Optic Coherence Tomography

Dr samina

AP Ophthalmology

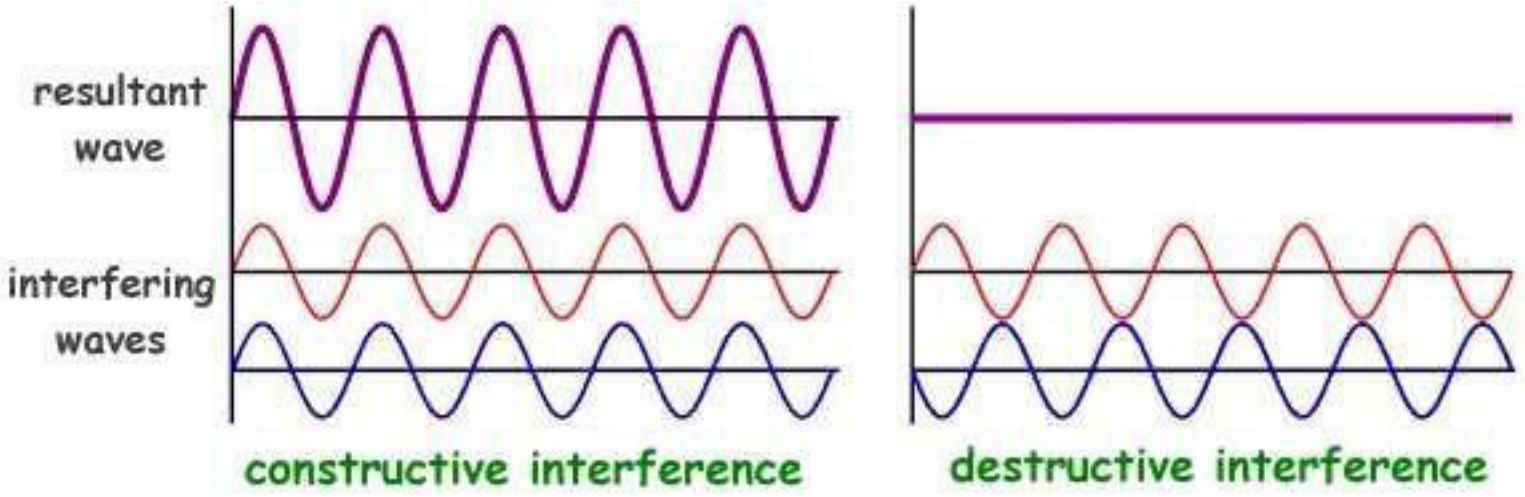
- non contact non invasive
- micron resolution
- cross-sectional study of retina
- correlates very well with the retinal histology

Principle –

Low coherence interferometry

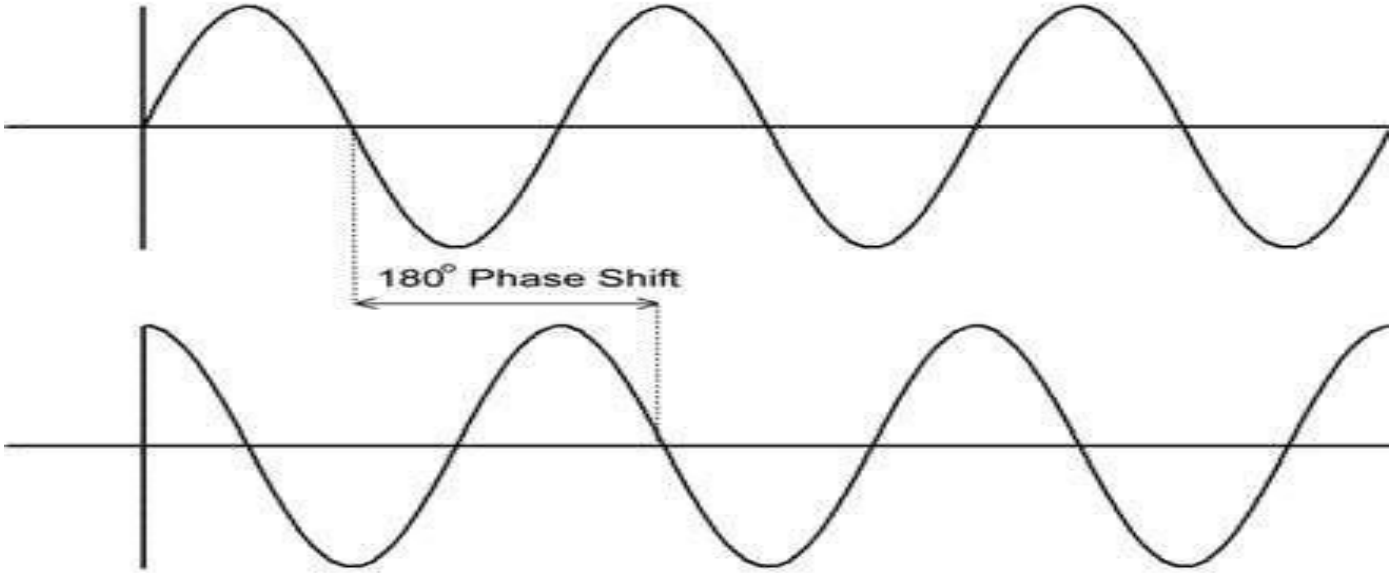
INTERFERENCE

- In physics , interference is a phenomenon in which two waves superimpose to form a resultant wave of greater or lower amplitude

