

Choroidal Assessment

By

Tarek Hemeida, MD.

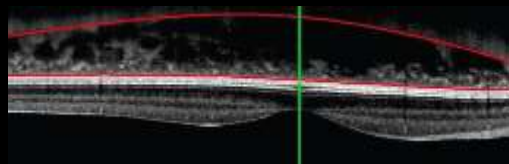
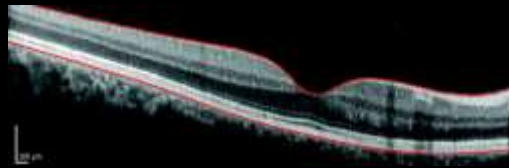
Armed-Forces Hospital, Alexandria

Assoc. Prof. Military Medical Academy.

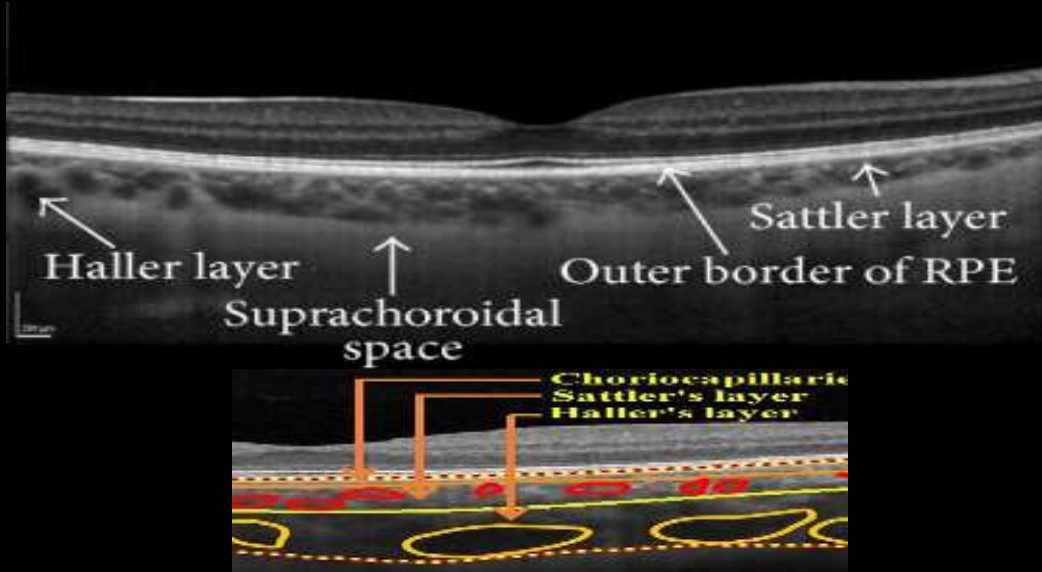
Choroid Enhanced Depth Imaging “EDI”



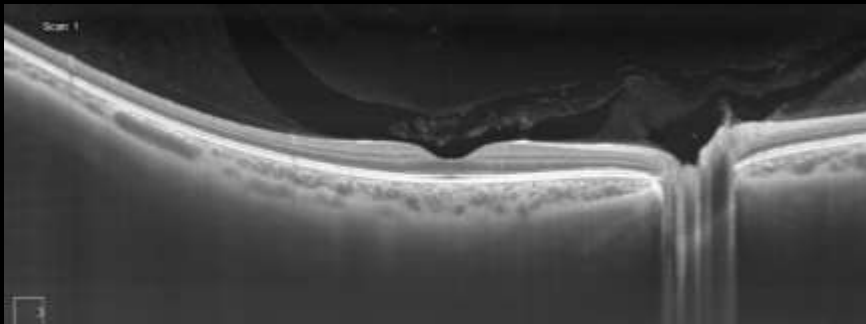
Richard Spaide MD.



