The value of OCT for suspected and confirmed Proliferative Diabetic Retinopathy

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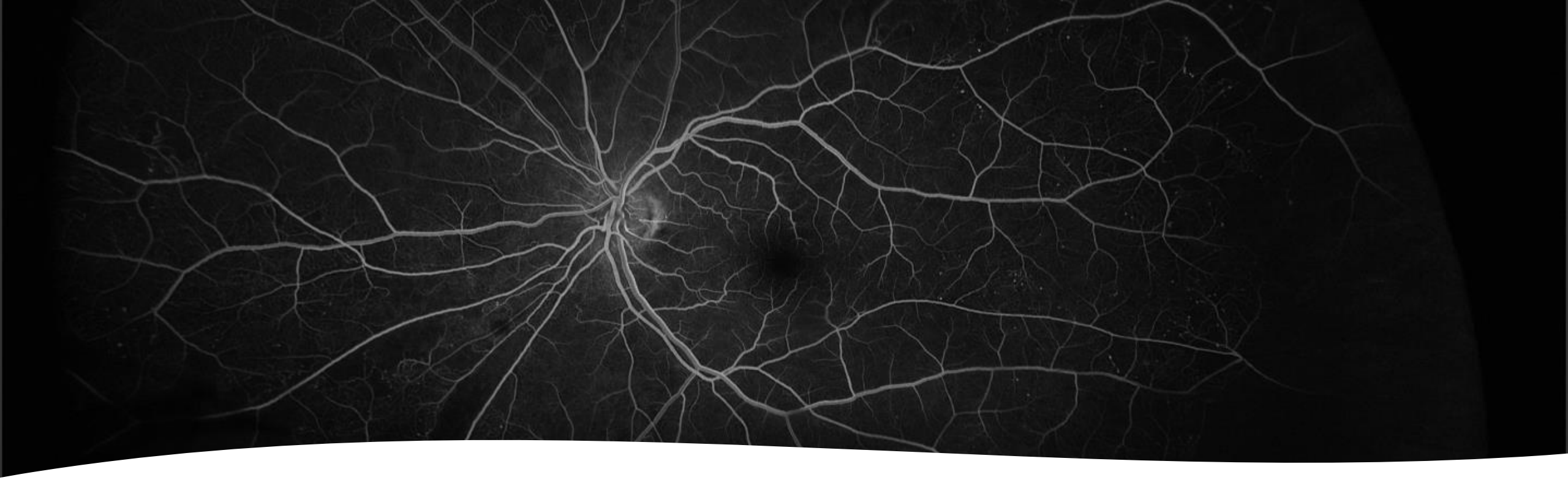
NOTG DESP Clinical Lead

Diabetic Retinopathy

- Non Proliferative
- Proliferative
  - Retinal – new vessels
    - New vessels at the Disc (NVD)
    - New vessels elsewhere (NVE)
- Vitreous haemorrhage masking above
- New vessels of the Iris(NVI)/Rubeosis

Proliferative DR

- When are we alerted of retinal new vessels:
  - DESP
  - Optometrist
  - Under care HES or other Ophthalmic: Planned visits/Opportunistic
  - Symptomatic:
    - vitreous haemorrhage
    - other signs of ischaemia:
      - Iris new vessels/Rubeosis/Rubeotic Glaucoma
      - Unexplained visual disturbance
        - Patient reported
        - GP/Diabetologists/Health Care



Not obvious at times ‘FFA- Gold Standard’

- E.g
  - Is it IRMA or NV

Fundus Fluorescein Angiogram

- Credited to 2 medical students at Indiana University
  - Harold Novotny and David Alvis

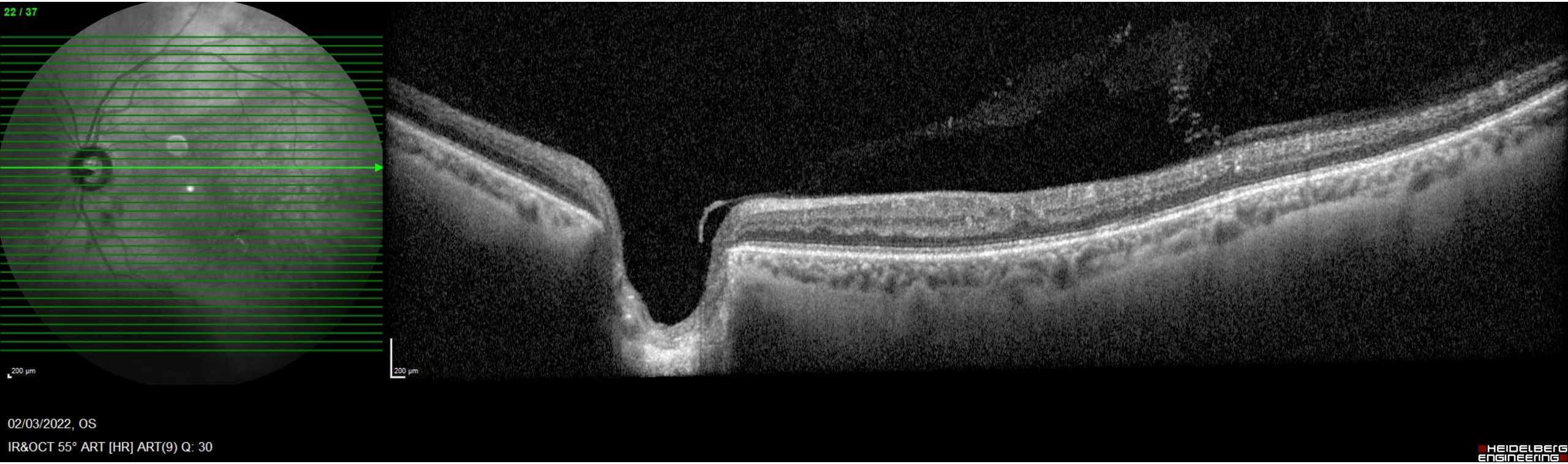
- ‘retinal circulation’ using Fluorescein dye, camera/imaging device + filter

- Risks:
  - Common
    - Yellow discolouration
    - Nausea and vomiting
  - 1/1000 allergy
  - 1/250000 severe allergy – hospitalisation

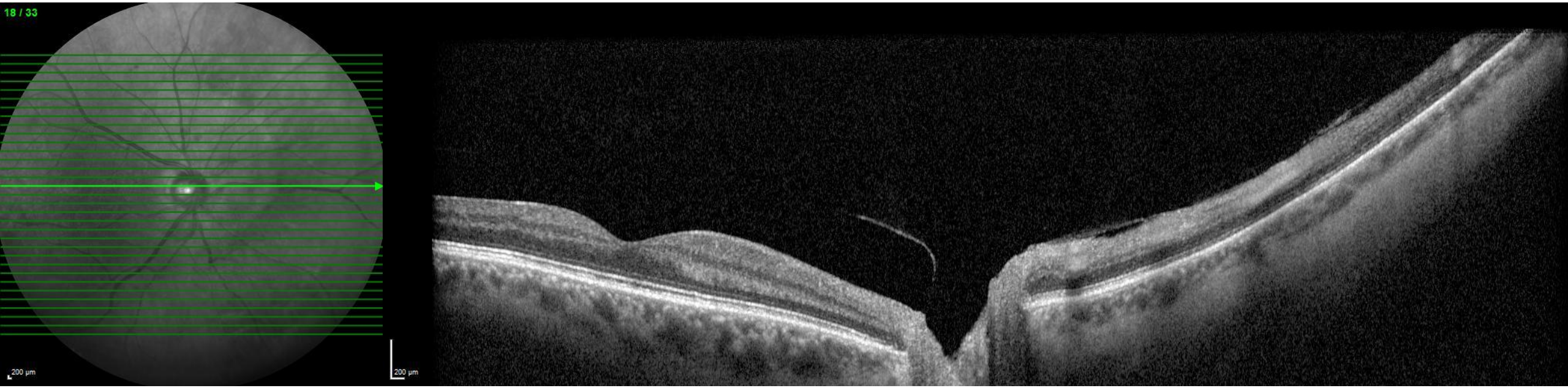
Ocular Coherence Tomography

- Has revolutionised retinal analysis and management.
- An essential kit MR/VR practice.
  - Expanded uses: Glaucoma/Neurophthalmology/Neurology....
  - Anterior segment….
  - Increasing numbers of Optometrists have them.

Internal Limiting membrane (ILM) and Vitreoretinal Interface (VRI)



ILM/VRI



Use in PDR: VRI/retinal surface

- New vessels grow.

- Could be a
  - pre ILM breach.
    - Noting in landmark studies most important for specified larger size.
  - ILM breach phase.
- Not entirely into the vitreous:
  - VRI/ILM to Projection into the ‘vitreous cavity’.
- Vitreous a good scaffold but not necessary.

Aim

- Identify OCT (markers) biomarkers for retinal new vessels (nv).
- In suspected/confirmed PDR cases OCT is ? as useful for nv as FFA.
- Reproducible?
- Eventually reduce need for FFA and clinic burden.
  - FFA clinic:
    - Resource intensive (Dye, Time, Drops, Staff: Nurse, Photographer, Doctor)

