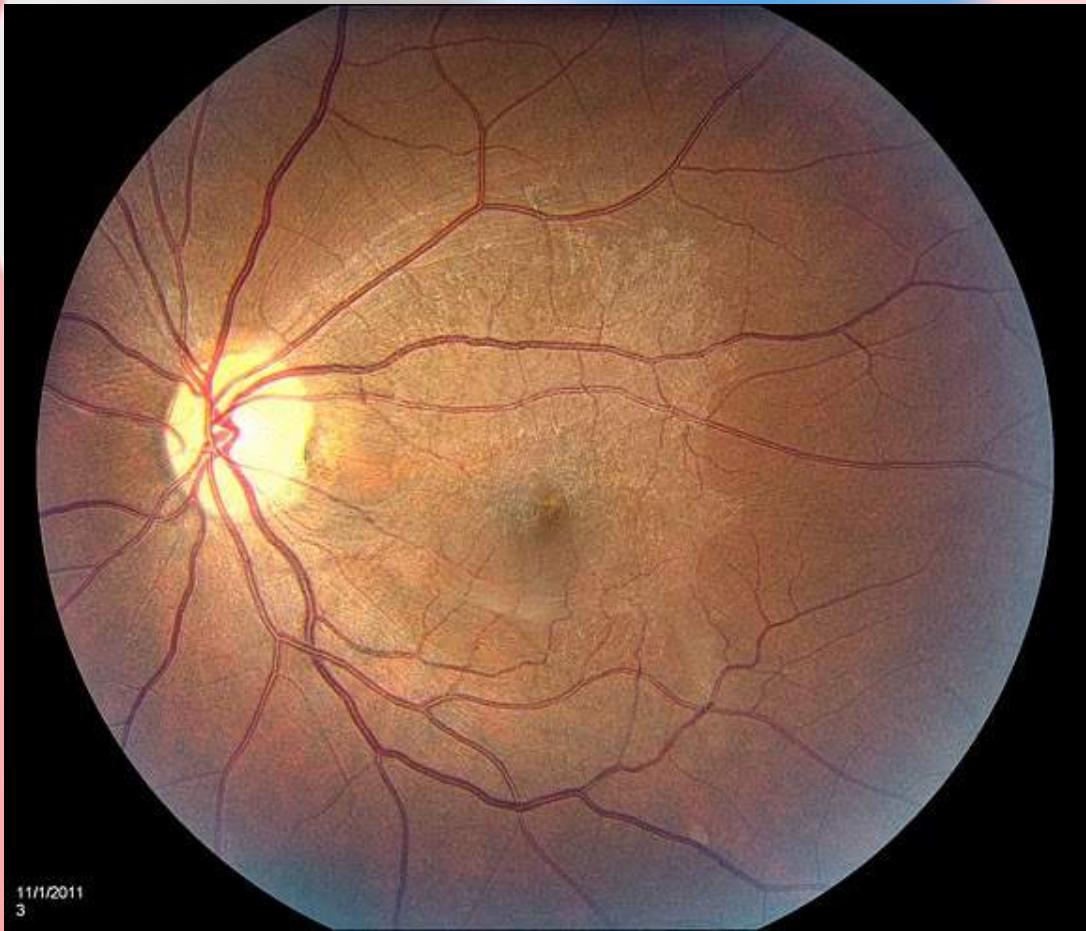


With PVD progression, residual vitreous tissue is left on inner retinal surface...

Residual vitreous proliferates to form ERM



Epiretinal membrane: Grade 1

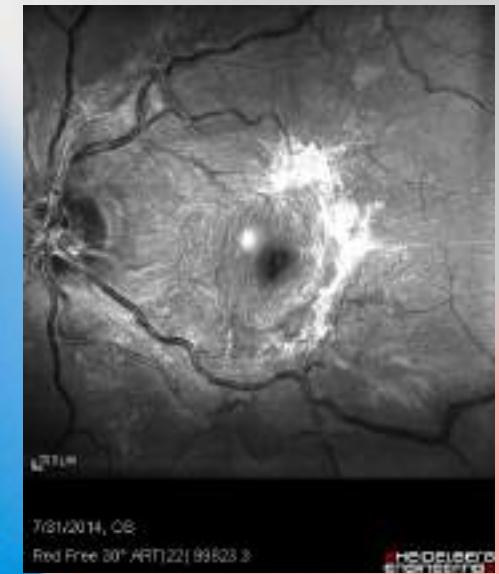


A cellophane-like sheen is observed over the macular area, causing very mild wrinkling of the inner retinal surface, with little or no modification of retinal vessel trajectory. These membranes are rarely symptomatic.

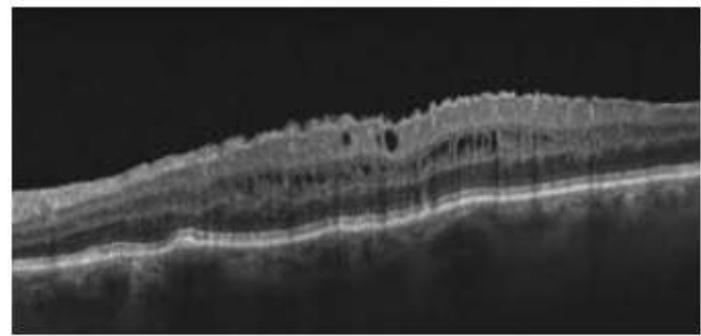
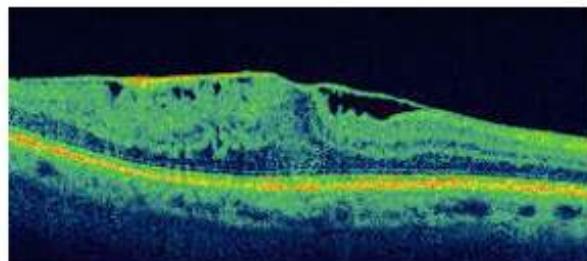
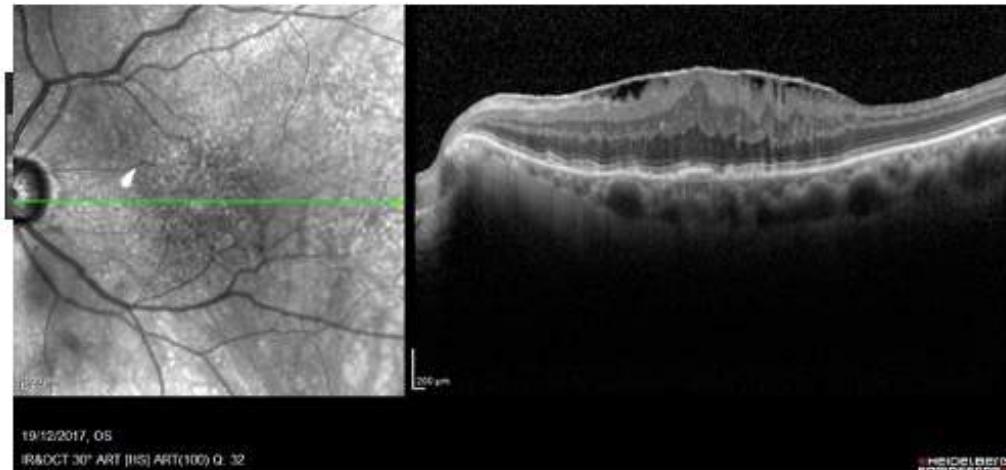
Epiretinal membrane: Grade 2



Fibrous tissue is observed over the macular area, causing *significant wrinkling of the retinal surface and modification of the retinal vessel trajectory.*

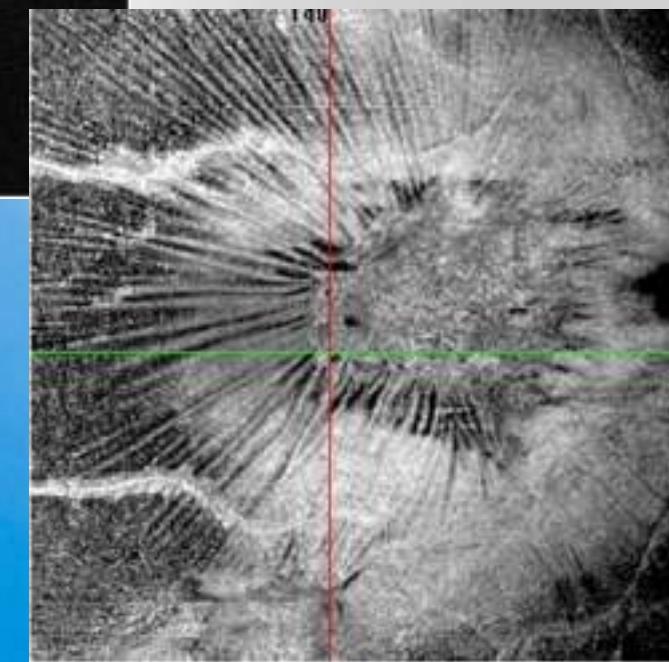
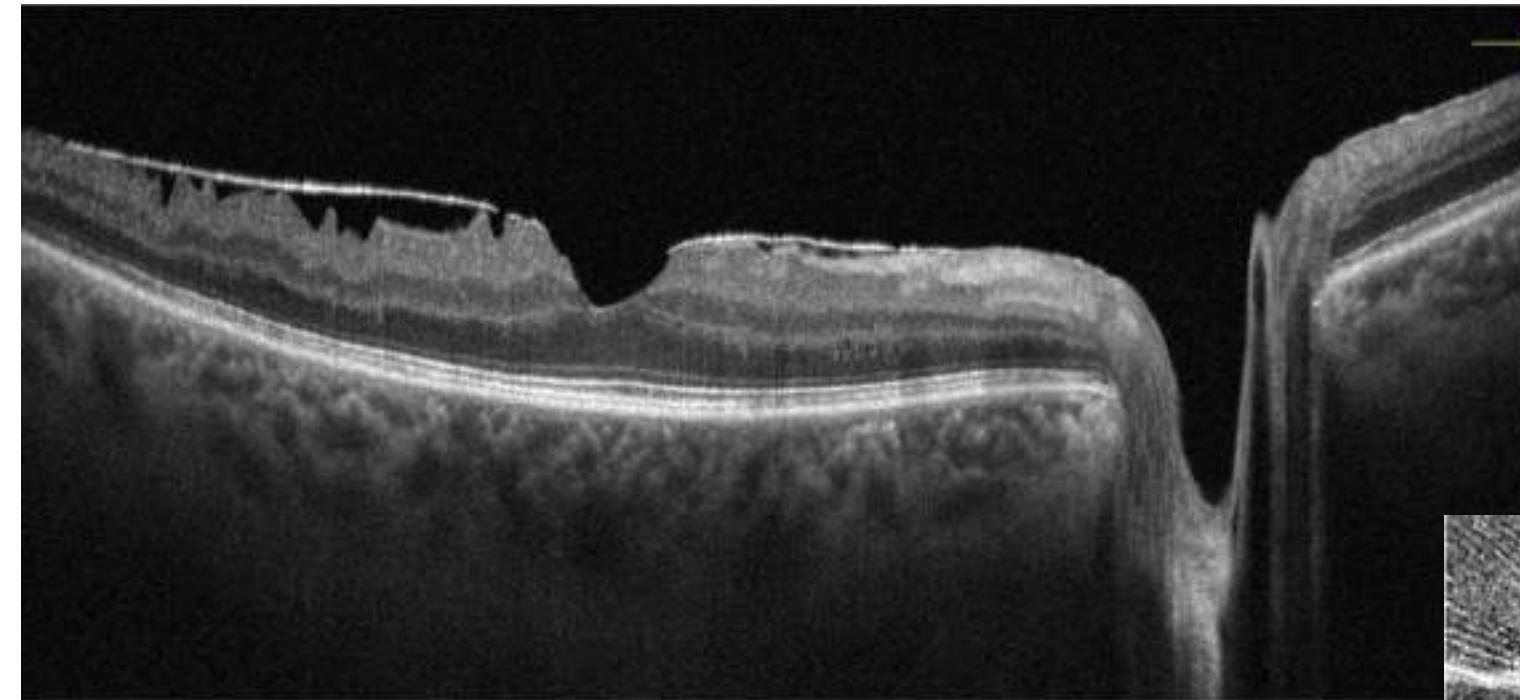


Epiretinal Membrane: OCT

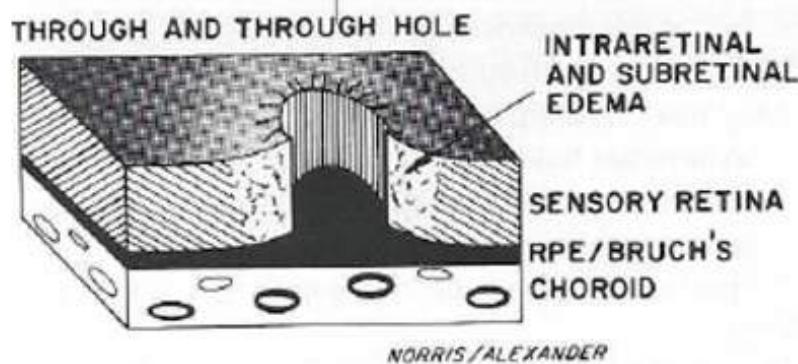


<https://www.retinaky.com/macular-pucker-louisville/>

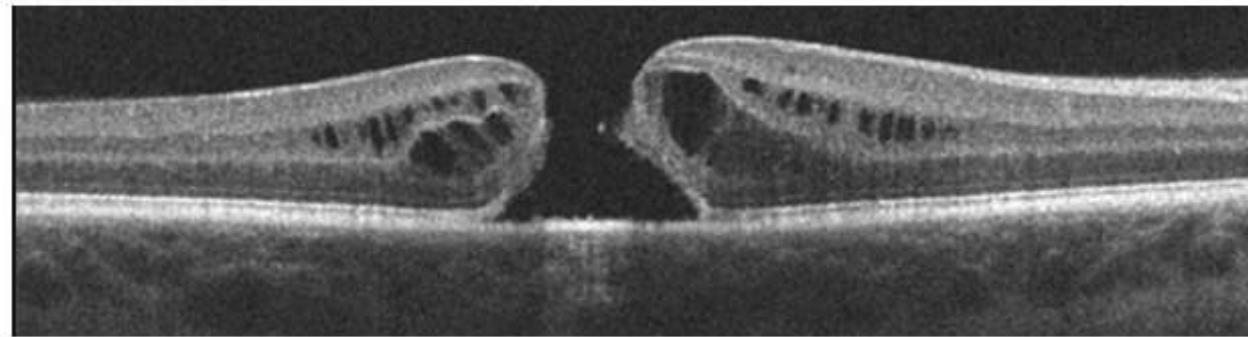
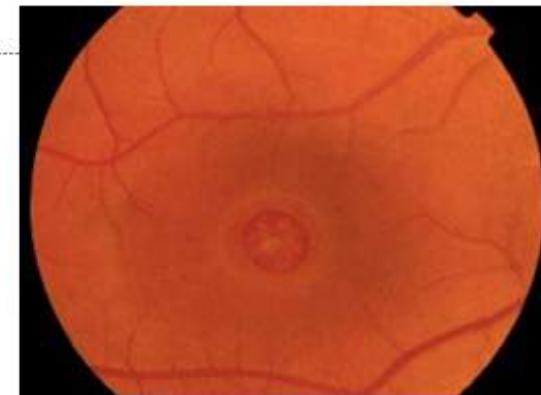
https://bjo.bmj.com/content/98/Suppl_2/i20



Full Thickness Macular Hole



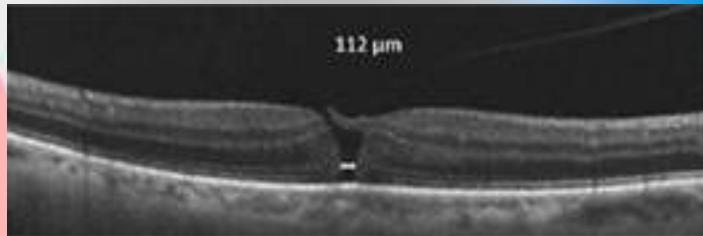
Defect spans entire width of neurosensory retina



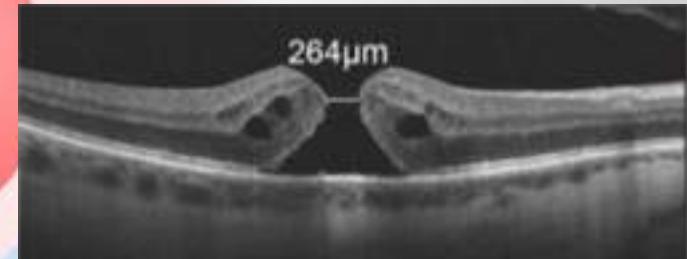
Small: Full thickness defect; \leq 250 um

Medium: Full thickness defect; >250 um and \leq 400 um

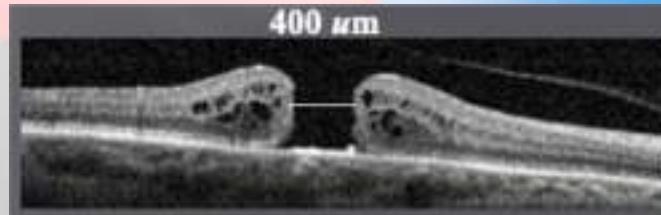
Large: Full thickness defect; >400 um



Small

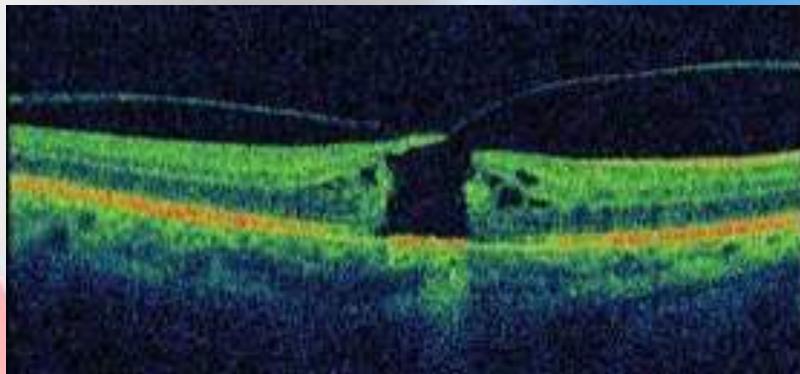


Medium



Large

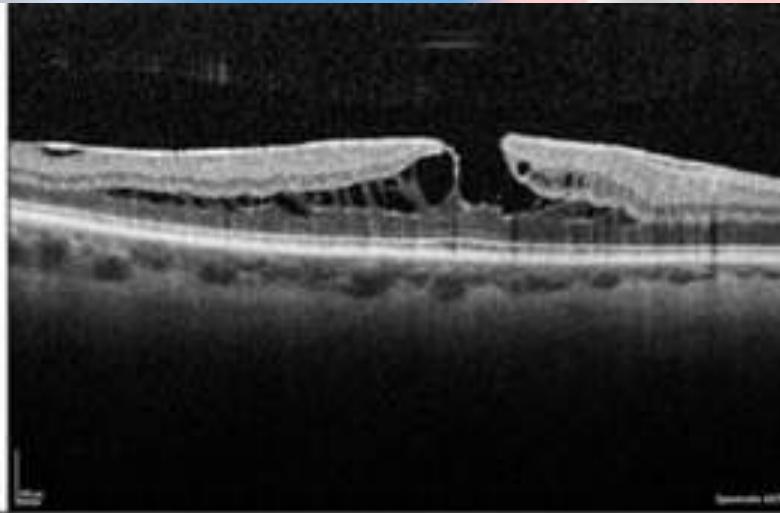
Is there VMT?? Primary versus Secondary



Primary

Secondary

Partial Thickness Macular Hole: Lamellar

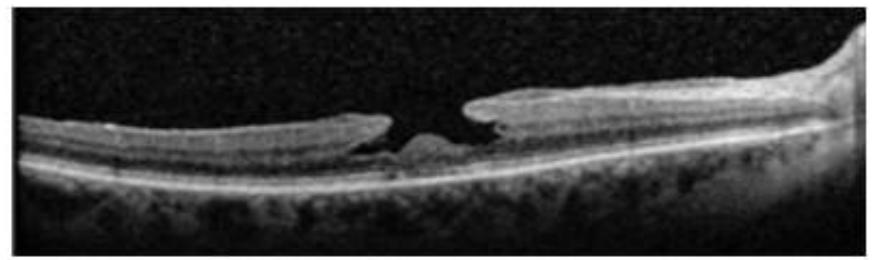


Tractional:

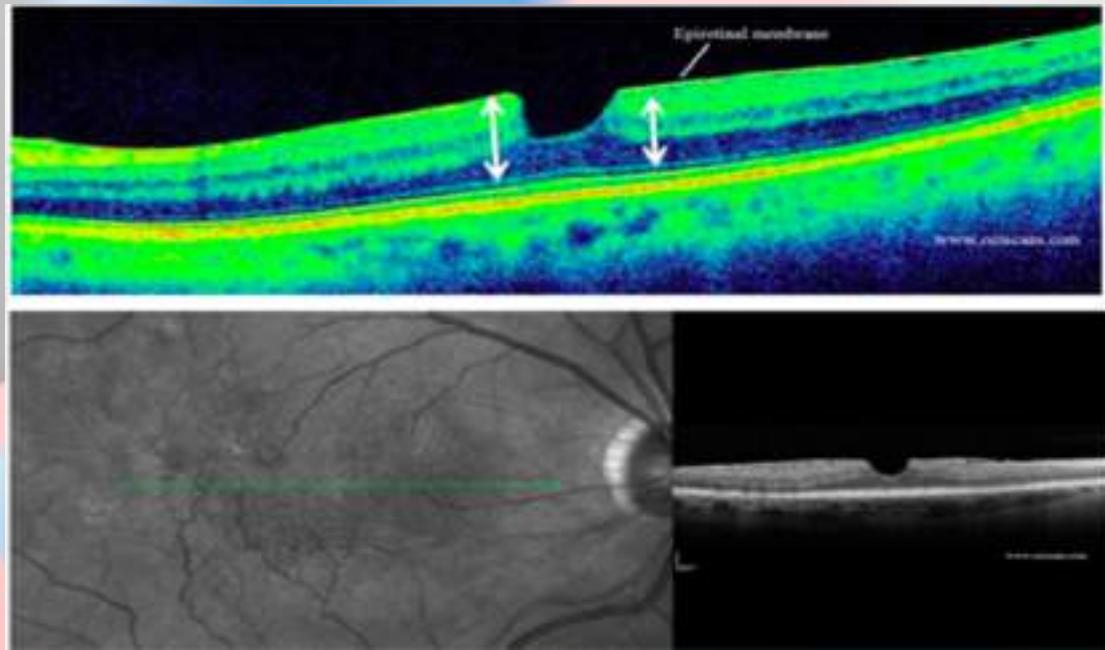
Epiretinal membrane
Foveal schisis

Degenerative:

Epiretinal proliferation
Round edges
Incomplete break

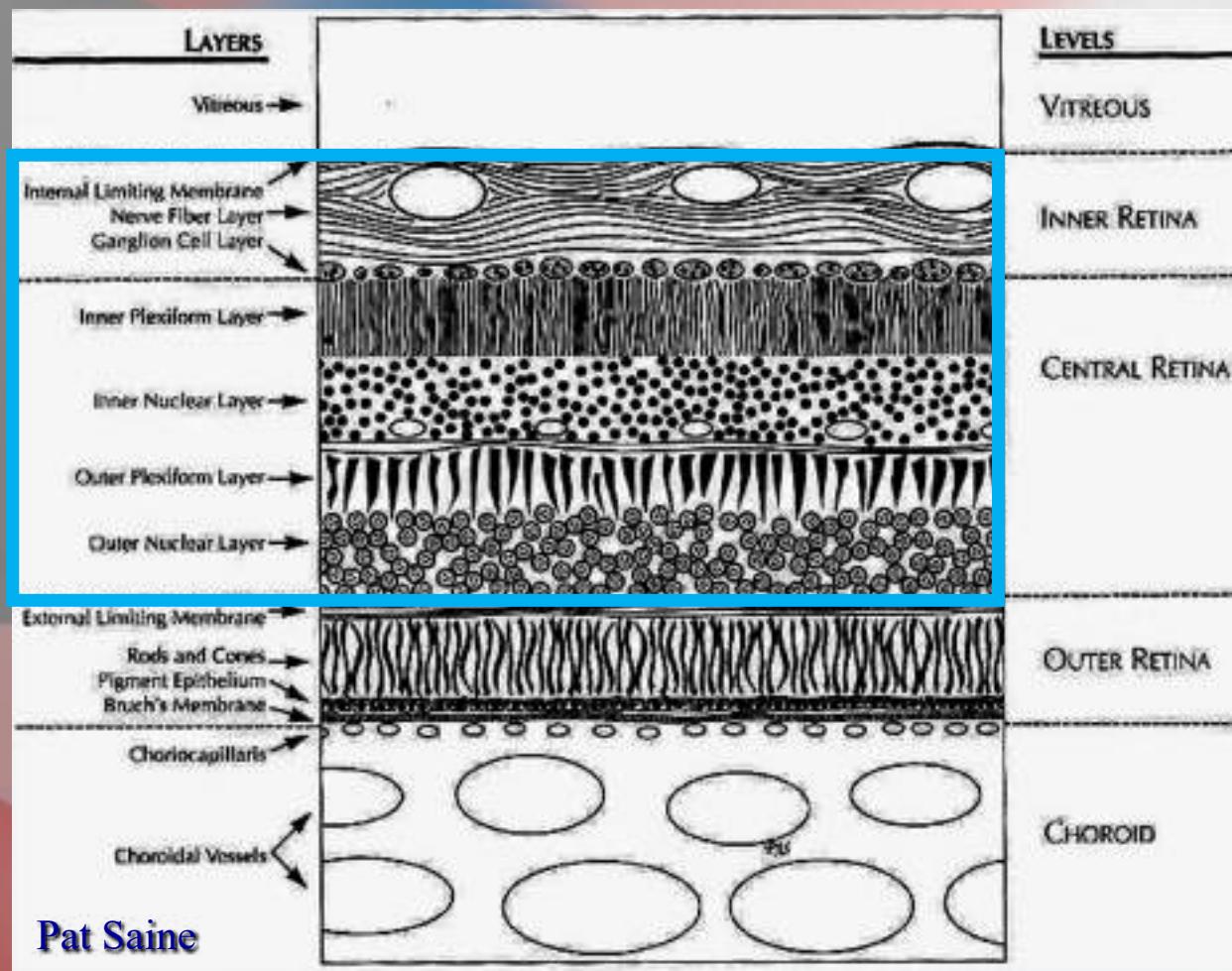


Partial Thickness Macular Hole: Pseudohole





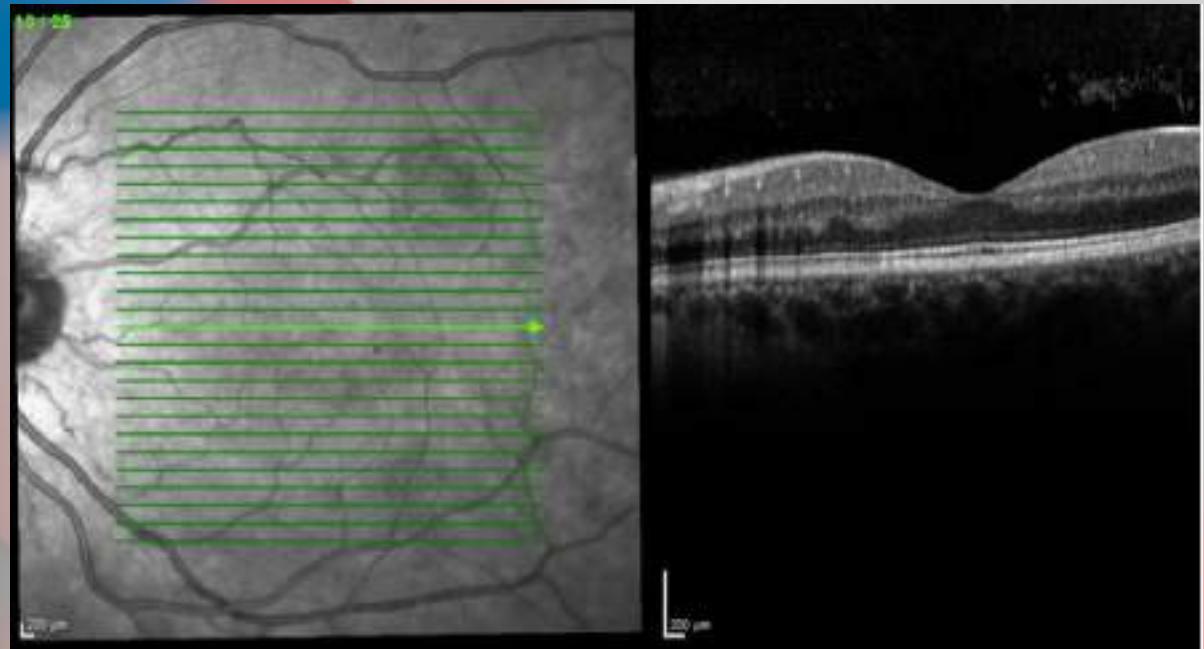
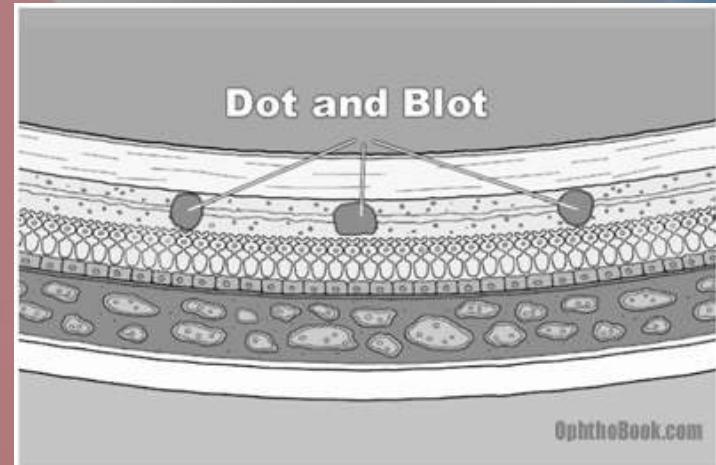
Inner Retinal Disease



Diabetic Retinopathy: Non-Proliferative

Hemorrhage: HYPER-reflective

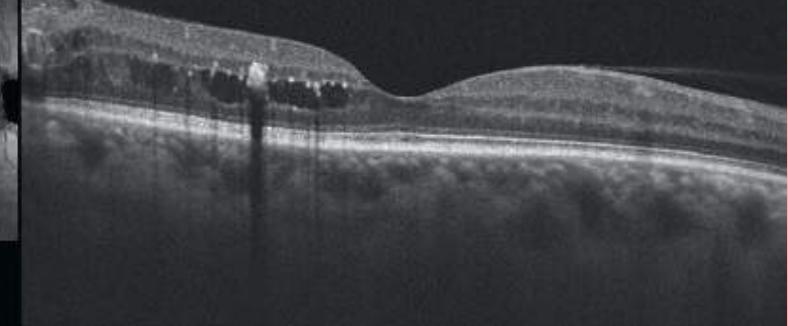
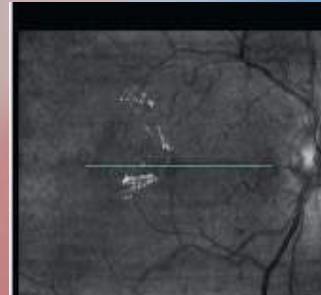
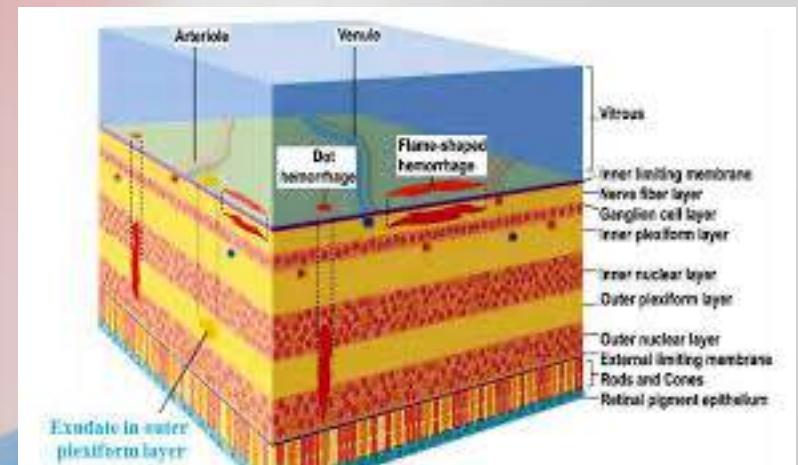
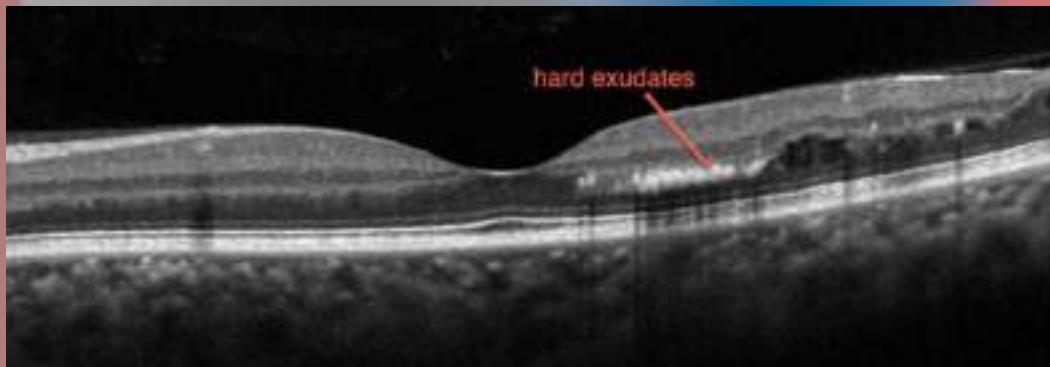
* *Check the layer* * *



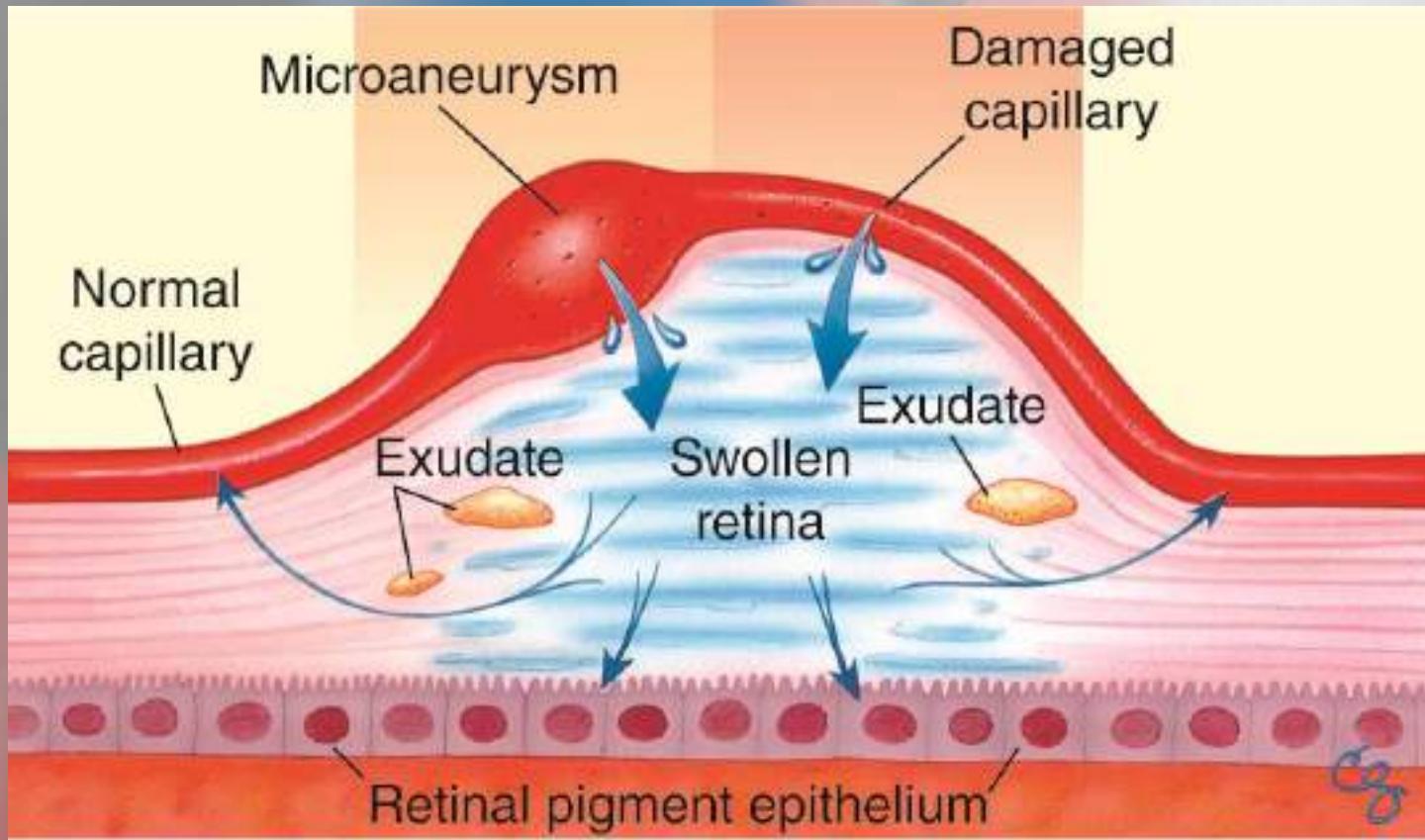
Diabetic Retinopathy: Non-Proliferative

Exudate: HYPER-reflective

* * Check the layer * * *

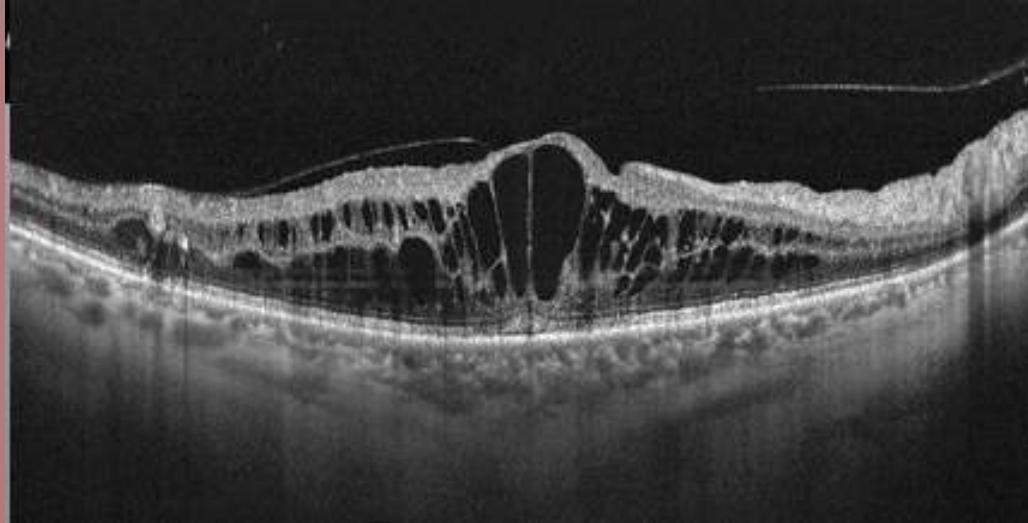


Diabetic Retinopathy: Macular Edema

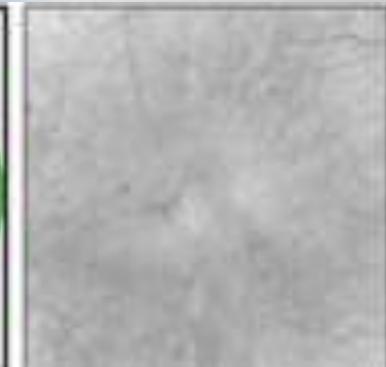
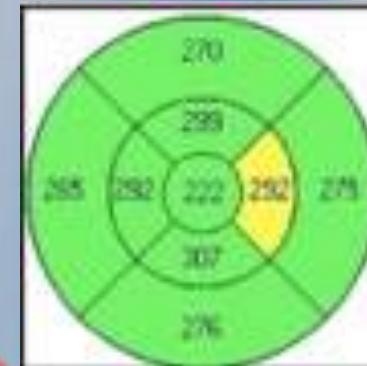
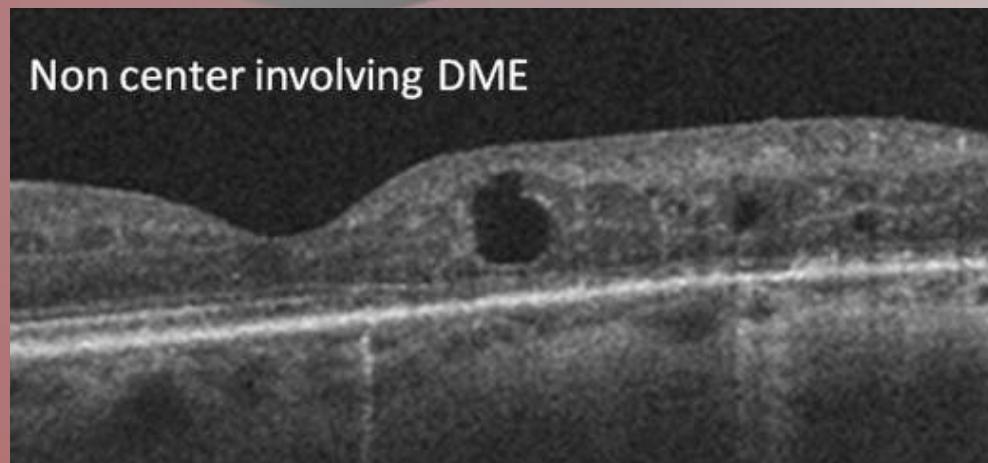
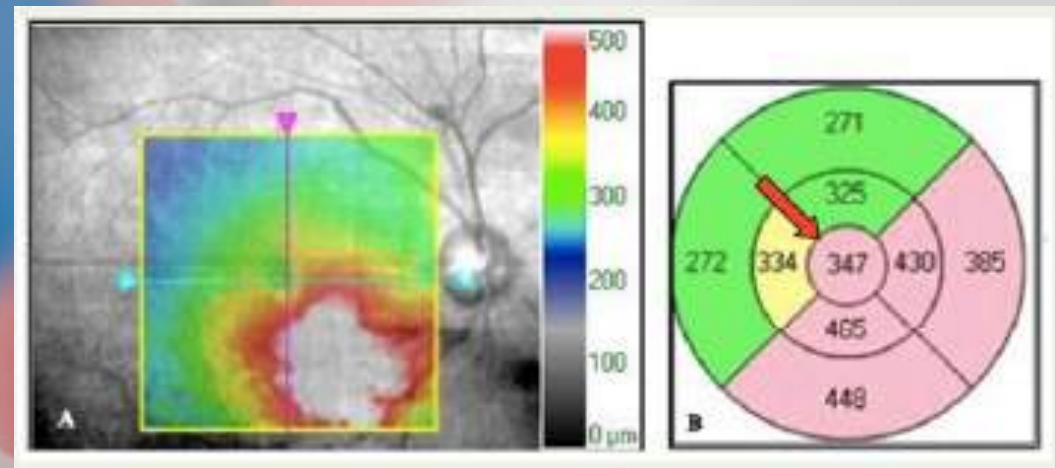
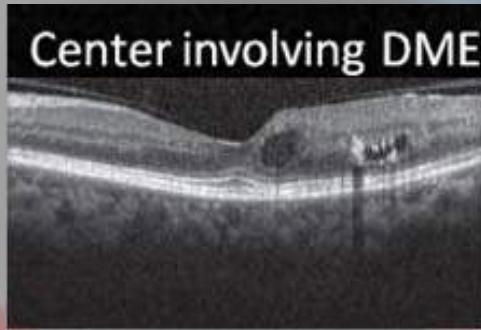


Diabetic Retinopathy: Macular Edema

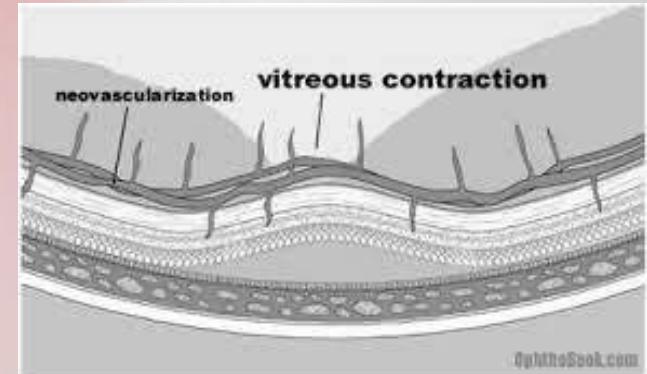
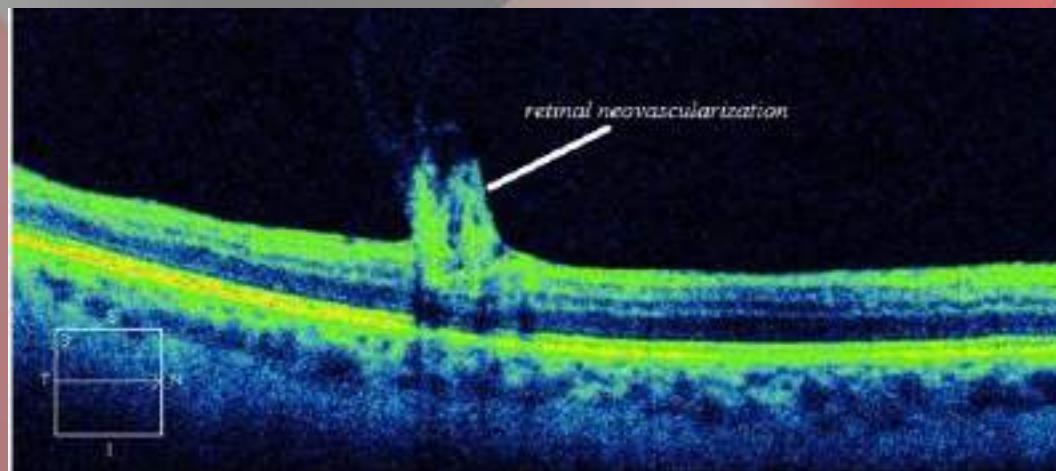
HYPO-Reflective: Serous Fluid



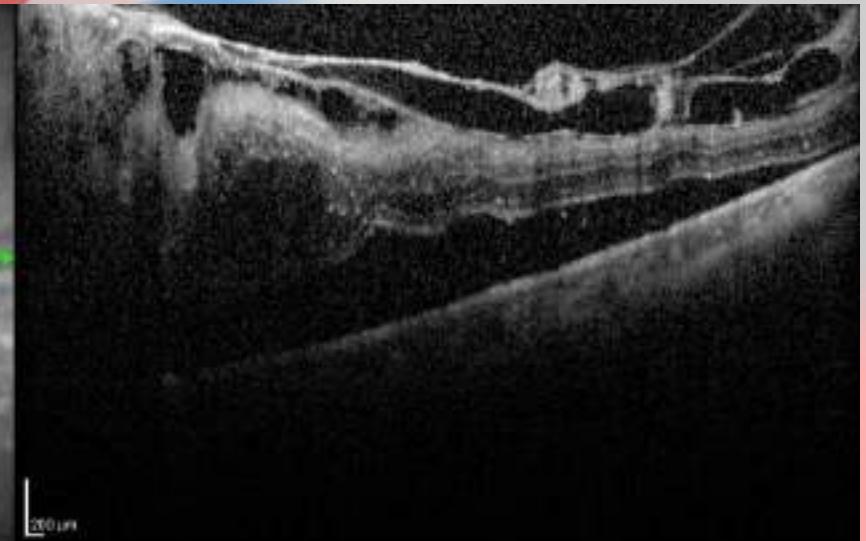
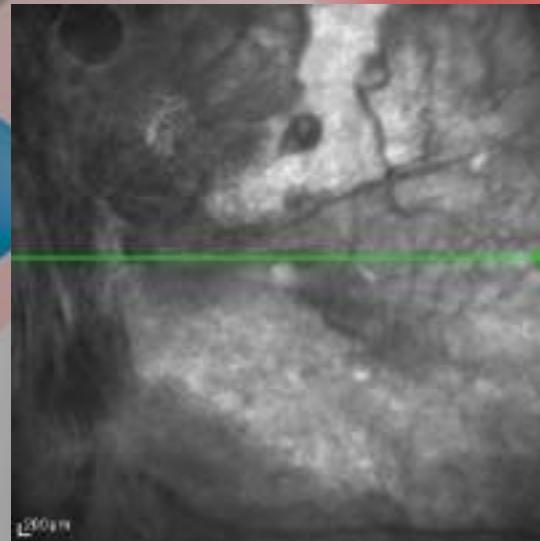
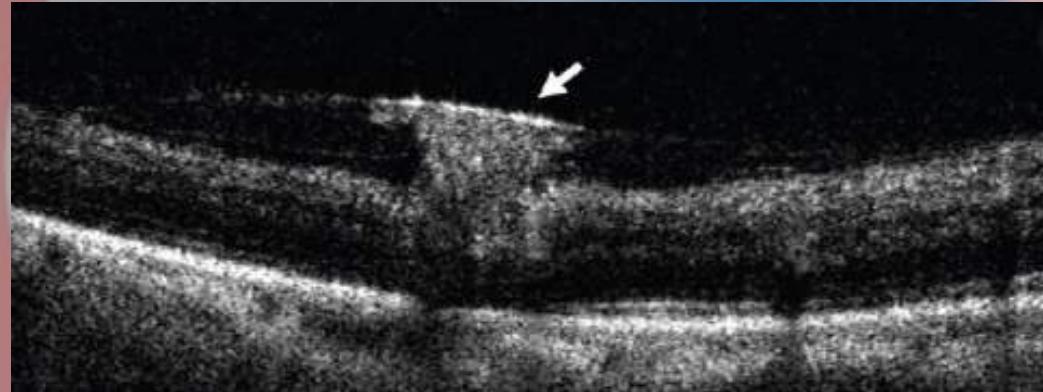
Macular Edema: CI versus NCI



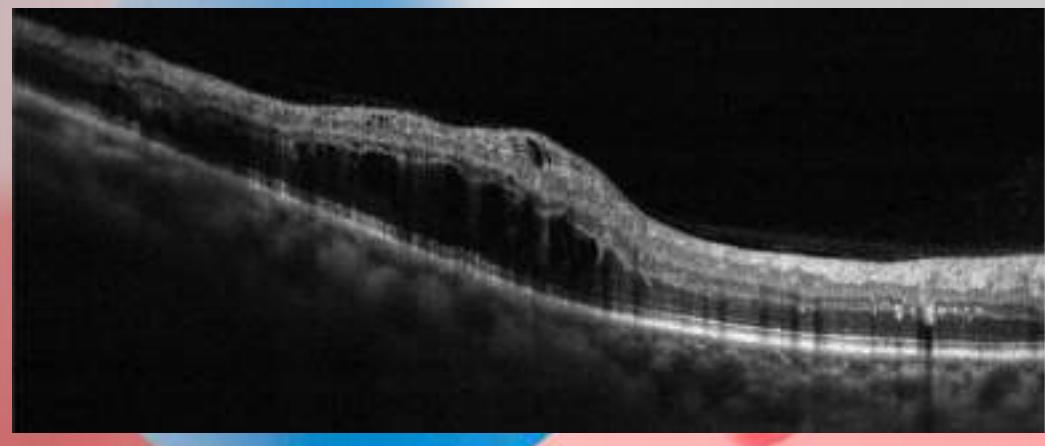
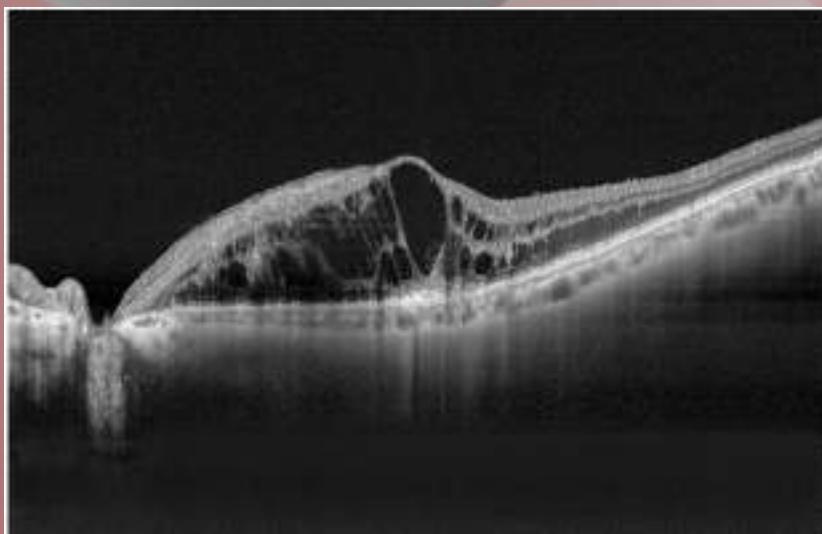
Diabetic Retinopathy: Proliferative



