

# Macula & Retina

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**23° corso  
di aggiornamento  
per il  
medico  
di base**

organizzato dal Gruppo Medico Formazione

**15 – 16 – 17 ottobre  
2025  
Palazzo dei Congressi  
Lugano**



**Ente Ospedaliero Cantonale**



# Macula & Retina and...Vitreous

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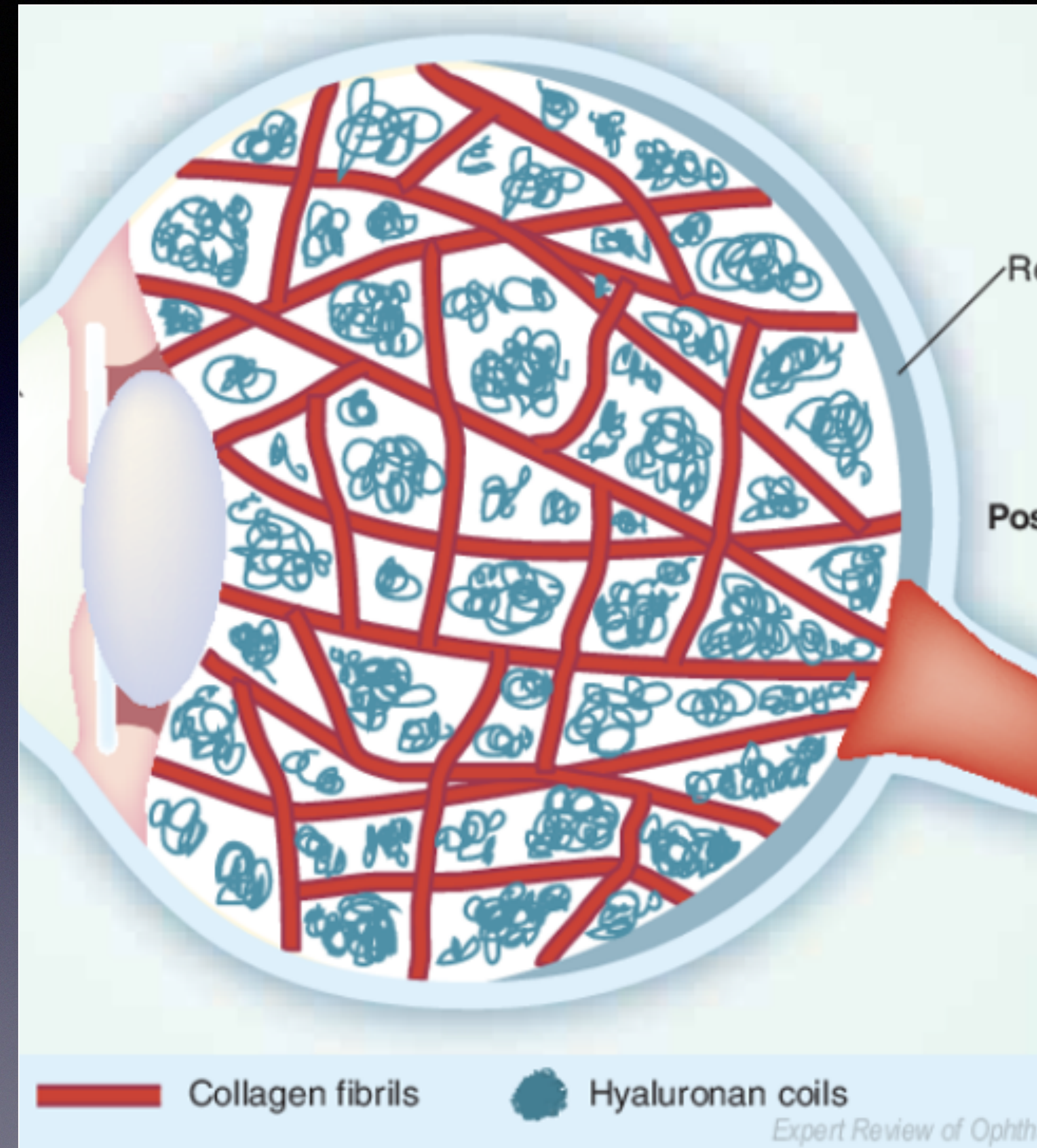
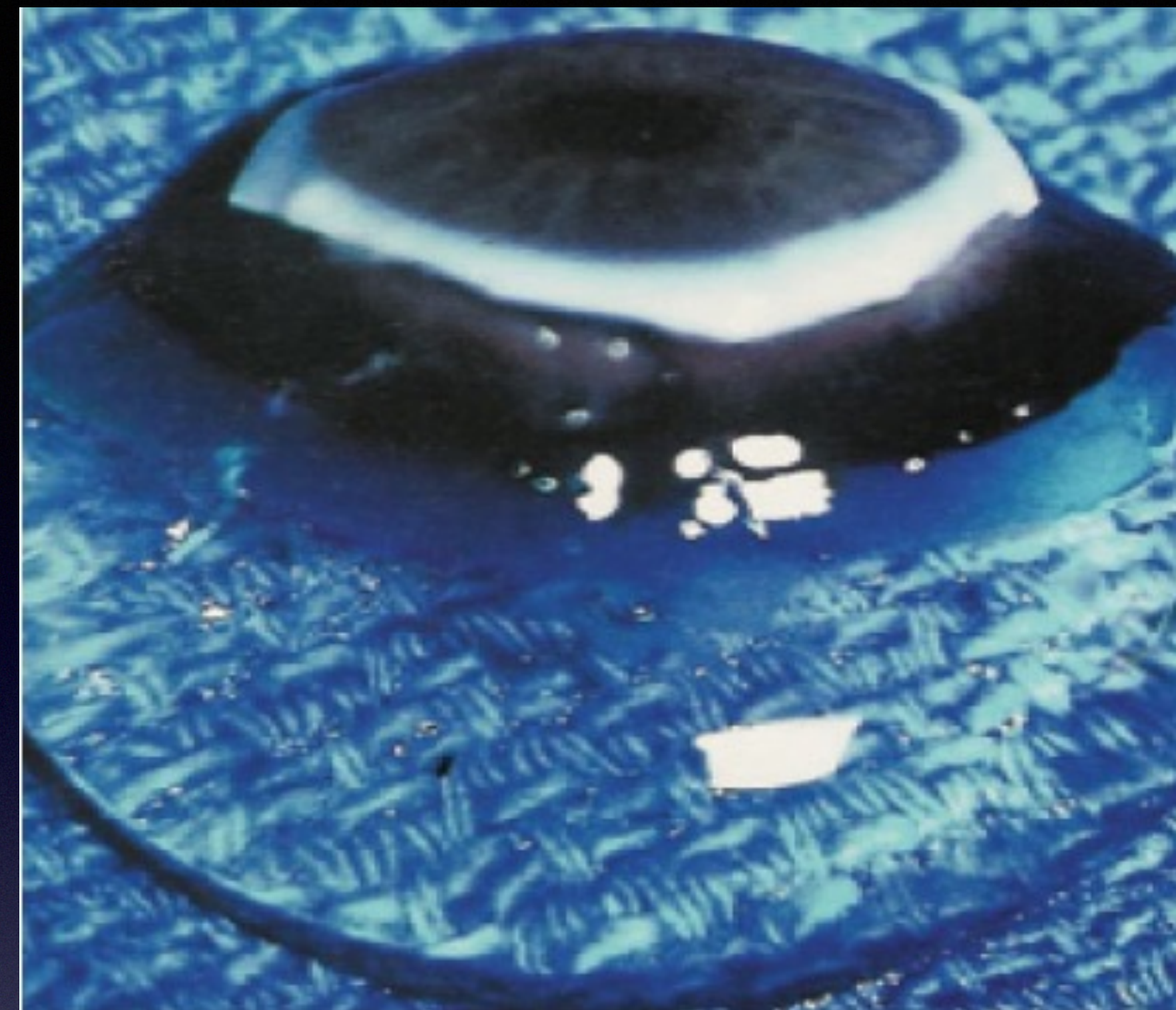
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Jerry Sebag  
The Vitreous  
New York 1989

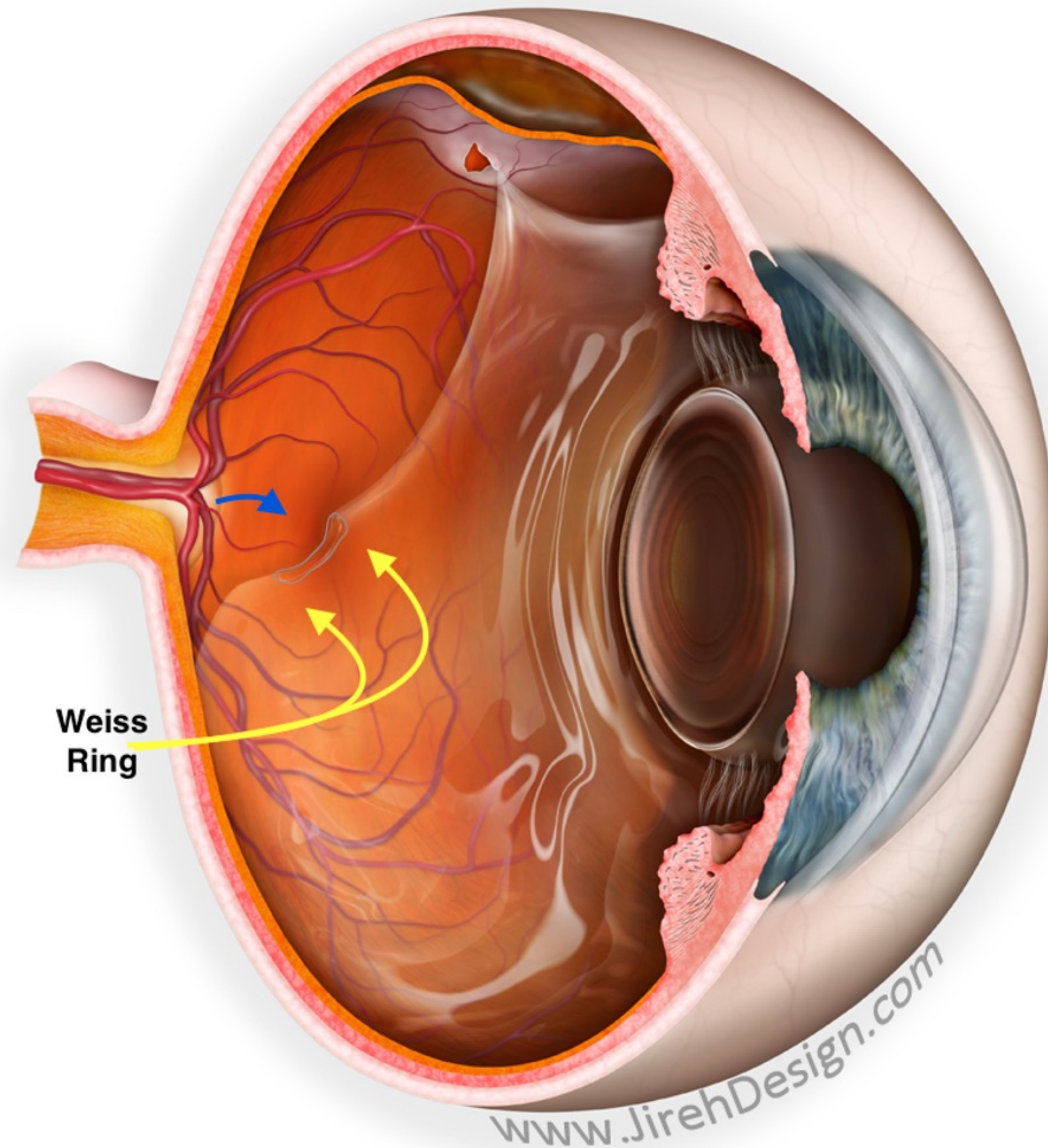


- Largest cavity of the eye
- 98% water
- 2-4x viscosity of water
- Real connective tissue (collagen type II and IX)

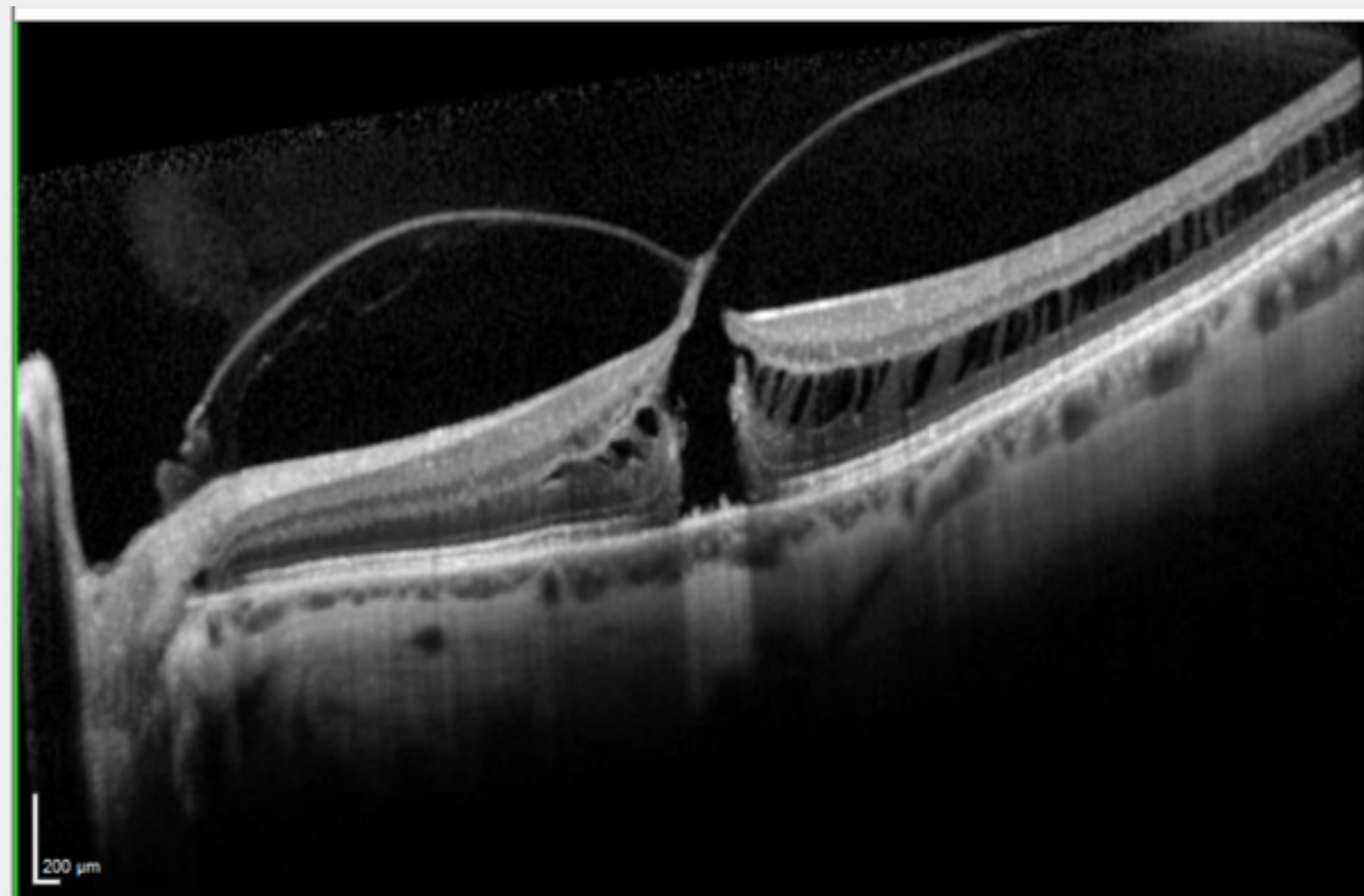
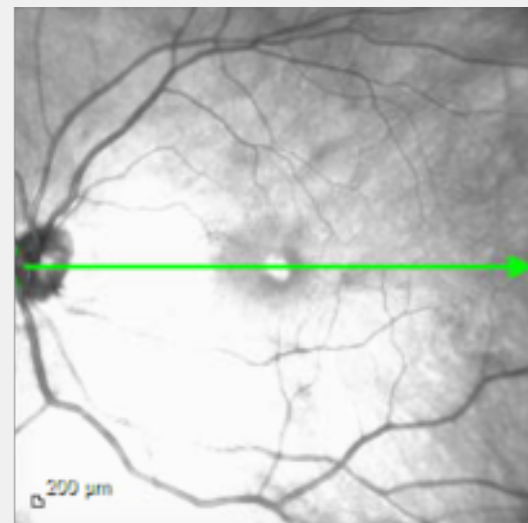


# Posterior Vitreous Detachment (PVD)

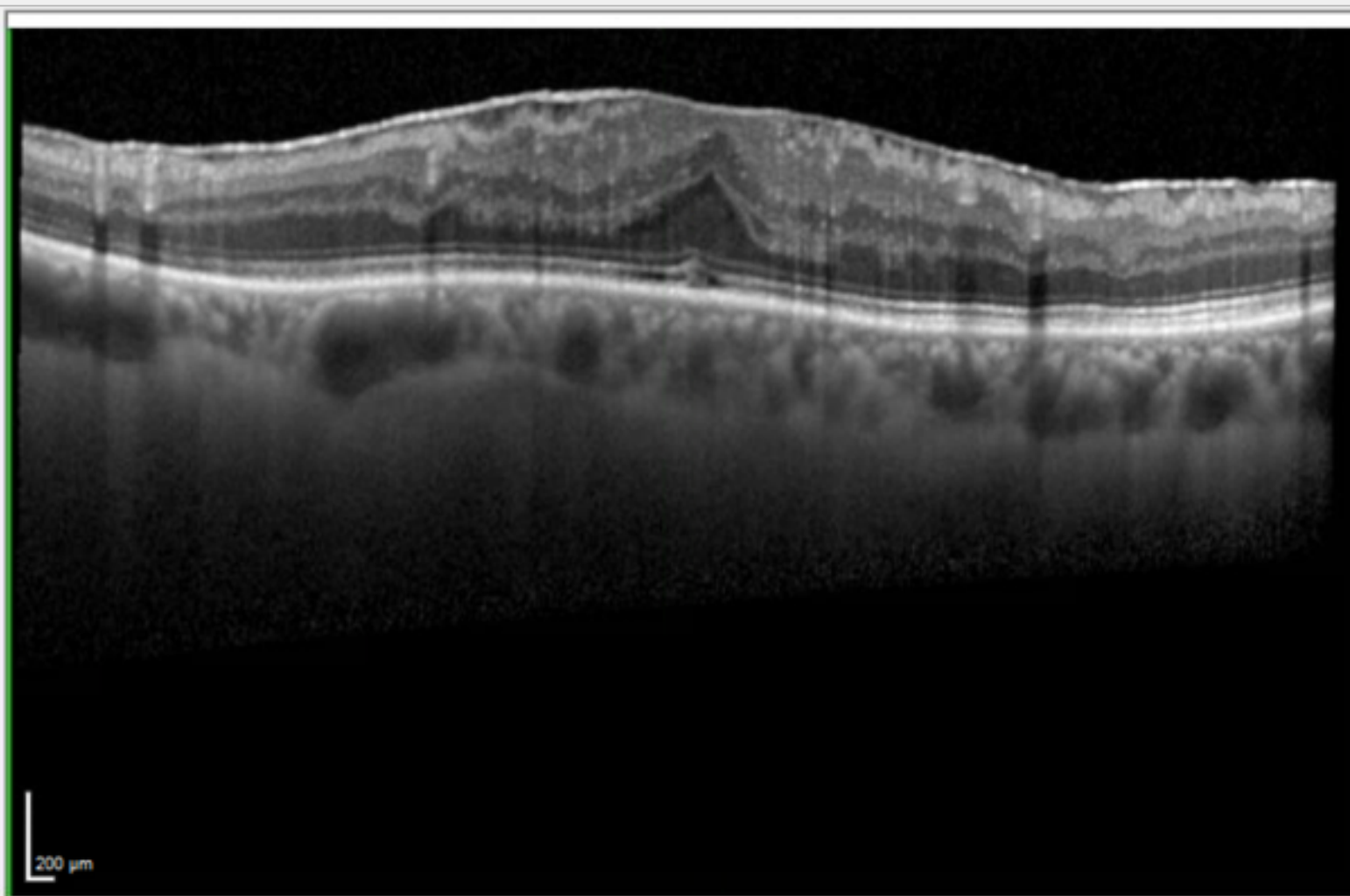
- **Age related changes...**
  - Syneresis (fluid filled cavities and collapse of gel)
  - Collagen fibers condense (mouches volantes, floaters)
  - Vitreous retraction (shrinkage)
  - Posterior vitreous detachment (PVD)



