OCT SCANS – WHEN TO DO AND HOW TO INTERPRET

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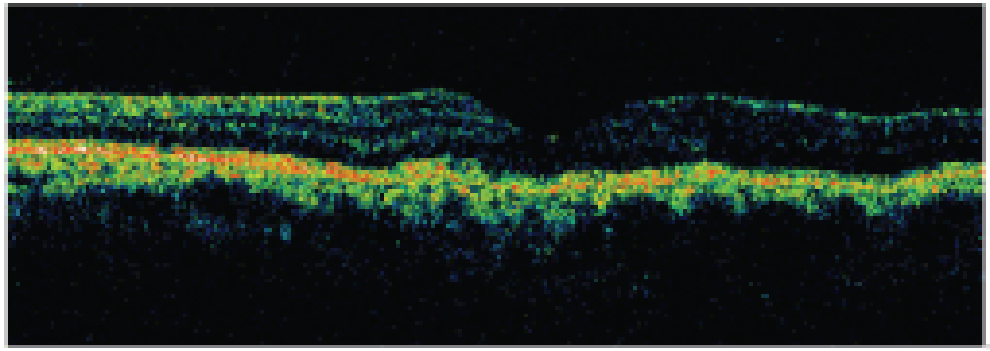
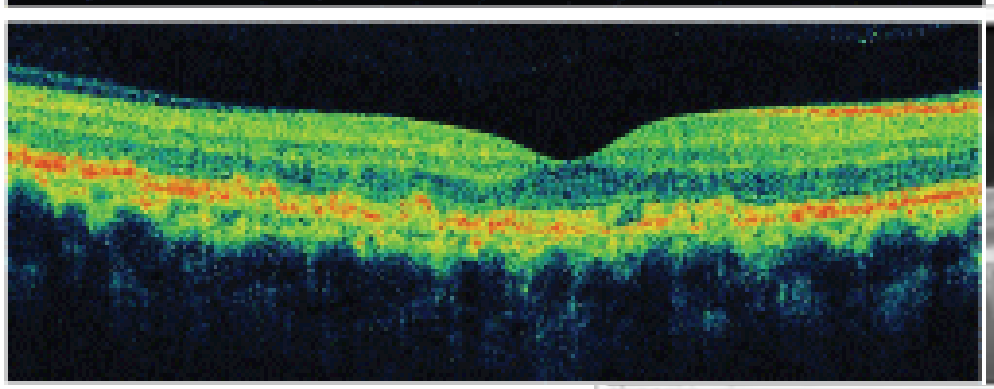
What is Optical Coherence Tomography?

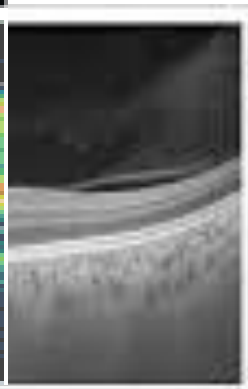
- Sort of light ultrasound
- Scatter versus reflection
- White light – low coherence
- Beam splitter
- Interferometry
- A lot of complicated mathematics
- Image of the eye is produced

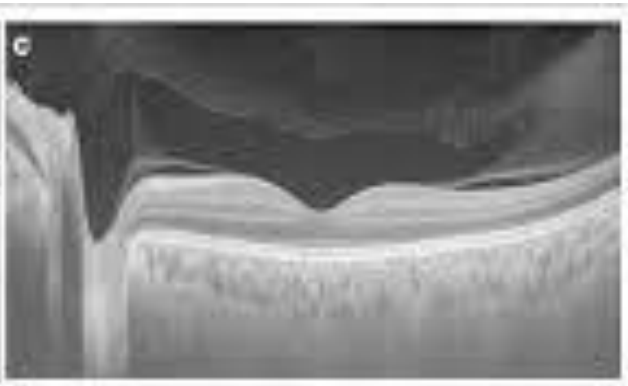
- Time domain, frequency (spectral) domain, swept source

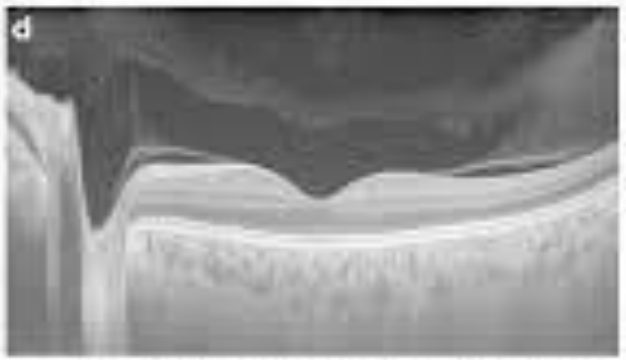
Types of OCT











When do we order OCT scans?

- Monitoring of medical retina conditions
- Diagnostic
- If the result will change management

- Glaucoma

Main Conditions where OCT is Essential

- ARMD – macular degeneration
- RVO – retinal vein occlusion
- DMO – diabetic macular oedema
- CNV secondary to all other lesions
  - Uveitis scars
  - Idiopathic
  - Peripapillary
  - Eccentric disciform
  - Myopia
  - PXE

ARMD

- Fixed dosing – nobody does this outside trials
- Loading and PRN – old fashioned
- Treat and extend – ideal

ARMD – Loading and PRN

- After diagnosis injection at baseline then monthly for three injections
- Follow up four weekly with injections if needed

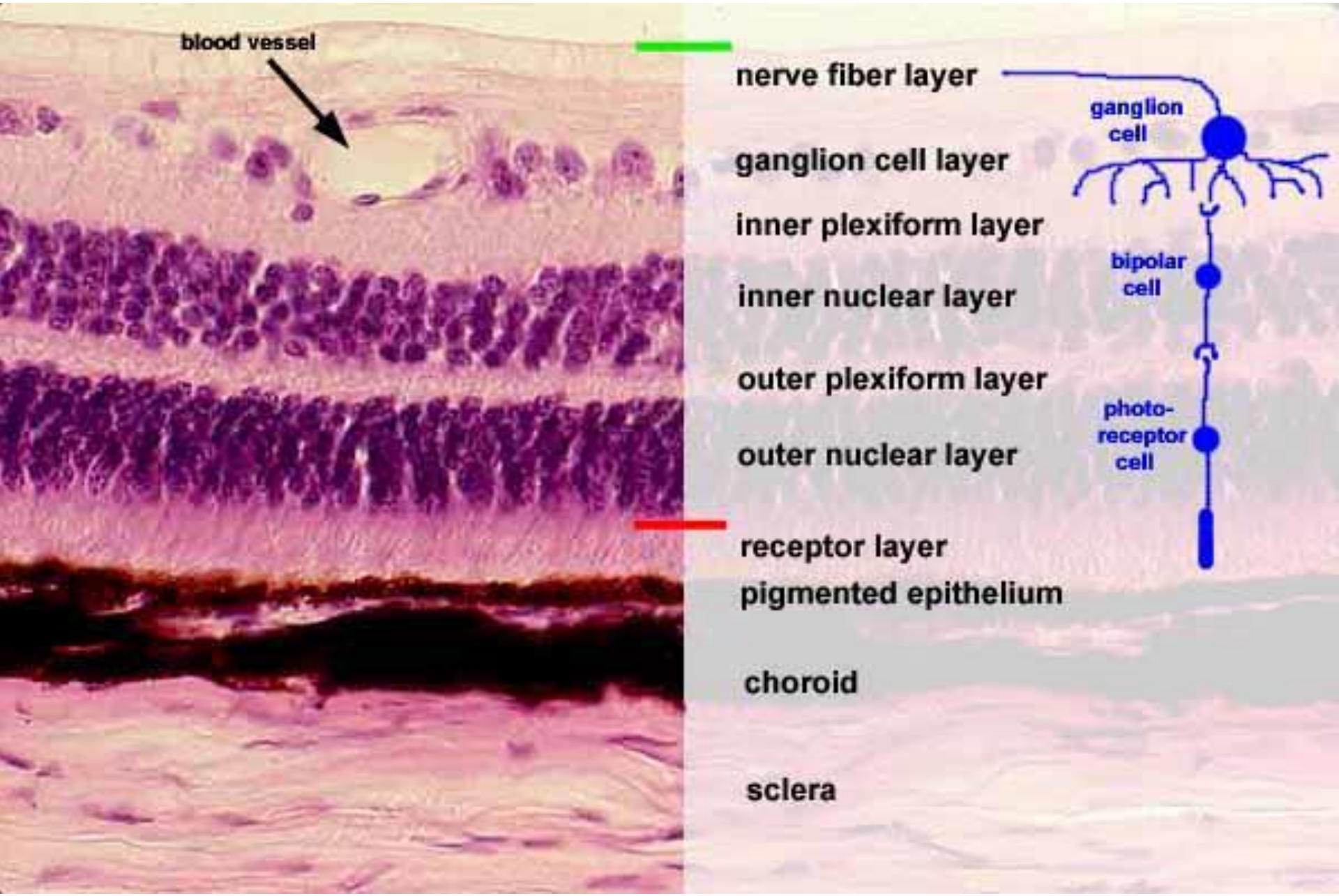
- Wait for it to get worse then treat to get it back

- Benefit:
  - Less injections initially
  - Very simple to administer

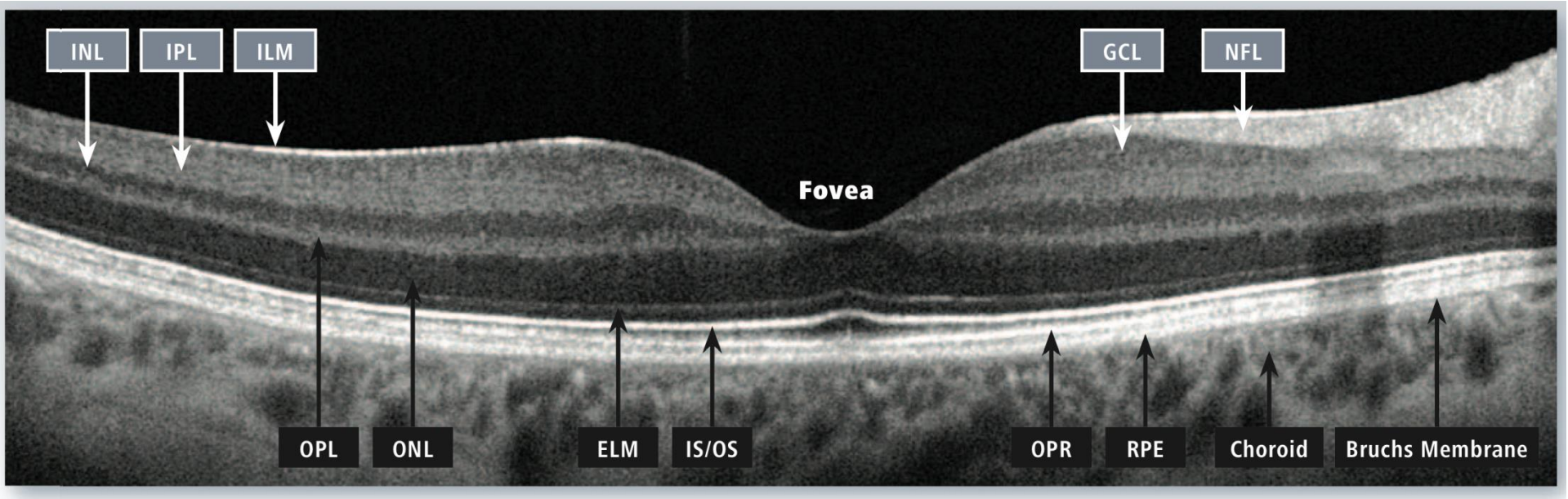
- Cons:
  - No exit plan
  - Carry on forever
  - Retina suffers harm with each recurrence
  - Many injections