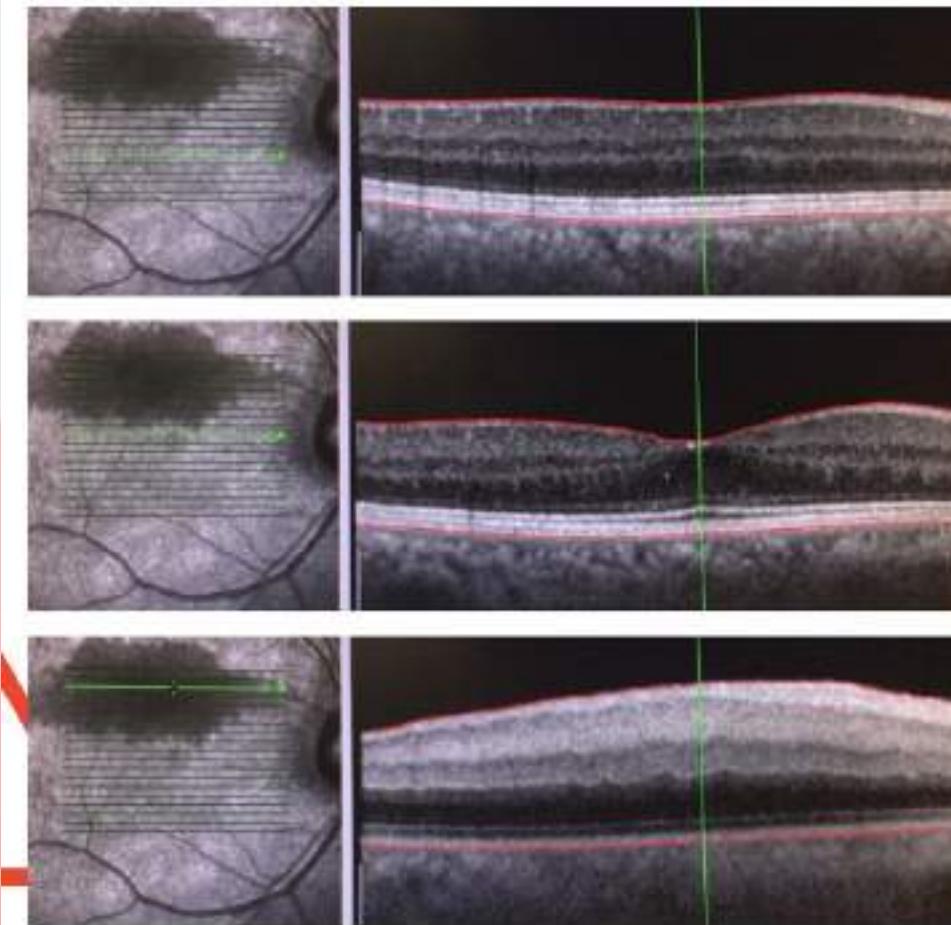
Diabetic Retinopathy: Proliferative



Vein Occlusion

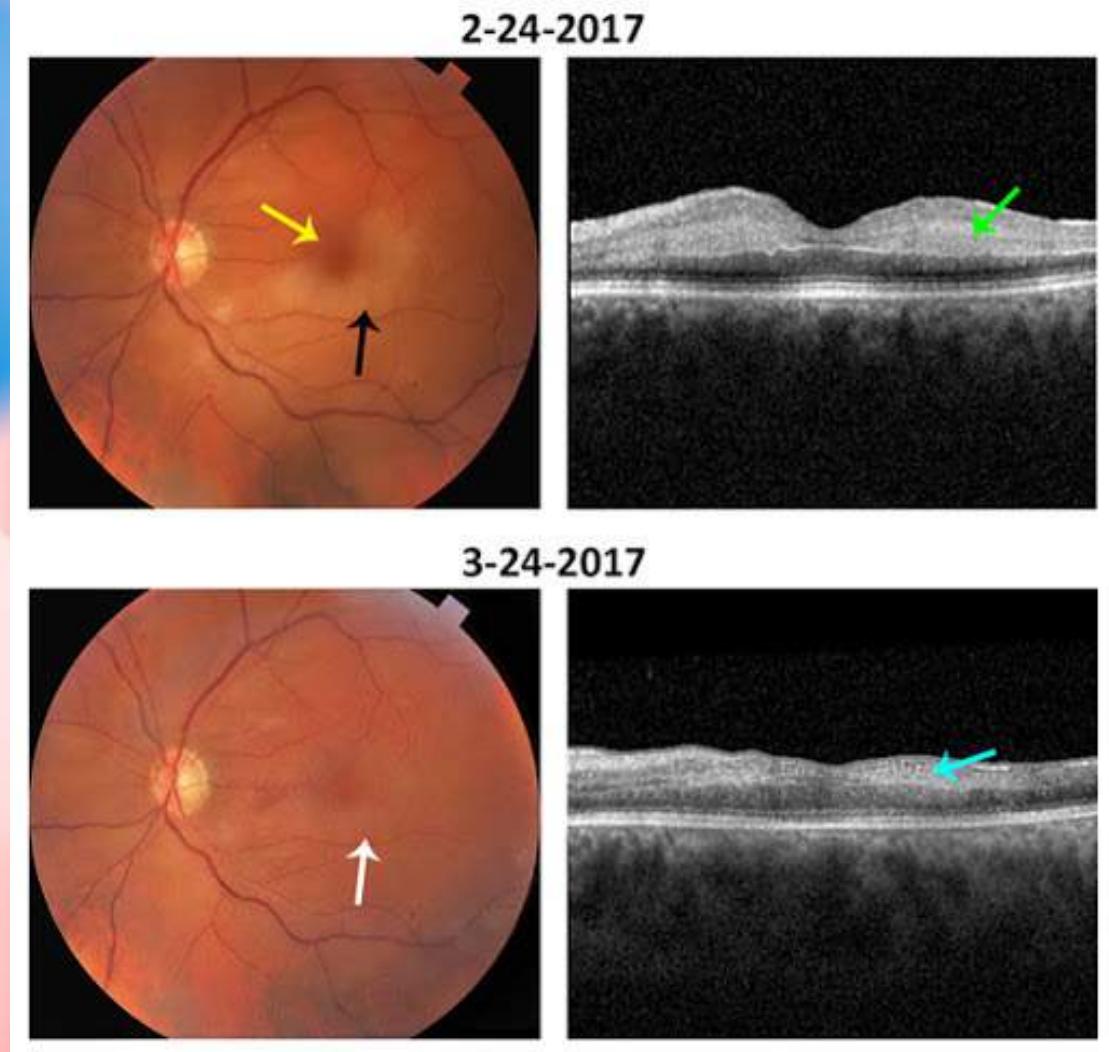


Artery Occlusion: Acute



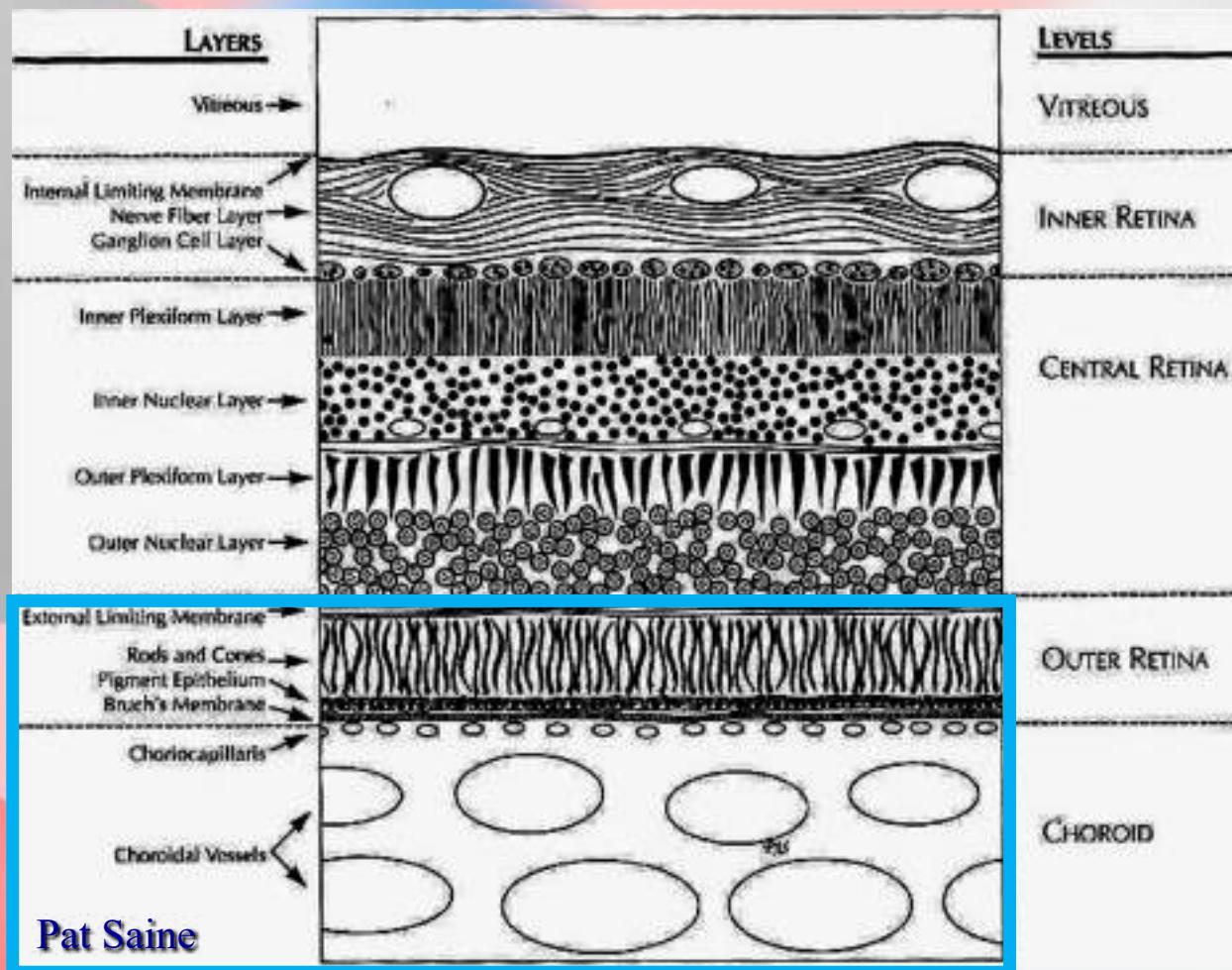
Artery Occlusion:

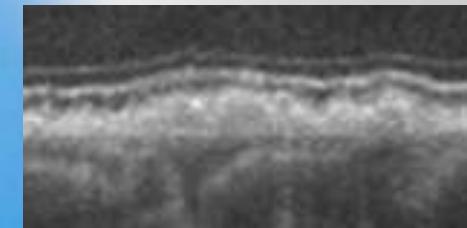
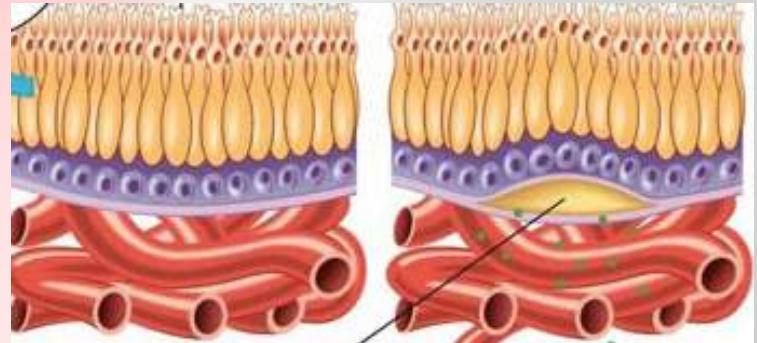
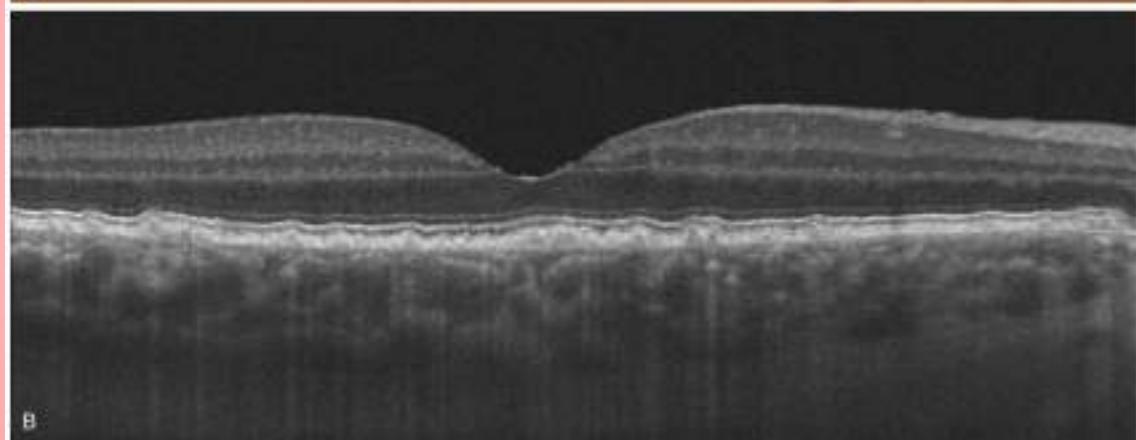
Chronic



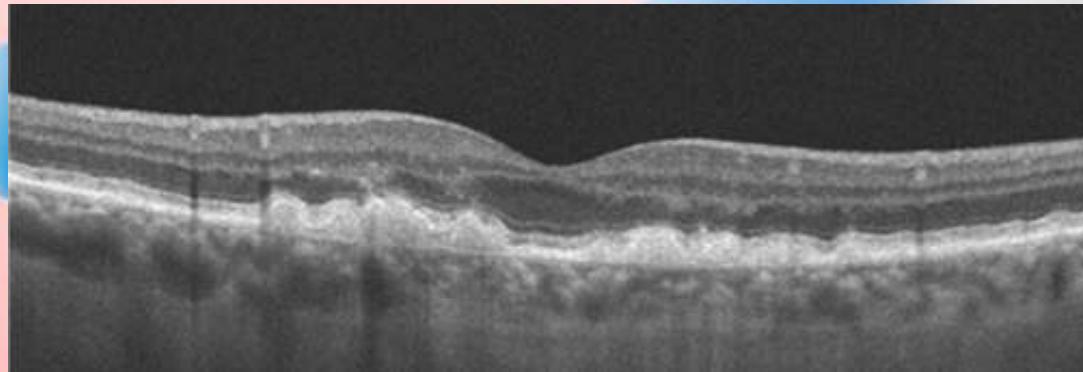
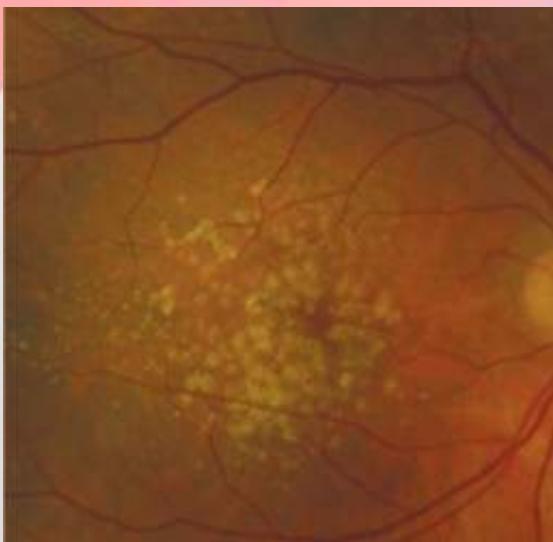


Outer Retinal Disease

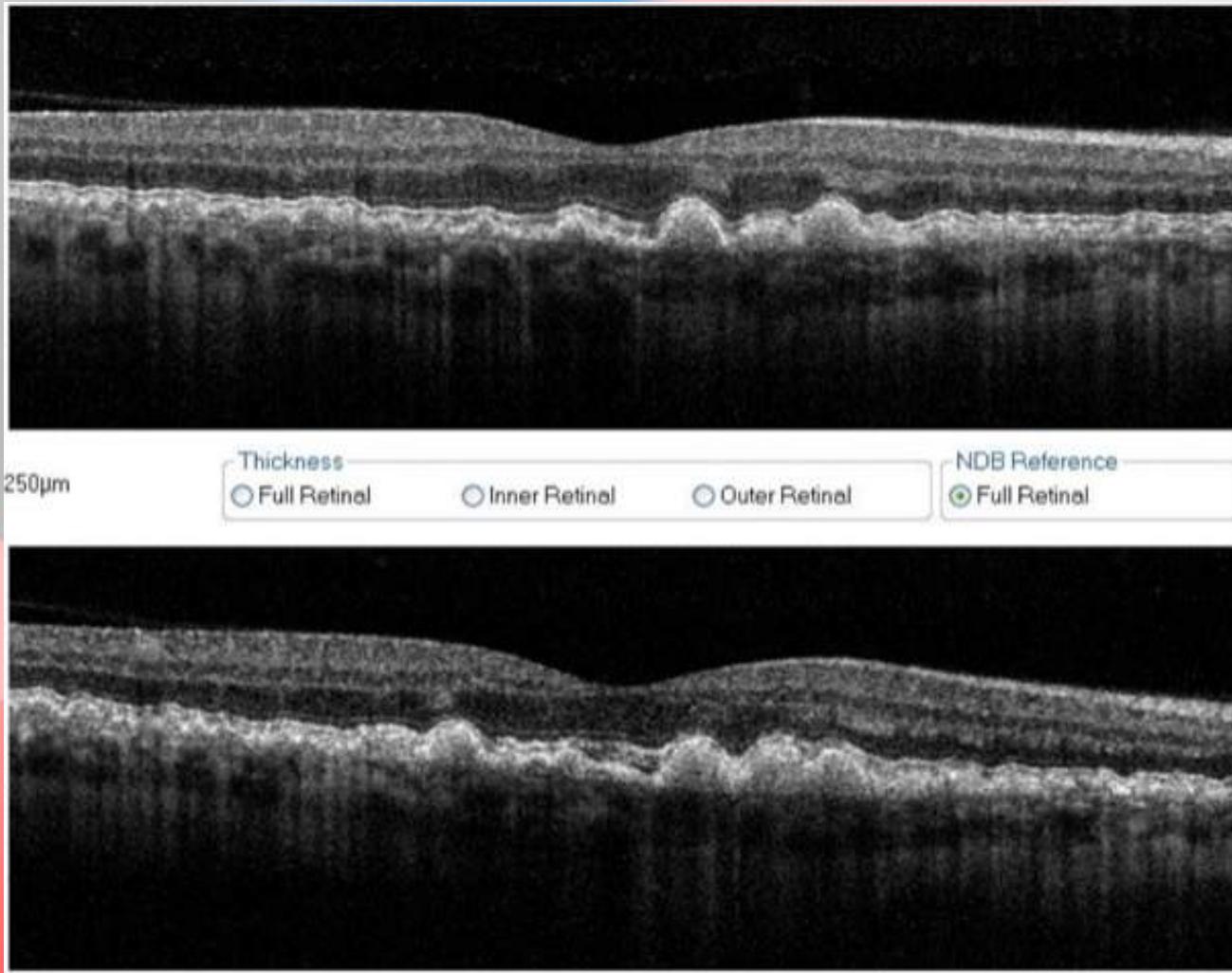




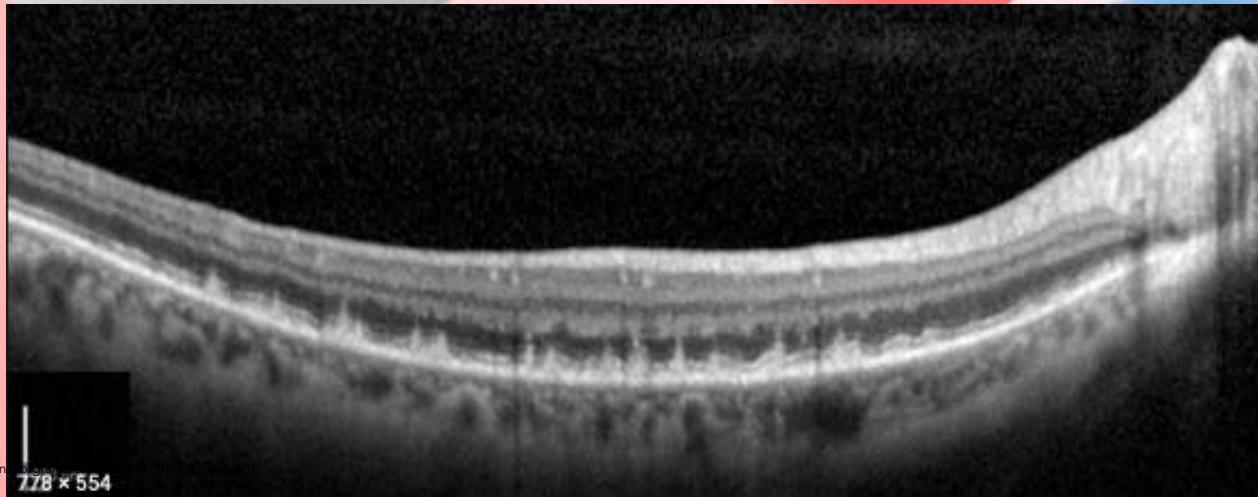
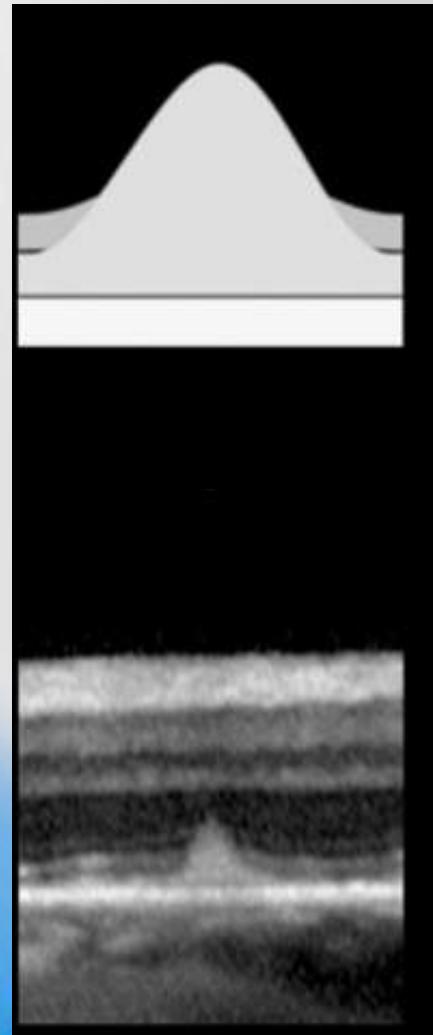
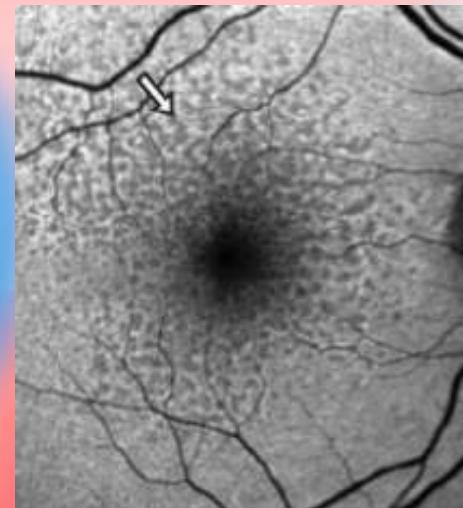
Drusen