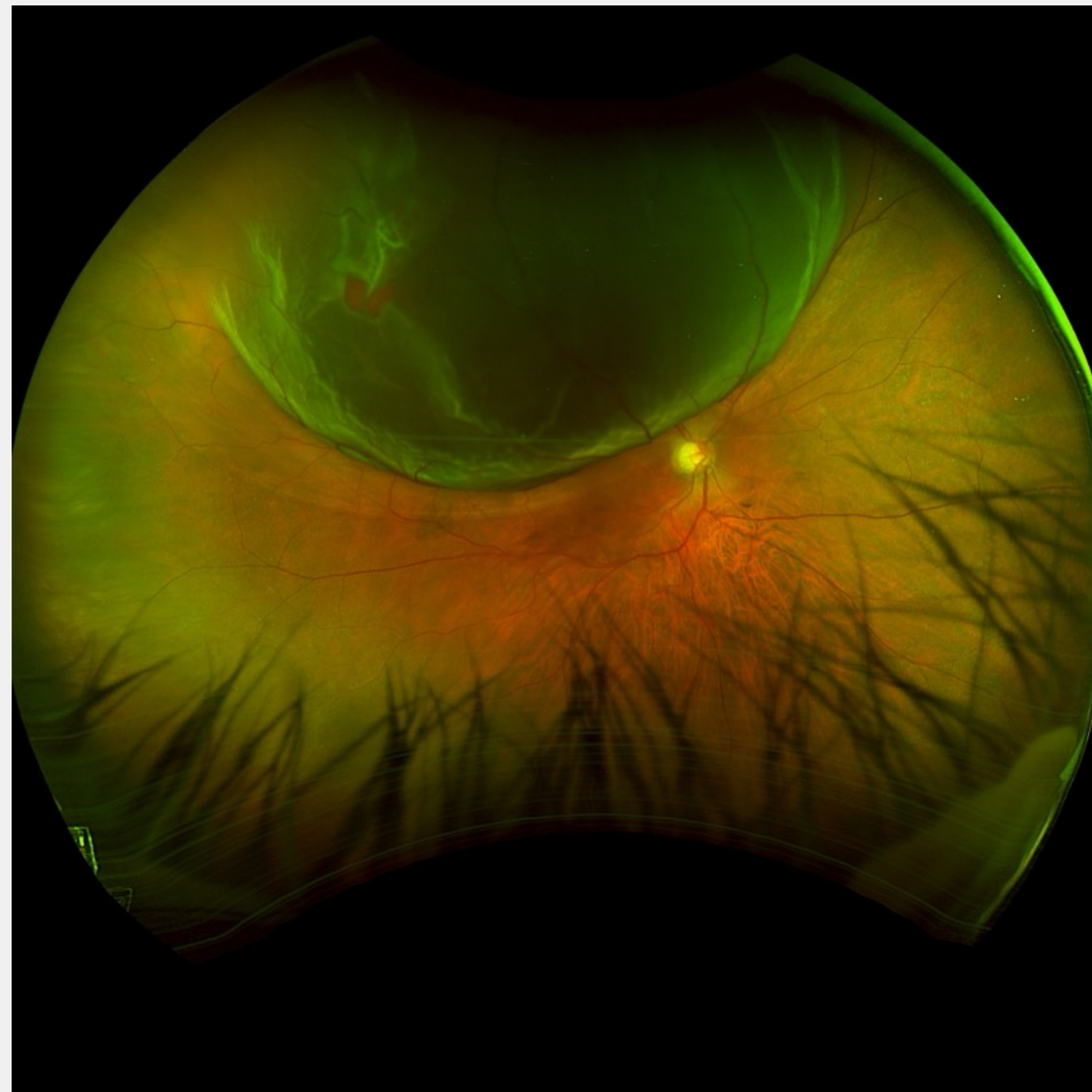




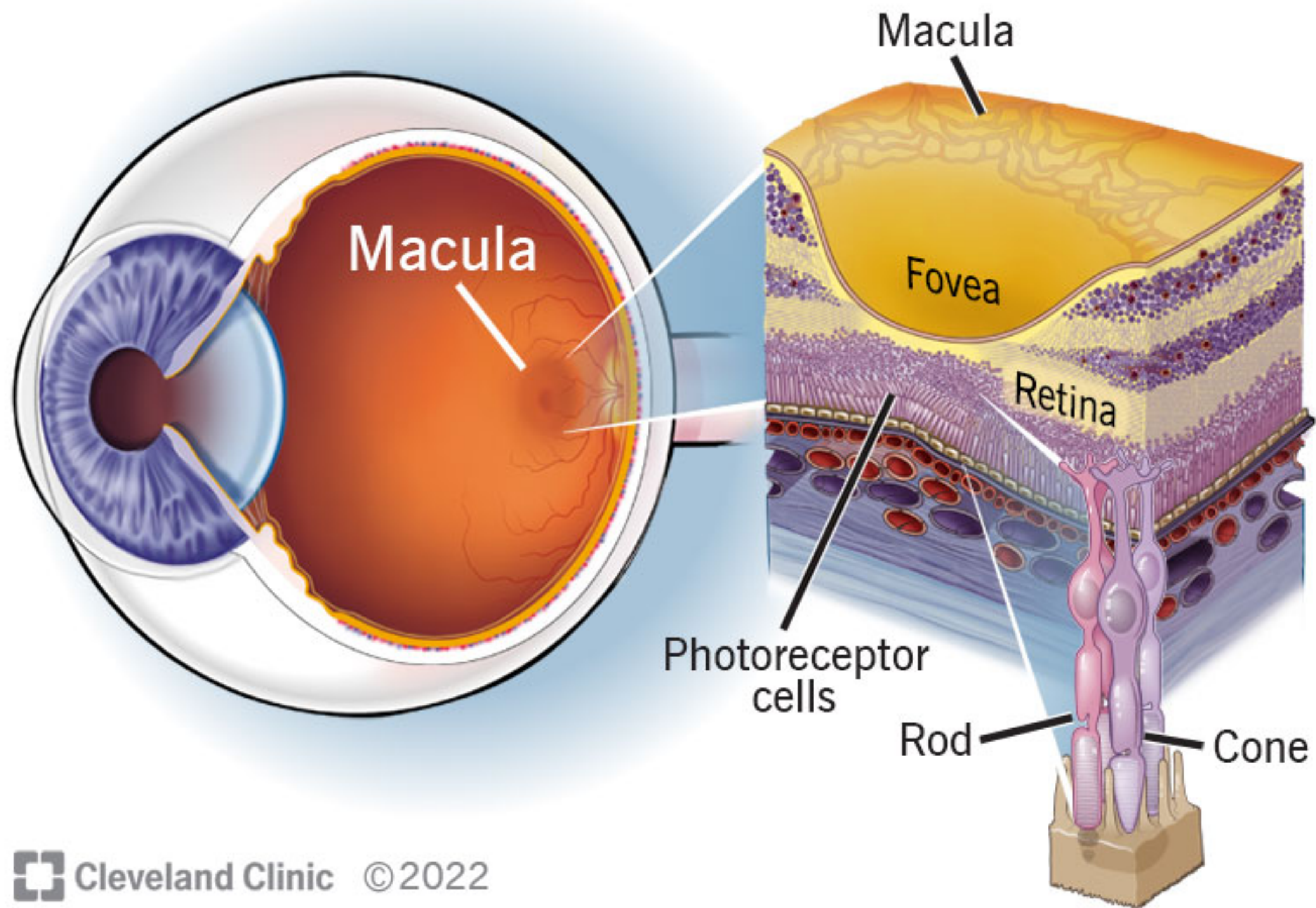
**Macular hole**



**Epiretinal membrane**

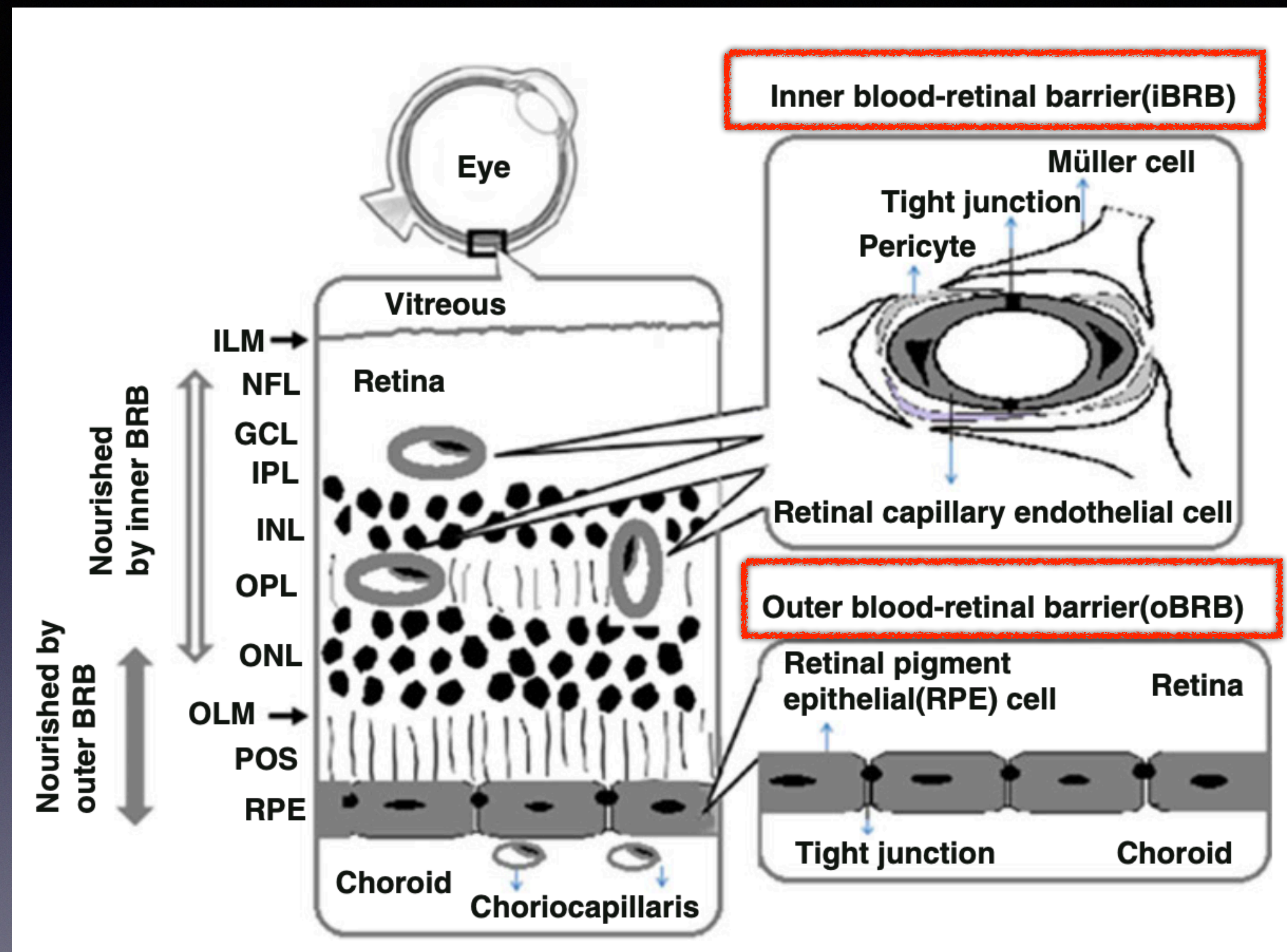
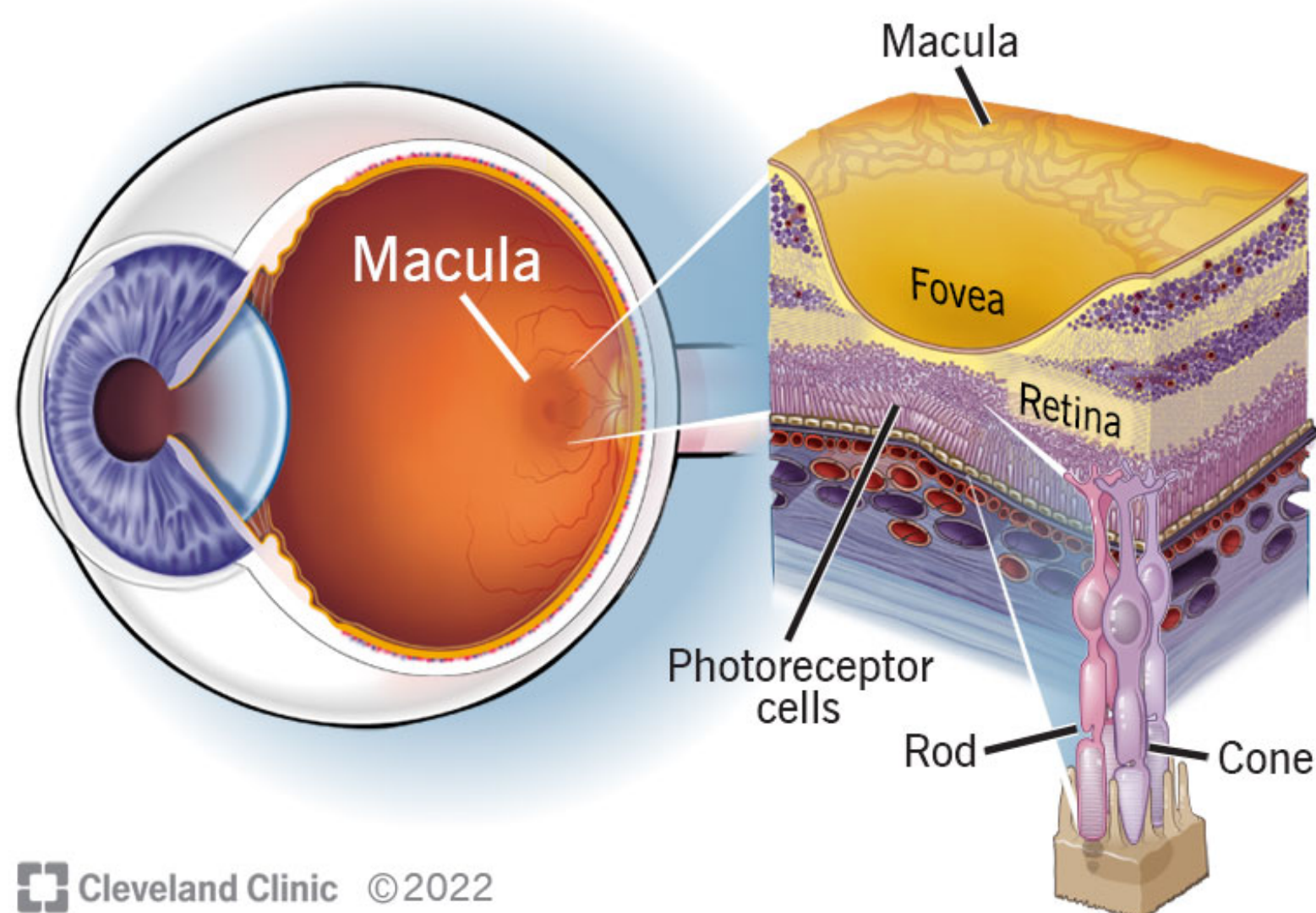






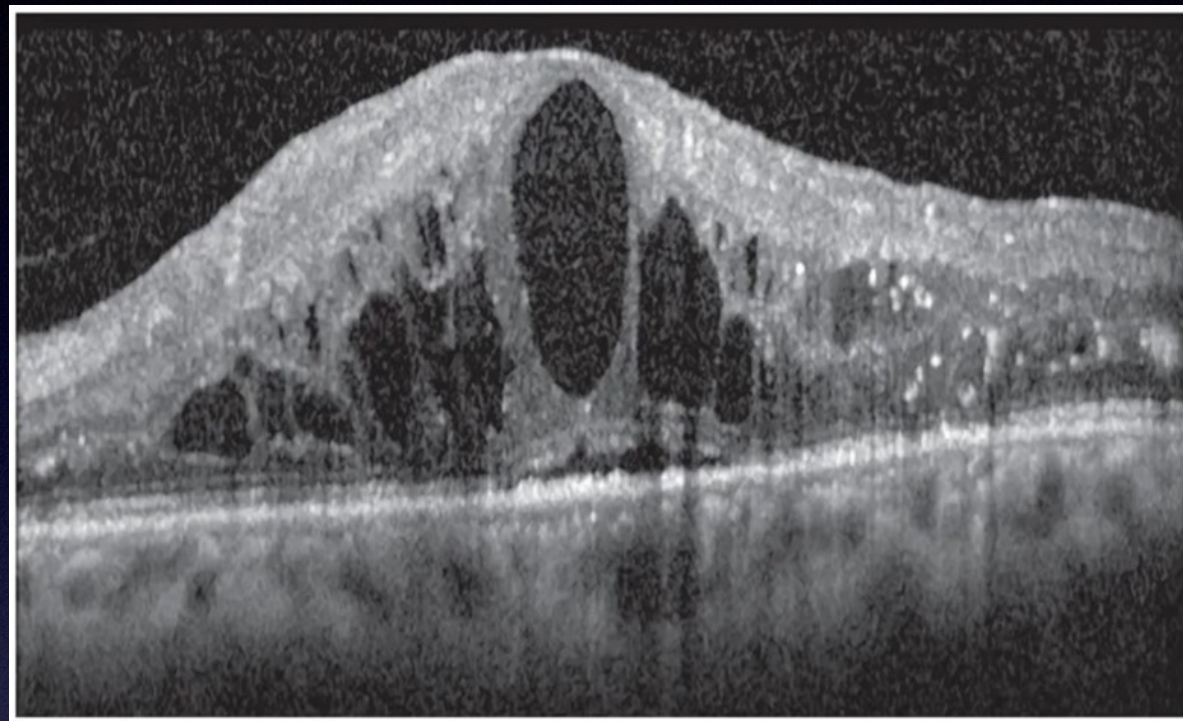


## Macula: Anatomy, Function & Common Conditions

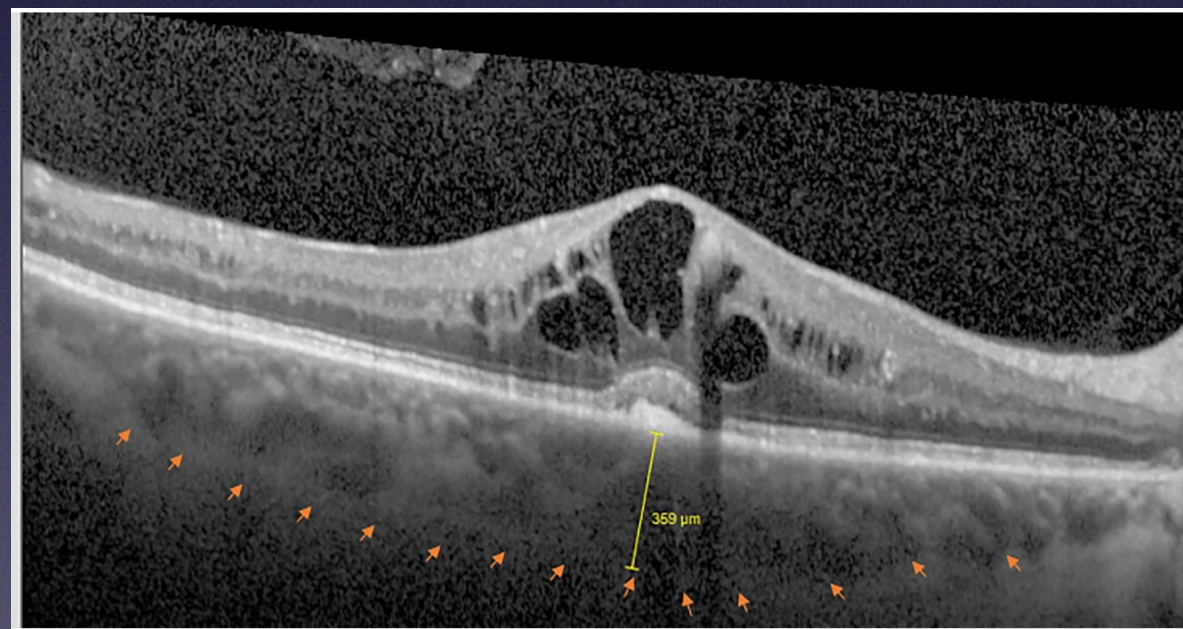




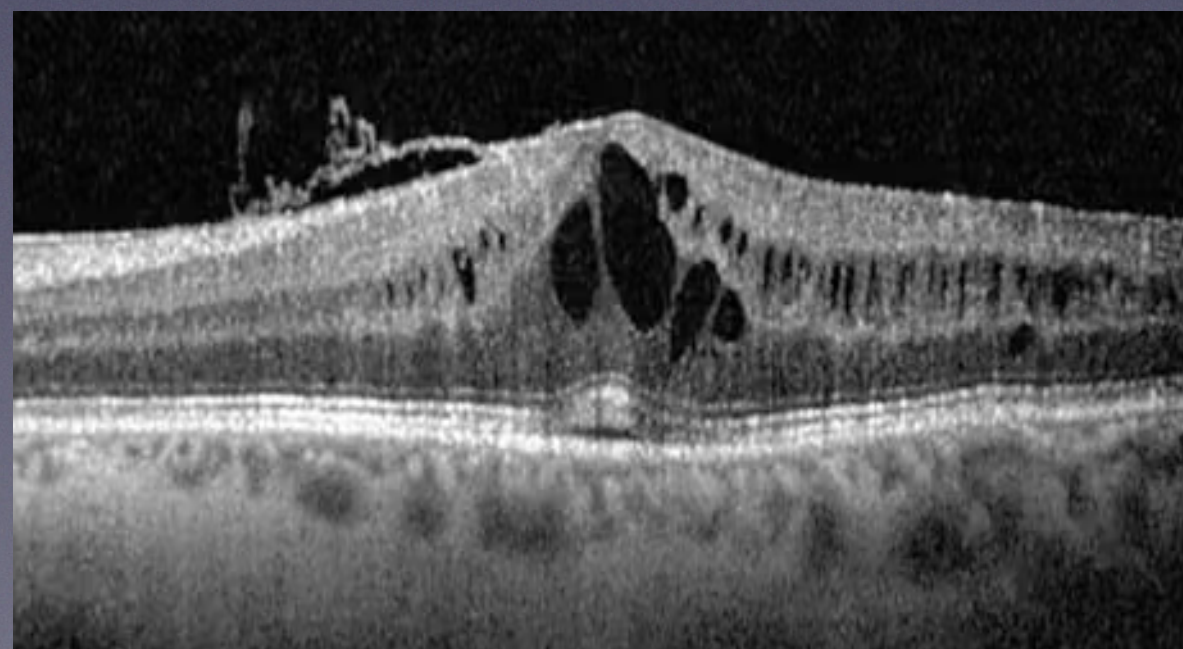
# Inner blood-retinal barrier(iBRB)