ARMD – Treat and Extend

- Three loading doses then extend intervals between injections
- Different hospitals have different regimes
- Concerns exist about deviations from the license
- Most places do in fact deviate from the license
- Singleton has adopted the 4,4,4,6,8,10,12 approach
- Benefits:
  - Prevents damage
- Drawbacks:
  - More injections initially


blood vessel
nerve fiber layer
ganglion cell layer
inner plexiform layer
inner nuclear layer
outer plexiform layer
outer nuclear layer
receptor layer
pigmented epithelium
choroid
sclera
ganglion cell
bipolar cell
photo-receptor cell

The OCT scan

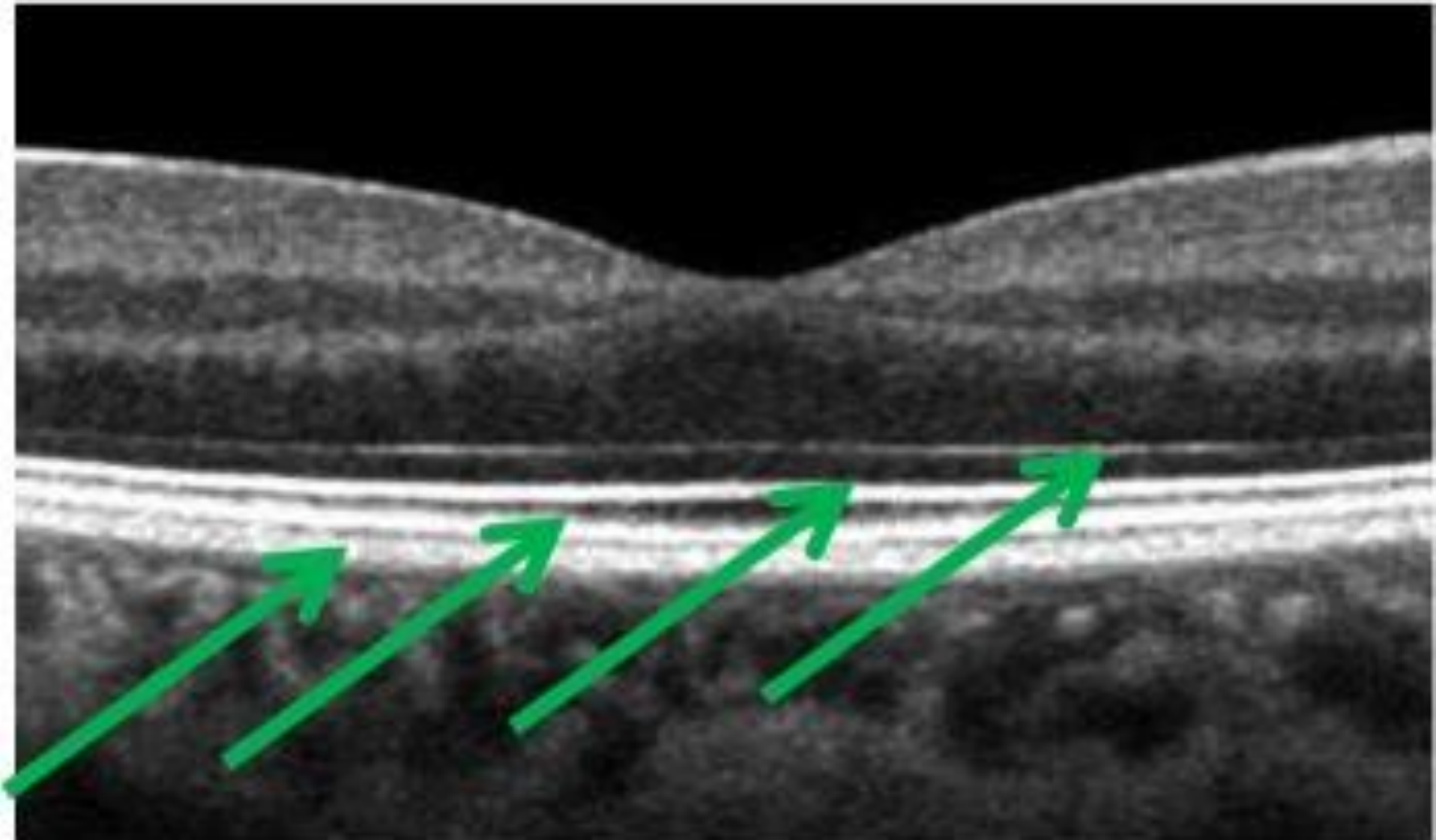


ILM: *Inner limiting membrane*
IPL: *Inner plexiform layer*
INL: *Inner nuclear layer*
OPL: *Outer plexiform layer*
ONL: *Outer nuclear layer*

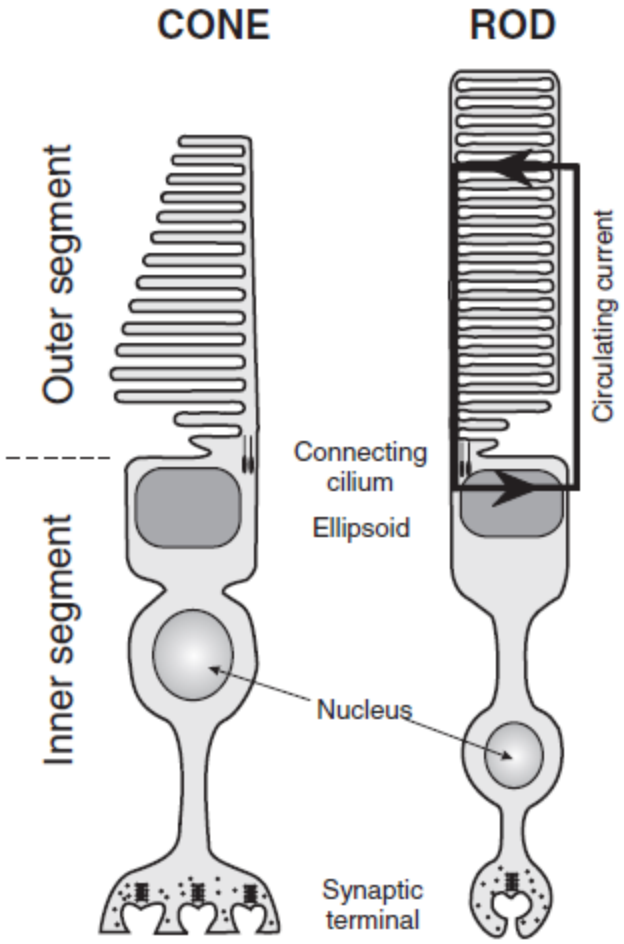
ELM: *External limiting membrane*
IS/OS: *Junction of inner and outer photoreceptor segments*
OPR: *Outer segment PR/RPE complex*

NFL: *Nerve fiber layer*
GCL: *Ganglion cell layer*
RPE: *Retinal pigment epithelium + Bruch´s Membrane*

