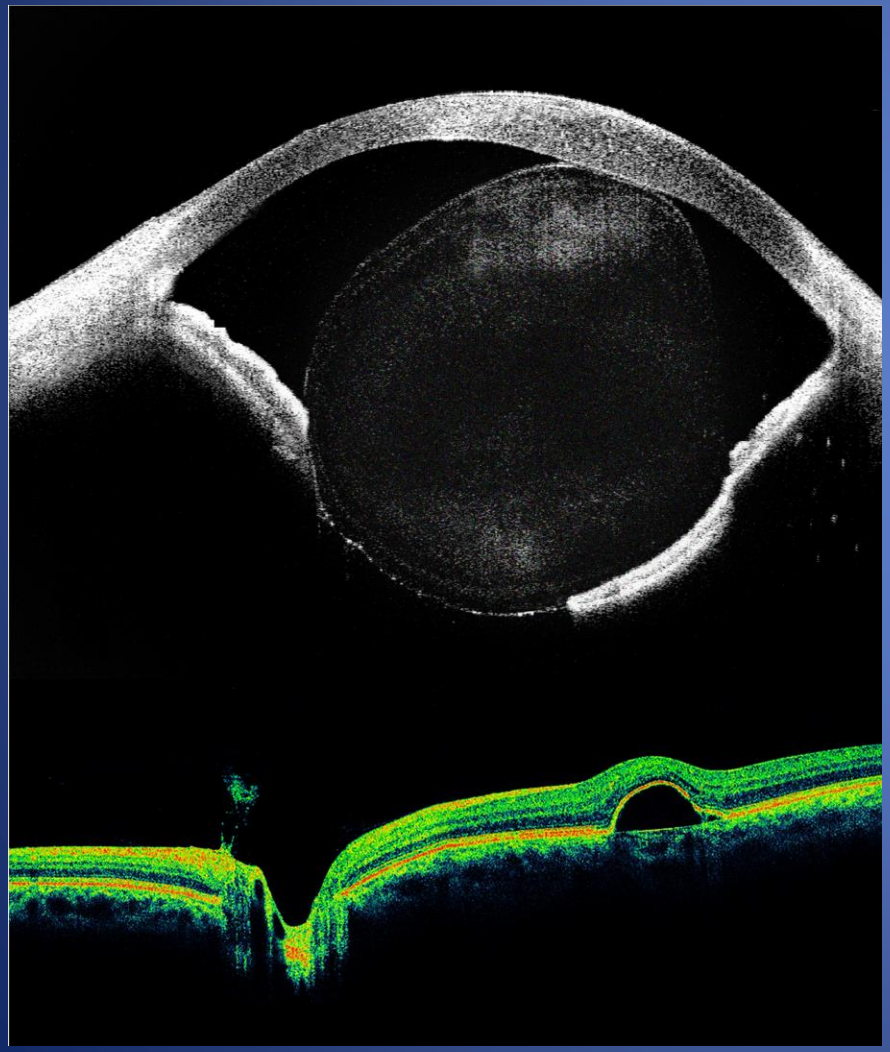
Multi-Modality Imaging

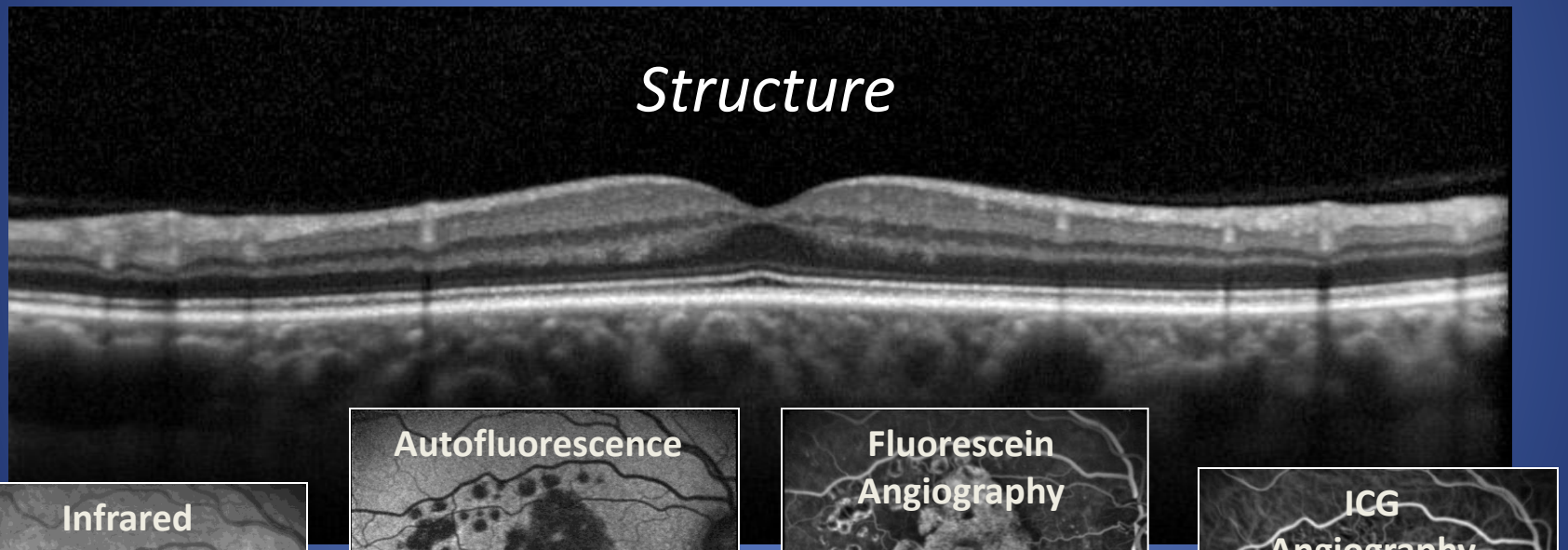


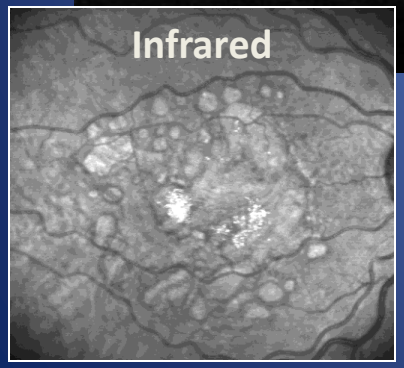
Michael P. Kelly, FOPS
Duke Eye Imaging
Duke University Eye Center

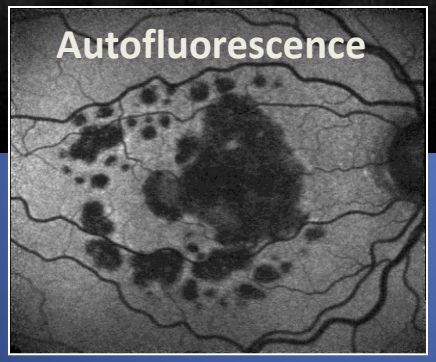
Simultaneous Multi-Modality Imaging:

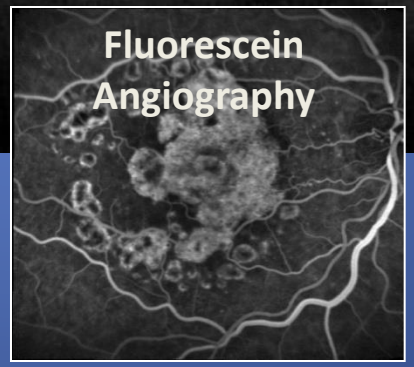
-Confocal Scanning Laser Ophthalmoscope

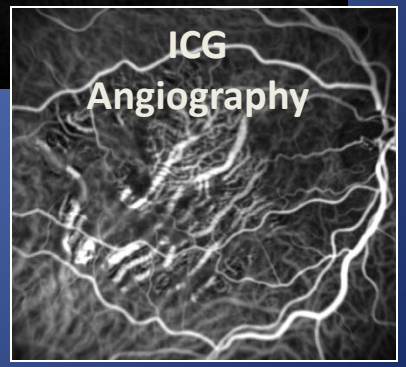
-Spectral-Domain Optical Coherence Tomography unit