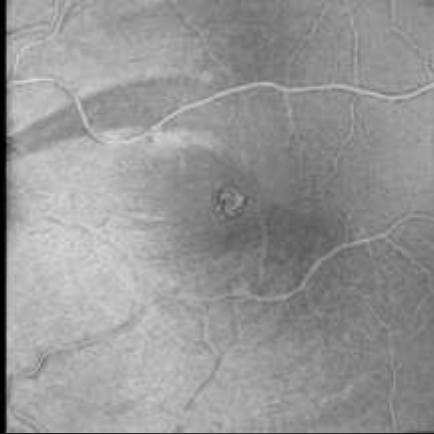
Choroid Enhanced Depth Imaging "EDI"



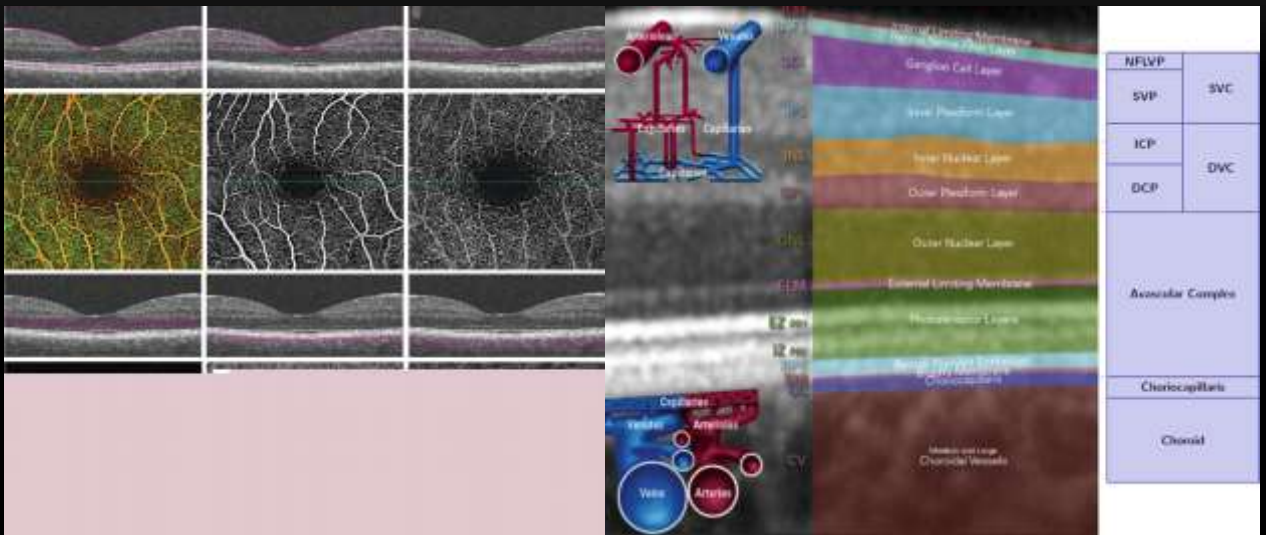
Choroid Swept Source OCT



En-Face Imaging



OCTA



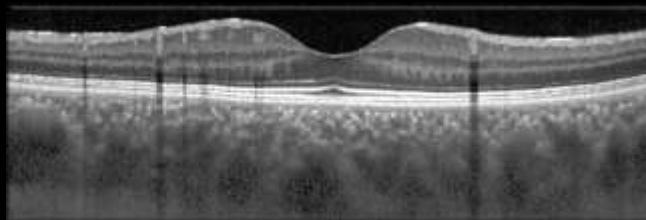


Pachychoroid Eye Diseases

2013

Pachychoroid

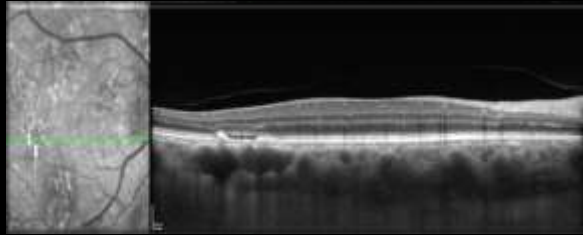
Pachychoroid (pachy-[prefix]: thick):
Abnormal & permanent increase in choroidal thickness.



Pachychoroid

Common characteristics:

- Increased choroidal thickening.
- Pathologically dilated veins in the Haller's "Pachy-Vessels".
- Thinning in Sattler's and choriocapillaris layers.