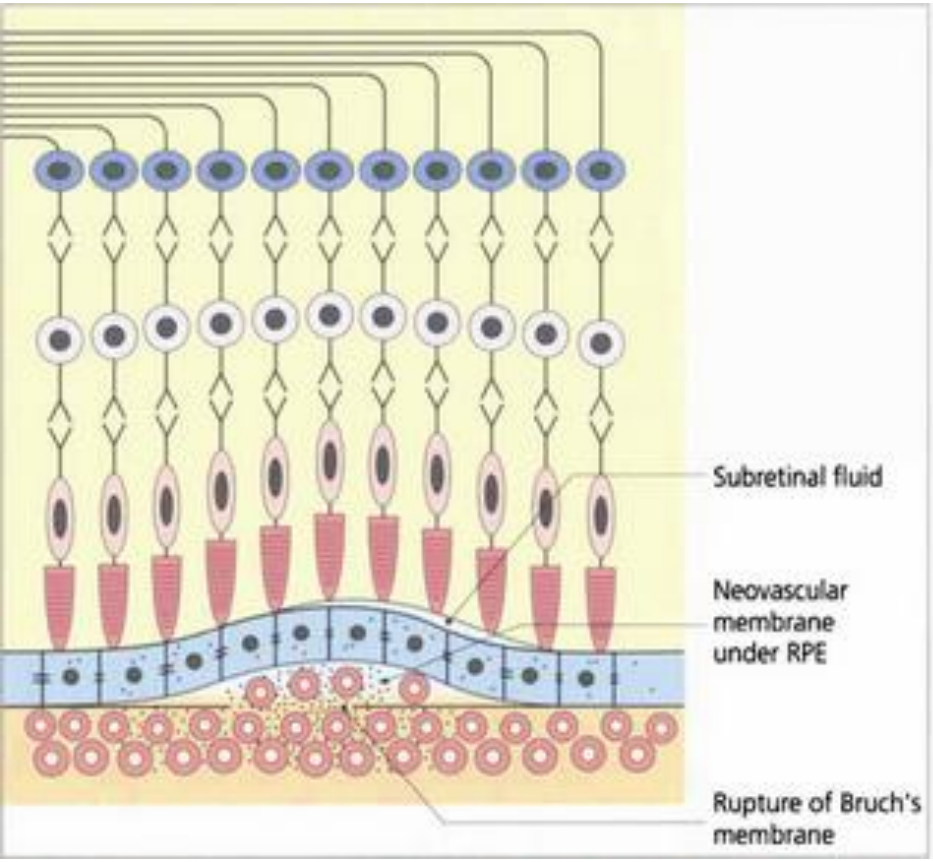
The OCT scan

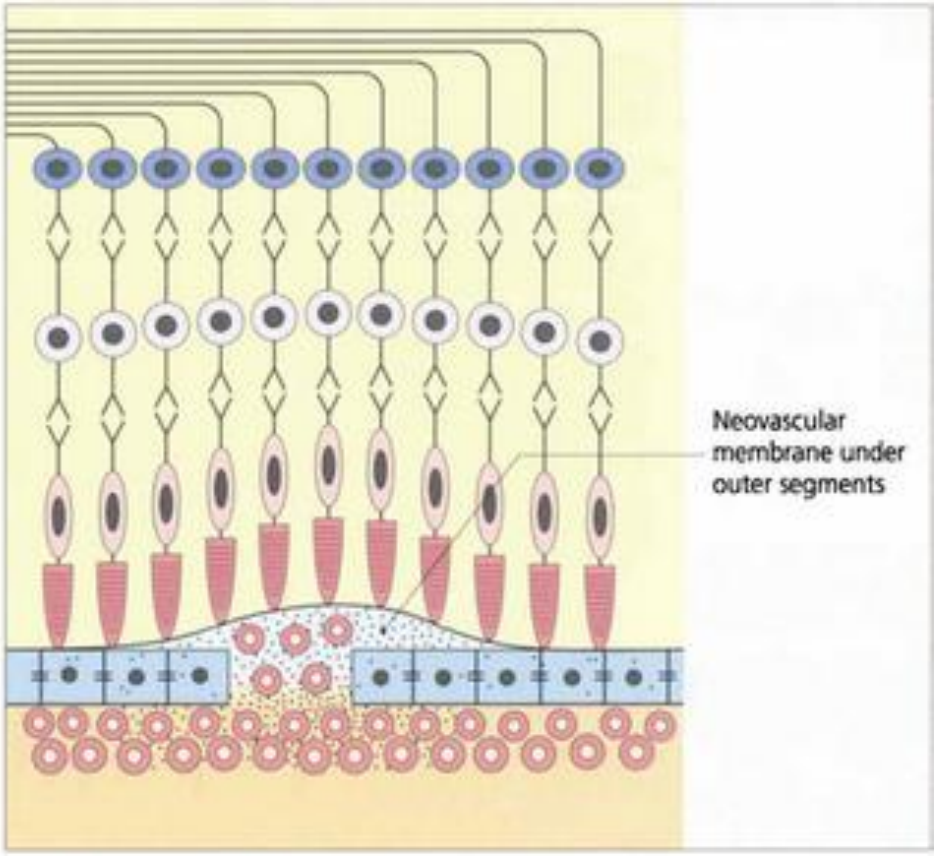


The Photoreceptor

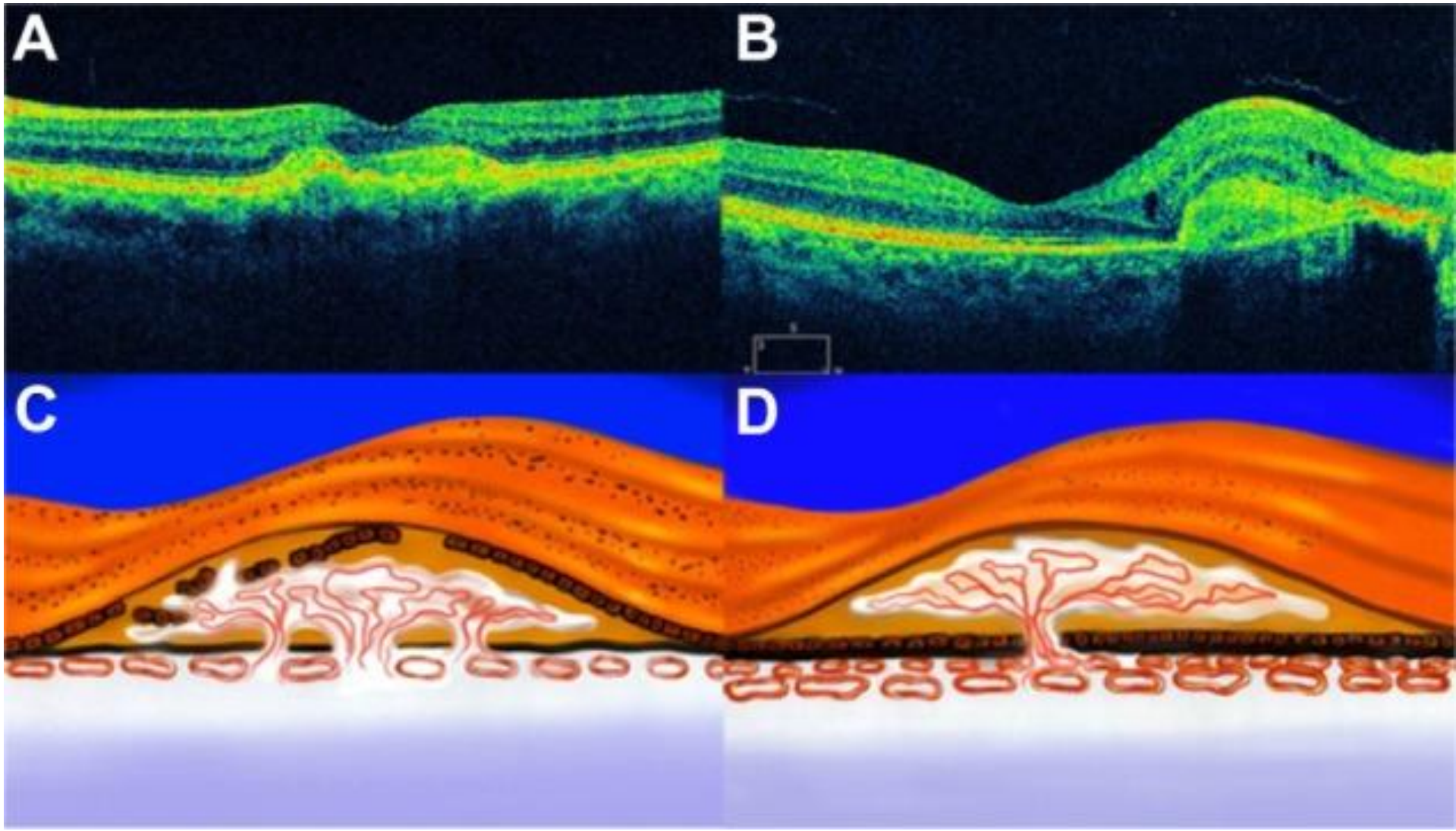


ARMD – types of membranes

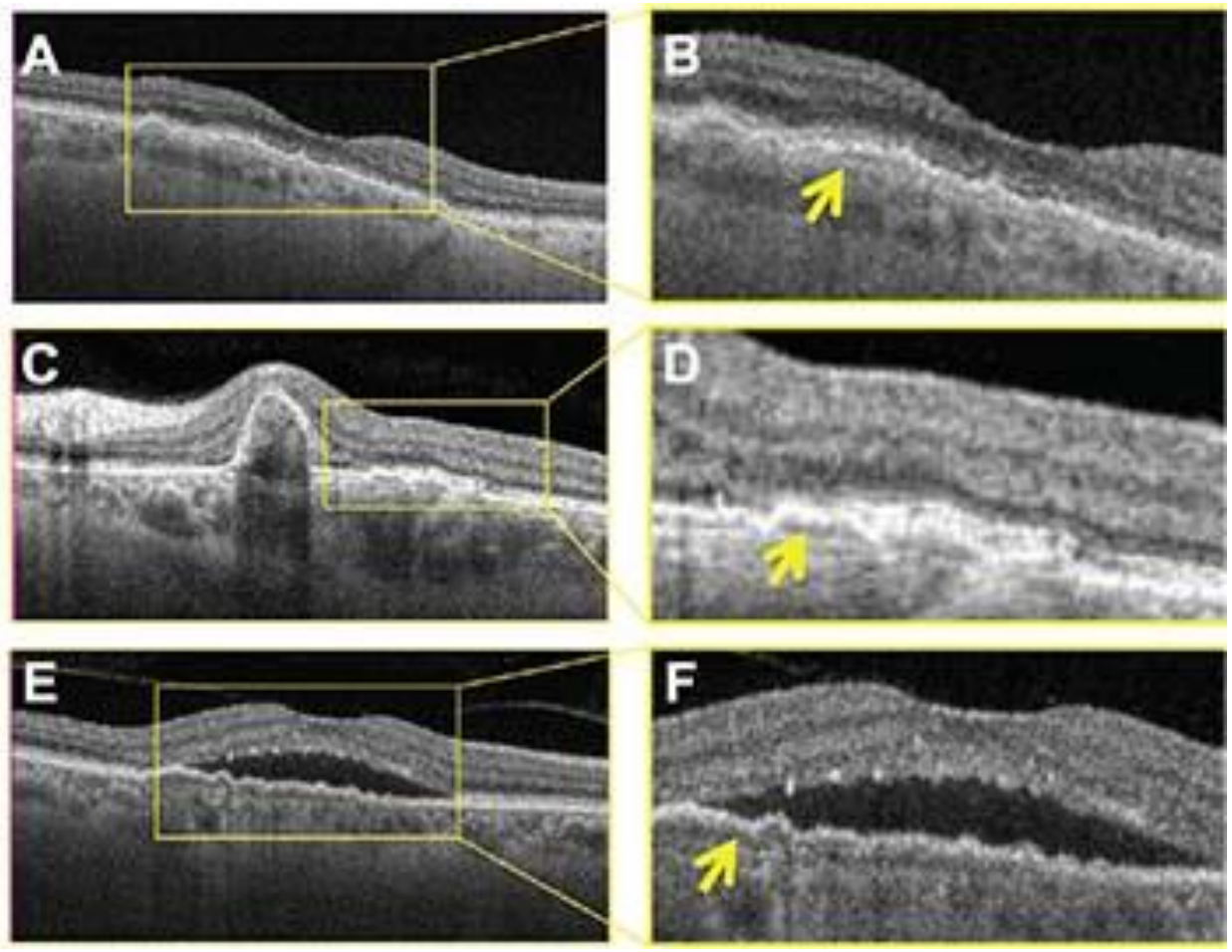




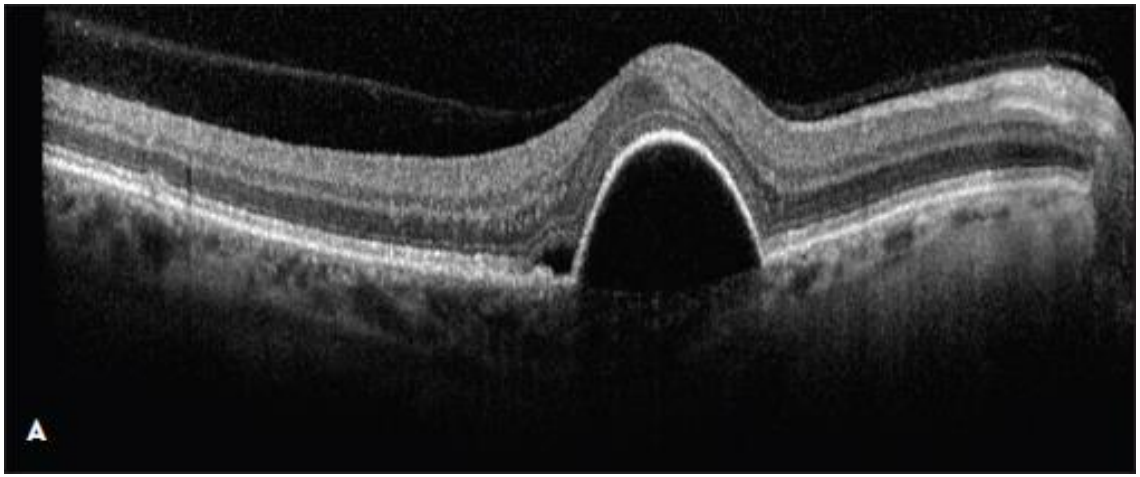
Types of membranes

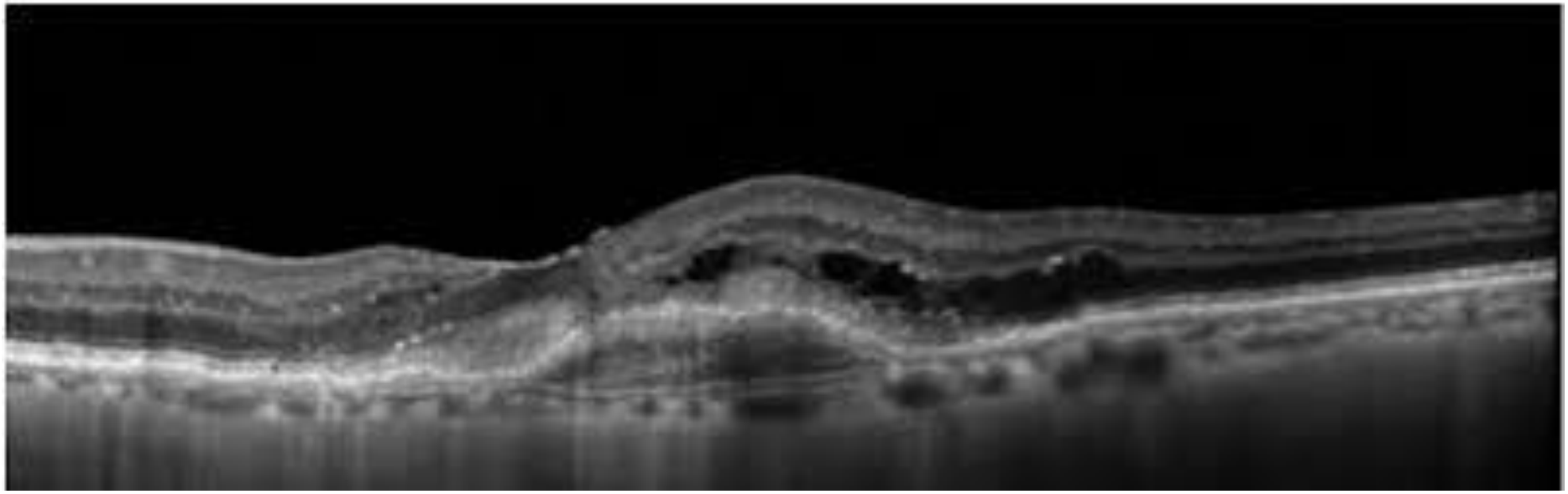


Double layer sign – Type 1 CNV

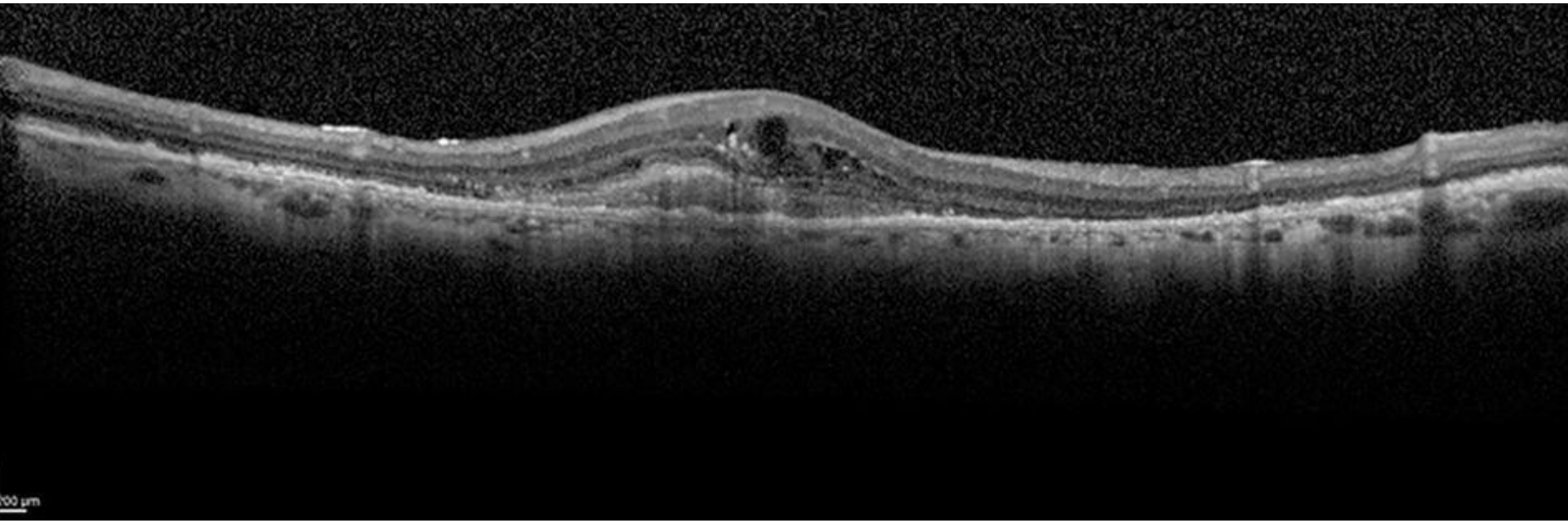