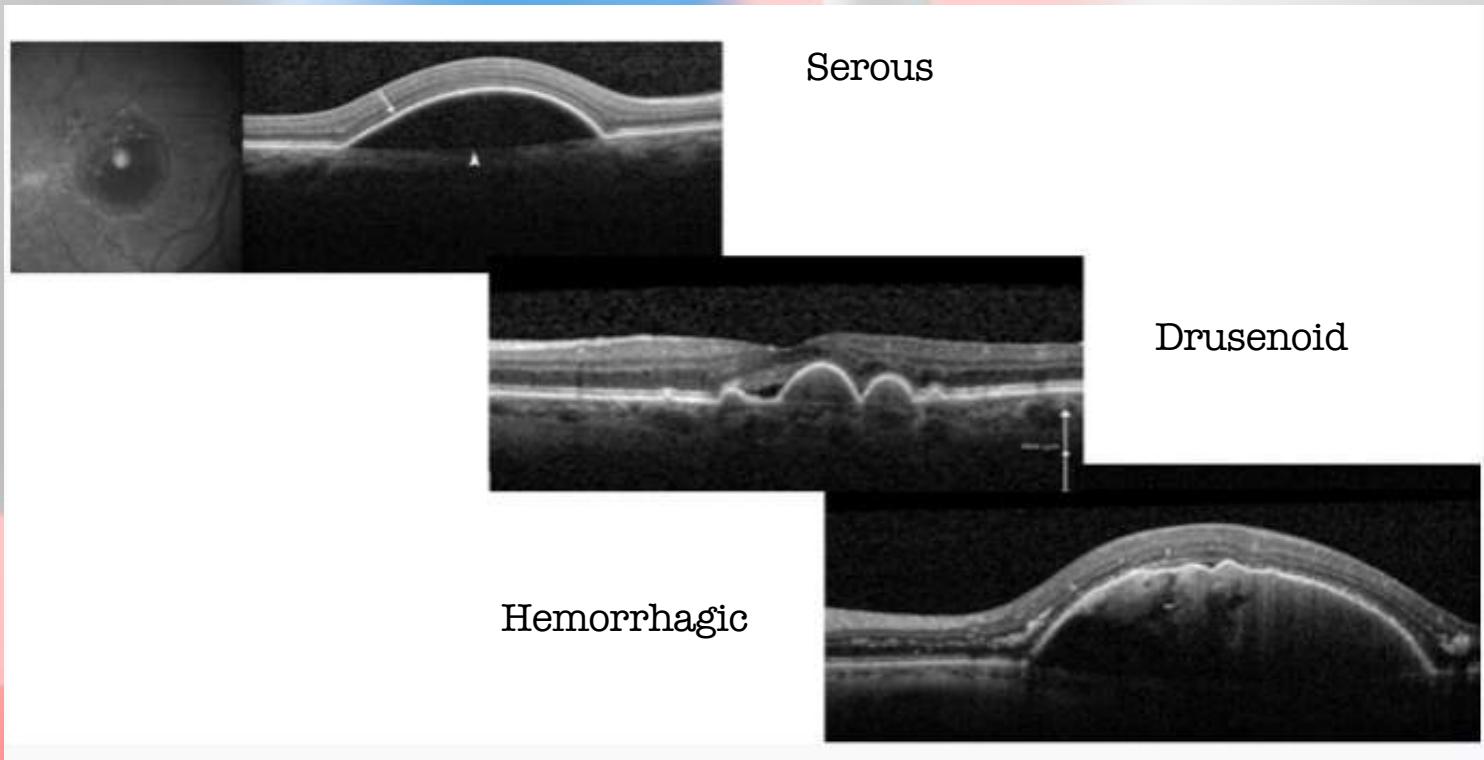
Change Analysis



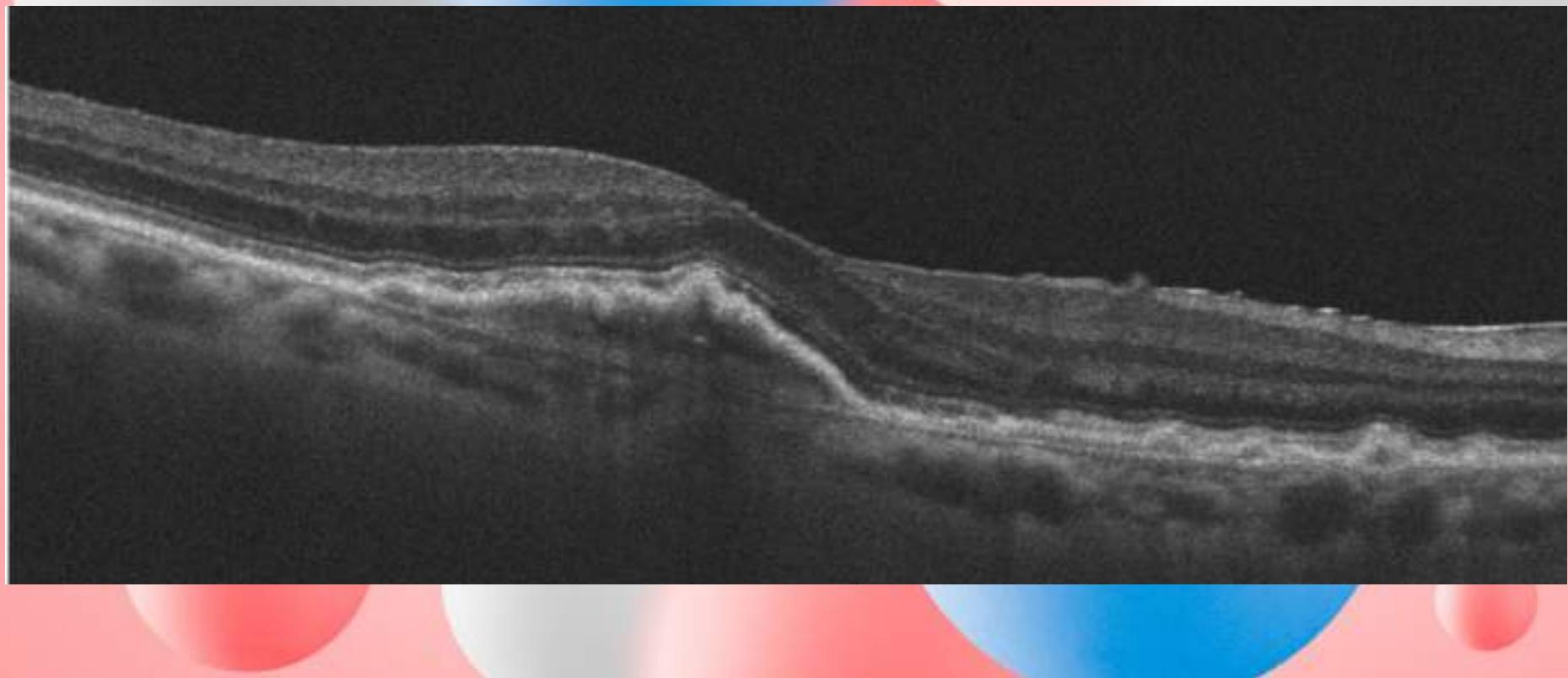
Reticular Pseudodrusen



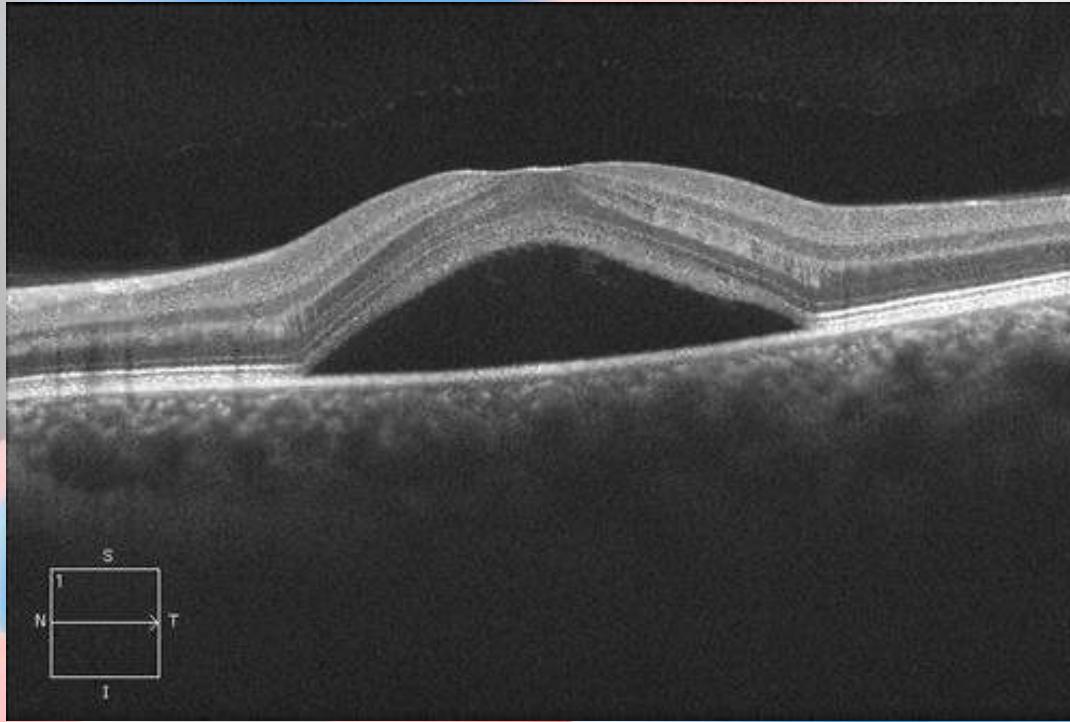
Pigment Epithelial Detachments



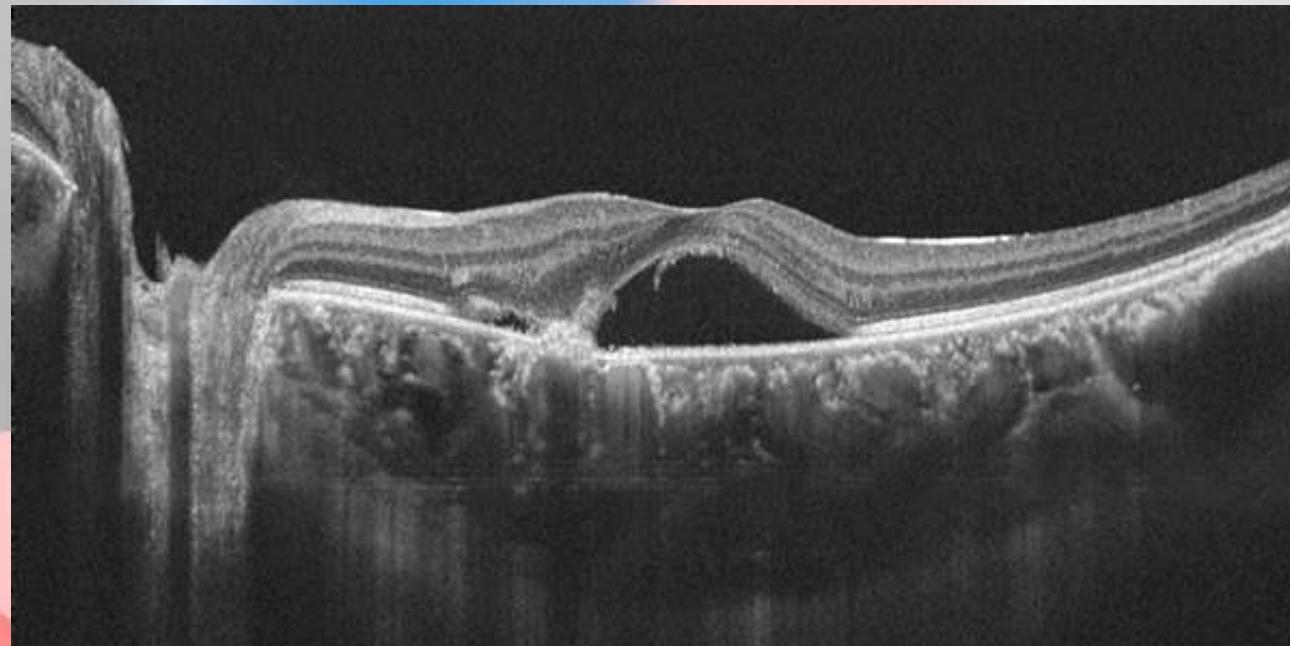
Pigment Epithelial Detachments: What Kind?



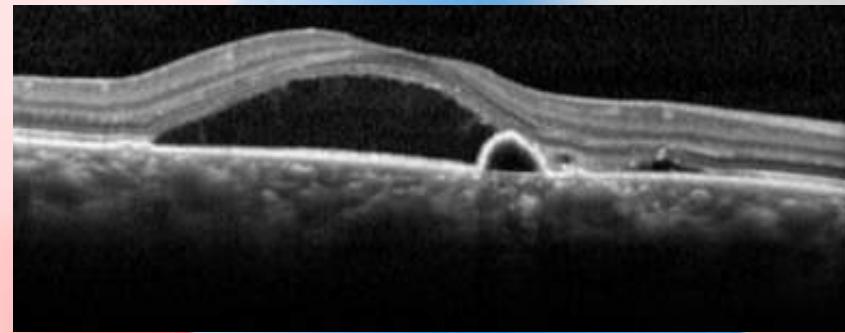
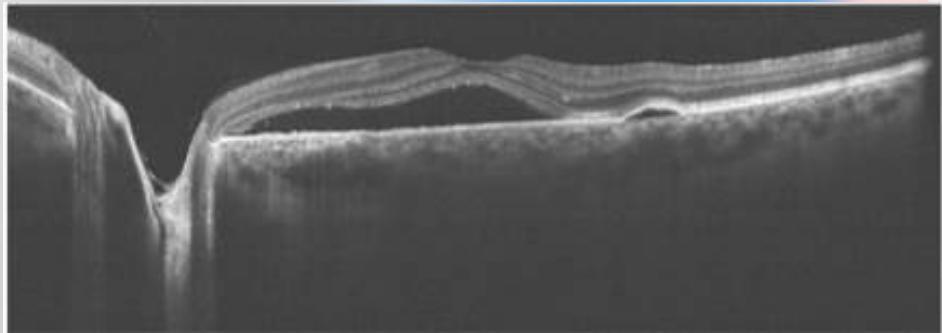
Central Serous Chorioretinopathy



Central Serous Chorioretinopathy: Chronic

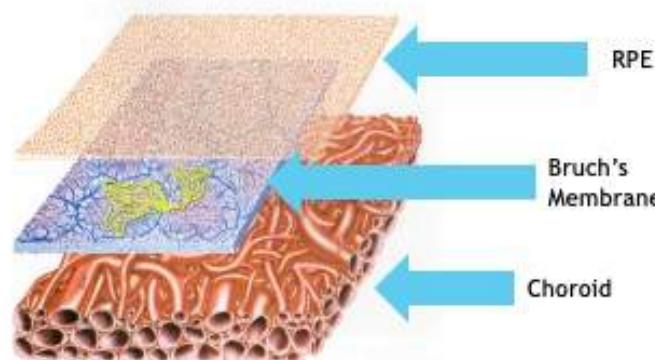


Central Serous Chorioretinopathy and PED

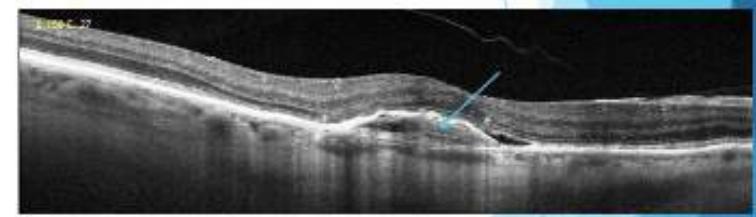


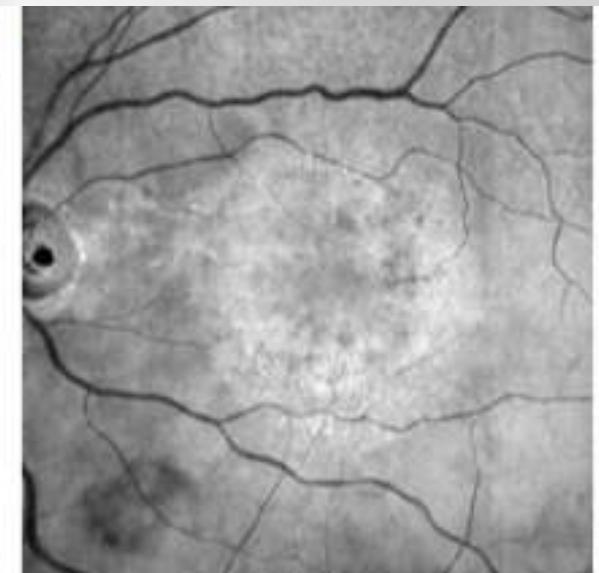
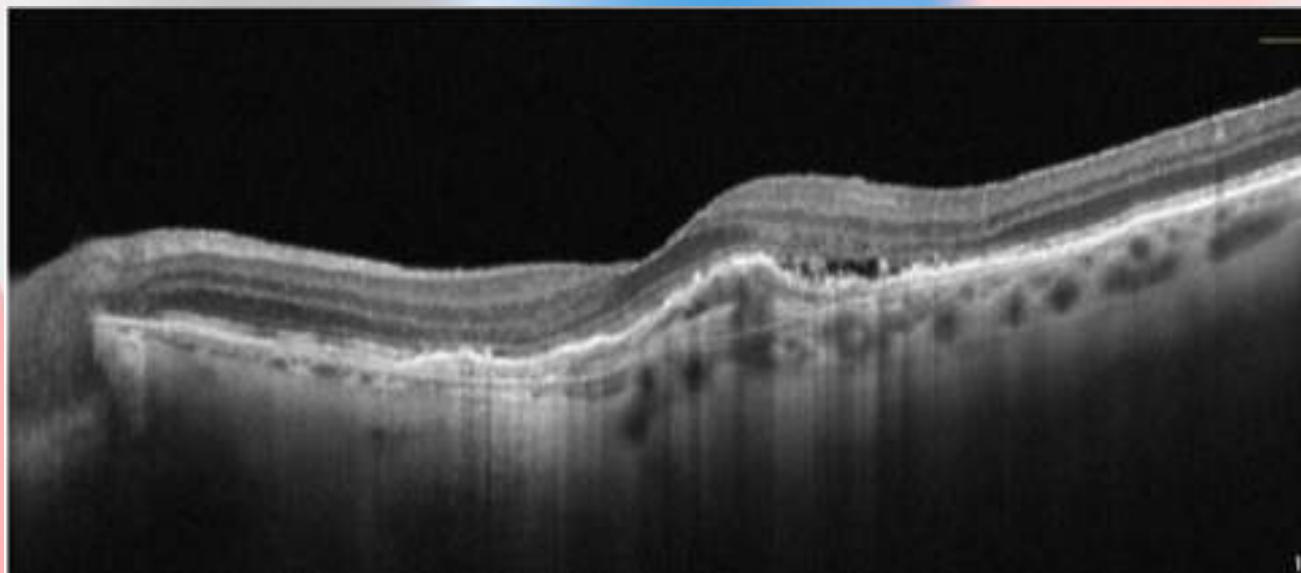
Age Related Macular Degeneration

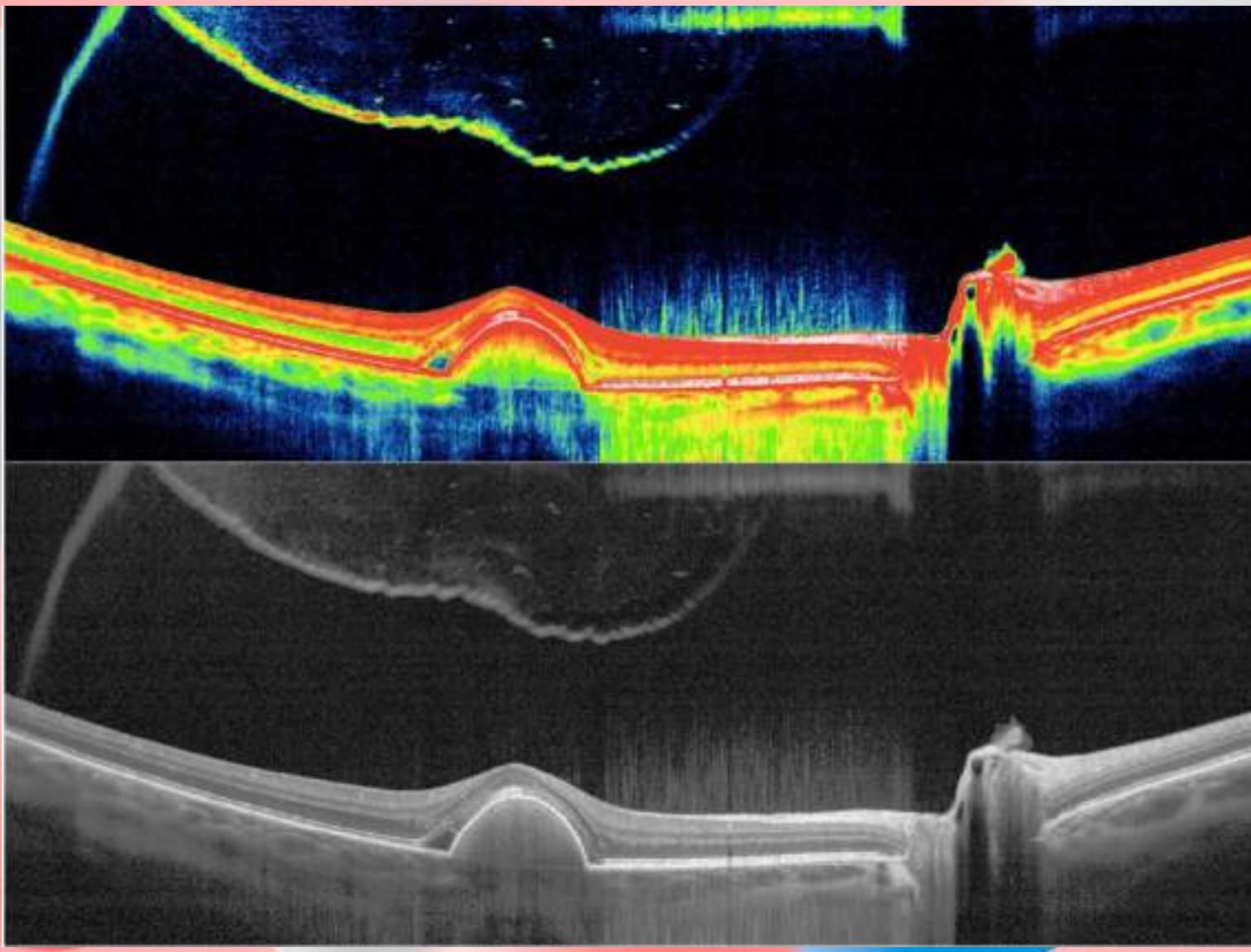
Type 1 "Occult" CNV



- ▶ New vessels develop in the choroid
- ▶ New vessels located **BELOW RPE** and **ABOVE Bruch's membrane**

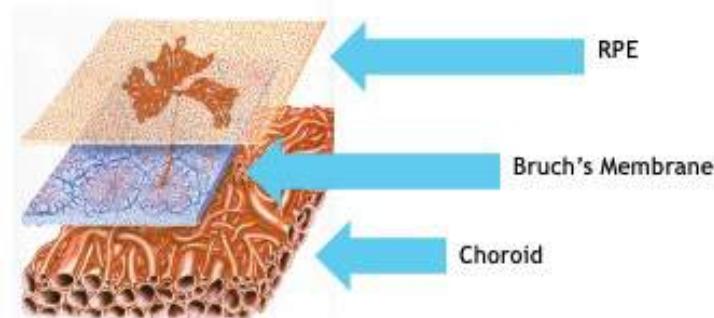




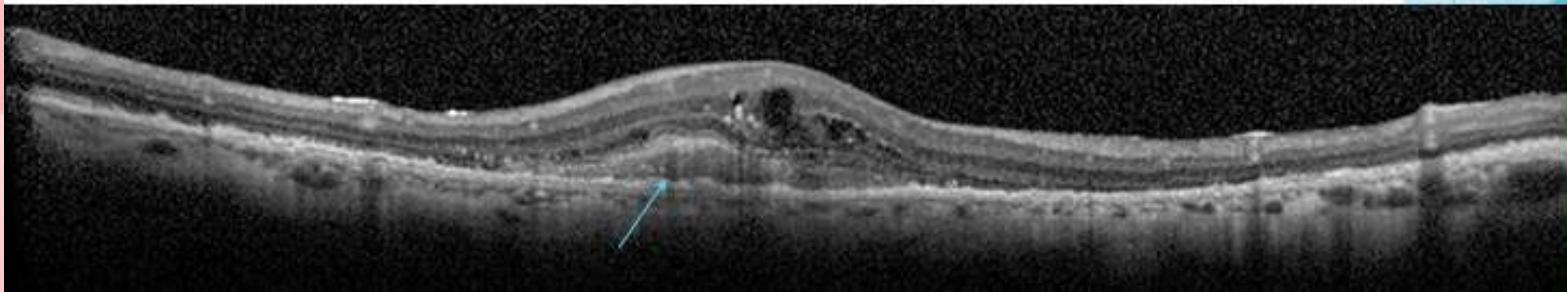


Age Related Macular Degeneration

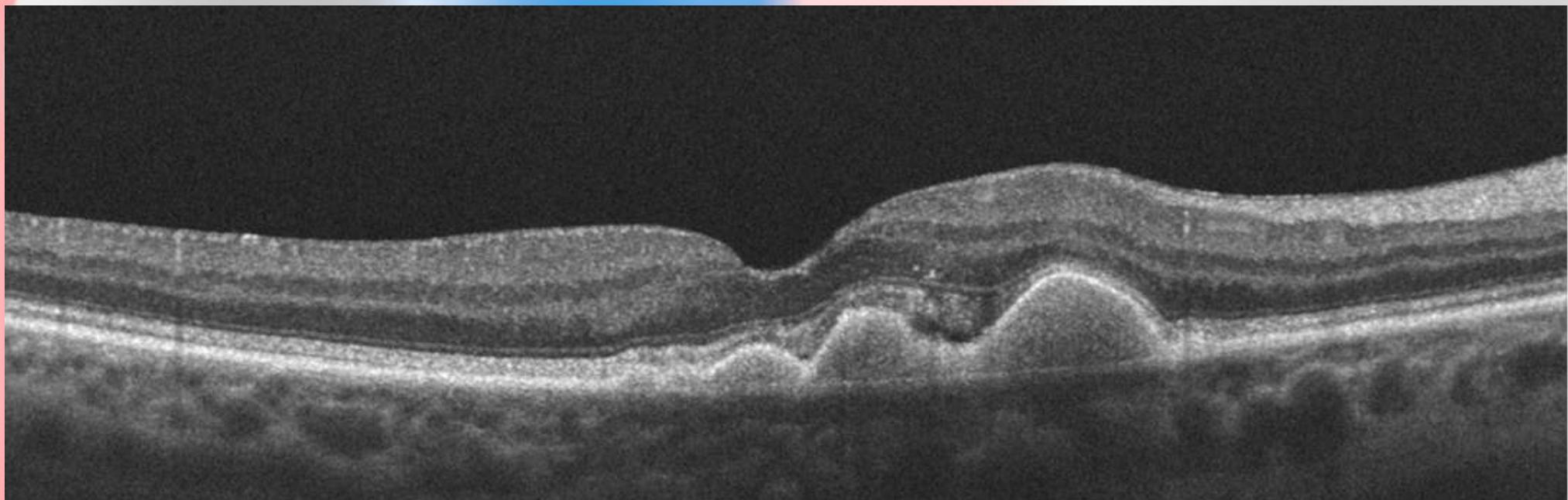
Type 2 "Classic" CNV



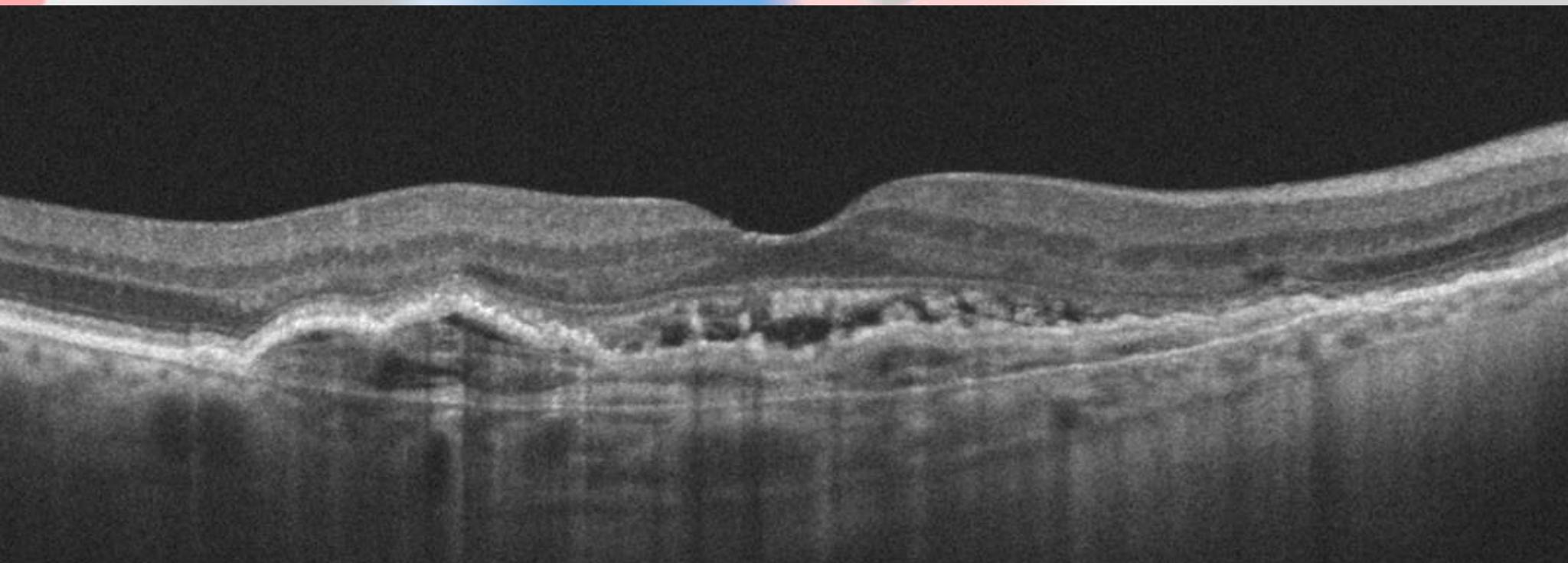
- ▶ New vessels develop in choroid
- ▶ New vessels located **ABOVE** the RPE and ABOVE Bruch's membrane