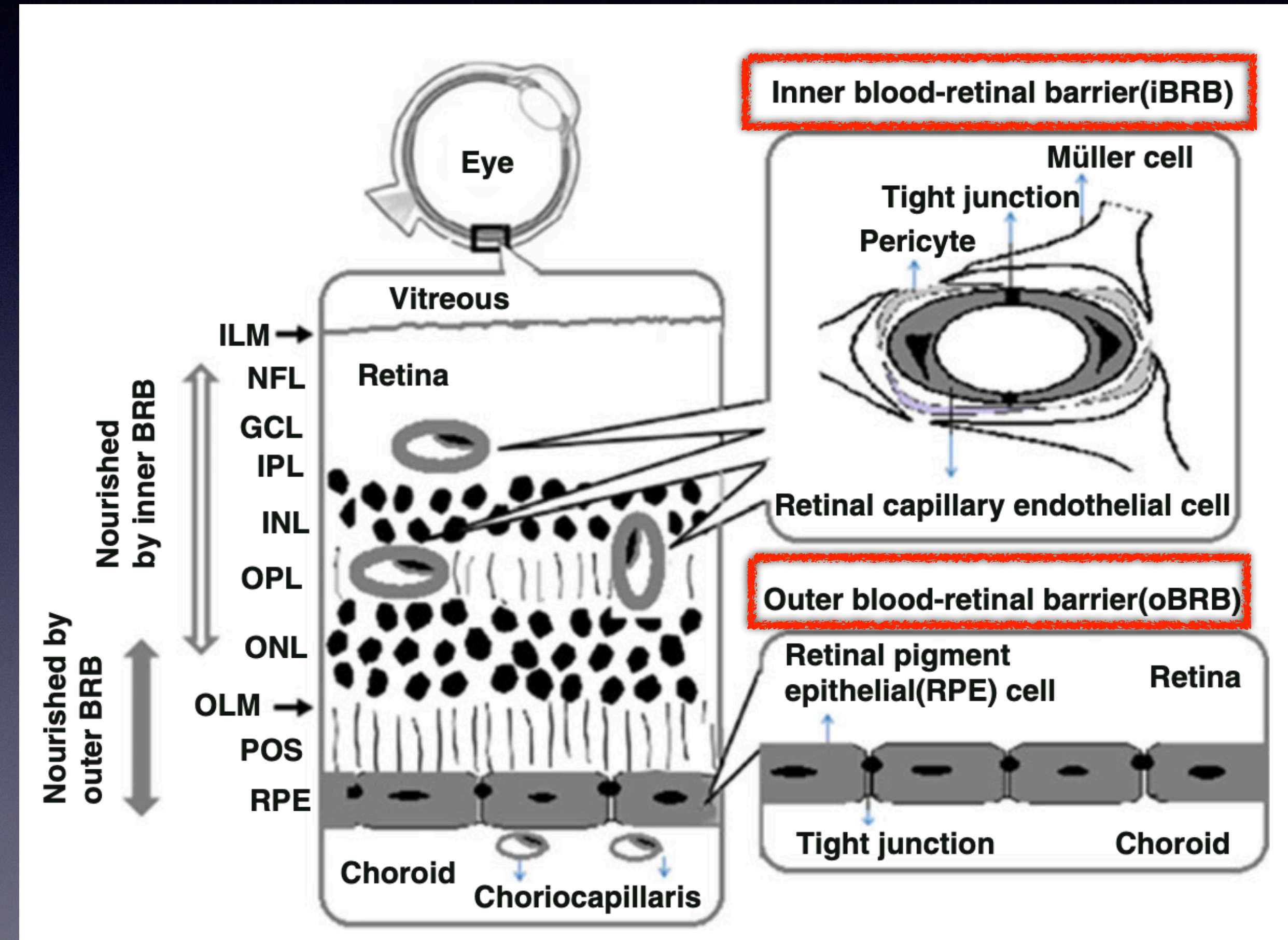
Diabetic macular oedema



Cystoid macular oedema  
in RVO

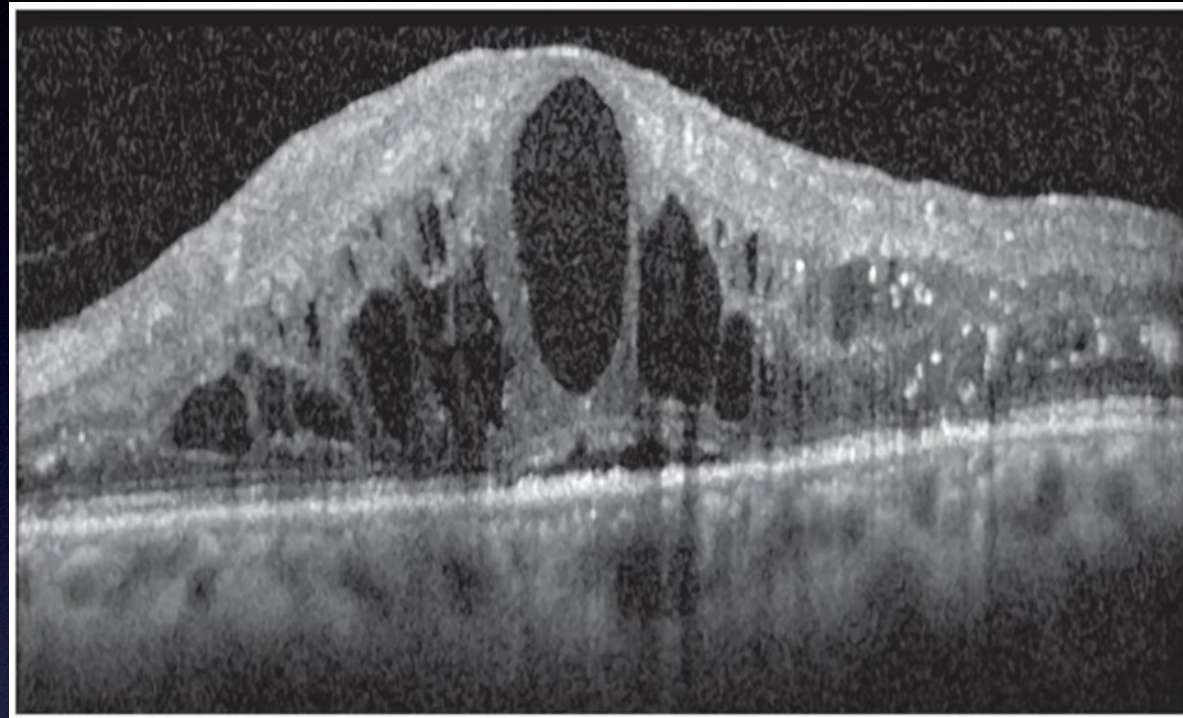


Cystoid macular oedema  
in uveitis

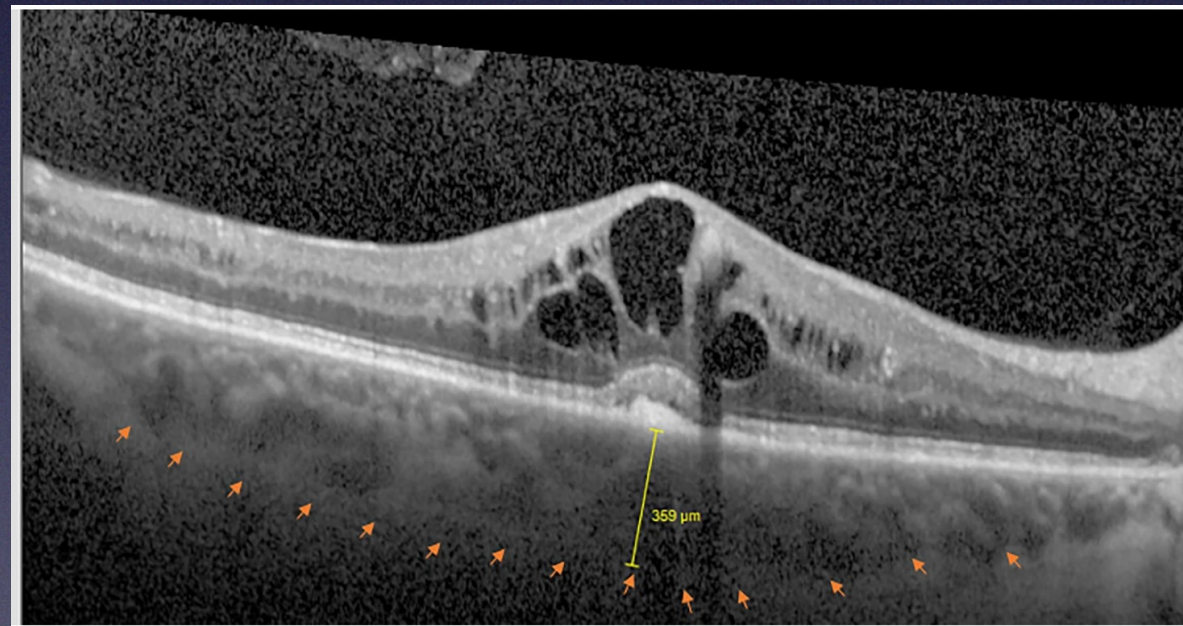




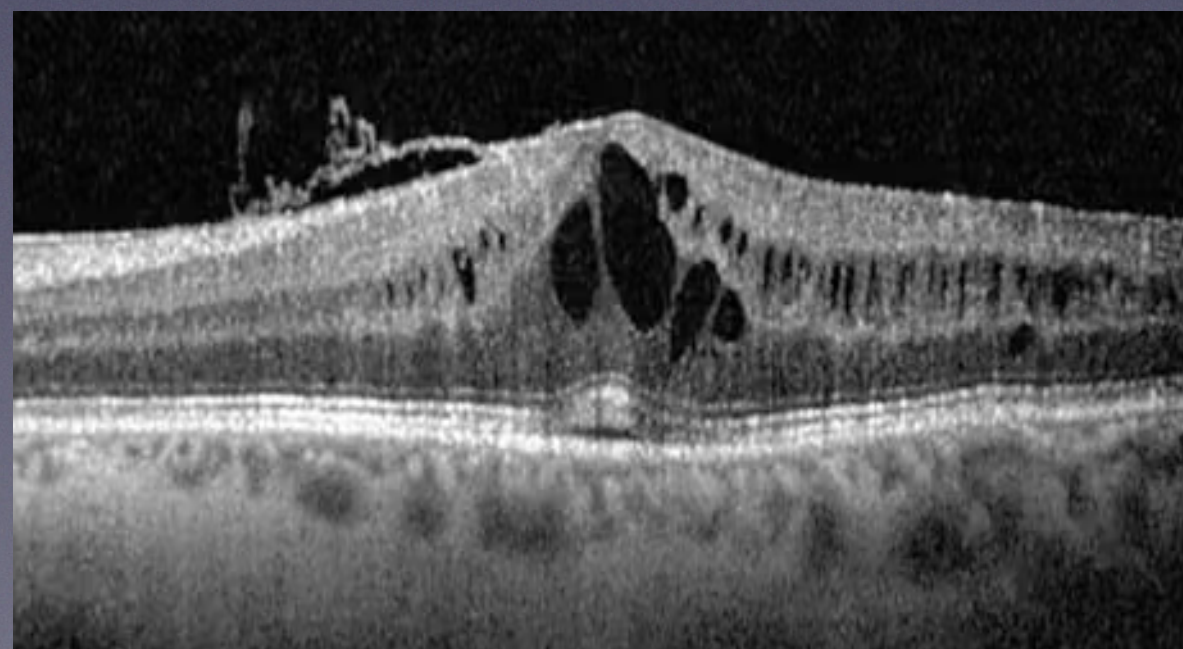
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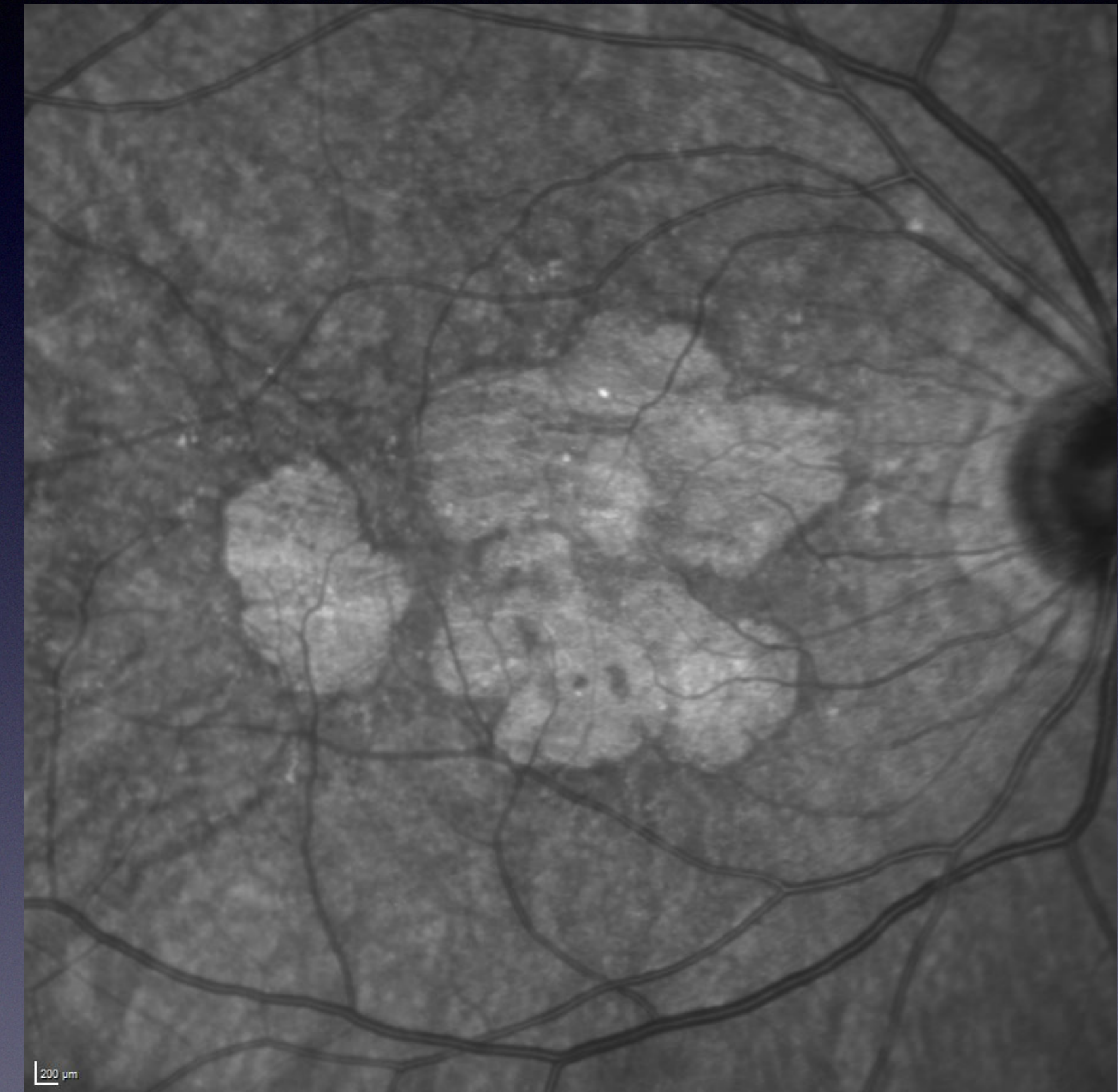


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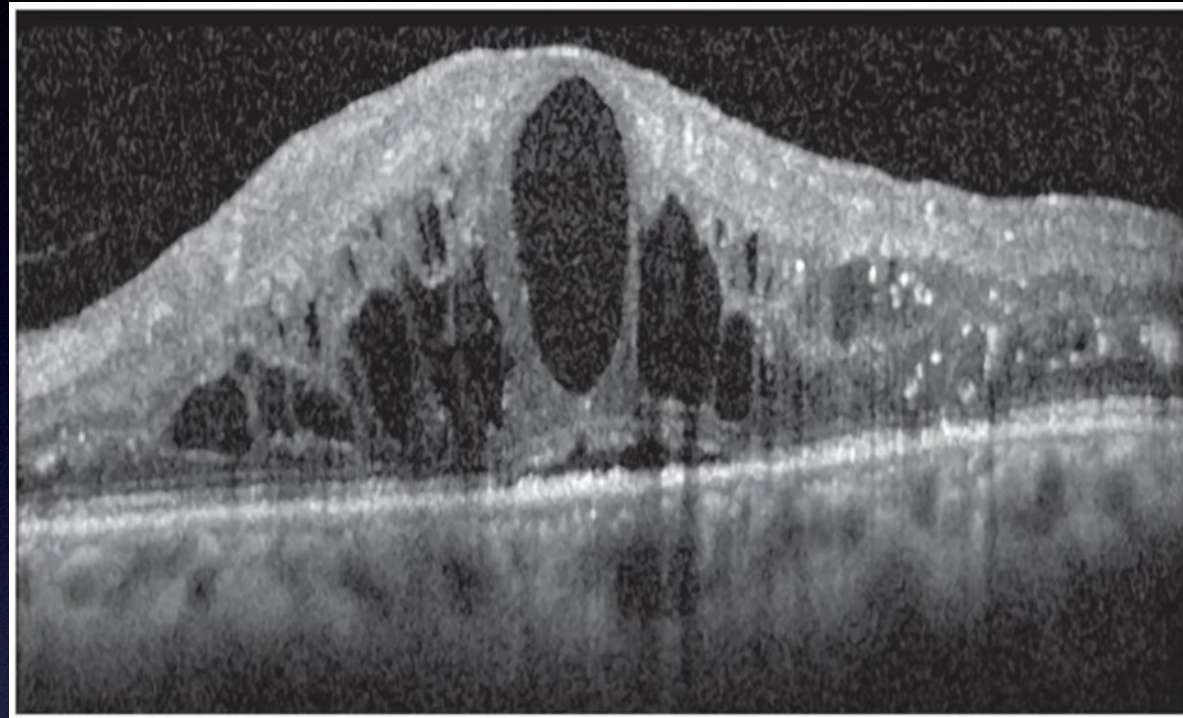
## Outer blood-retinal barrier(oBRB)



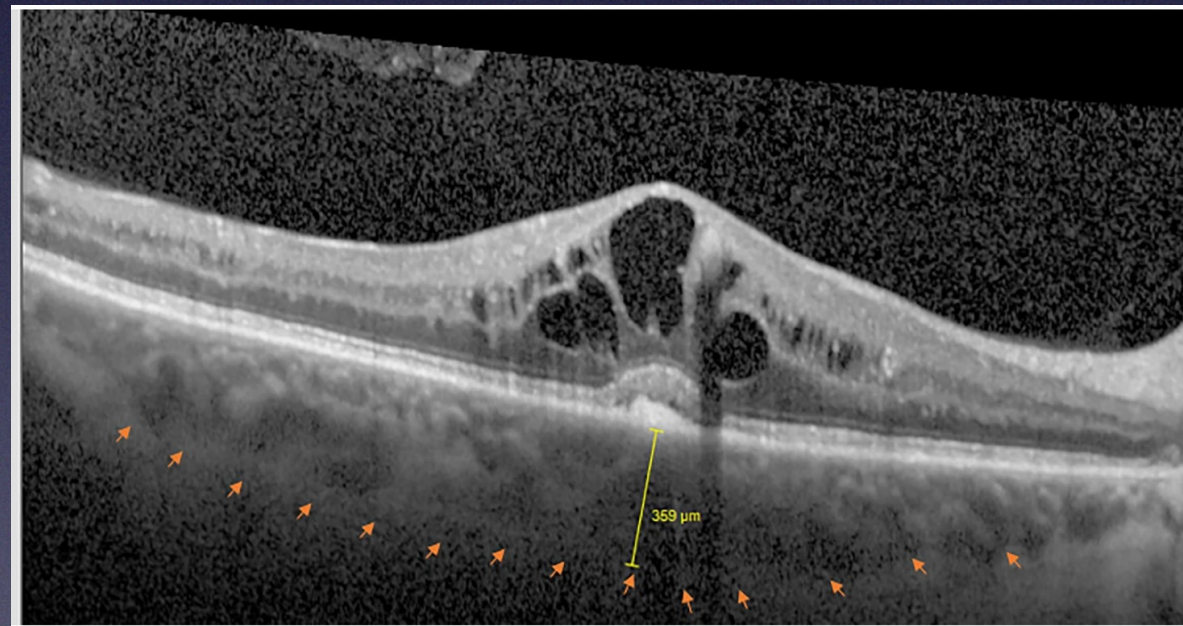
Geographic atrophy



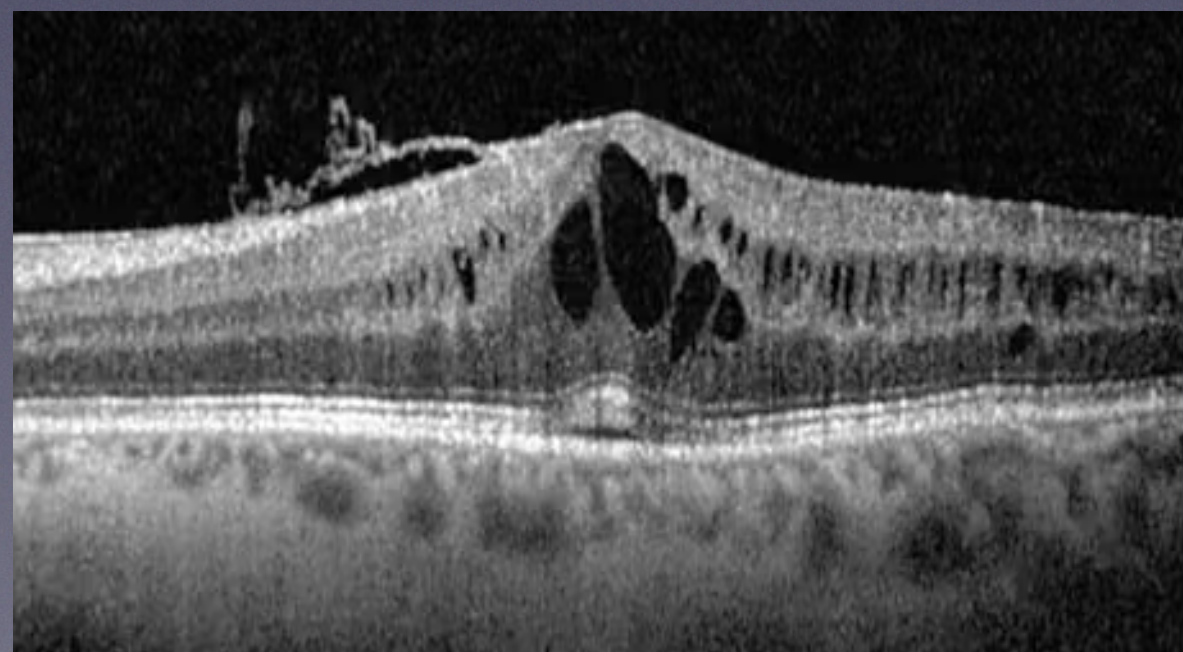
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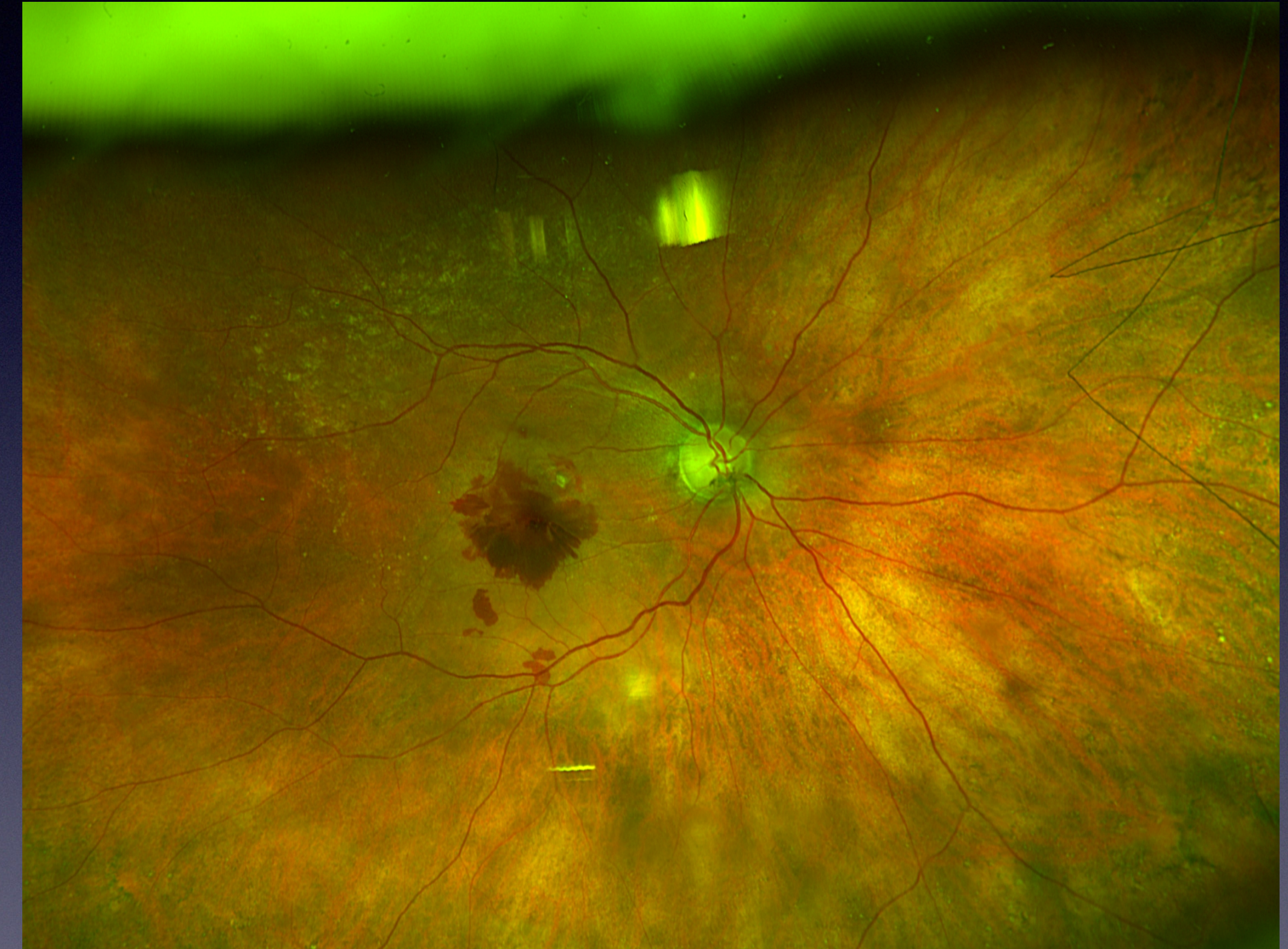


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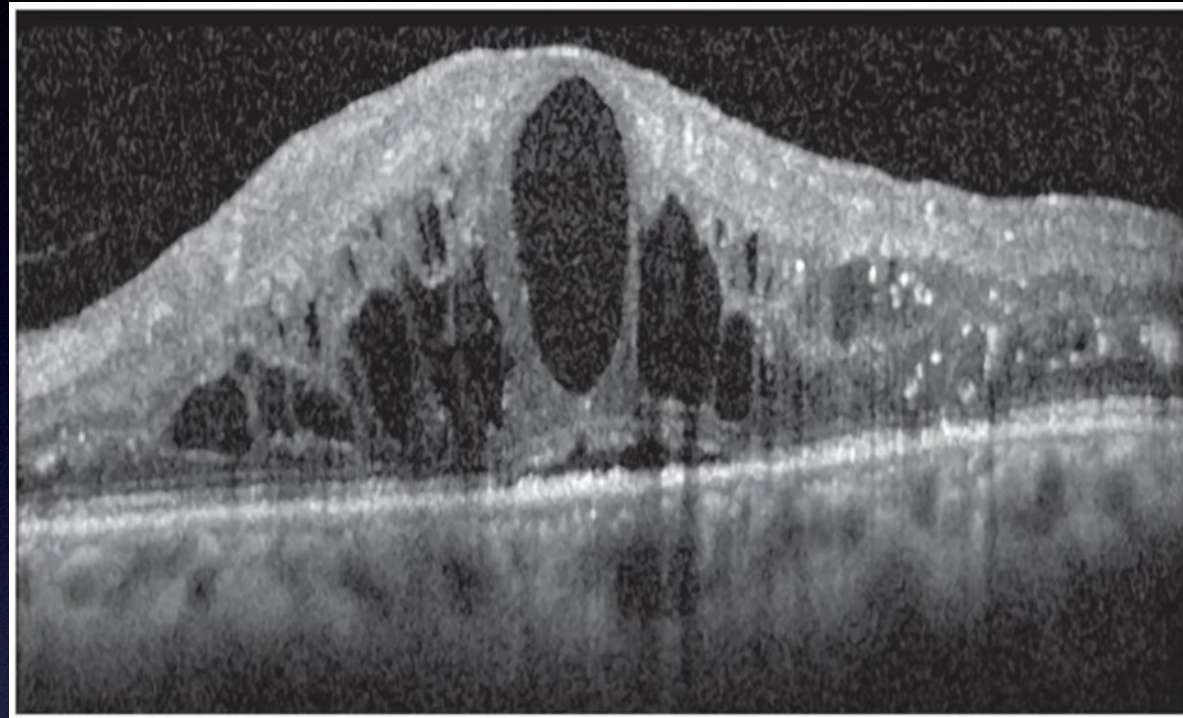
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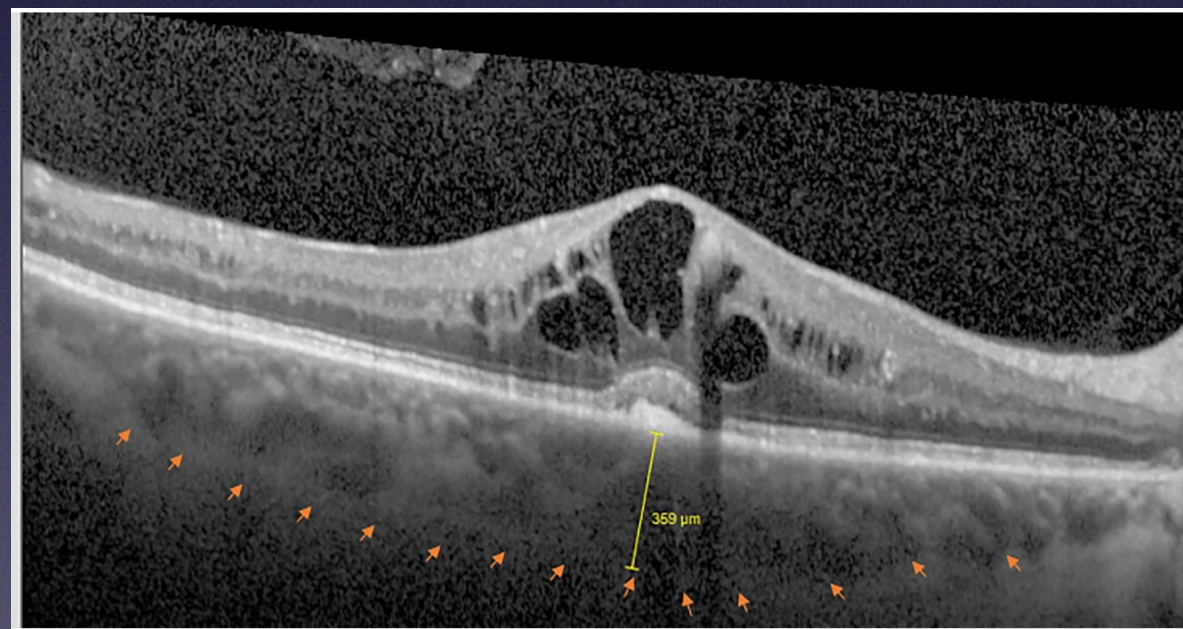
Macular hemorrhage