Pigment epithelial detachments





Type 2 membrane



Type 3 membrane

When do you treat in a PRN regime?

- If you're within the three loading doses
- If there if fluid on the OCT scan
- If there is blood on examination

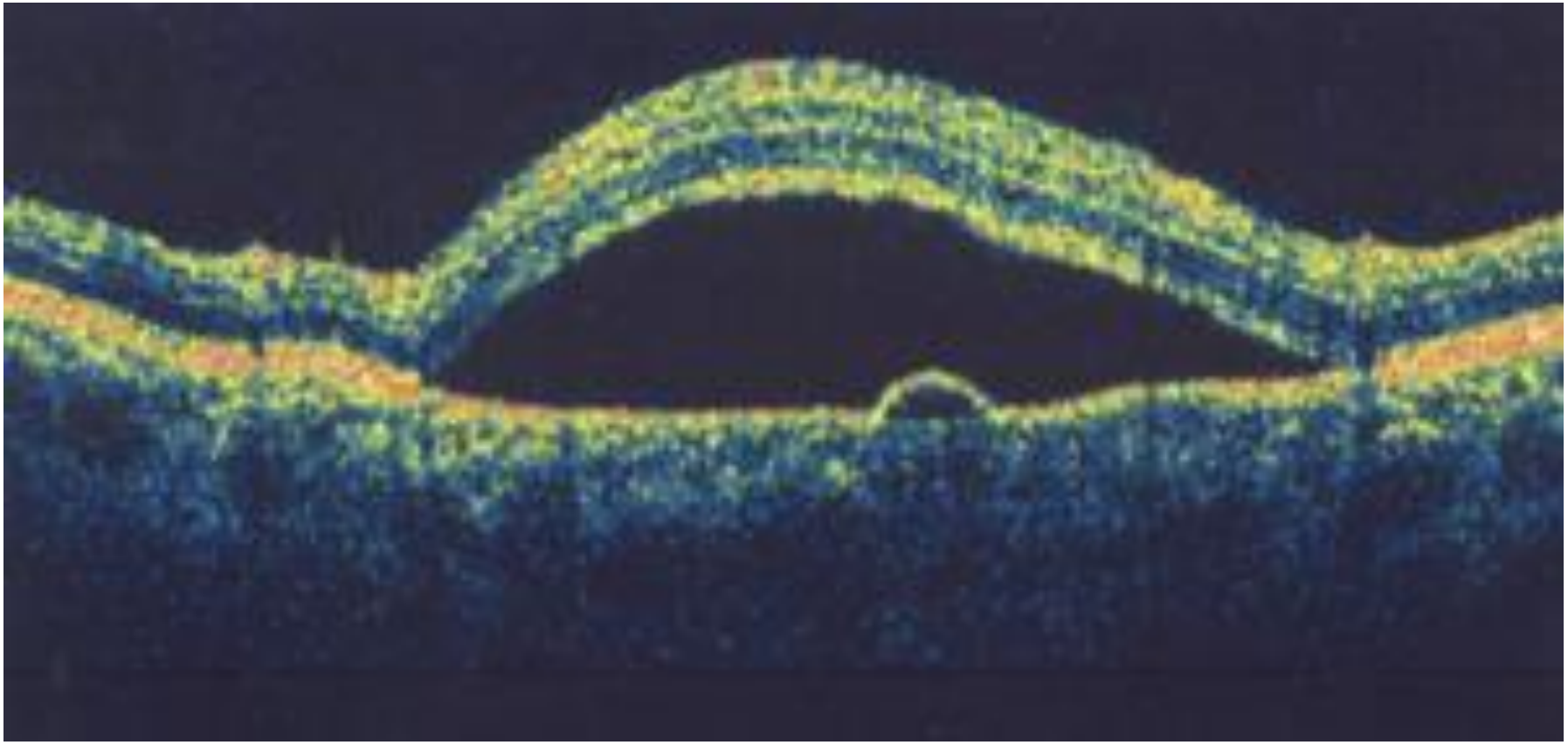
- THAT'S IT

Fluid on examination

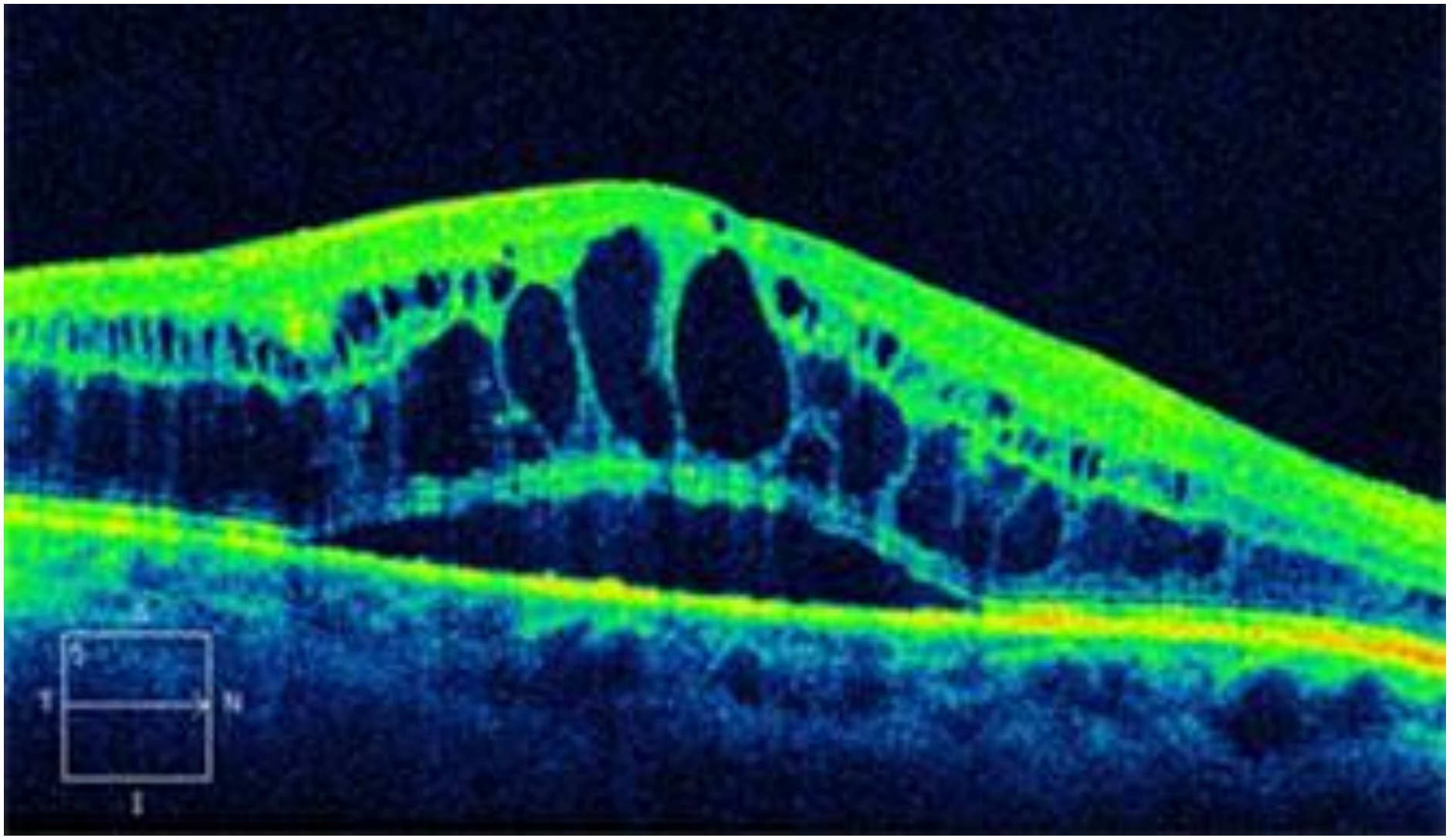
- Cysts in the retina
- Fluid under the retina
- Some kind of combination