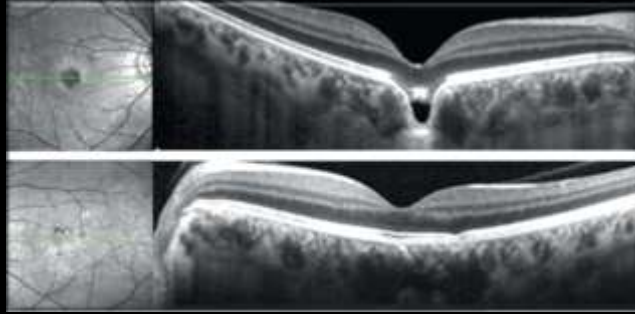
Pachychoroid Eye Diseases

- 1- Pachychoroid Pigment Epitheliopathy (PPE).
- 2- Central Serous Chorioretinopathy (CSCR).
- 3- Pachychoroid Neovascularopathy (PNV).
- 4- Polypoidal Choroidal Vasculopathy (PCV).
- 5- Peri-Papillary Pachychoroid Syndrome.
- 6- Focal Choroidal Excavation.

Pachychoroid Eye Diseases

1- Those with exudative changes

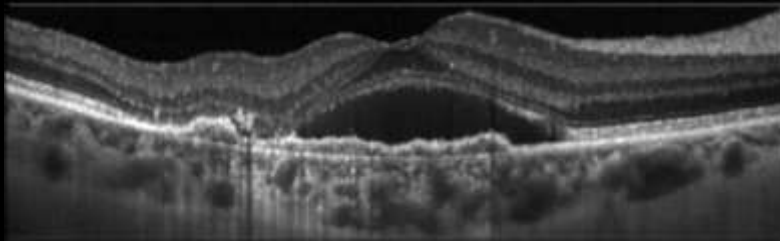
a- Focal Choroidal Excavation.



Pachychoroid Eye Diseases

1- Those with exudative changes

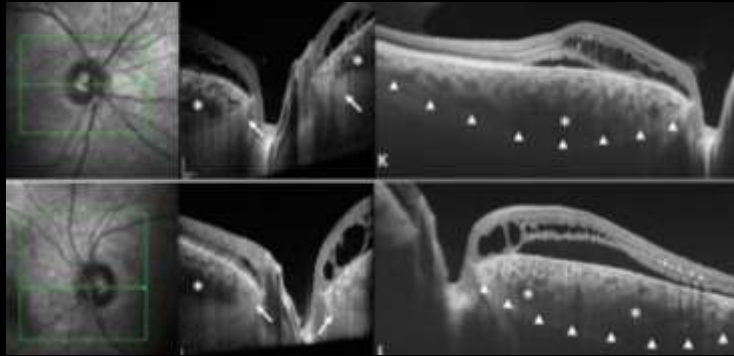
b- Central Serous Chorioretinopathy (CSCR).



Pachychoroid Eye Diseases

1- Those with exudative changes

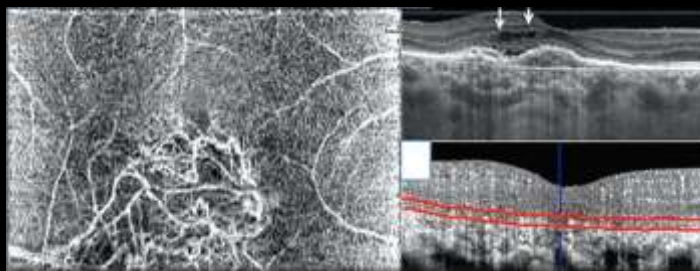
c- Peri-Papillary Pachychoroid Syndrome.



Pachychoroid Eye Diseases

2- Those that develop neovascularization

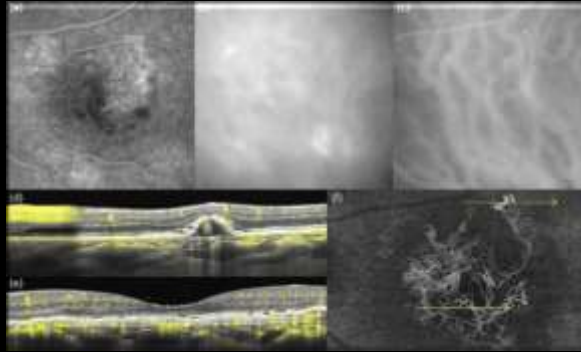
a- Pachychoroid Neovascularopathy (PNV).