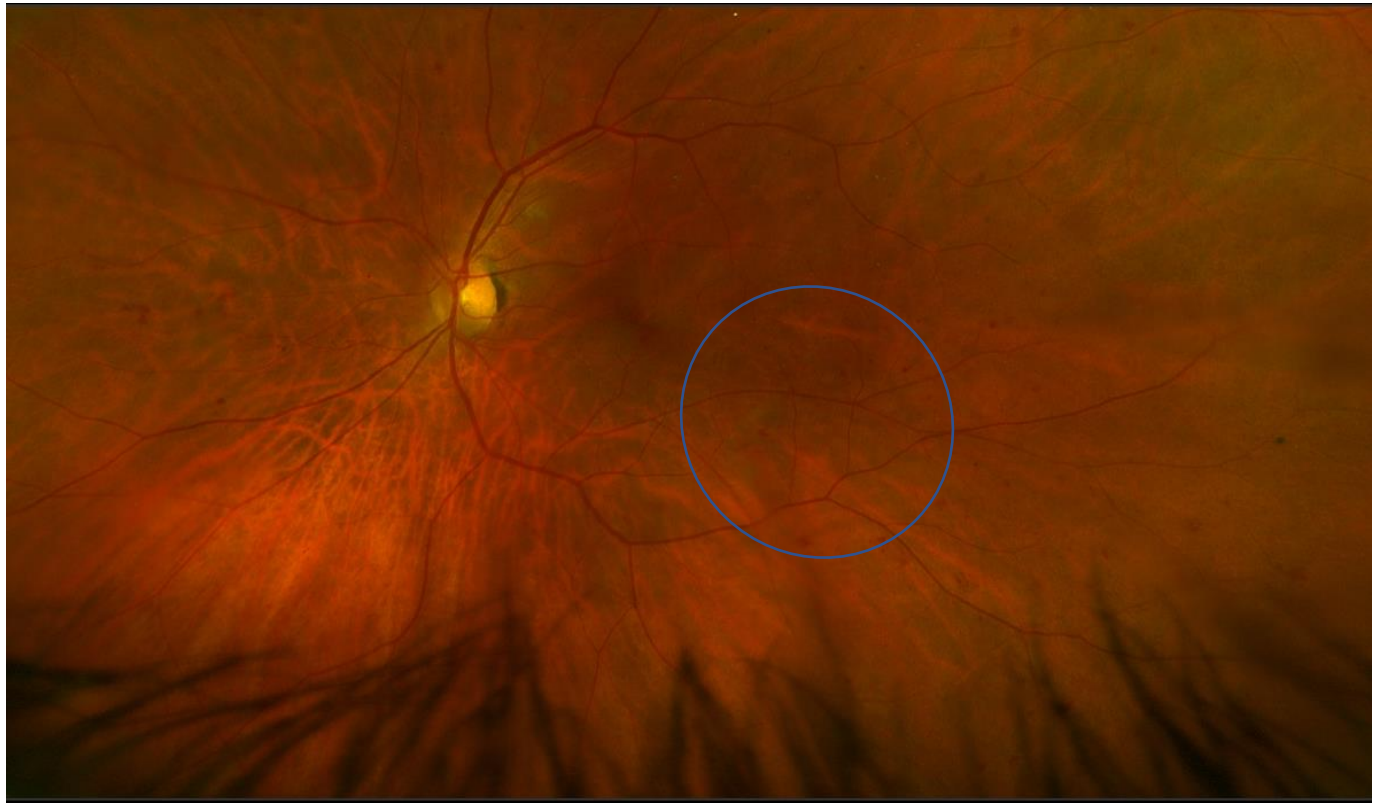
Methods

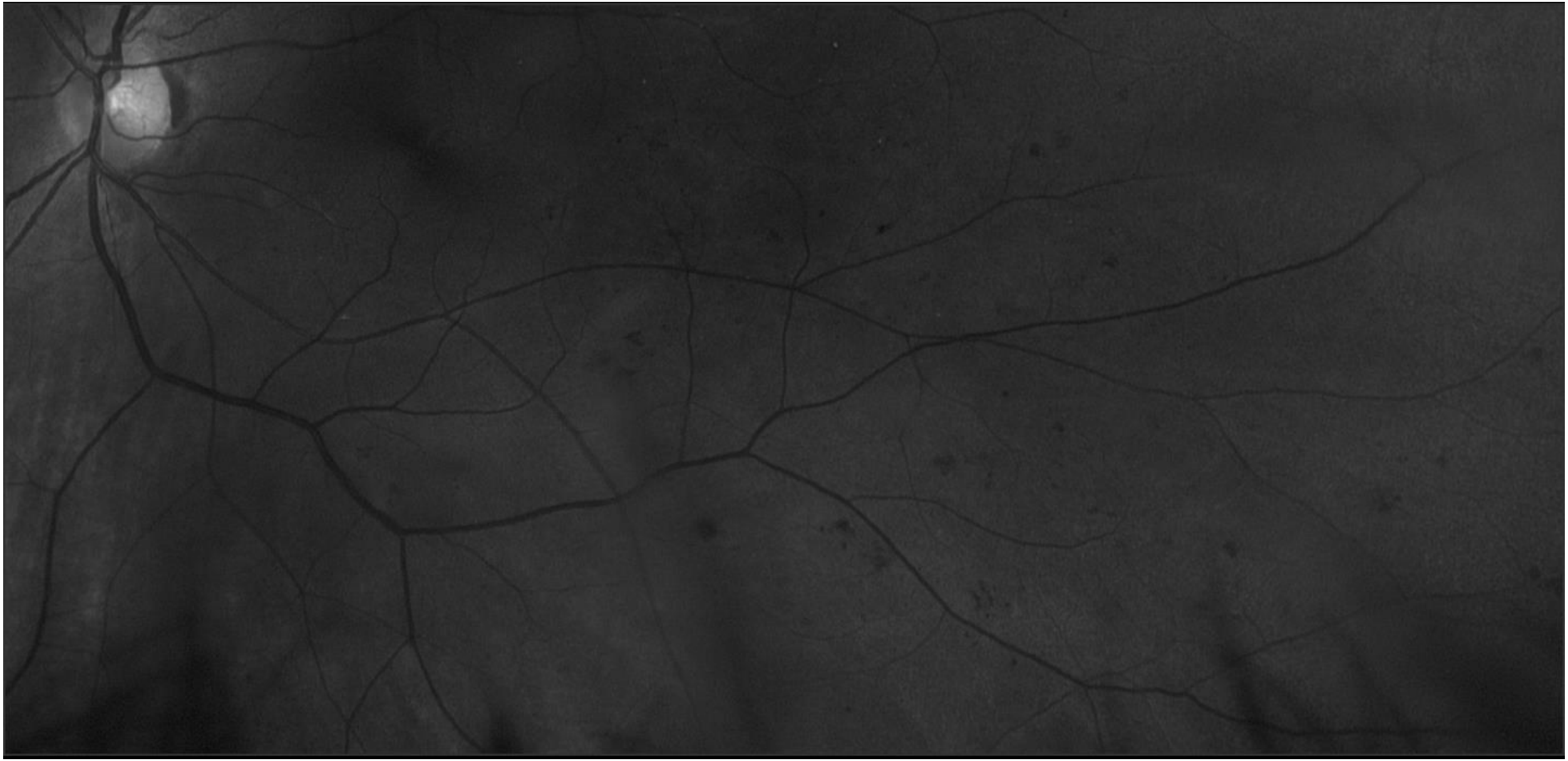
- OCT markers to compare with the following:
  - FFA ordered where IRMA/nv cannot be clinically differentiated.
  - Cases FFA performed to confirm/refute nv.
  - FFA in known nv to identify areas needing further laser.
  - FFA in vitreous haemorrhage.
  - FFA in other suspicion of nv.

Case 1

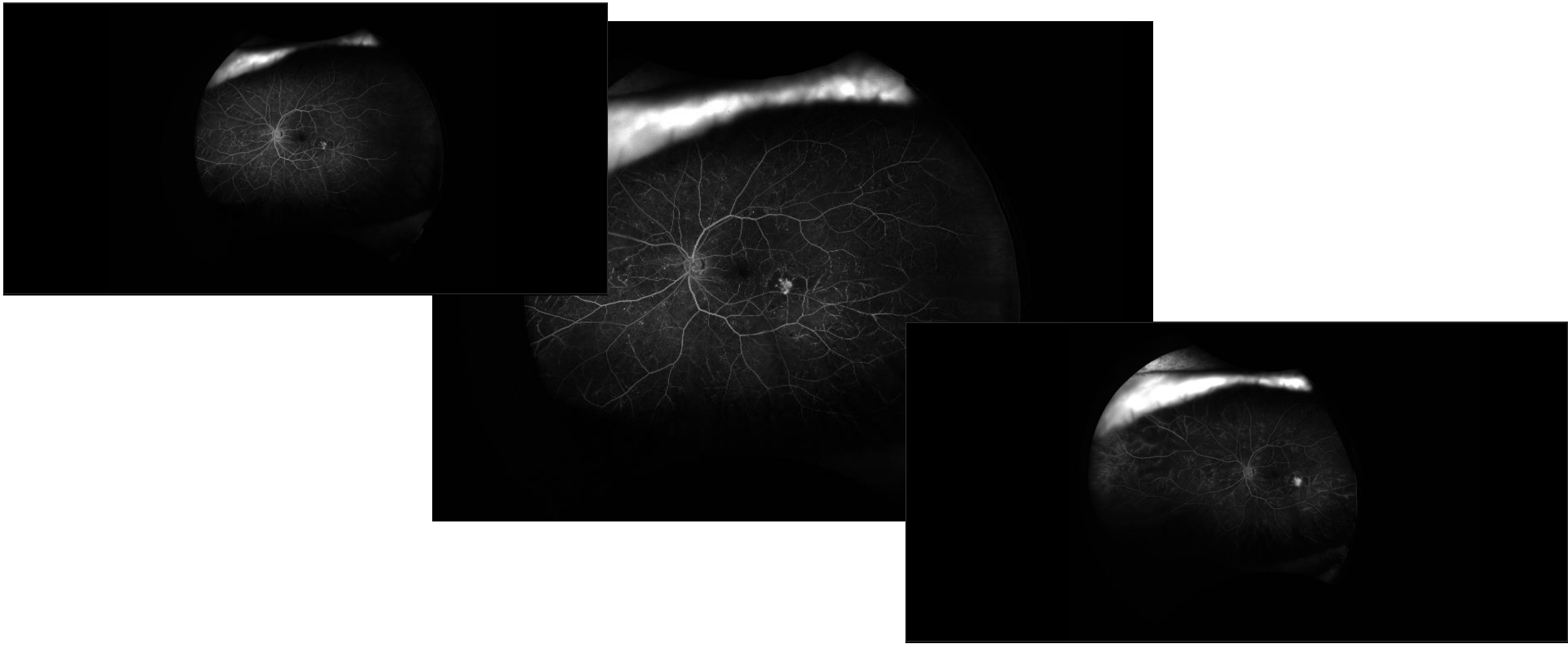
Case 1: Area of suspicion: ?IRMA

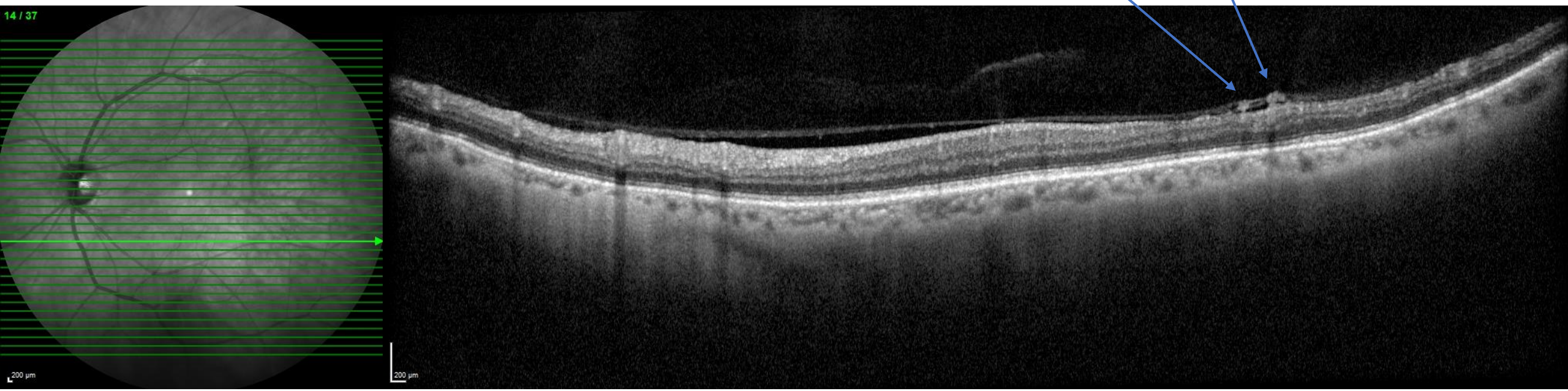
- 66 year old female
- Is it or not nv.
- Clinical suspicion:
  - IRMA?
  - Clinician needed confirmation