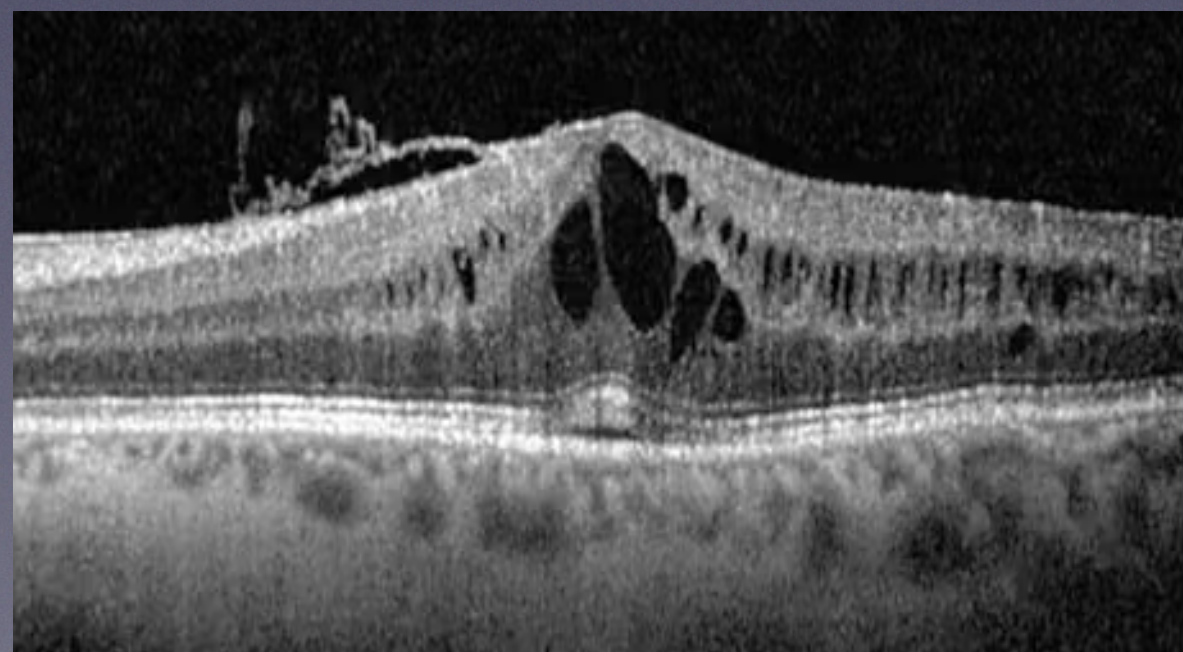
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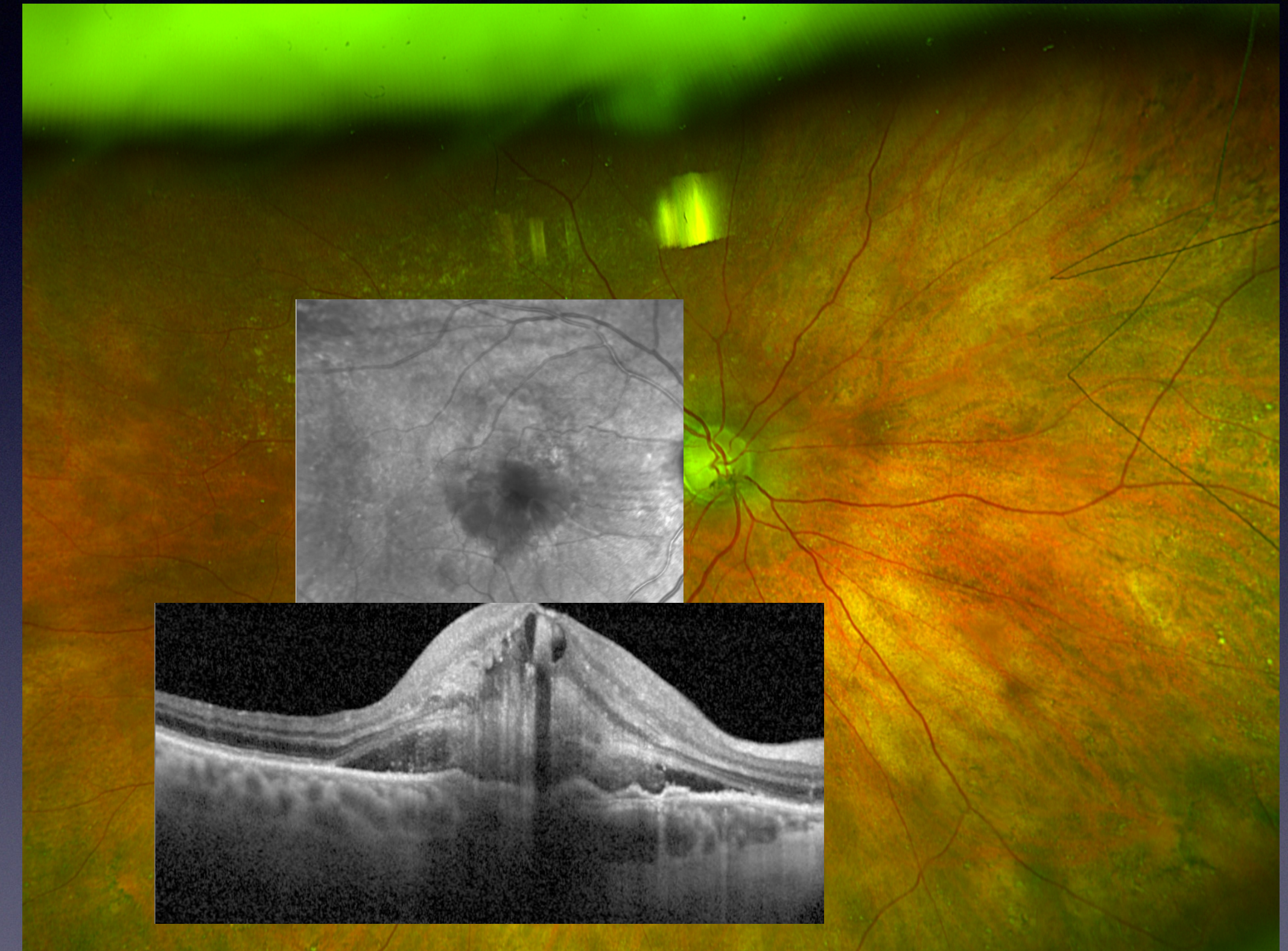


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Cystoid macular oedema  
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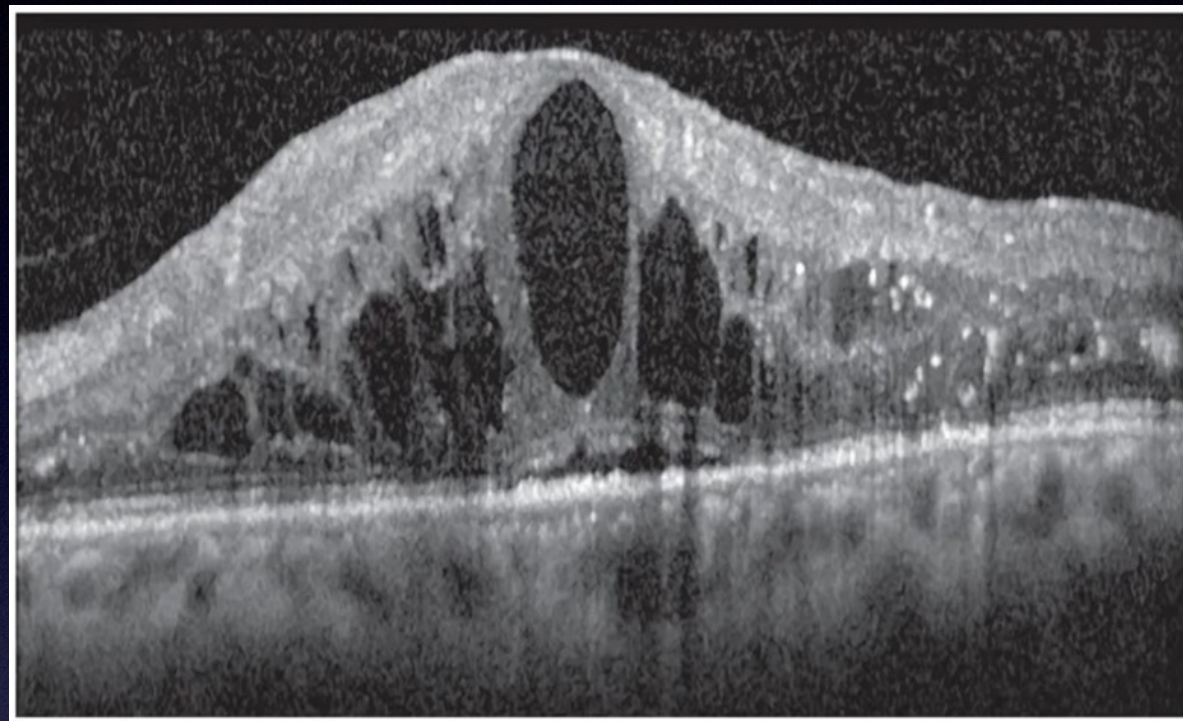
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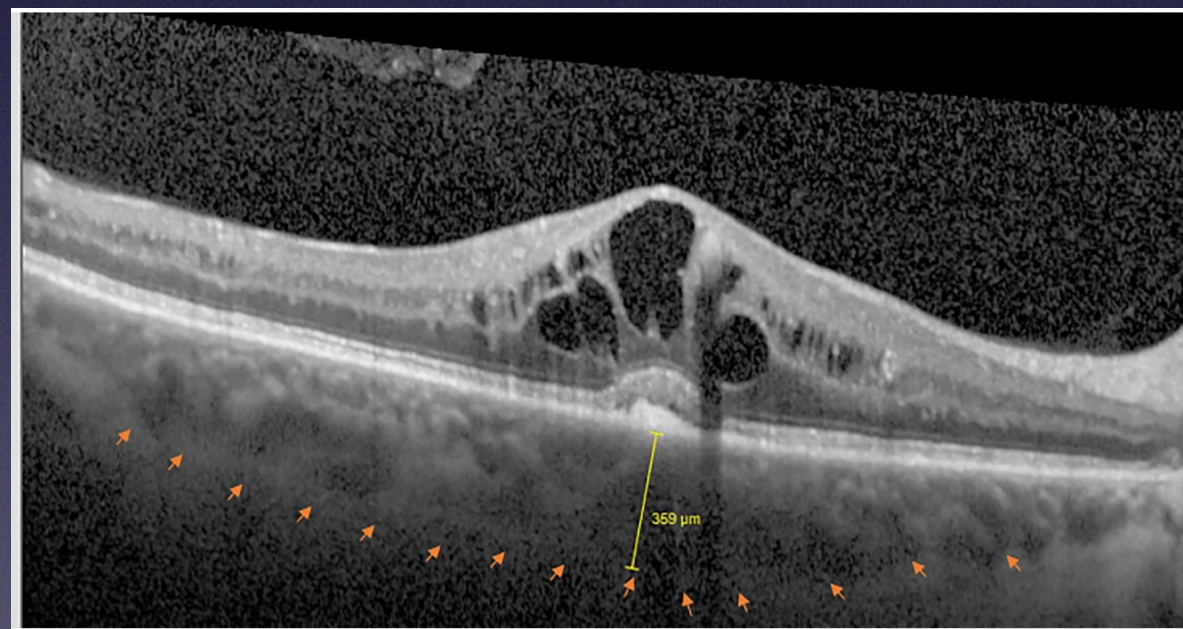
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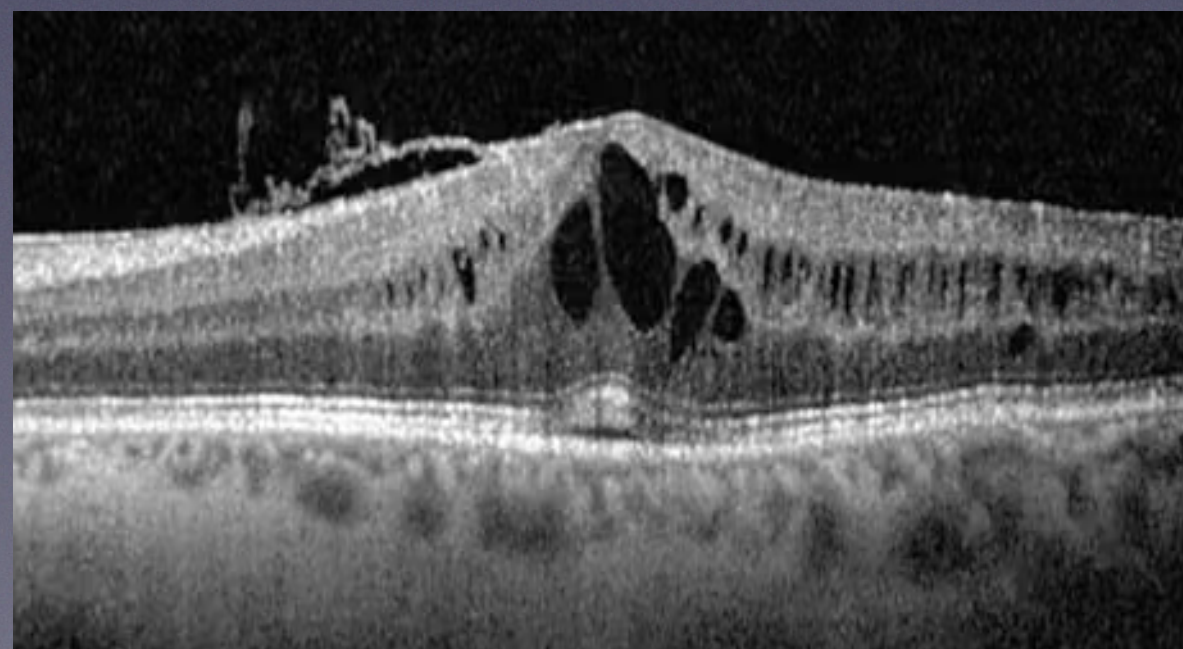
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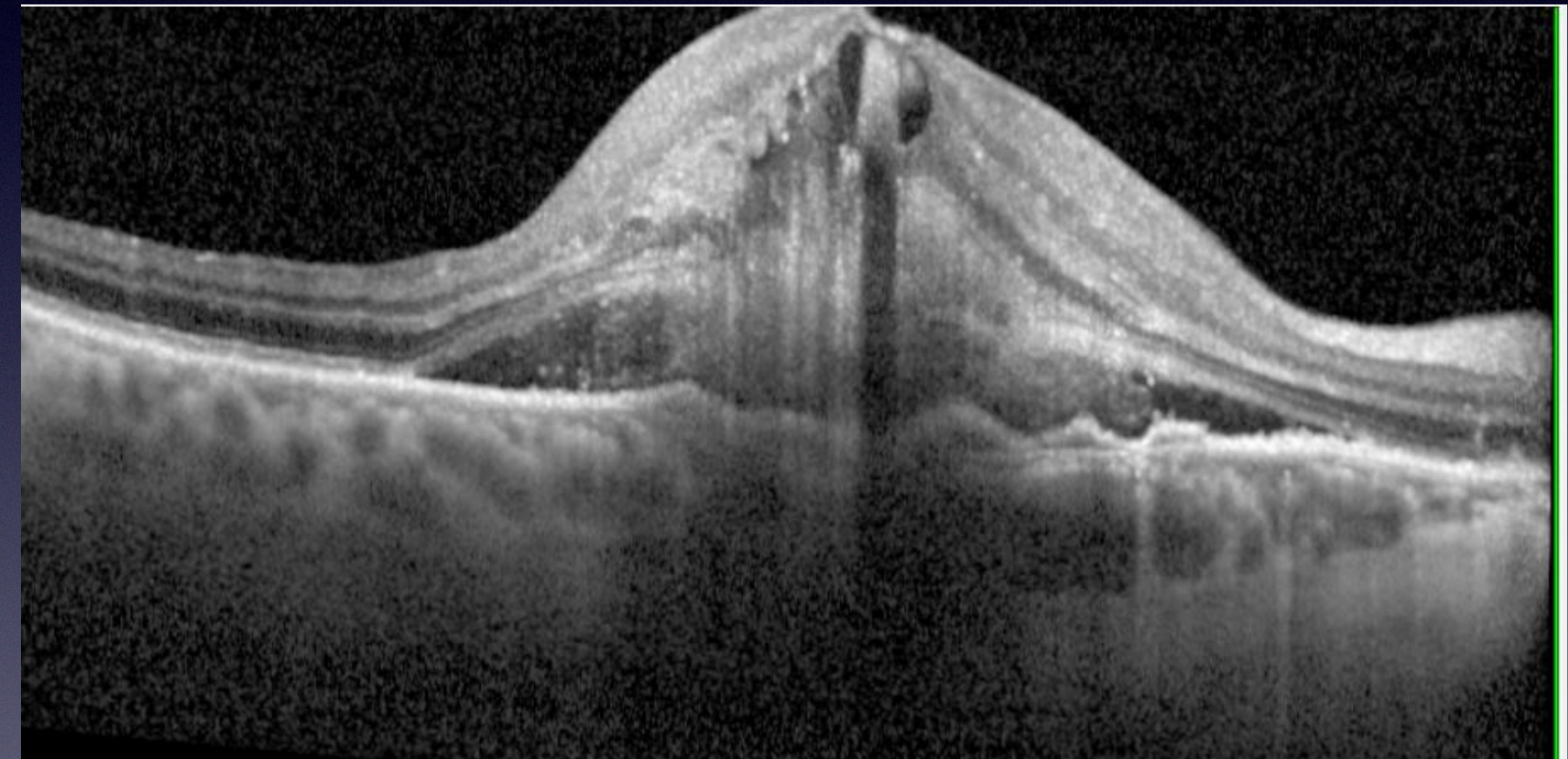


Cystoid macular oedema  
in RVO

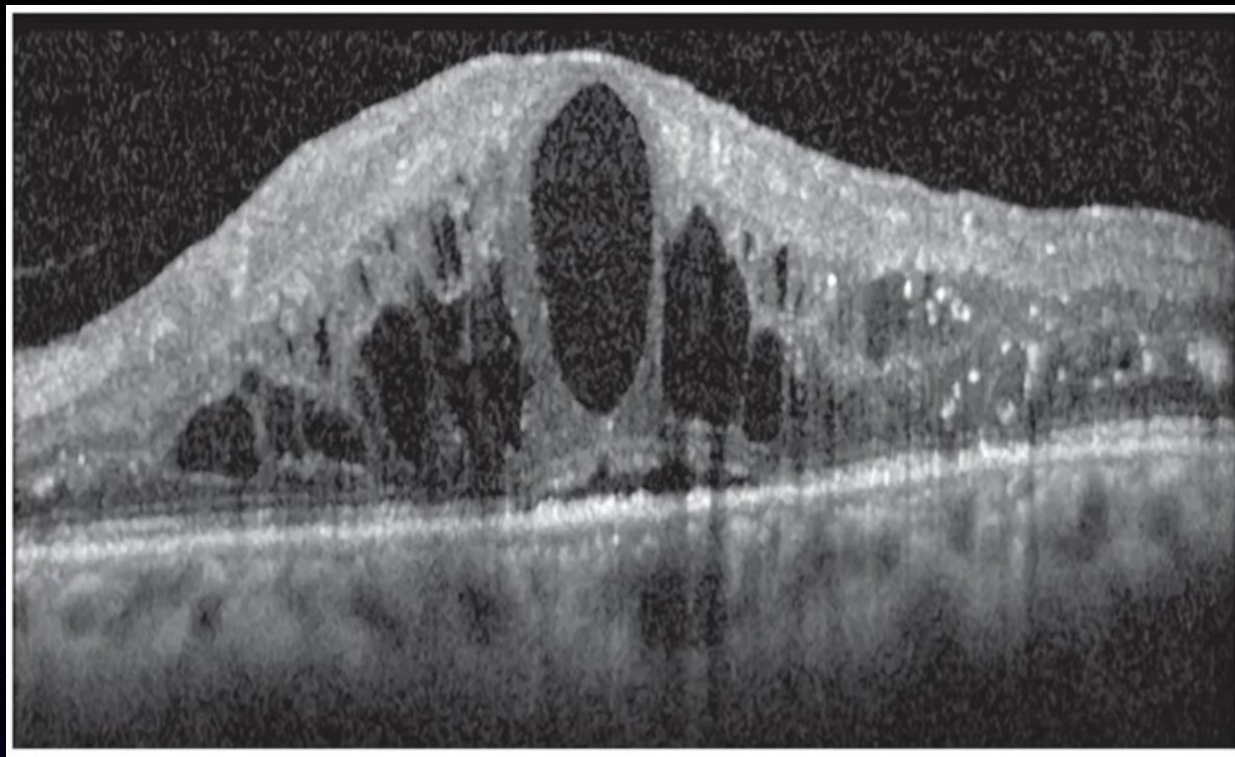


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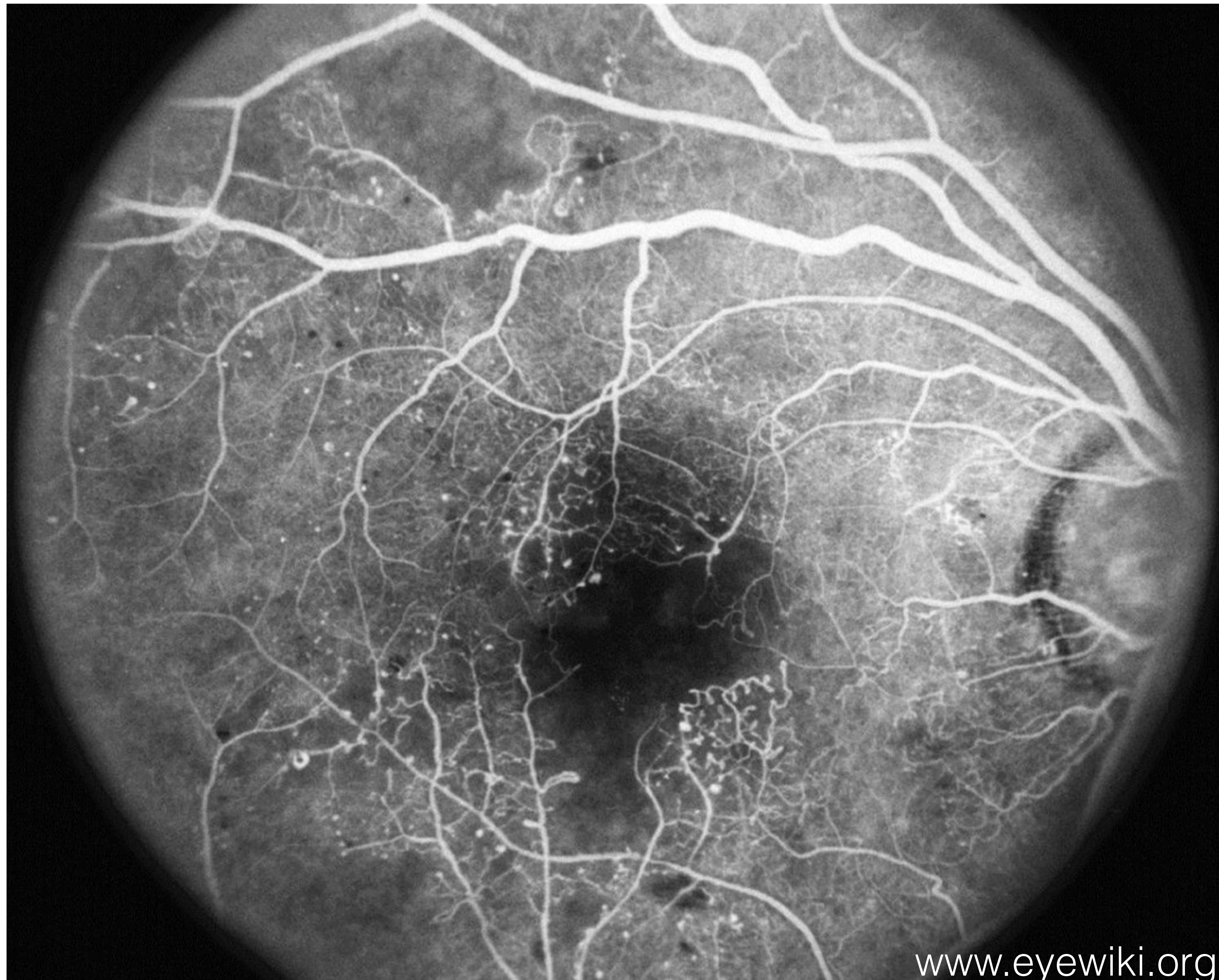