- NOT fluid under the RPE

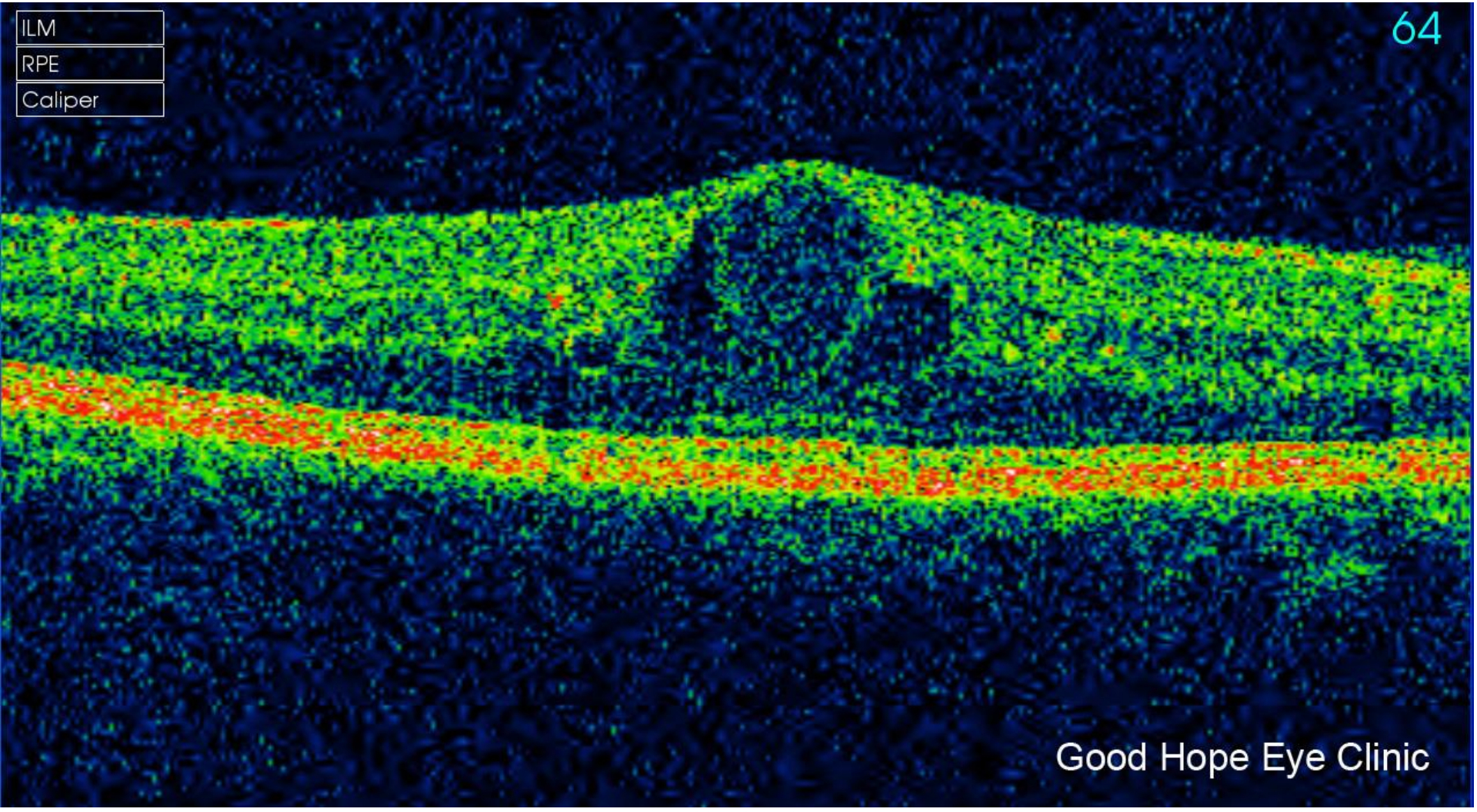
A Test



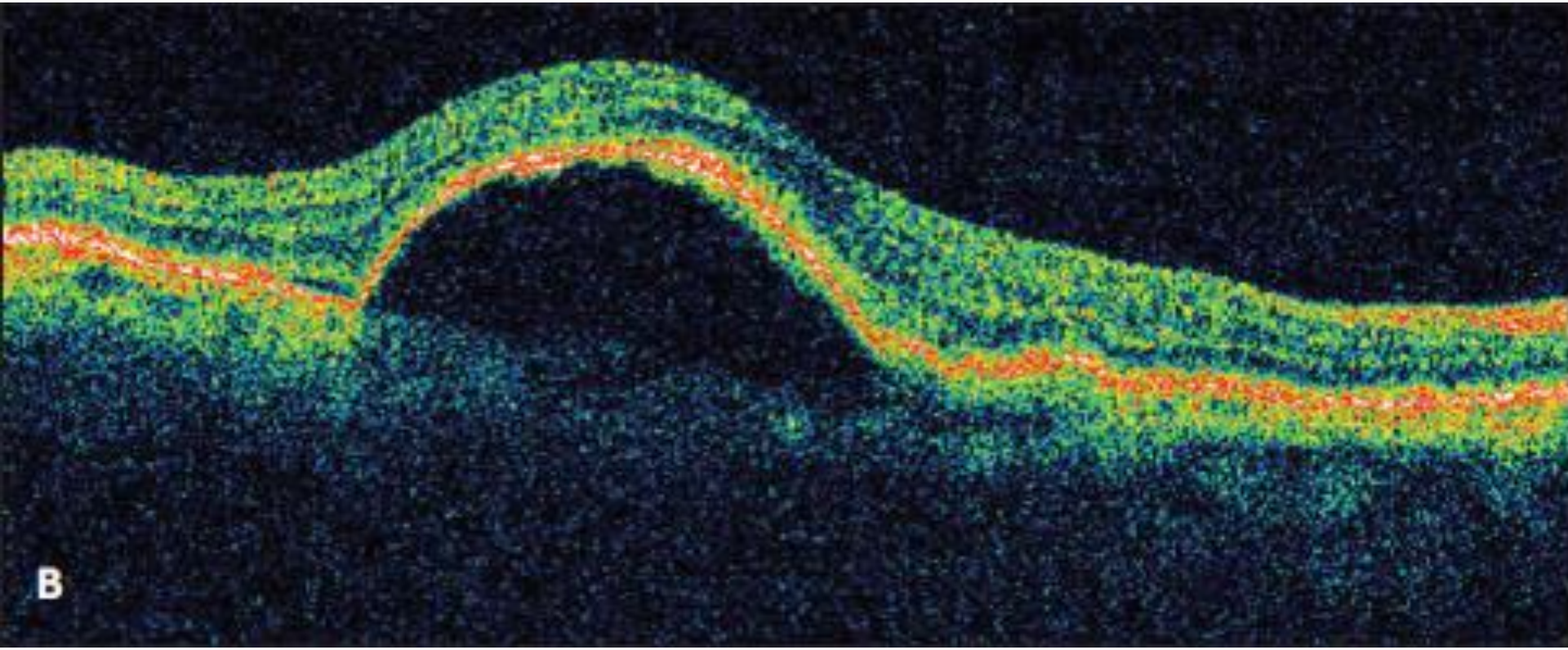
Another test



Third test



Final test



So…

- If there is IRF or SRF or new blood you treat
- If not – you don't

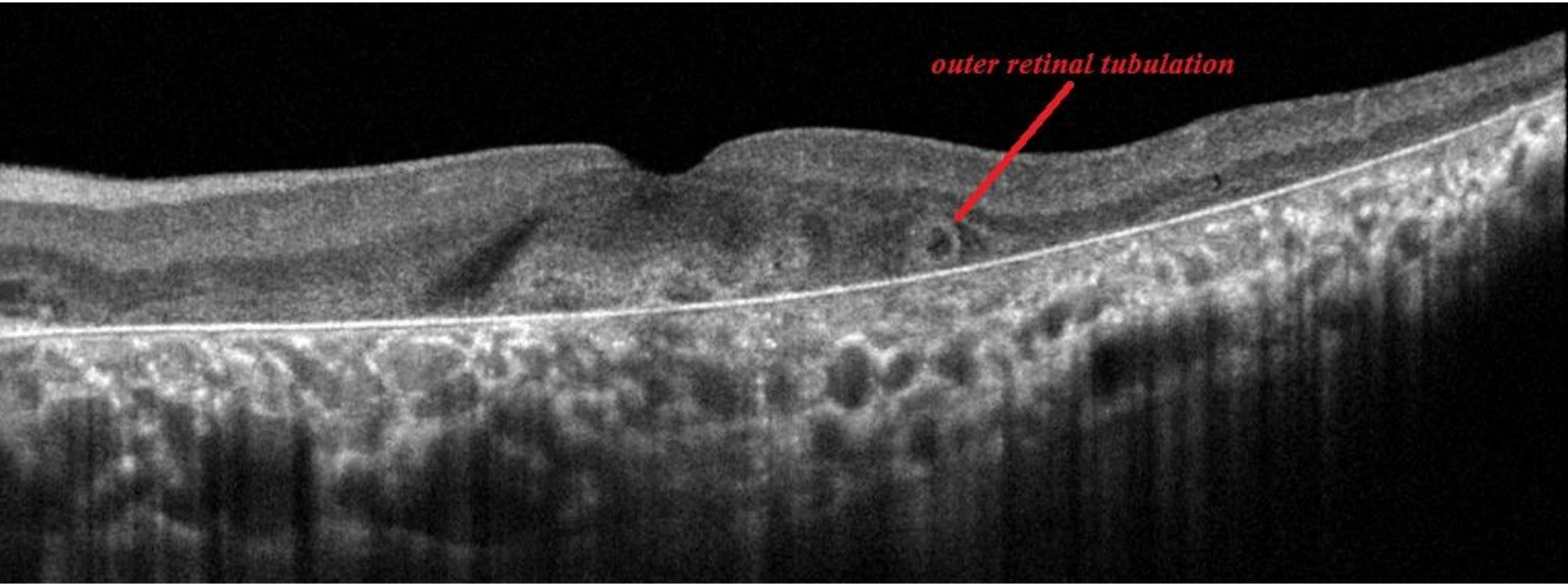
- Bear in mind NICE guidelines* of vision of better than 1.2 but they are guidelines – GUIDELINES