Pachychoroid Eye Diseases

2- Those that develop neovascularization

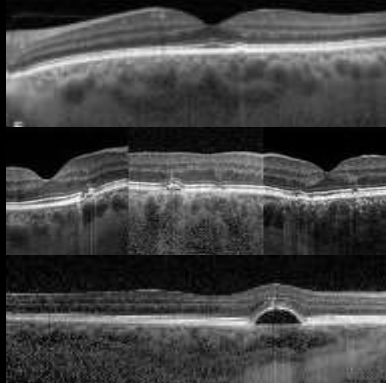
b- Polypoidal Choroidal Vasculopathy (PCV).



Pachychoroid Eye Diseases

2- Those those with atrophic changes

- Pachychoroid Pigment Epitheliopathy (PPE).



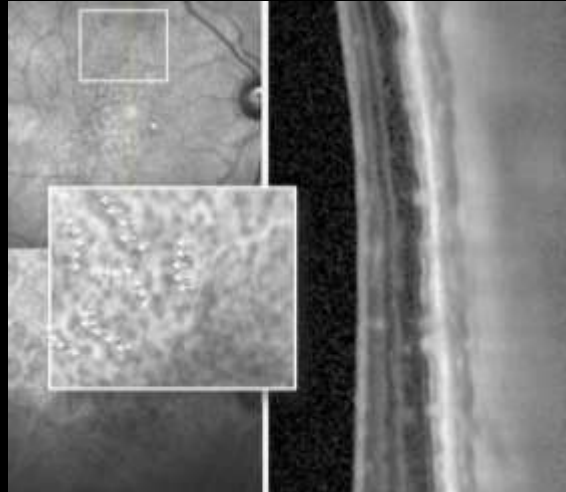
AMD

AMD



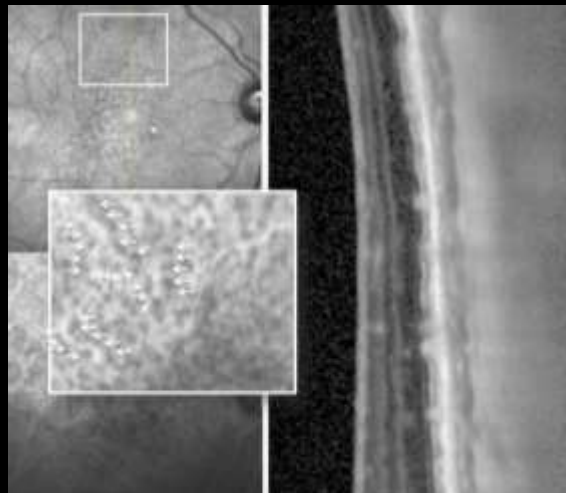
AMD Reticular Pseudodrusen

- Eyes with reticular pseudodrusen have a generally thinner choroid compared to eyes with early AMD.
- Eyes with reticular pseudodrusen are at higher risk of developing wet AMD



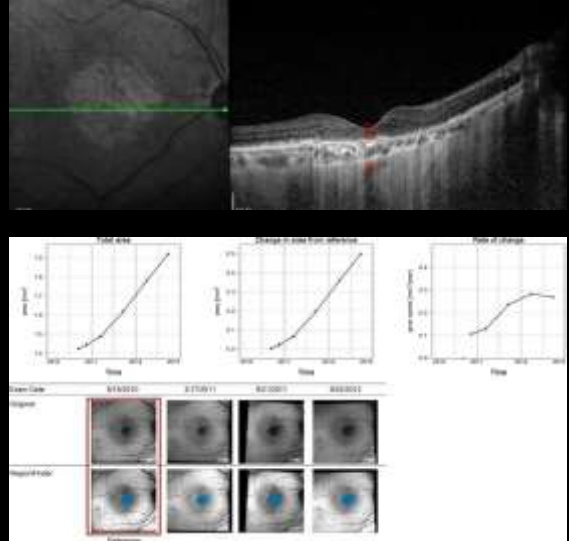
AMD Reticular Pseudodrusen

- Eyes with reticular pseudodrusen have a generally thinner choroid compared to eyes with early AMD.
- Eyes with reticular pseudodrusen are at higher risk of developing wet AMD



AMD Geographic Atrophy

Sub-foveal choroidal thickness may be a predictor of disease progression in GA.