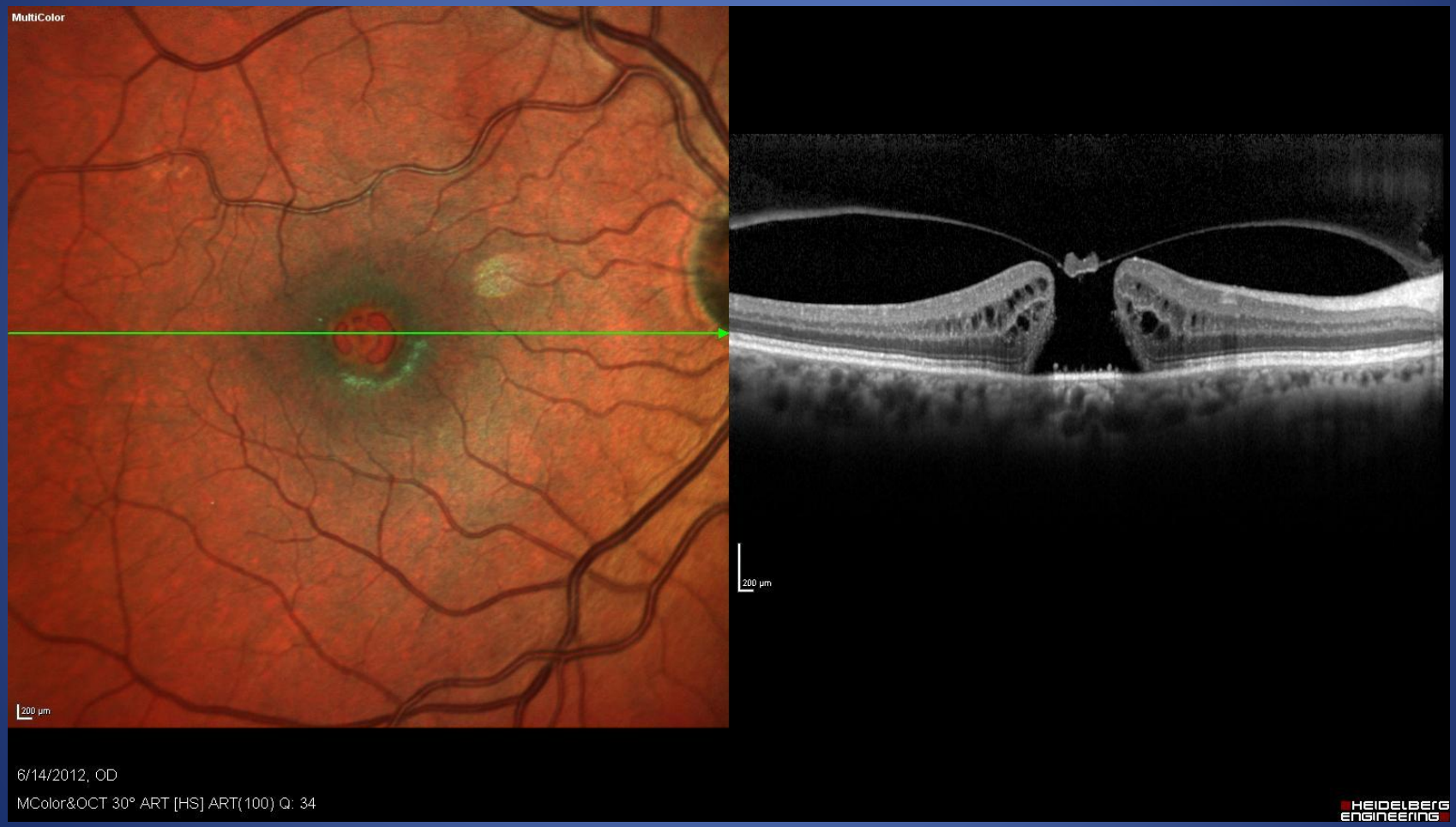




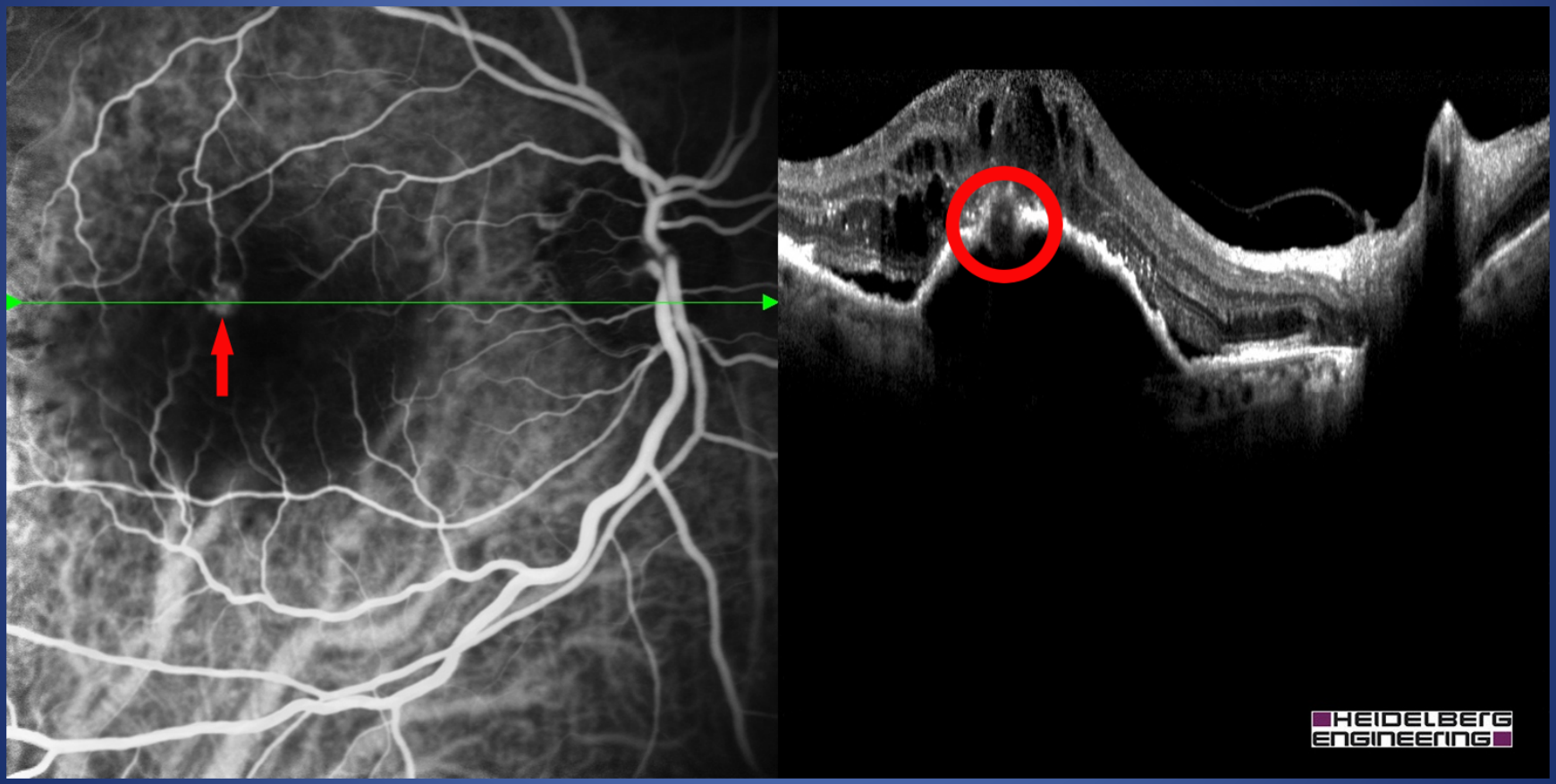


Function

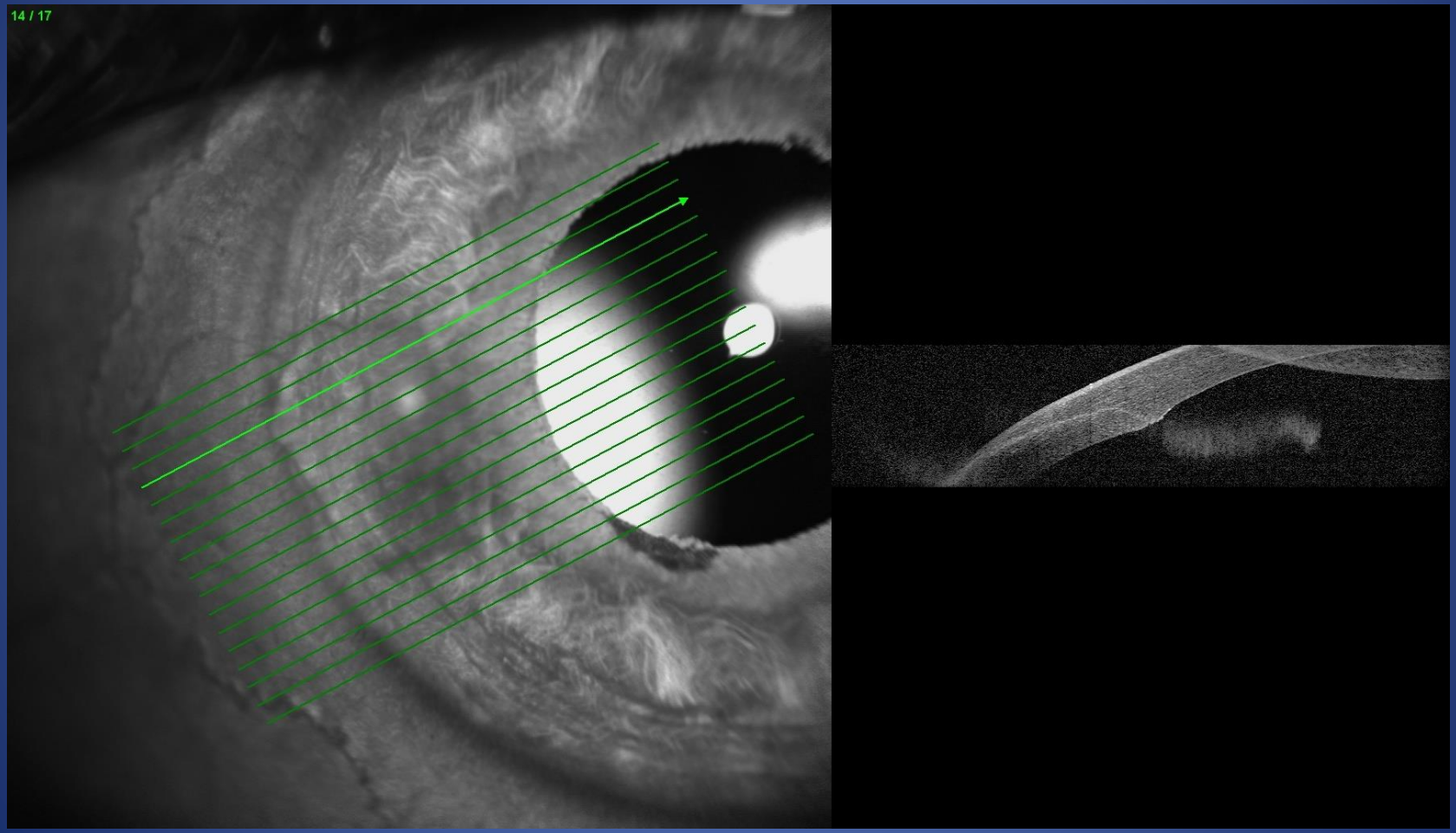
Color Fundus Photography/SD-OCT



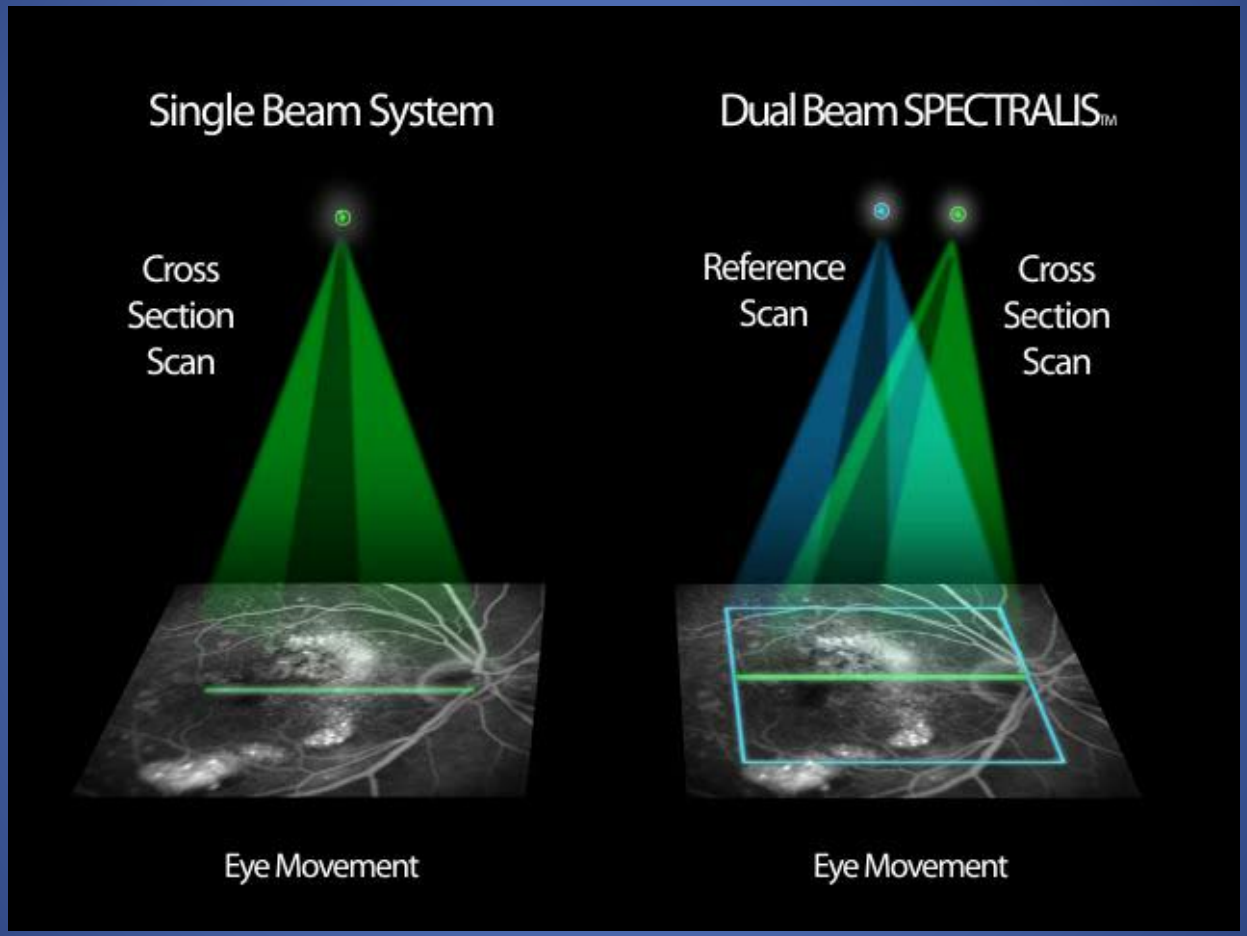
Multi-Modality Imaging



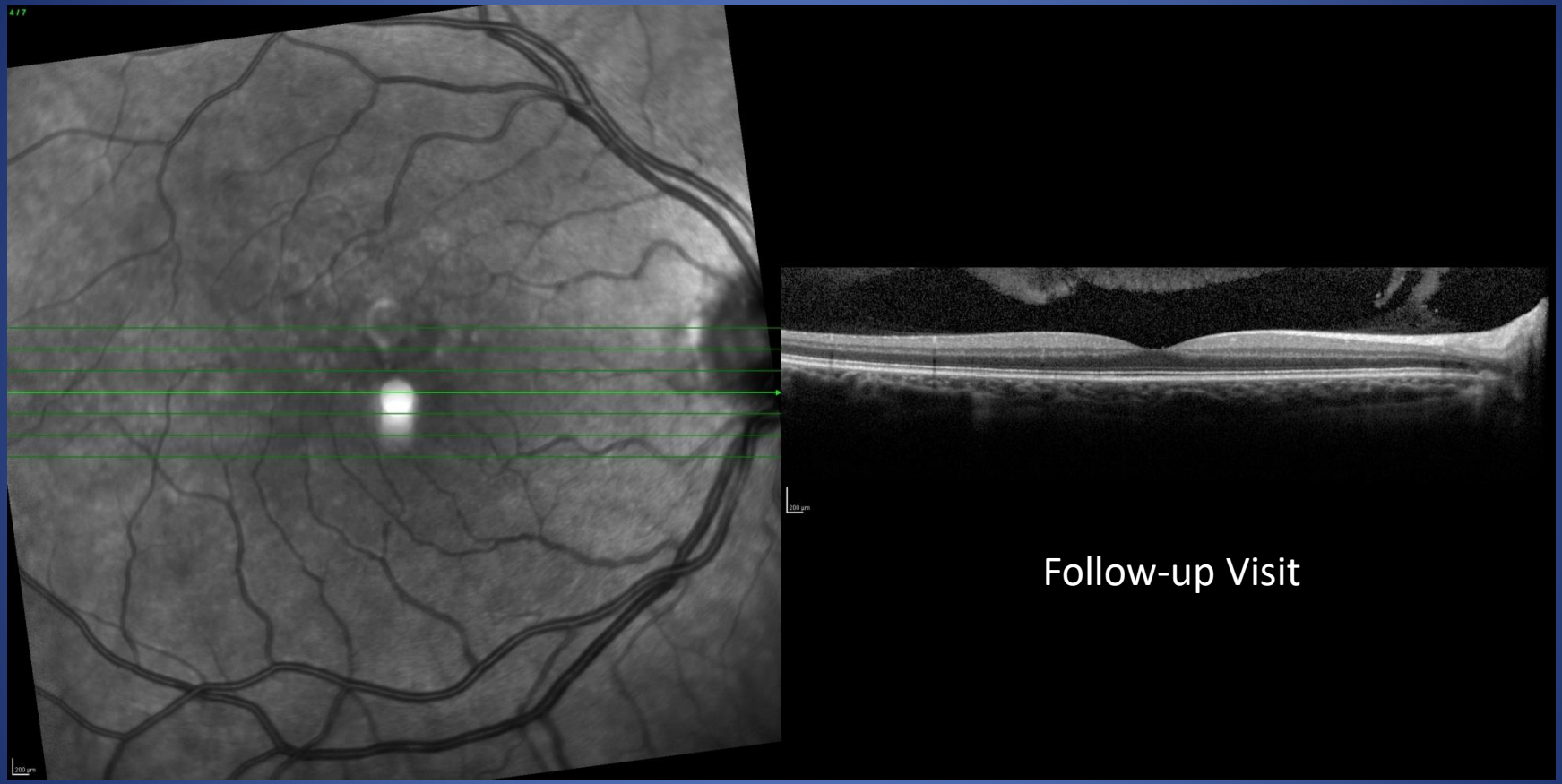
Identifies exact location



Active Eye-Tracking

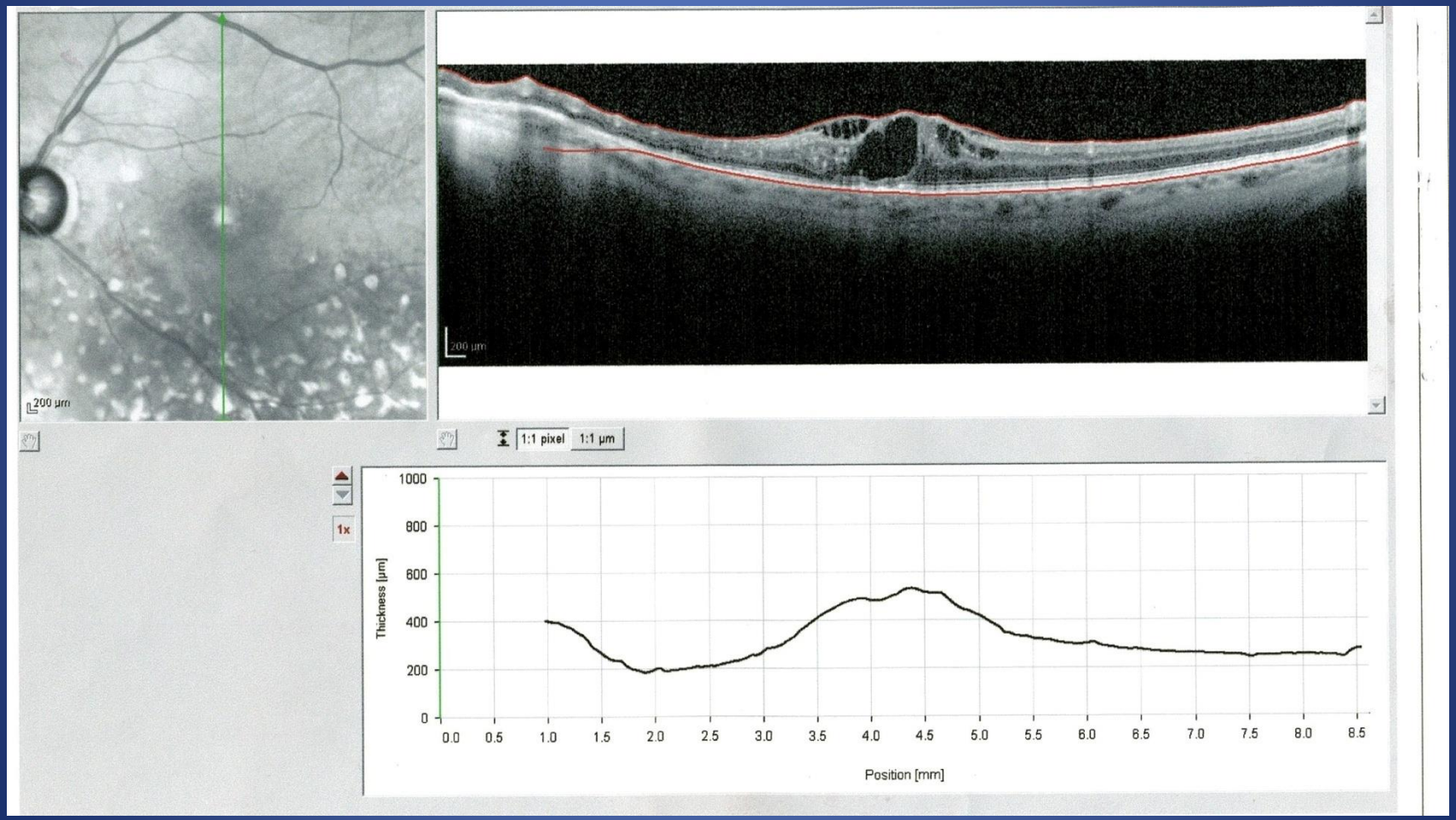


Active Eye-Tracking

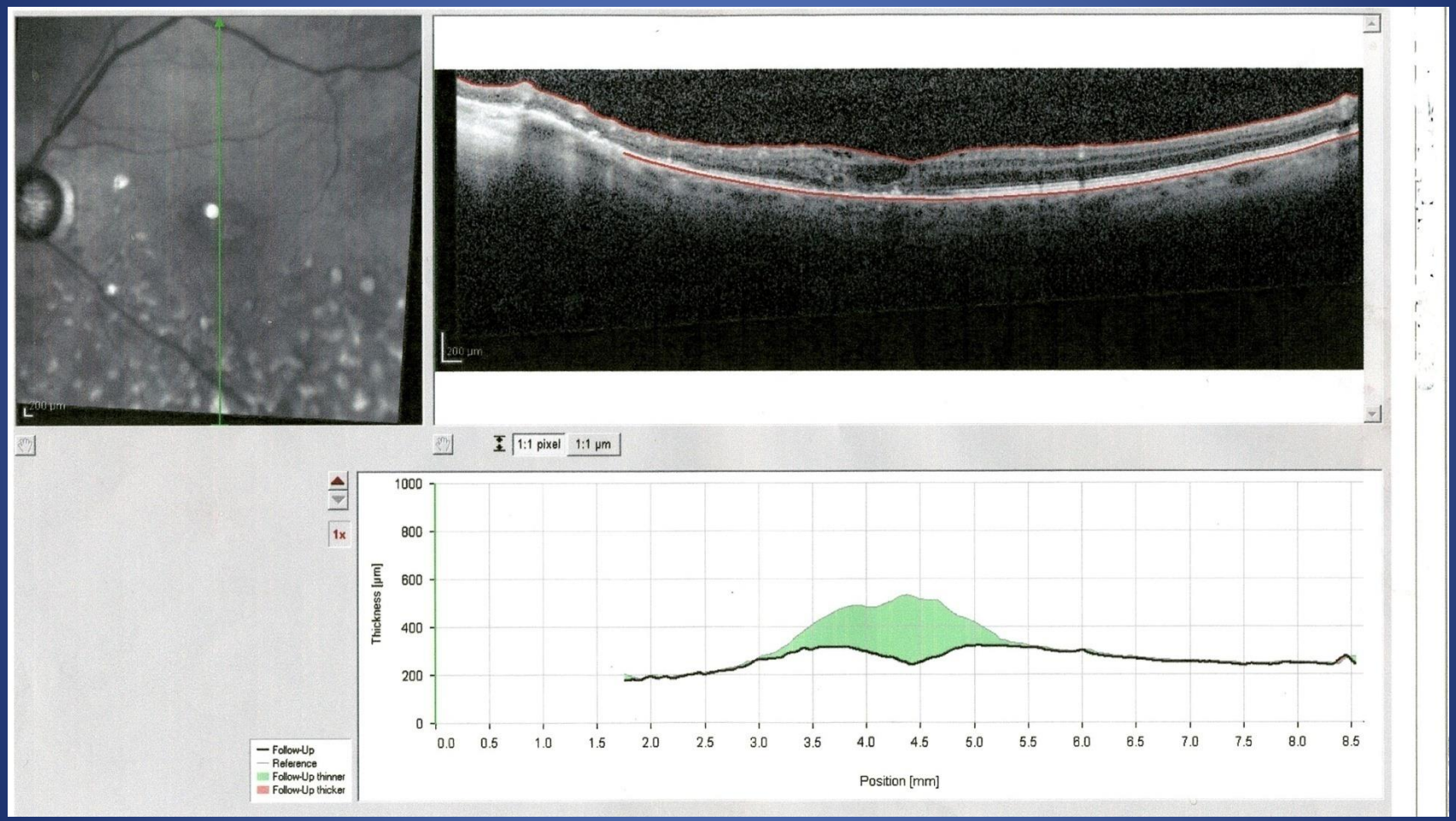


-Eliminates Eye Movement
-Accommodates for Head-tilt
-Allows for Exact Placement of OCT Scan on return visits

Visit-to-Visit Comparison

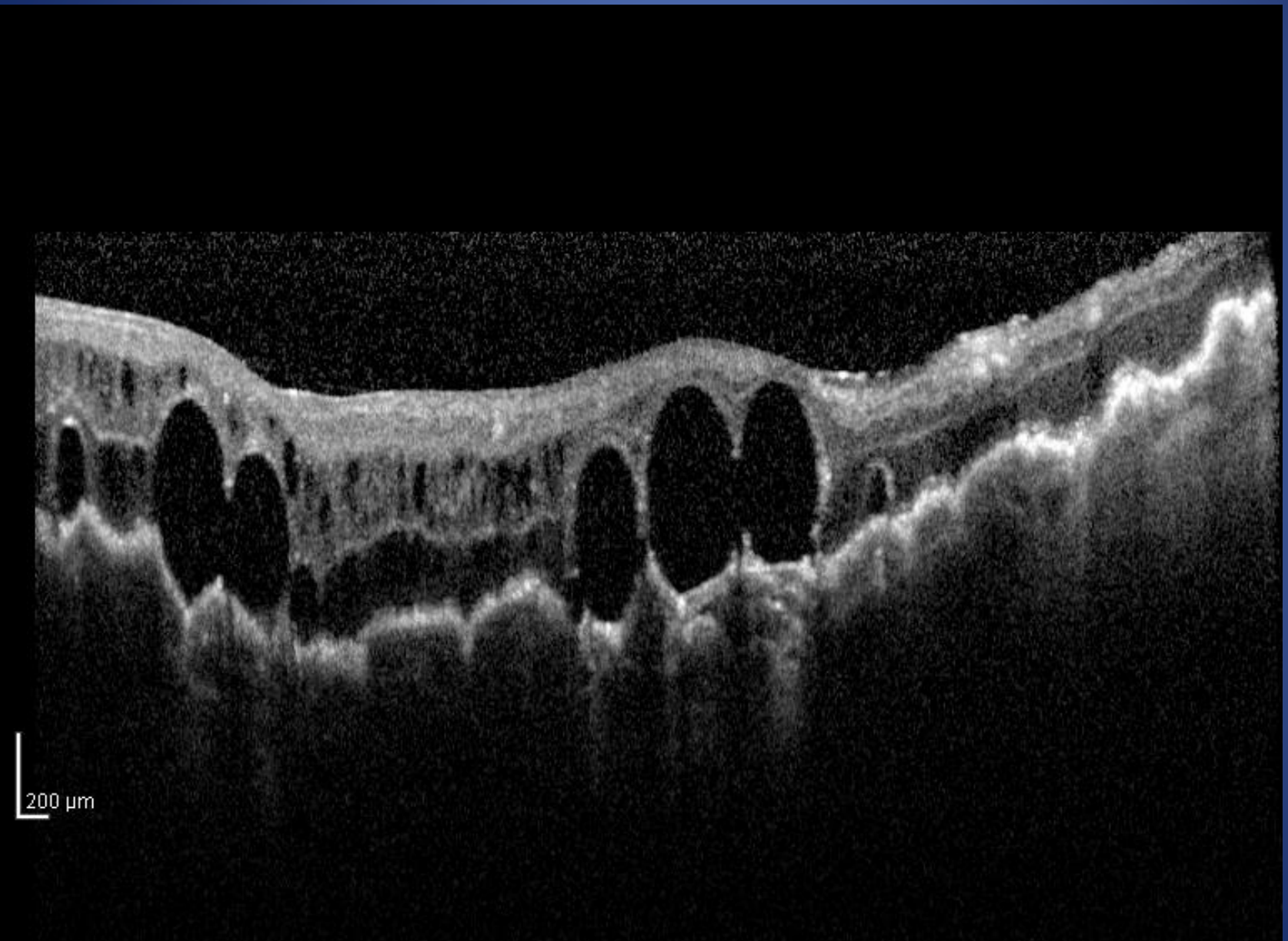


Treatment, Resolution, Comparison

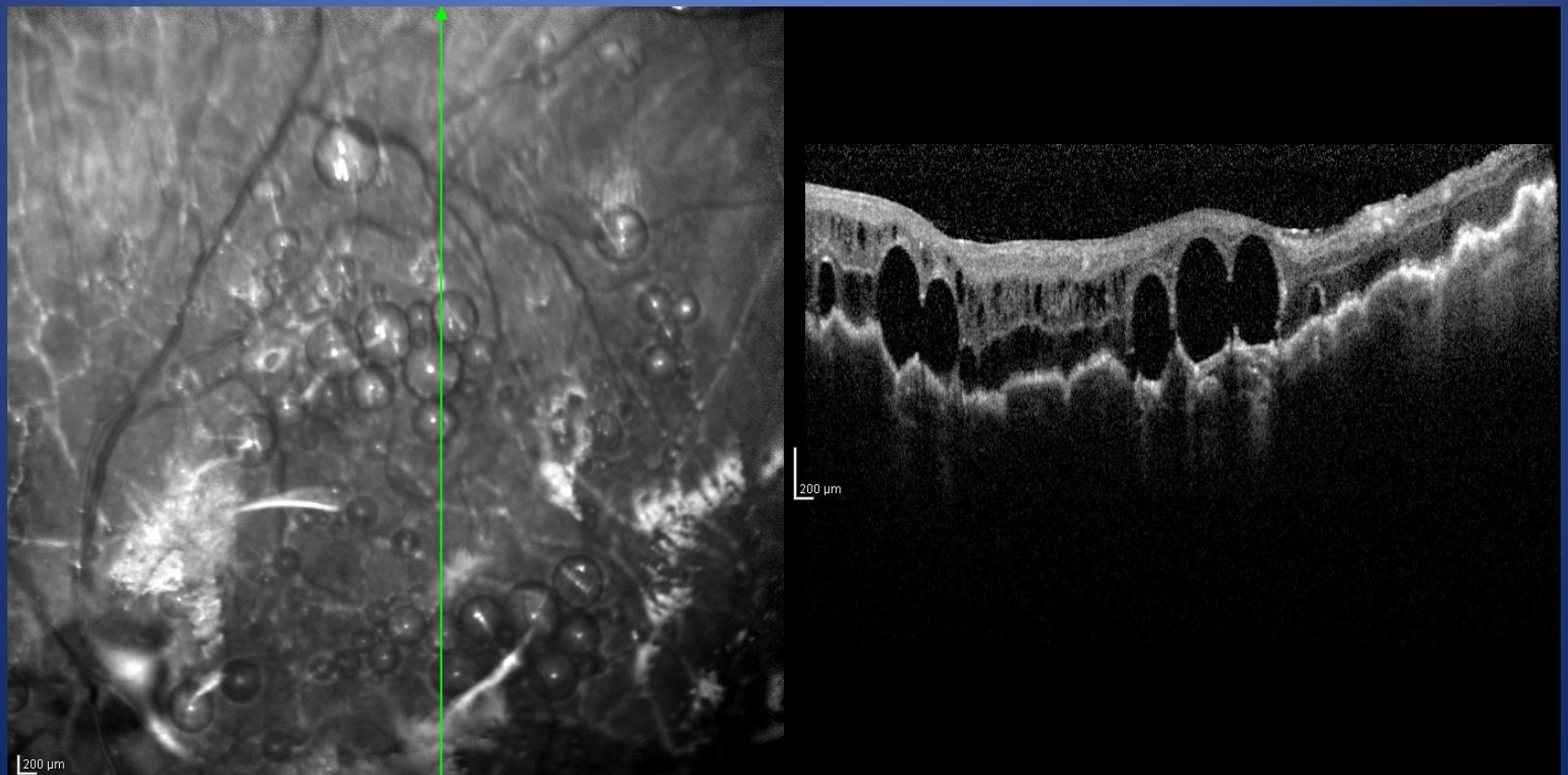


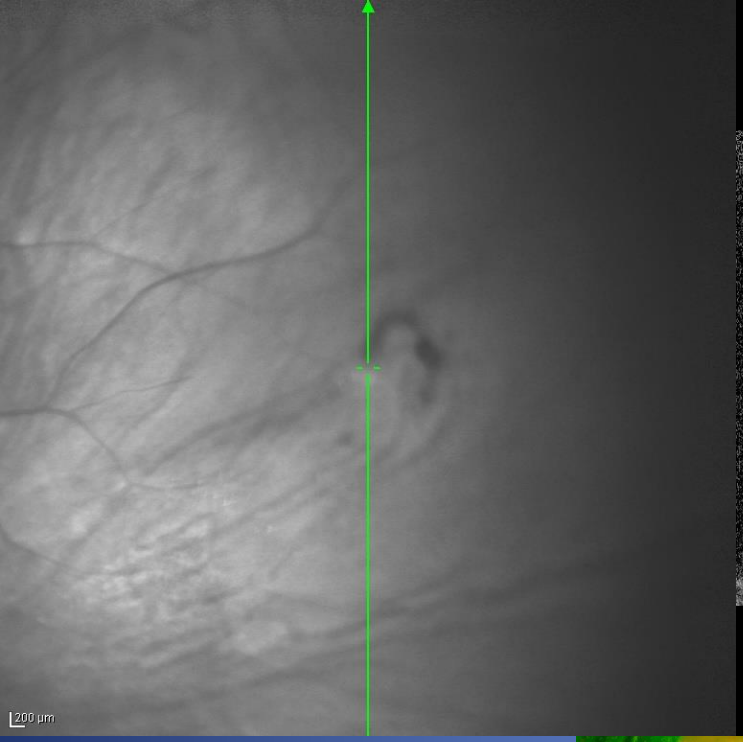
Eye-Tracking is Key to Accurate follow-up