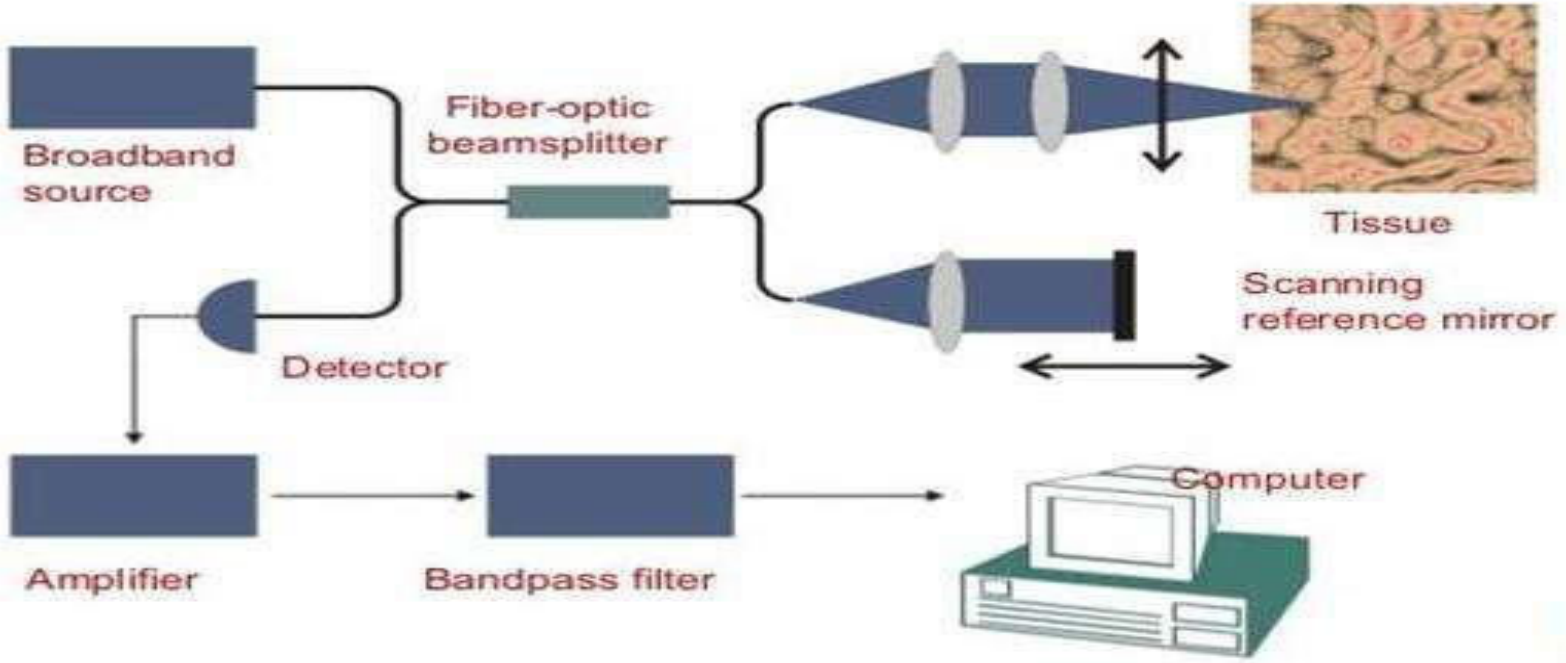


COHERENCE

- In physics two waves are coherent if they have a constant phase difference and same frequency and are non coherent if there is a constant changing phase difference



THE OCT SETUP

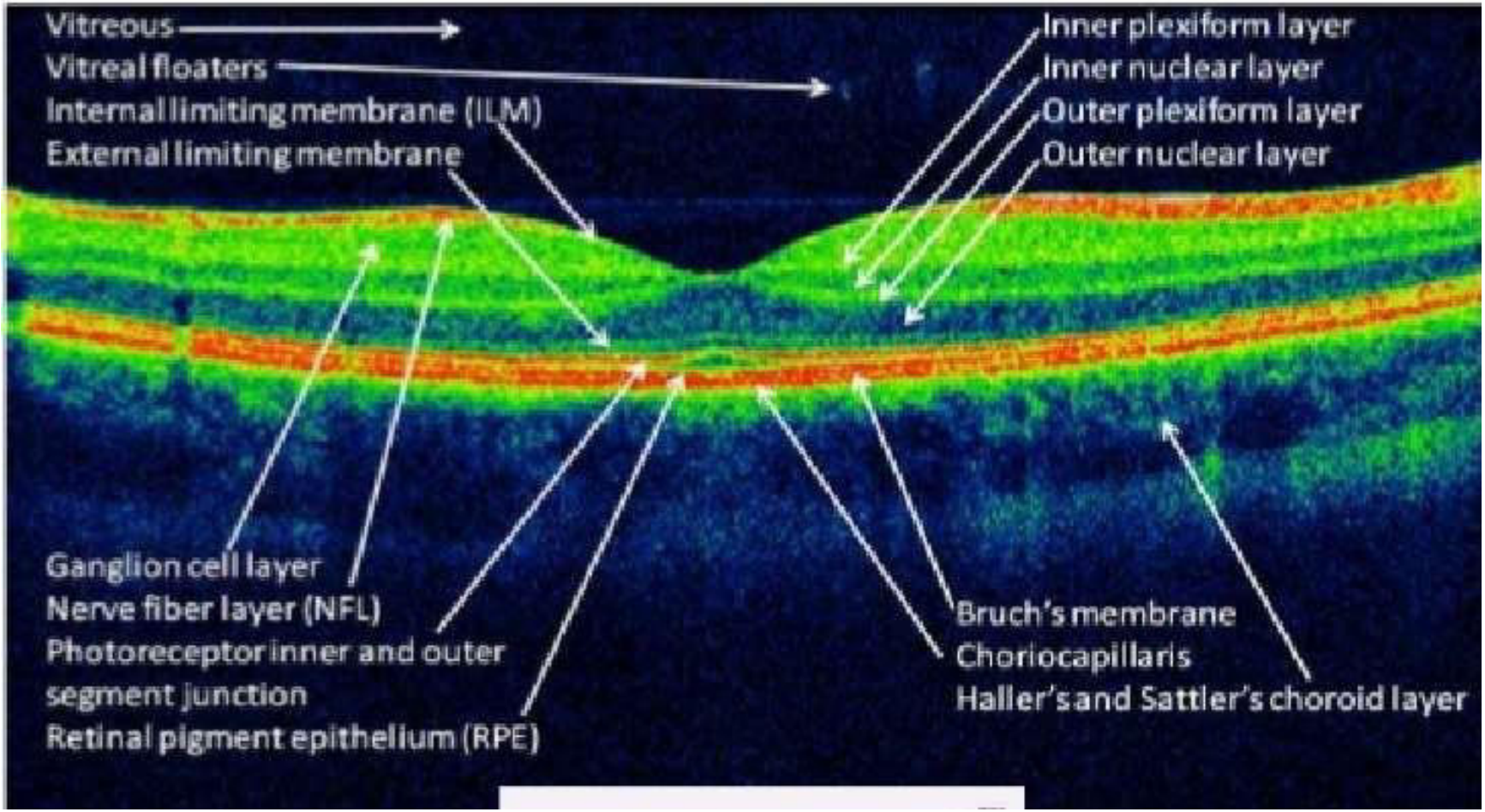


Types of oct

- **Time domain**
  - Reference mirror moves
  - 1 pixel at a time
  - Slow
  - Motion artifacts present
  - Less sharp images