FFA – ‘Gold standard’

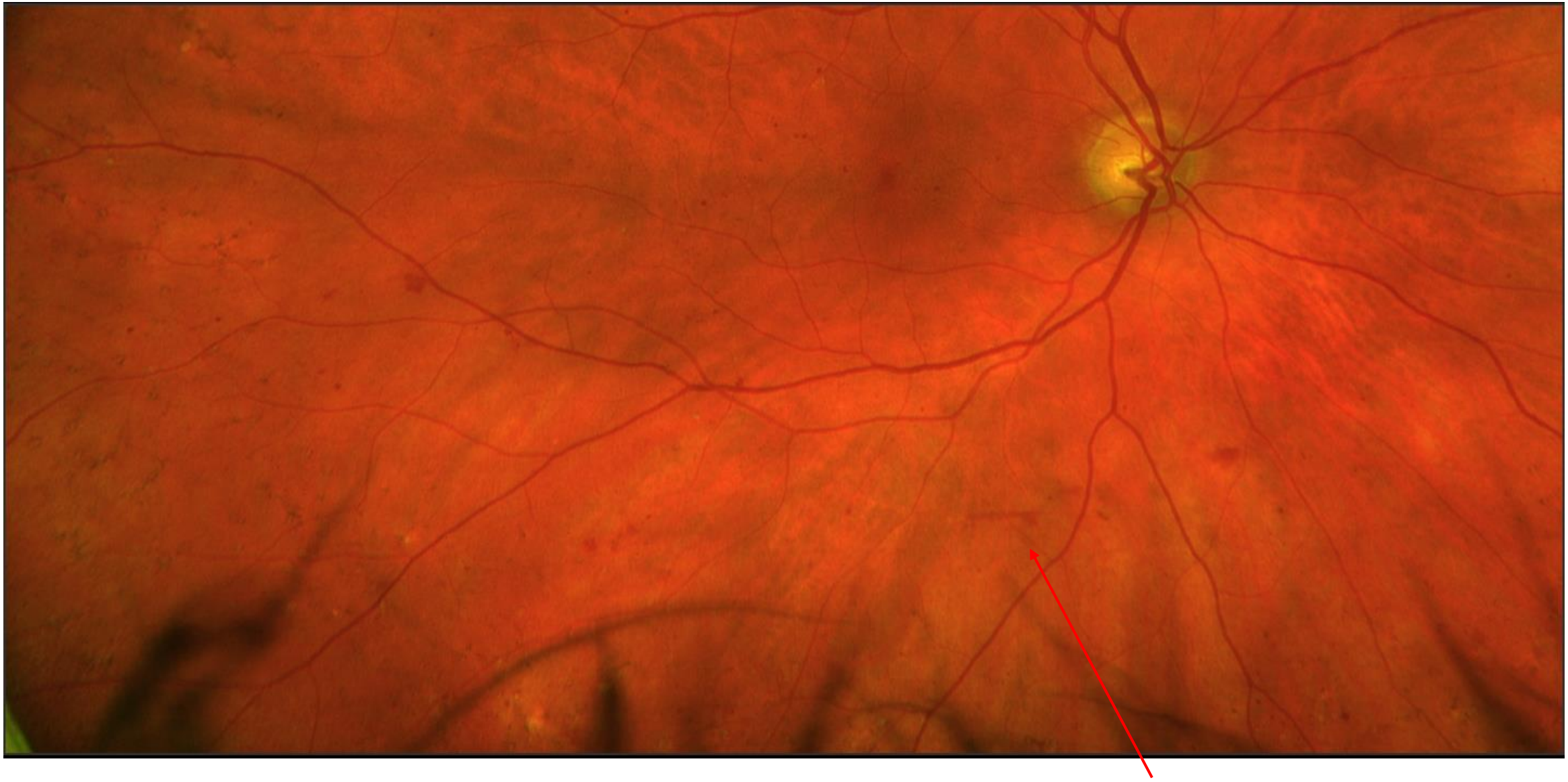


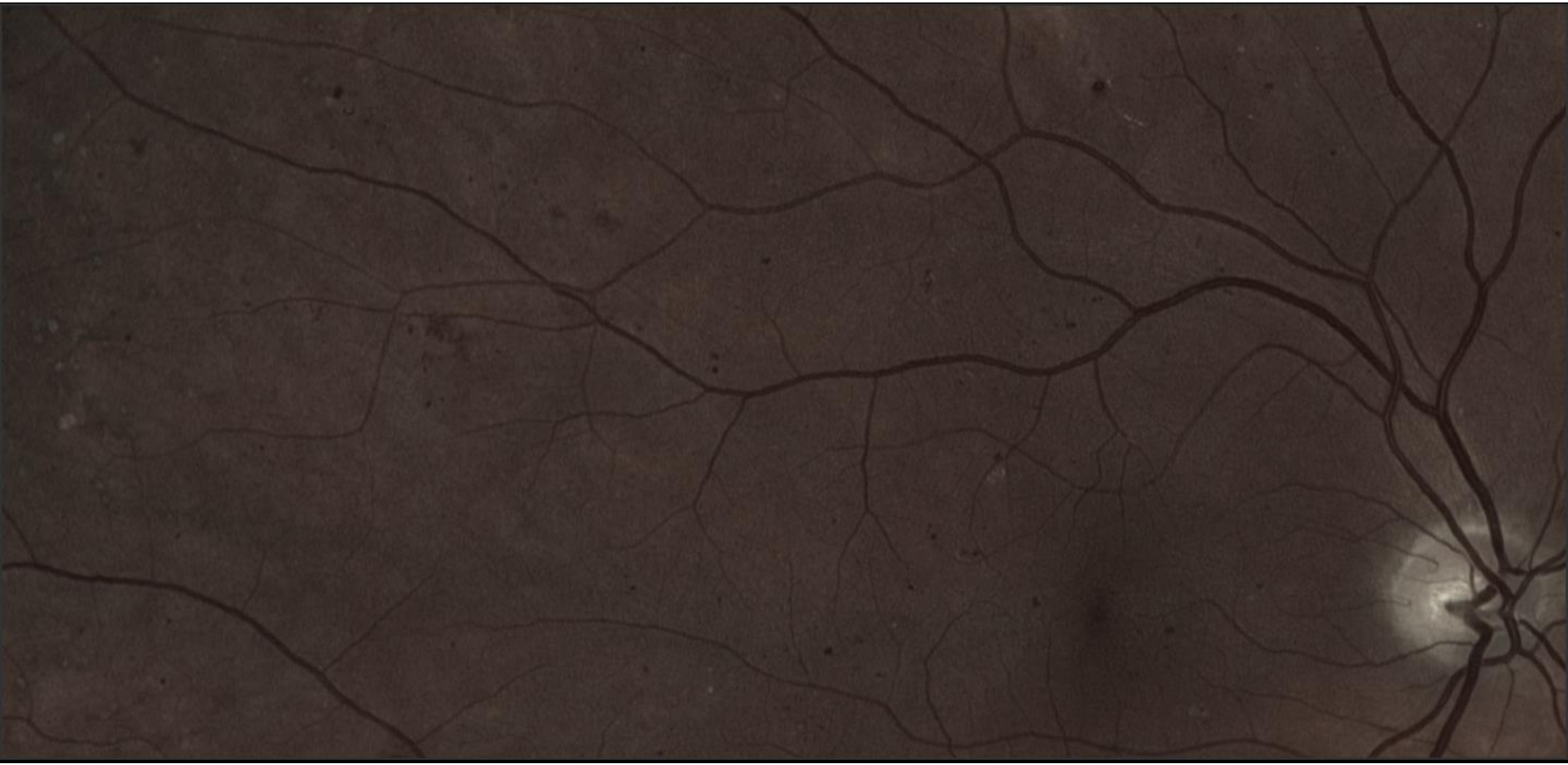

14 / 37
200 µm
200 µm

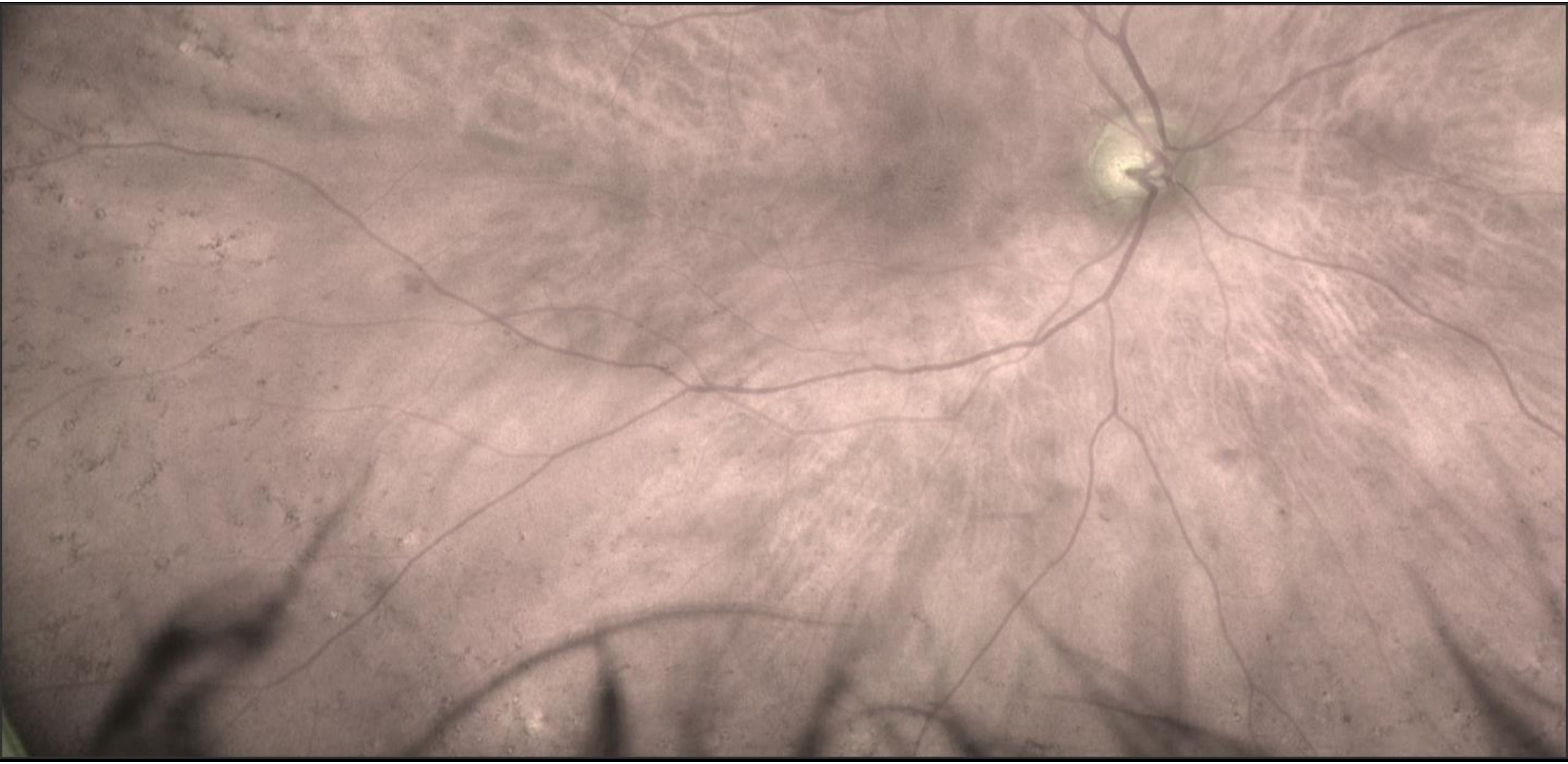
Case 2

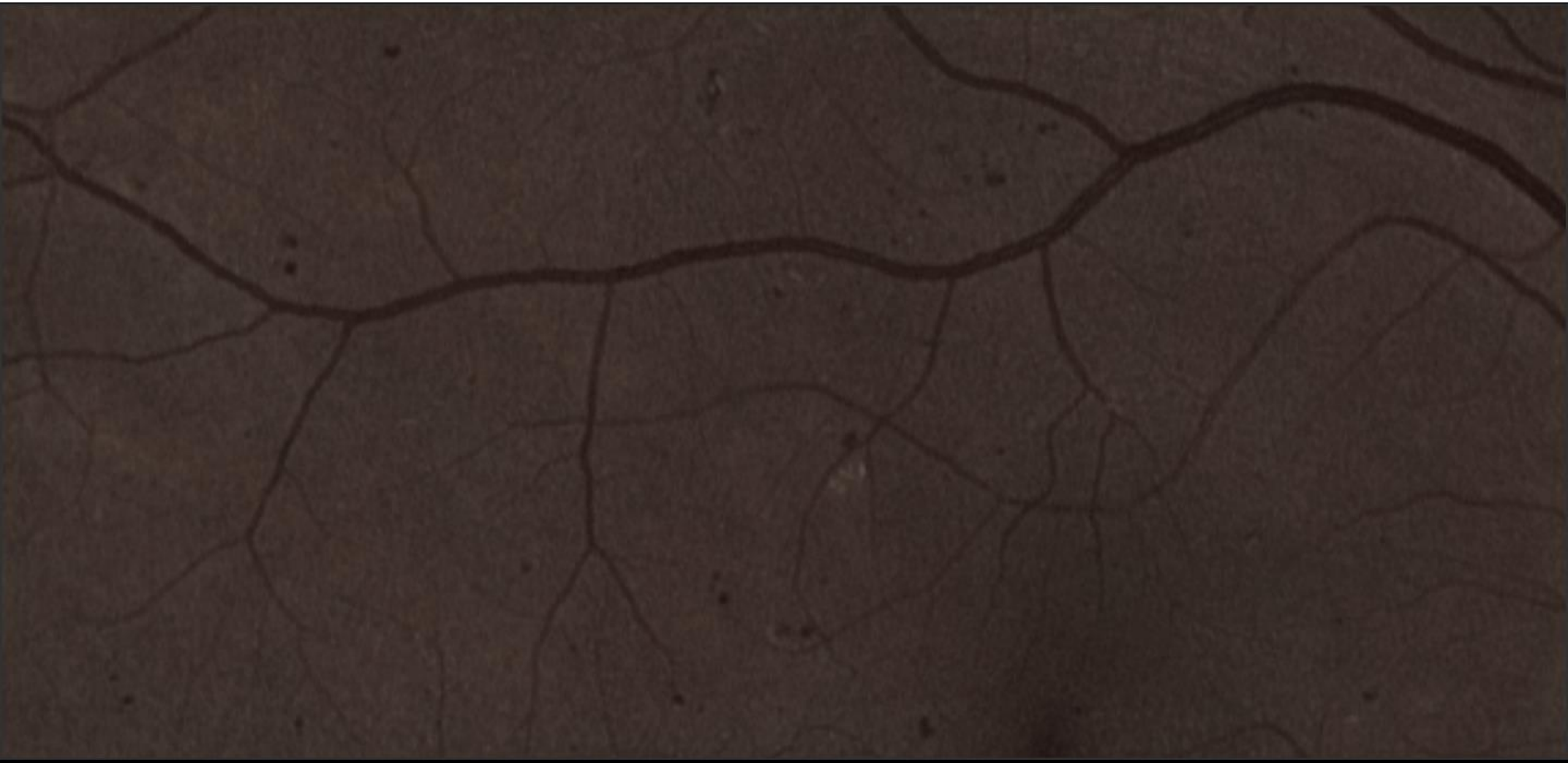
- Diabetic
- Subtle Pre retinal (subhyloid) haemorrhage
- Clinician: unsure