Lee J, Lee D, Lee J & Yoon Y. Correlation Between Subfoveal Choroidal Thickness and the Severity or Progression of Nonexudative Age-Related Macular Degeneration. *Invest Ophthalmol Vis Sci.* 2012;53:1258–1263

AMD Age Related Choroidal Atrophy

Age-Related Choroidal Atrophy

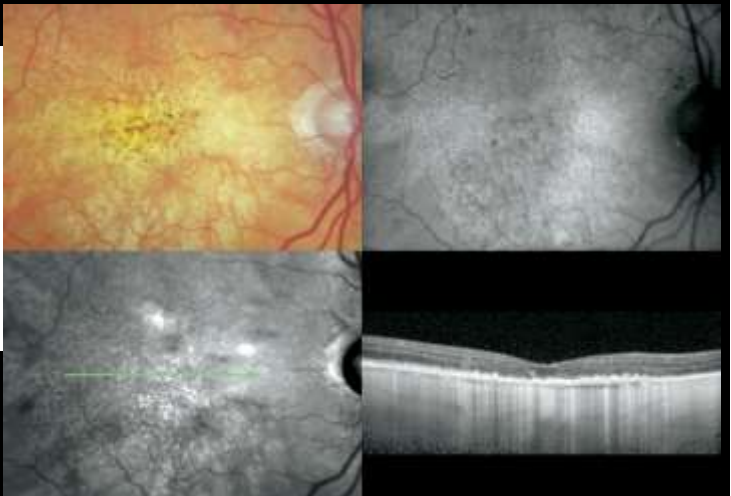
RICHARD E. SPAIDE

• PURPOSE: To report the clinical characteristics of a newly defined entity, age-related choroidal atrophy.

• DESIGN: Retrospective, observational case series.

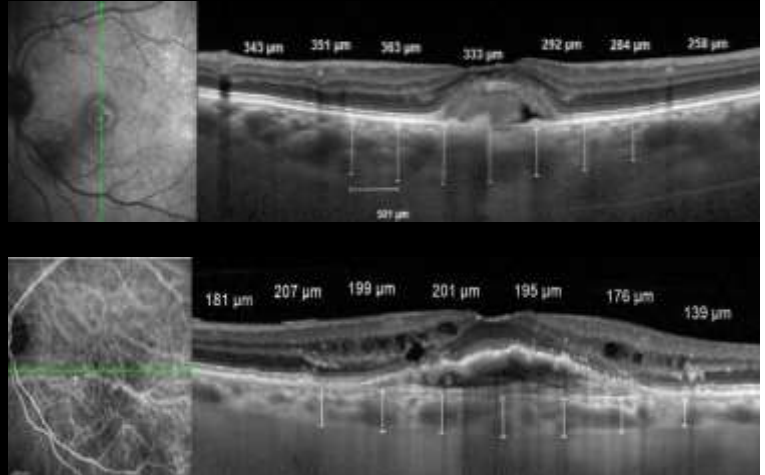
• METHODS: The choroidal thickness was measured in images obtained by positioning a spectral-domain optical coherence tomography device close enough to the eye to acquire an internal image. Seven sections cut comprised of 100 averaged scans were obtained within a 3 × 3-mm region or larger rectangle to encompass the macula and temporal peripapillary retina. The choroidal thickness of patients less than 125 μm in thickness was included, whereas eyes with serous or hemorrhagic detachments, photodynamic therapy, neovascular choroidal neovascularization, or neovascular atrophy were excluded. The patients were evaluated for visual acuity, macular appearance, and the presence of glaucoma.

• CONCLUSIONS: Age-related choroidal atrophy affects older individuals in whom posterior pole choroidal atrophy develops that may or may not also be associated with findings typical for AMD. Patients with age-related choroidal atrophy are at a higher risk for glaucoma. *Invest Ophthalmol Vis Sci.* 2005;46:1890–1900. © 2005 by Elsevier Inc. All rights reserved.