- **Spectral domain**
  - Reference mirror stationary
  - 2048 pixel at a time
  - Rapid
  - No motion artifacts
  - Sharper and clear images

Anatomy of Retina on OCT

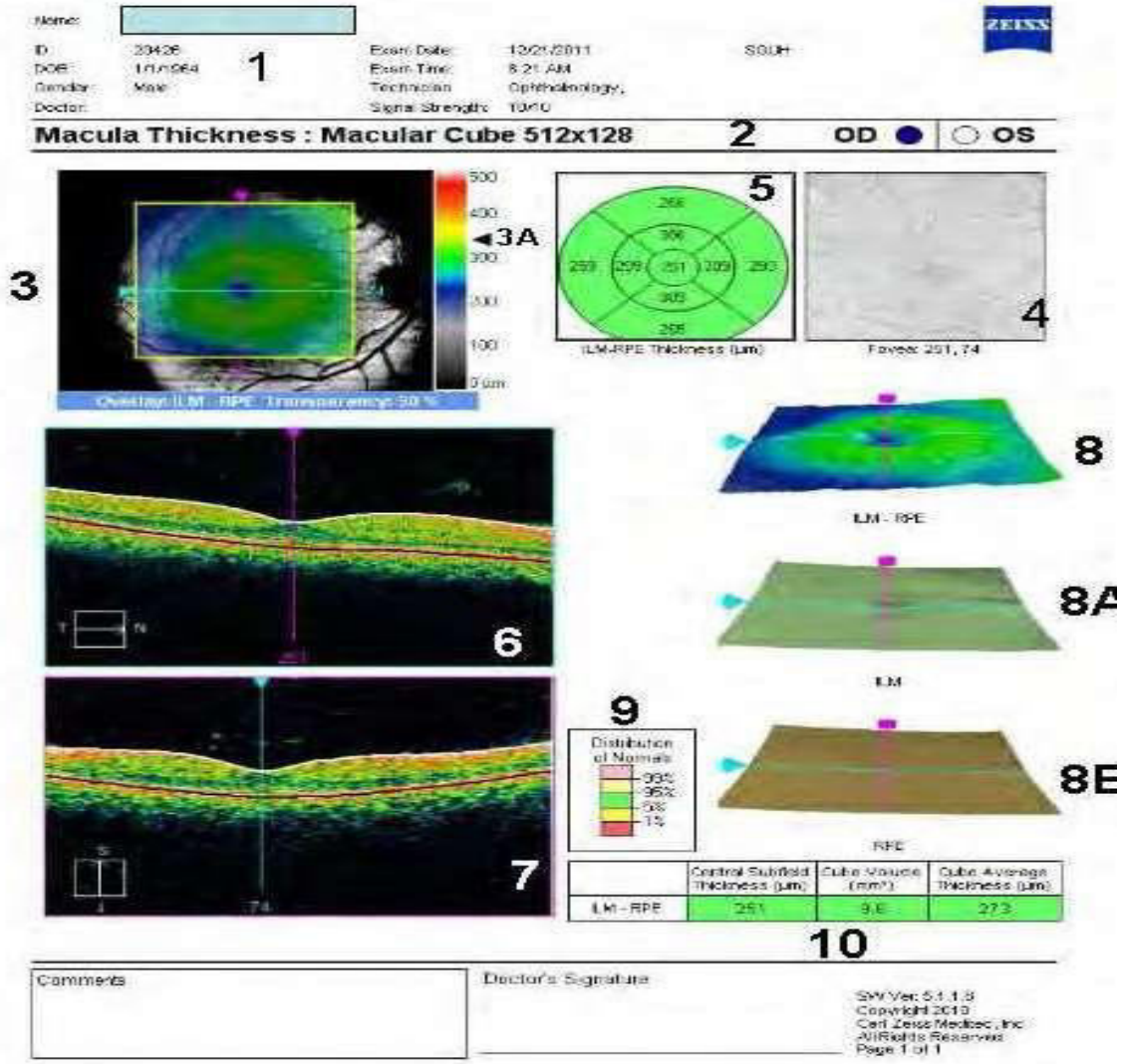


Type of Scan

- **POSTERIOR SEGMENT SCAN**
  - MACULAR SCAN
  - OPTIC DISC SCAN
  - RNFL THICKNESS ANALYSIS SCAN

- **ANTERIOR SEGMENT SCAN**

PRINT OUT


Name:
ID: 20426
DOB: 1/1/1964
Gender: Male
Doctor:
1
Exam Date: 12/21/2011
Exam Time: 8:21 AM
Technician: Ophthalmology,
Signal Strength: 10/10
SOLH
ZEISS
Macula Thickness : Macular Cube 512x128
2
OD
OS
3
500
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3A
300
200
100
0 µm
Overlay: ILM - RPE Transparency 50 %
5
266
306
259
259
251
289
290
303
265
(LM-RPE Thickness (µm)
4
Fovea: 251, 74
8
ILM - RPE
8A
ILM
9
Distribution of Normals
99%
95%
5%
1%
8E
RPE
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7
T
N
S
I
74
Central Subfield Thickness (µm)
Cube Volume (mm³)
Cube Average Thickness (µm)
ILM - RPE
251
9.6
273
10
Comments
Doctor's Signature
SW Ver: 5.1.1.8
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- **ADVANTAGES OF OCT**
- Its noncontact unlike USG, and noninvasive, unlike FFA,ICG.
- Children easily tolerate it.
- Very helpful for quantitative information about macular thickness.
- Valuable teaching tool for the ophthalmologist as well as patient.