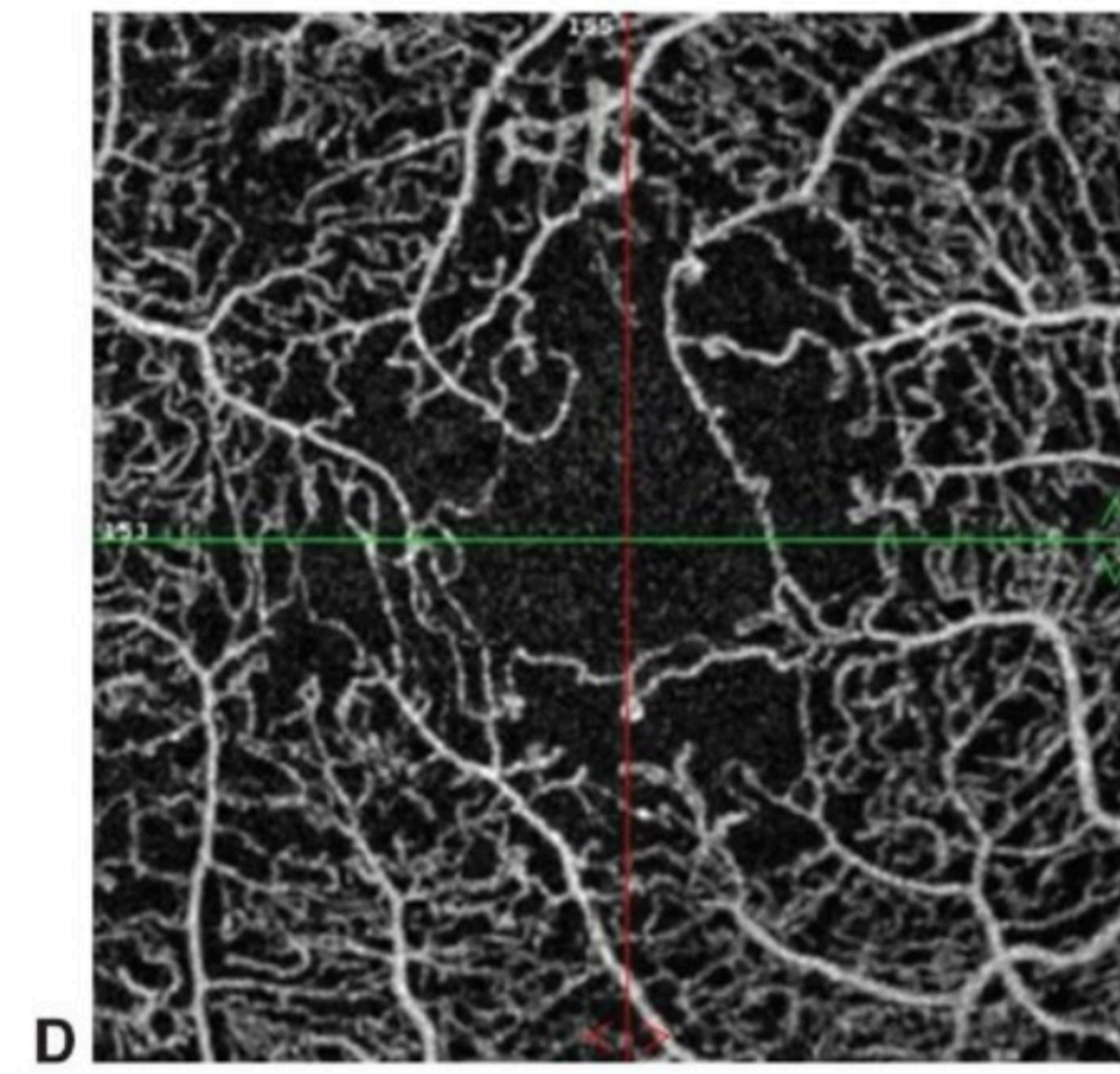
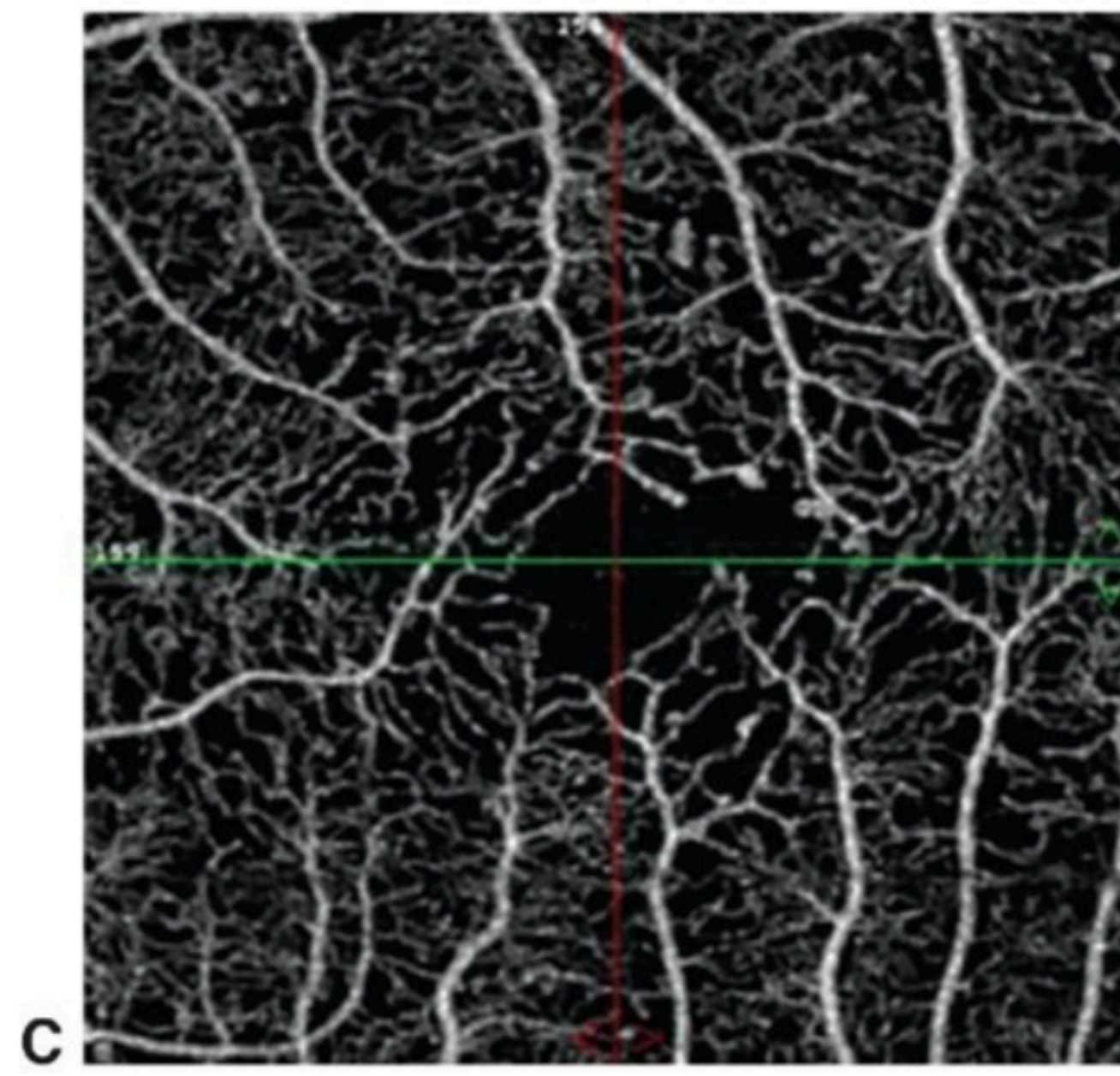
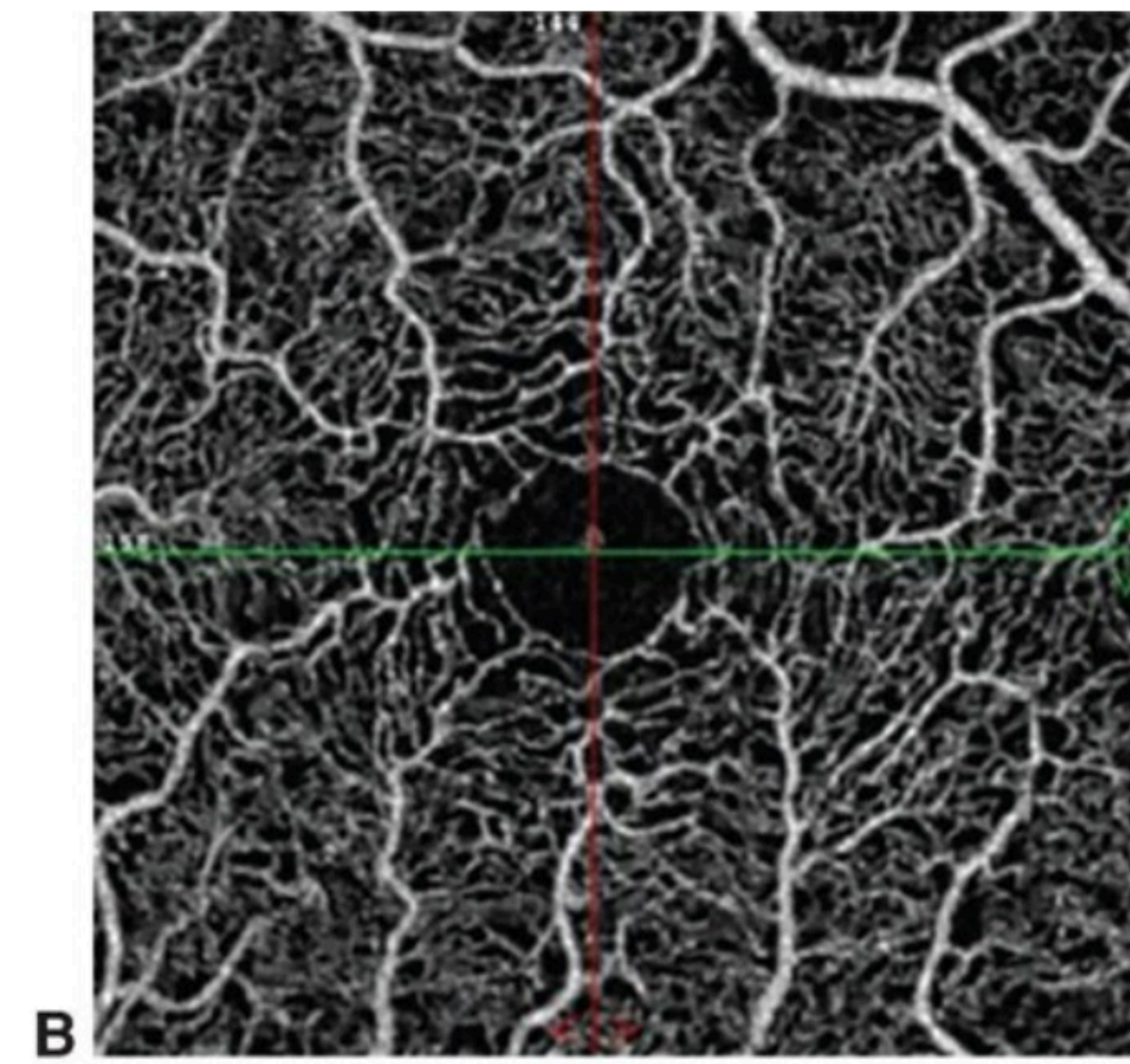
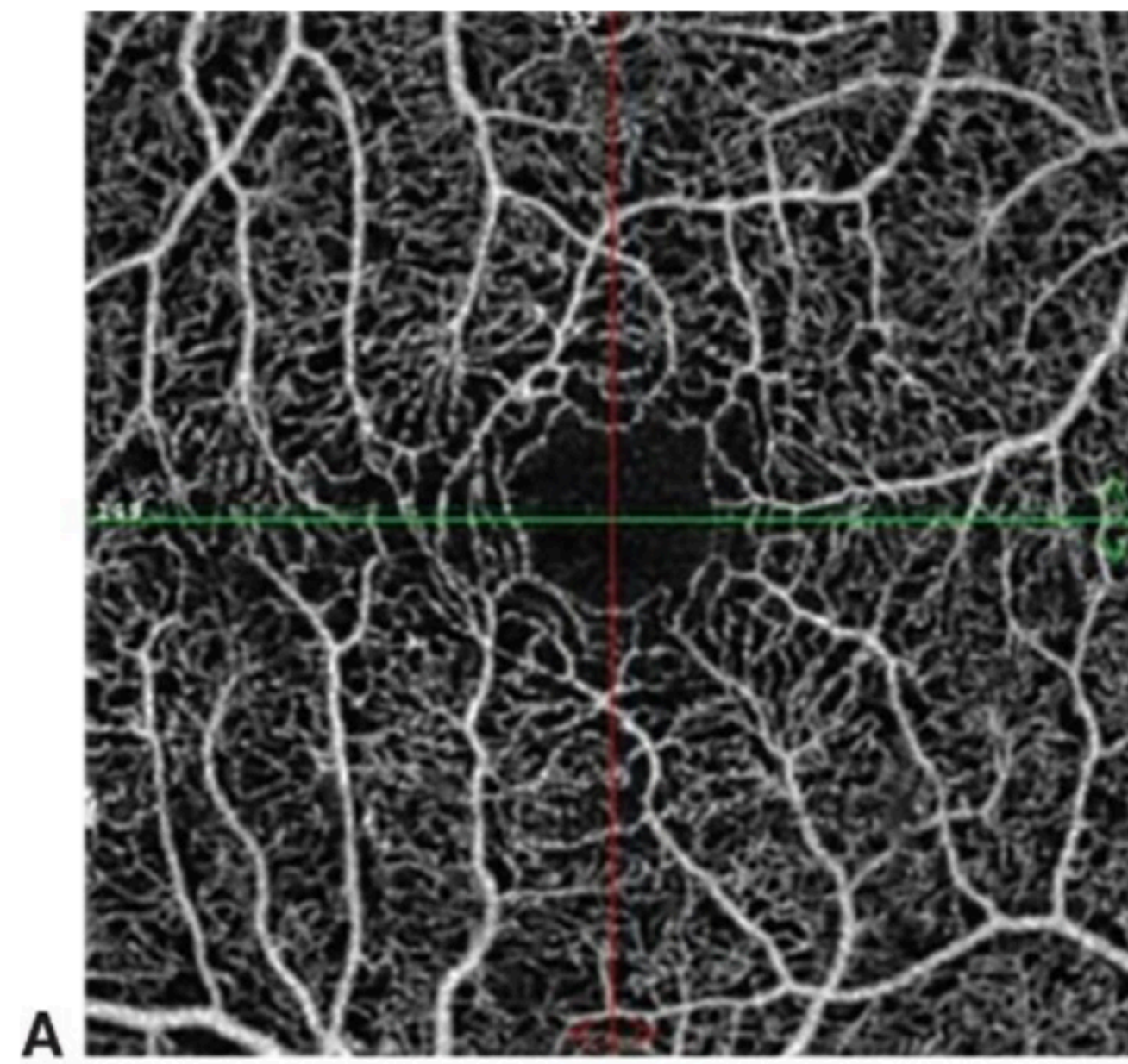
## Diabetic retinopathy and maculopathy

- Estimated 25% of all diabetic patients have some form of DR
- Damage to retinal vessels due to chronic hyperglycaemia —> earliest sign **microaneurysm**
- Maculopathy can manifest as **diabetic macular edema** and/or **ischemic maculopathy**
- Two fundamental problems: **increased vascular permeability** and **capillary occlusion**
- **Capillary closure** and **non perfusion** occur due to endothelial damage and clogging of capillaries
- Widespread **ischemia** triggers retina to release **VEGF** (vascular endothelial growth factor)











# Risk factors and worsening factors

- **Duration**

- Type 1 >75% after 15 - 20 years

- **Hyperglycemia (High HbA1c)**

- Every 1% reduction in HbA1c significantly lowers risk of onset or worsening of DR

- **Hypertension**

- Both diabetes and hypertension damage microvasculature

- **Dyslipidemia**

- Often more extensive lipid deposits, improving lipid profiles has shown modest benefits in reducing DR progression

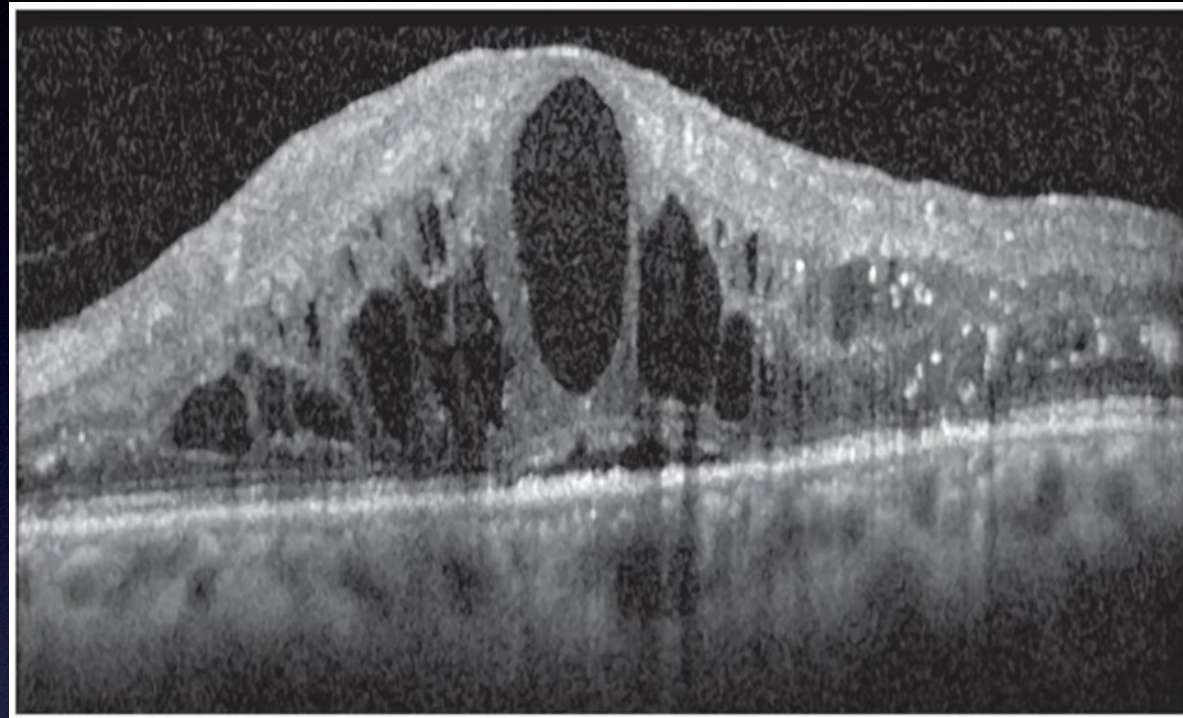


# Risk factors and worsening factors

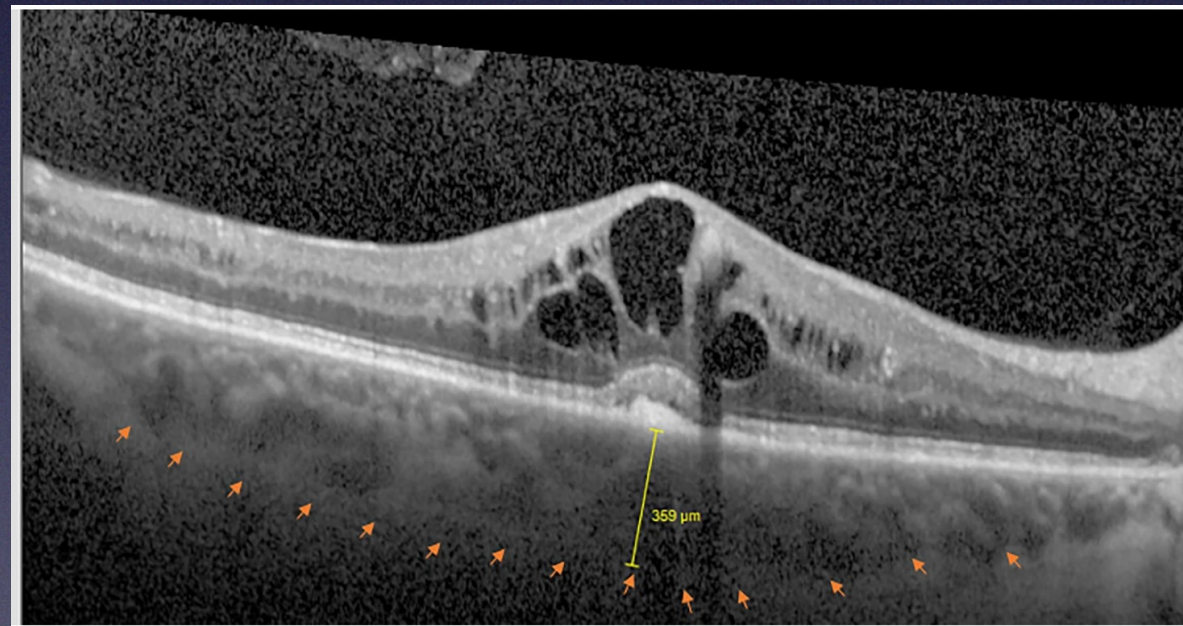
- **Diabetic nephropathy**
  - Proteinuria is a strong predictor of severity of DR, anemia resulting from kidney disease can exacerbate retinal ischemia
- **Obstructive sleep apnea**
- **Smoking**
- **Pregnancy**
- **Medication (Glitazones)** - cause fluid retention, may worsen macular edema



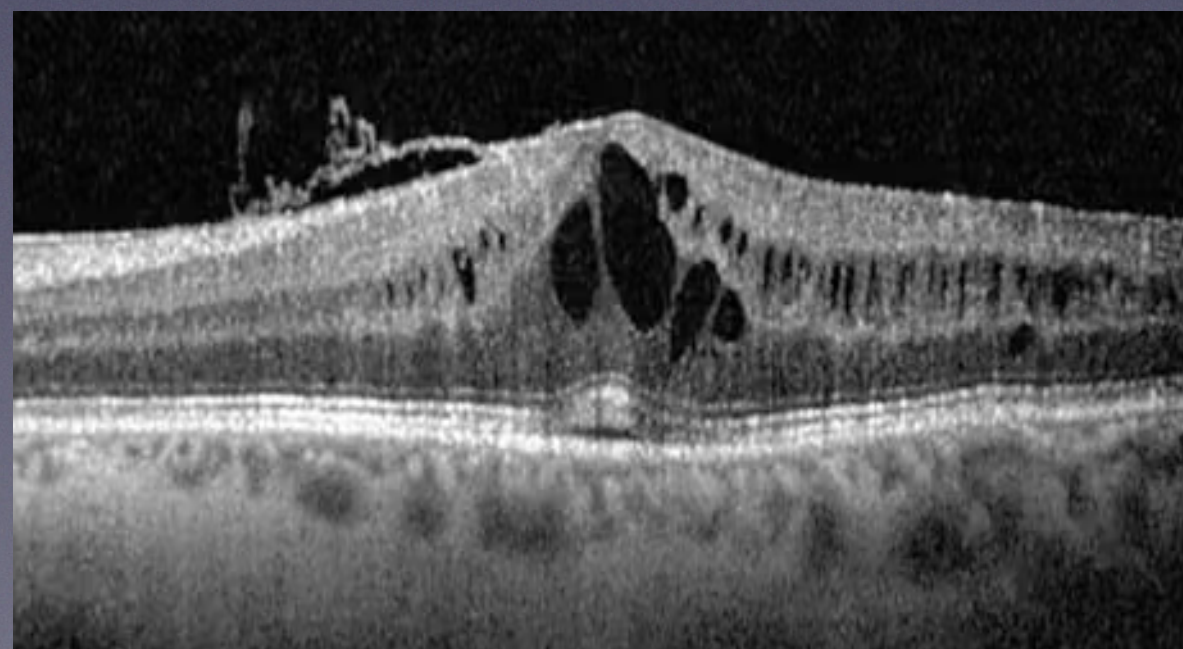
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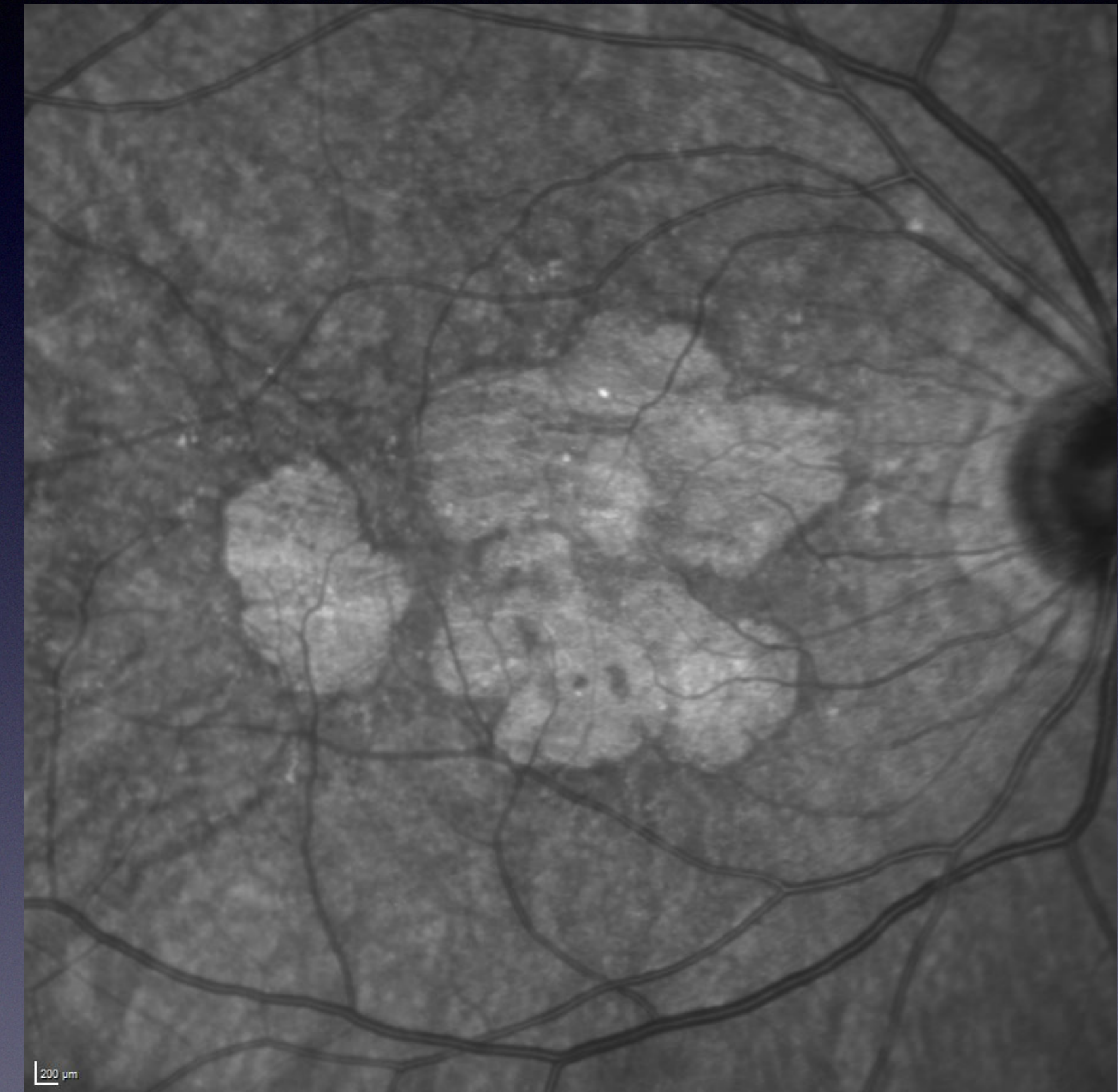