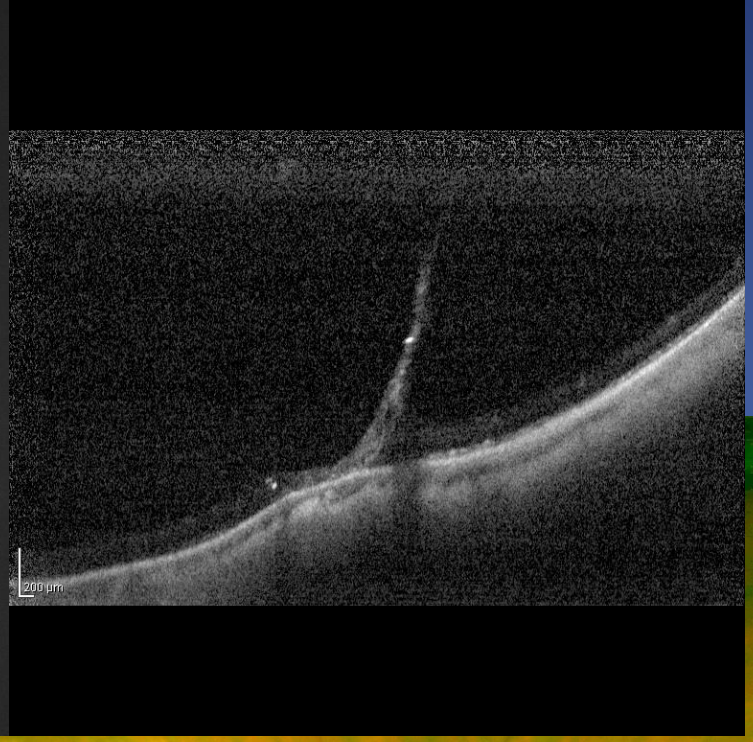
SD-OCT



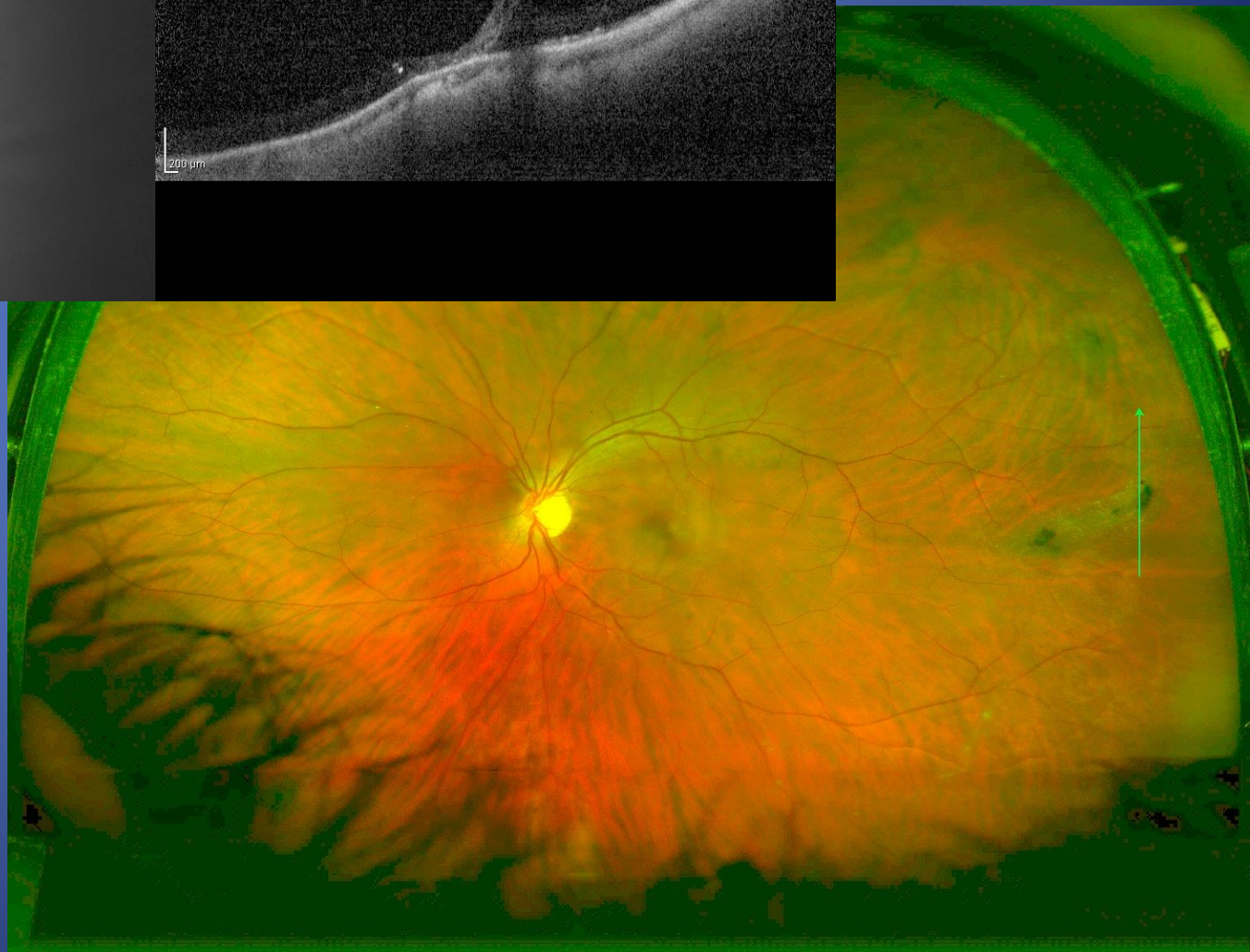
Multi-Modality IR/SD-OCT



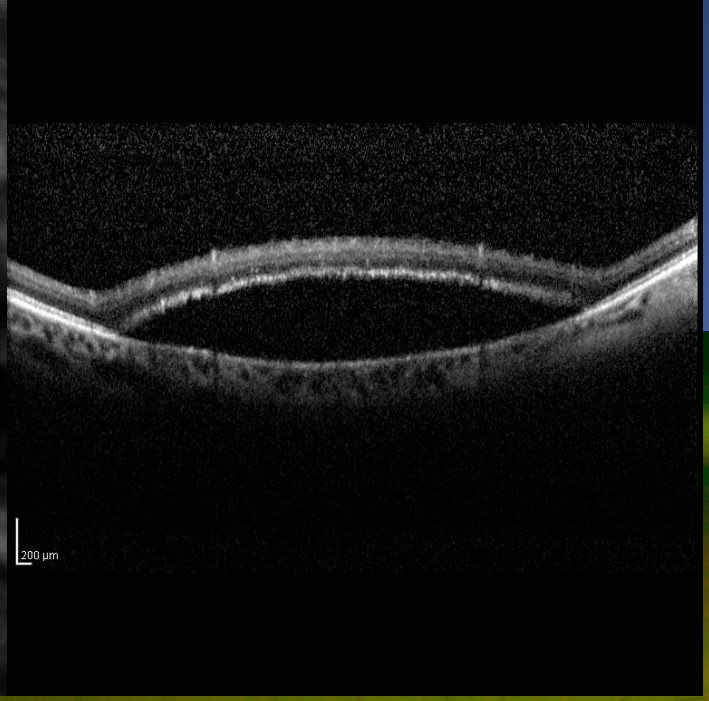


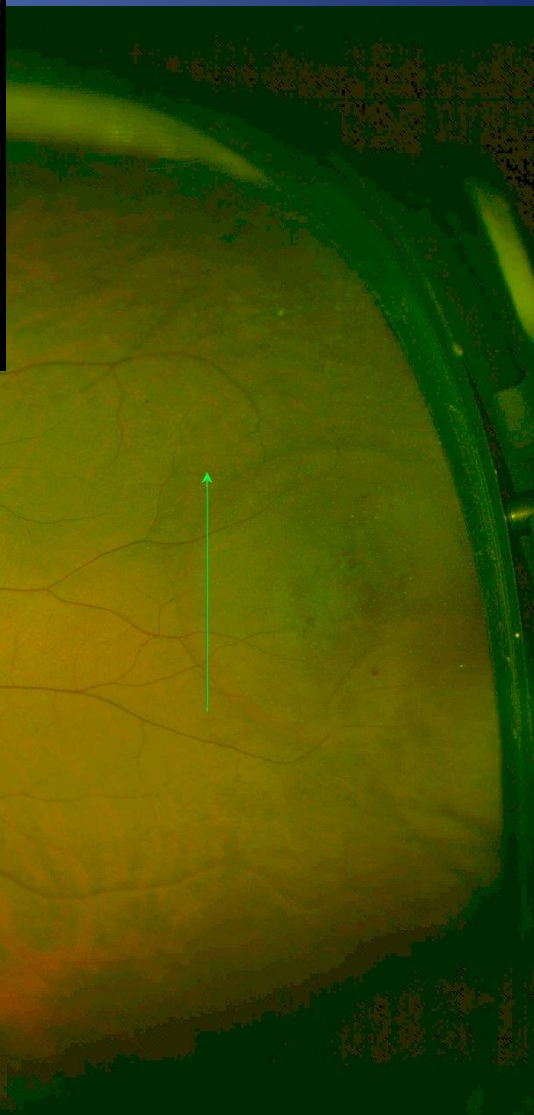


Lattice

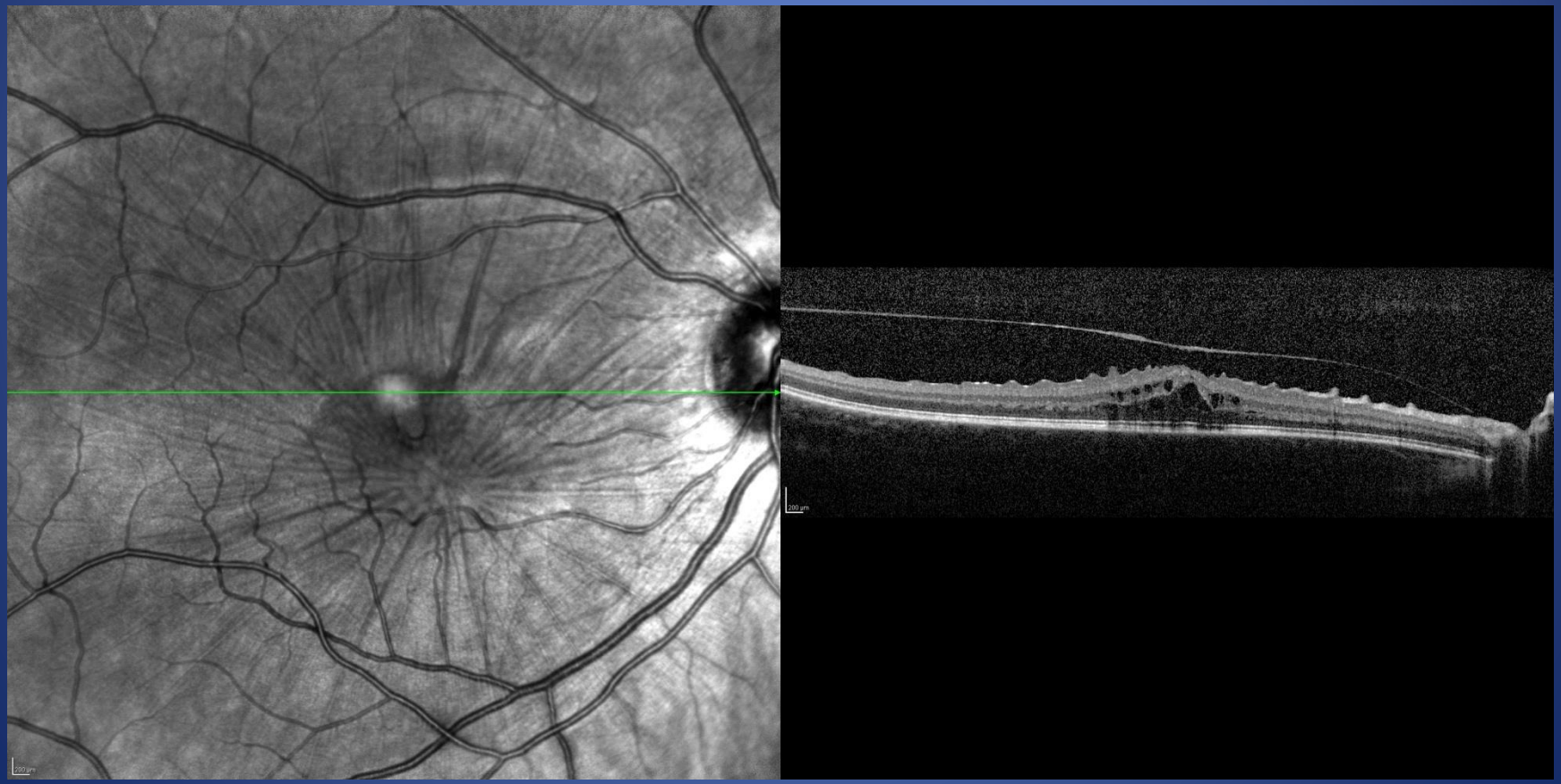


Retinal Detachments





IR/SD-OCT



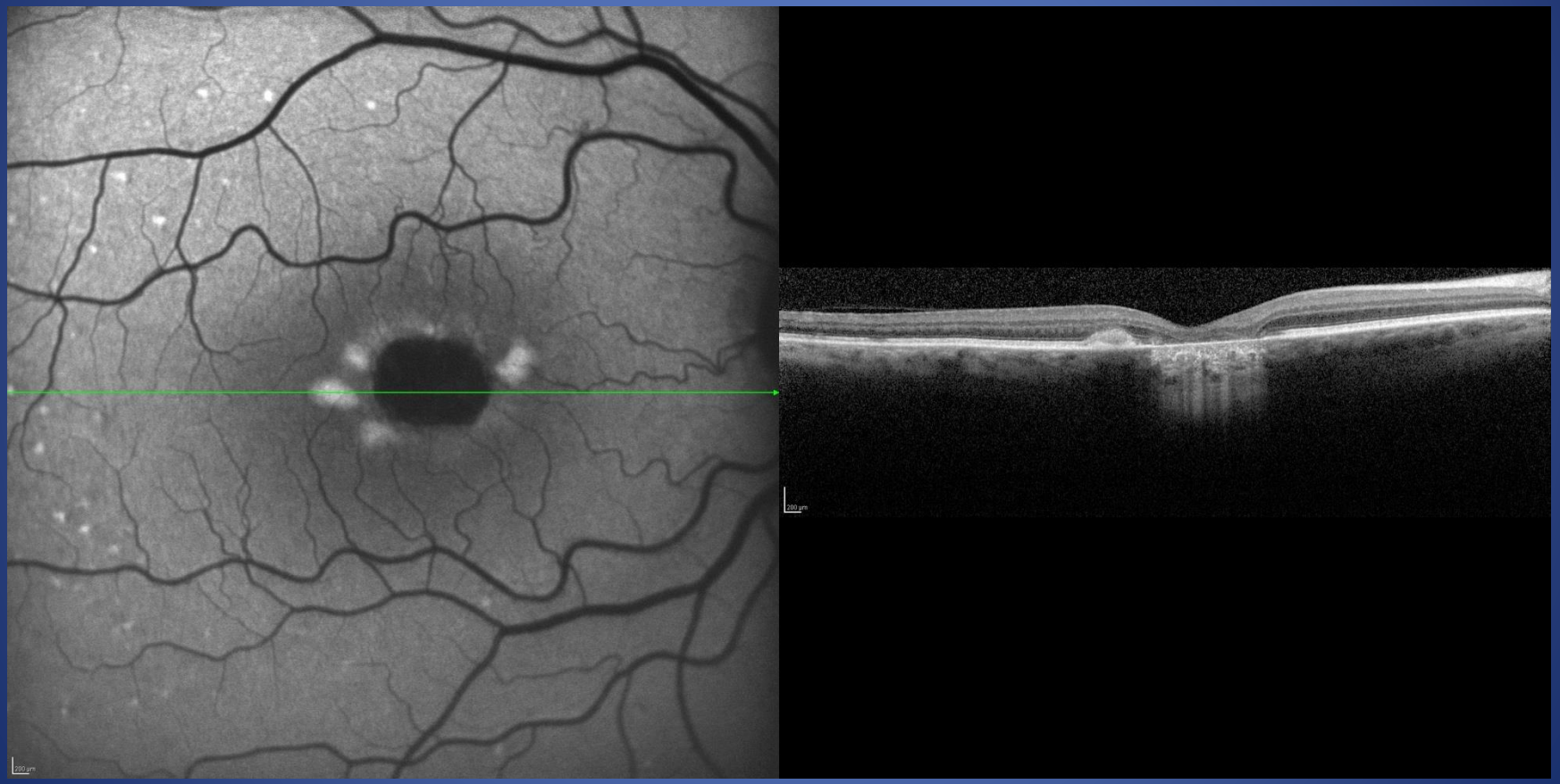
IR/SD-OCT

IR = Fine details of the ERM

IR/SD-OCT, AF/SD-OCT, FA/SD-OCT, ICG/SD-OCT

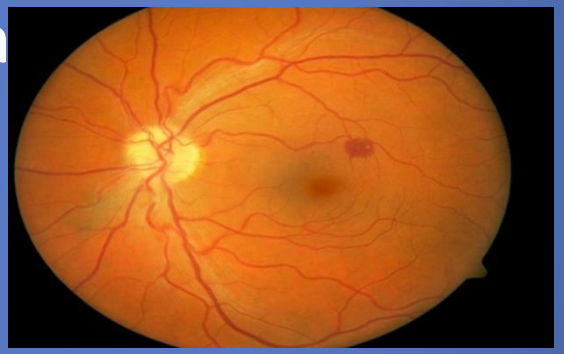
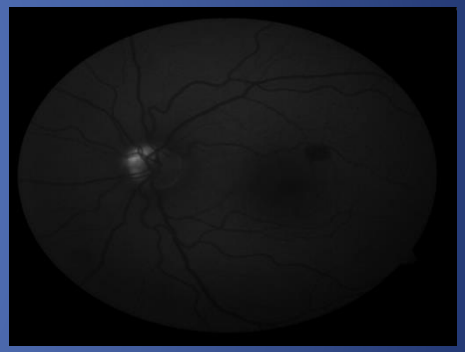
Function

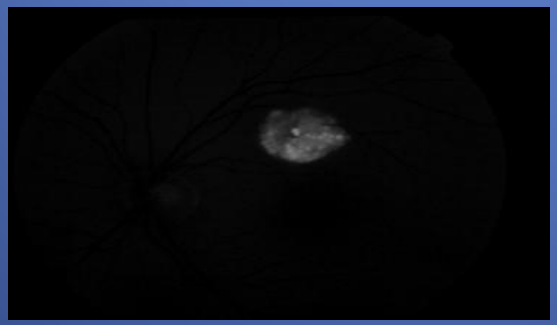
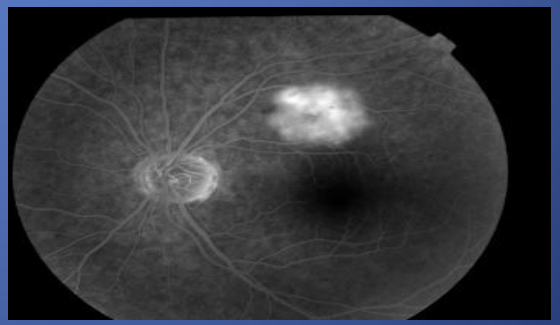
Structure



Autofluorescence

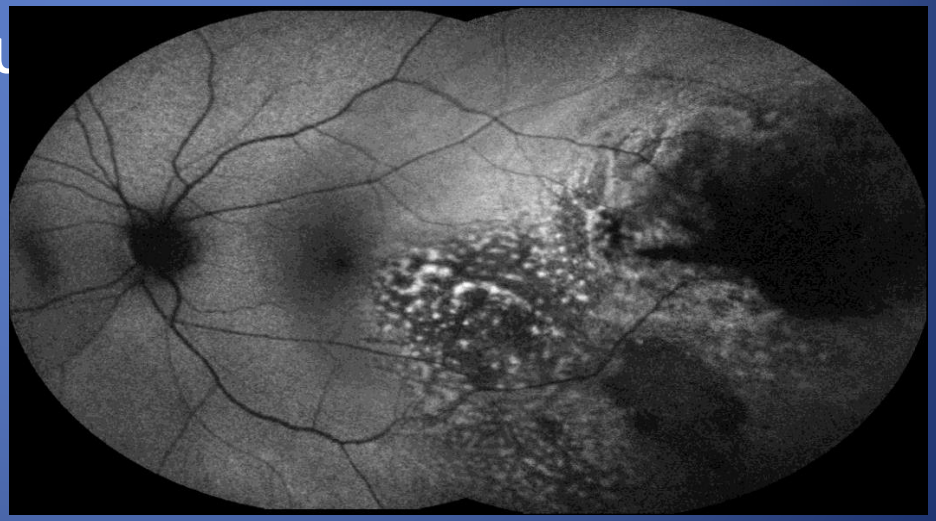
- Old School:
  - Optic NerveHead Drusen.
  - Astrocytic Hamartom