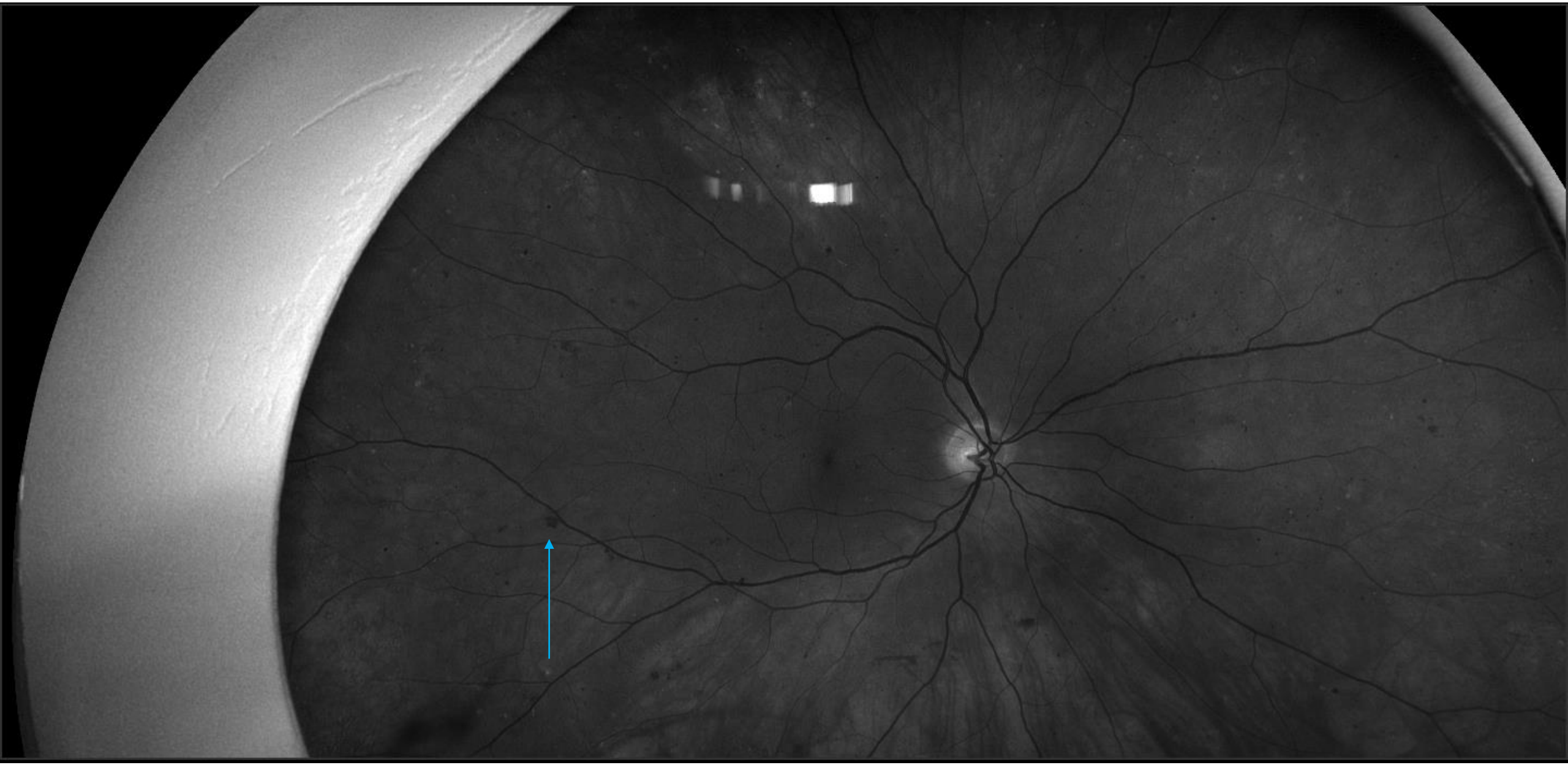
Case 2: subtle pre retinal haemorrhage

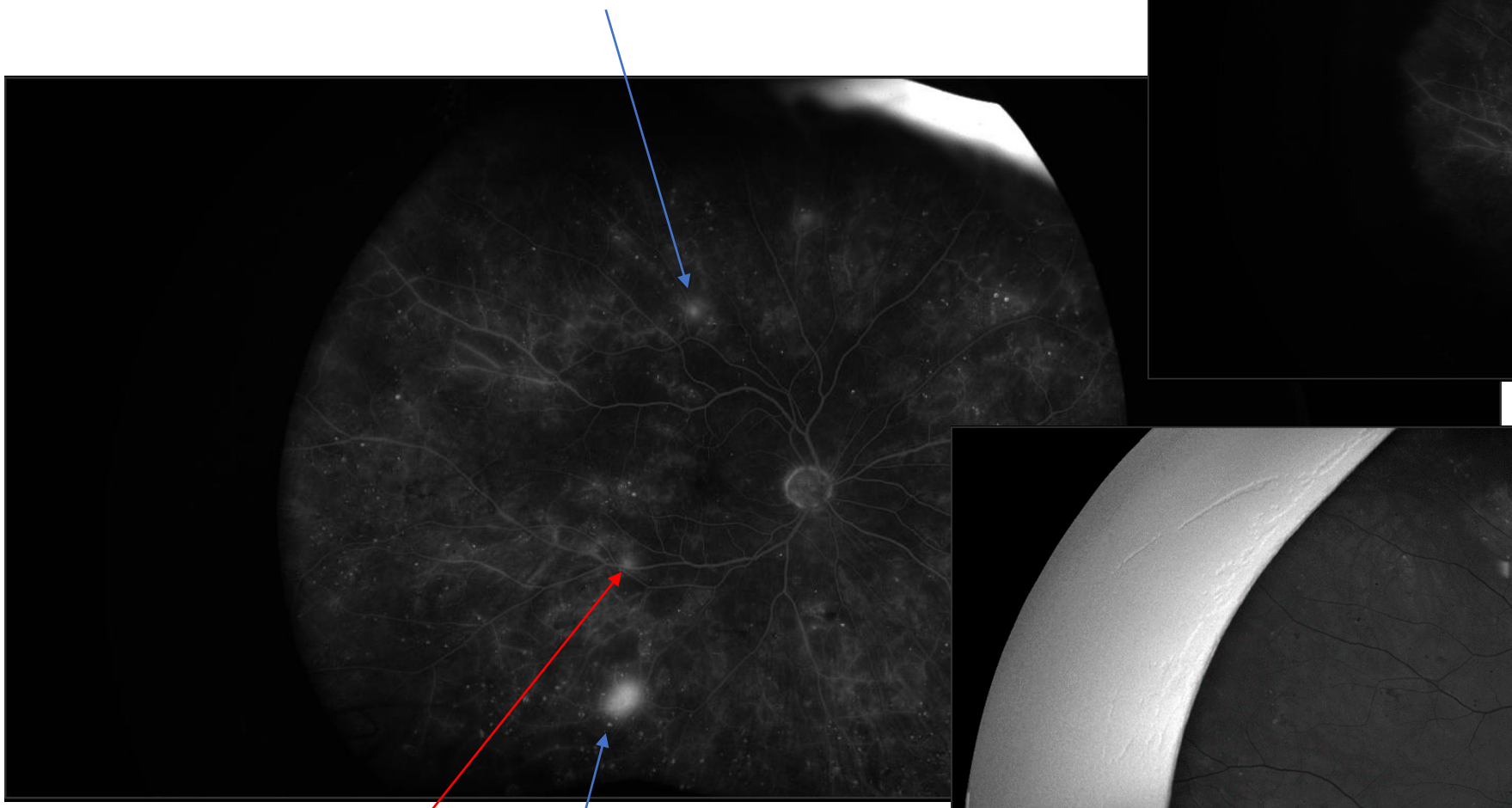


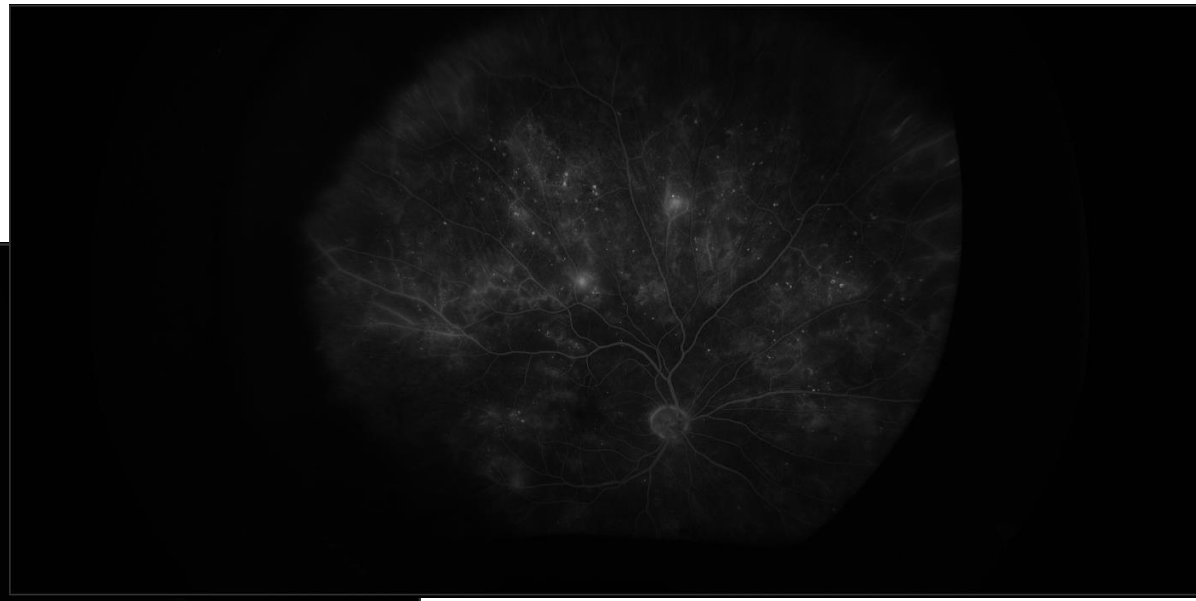


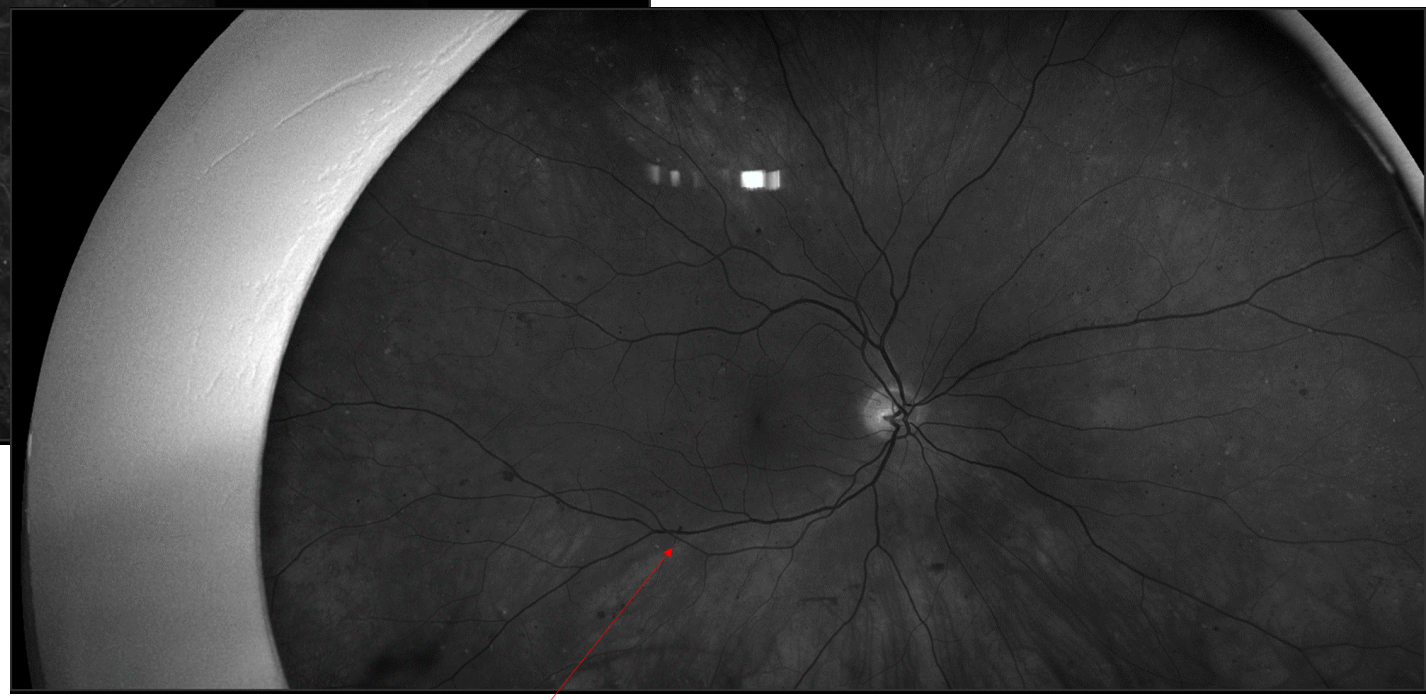


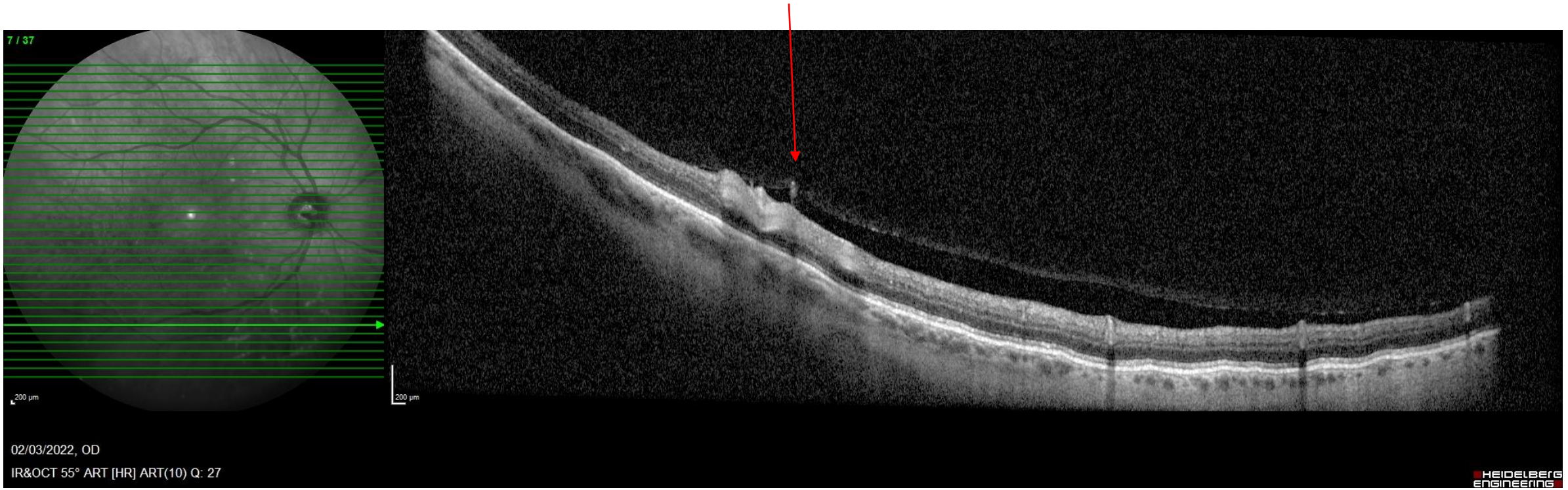


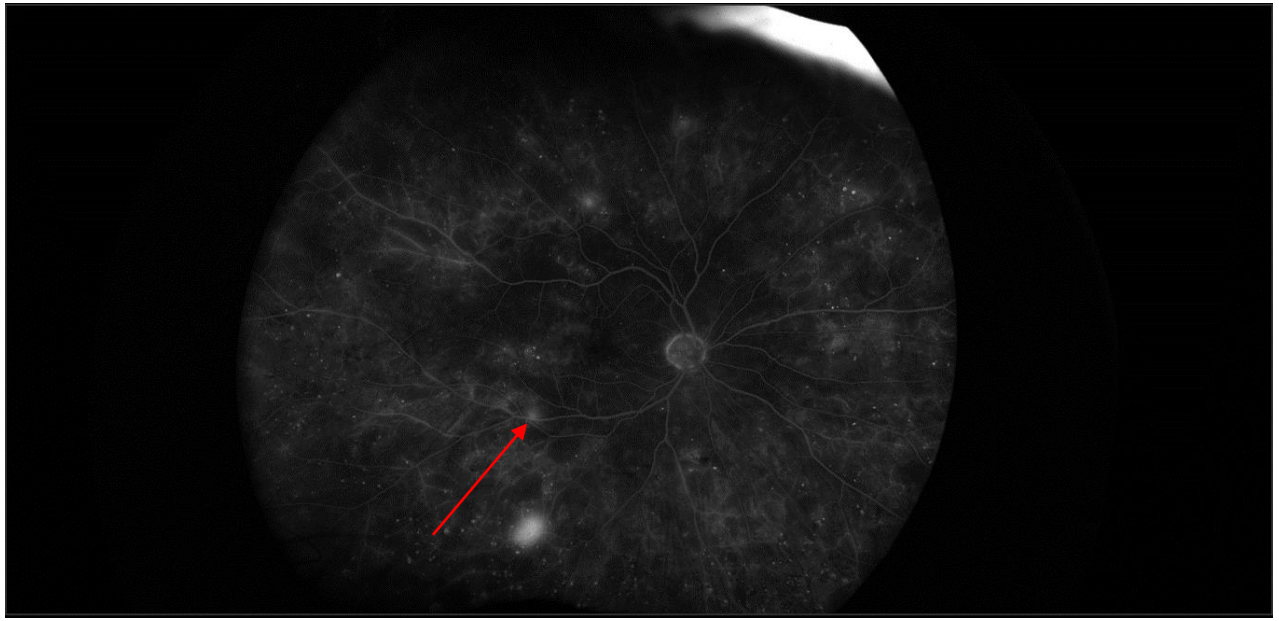


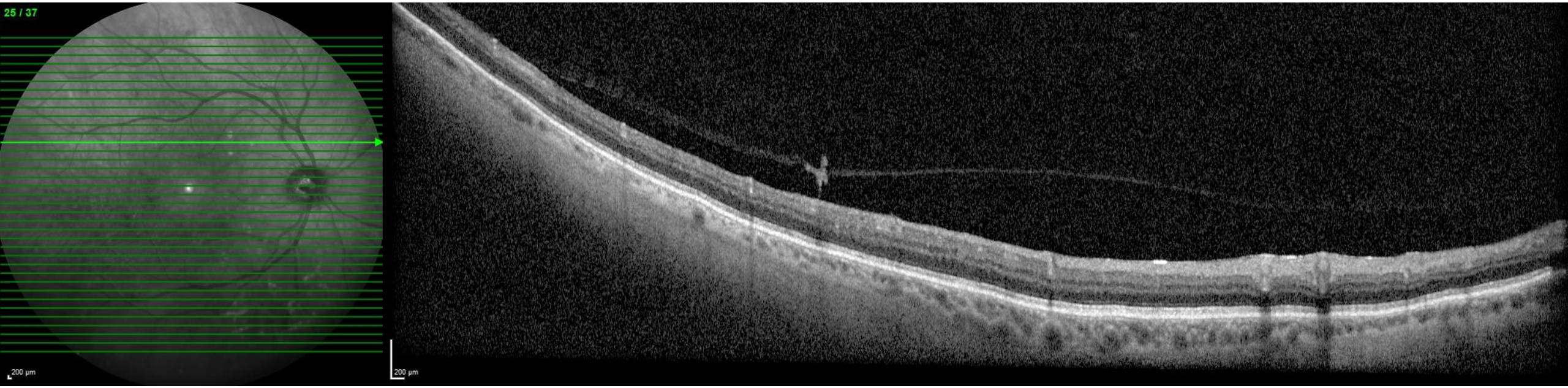







7 / 37
200 µm
200 µm
02/03/2022, OD