Cystoid macular oedema  
in RVO



Cystoid macular oedema  
in uveitis

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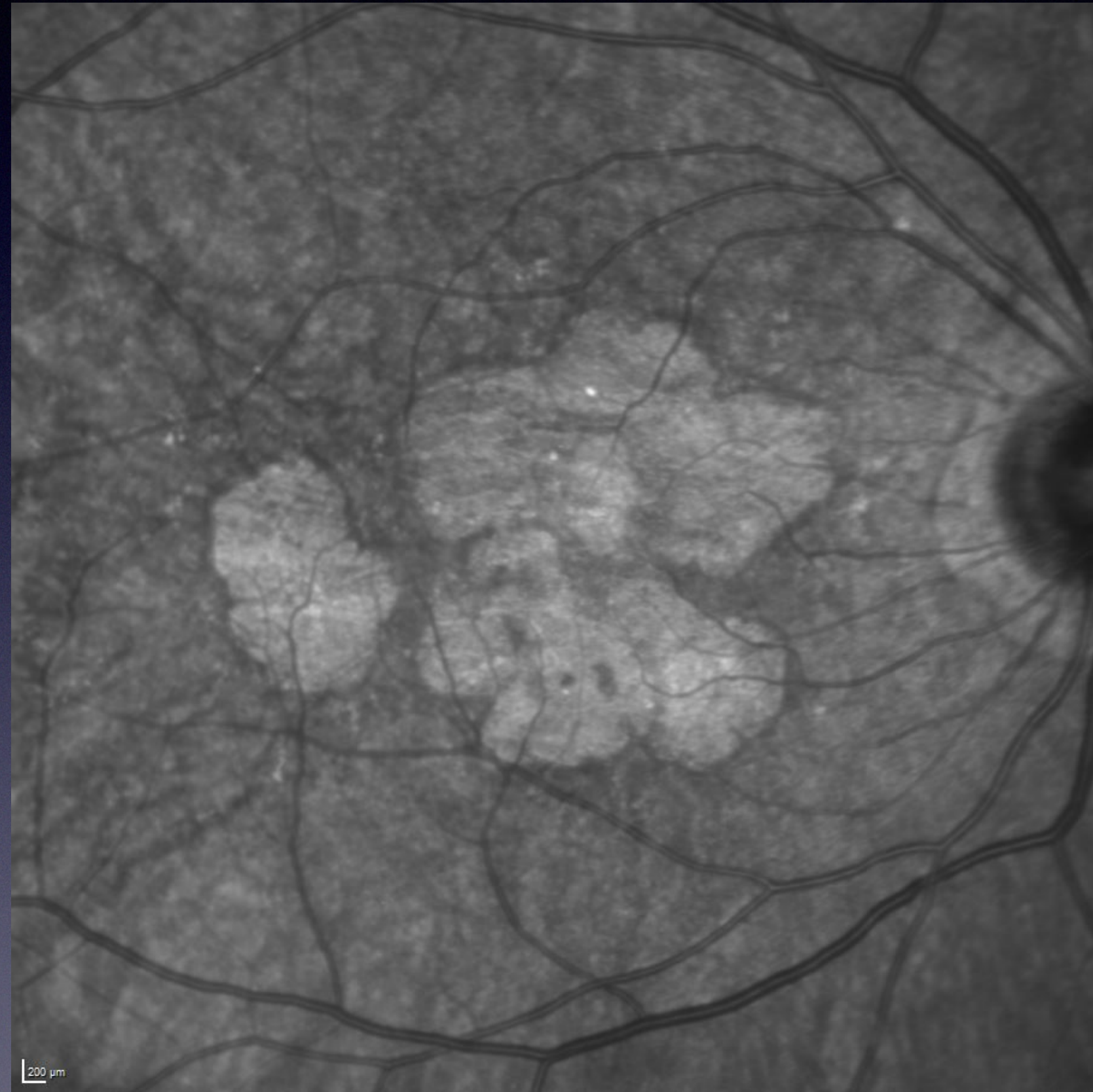


Geographic atrophy

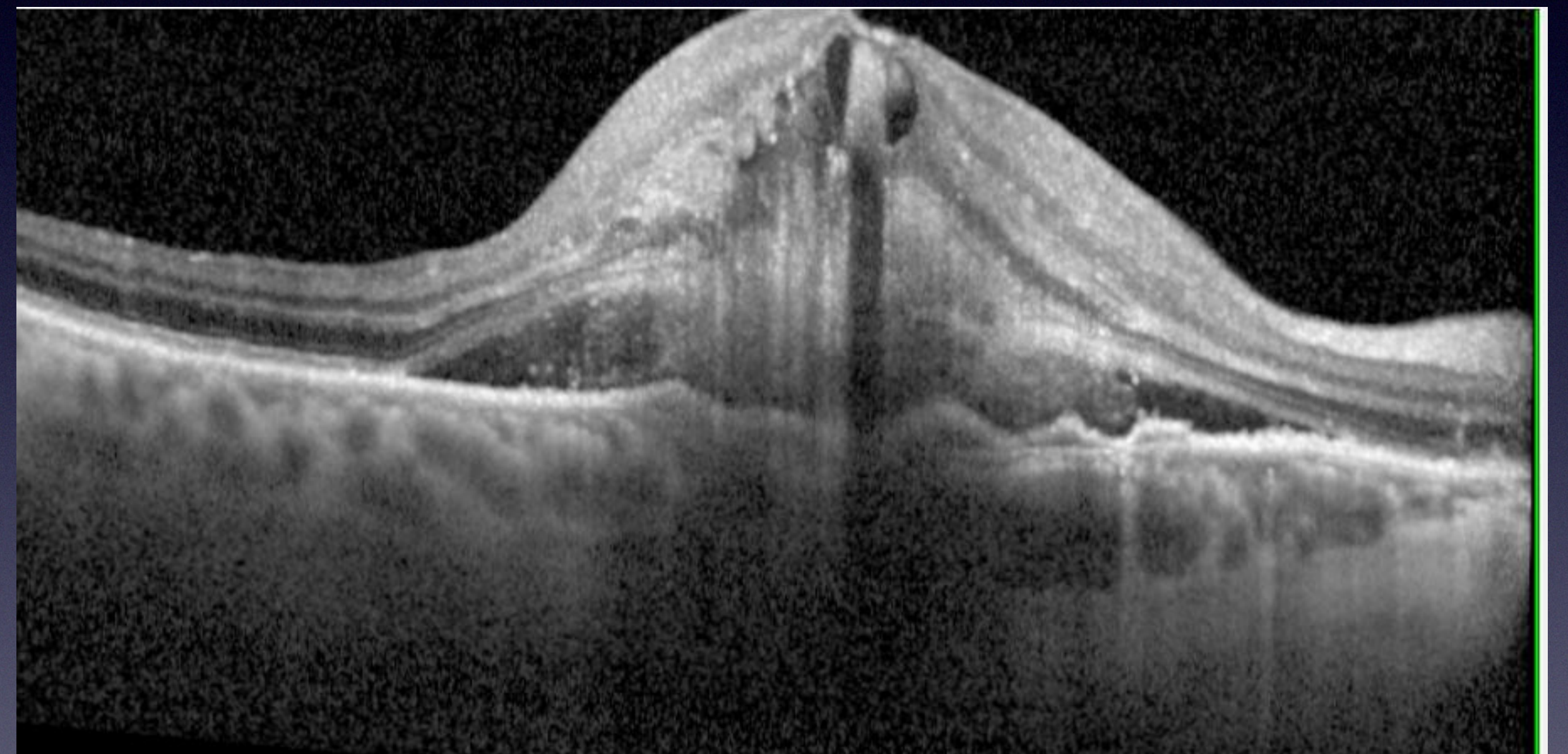


## Outer blood-retinal barrier(oBRB)

## Age-related macular degeneration

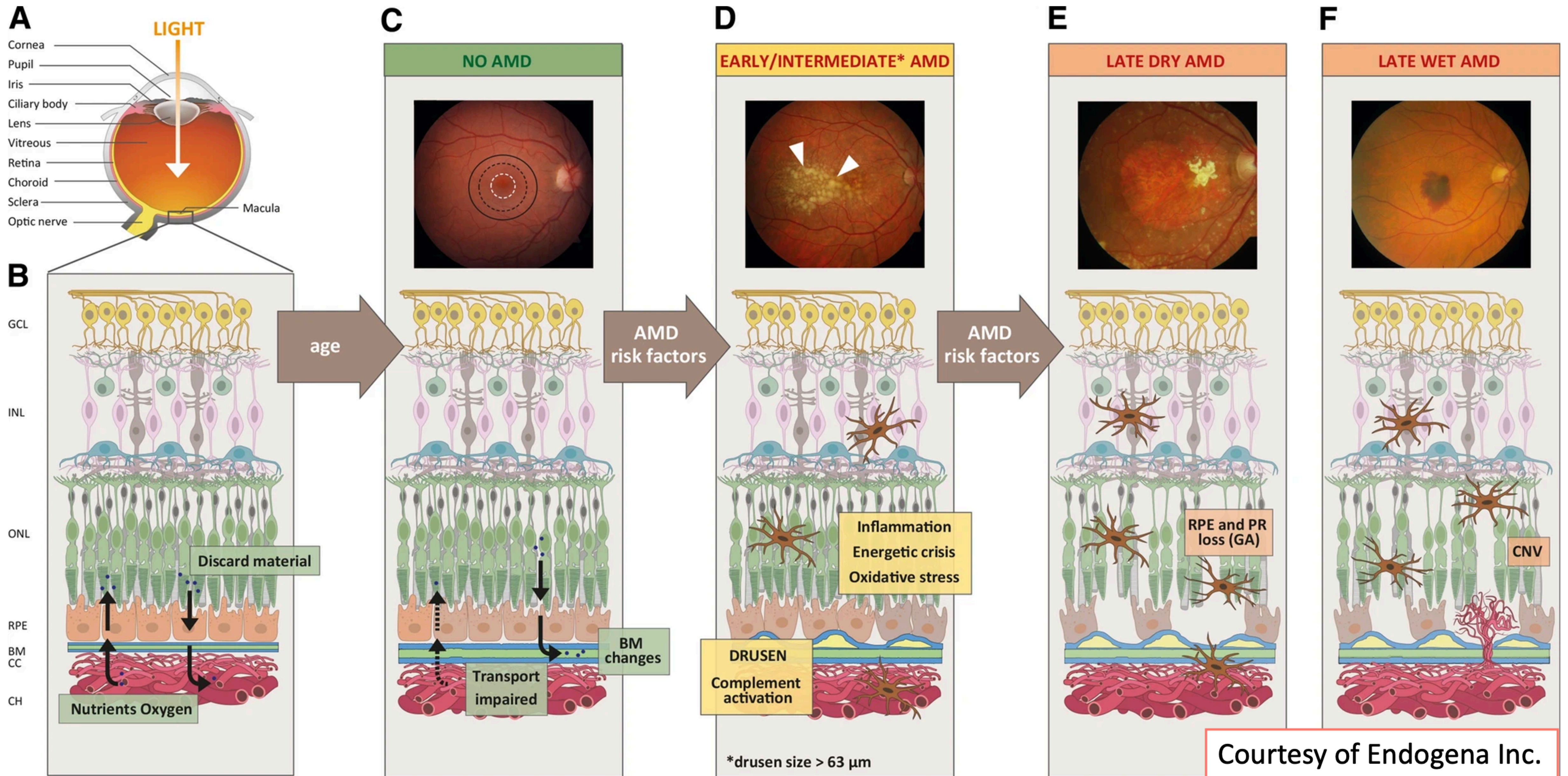


Geographic atrophy



Neovascular AMD







# Drusen = hallmark of AMD

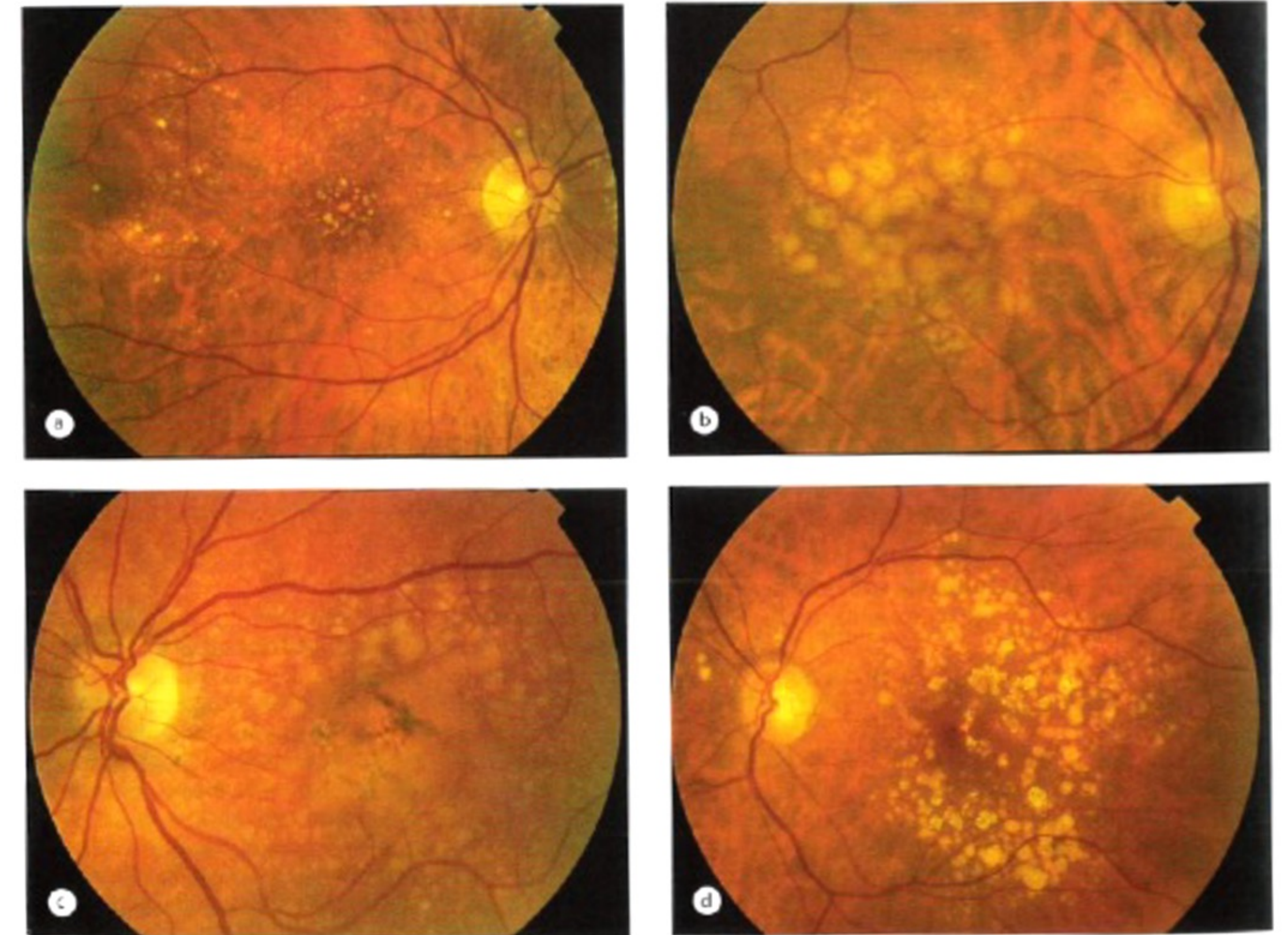
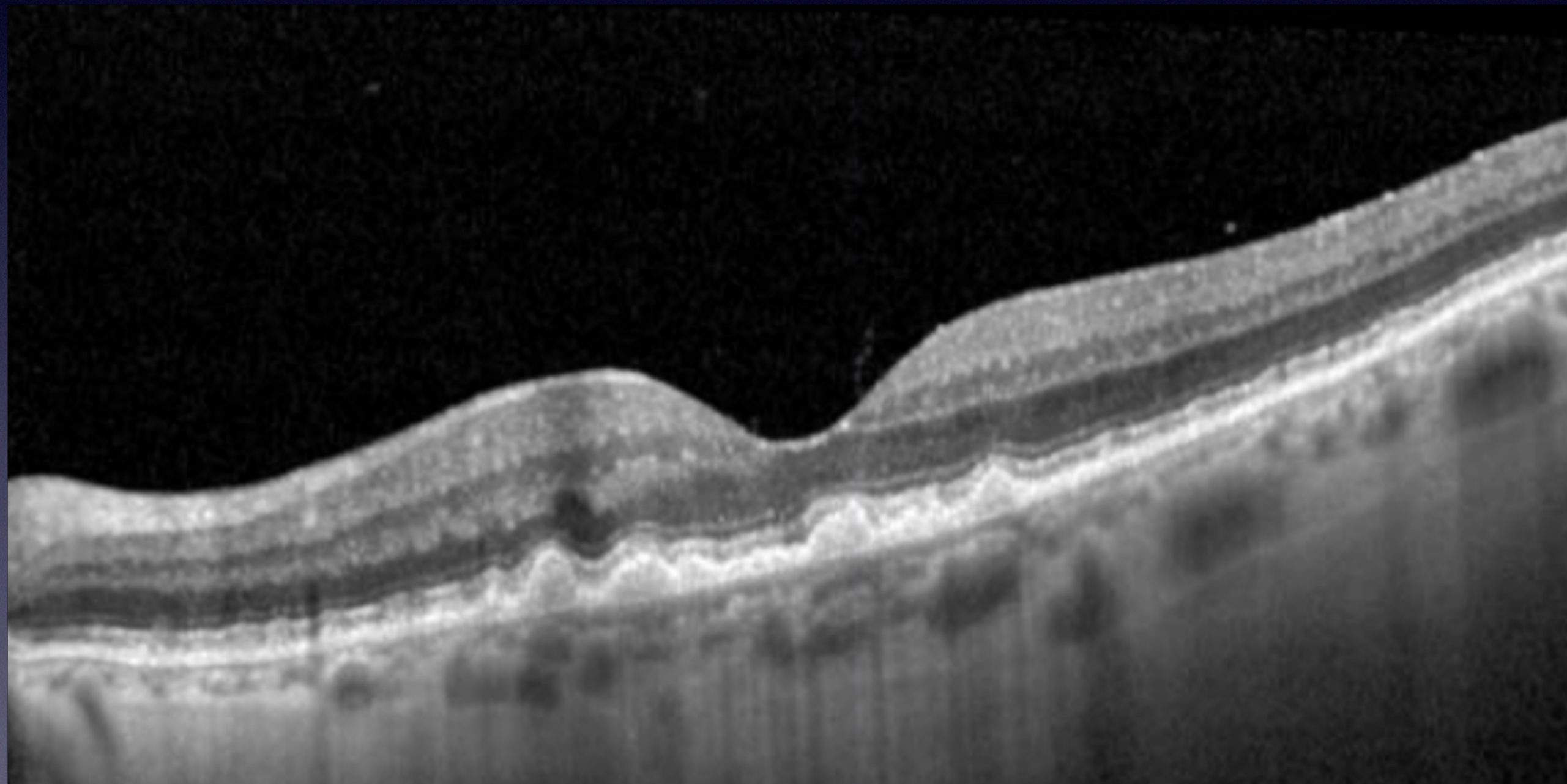
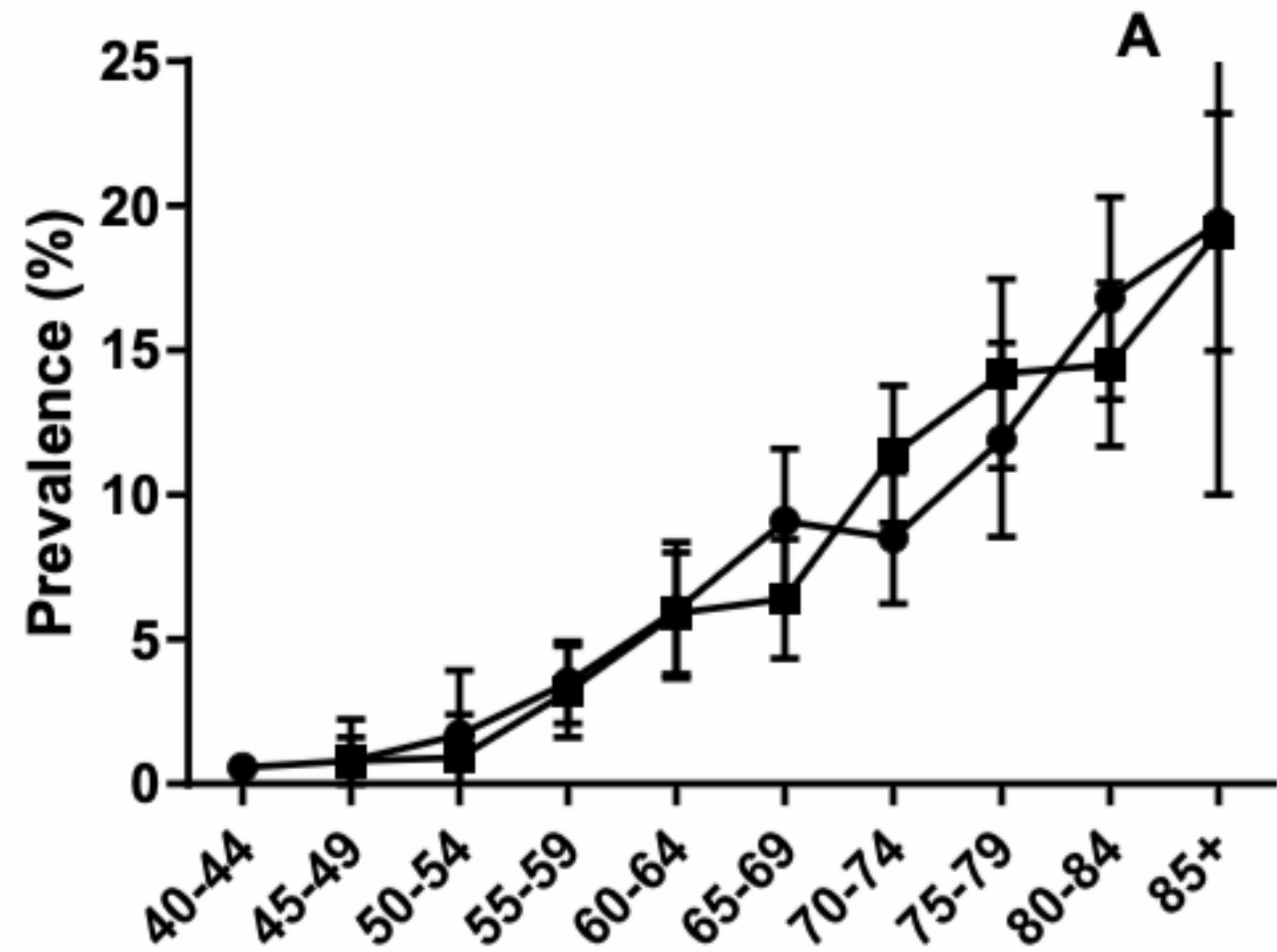


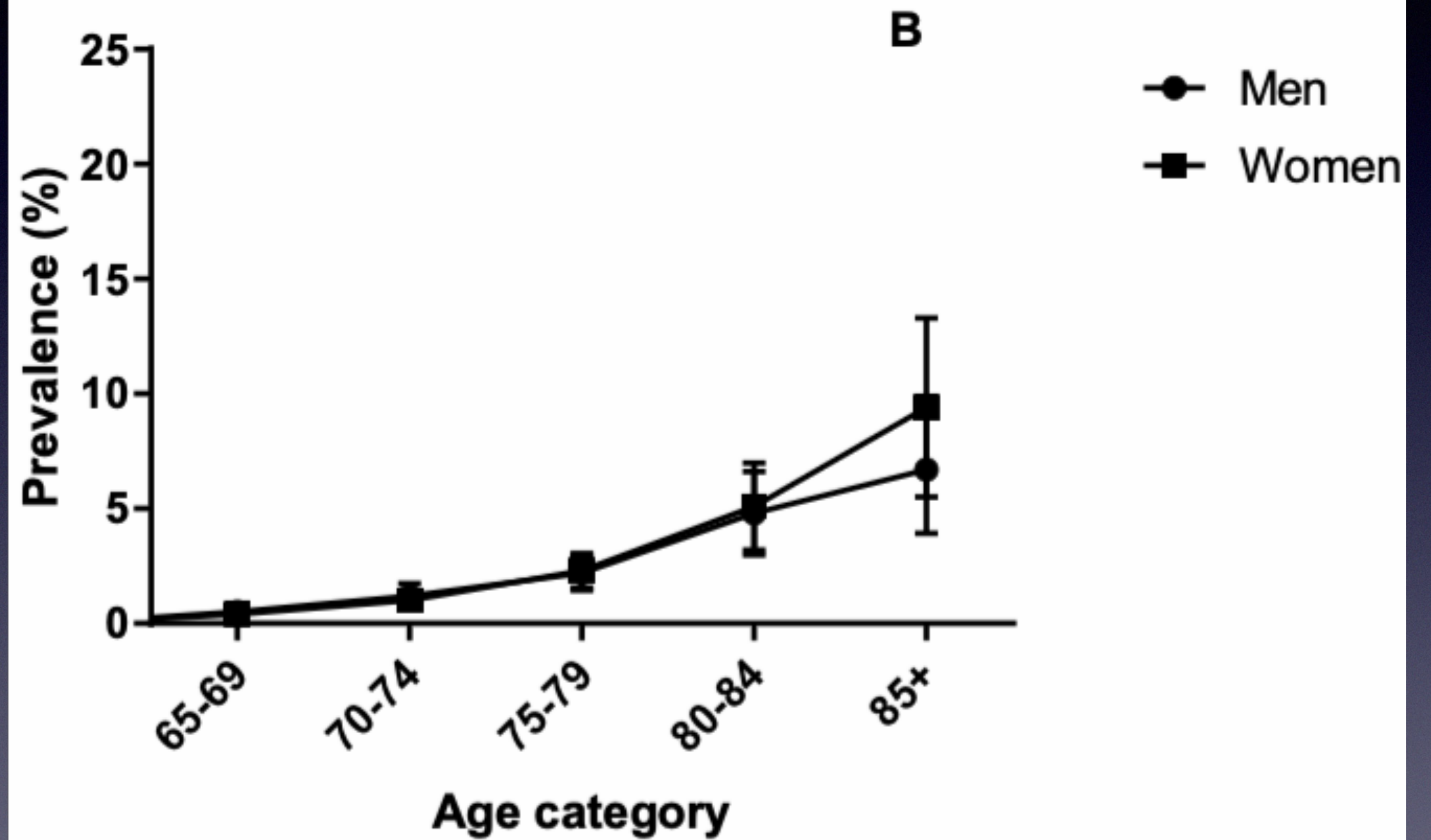
Abb. 17.4 Drusen. a Harte Drusen; b weiche Drusen; c miteinander verschmolzene weiche Drusen; d kalzifizierte Drusen