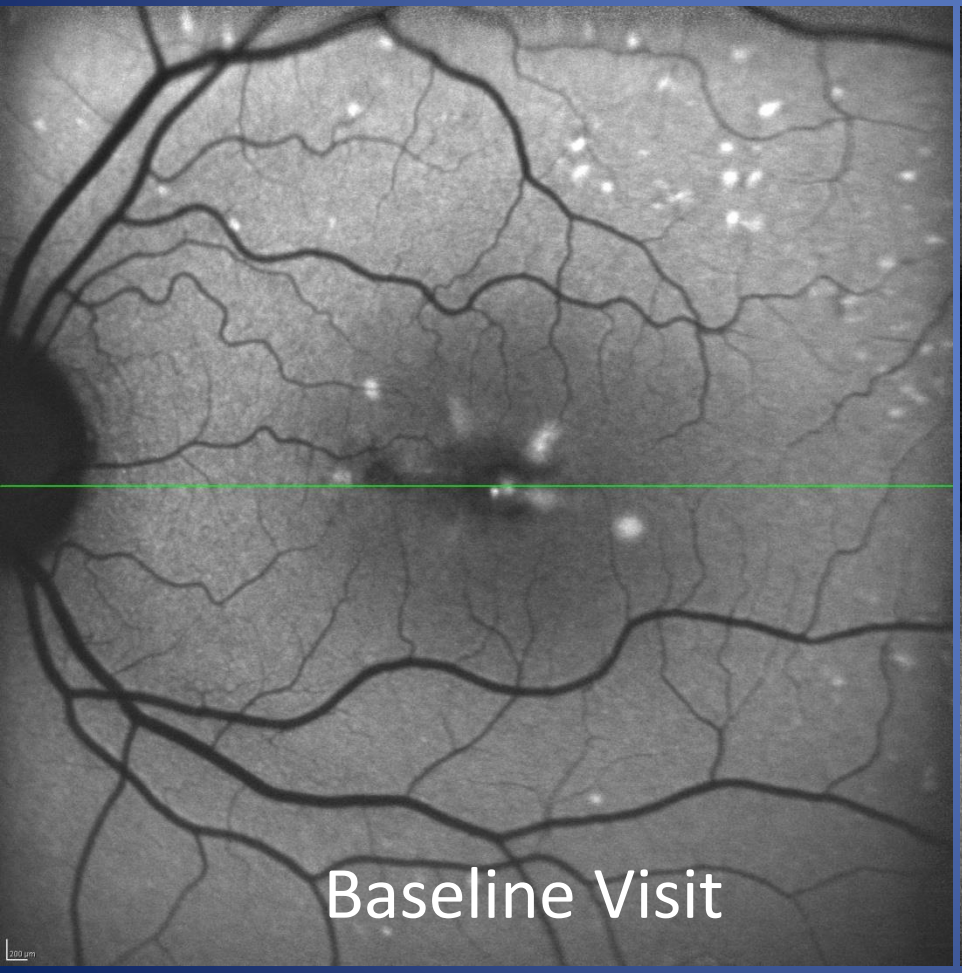



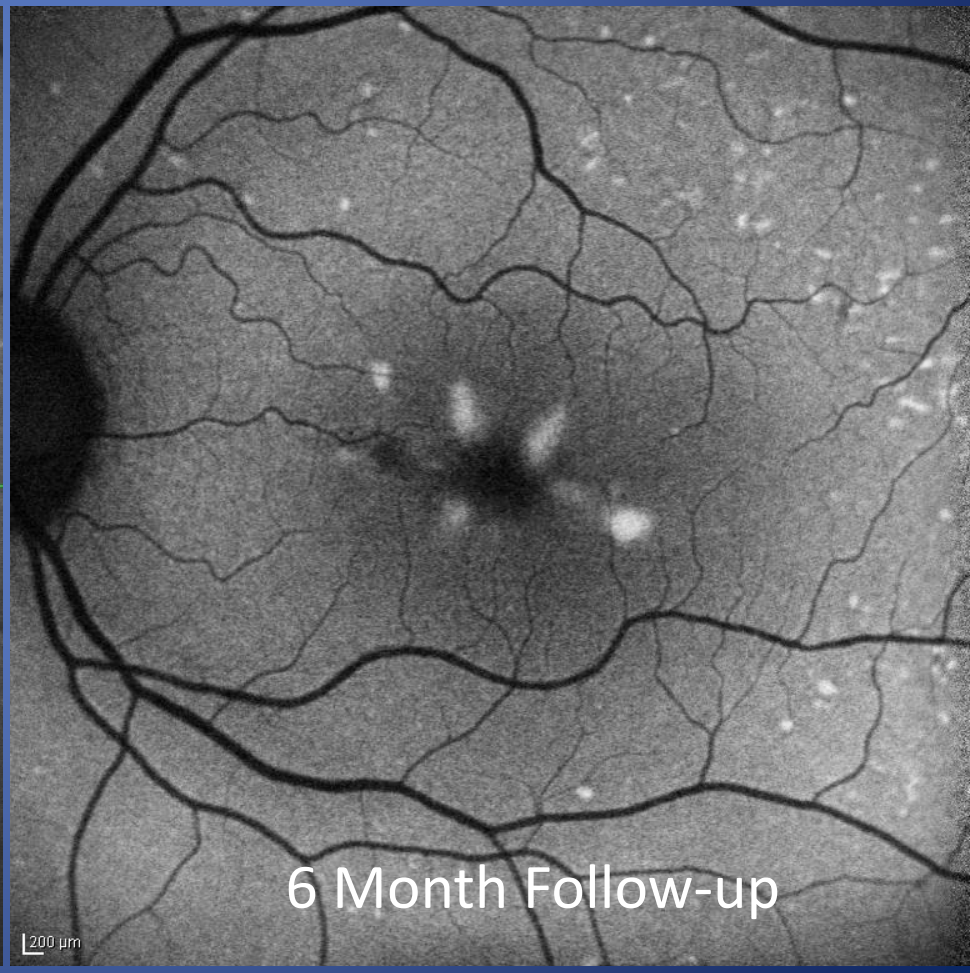
Autofluorescence

- New School:
  - Dry AMD.
  - Hereditary Macular Dystrophies.
  - hers u

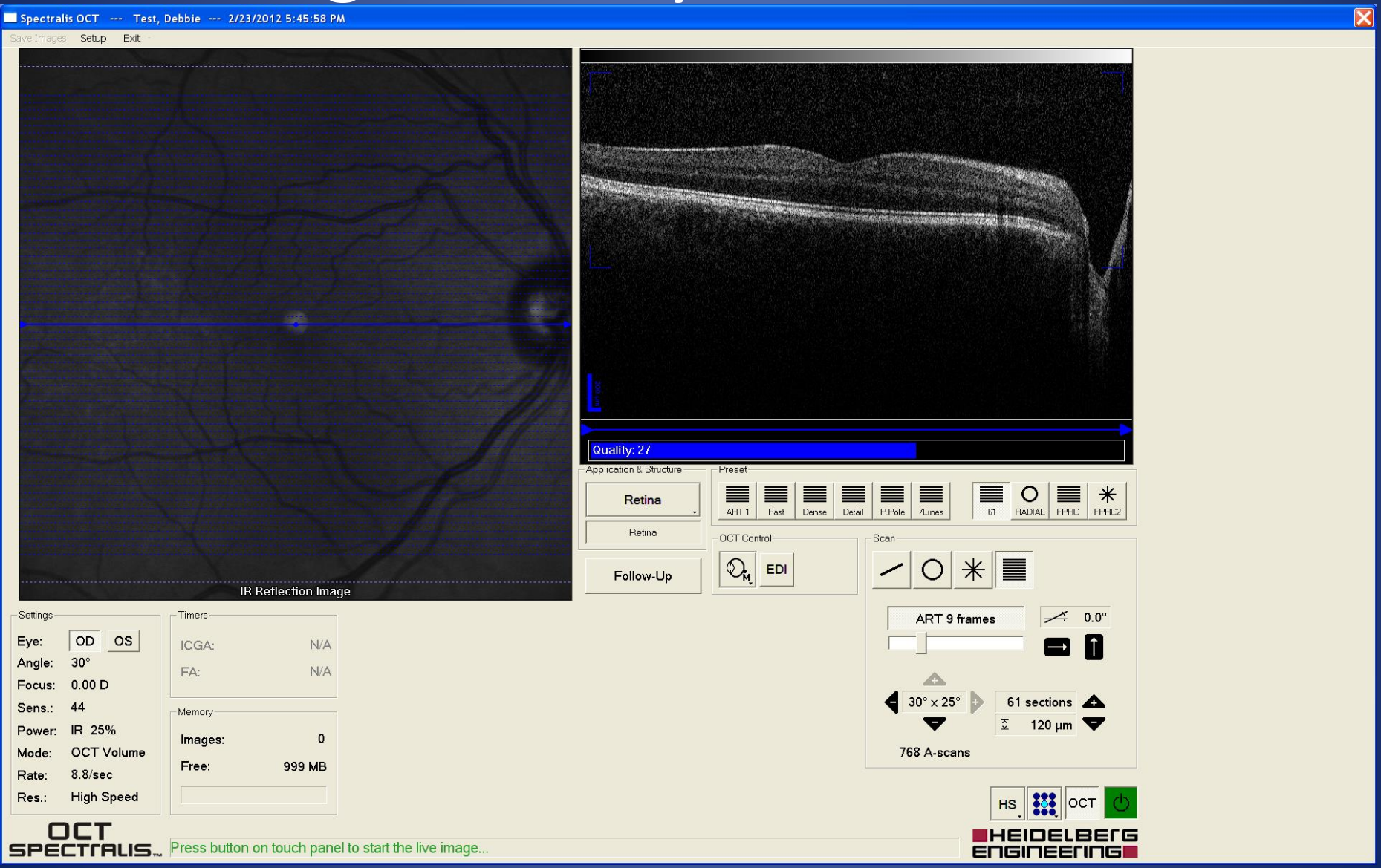


Fundus Autofluorescence (FAF)