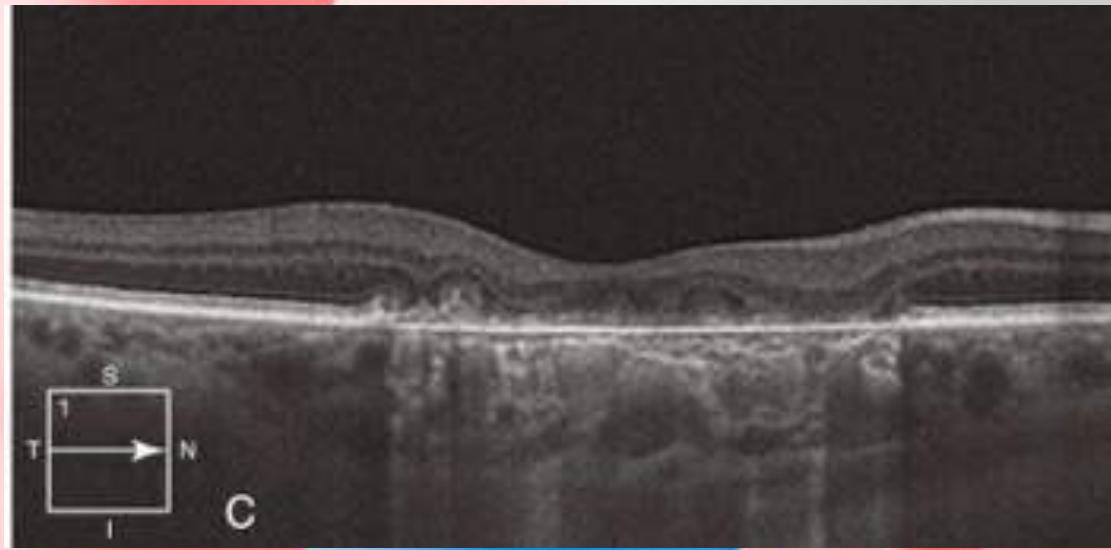
Age Related Macular Degeneration

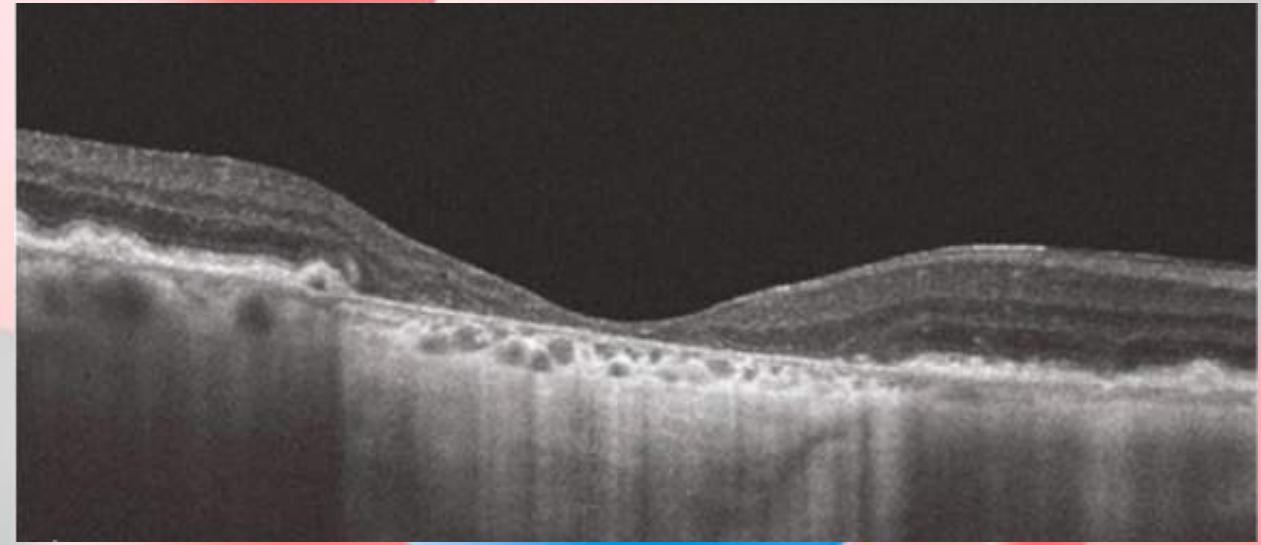
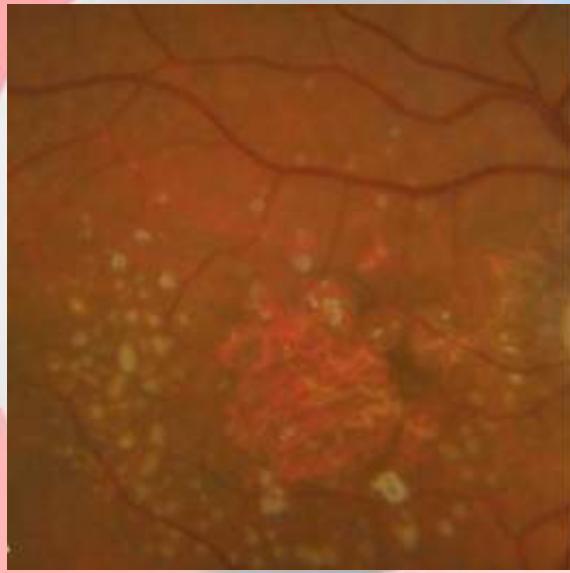


Age Related Macular Degeneration



Geographic Atrophy





Outer Retinal Disease

Evaluation of Melanocytic Lesions

T

F

S

O

M

U

H

D

Thickness of greater >2.0 mm

Subretinal Fluid

Symptoms of reduced vision or photopsia

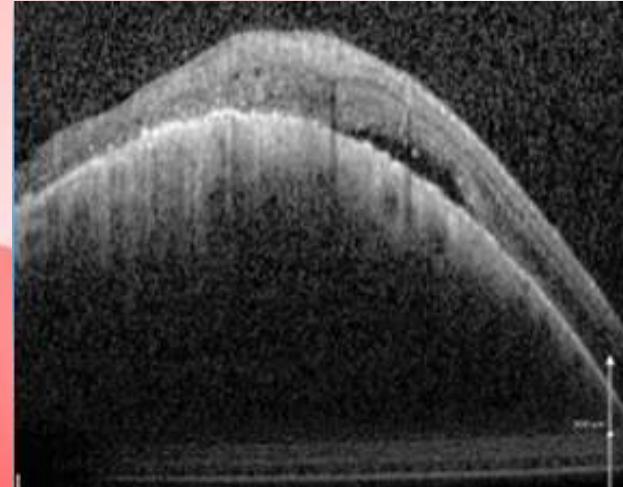
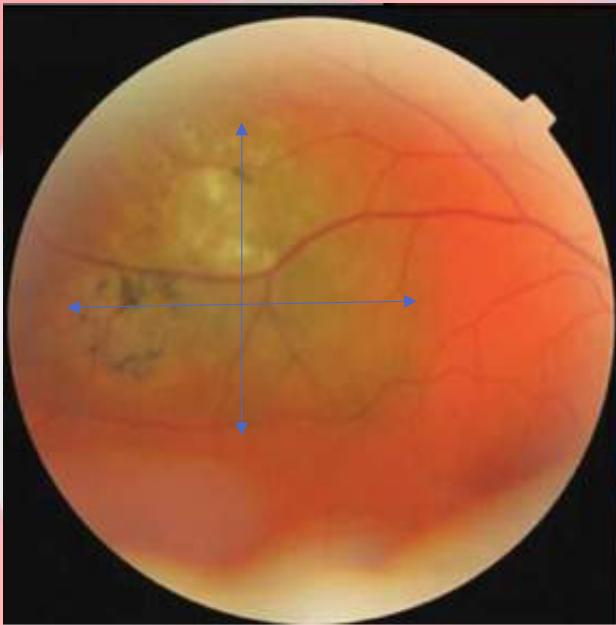
Lipofuscin (Orange pigment)

Neoplastic Margin < 3mm from optic disc

Hollow intrinsic acoustic signal using Ultrasonography

Absence of surrounding depigmented Halo

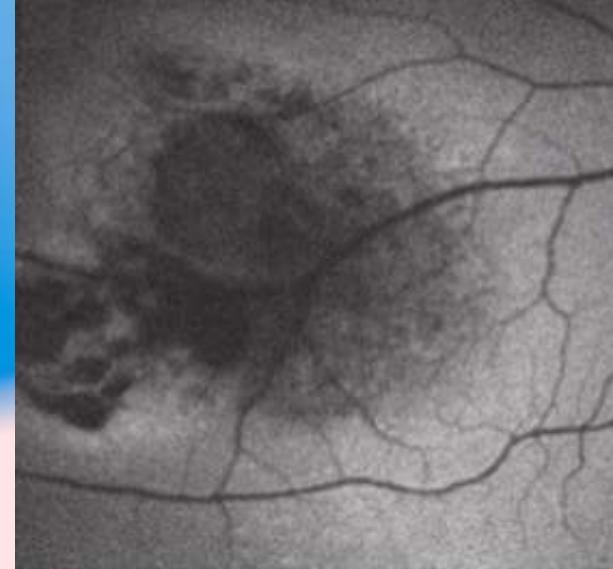
Absence of overlying Drusen



The melanoma measured 9.0 mm by 8.0 mm in basal dimensions and has an estimated thickness of 3.0 mm

Thickness of greater >2.0 mm

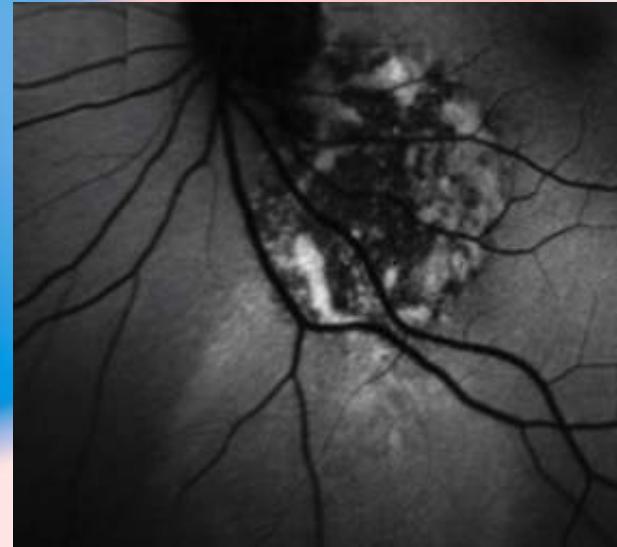
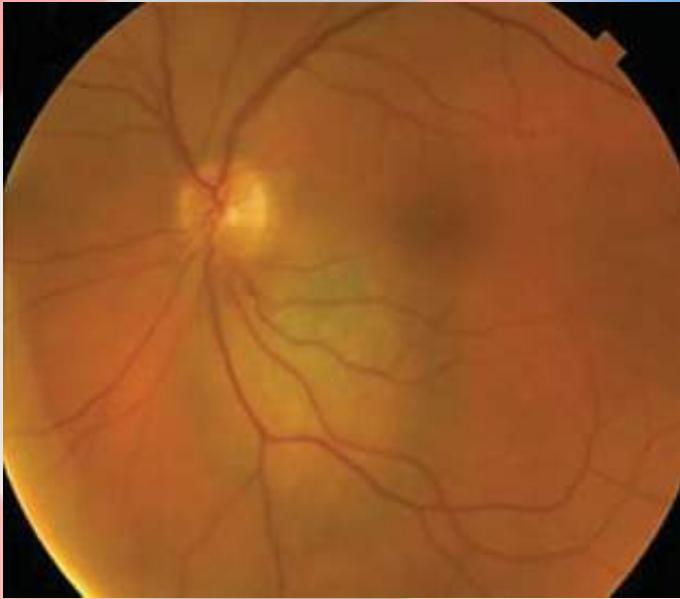
Subretinal Fluid



Choroidal melanoma with extensive RPE changes. FAF shows hypo-autofluorescence of the lesion with an area of mild hyper-autofluorescence along the temporal edge of the lesion.

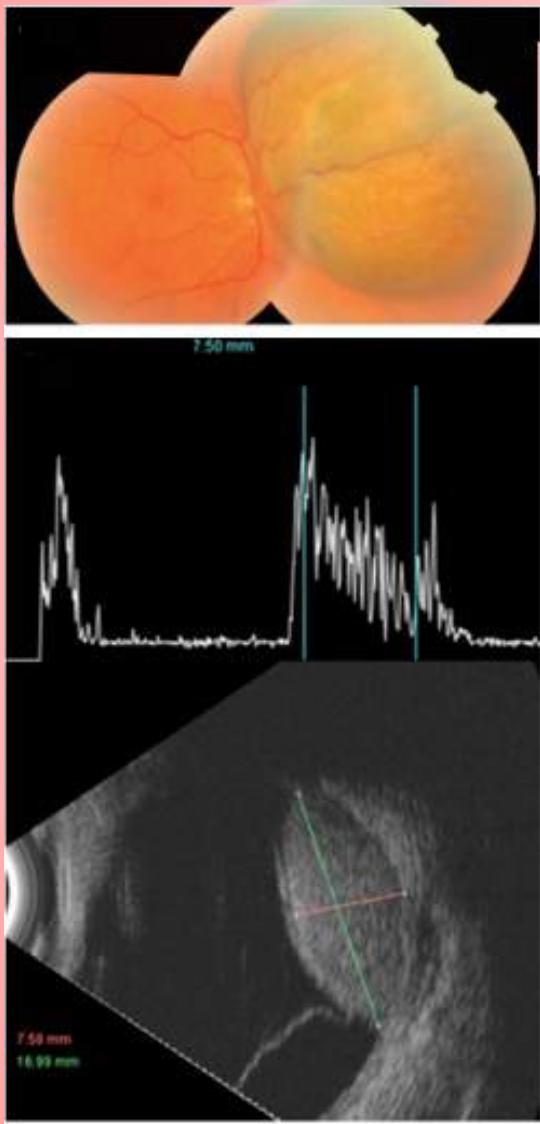
O

Lipofuscin (**Orange** pigment)



M

Neoplastic **Margin < 3mm** from optic disc



U

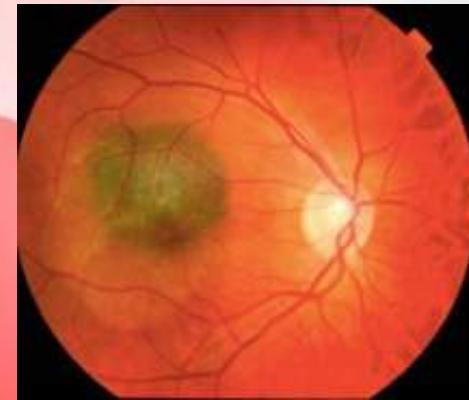
Hollow intrinsic acoustic signal of the neoplasm using Ultrasonography

A-scan ultrasonography, demonstrates a high initial spike, low-to-medium internal reflectivity.

B-scan ultrasonography appears as an echo-dense mass with internal homogeneity



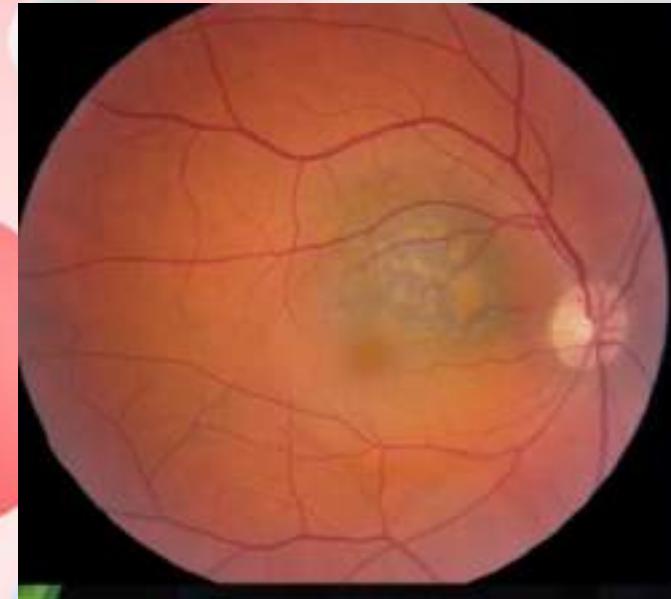
Melanoma



Nevus

H

Absence of surrounding depigmented **Halo**



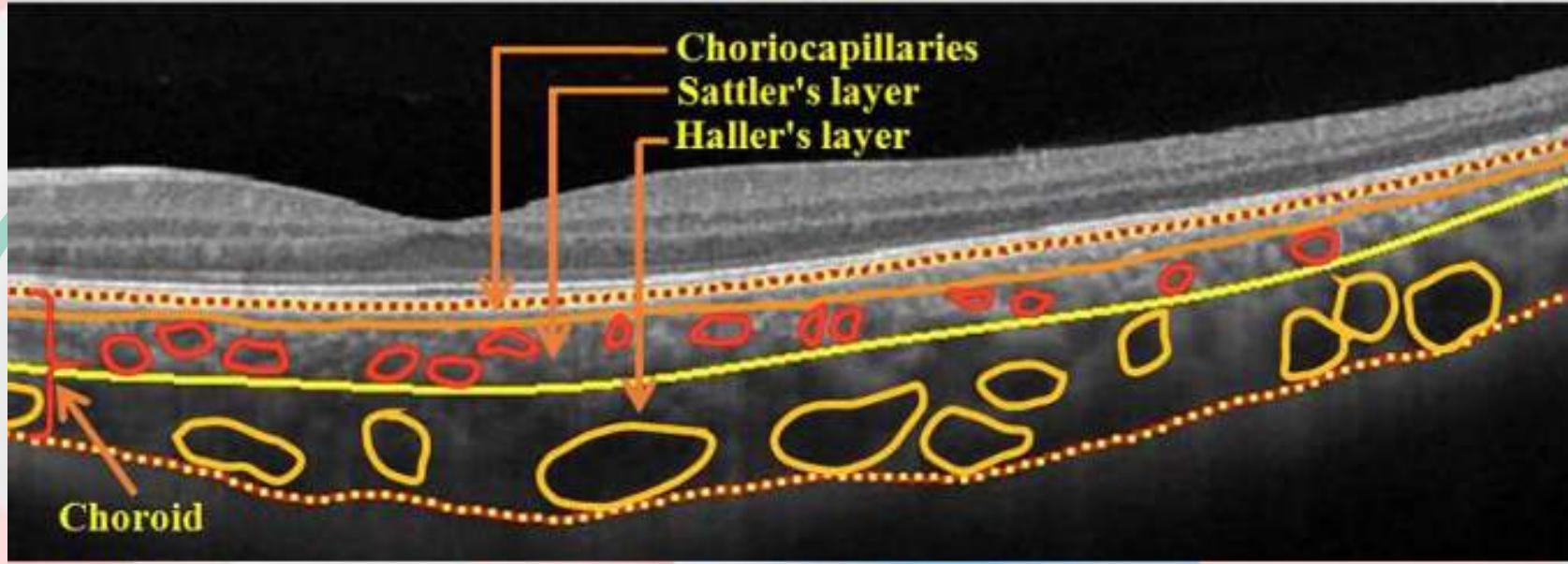
D

Absence of overlying Drusen

Outer Retinal Disease

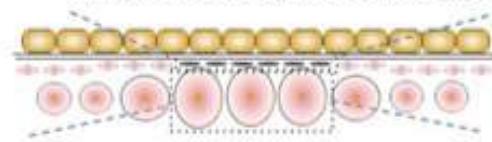
Pachychoroid Clinical Spectrum

Pachychoroid Spectrum refers to a group of clinical entities that have a common characteristic: a pachychoroid (thick choroid)



Pachychoroid

- Inner choroidal attenuation



- Dilated large choroidal vessels

Features of the Choroid

- ❖ Choroidal thickness varies with age, ethnicity and axial length
- ❖ Normal subfoveal choroidal thickness 250-350 μm
- ❖ Pachychoroid: Choroidal thickness >390 μm ;
 - ❖ Extrafoveal thickness exceeding subfoveal by 50 μm

Chorioretinal Disease affects choroidal thickness!

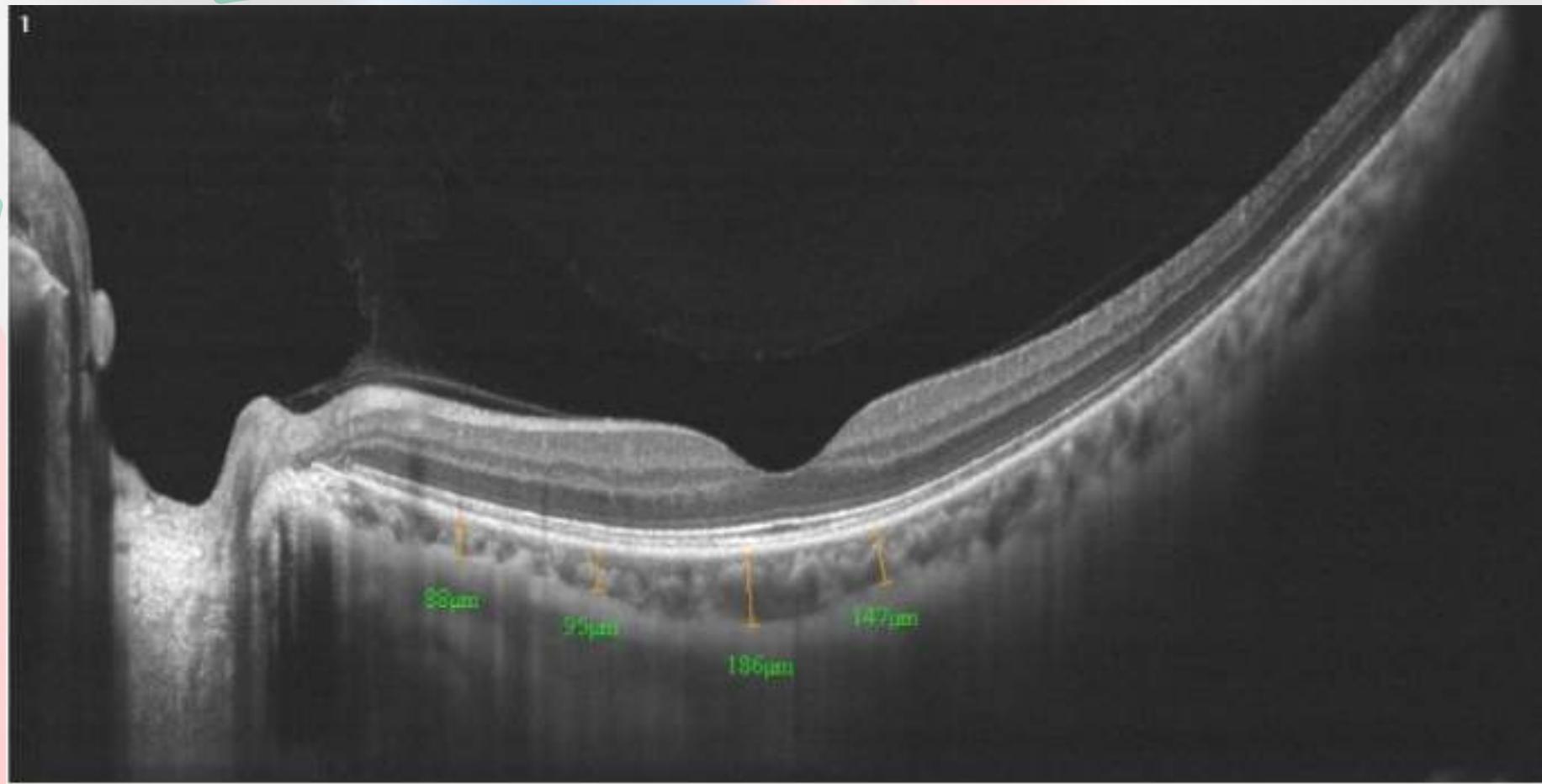
Thicker

- ❖ Central Serous Chorioretinopathy
- ❖ Polypoidal Choroidal Vasculopathy

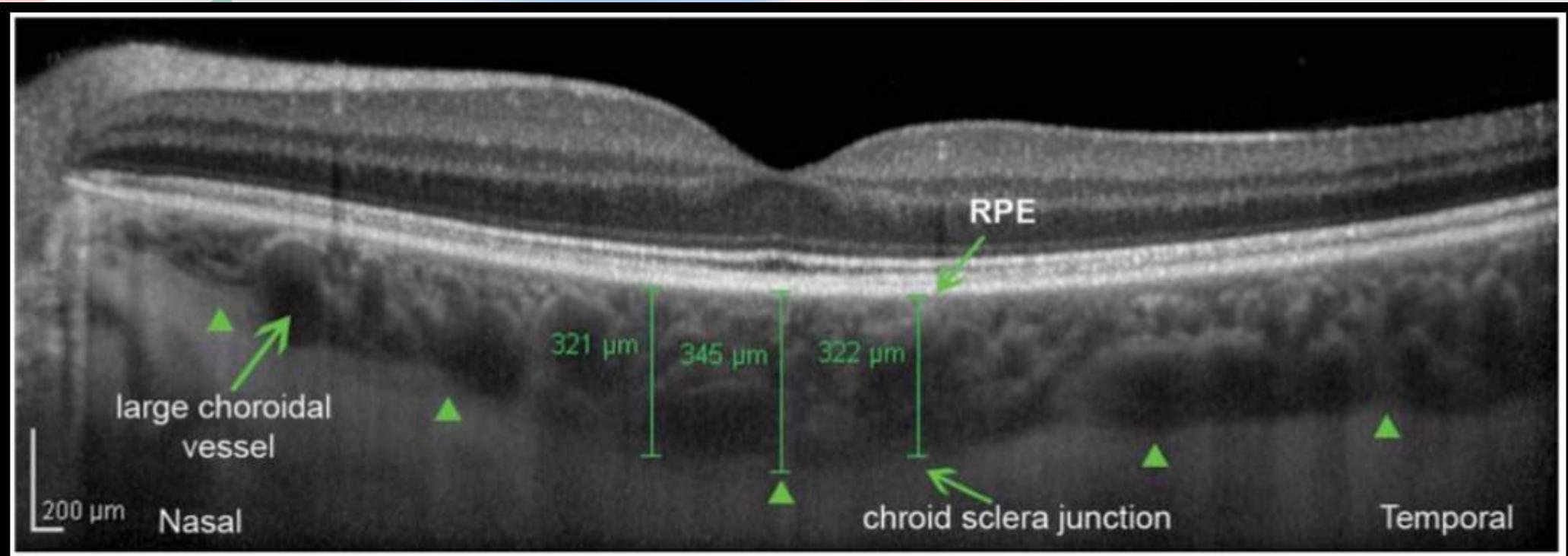
Thinner

- ❖ Age Related Macular Degeneration
- ❖ Proliferative DR/ DME
- ❖ Retinitis Pigmentosa
- ❖ Glaucoma