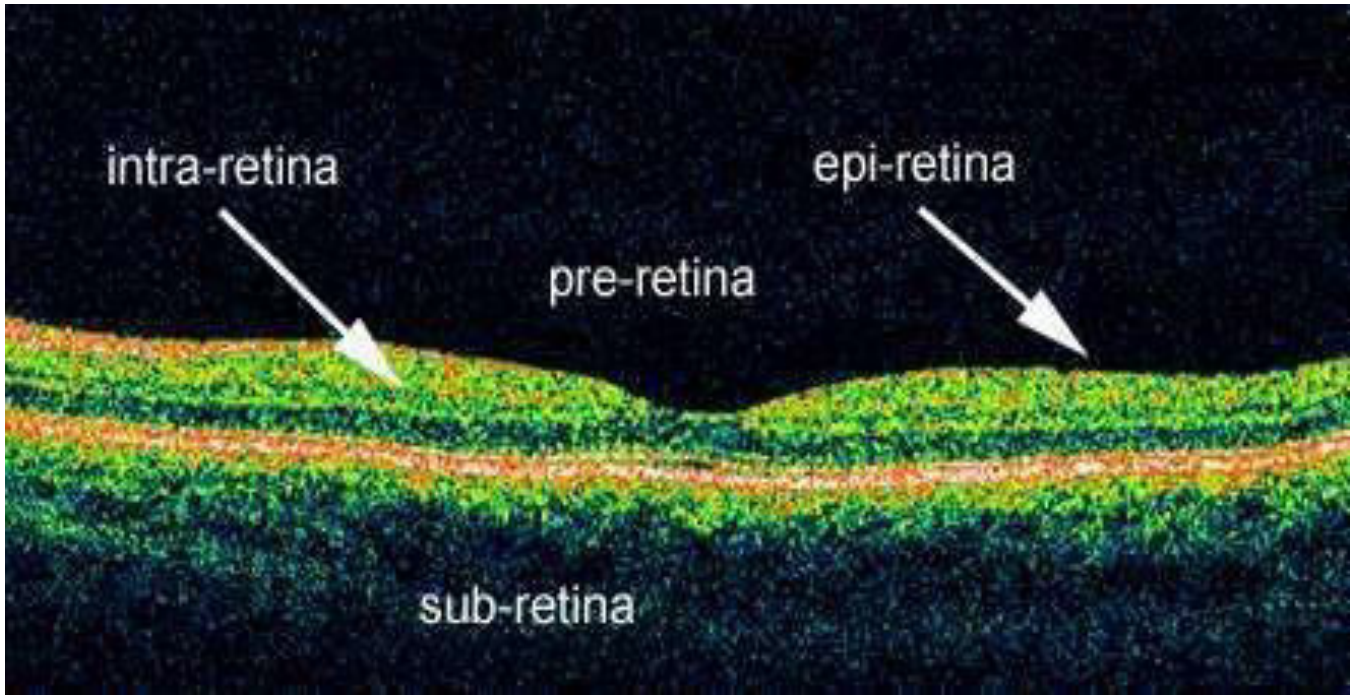
- **DISADVANTAGES**
- Media opacity.
- Scan quality depends on the skill of OCT operator.
- Not possible with uncooperative patients.
- Measurement of Fovea Thickness not accurate if scan not through the center of fovea.

Uses/ indications

- Neurological
- Ophthalmological
- Other uses

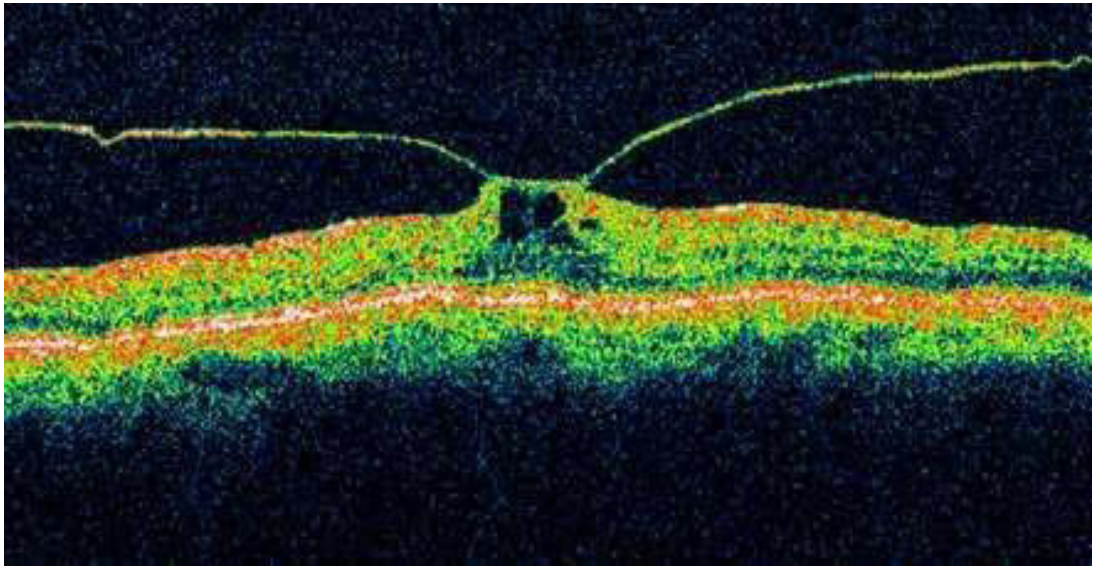
Opthalmological uses

- For purposes of analysis, the OCT image of the retina can be subdivided vertically into four regions
  - Pre-retina
  - Epi-retina
  - Intra-retina
  - Sub-retina