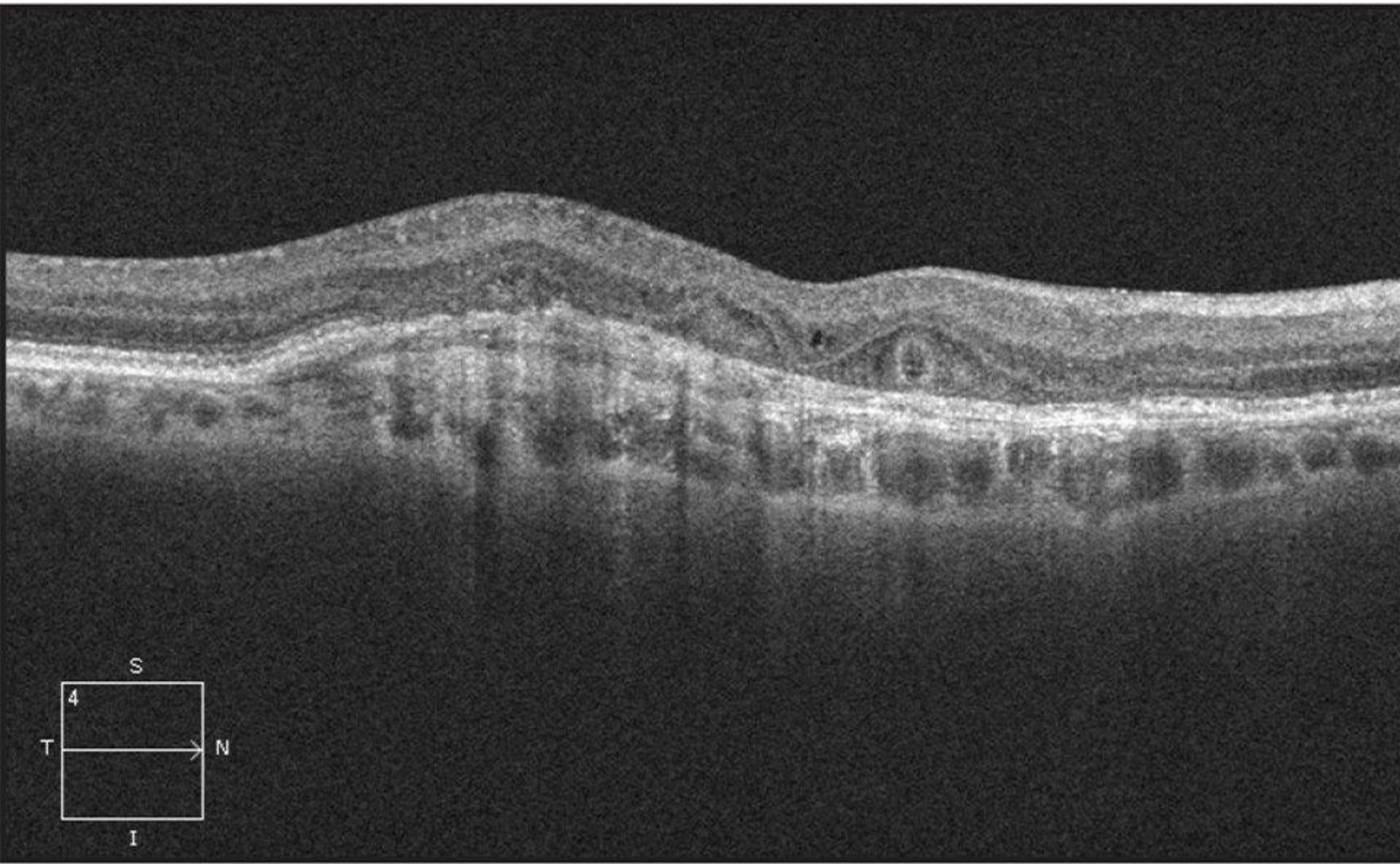
- **NICE guidelines NG82: Age-related macular degeneration- www.nice.org.uk/guidance/ng82*

Pitfalls

- Not all ‘fluid’ is fluid
- Outer retinal tubulations
- Scar tissue
- Structural damage

Outer retinal tubulations

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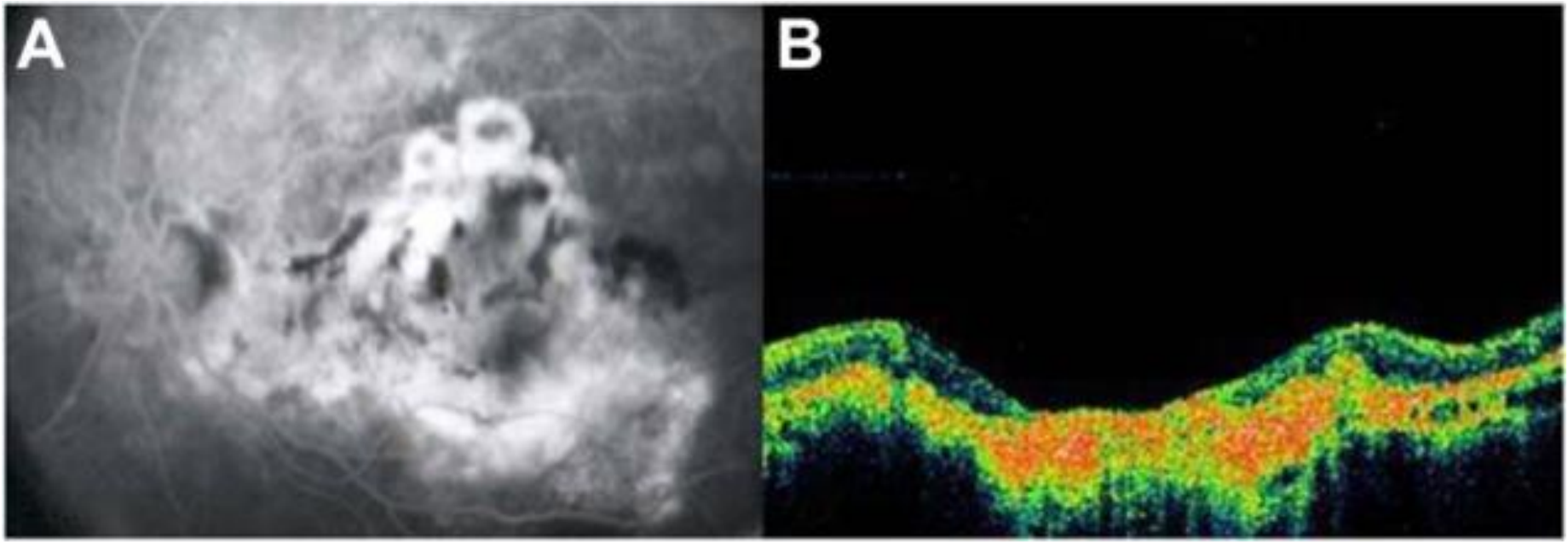
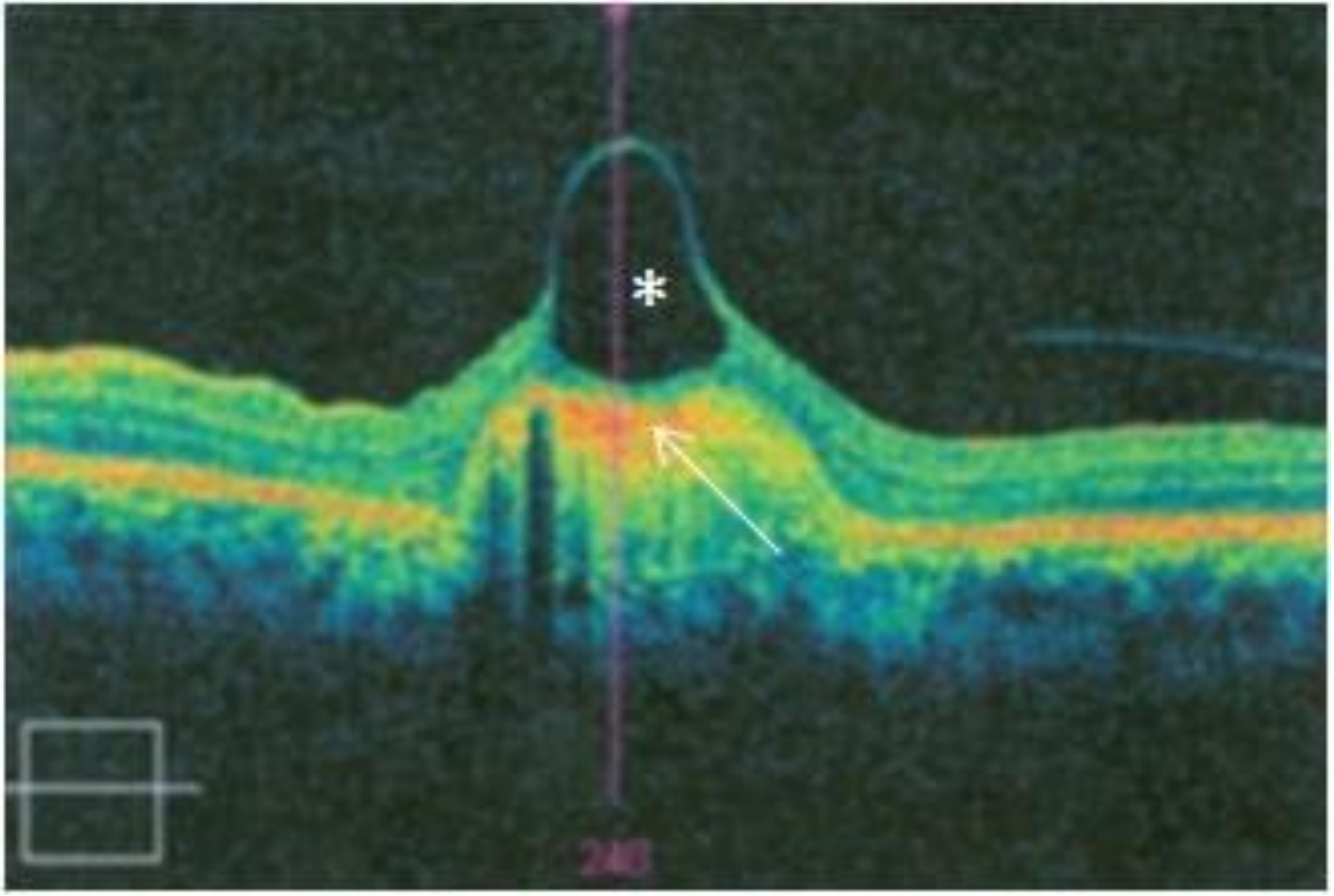
Disciform scar





In Summary

- If the vision is not out of range
- If there is fluid in the retina or under the retina
- If there is haemorrhage

- TREAT

- Otherwise – don't
- Patient complains of decreased VA but OCT dry – DON'T
- VA better but fluid or blood present - TREAT