IR&OCT 55° ART [HR] ART(10) Q: 27
HEIDELBERG ENGINEERING




25 / 37
200 µm
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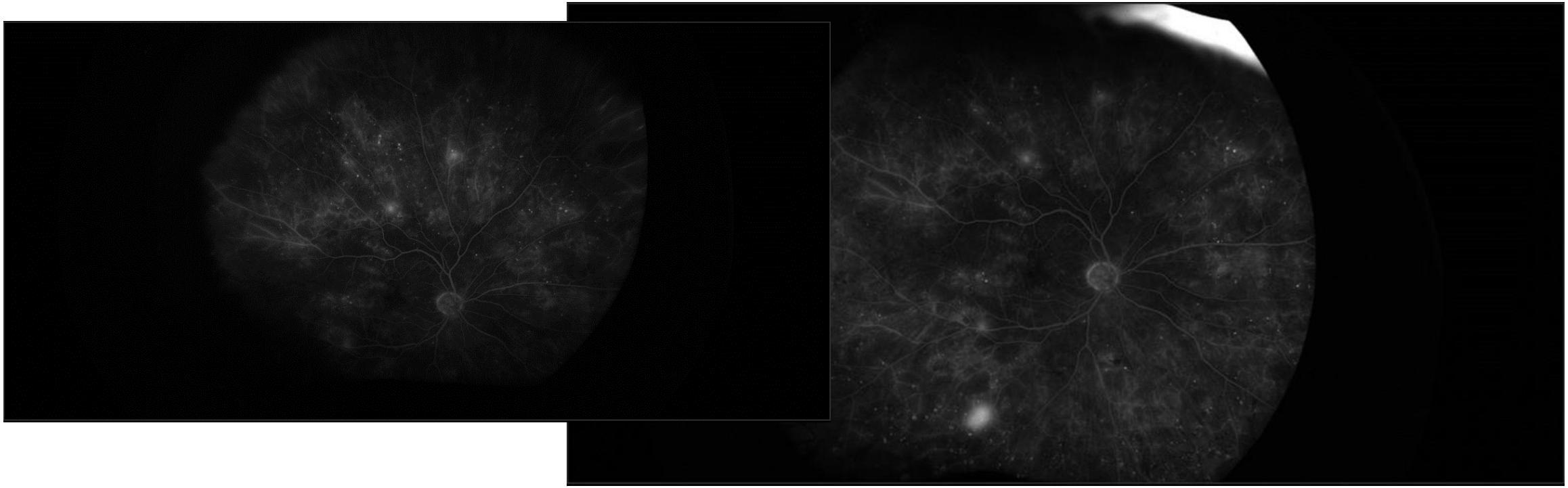


Analysis

- 68 Images from
- 34 Patients
- Masked and Unmasked analysis.

FFA +/OCT +

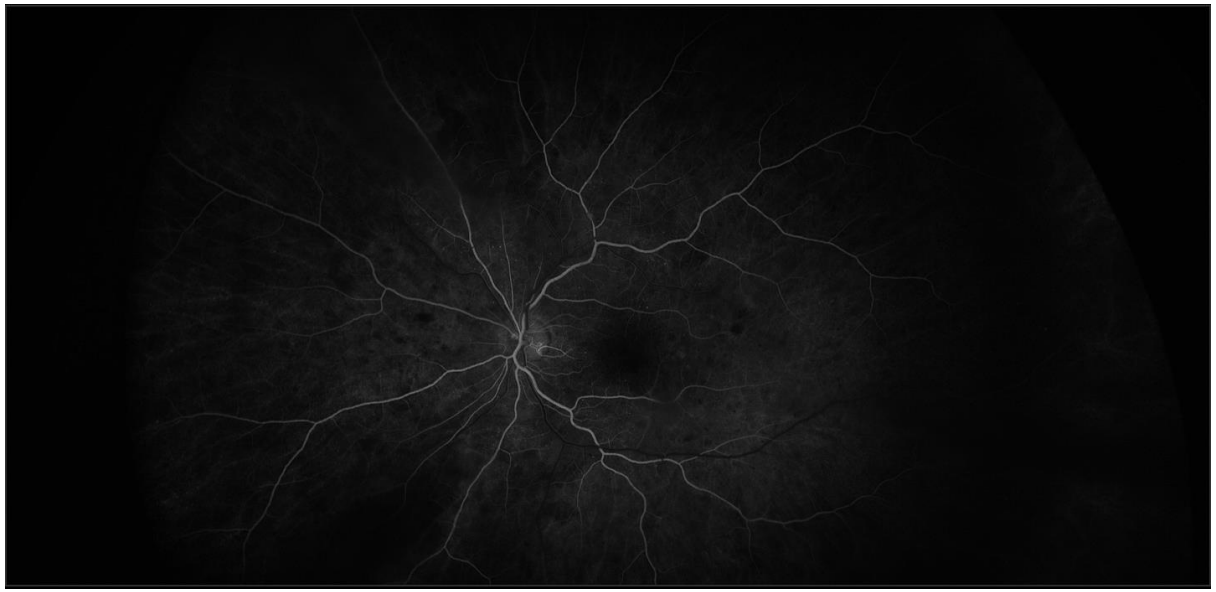
- Unmasked
  - 31 +ve FFA images: OCT markers identified in all 31 scans.
- Masked
  - OCT: 30 agreement, 1 –ve.