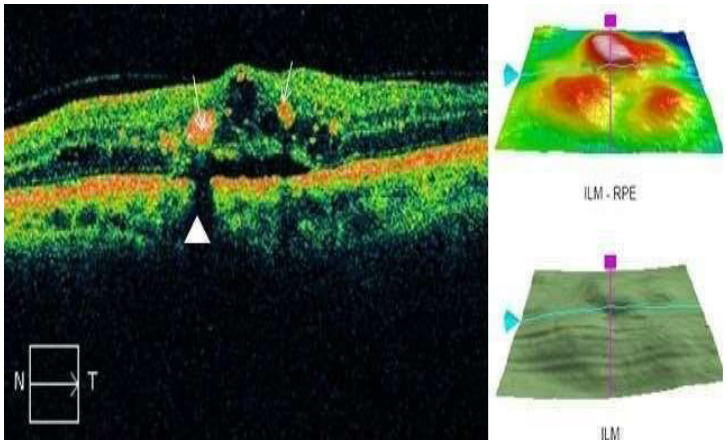
Pre retinal and epiretinal pathology

- **Anomalous structures**
  - pre-retinal membrane
  - epi-retinal membrane
  - vitreo-retinal strands
  - vitreo-retinal traction
  - pre-retinal neovascular membrane
  - pre-papillary neovascular membrane



Intra retinal pathology

- Choroidal neovascular membrane
- Diffuse intra-retinal edema
- Cystoid macular edema
- Drusen
- Hard exudates
- Scar tissue
- RPE tear



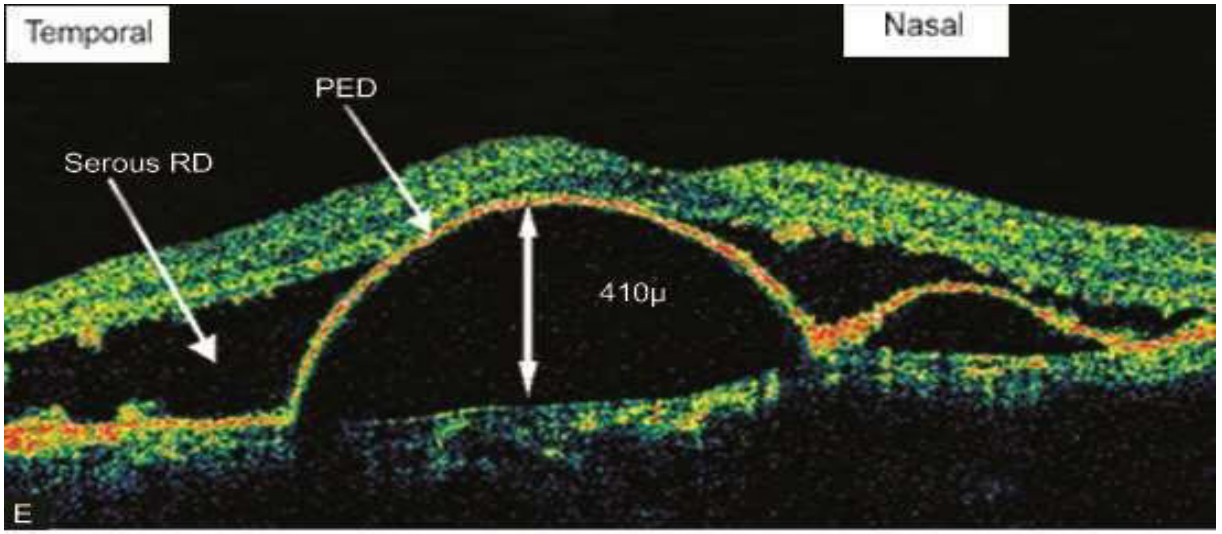


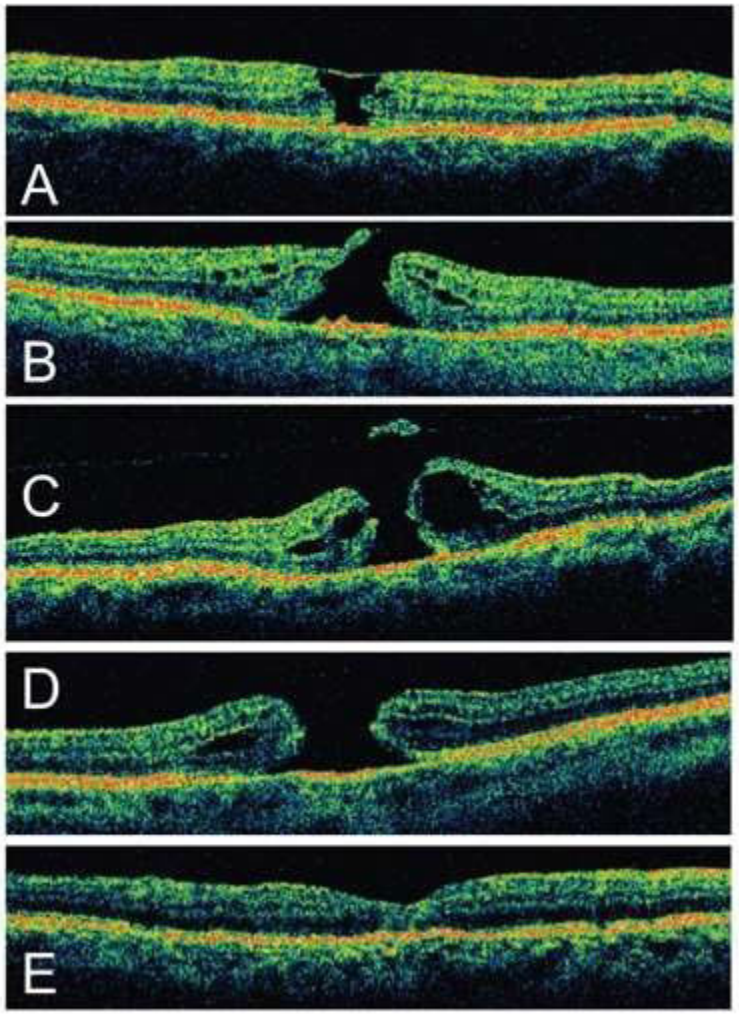
Fig. 6-2e

- Scan of posterior segment pathology

1.Macular Hole

•confirmation of diagnosis and differentiates it from lamellar hole, foveal pseudo cyst.