Choroid: In Detail



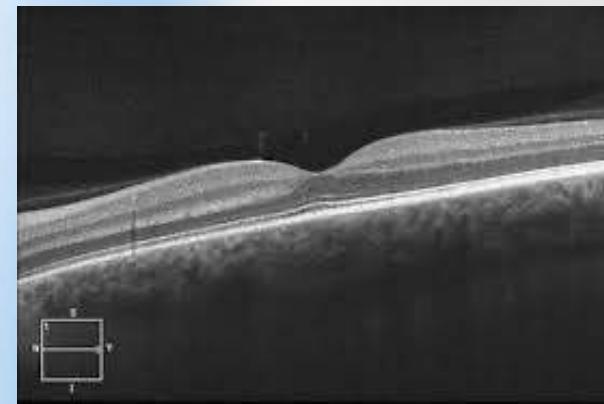
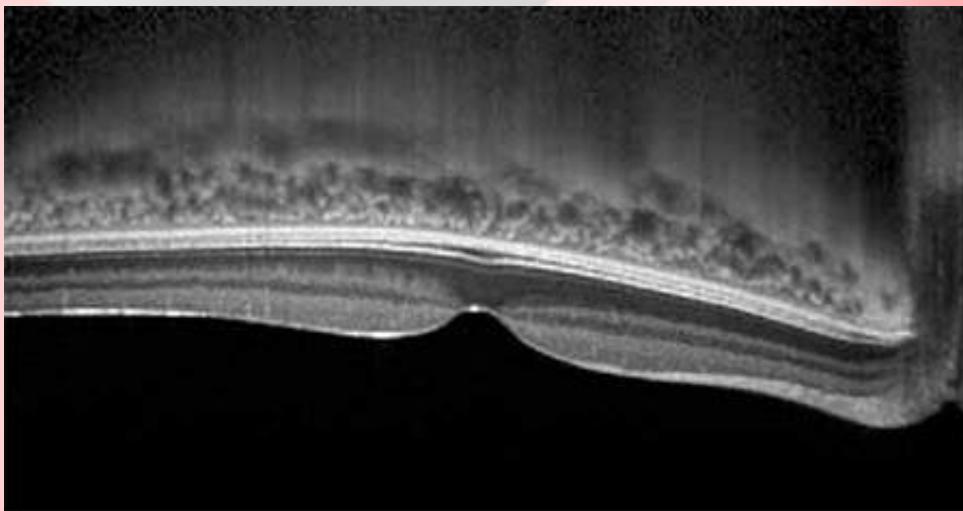
Choroid: In Detail (Pachychoroid)

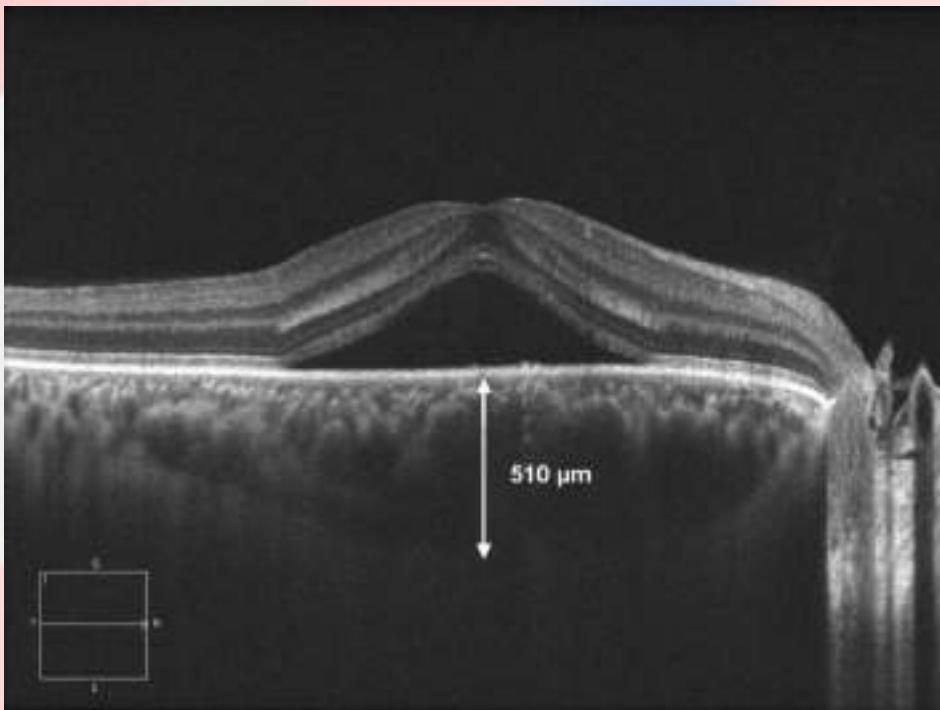


Enhanced Depth Imaging

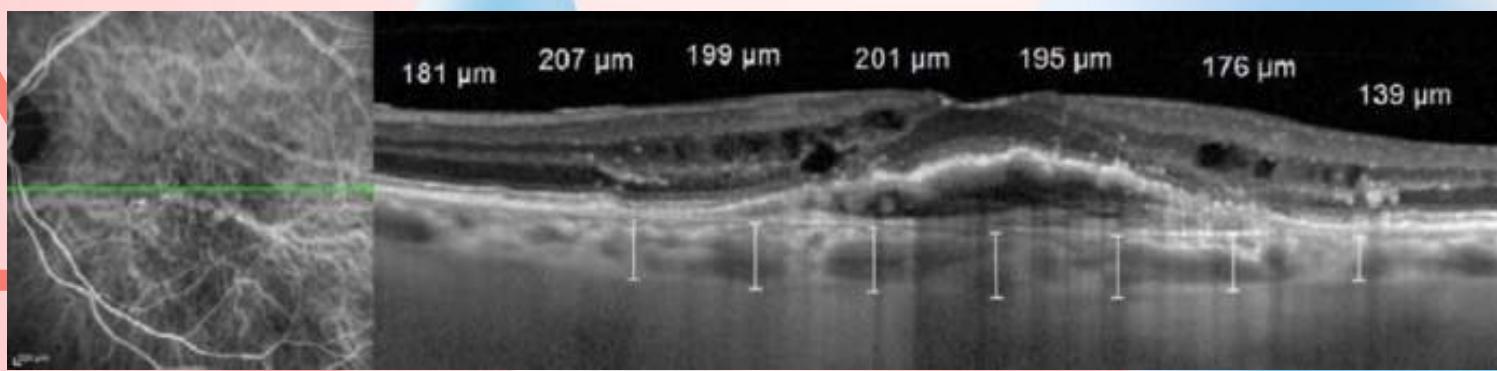
Place OCT closer to patient's eye; improves image resolution

Inverting the image provides enhanced visualization of the RPE,
Bruch's membrane, choroid and sclera (extra 500-800 um penetration)





CSR: Thick



AMD: Thin

Pachychoroid Clinical Spectrum

- ❖ Uncomplicated Pachychoroid
- ❖ Central serous chorioretinopathy (CSC)
- ❖ Pachychoroid neovasculopathy
- ❖ Polypoidal choroidal vasculopathy
- ❖ Focal Choroidal Excavation

Pachychoroid Clinical Spectrum

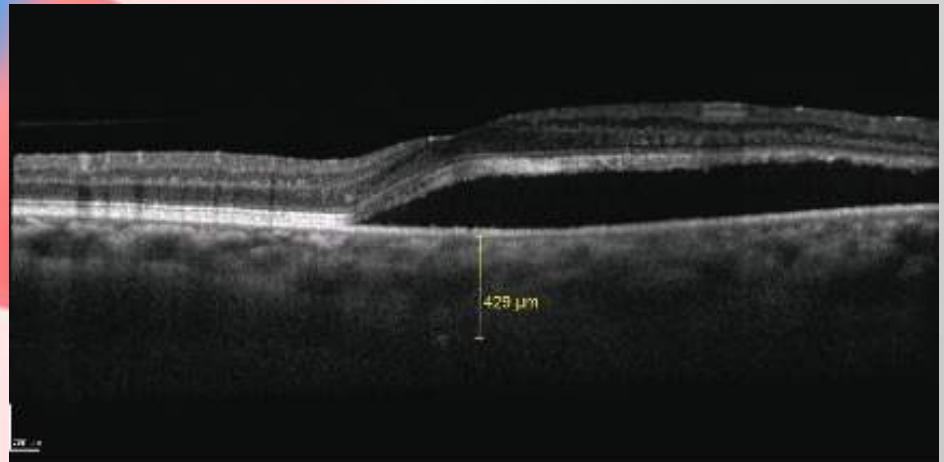
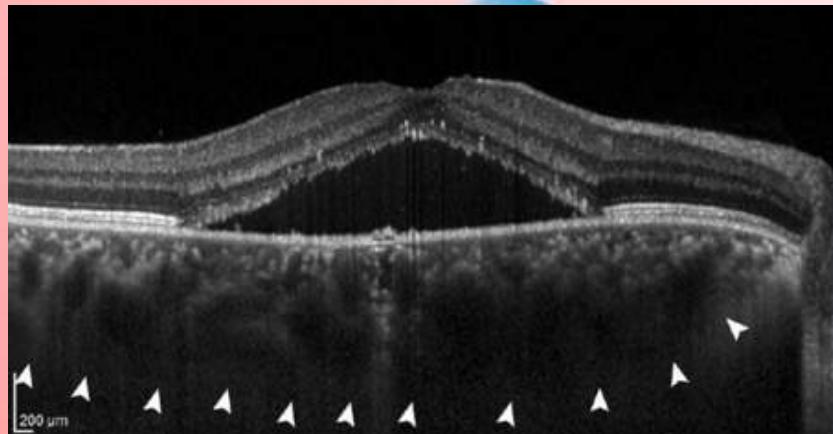
❖ *Uncomplicated Pachychoroid*

- No RPE alterations
- No subretinal fluid



Pachychoroid Clinical Spectrum

❖ *Central Serous Chorioretinopathy*



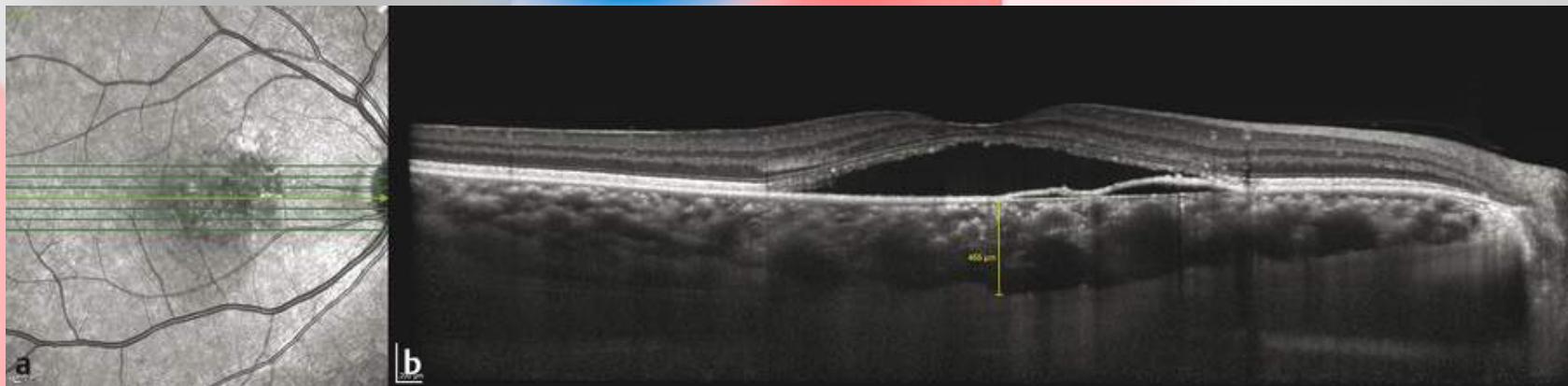
https://en.wikipedia.org/wiki/Pachychoroid_disorders_of_the_macula

<https://entokey.com/central-serous-chorioretinopathy-and-pachychoroid-disease/>

Pachychoroid Clinical Spectrum

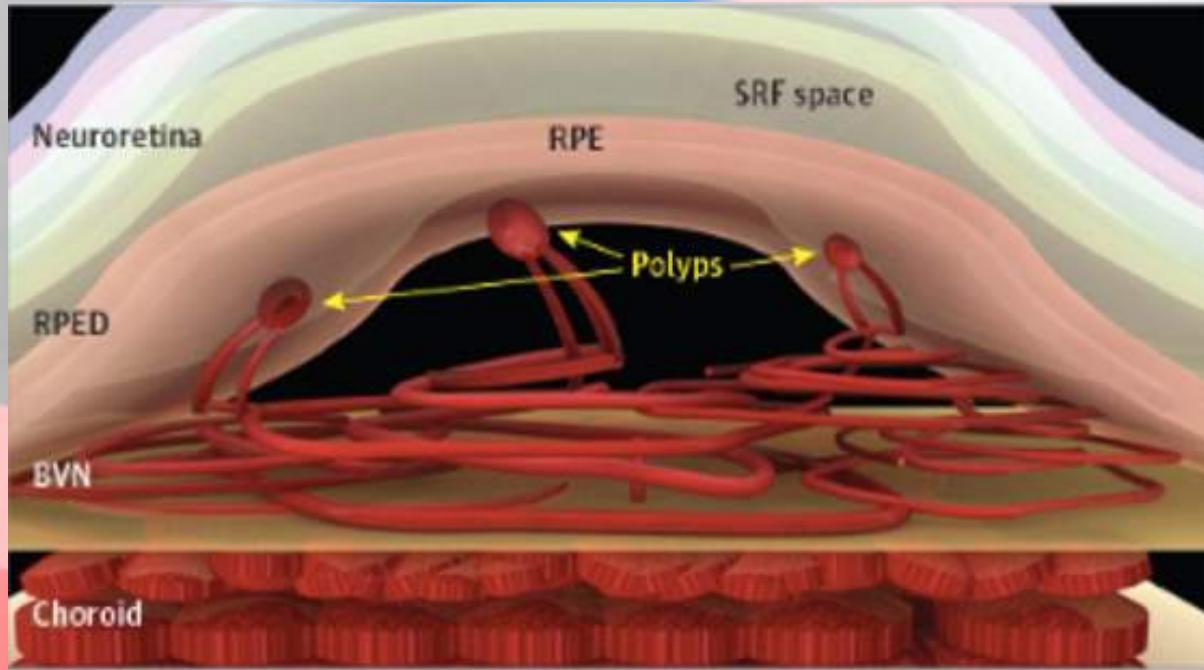
❖ *Pachychoroid Neovascularopathy*

- Type 1 CNV with thick choroid!



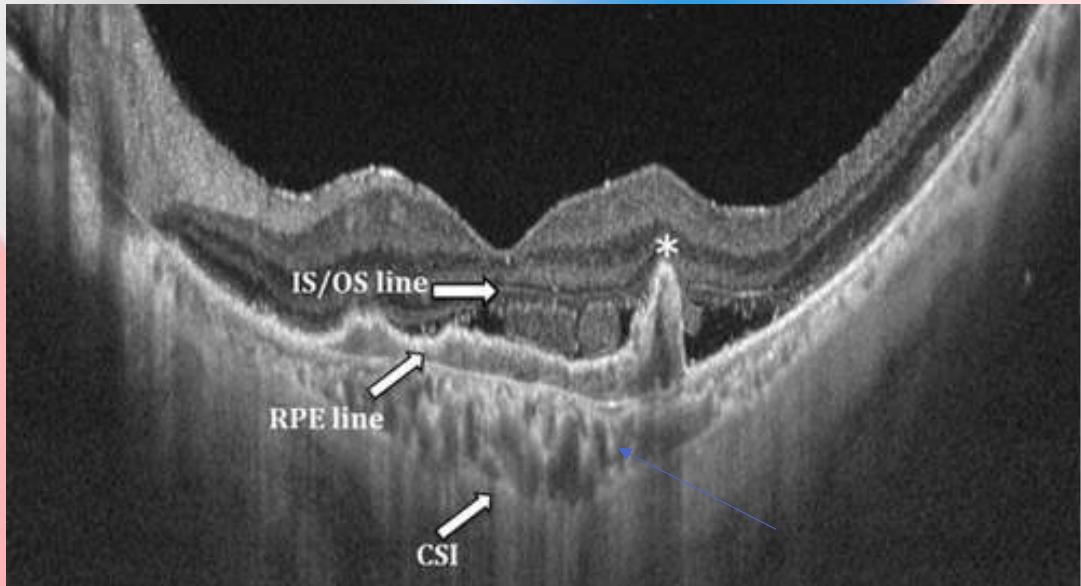
Pachychoroid Clinical Spectrum

❖ *Polypoidal Choroidal Vasculopathy*



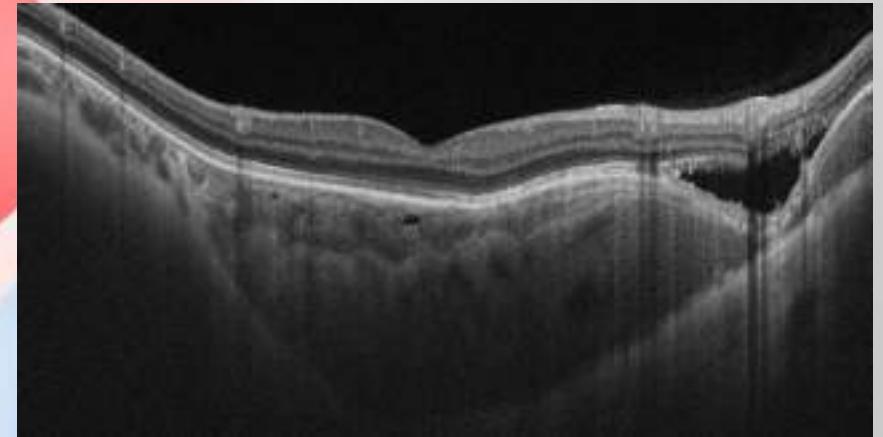
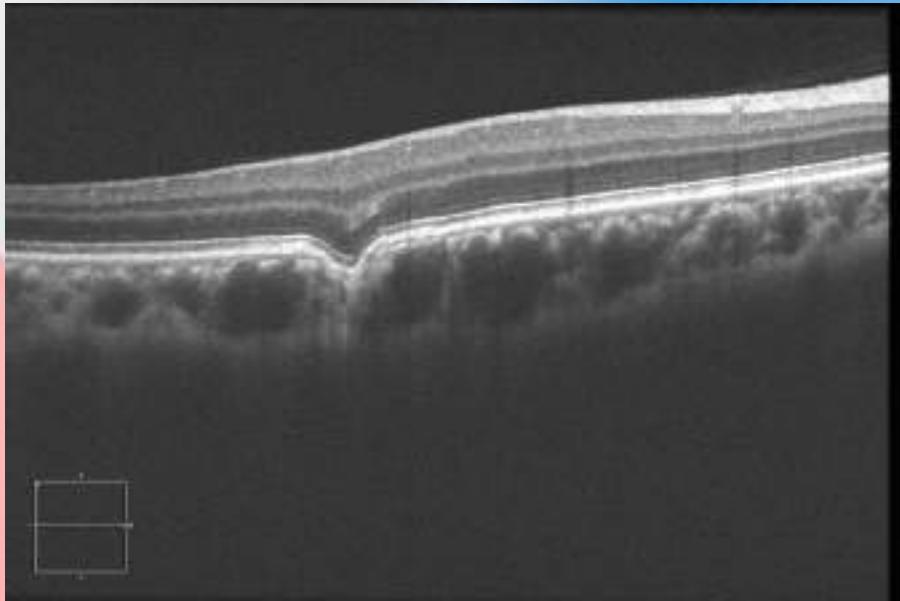
Pachychoroid Clinical Spectrum

❖ *Polypoidal Choroidal Vasculopathy*



Pachychoroid Clinical Spectrum

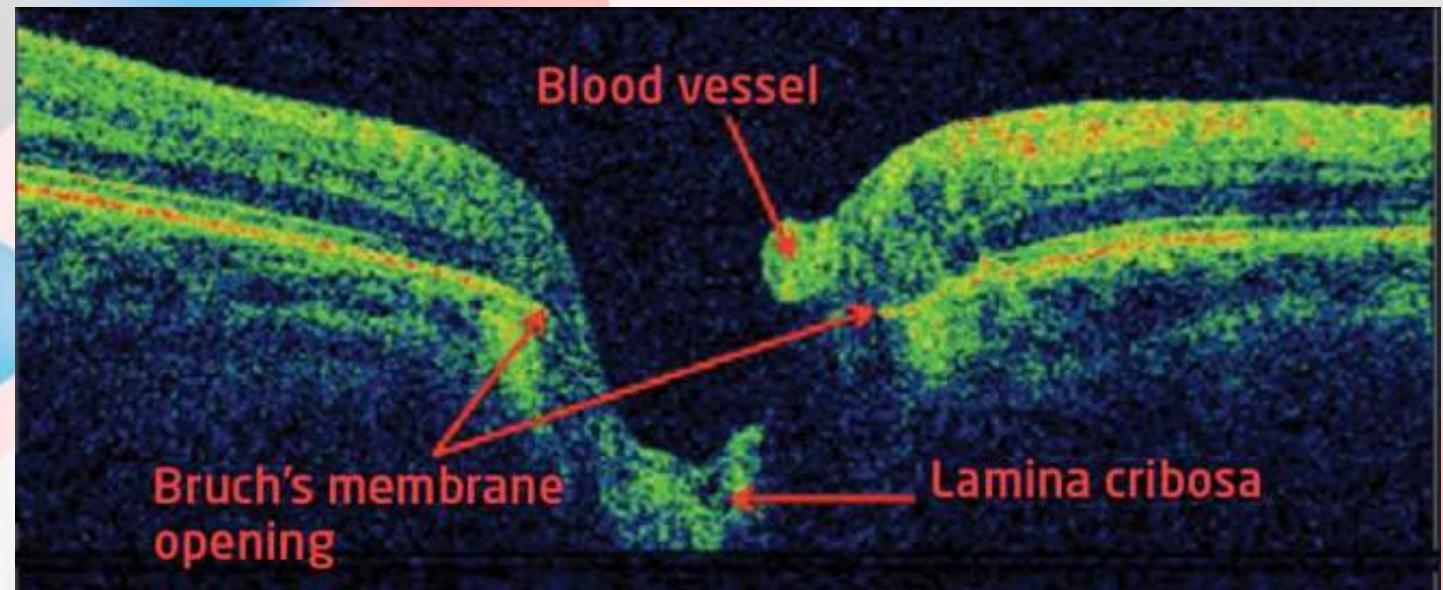
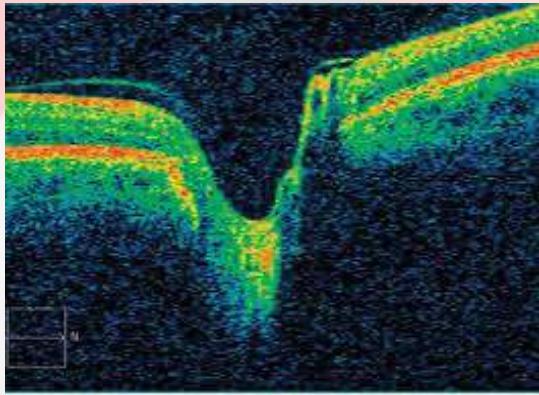
❖ *Focal Choroidal Excavation*



- Conforming (photoreceptor tips are in direct contact with RPE)
- Non-conforming (photoreceptor tips are detached from RPE)