Treat and extend

- Change the follow up and not the decision to inject or not
- Principle otherwise exactly the same
- EXACTLY

- Typical regimen:
- Loading three doses separated by four weeks
- Then…
- If dry – inject and follow up six weeks
- If dry – inject and follow up eight weeks
- If dry – inject and follow up ten weeks
- If dry – inject and follow up twelve weeks (*3)

Treat and extend

- After three lots of twelve – stable monitoring clinic quarterly forever – or if sensible discharge
- If goes wet – inject and reduce follow by two weeks
- Give three more injections at this level then try extend again
- If still dry – inject and follow up after 2 week extension
- If goes wet go back
- AND SO ON AND SO ON AND SO ON FOREVER

Other treat and extend regimens

- 0,4,6,8,10,12
- 0,4,4,6,8,10,12
- 0,4,4,8,8,8,10,12,12,12 (Moorfields)

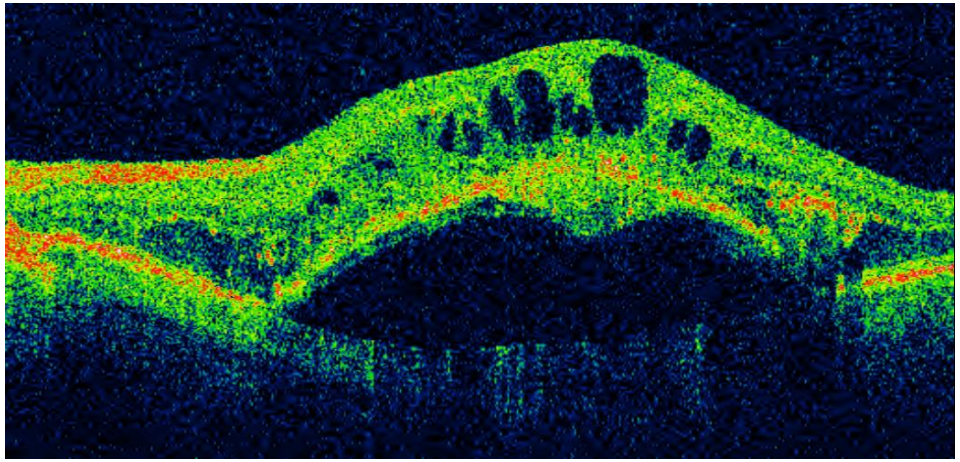
- It really is very variable

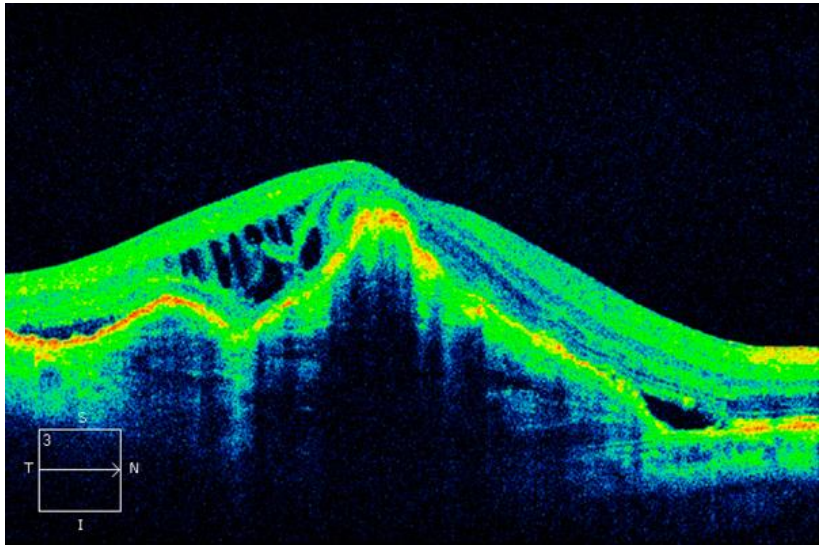
In a nutshell

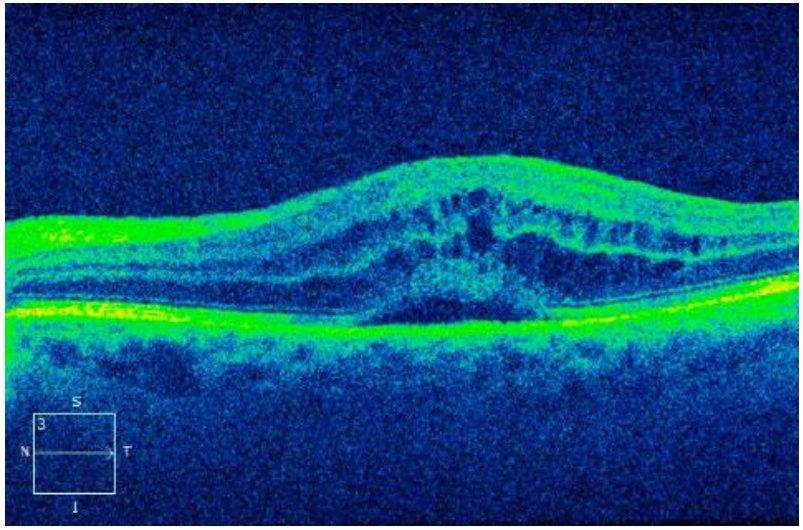
- If in doubt - treat

DMO

- OCT fluid is either IRF or SRF if bad but NEVER sub RPE
- Which one of these is DMO?







Diabetes causes an inflammatory cascade

- If caught early anti VEGF works
- If chronic needs steroid

- DIFFERENCES WITH AMD:
- Fluid less dangerous
- Bleeding less dangerous
- Whole thing less dangerous
- More relaxed
- Less dangerous

Regimes

- Eylea compared to Lucentis - DRCR.net protocol T*
- Loading five monthly injections with Eylea
- Lucentis – three monthly injections
- Why the difference? License. Nothing clinical
- Clinical considerations:
- Treat and extend DMO?
- PRN DMO?
- Some places treat DMO and AMD the same with treat and extend
- Do you need to load five?

**Curr Opin Ophthalmol.2017 Nov;28(6):636-643. doi:10.1097/ICU.0000000000000424.*

The Main Question

- When do you switch to steroid?
- When has the antiVEGF failed?
- This is the $64,000 question

- If the fluid is still there after 3?
- If the fluid is still there after 5?
- If the fluid is still there after 8?

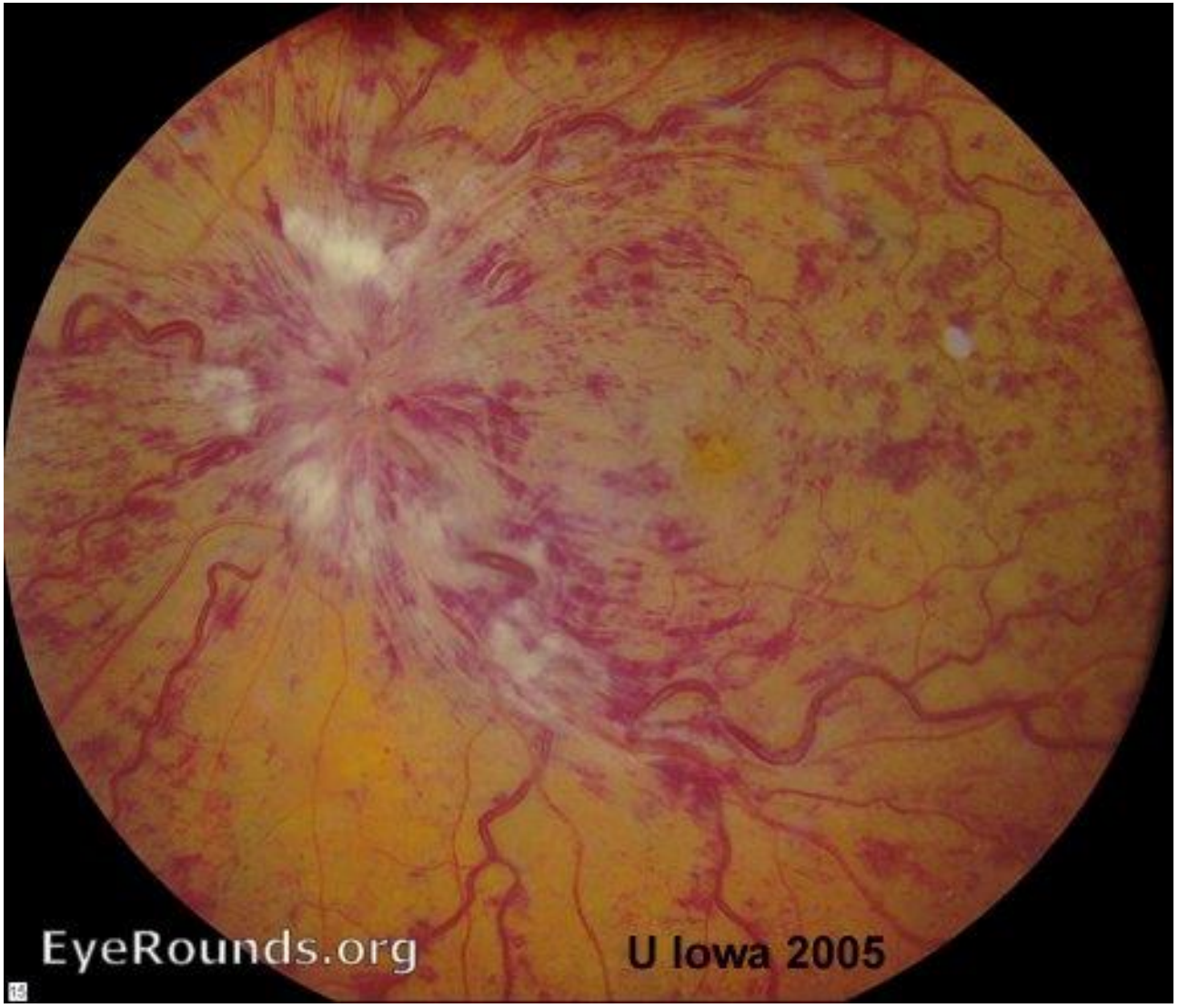
- Different experts say different things
- Bressler – never
- Kupperman – after three

Steroid

- Ozurdex first – 6 months (3)
- Then Iluvien – 3 years (1.5)