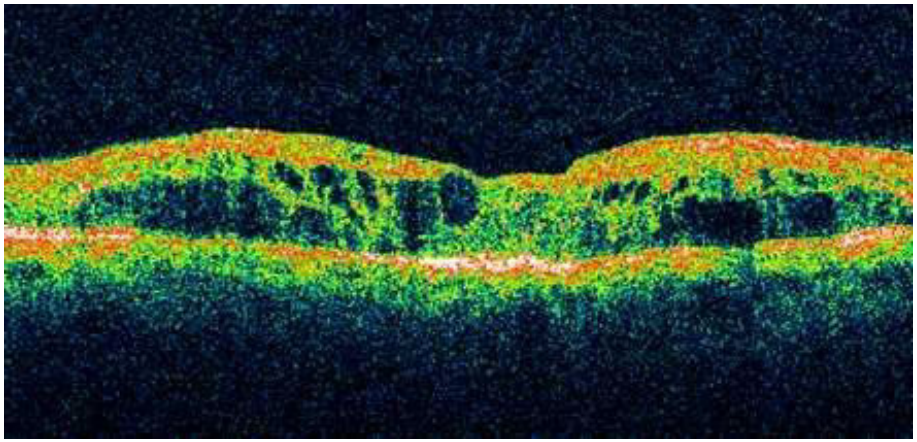
•monitoring the course of the disease and the response to surgical intervention.



2.Macular Edema

•: intraretinal areas of decreased reflectivity and retinal thickening.

•Round, optically clear regions within the neurosensory retina are noted in cystoid macular edema.



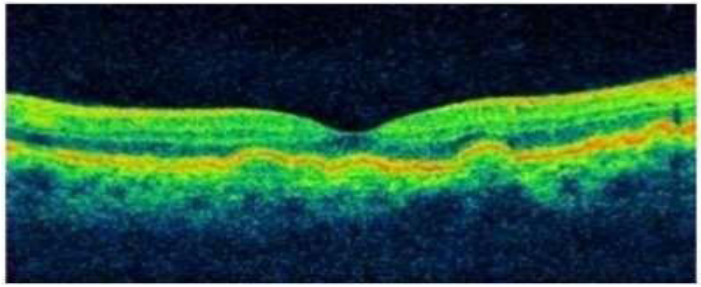
3. ARMD

•Morphological changes in the non exudative ARMD.

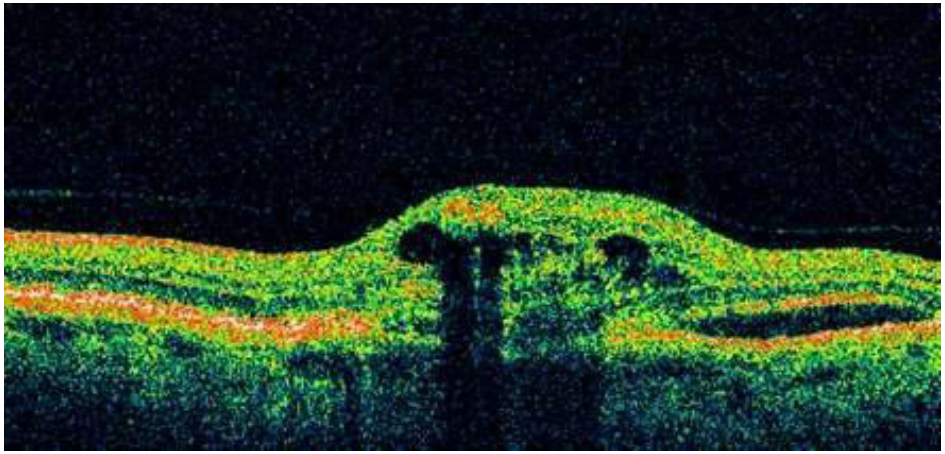
•Subretinal fluid, intraretinal thickening and

•sometimes, choroidal neovascularization in exudative ARMD.