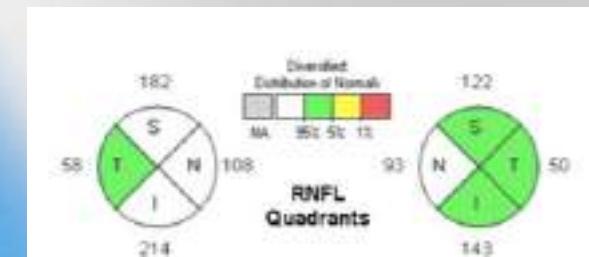
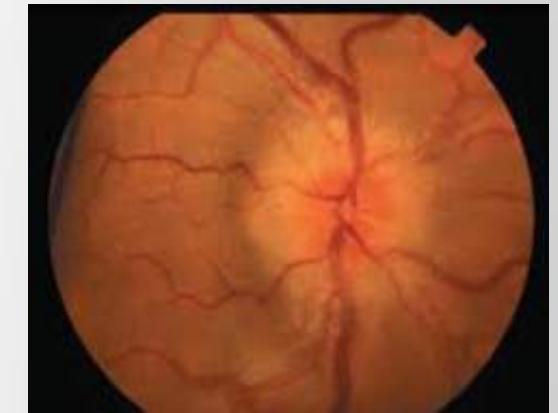
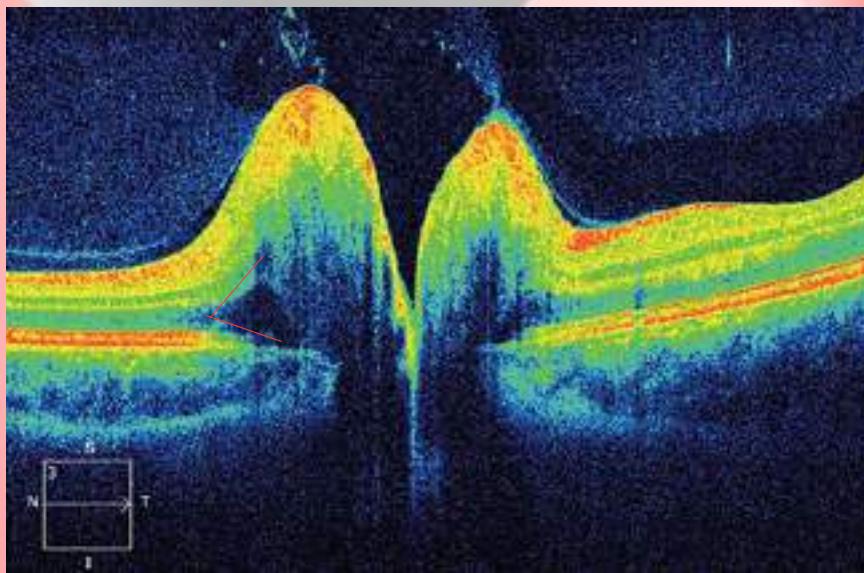
Optic Nerve OCT



Papilledema

Important features of disc edema on OCT:

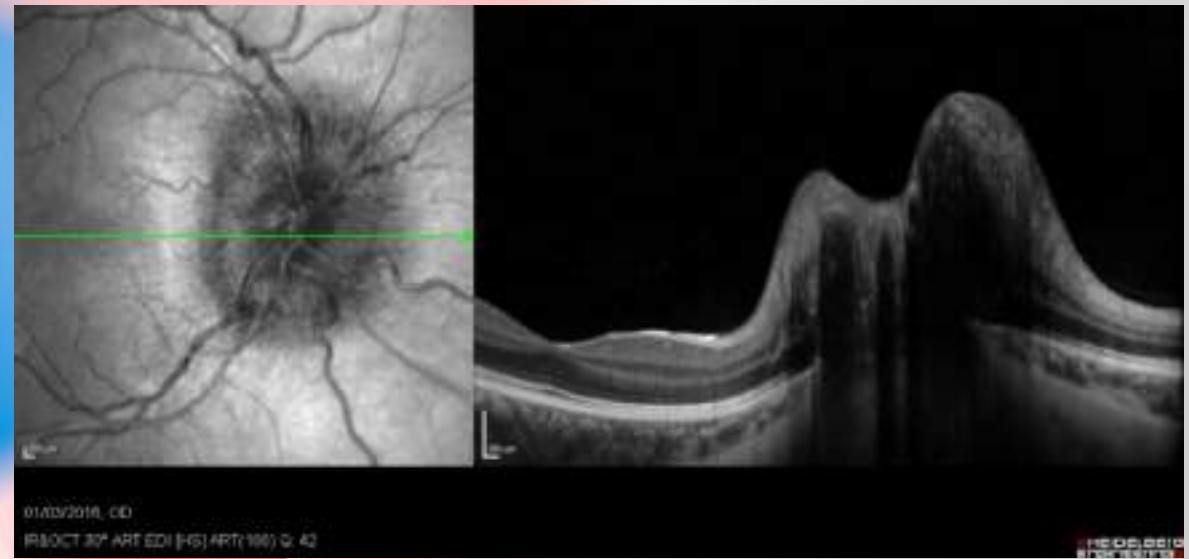
- Smooth contour of elevation
- Nasal RNFL >86 um
- Thick hypo-reflective space adjacent to disc
“lazy V” (Especially nasal)



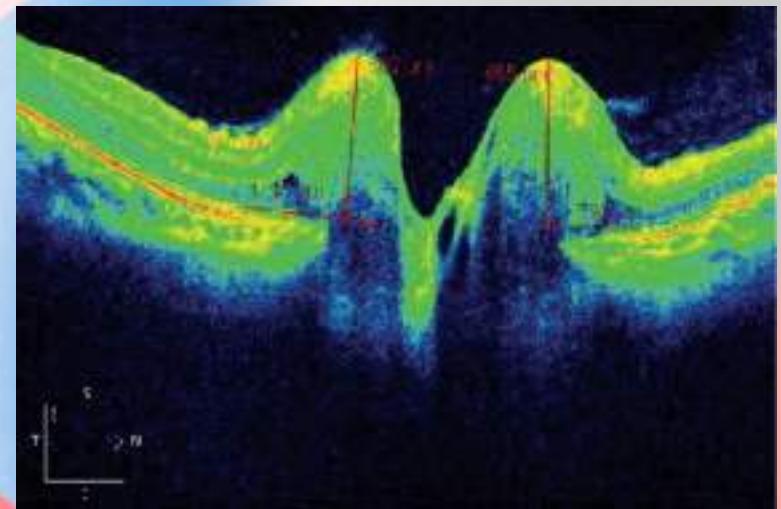
<https://www.ophthalmologymanagement.com/issues/2015/december-2015/the-papilledema-dilemma>

<https://www.restorevisionclinic.com/blog/idiopathic-intracranial-hypertension-vision-at-risk>

Papilledema

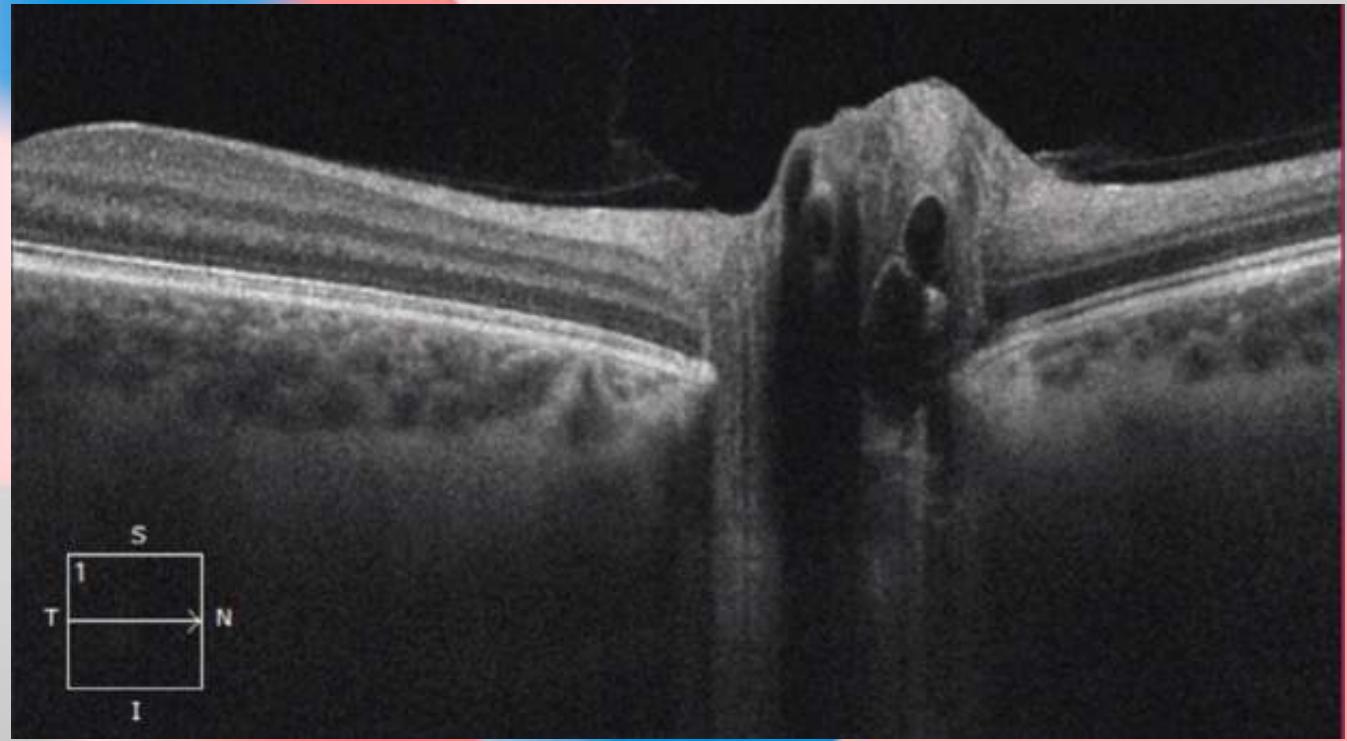
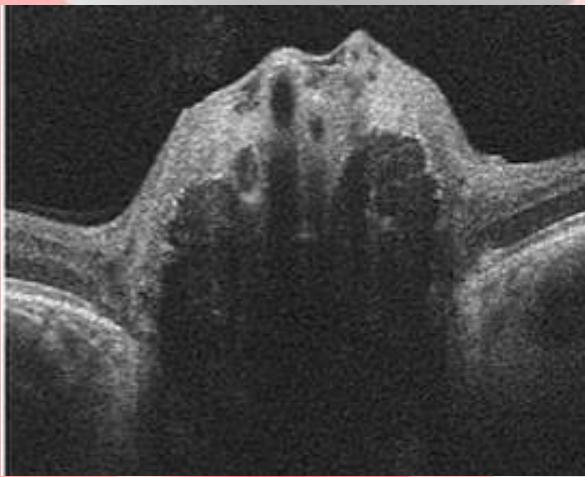


- Increased ICP will push the globe anteriorly
- With EDI, can see an anteriorly displaced Bruch's membrane



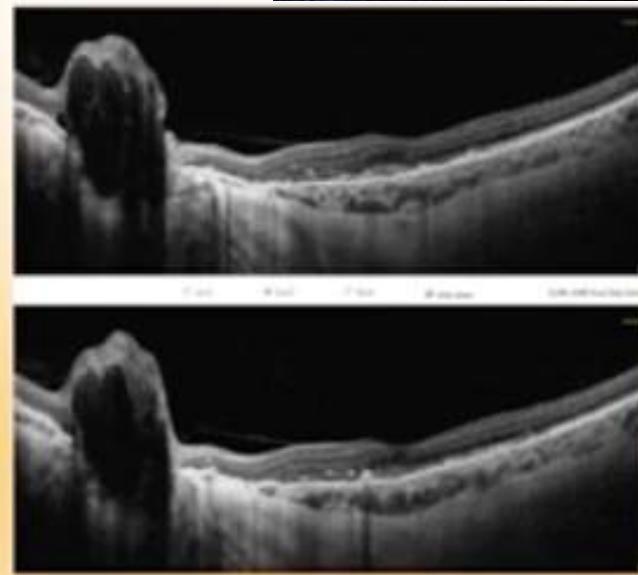
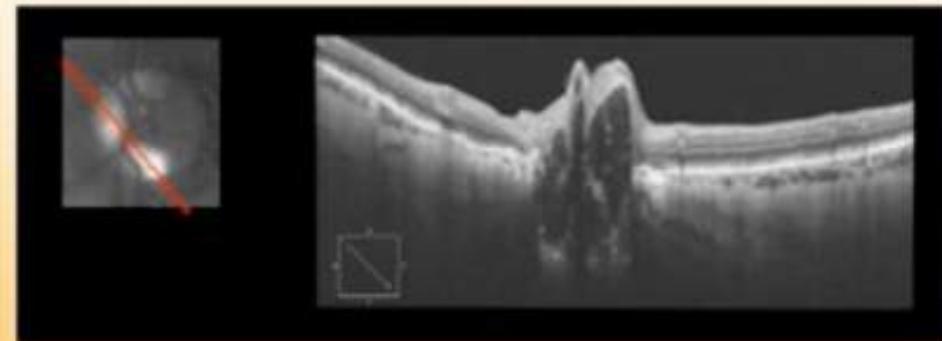
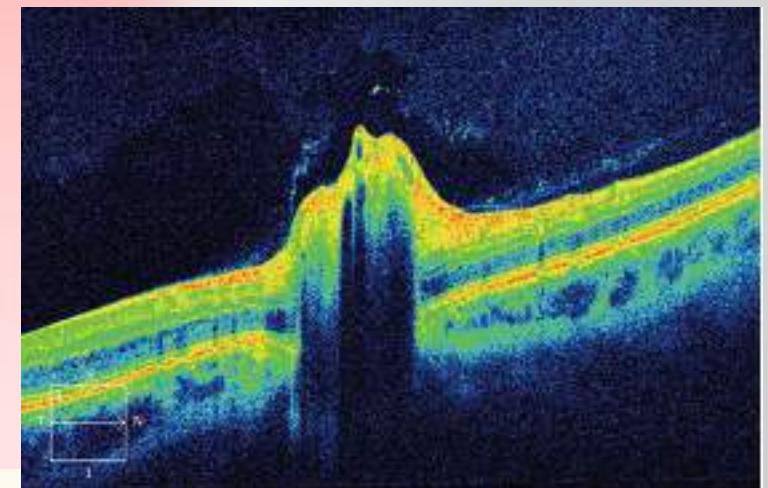
ONH Drusen

Irregular, bumpy contour
Hypo-reflective centers
Hyper-reflective margins



ONH Drusen

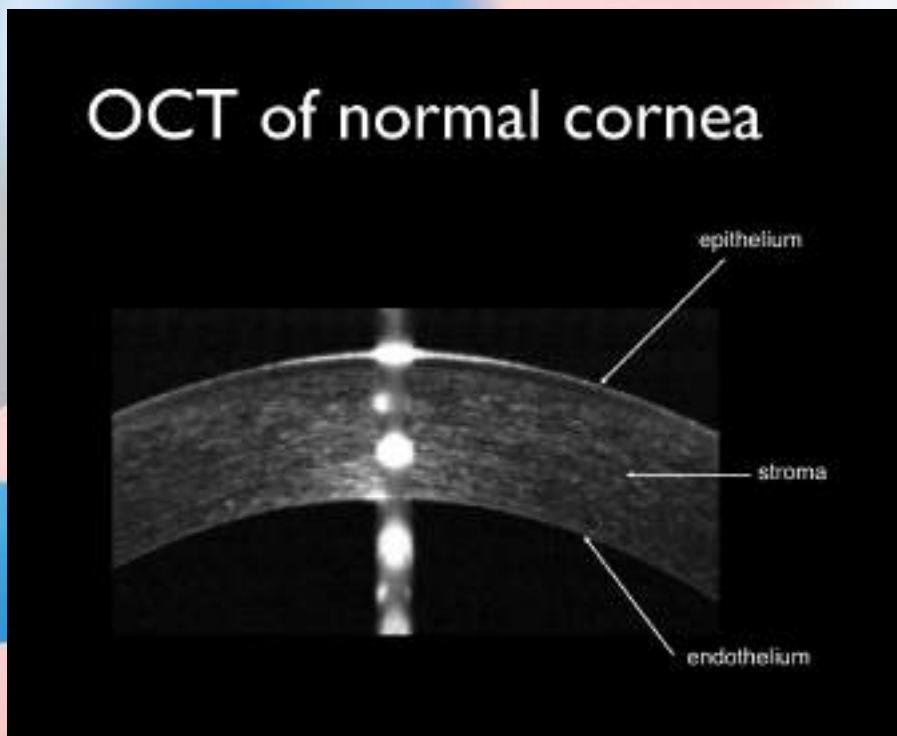
Reflectance of Hyaline and Shadowing beneath:
Not seen in cases of papilledema

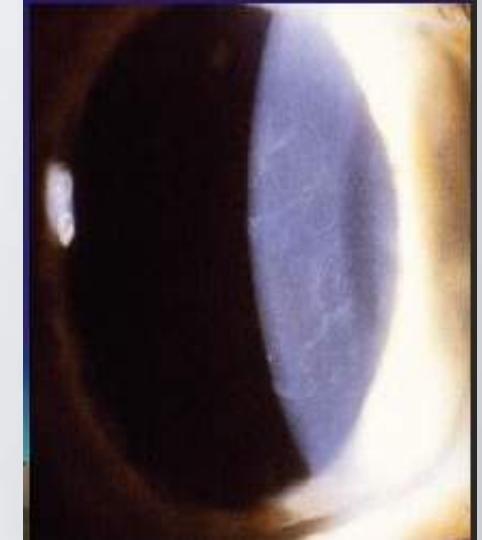
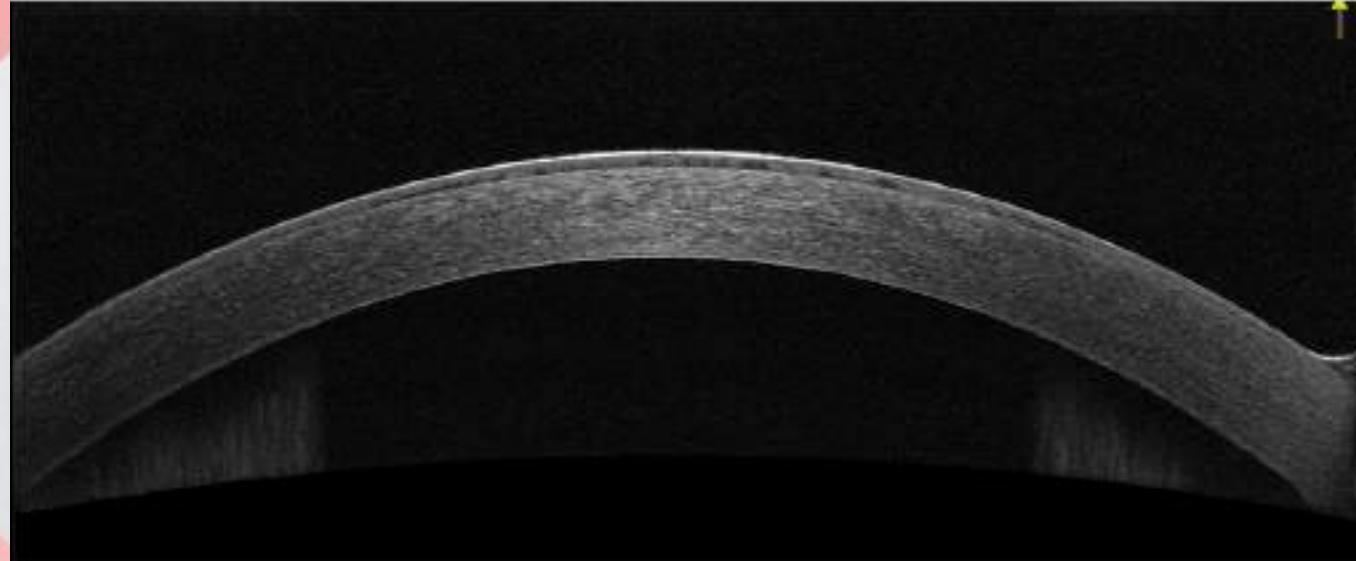


Anatomy of a Corneal OCT Scan

Normal Scan

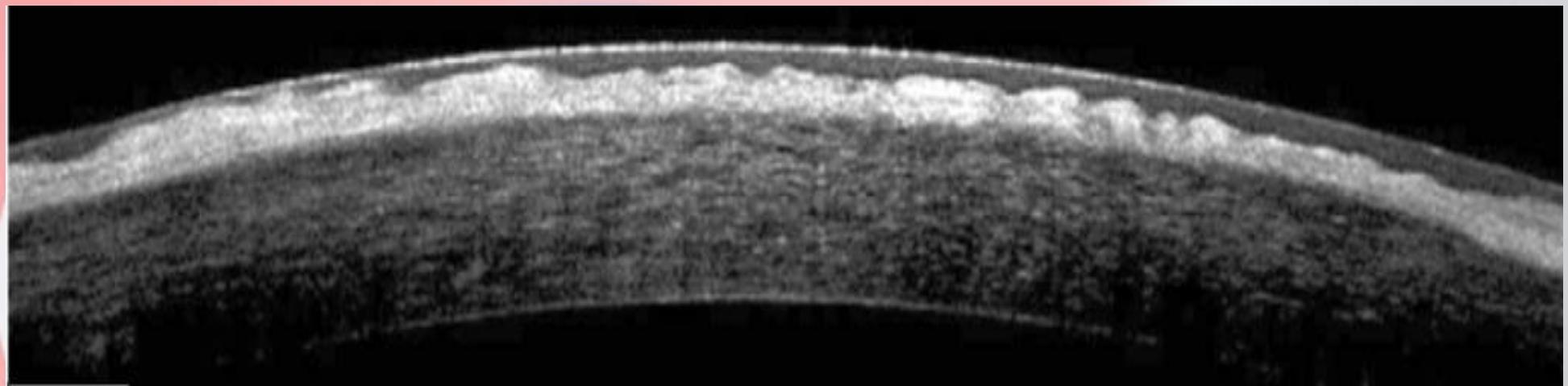
Normal Cornea





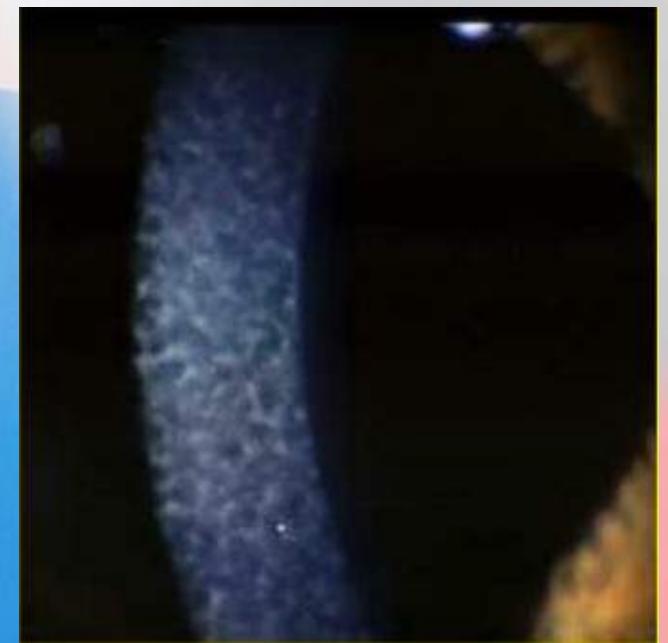
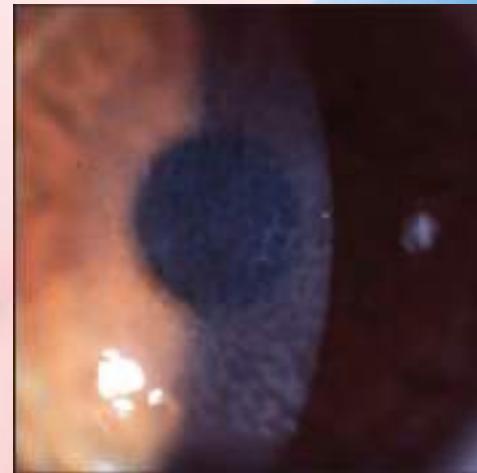
*Epithelial/Sub-Epithelial
Dystrophies
Map Dot Fingerprint*

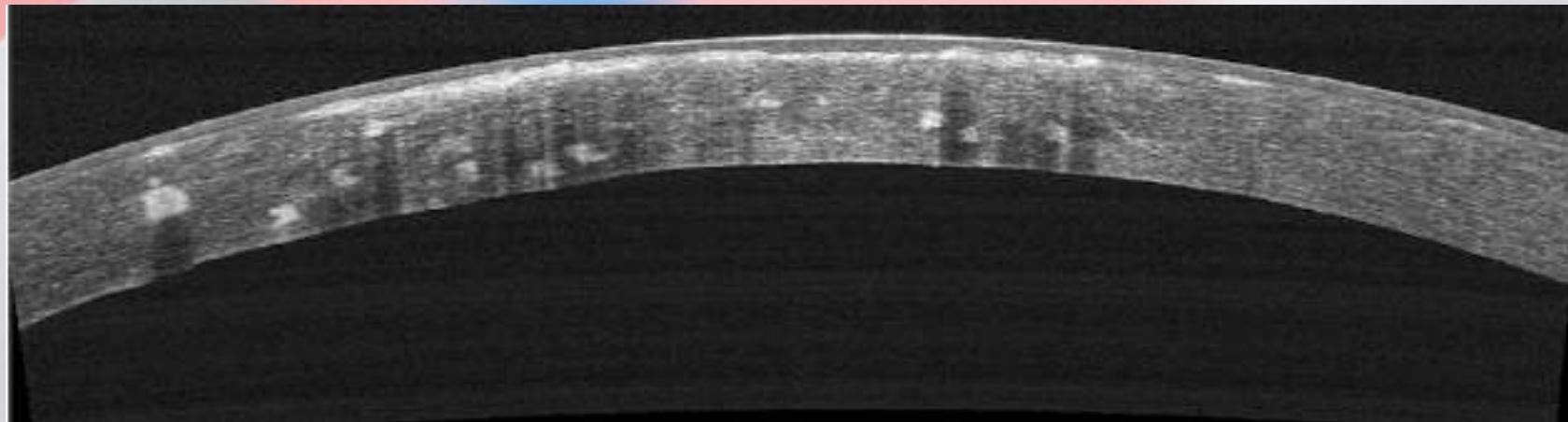




Epithelial/Sub-Epithelial Dystrophies

Reis Buckler

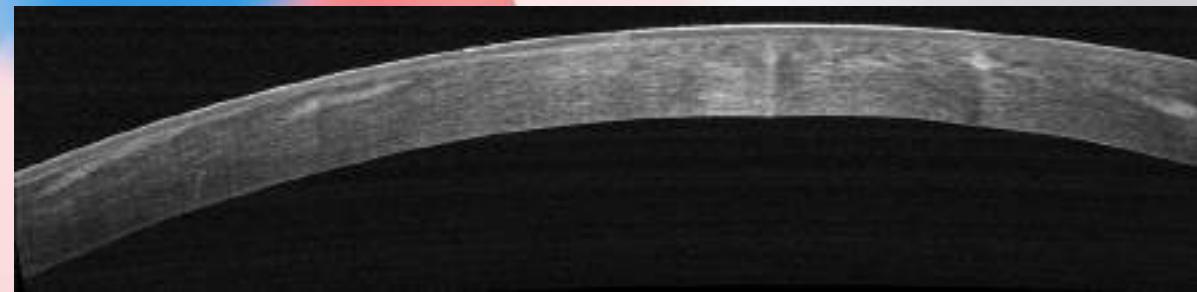
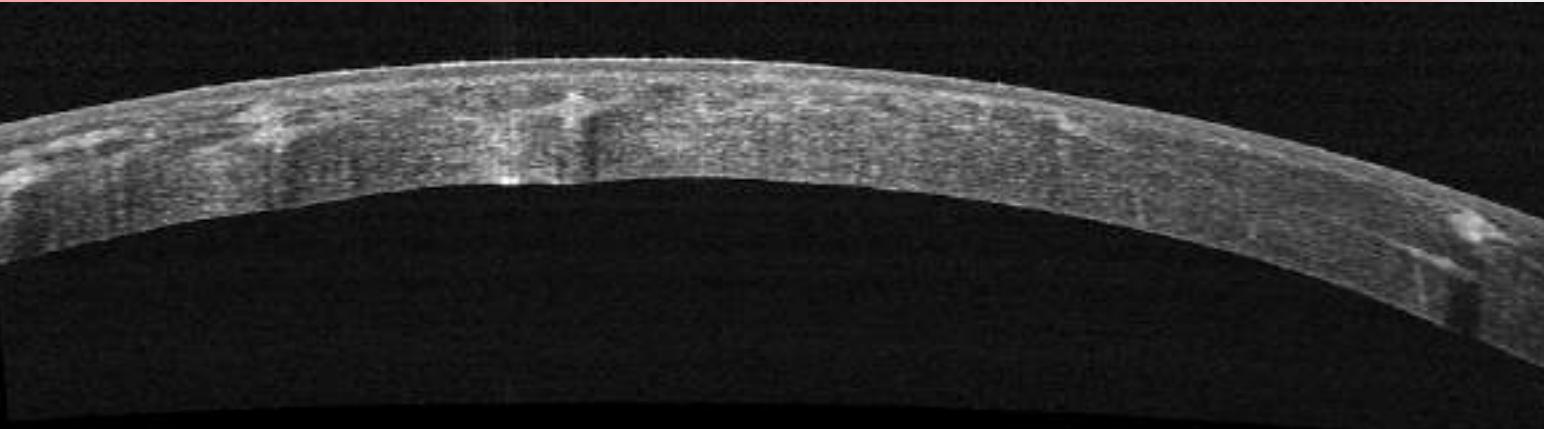