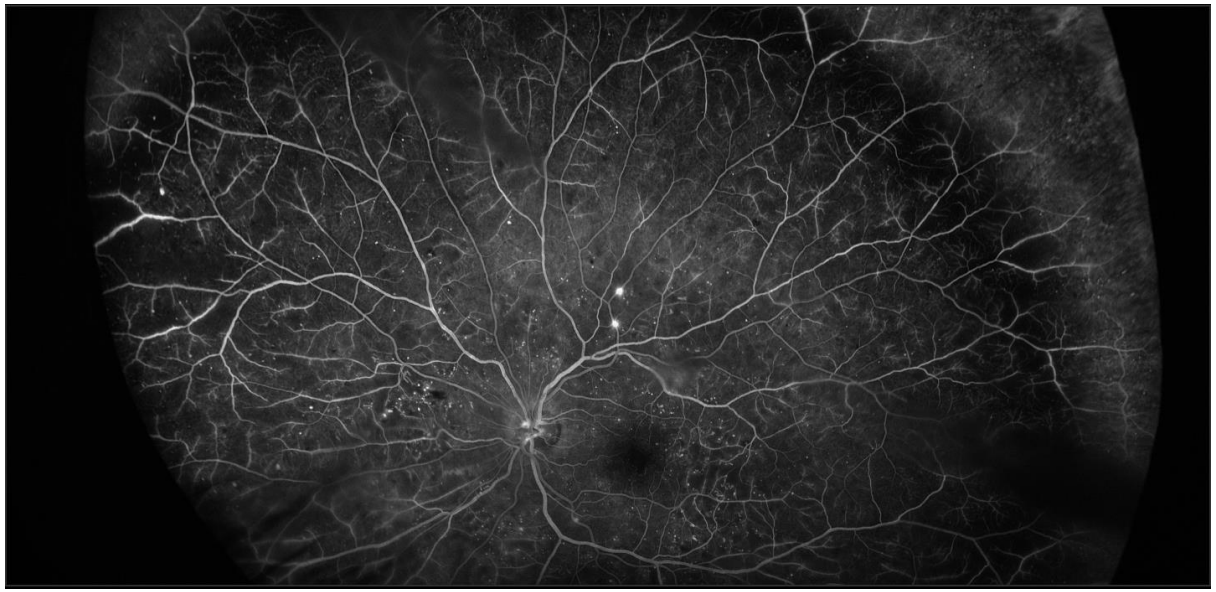
FFA -/OCT -

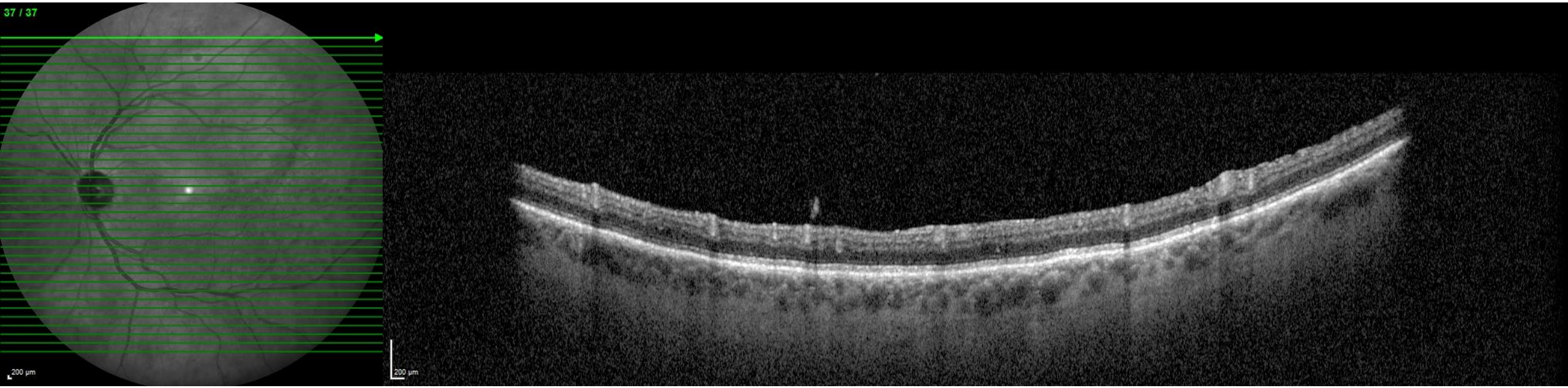
- Unmasked
  - 37 -ve FFA images: OCT correctly identified all 37 negative.
- Masked
  - OCT: 36 agreement, 1 +ve

State of vitreous

- PVD state has no impact
  - NV projections still present on OCT scans.