AMD Adult Onset Foveomacular Vitelliform Dystrophy (AOFVD)

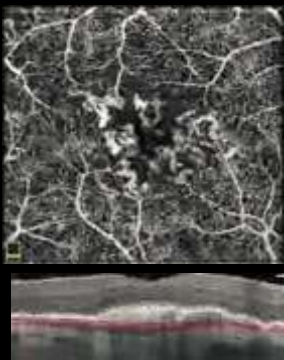
- One of the major differential diagnoses for wet AMD is AOFVD.
- Choroidal thickening in AOFVD that is, in contrast with the typical choroidal thinning observed in advanced AMD



Coscas F, Puche N, Coscas G, Srour M, François C, Glacet-Bernard A, *et al.* Comparison of macular choroidal thickness in adult onset foveomacular vitelliform dystrophy and age-related macular degeneration. *Invest Ophthalmol Vis Sci* 2014;55:64-9

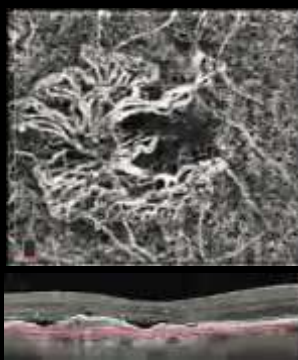
CNV

Immature



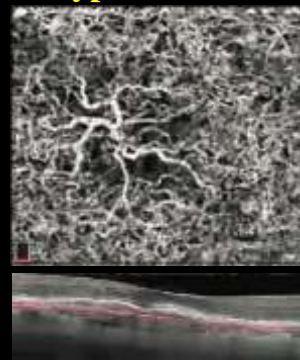
- Tangle or Rosette
- Capillary Fringe.
- Secondary Cap. branching.
- Remarkable growth “CNV Doubling”.

Mature



- Mature Large vessels “Sea-fan”
- More resistant to Anti-VEGF.
- Arteriogenesis.
- Modest Stable growth “50%”.

Hyper-Mature



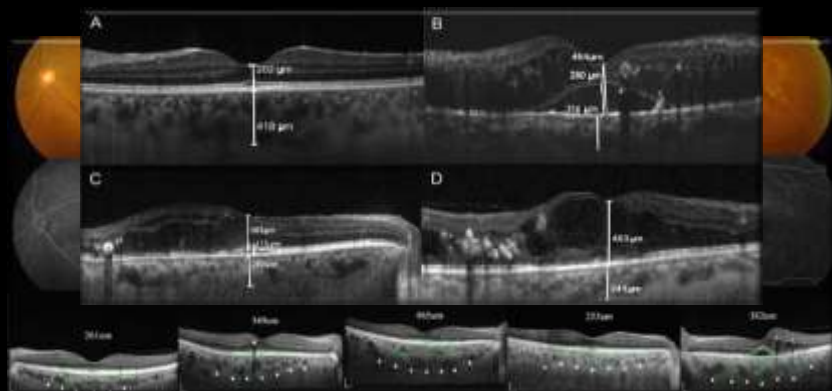
- Large Straight Vessels.
- Dead Tree appearance.
- In-active growth.

Diabetic Choroidopathy

Diabetic Choroidopathy

Choroidal Thickness.

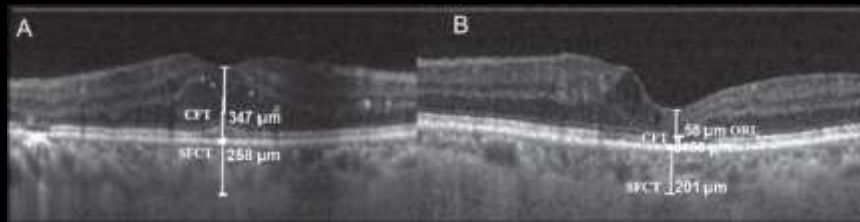
-Change in choroidal thickness in
DR & DME is still controversial.



Diabetic Choroidopathy

Choroidal Thickness.

-Both anti-VEGF and PRP caused a decrease in choroidal thickness.