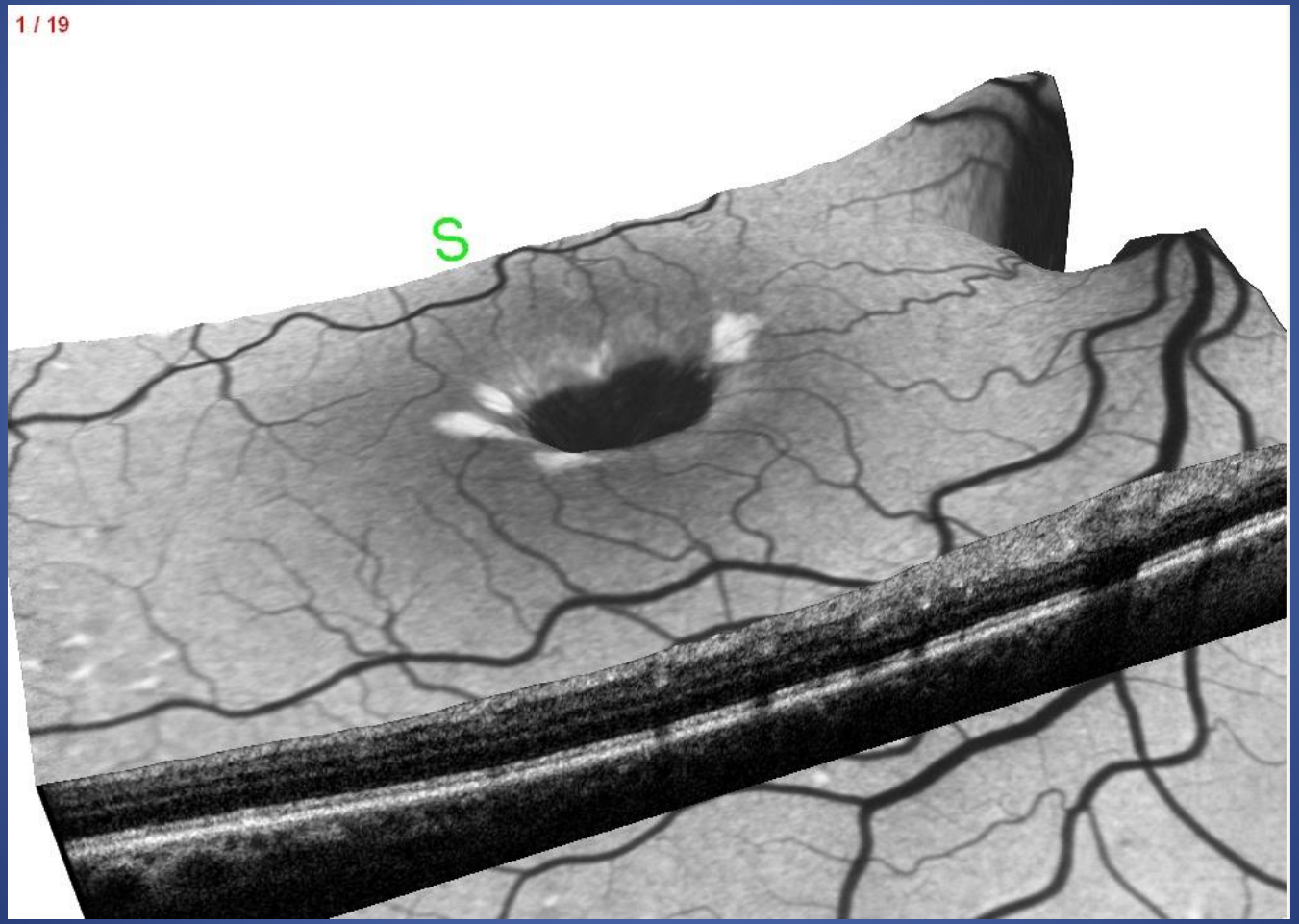


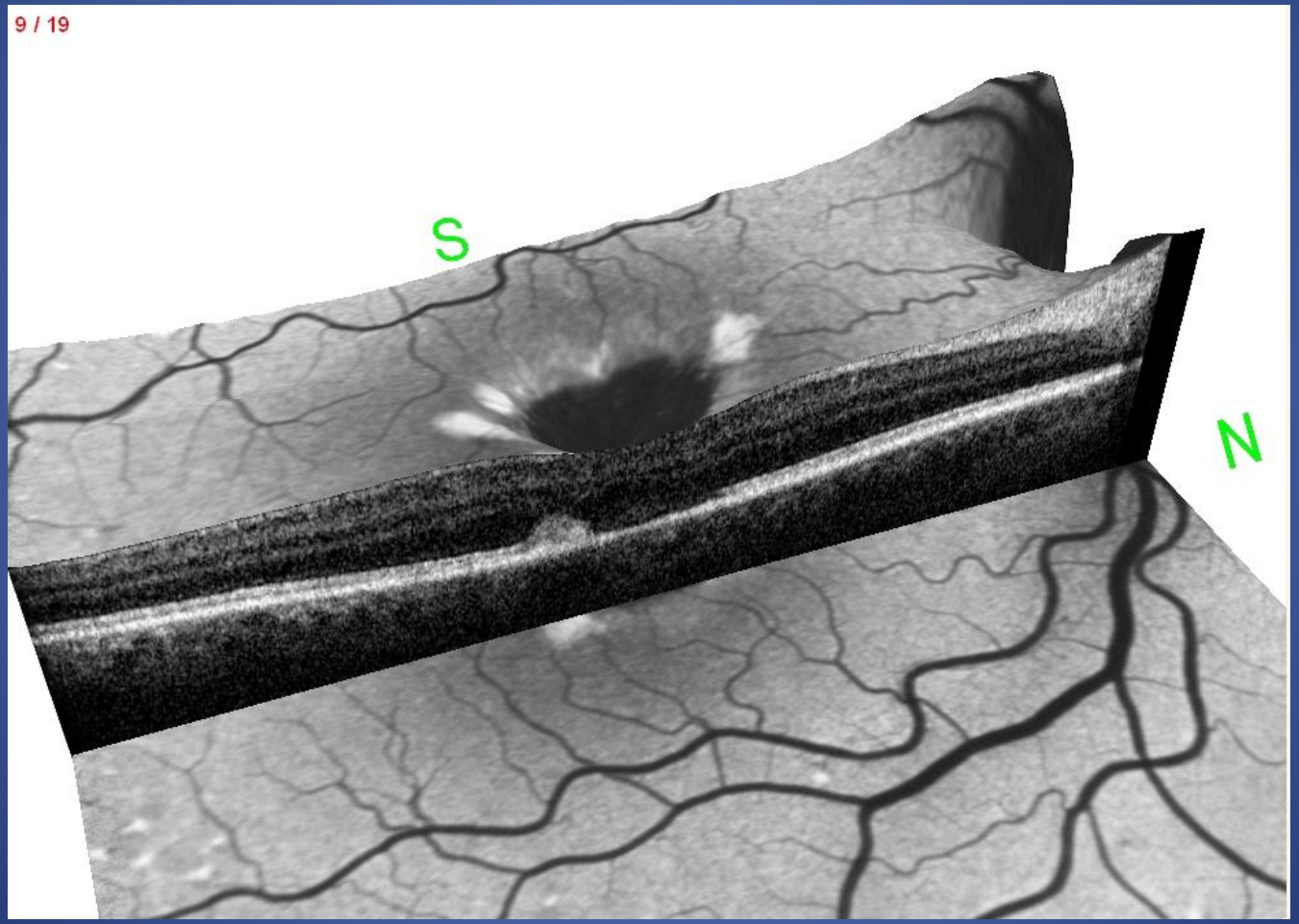


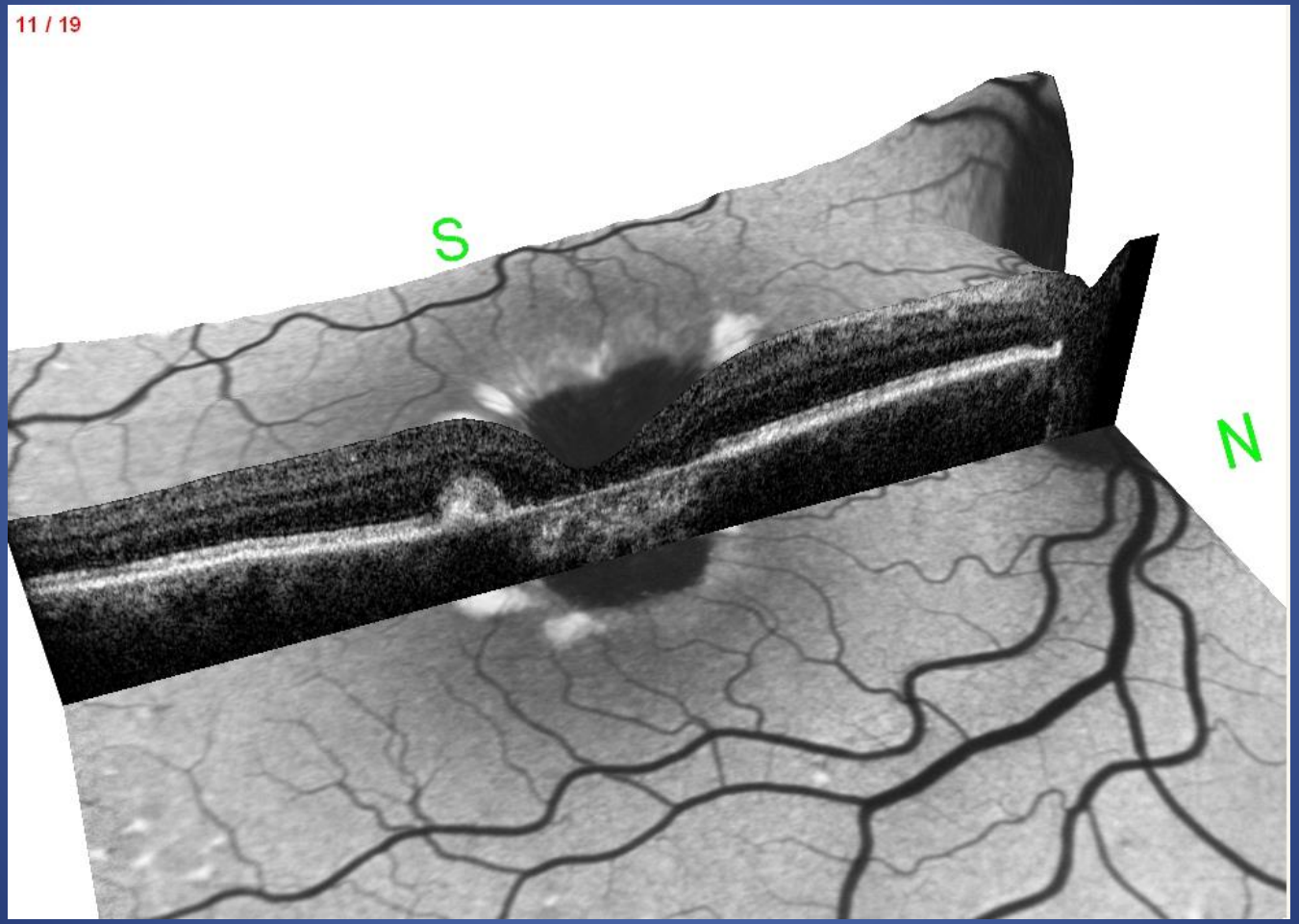
High-Density Volume Scan

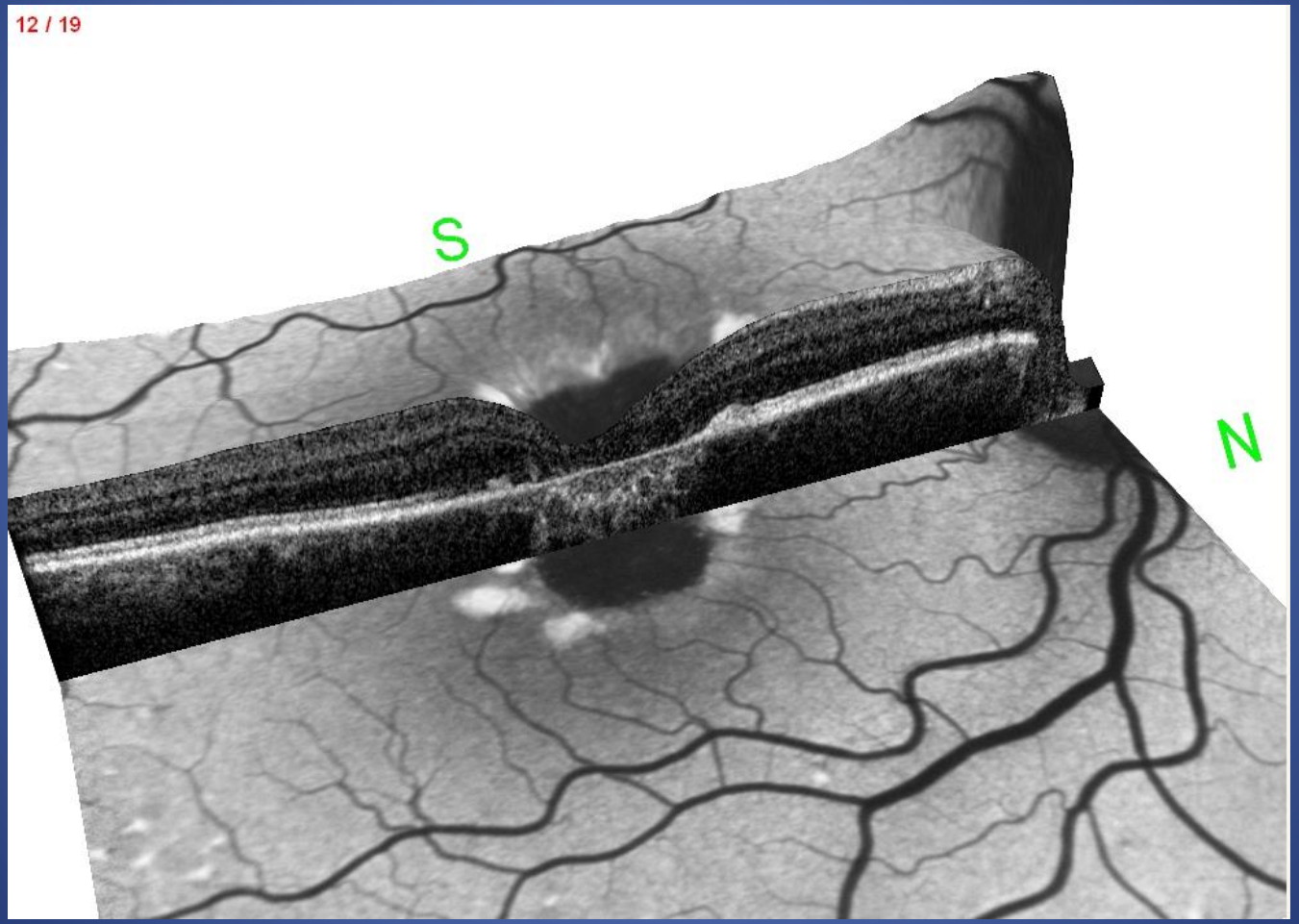


AF/SD-OCT

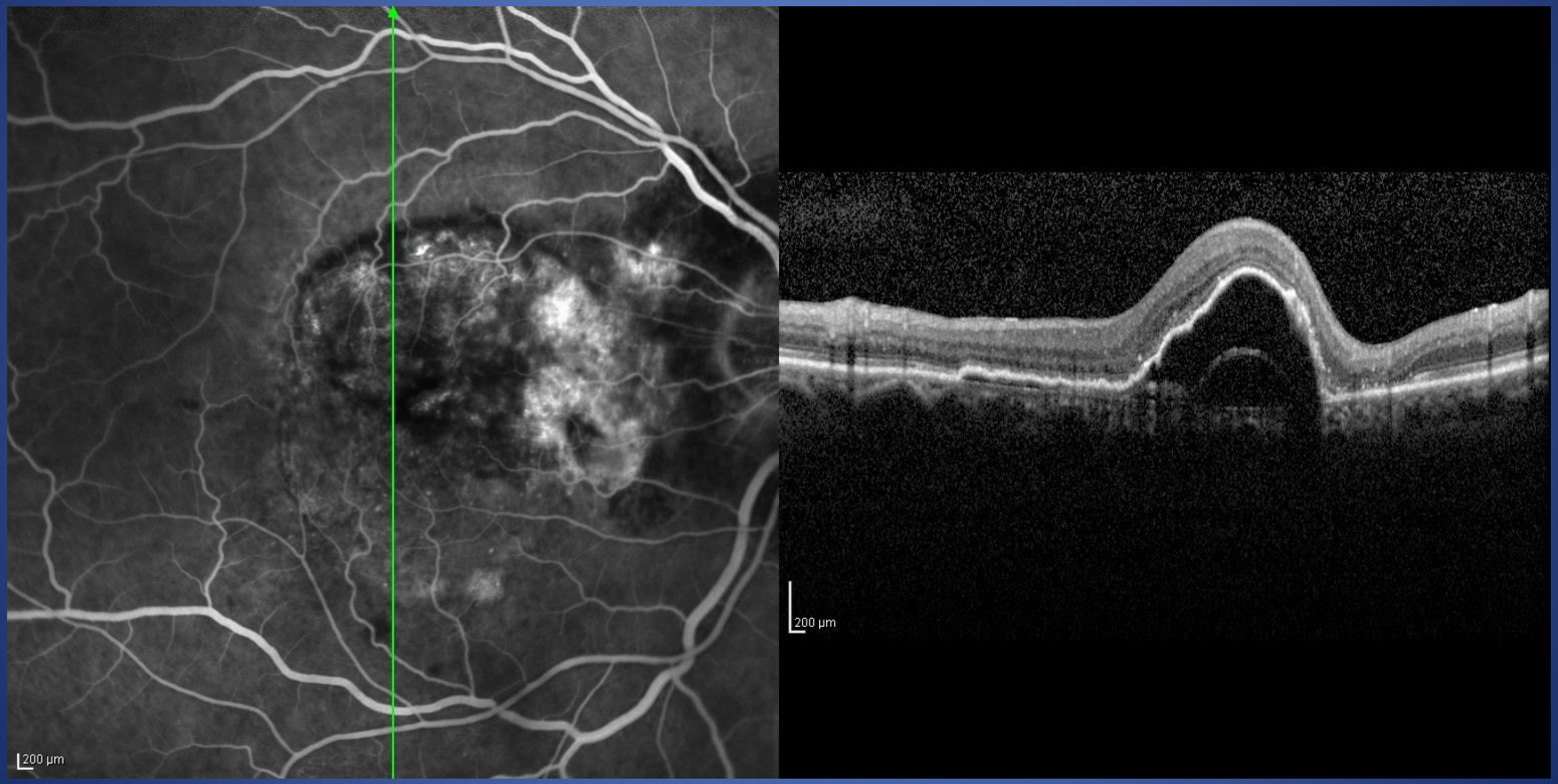



9 / 19
S
N

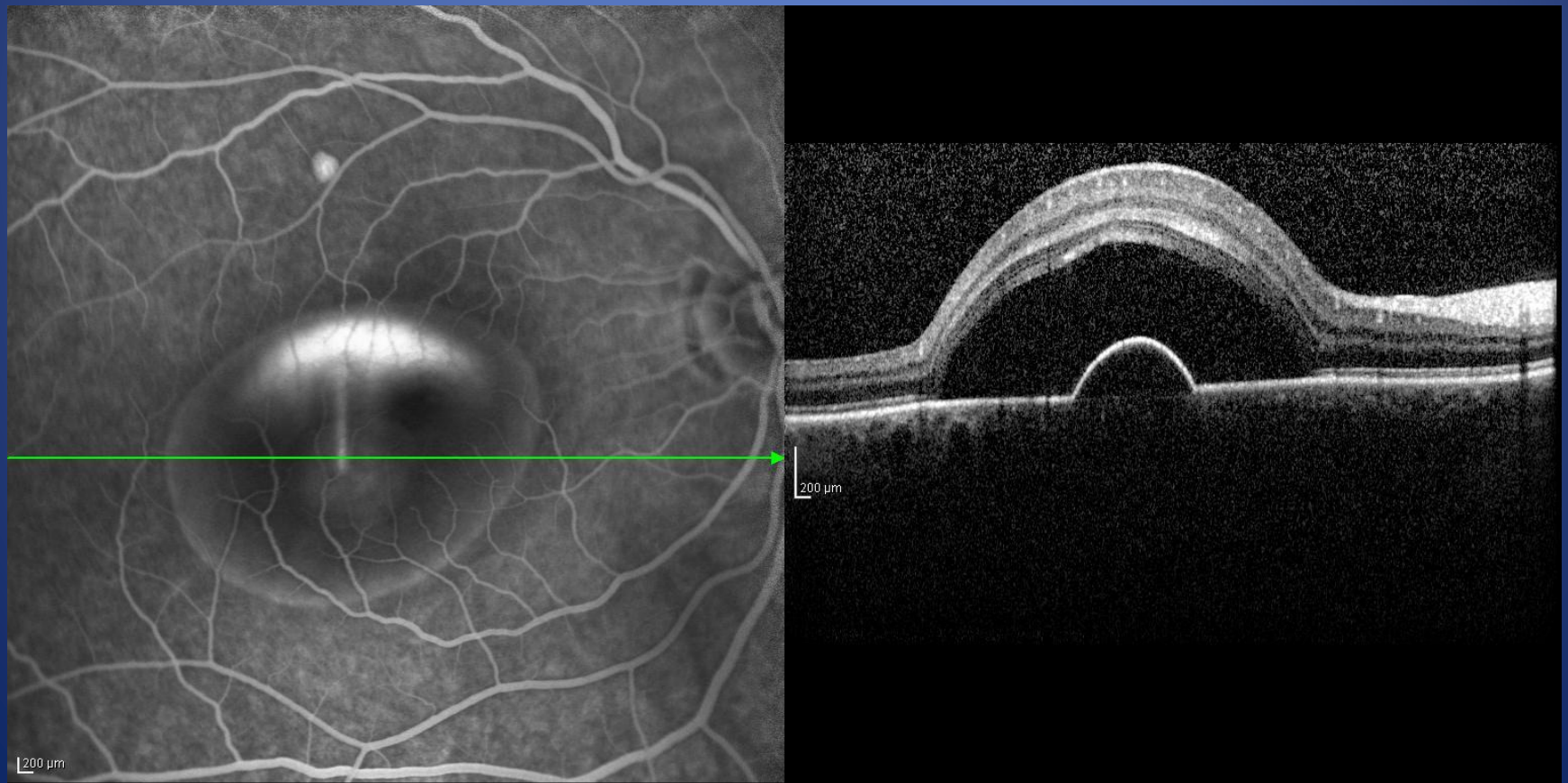

11 / 19
S
N


12 / 19
S
N

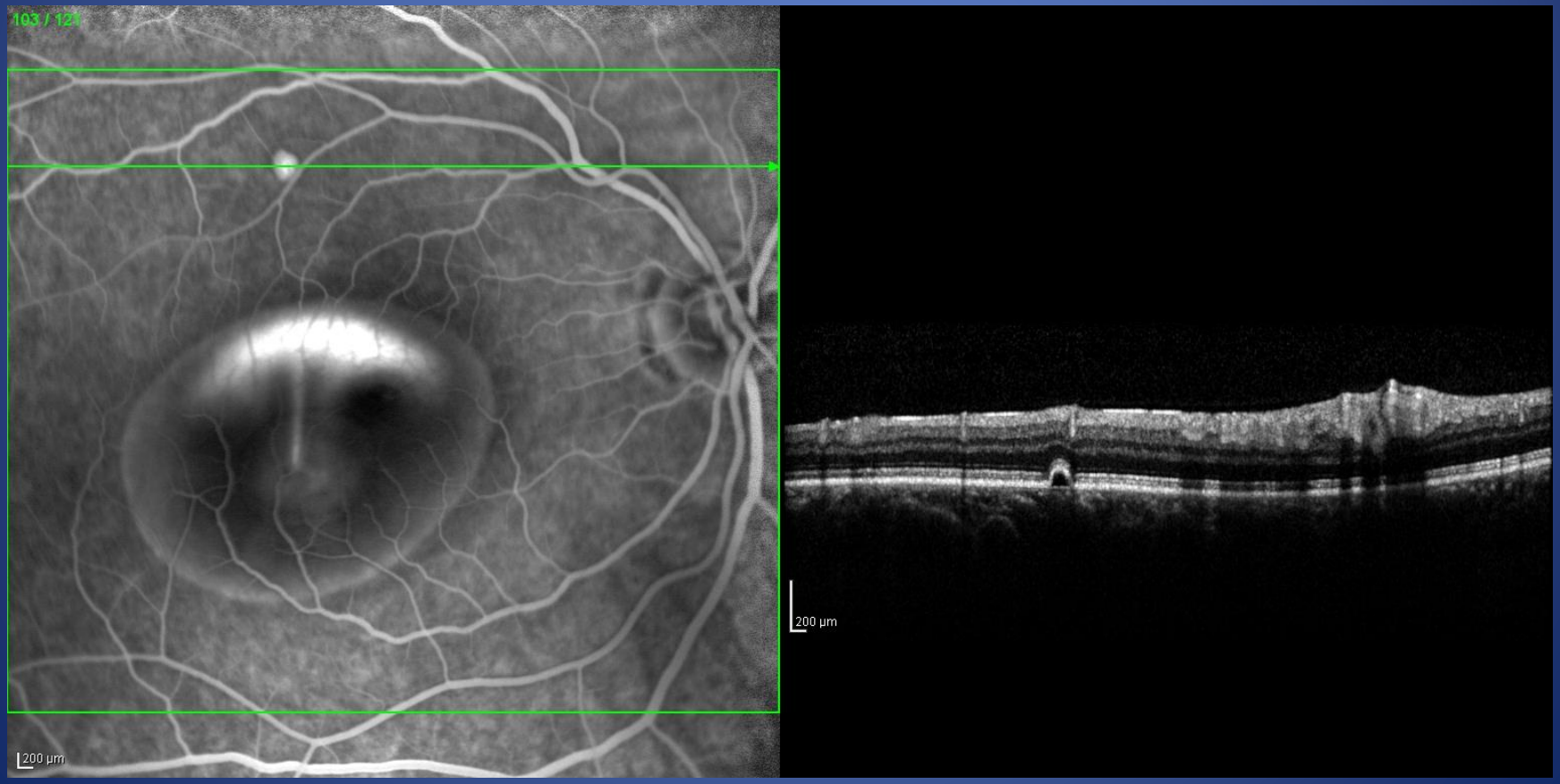
FA/SD-OCT



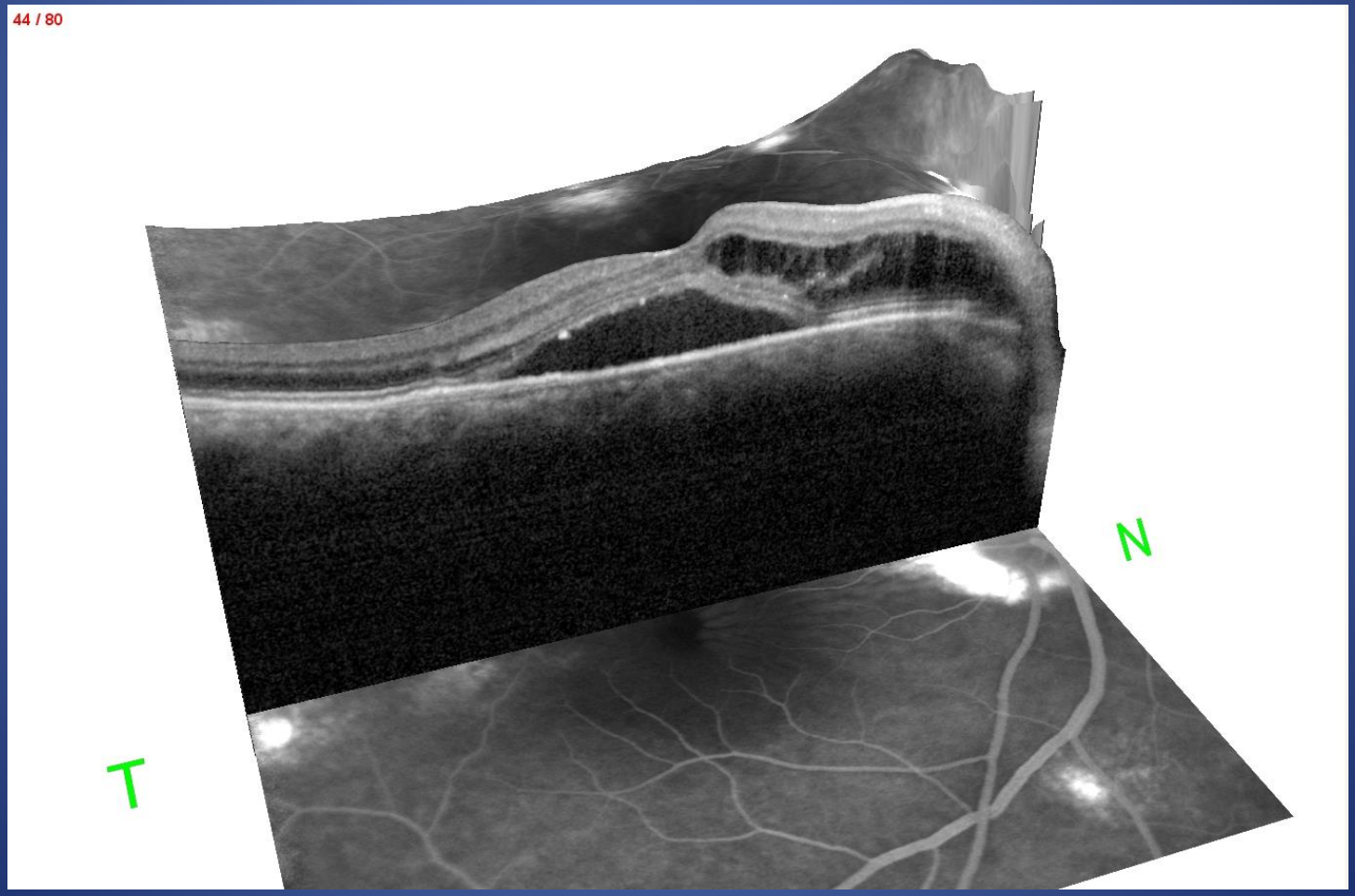
FA/SD-OCT

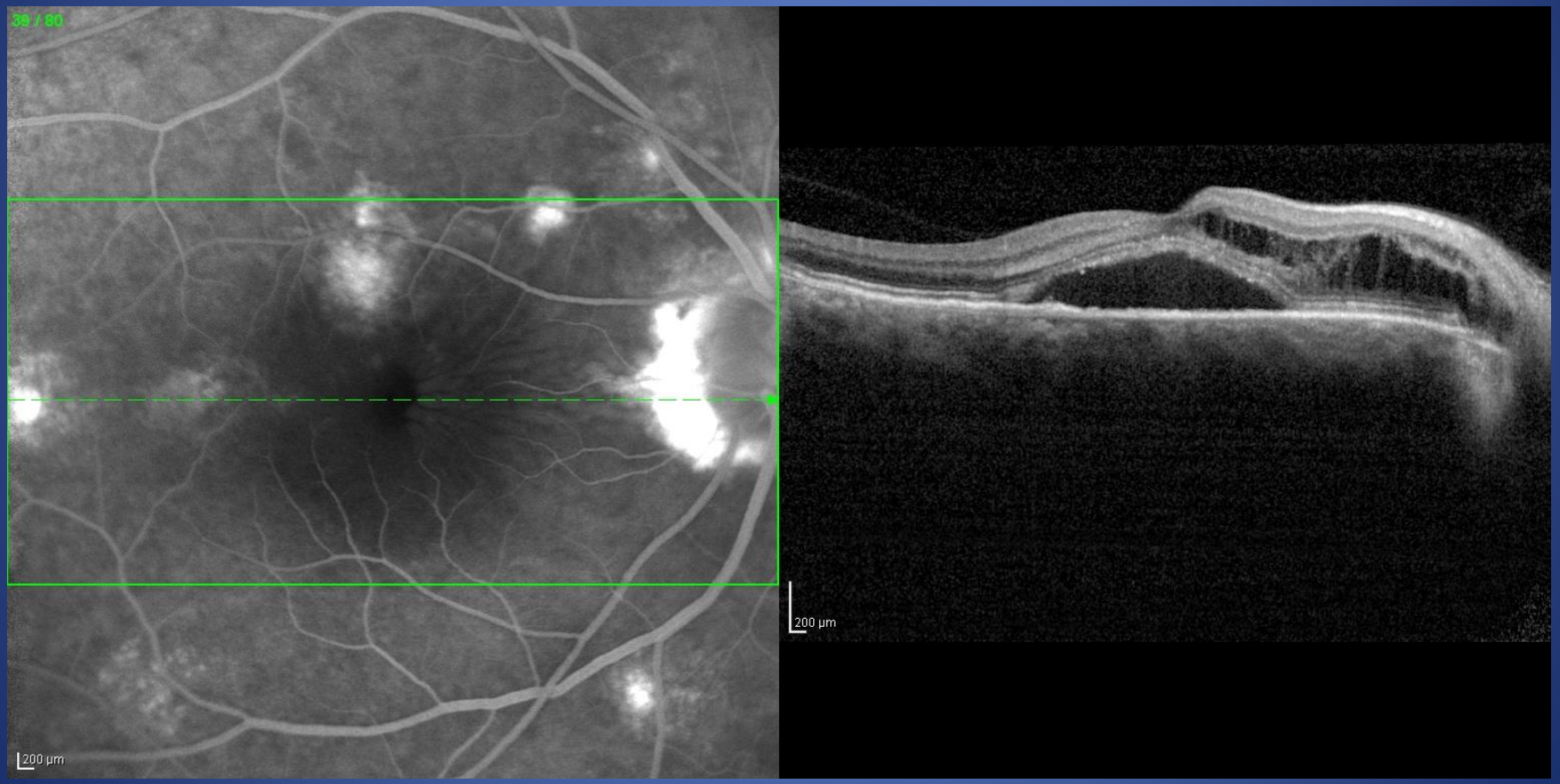


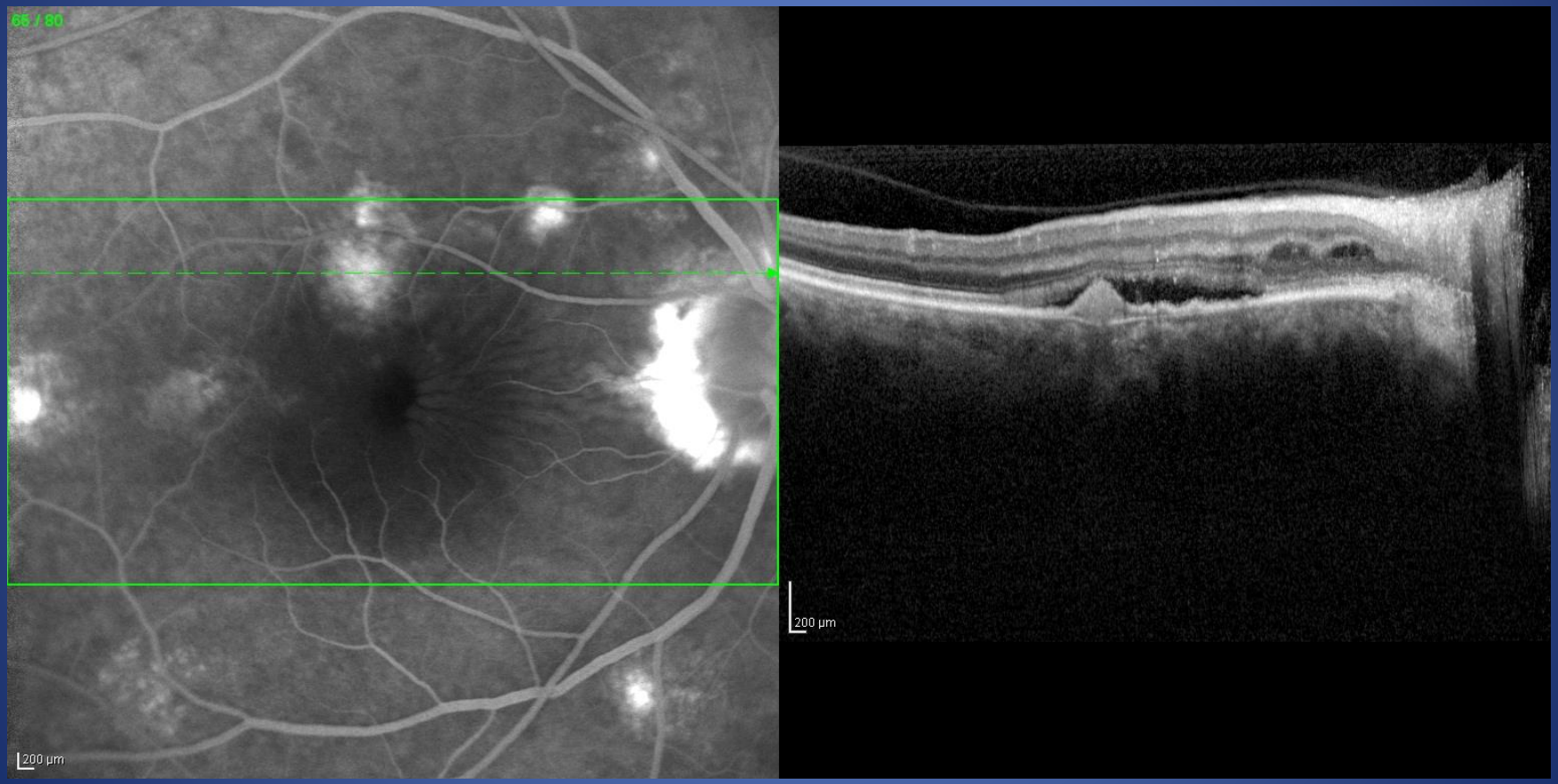
FA/SD-OCT



FA/SD-OCT, 61-Line Volume Scan



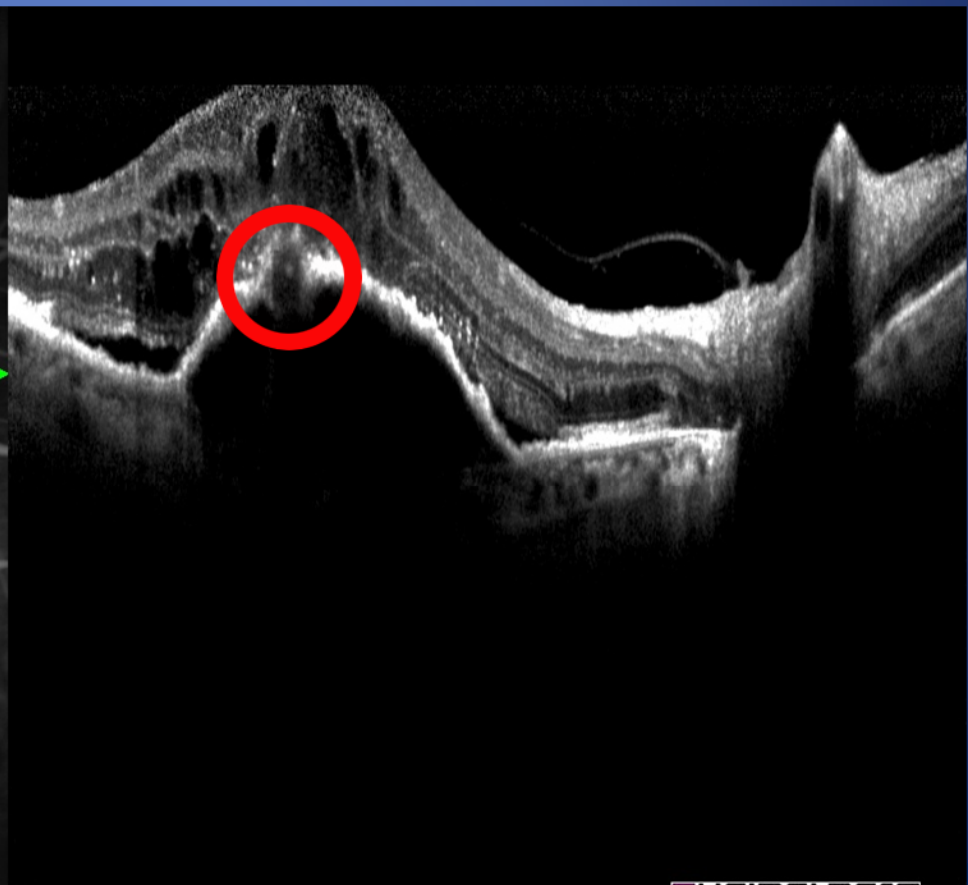

39 / 80
200 µm
200 µm


65 / 80
200 µm
200 µm

ICG/SD-OCT
Find it with ICG, go after it with OCT.

Function

Structure



High-Speed ICG Acquisition

- Heidelberg HRA2 & Spectralis.
- Laser Power Output:
  - Ophir Nova Power Meter: 2.4 - 2.8 mw.
- Set Defaults:
  - Movie Max, High-Speed.
  - 2-Second Buffer.
- Calibrate the Touch-Pad.

Parameters

- High-Speed (8.8 FPS, 768 x 768).
  - High-Res = 5 FPS…too slow (1536 x 1536)
- Standard Lens (rarely use the 55).
- 100% Laser Output (rarely 75%-HRA2)
- Sensitivity (<90%)
- No dual-FA/ICG.

ICG Dye Prep

-2 cc's of Aqueous Solvent.