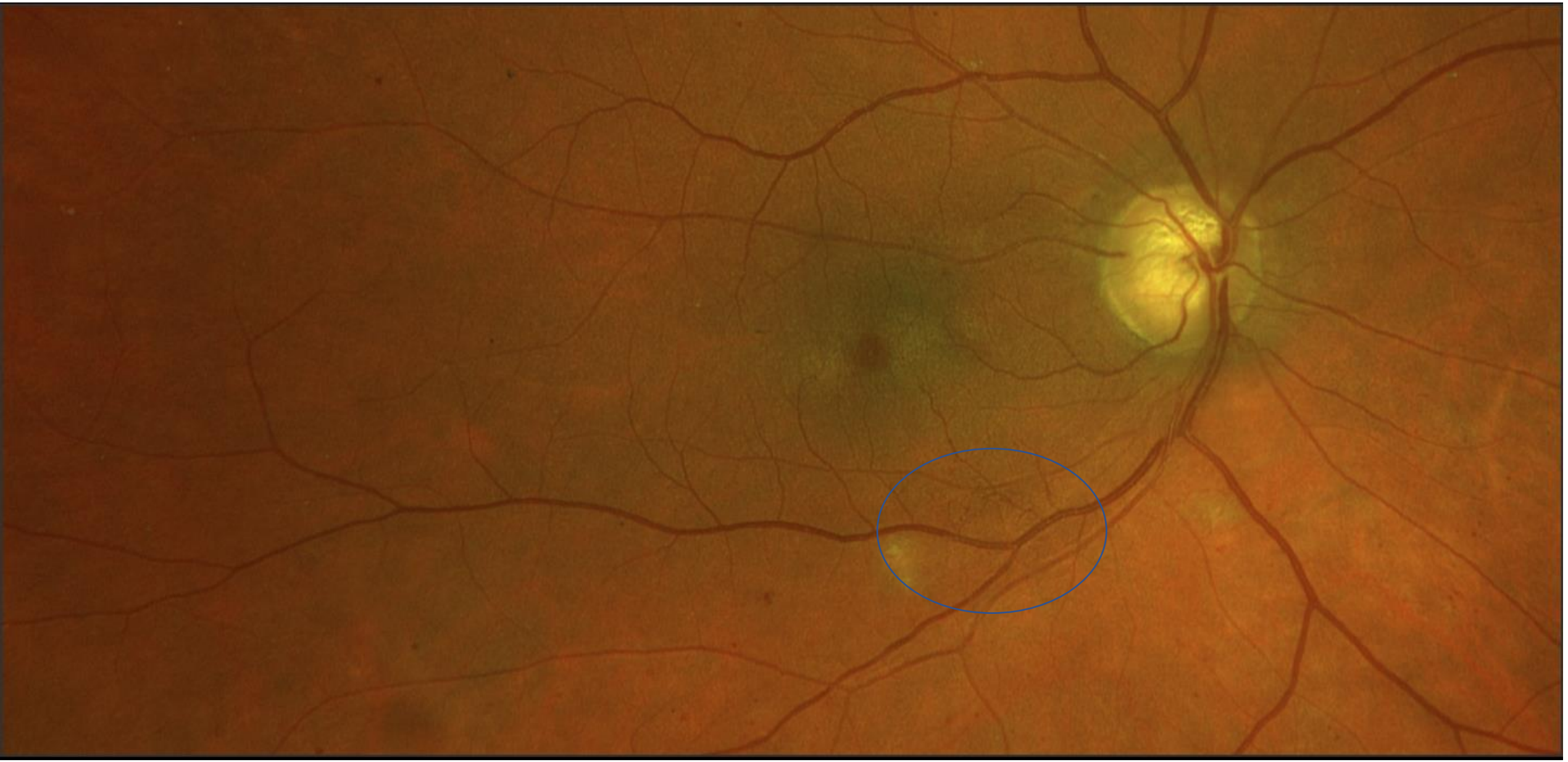


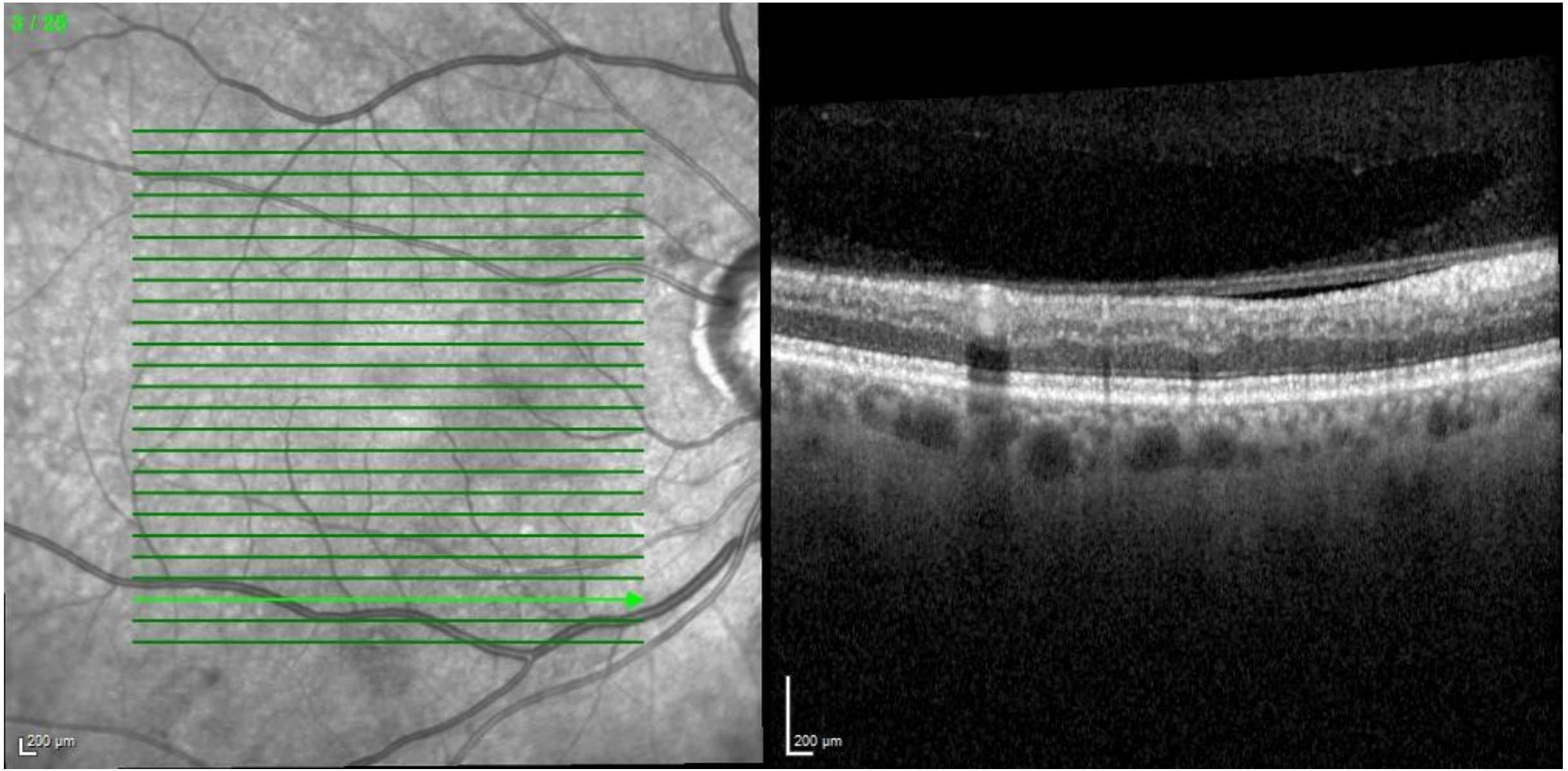



37 / 37
200 µm
200 µm

IRMA

- 11 instances of FFA ordered for ?IRMA
  - 3 were new vessels: FFA +ve
  - 8 IRMA as FFA –ve
- We already know OCT was excellent for new vessels.
- OCT also excellent where likely IRMA i.e. no false +ves

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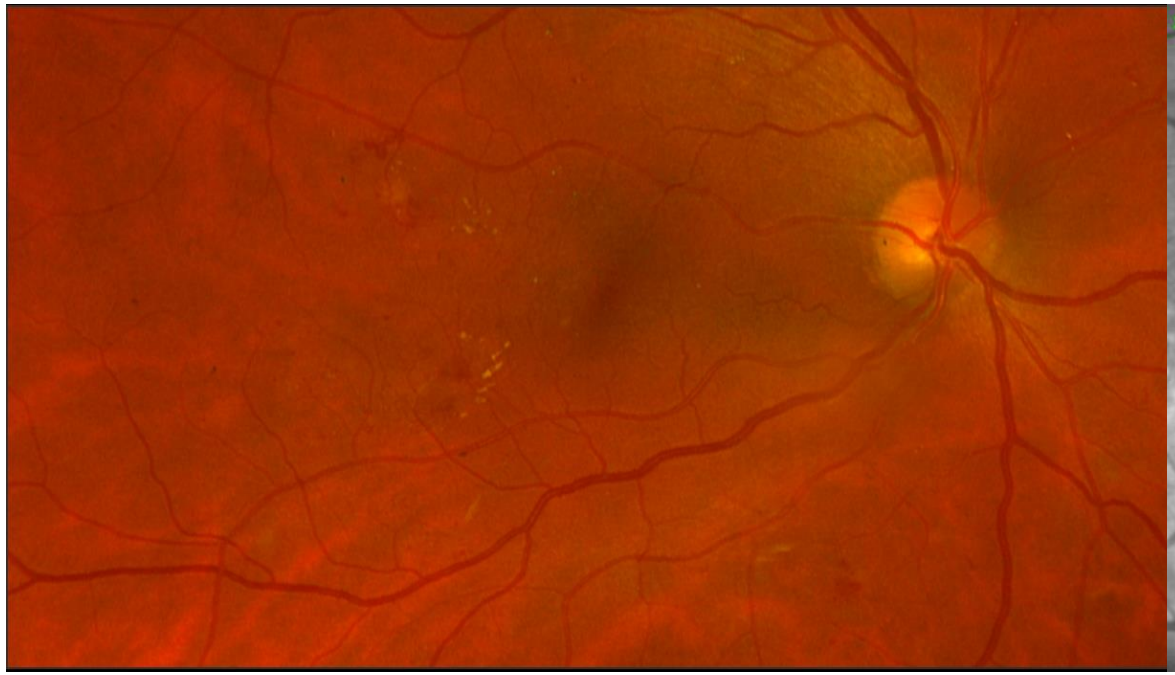
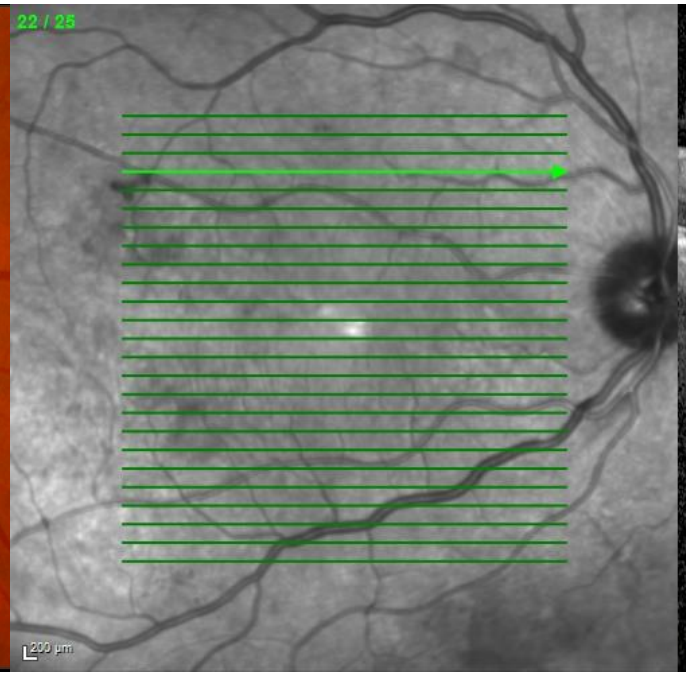
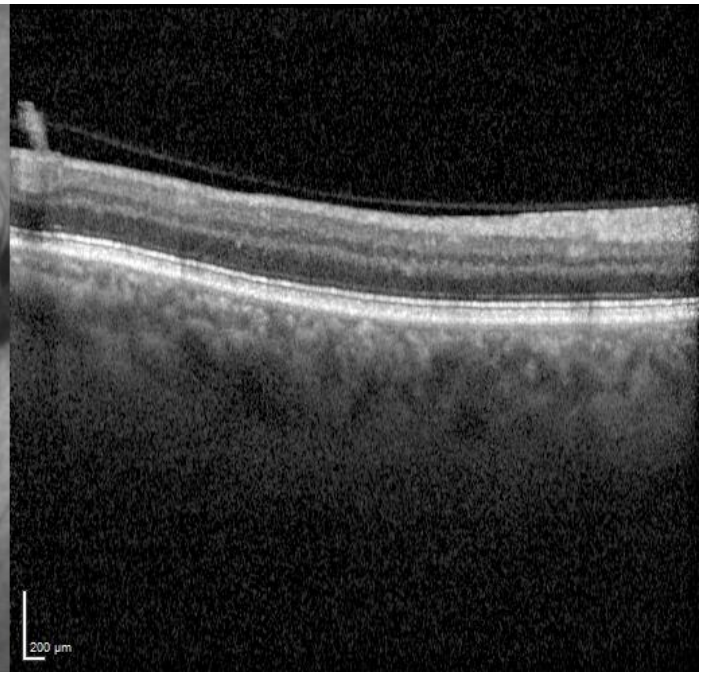