Drusens- seen between bruch's membrane and RPE

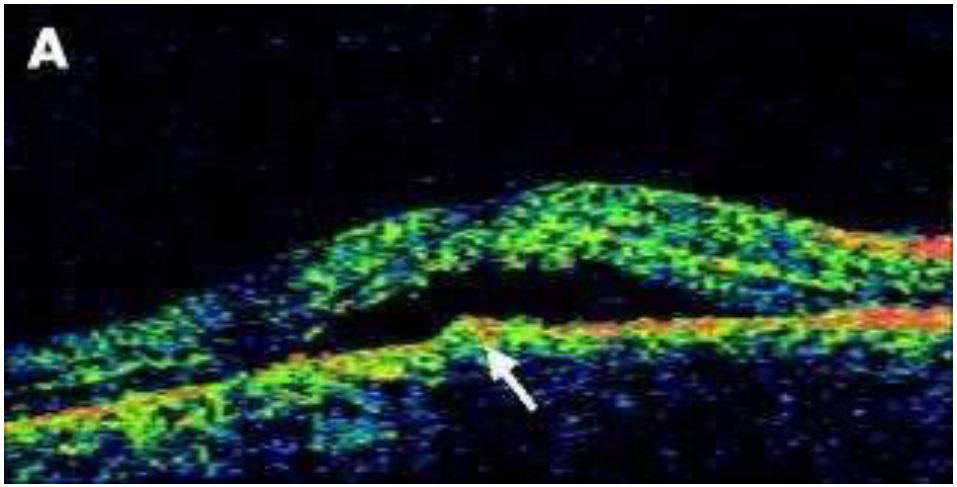


• hyperreflective bumpy RPE with localised PED

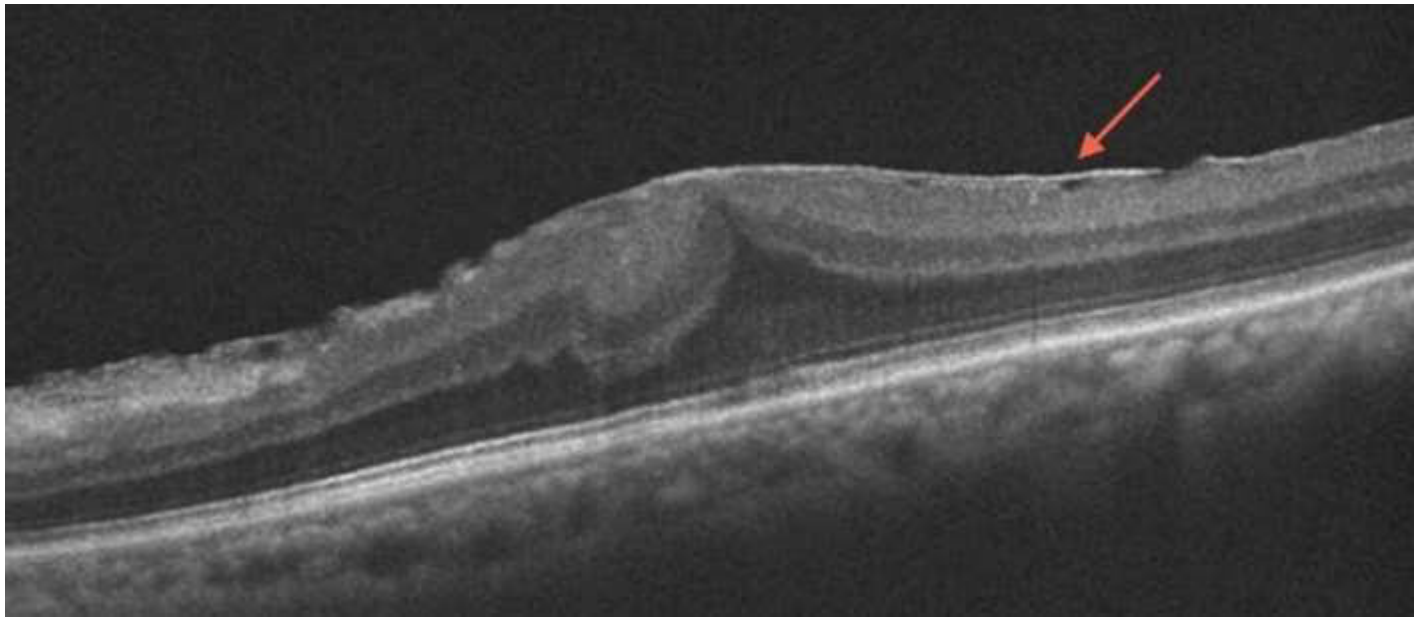


4. Central serous retinopathy

- area of decreased reflectiv ity between two hyper reflective areas



5. Epiretinal membrane:
highly reflective diaphanous membrane over the surface of retina.

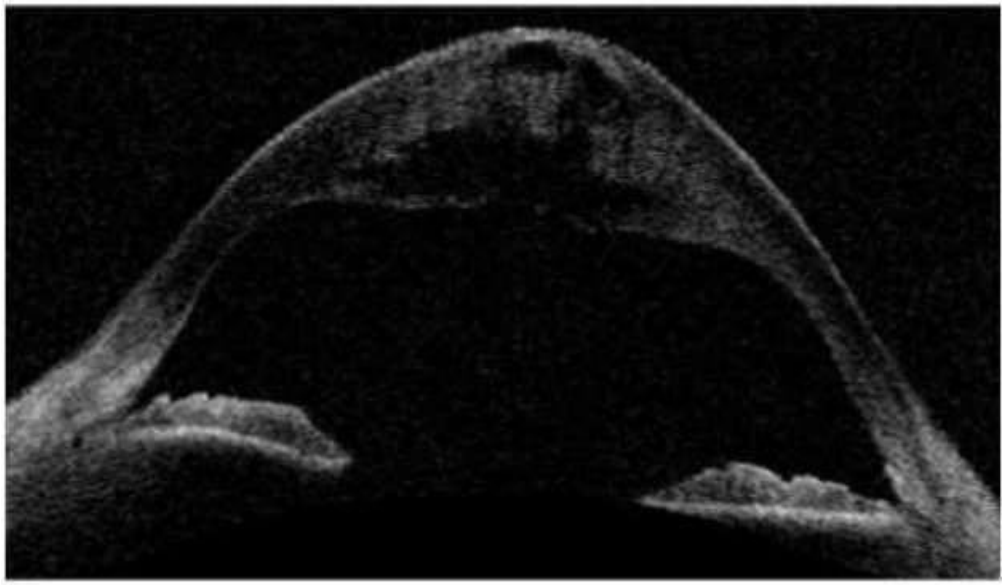


OCT IN GLAUCOMA

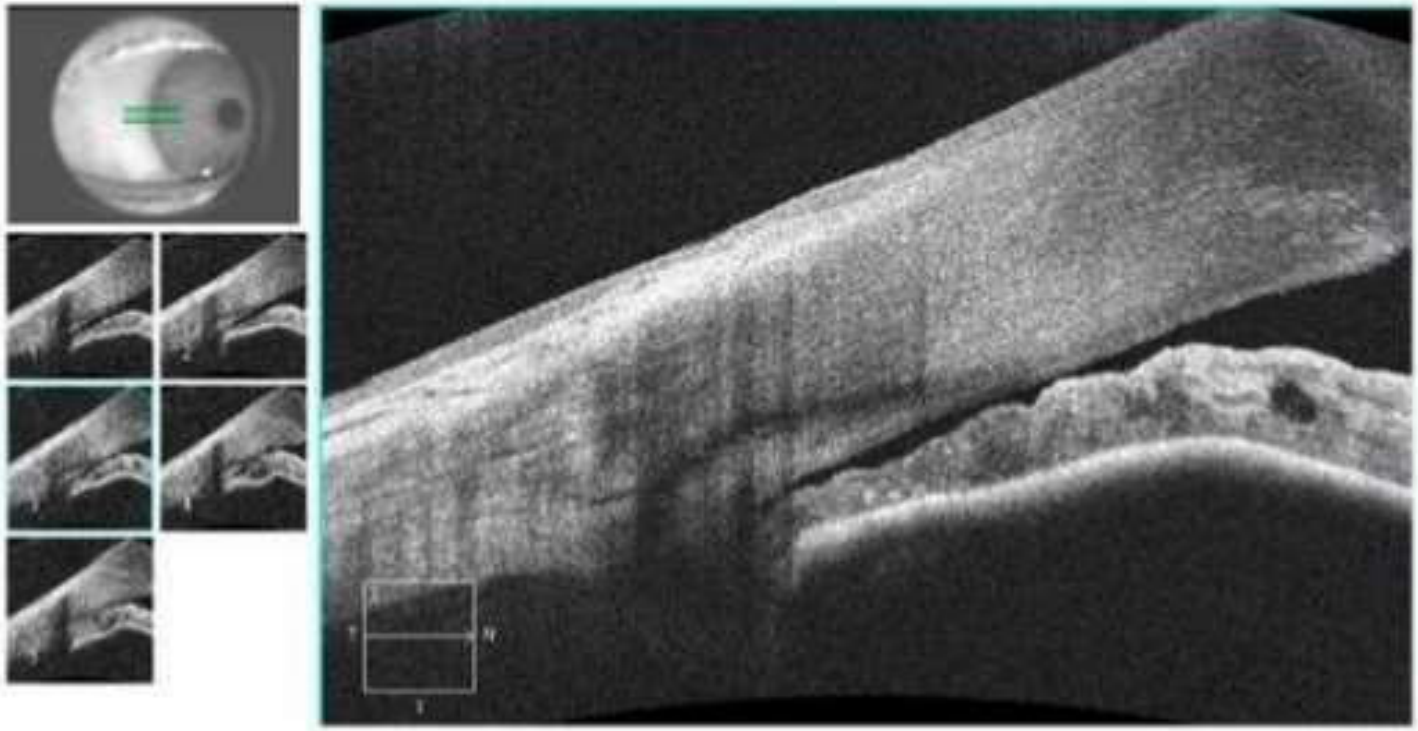
- Diagnosing and monitoring the glaucomatous change.
- Evaluating the RNFL for early (pre- perimetric) glaucoma detection.
- Evaluation of cystoid macular edema after combined cataract and glaucoma surgery.