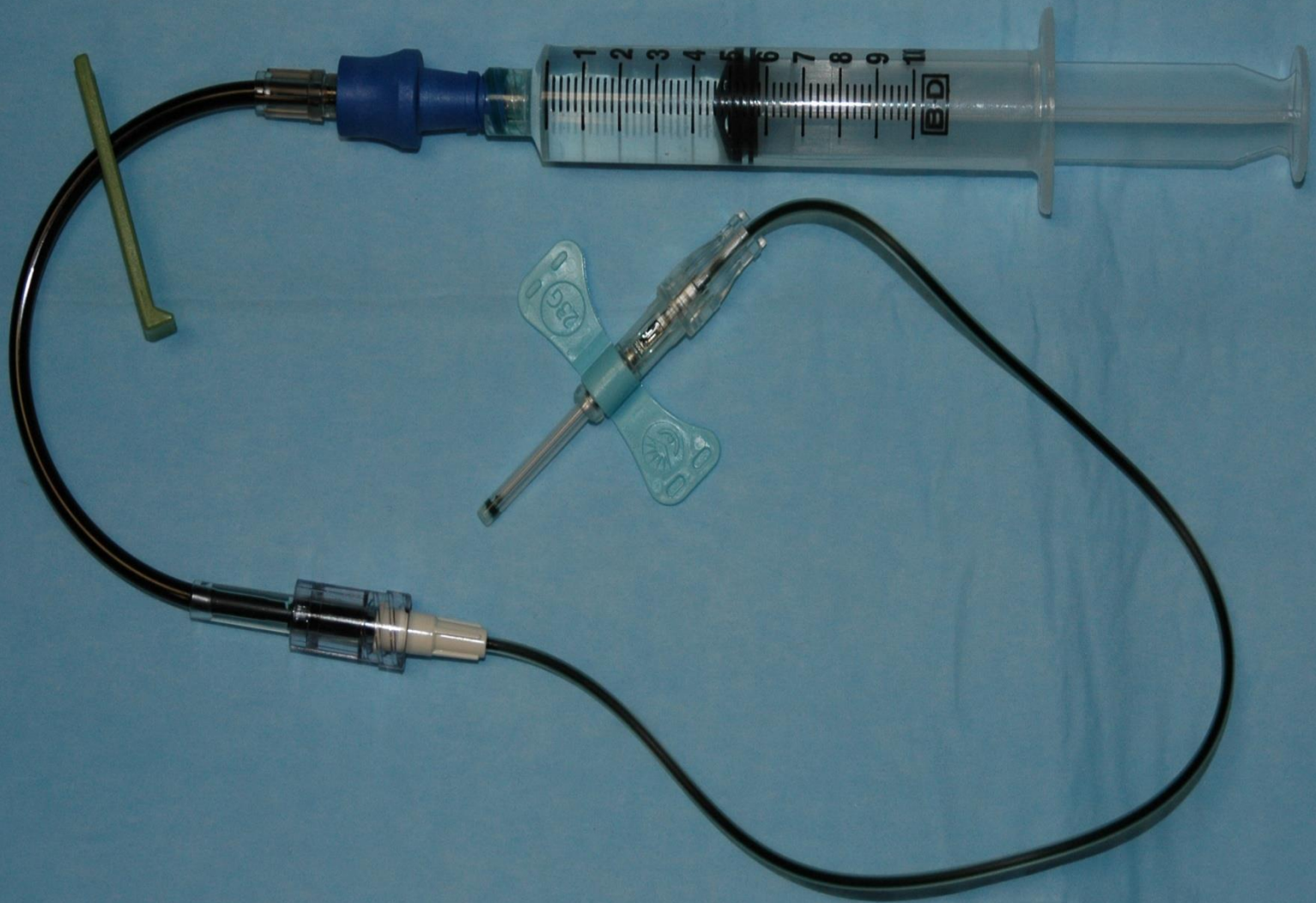
-Draw 1cc into TB Syringe.

-Draw 3cc sodium chloride for flush.

-Attach a 7 inch Macrobore Extension set to a 12 inch Butterfly infusion set.

-Push Dye into Tubing, Remove TB Syringe.

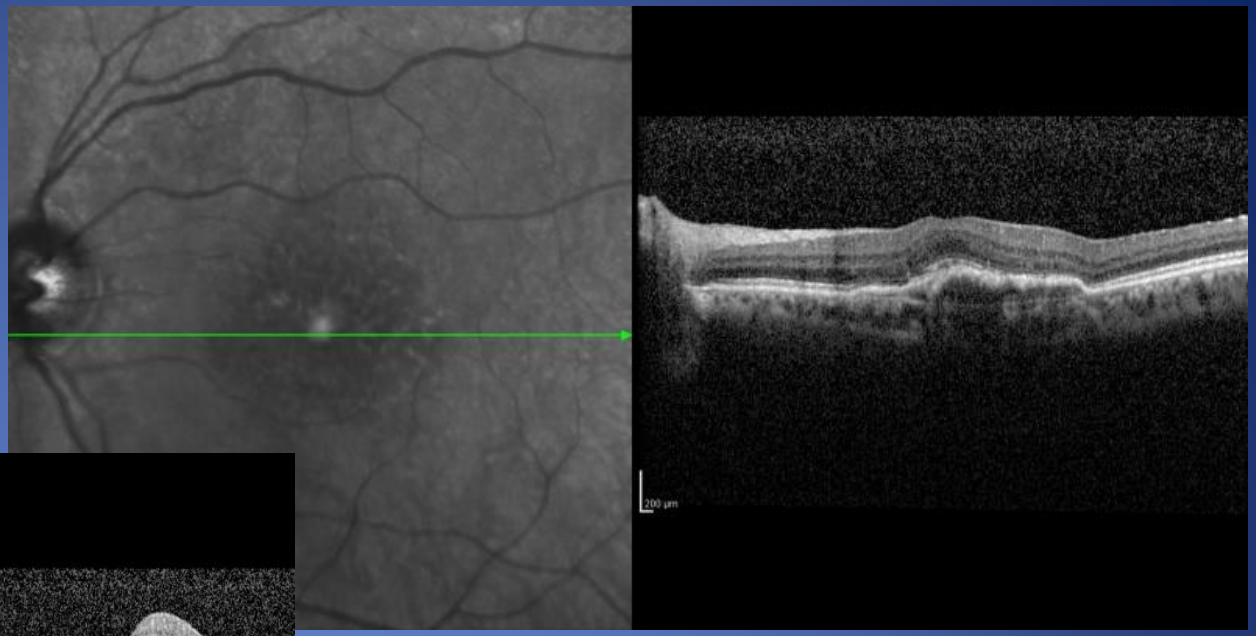
-Attach Saline Flush Syringe.

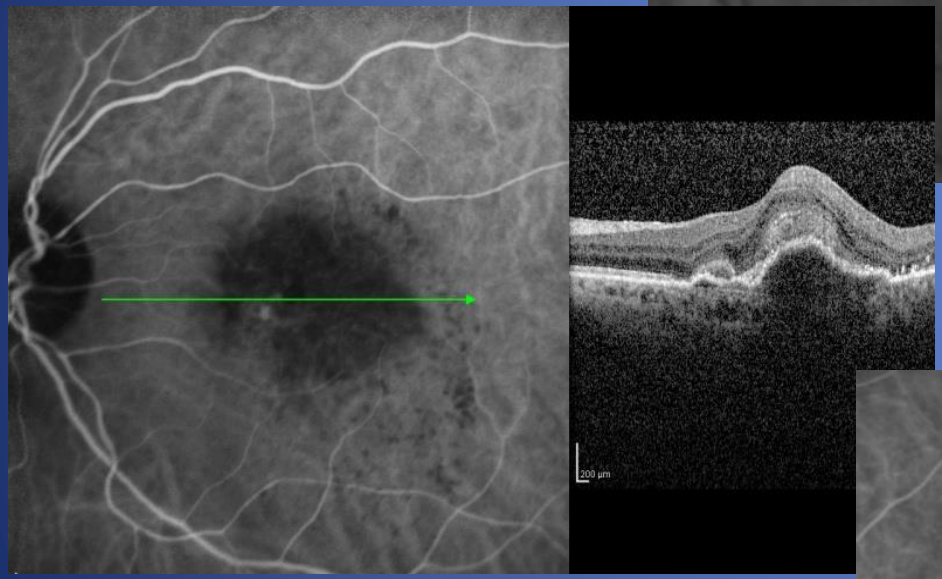


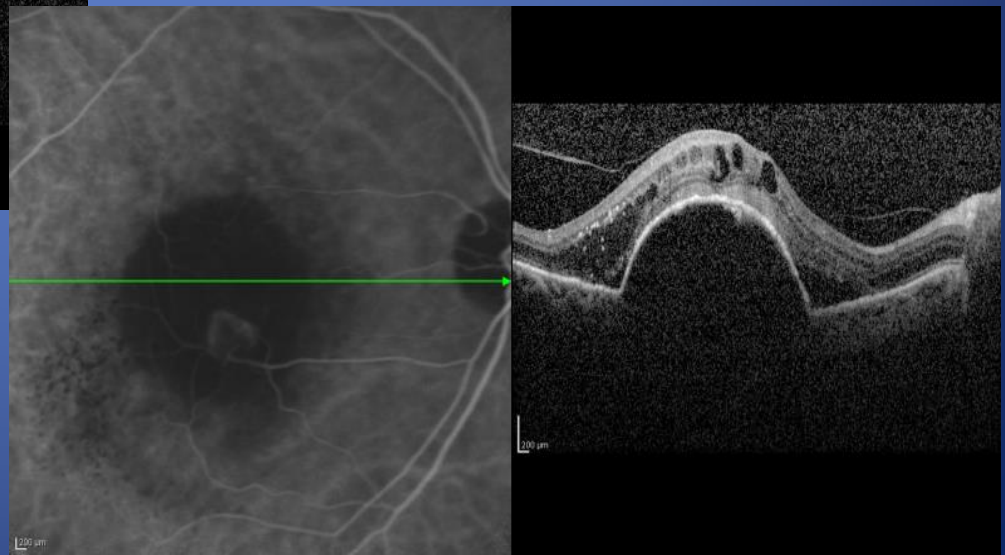
Focus

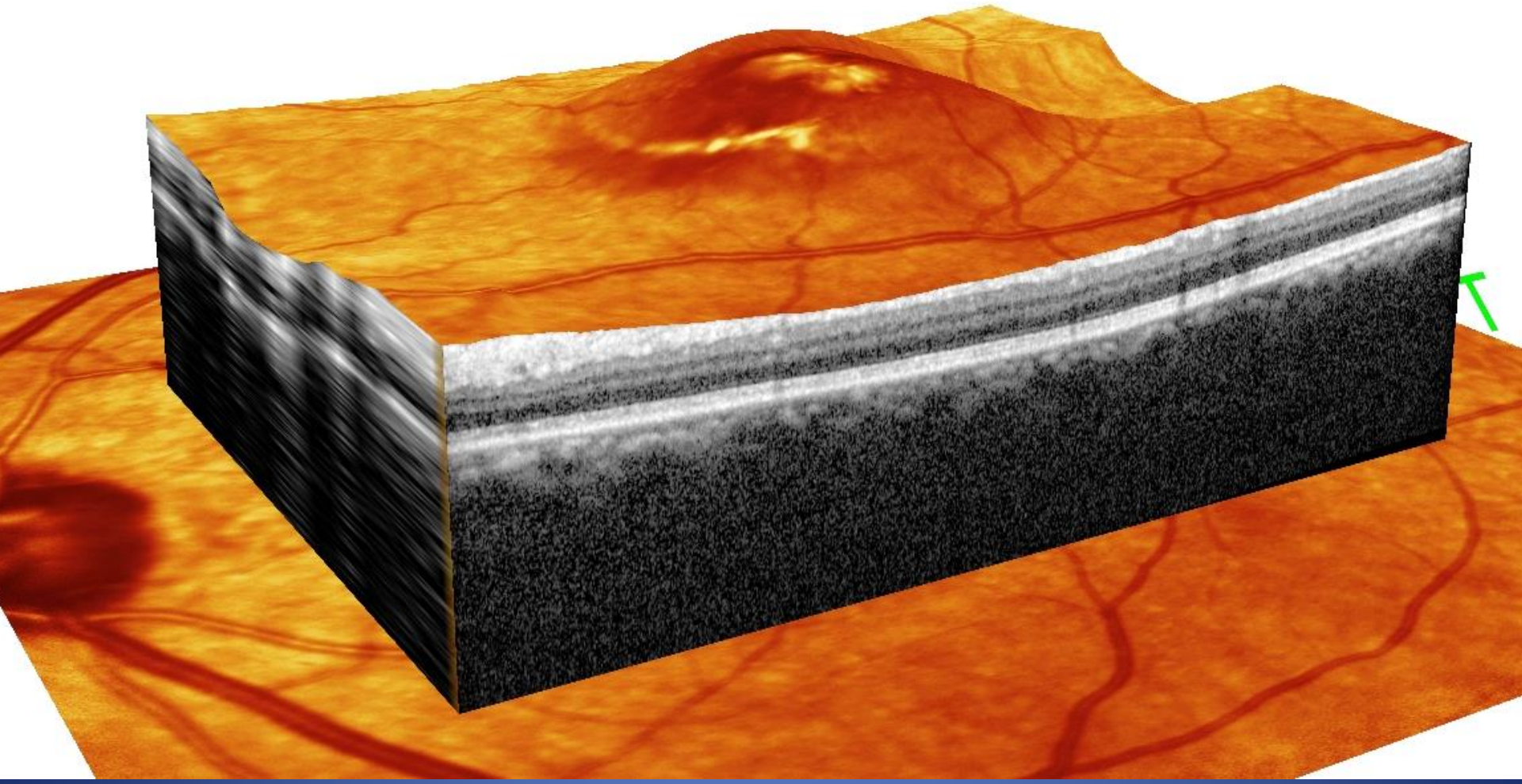
- Use IR setting.
- Focus is achieved when image is Brightest.

- Focus on retinal surface (Not on PED).
  - Look at the OCT!
- Suspect Feeder: Focus .25D Deeper.
- Suspect RAP Stage 2 or 3: Focus .25D Anterior.
- Suspect PCV or Stage 1 RAP: No Focus Change.
- Alignment is KEY to Avoiding Grain.
  - Stay Axial unless Central Cataract.