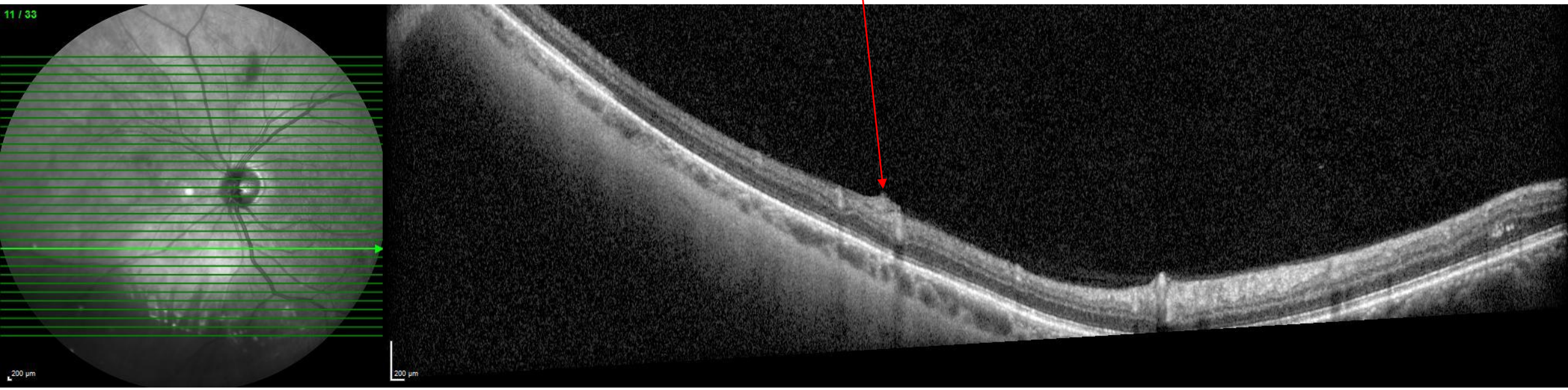
? Reduplication







Breach



Conclusion

- If you think IRMA.
  - OCT – guided/targeted.
  - Widefield OCT.
- If you think new vessels.
  - OCT.
- Advantages
  - Quick treatment decisions: Laser at same clinic visit.
  - A test that answers a question
  - Can reduce FFA requests by 70-80%+
  - OCT in screening:
    - Waiting for inclusion to National Program for macular oedema.
    - Progress could be made on other uses as demonstrated.
      - Reduce the burden for urgent referrals: R3A.