Stromal Dystrophies

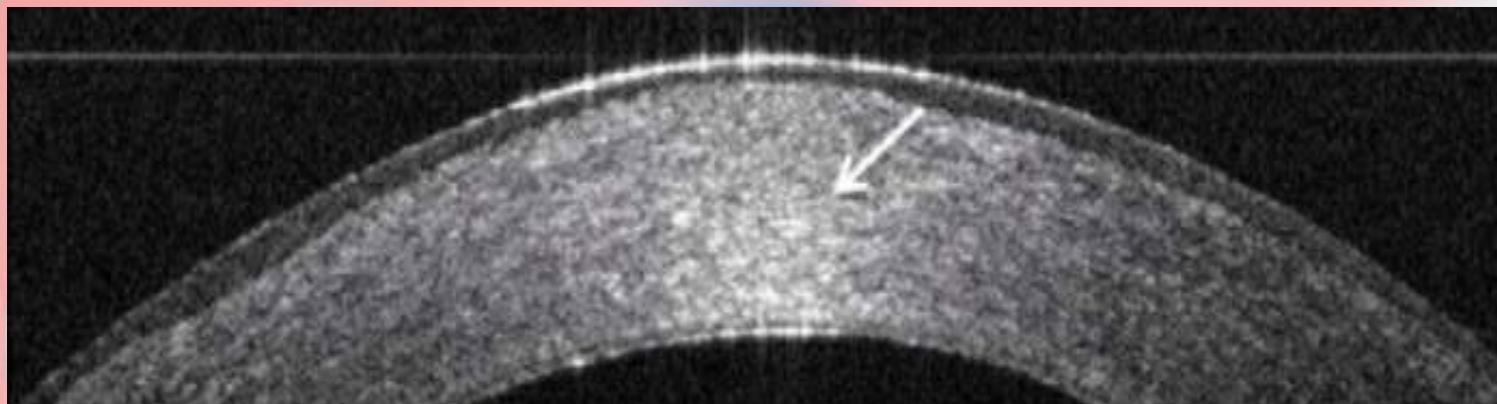
Granular





Stromal Dystrophies Lattice

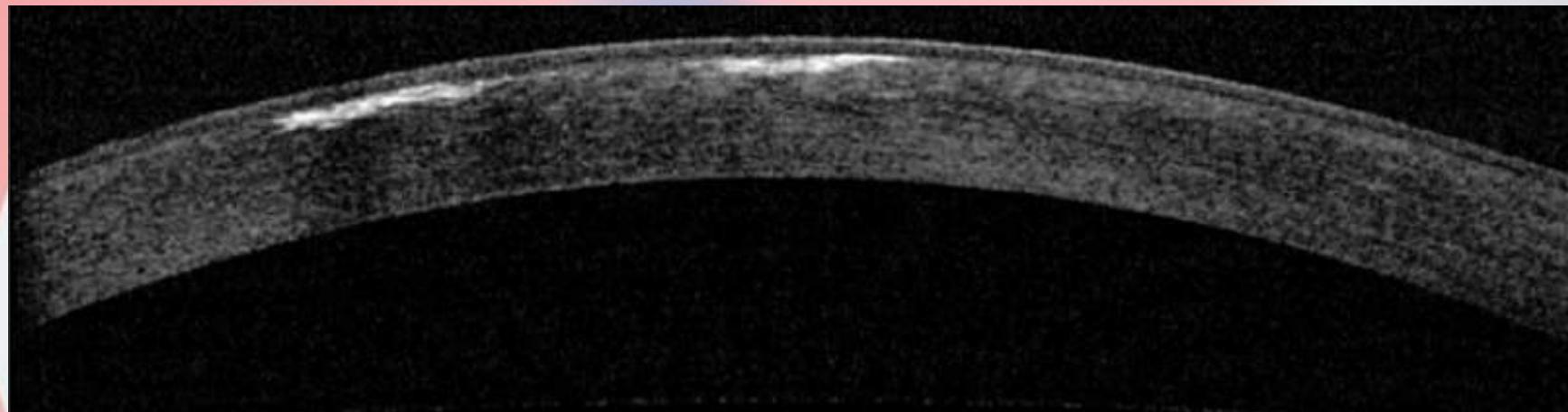




Stromal Dystrophies

Macular



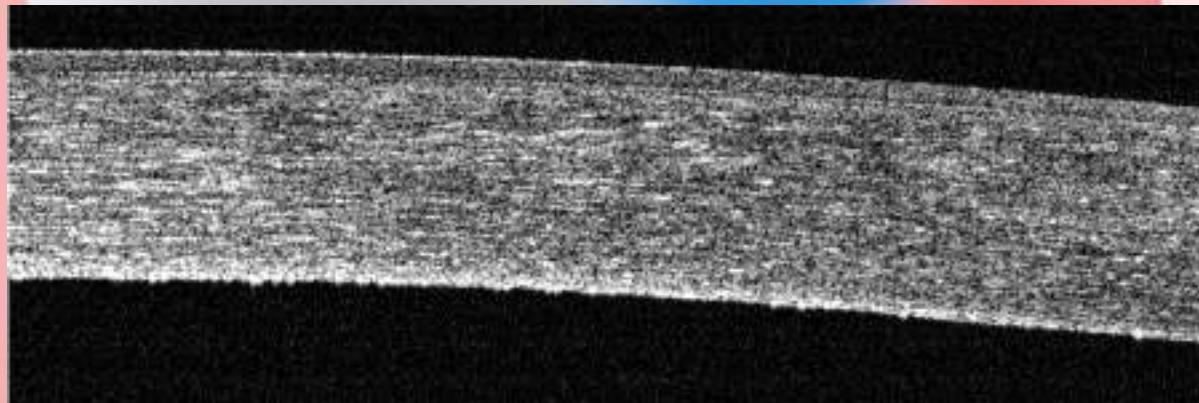
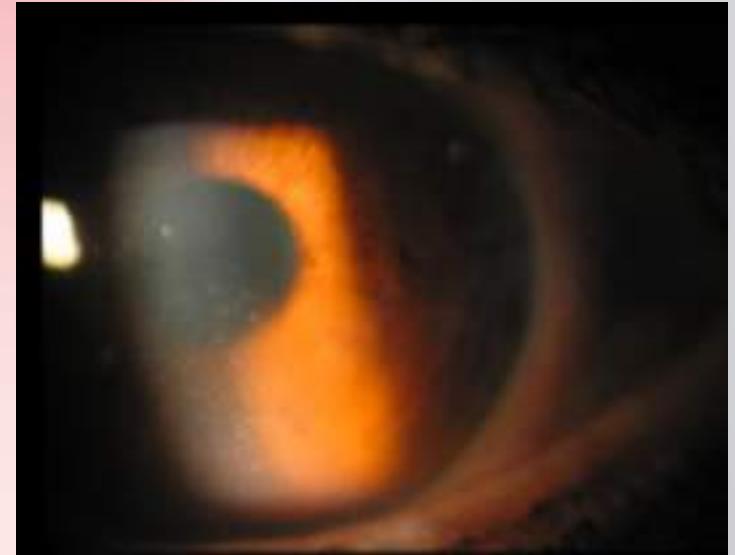
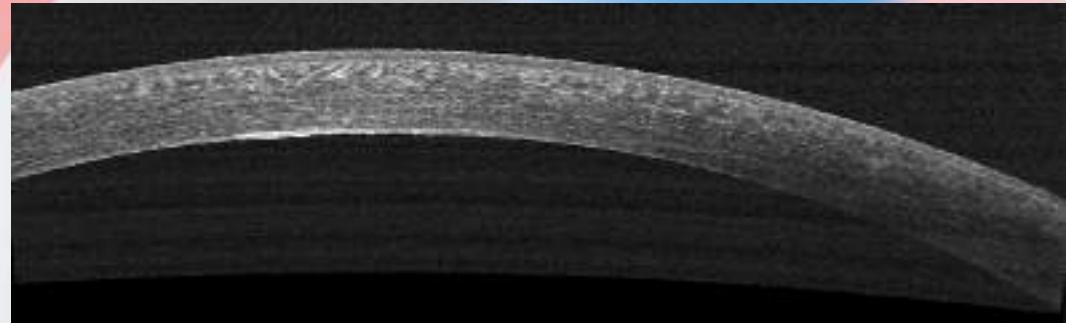


Stromal Dystrophies

Schnyder Crystalline

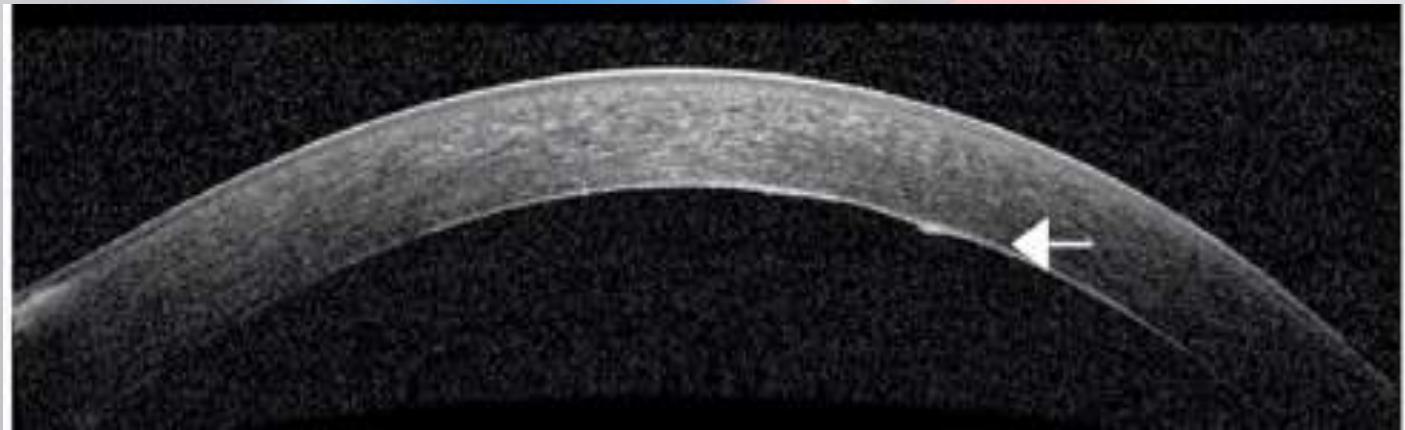


99



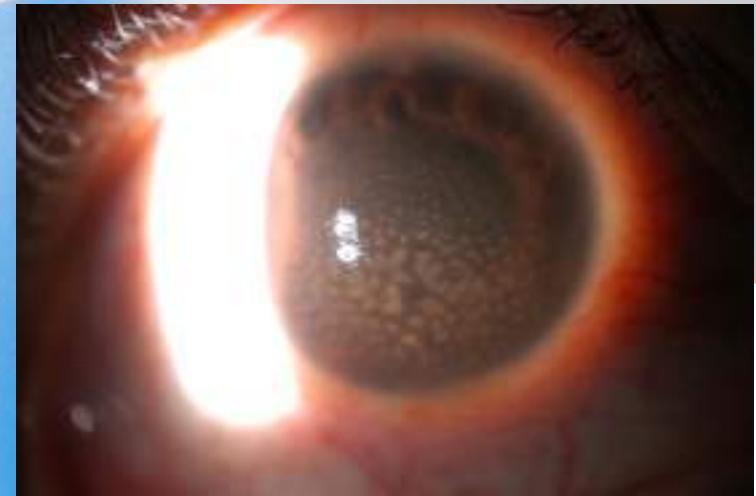
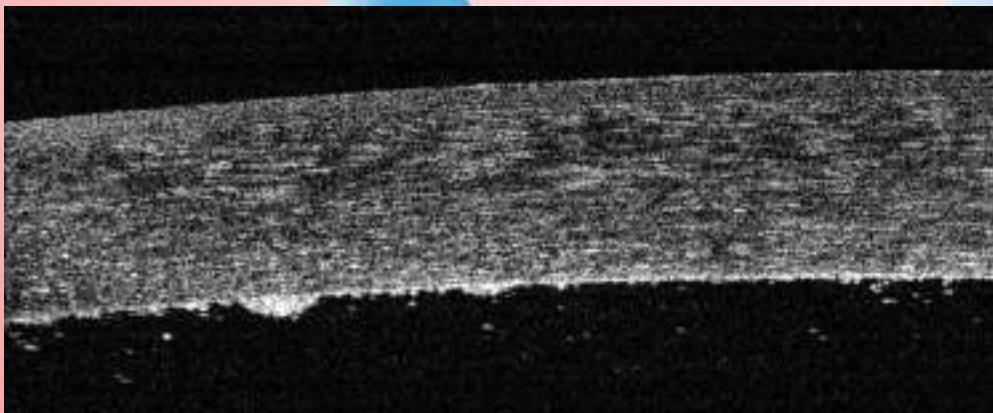
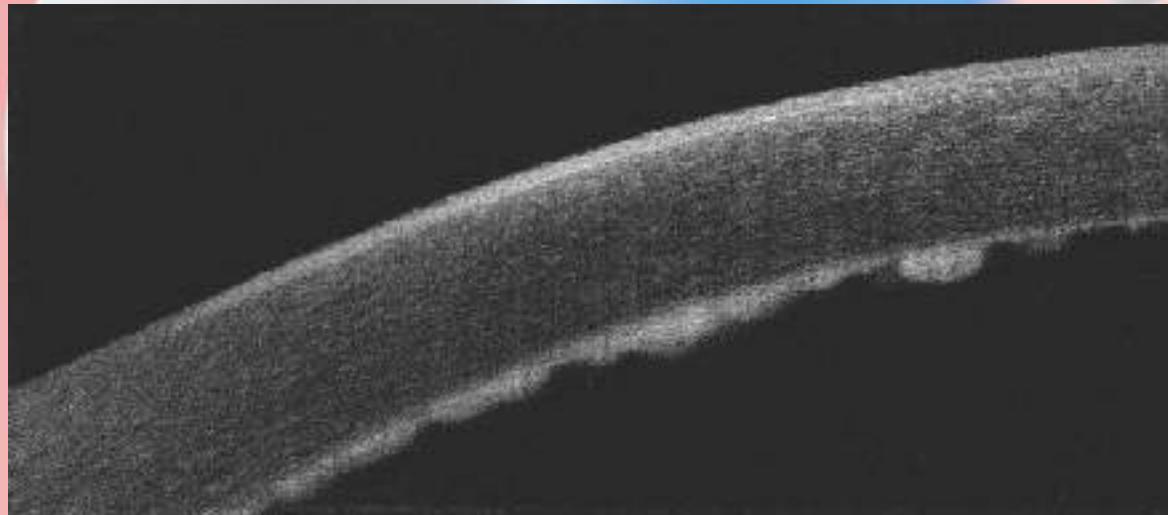
Endothelial Dystrophies
Fuch's Endothelial



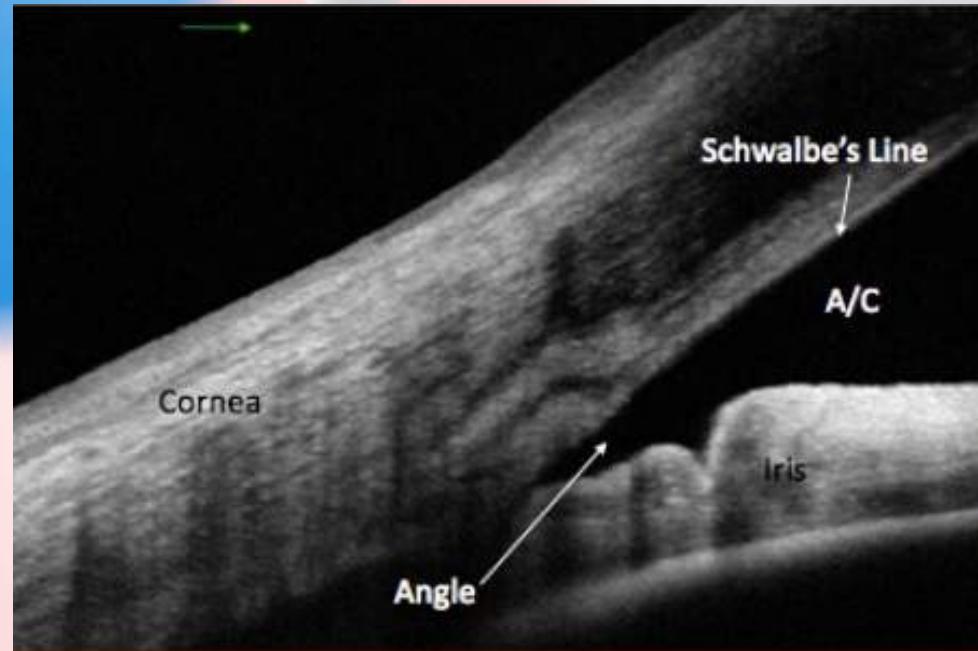


Endothelial Dystrophies Posterior Polymorphous

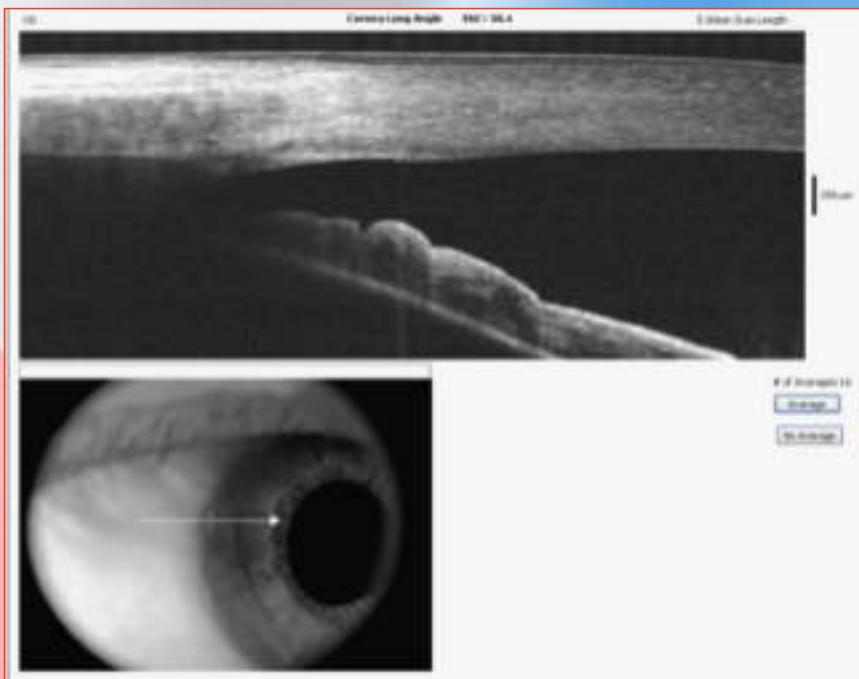
Keratic Precipitates



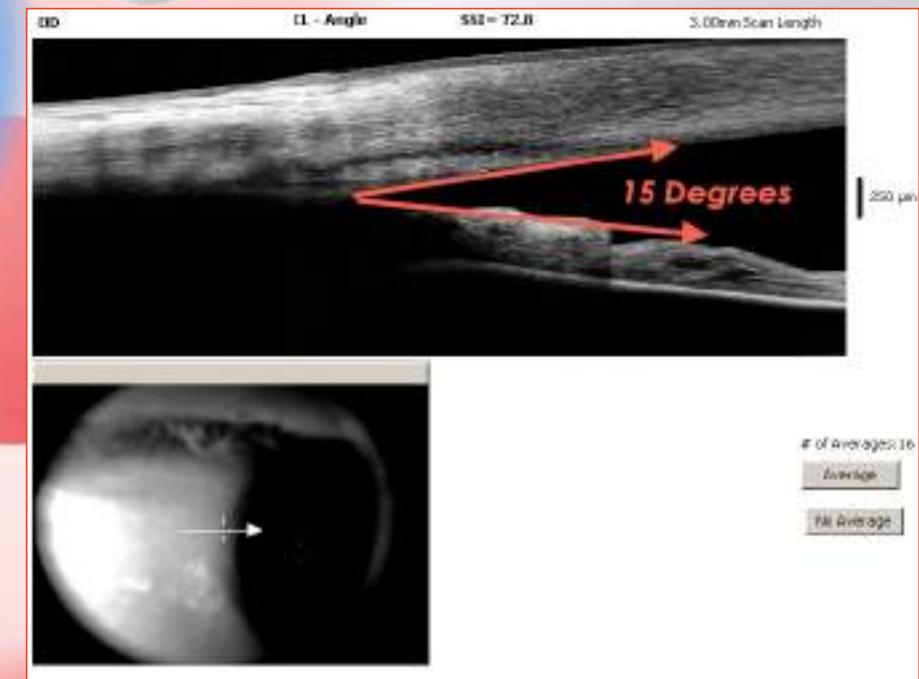
Angle Measurement



Angle Measurement



Normal

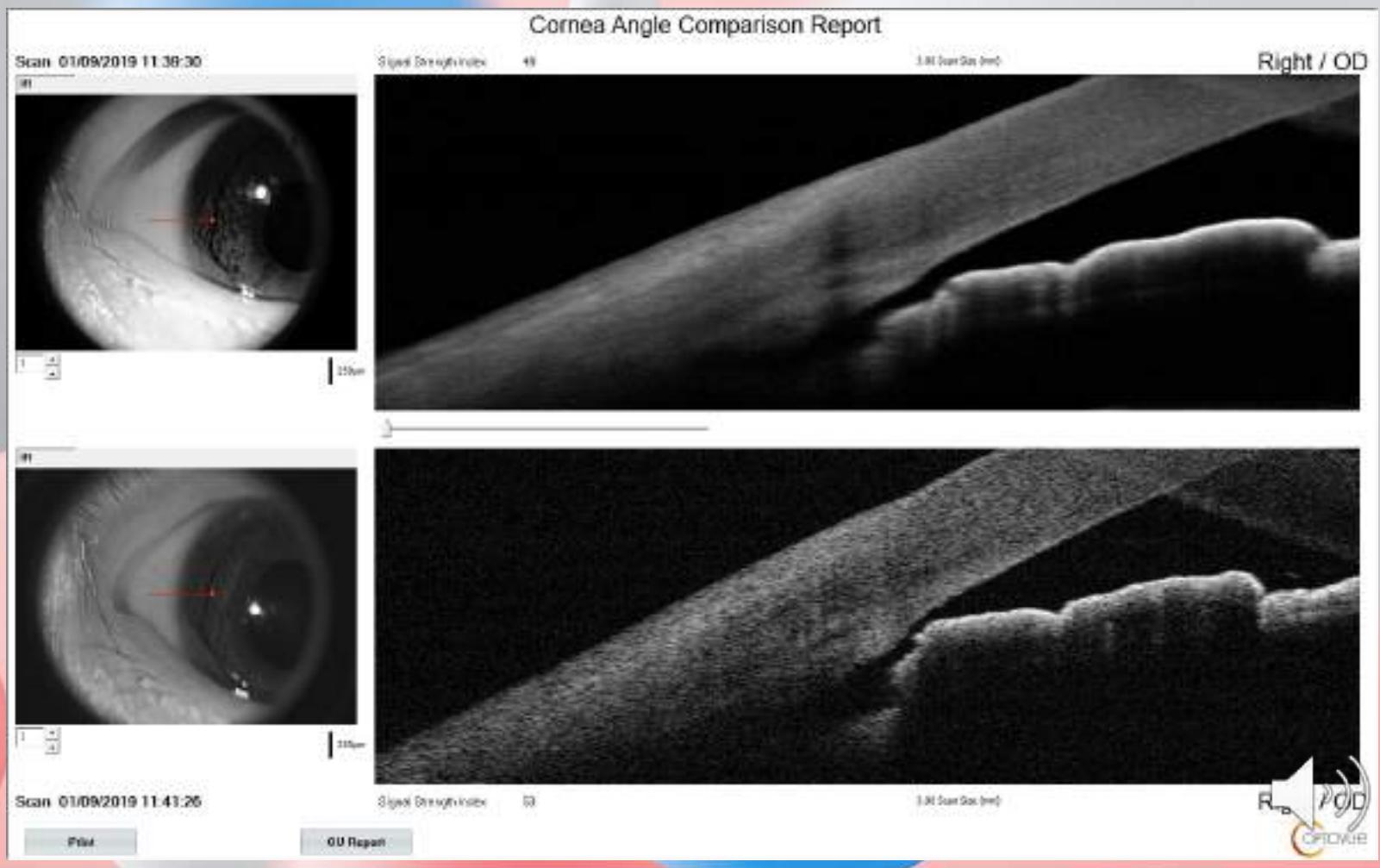


Narrow



How narrow is the angle???

Light



Dark



Thank you!!!

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