200 µm

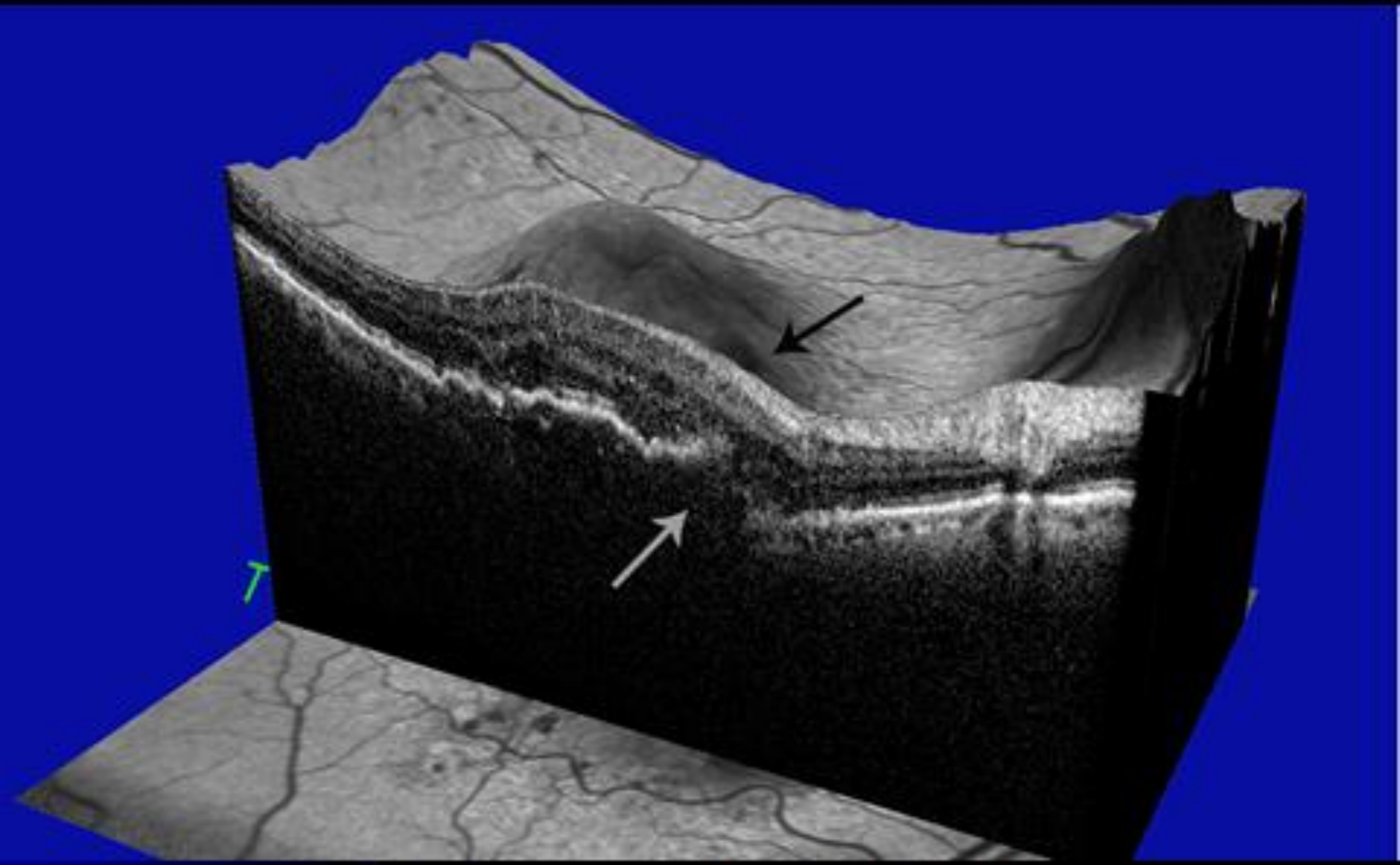

200 µm


200 µm
200 µm

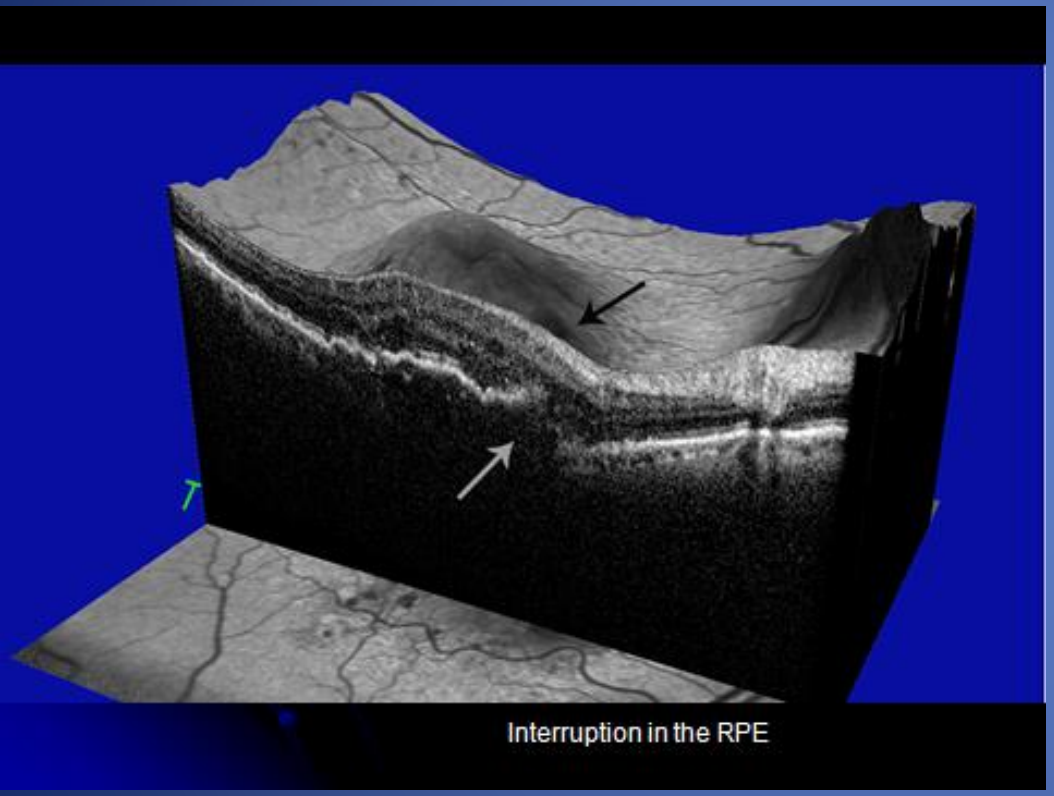


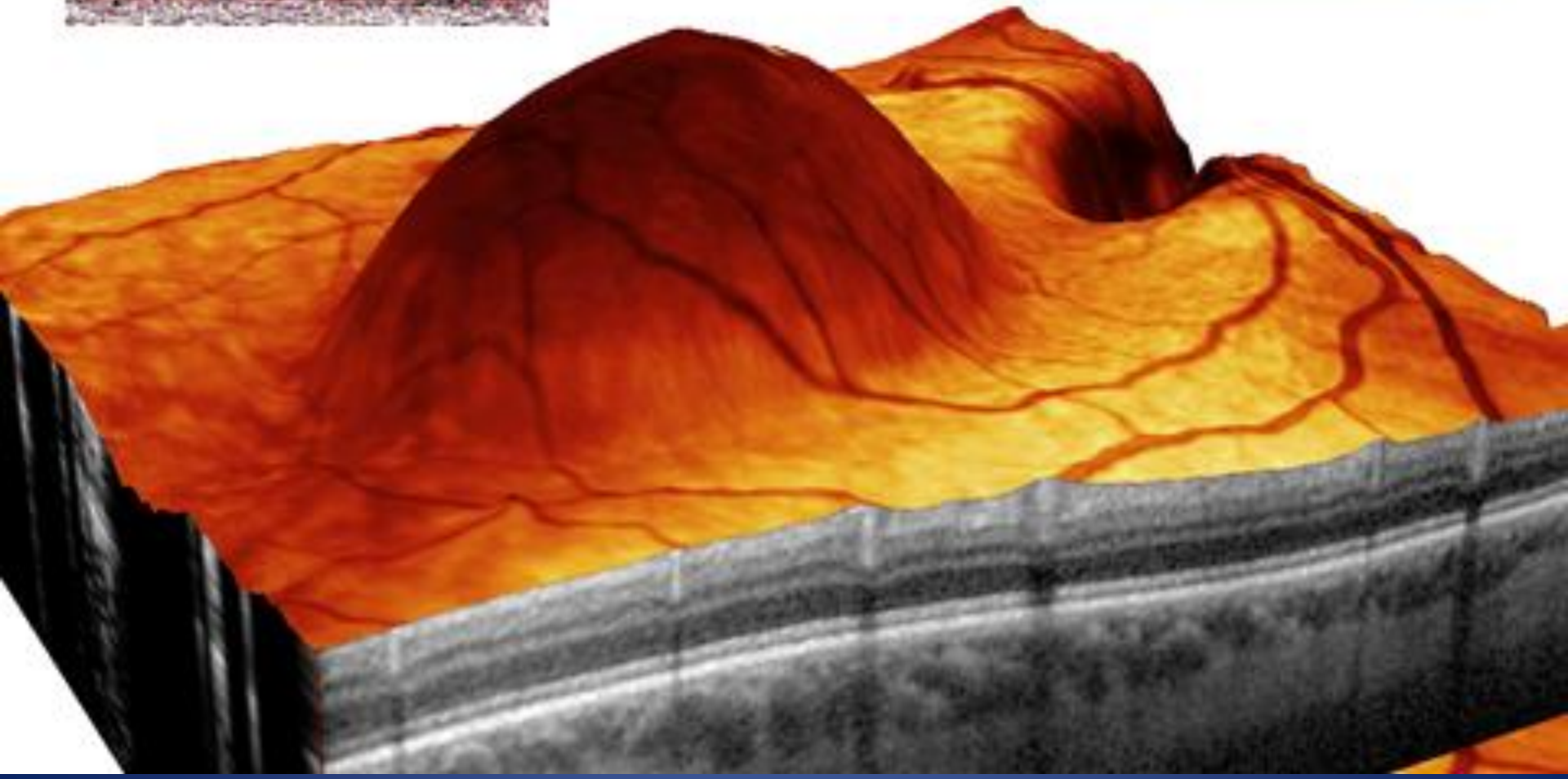
82 y/o with AMD
20/64 OD, 20/25 OS


61 Line Volume Scan

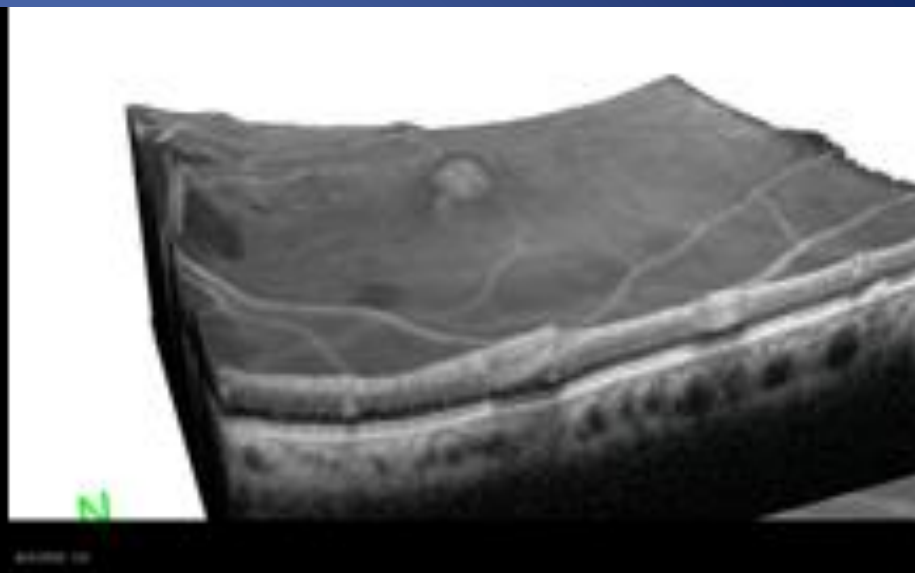


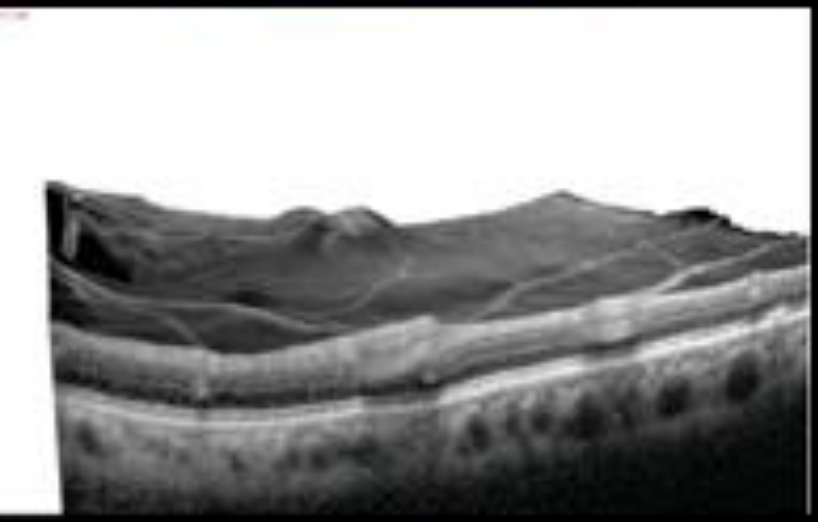
Interruption in the RPE

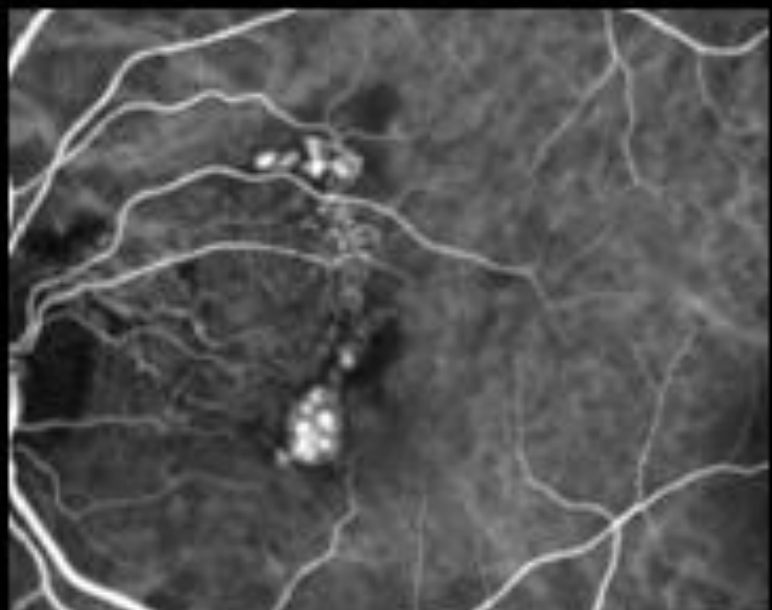

Interruption in the RPE



Polypoidal Choroidal Vasculopathy







Patient Management

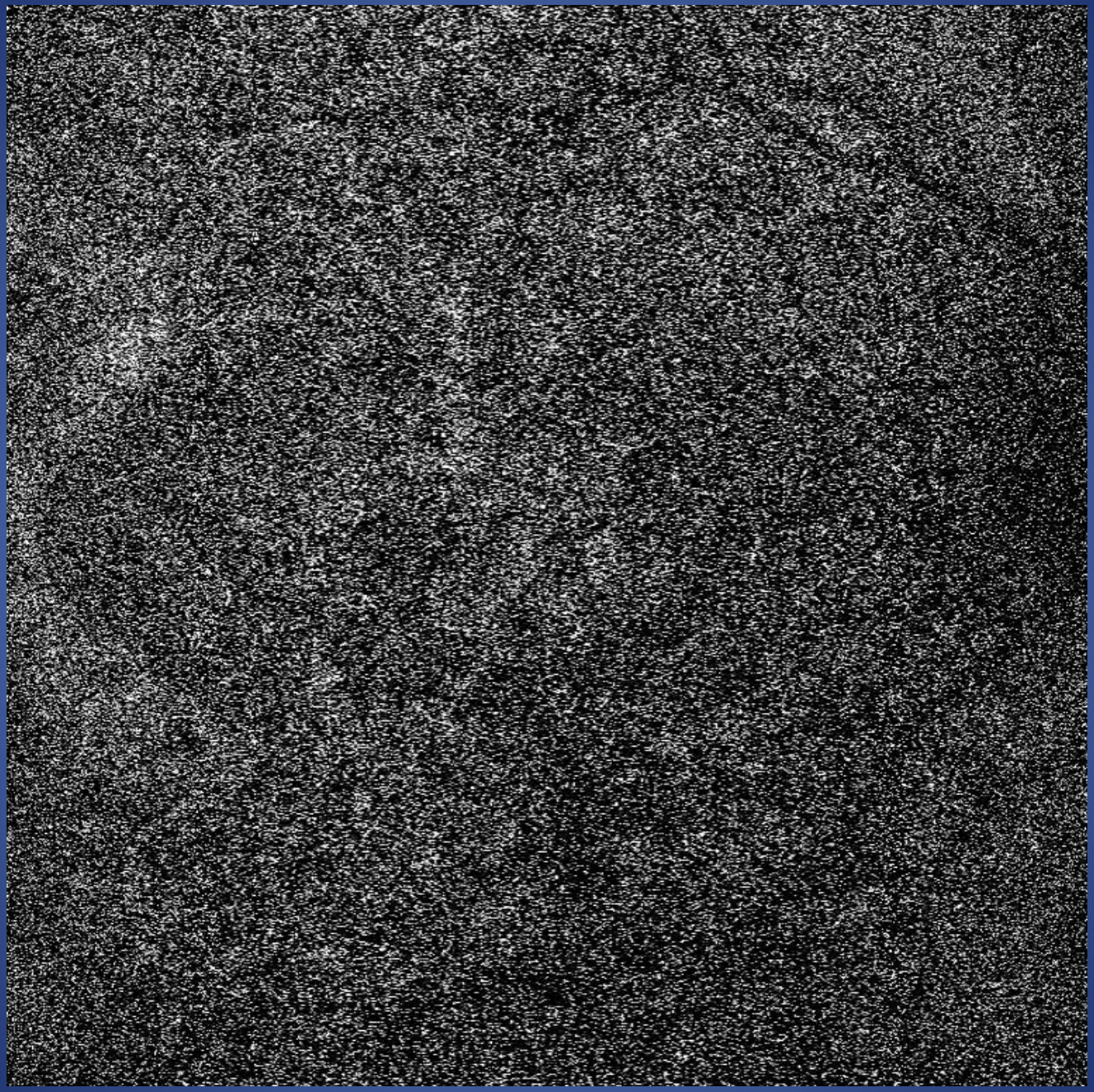
- Make Sure the Patient understands what is going to happen…
  - Their hard work is a BIG part of getting a successful study.
  - "…hold perfectly still for the first minute, then you can relax.."
  - Get someone to hold their head in place if need be.
  - Align – inject – then Coach them thru it.

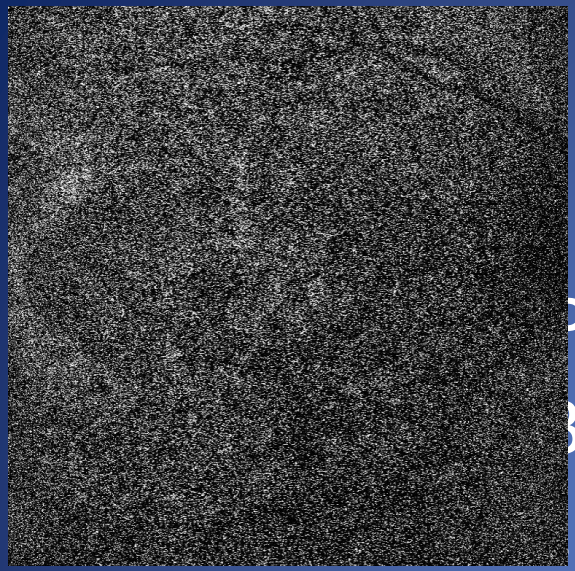
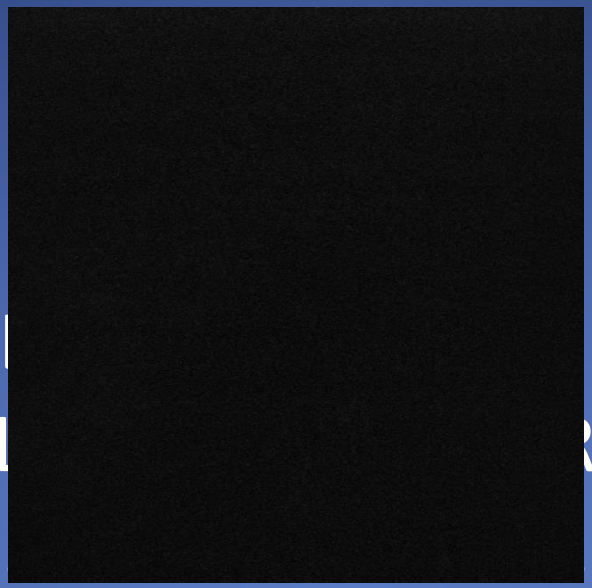
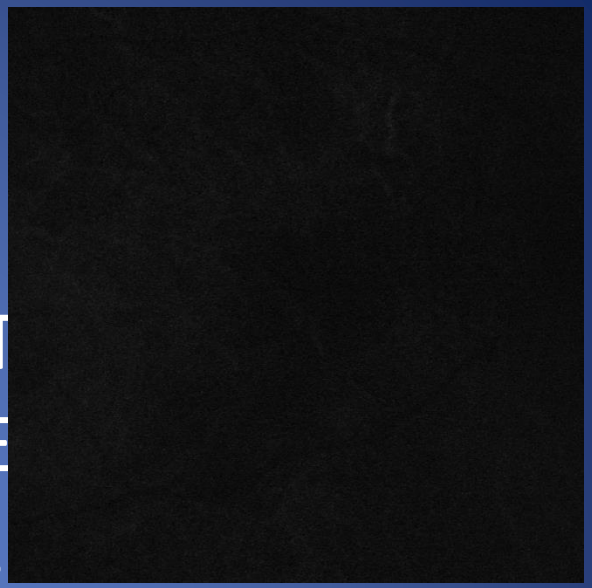
Capture Protocol

- AF
- IR
- ICG Movie to 1 Minute.
- Still Image Capture at 1 Minute Study Eye.
- Still Image Capture at 1 Minute Fellow Eye.
- Late ICG images at 2 Minutes, OU.

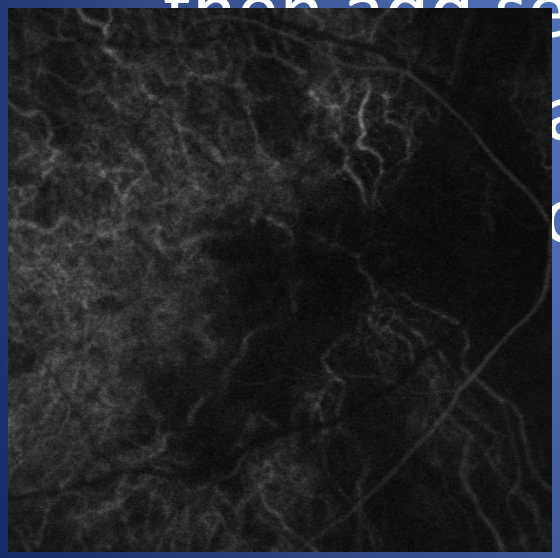
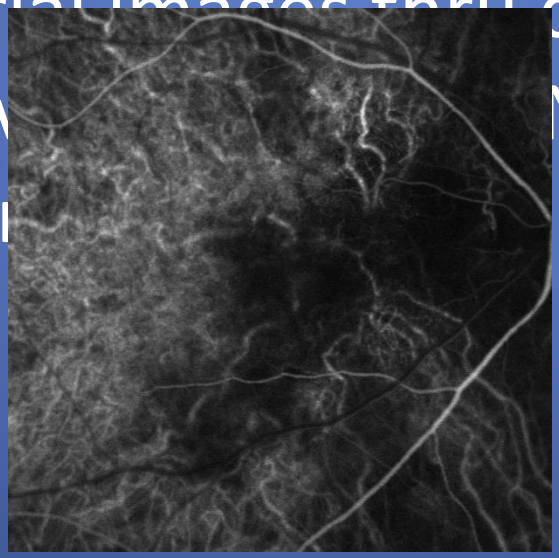
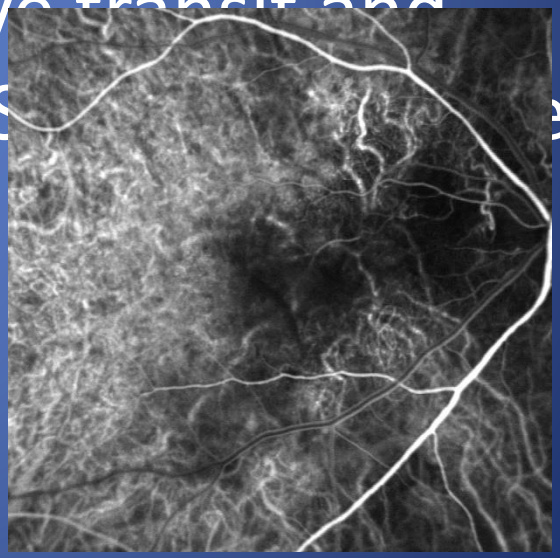
HRA2 or Spectralis Settings:

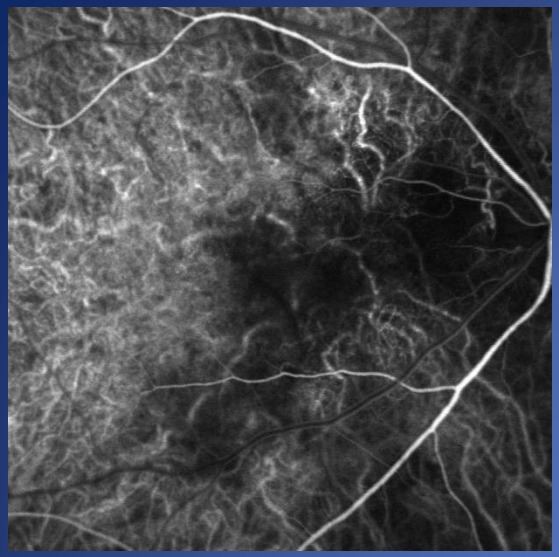
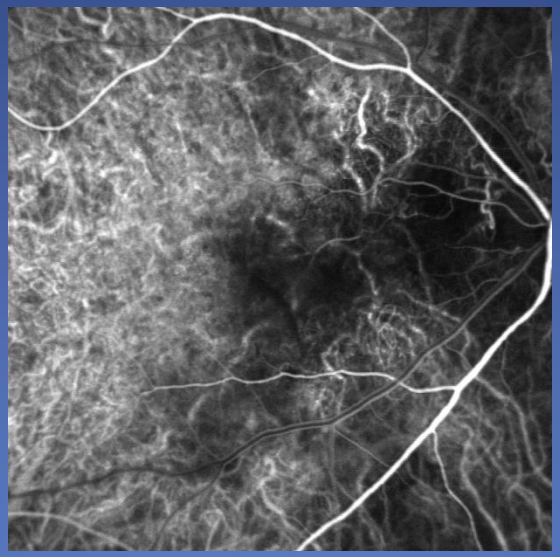
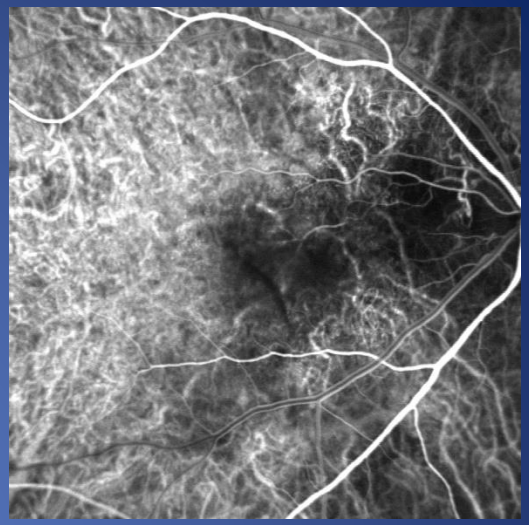
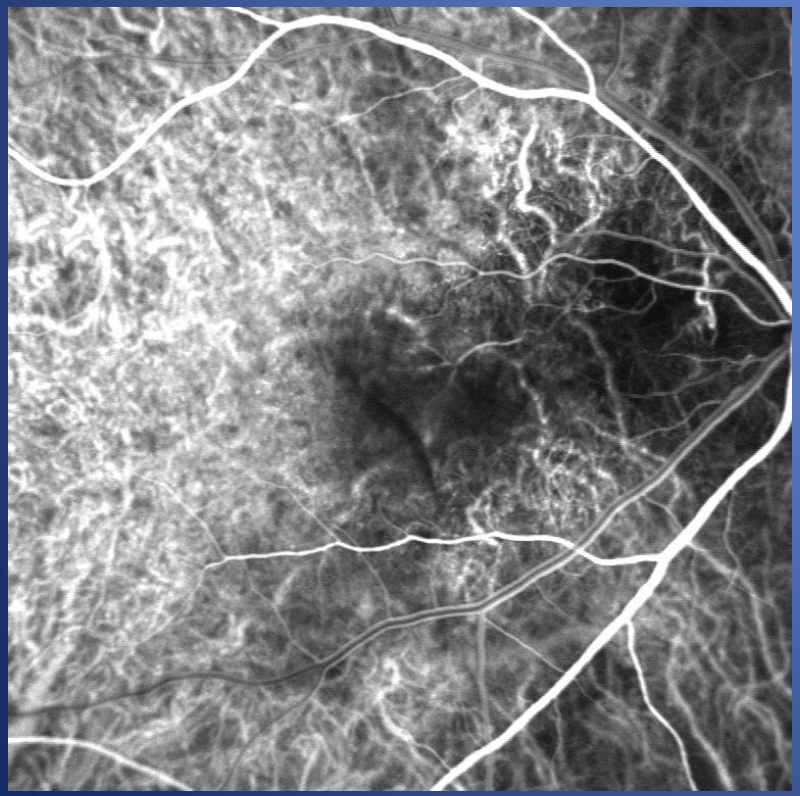
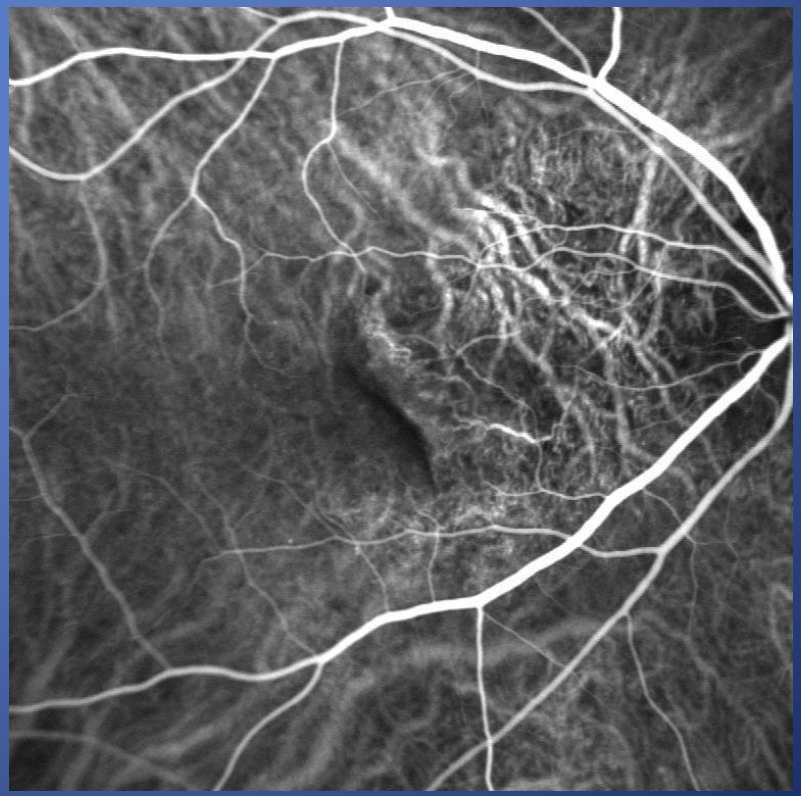
- 100% Power.
- Movie Max.
- High speed.
- ICG Setting.