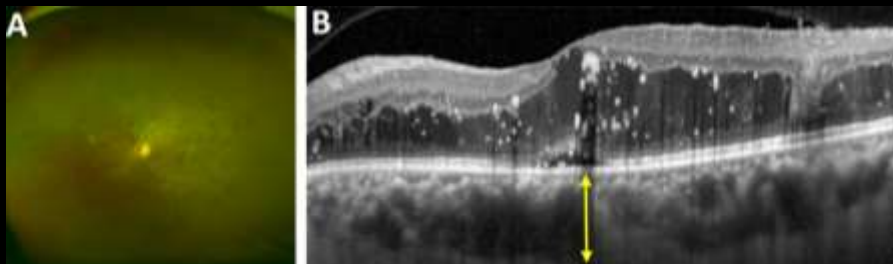


Diabetic Choroidopathy

Choroidal Thickness.

-DME with SMD "sub-macular detachment" shows

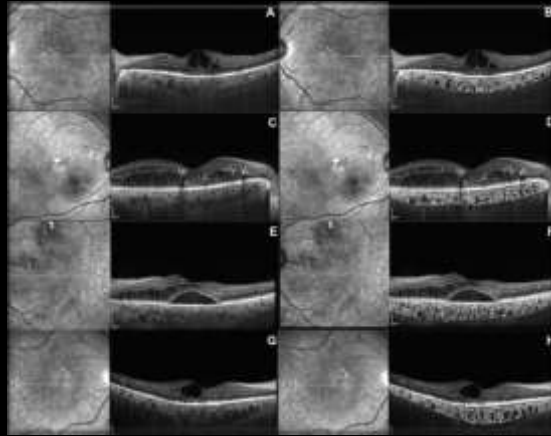
Pachychoroid.



Diabetic Choroidopathy

Choroidal Blood Flow.

-Patients with DR & DME have decrease in CVI "choroidal vascular index".

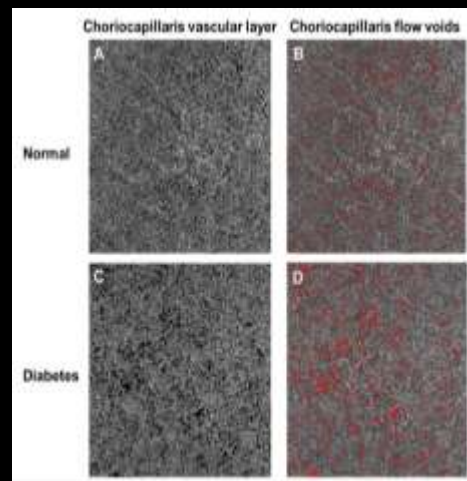


Diabetic Choroidopathy

En-Face Imaging.

-Choriocapillaris flow impairment. "choriocapillaris flow voids".

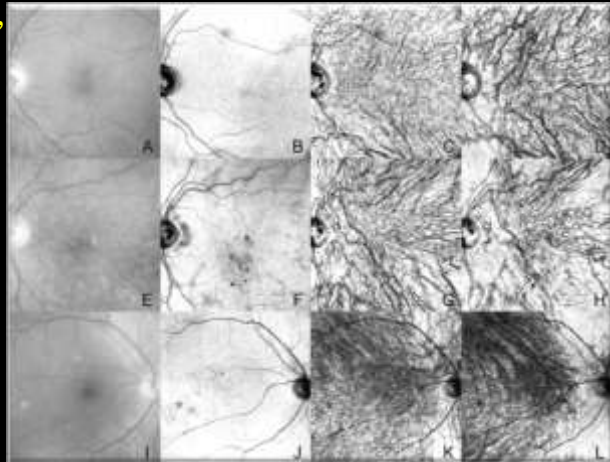
-Flow voids can be seen as areas of dark regions in the angiogram.



Diabetic Choroidopathy

En-Face Imaging.

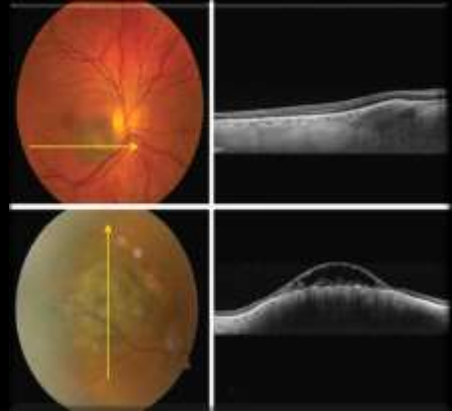
-Enface SS-OCT demonstrated loss of vessels in Sattler's layer, focal narrowing in vessels in Haller's layer with vascular stumps & aneurysmal changes in Haller's layer.