ANTERIOR SEGMENT OCT

- Corneal thickness and keratoconus evaluation
- Anterior chamber angle
- Assessing the fit of intraocular lens implants



- Results of corneal implants

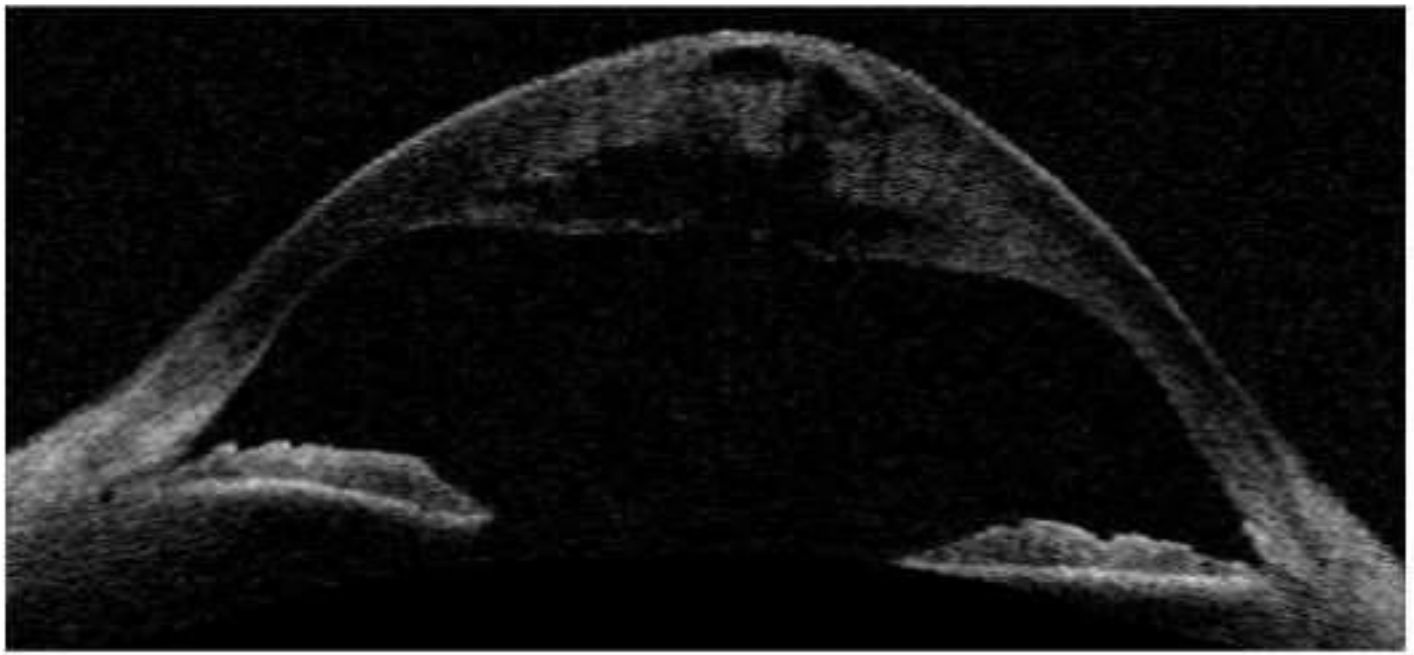


Images courtesy of Martha Leen, M.D. & Paul Kremer M.D. Achieve Eye and Laser Specialists, Silverdale, WA

Narrowing of angle of anterior chamber

Tumor of the iris

Keratoconus



- Conical cornea with central stromal thinning

Limitations

- Quality of OCT depends on the transparency of the ocular media
- OCT is operator dependent
- The statistical analysis is based on a control population, which may not be accurate depending on the population studied

Thank you