### Early AMD

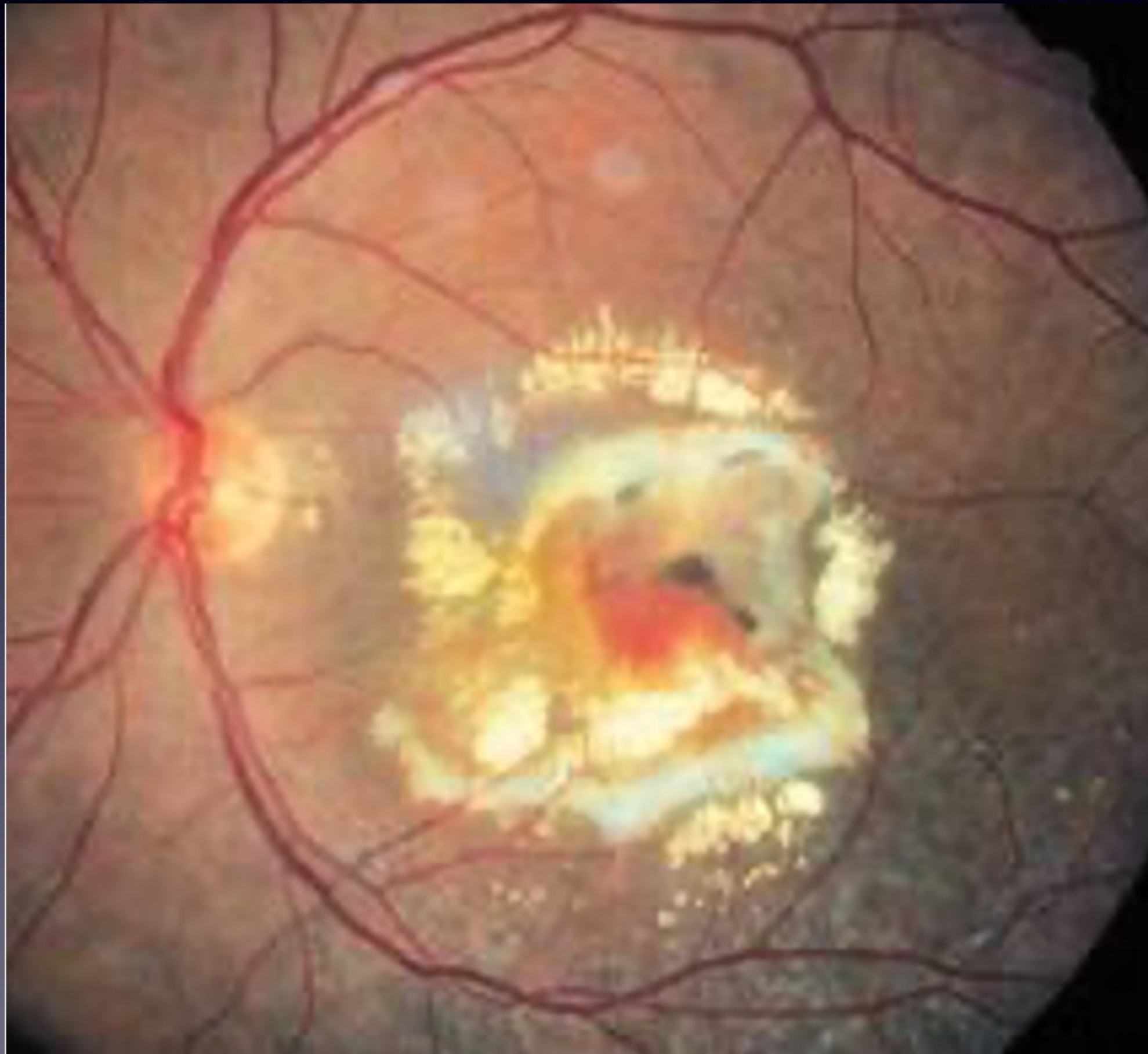


### Late AMD

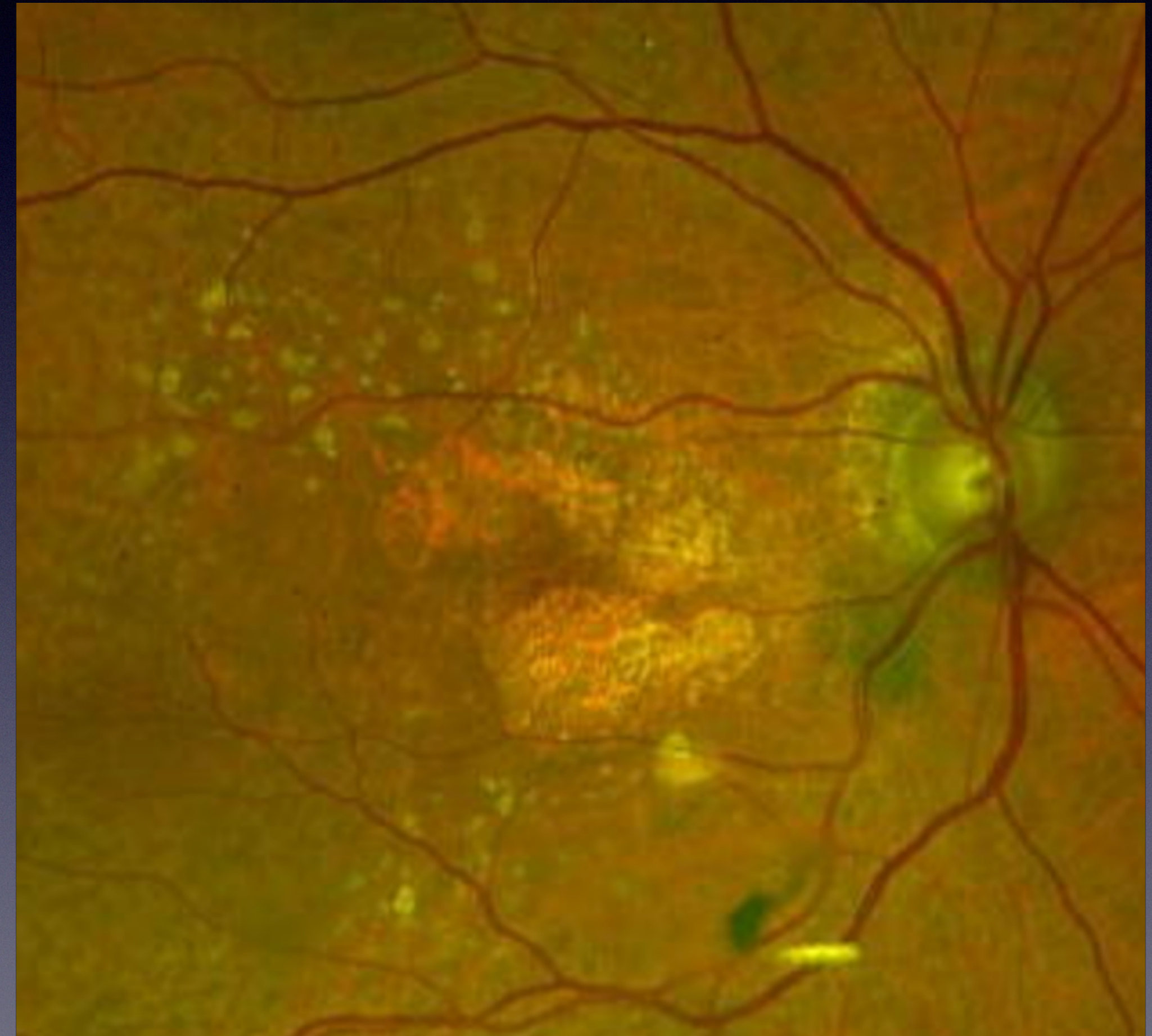




**NEOVASCULAR**



**GEOGRAPHIC ATROPHY**





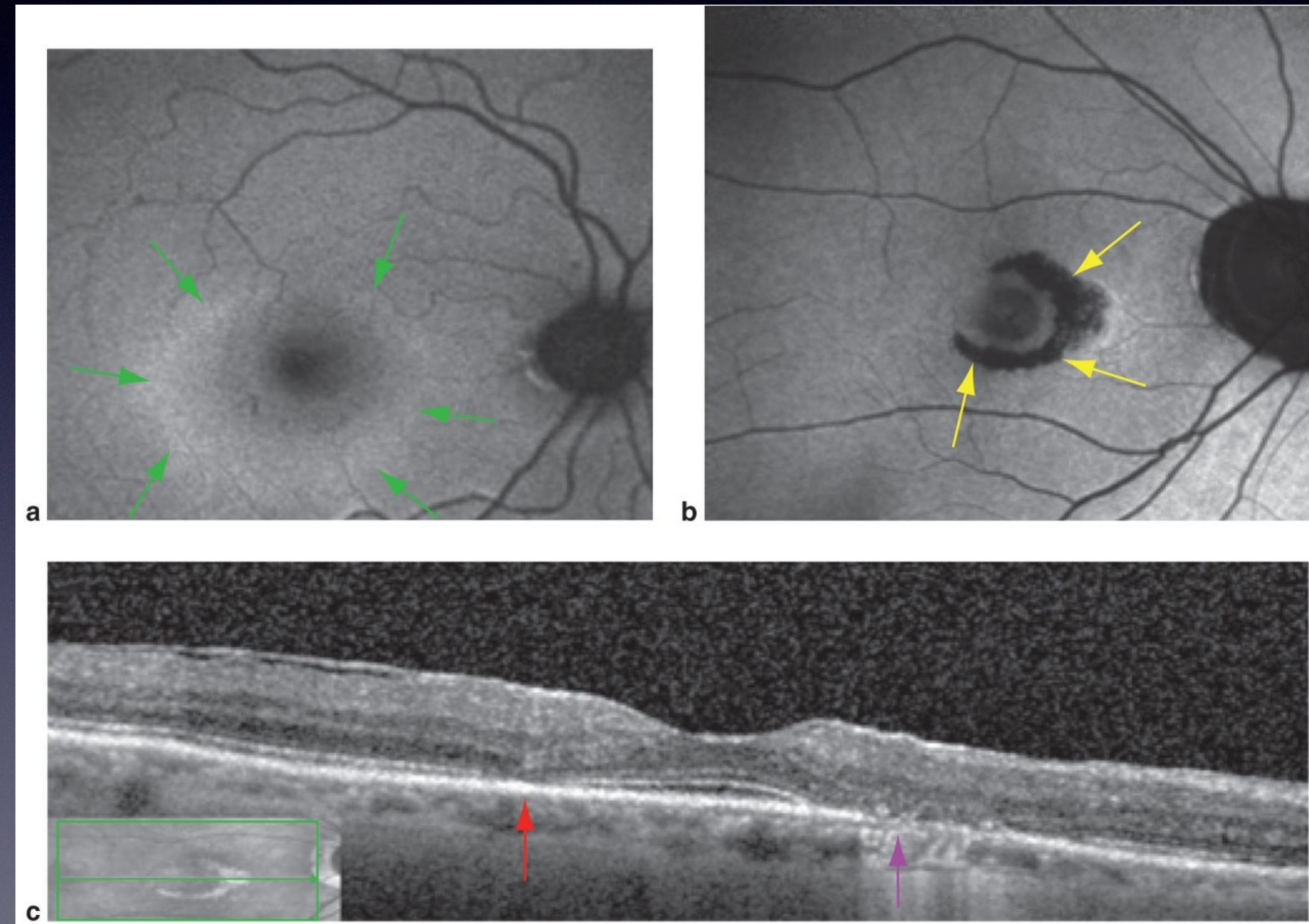
# Systemic Medications & **Retinal Toxicity**





# Hydroxychloroquin

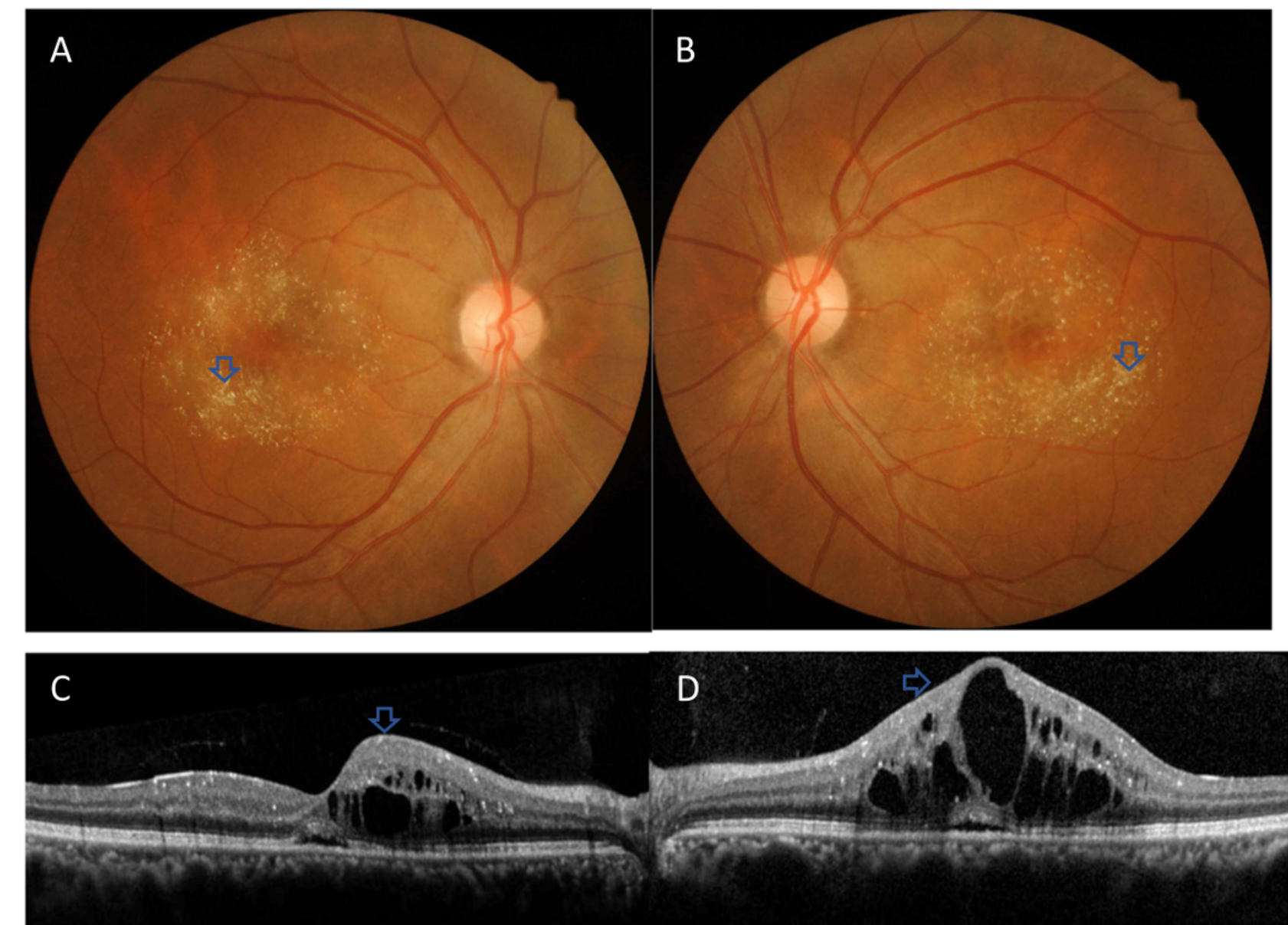
- Dose-dependent retinopathy
- HCQ binds melanin in RPE leading to photoreceptor damage
- Risk rises with high daily dose ( $>5\text{mg/kg}$  real body weight), long duration, renal impairment, or concurrent tamoxifen use
- **5 x 5 rule** (keep dose  $<5\text{mg/kg/day}$ , and begin annual exams after 5 yrs therapy)





# Tamoxifen

- Can cause crystalline retinopathy with intraretinal crystal deposits and cystoid macular edema
- Mechanism not fully understood; may form complexes in retinal cells and disrupt lysosomal function, leading to axonal degeneration and Müller cell dysfunction
- Vision often improves after stopping

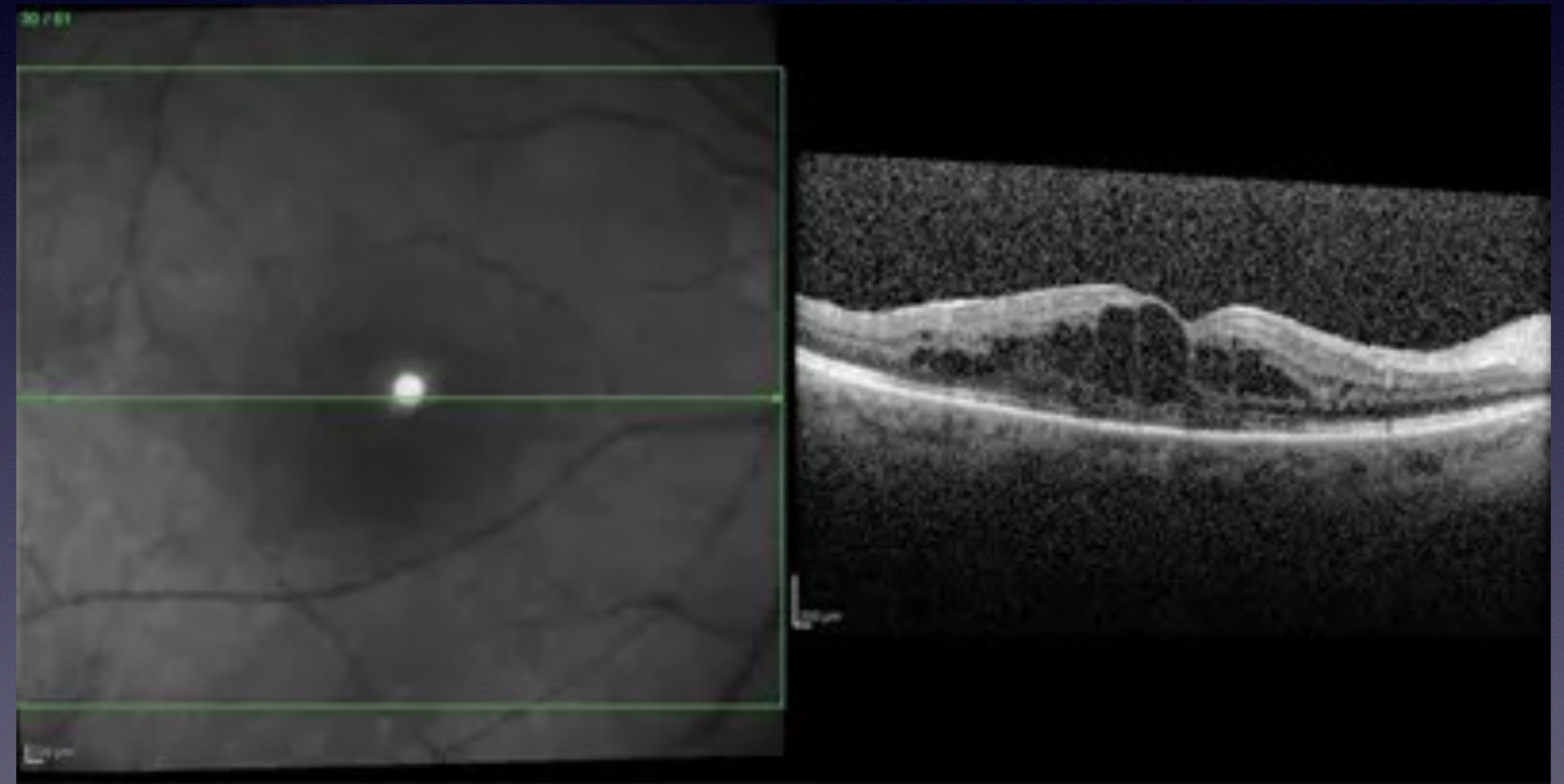


**Fig. 1** CFP and OCT taken in May 2018. Fundus examination revealed yellow-white refractive deposits in the macular and paramacular areas in the right eye (**a**) and the left eye (**b**). OCT showed CME and refractile deposits in superficial retinal layer, while mild subretinal fluid can also be found in both eyes (**c, d**)



# Fingolimod (Gilenya)

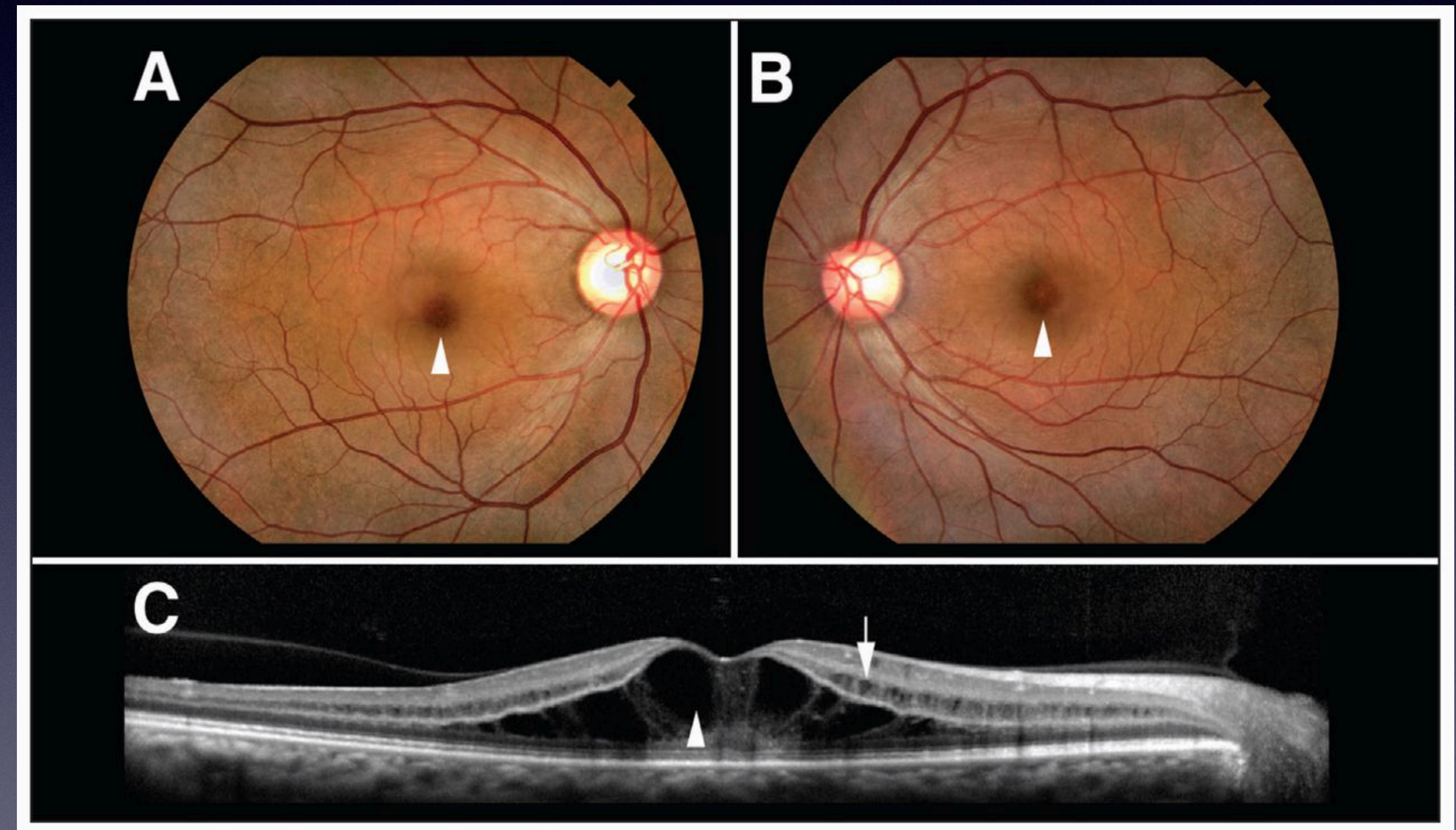
- **FAME** (Fingolimod-associated macular edema)
- Typically in the first three months of therapy
- Disrupts inner blood retinal barrier
- Risk dose dependent, and higher in patients with diabetes or history of uveitis