- Side effects:
- CATARACT
- PRESSURE - GLAUCOMA

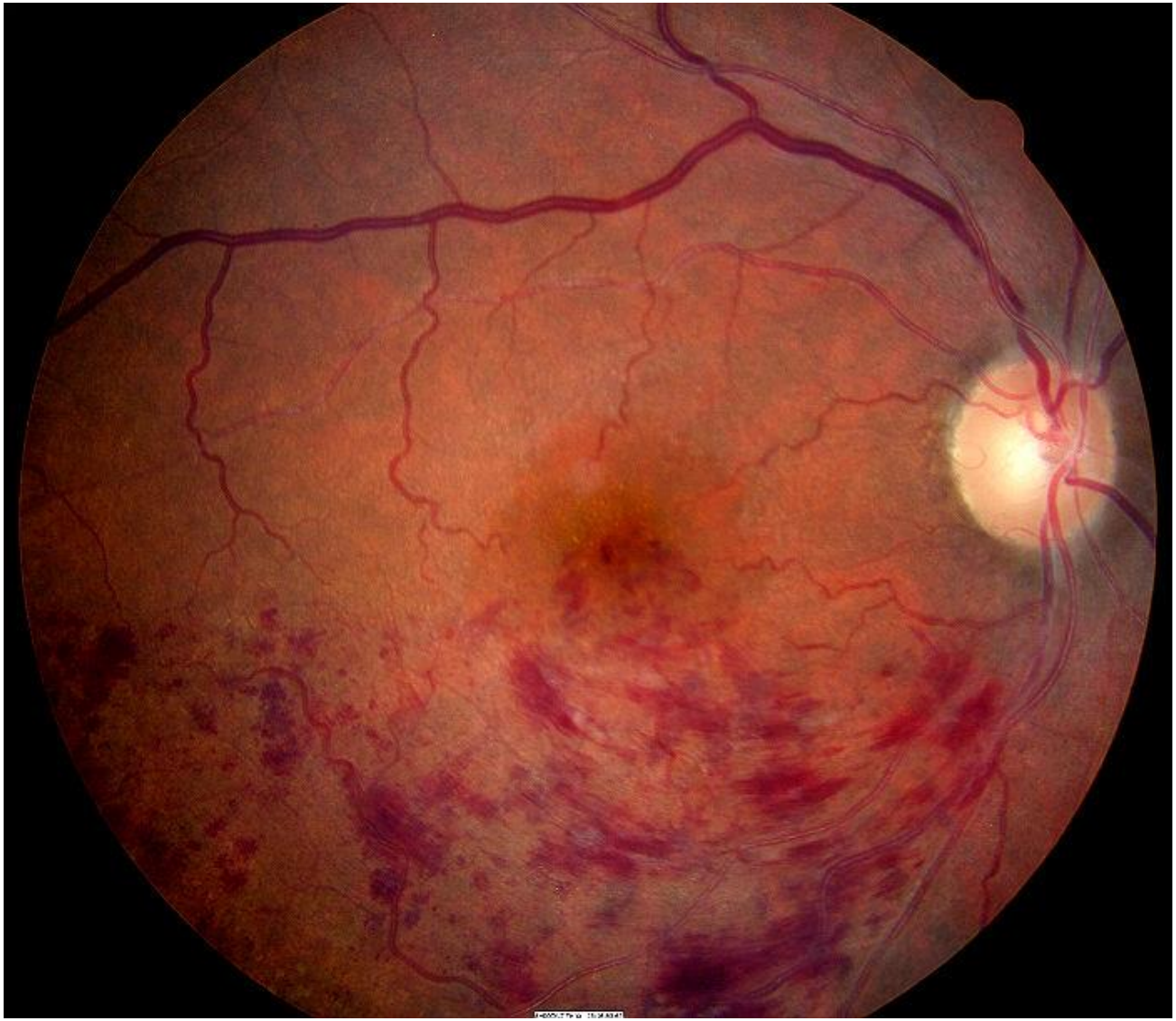
RVO



BRVO

BRVO or CRVO?

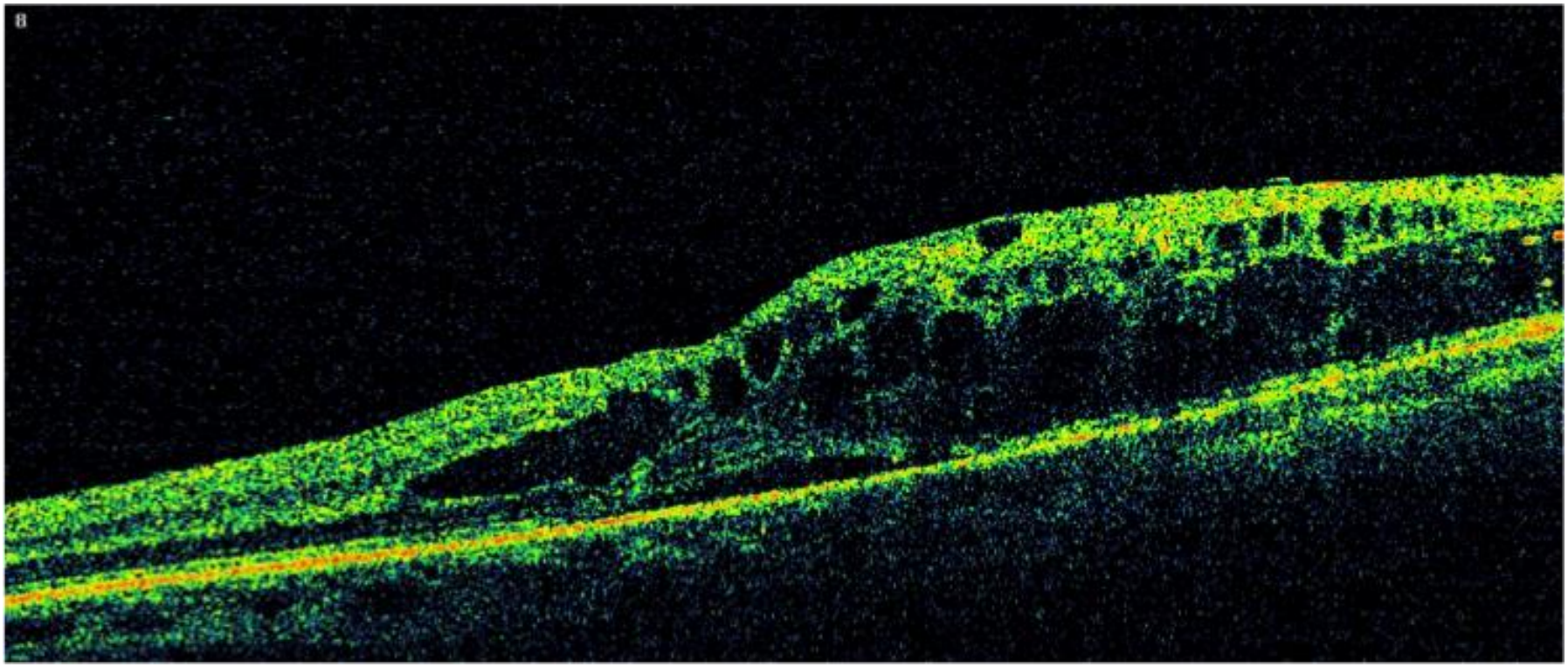
BRVO or CRVO?



Treatment

- Ozurdex – UNLESS – ‘young’, or some kind of glaucoma problem
- If ‘young’, or glaucoma:
- Eylea course of three monthly injections then discharge to clinic
- Typically responds very well
- Should we give just one?

OCT – similar to DMO



RVO DMO AMD

- How about one treat and extend regime for all?
- It is interesting to hypothesise about
- But basically AMD is a different beast – aggressive and unforgiving
- DMO can be there for many months before permanent damage occurs
- RVO can get better by itself sometimes

CNV secondary to all the other causes

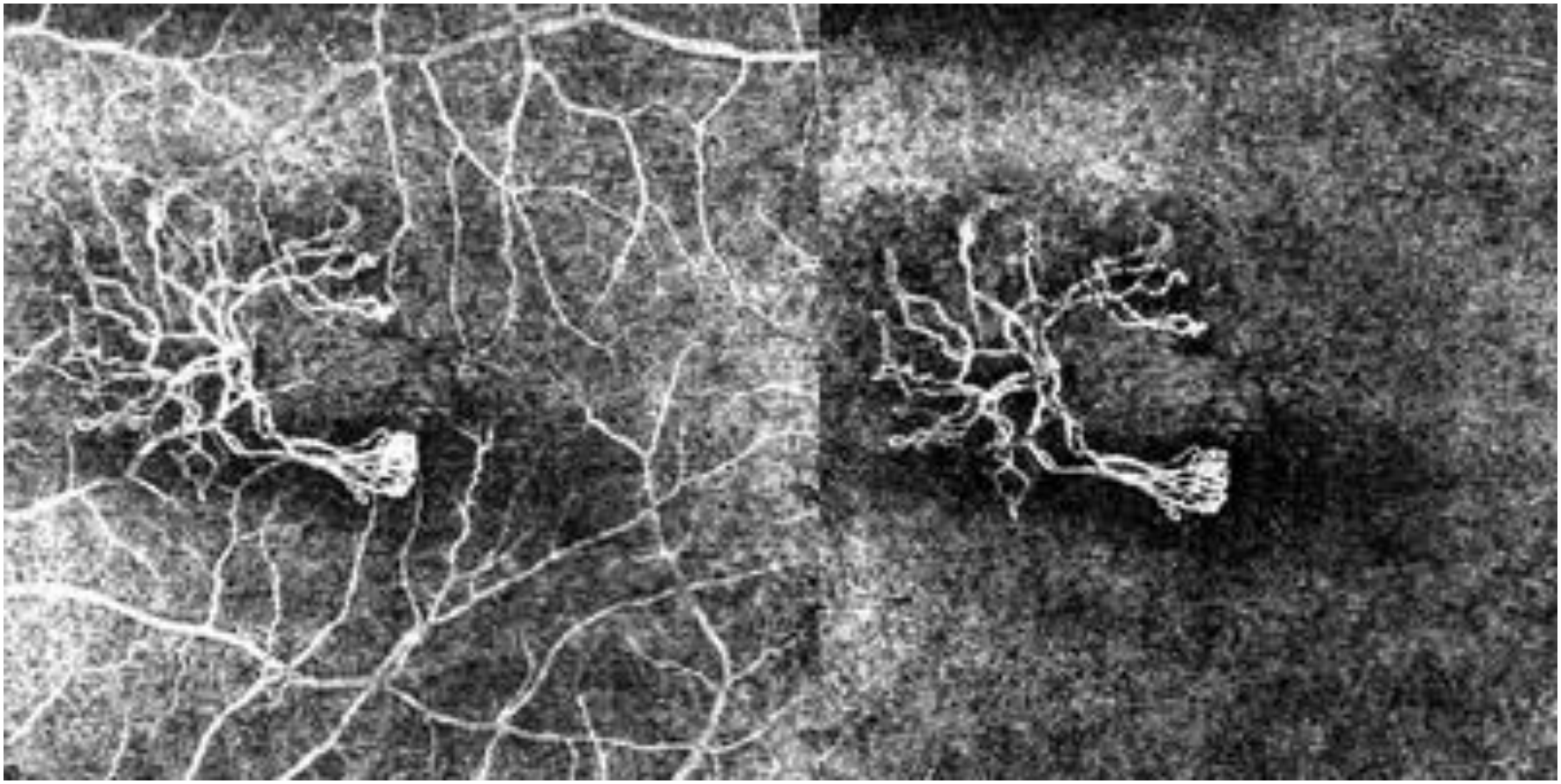
- No consensus
- Eylea PRN without loading?
- Avastin (Moorfields)
- Load times three with Eylea / Lucentis?
- Where to monitor?

- These are rare however

When do we order an OCT?

- Diagnostic
- If the result will change management
- Monitoring of medical retina conditions

- When do we NOT?
  - At every visit routinely
  - If you don't know what's going on
  - If the outcome will not change management – e.g. advanced wet AMD



Diolch

- Unrhyw Gwestiynau?