Choroidal Tumors

Choroidal Nevus

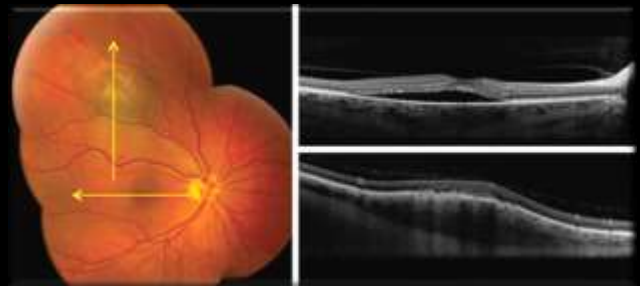
- Domed, smooth-surfaced mass with deep choroidal shadowing depending upon tumor pigmentation
- Shah et al. “104 cases”:
Choriocapillaris compression overlying the nevus (94%), RPE atrophy (43%), RPE loss (14%), RPE nodularity (8%), photoreceptor loss (43%), ellipsoid irregularity (37%) or loss (6%), and mild inner retinal finding.



Shah SU, Kaliki S, Shields CL, Ferenczy SR, Harmon SA, Shields JA. Enhanced depth imaging optical coherence tomography of choroidal nevus in 104 cases. *Ophthalmology* 2012;119:1066-72.

Choroid melanoma

- EDI-OCT of choroidal melanoma generally shows gentle domed shaped, smooth-surface topography with relatively fresh subretinal fluid demonstrating **shaggy photoreceptors**.
- Shaggy photoreceptors could represent edematous photoreceptors or macrophages with lipofuscin on the posterior surface of the detached retina



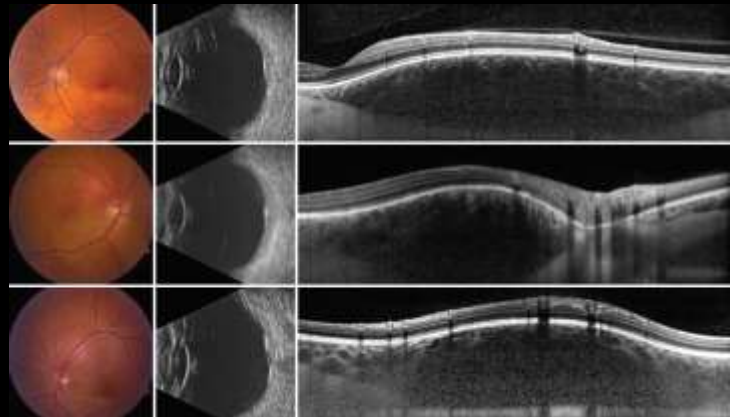
Choroid Metastasis

- Choroidal metastasis characteristically shows a “**lumpy bumpy**” topography that can be clinically and ultrasonographically too subtle to appreciate. Relatively fresh overlying subretinal fluid might appear with shaggy photoreceptors.



Choroid Hemangioma

- Choroidal hemangioma depicted a choroidal mass which shows: **smooth surface, gently sloping anterior contour** with expansion of small, medium, and large-size choroidal vessels **without choriocapillaris compression** “DD. from CSC”.



Choroid lymphoma

- Choroidal lymphoma can be clinically subtle with thin tumor infiltration that might not be detectable with fundus examination or ultrasonography.
- EDI-OCT: **Oceanic surface** with a calm, flat infiltration of the choroid if thin, a rippled appearance if thicker, and undulating **“Seasick”** appearance if the tumor is thick.



Take Home Message

- Choroidal imaging using deep-penetration OCT systems is a noninvasive reproducible technique that allows in-vivo quantitative and qualitative assessment of the choroid, including each layer.
- Choroidal imaging could be used to explain the vision loss, disease activity, and monitor the treatment response for a large variety of chorioretinal disorders.
- Further advancement in choroidal imaging including measurement of blood flow and morphological changes during follow-up would help to improve the understanding and utility of this information in daily clinical practice.



Thank You