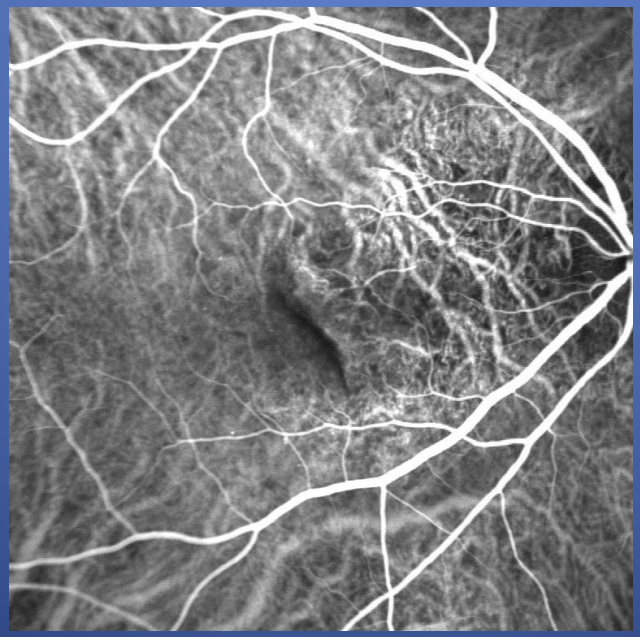


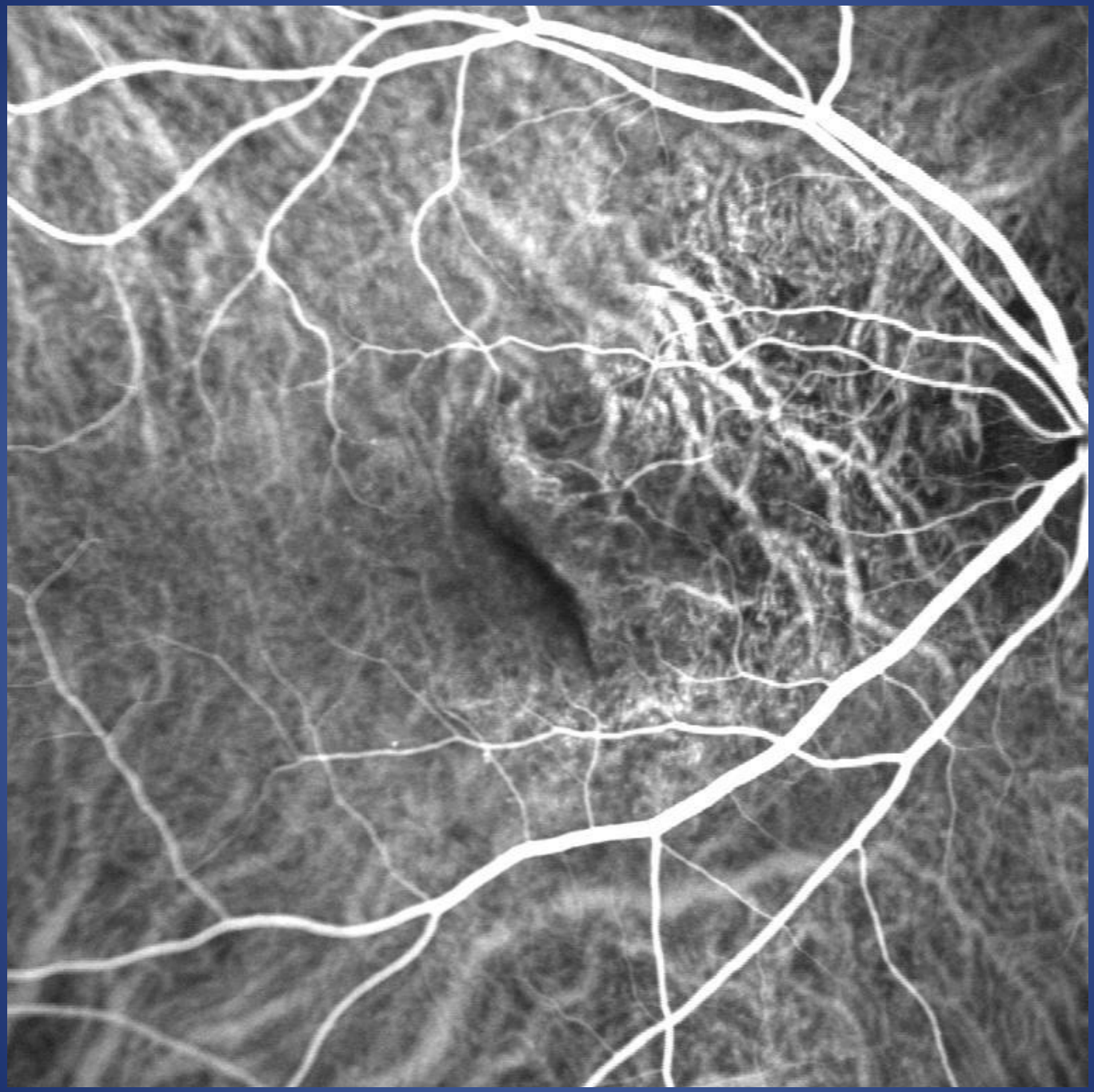




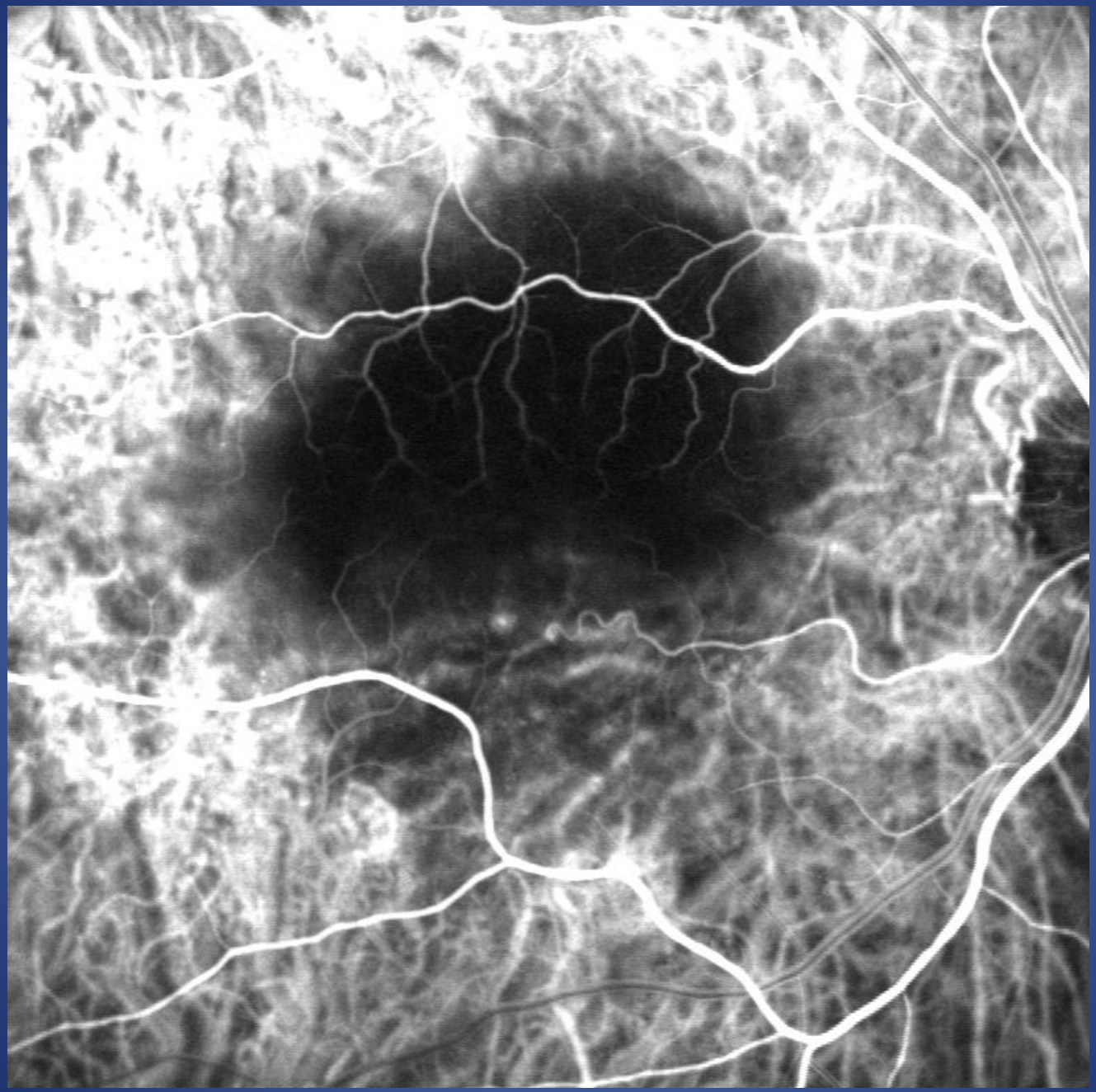
then add serial images thru dye transit and

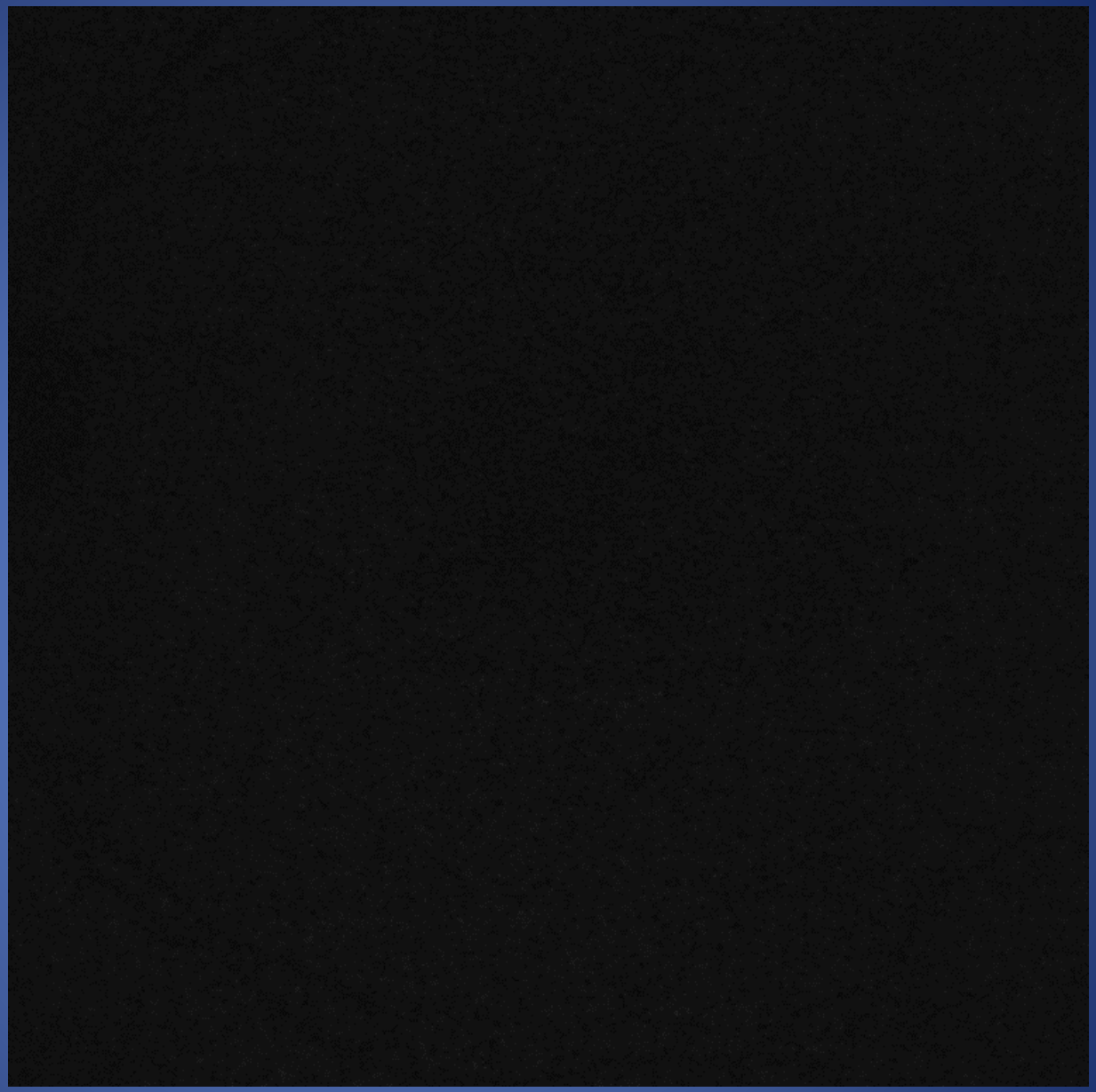




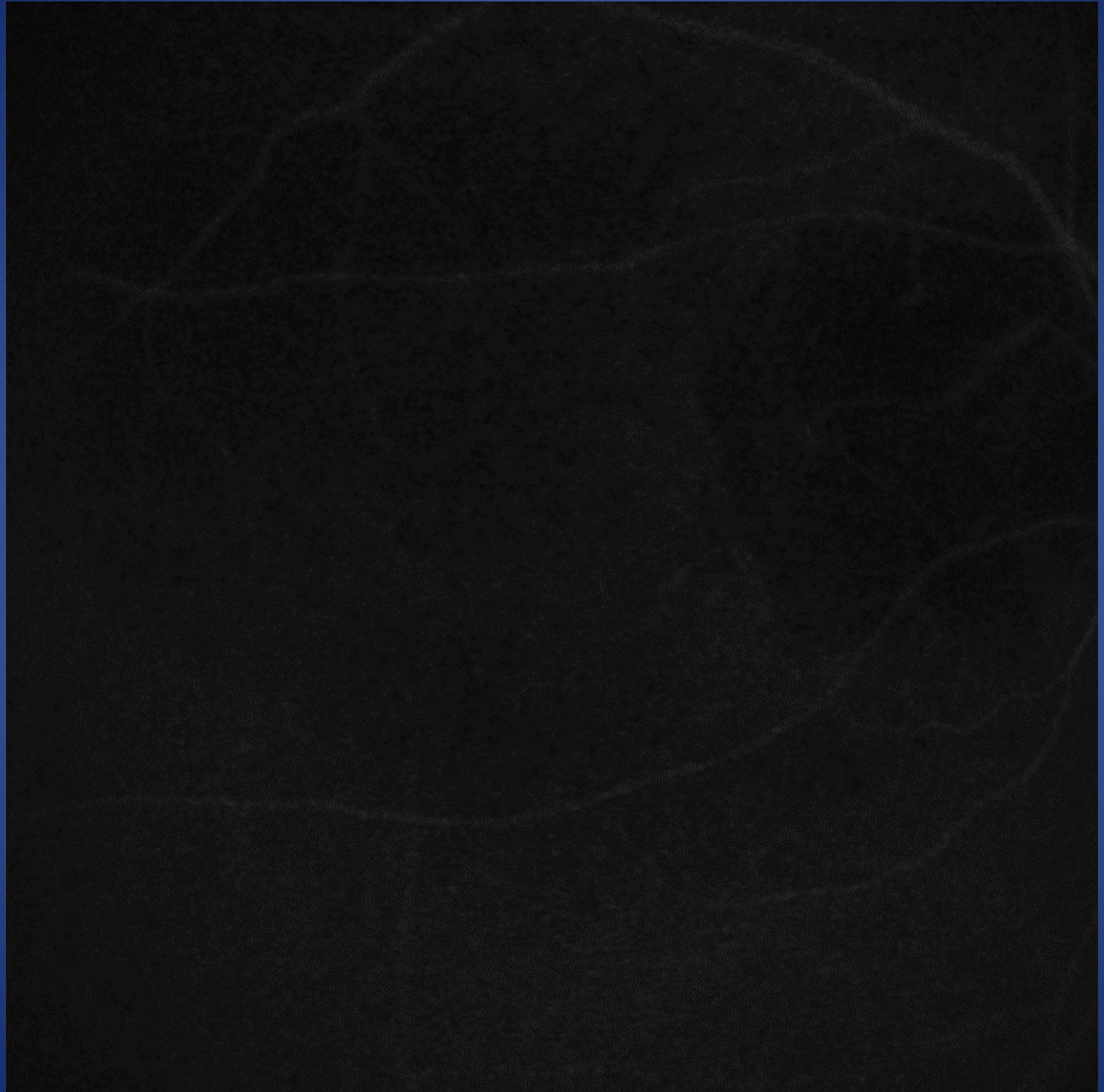


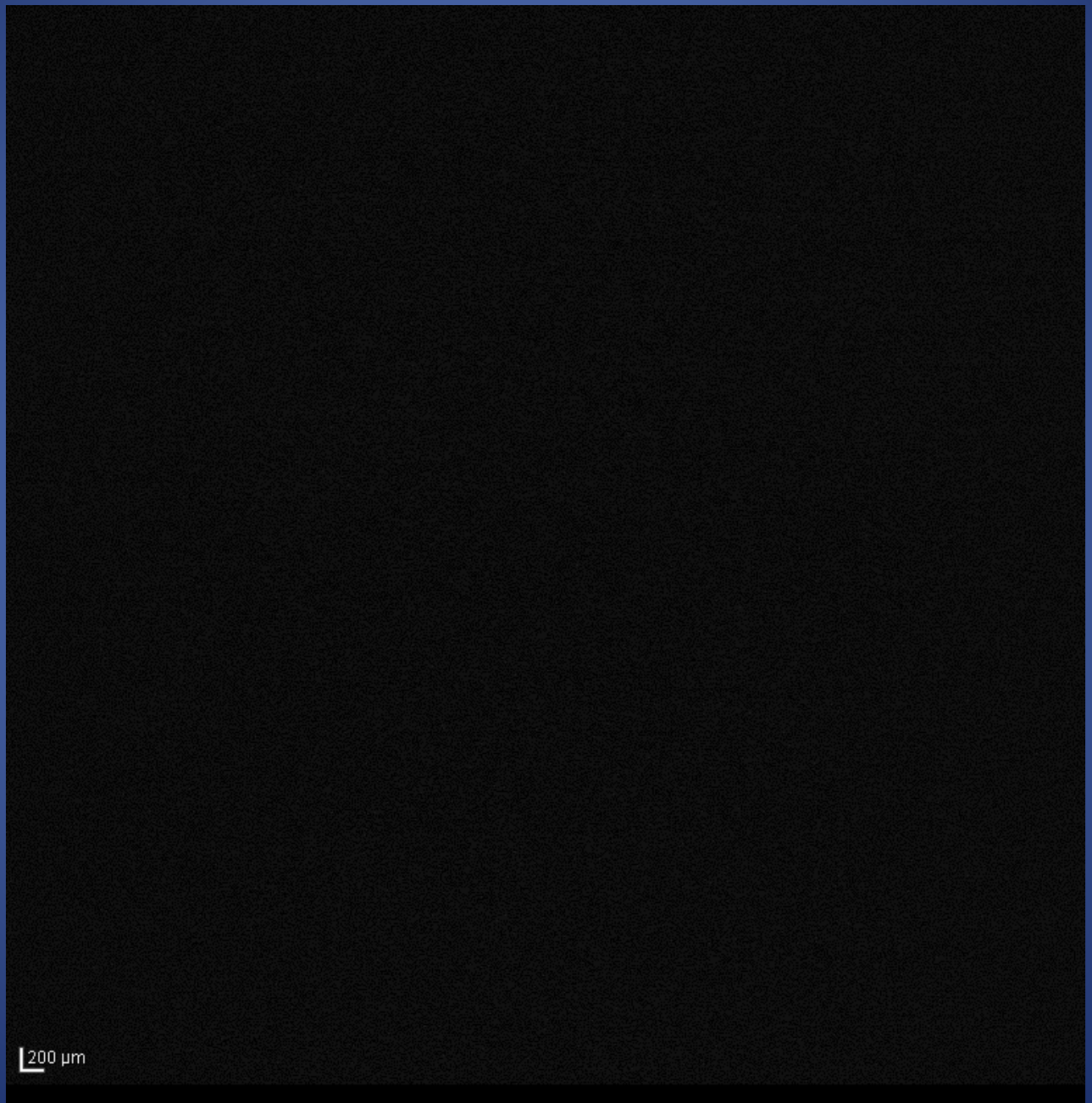




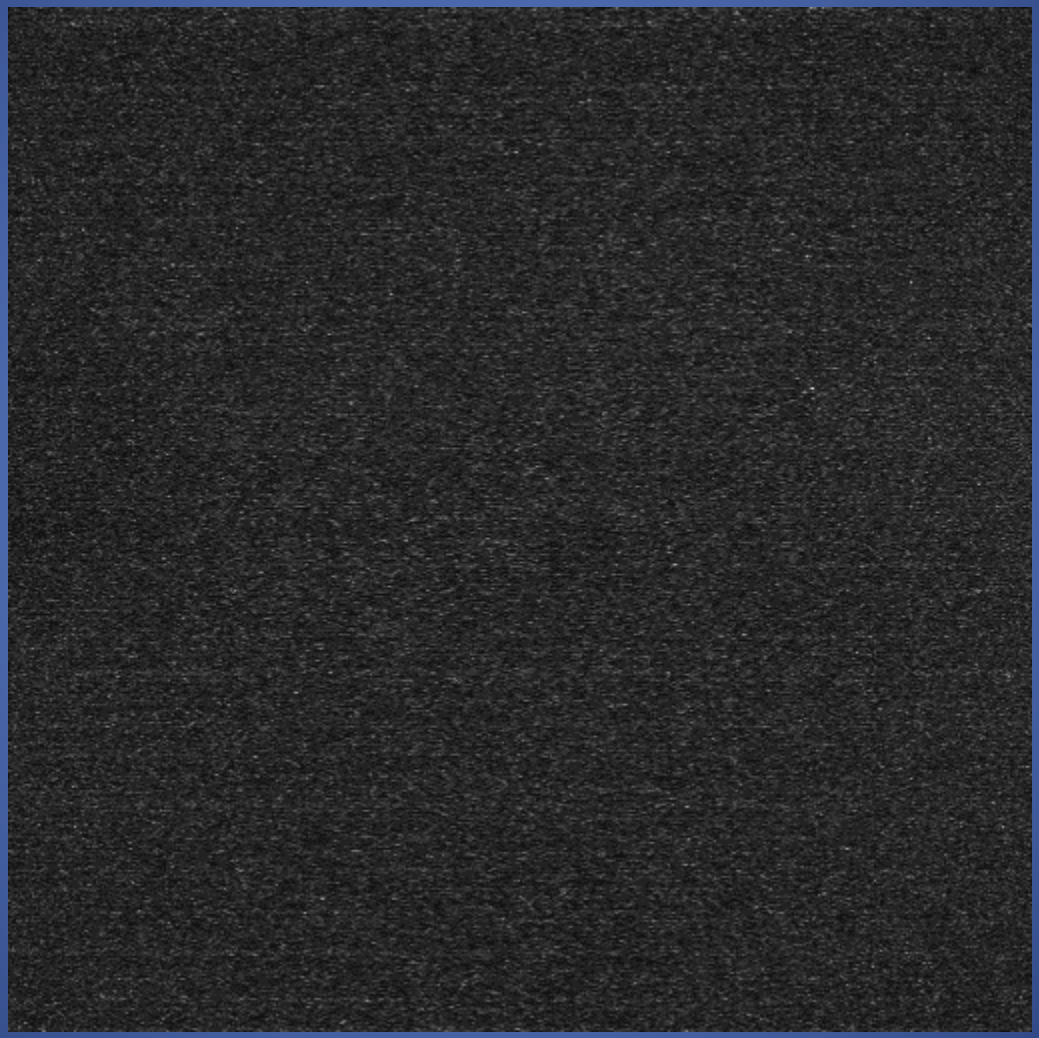


Ride the toggle to maintain optimum exposure.




200 µm


200 µm




200 µm

Crucial Technique Points

- Control Image Blooming.
  - What area to expose for? What is too Bright/Dark?
- Alignment is KEY.
- Focus Techniques:
  - Review OCT: Different from last visit?
  - Check imbedded data for focus level.

Re-Injection?

-Focus critically, note focus level.

-Wait 10 Minutes for dye to clear.

-Re-inject.

ICG Quality is Driven by:

- Hardware…must be operating at optimal performance.
- Patient Management is KEY.
- Photographer Technique is KEY.

Questions?

Thank you