# Taxanes (Paclitaxel, Docetaxel, etc)

- May cause cystoid macular edema, rarely optic neuropathy
- Mechanism thru **blood-retinal barrier disruption** leading to perifoveal capillary leakage
- Taxanes interfere with microtubules, which might impair axonal transport in ON



Rajesh C. Rao and Netan Choudhry  
CMAJ February 16, 2016 188 (3) 216; DOI: <https://doi.org/10.1503/cmaj.131080>



# Interferon-alpha

- Microvascular injury leads to cotton wool spots and retinal haemorrhages
- Usually within 2-5 months of starting therapy
- Most cases mild, in rare instances ischemic retinopathy





# Vigabatrin

- Causes **irreversible** concentric peripheral visual field constriction (**Vigabatrin-associated retinopathy**)
- Neurotoxic damage, particularly to photoreceptors, and possibly retinal ganglion cells
- Incidence high, up to 30-50% of patients on vigabatrin

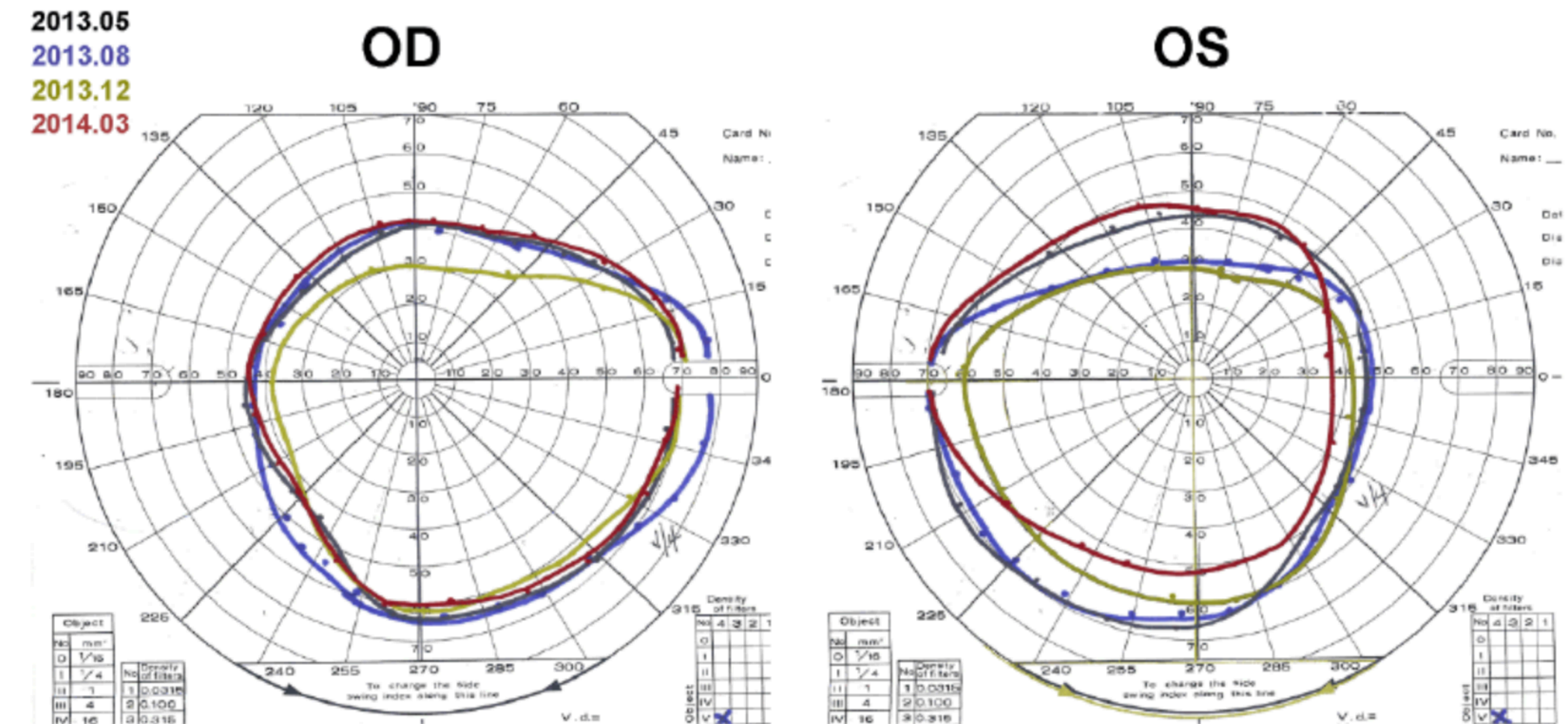
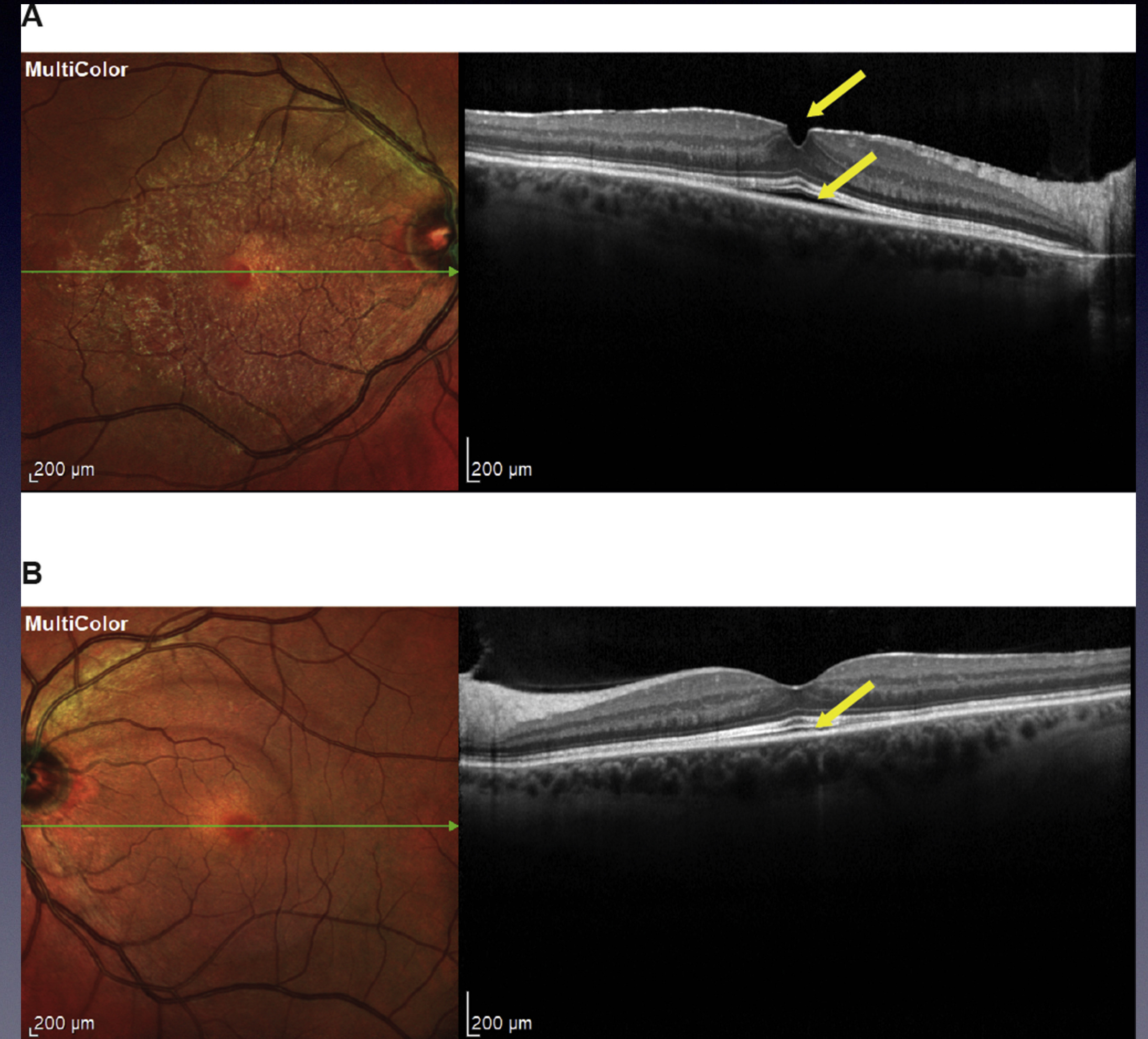


Figure 2: Goldmann perimetry field. Images show constricted visual fields. Notably, the field dated 2014.03, is moderately improved from the visual field taken four months earlier - 2013.12.



# FGFR/MEK Inhibitors

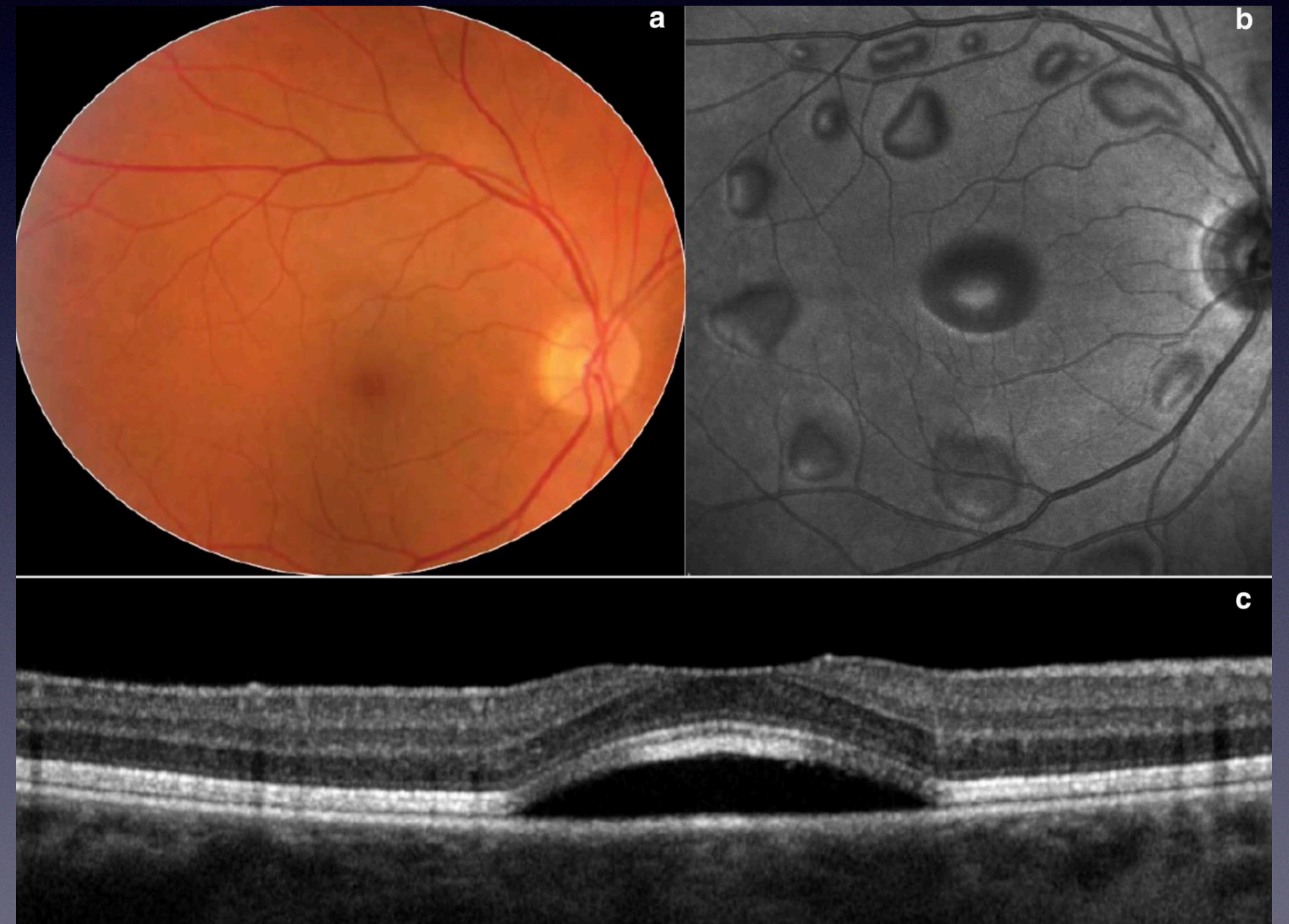
- A class effect of MEK inhibitors is a serous retinopathy called “**MEK-inhibitor associated retinopathy**”
- Some patients also develop RPE changes, optic disc swelling and **uveitis**
- Serous detachments tend to occur early within the first months of treatment, usually bilateral, and **self-limiting**





# FGFR/MEK Inhibitors

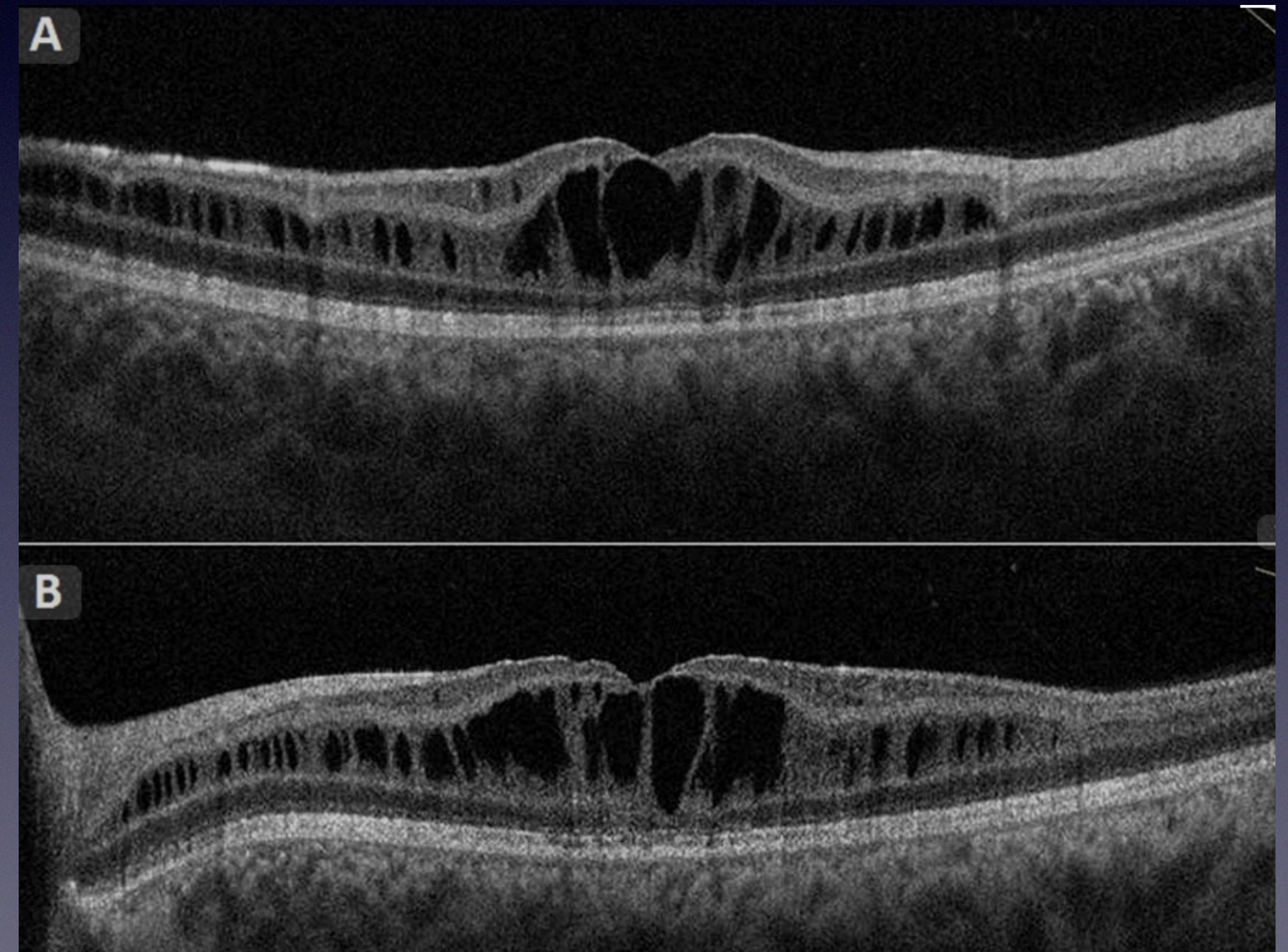
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# Niacin (Nicotinic Acid)

- Niacin can cause toxic cystoid macular edema
- “Niacin maculopathy” is reversible after stopping
- Incidence is low (<1% of patients)
- Postulated mechanism is dysregulation of retinal capillaries





# Pattern of retinal toxicity

## Disruption of the retina and RPE

- Chloroquine derivatives
- Phenothiazines
- FGFR/MEK Inhibitors
- Vigabatrin
- ...

## Vascular damage

- Interferon
- Metamphetamine/cocaine
- Oral contraceptives
- ...

## Cystoid macular edema

- Fingolimod
- Tamoxifen
- Taxanes
- Glitazones
- ...



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*MILLE GRAZIE PER L'ATTENZIONE*



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# Clinica di Oftalmologia EOC



**PD Dr. Moreno Menghini**

Primario



Dr. Francesca  
Bruzzone



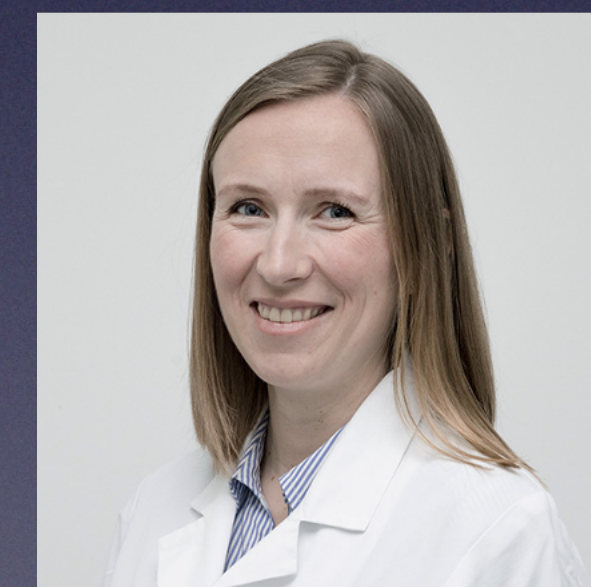
Dr. Alex  
Casanova



Dr. Michele  
Clerici



Dr. Gabriela  
Grimaldi

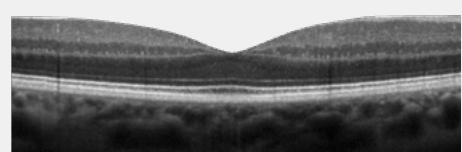


Dr. Kathrin  
Perruchoud-Ader



Dr. Giulio  
Volpe





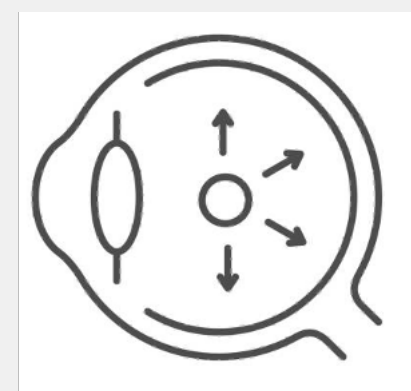
**Medical  
Retina**



**Vitreoretinal  
surgery**



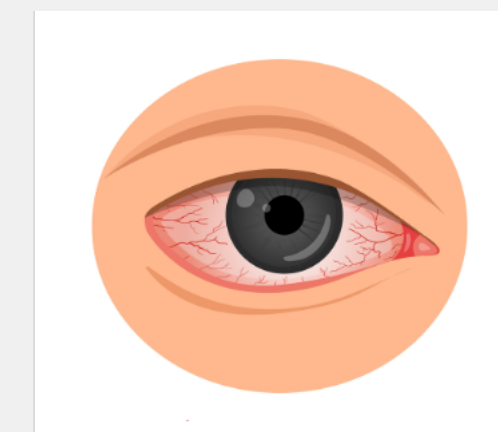
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General**



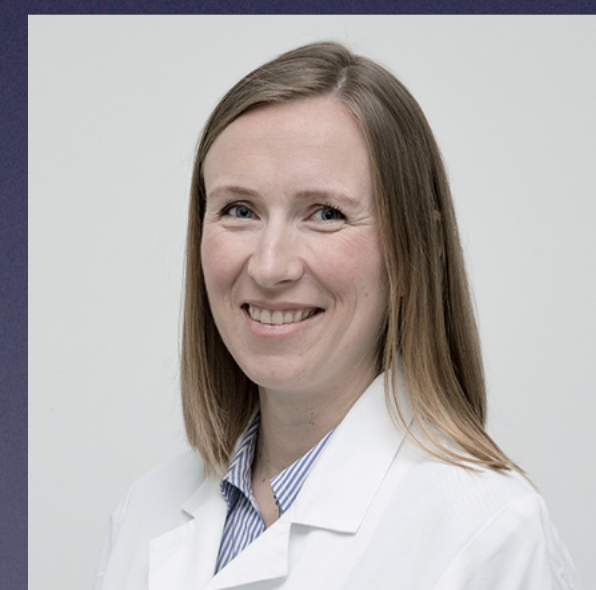
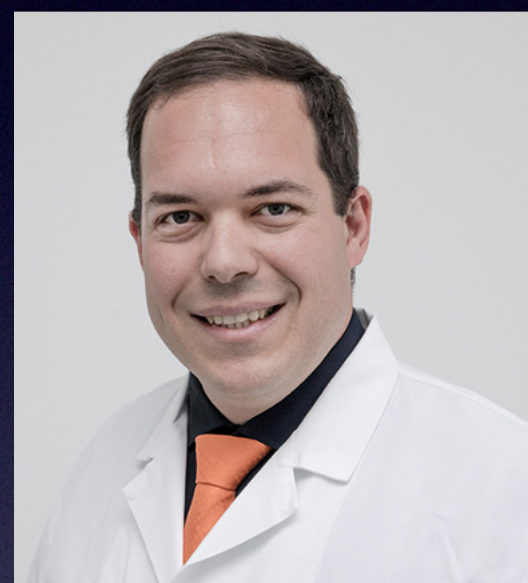
**Glaucoma**



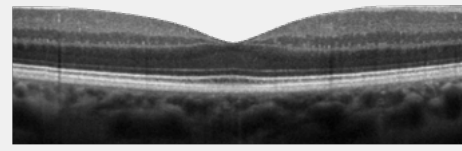
**Neuro-  
ophthalmology**



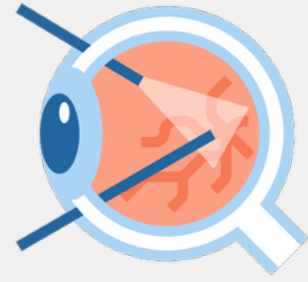
**Uveitis**







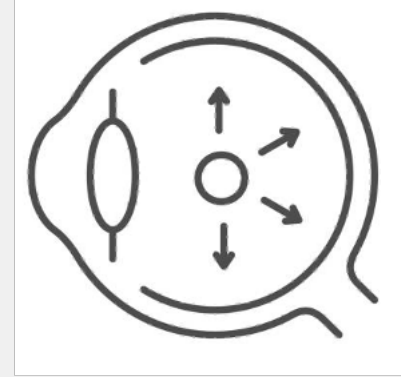
**Medical  
Retina**



**Vitreoretinal  
surgery**



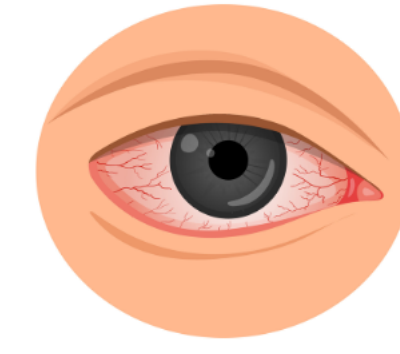
**A&E +  
General**



**Glaucoma**



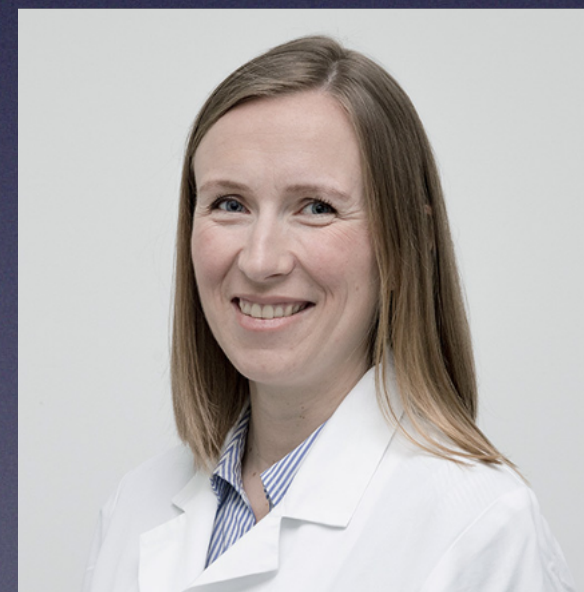
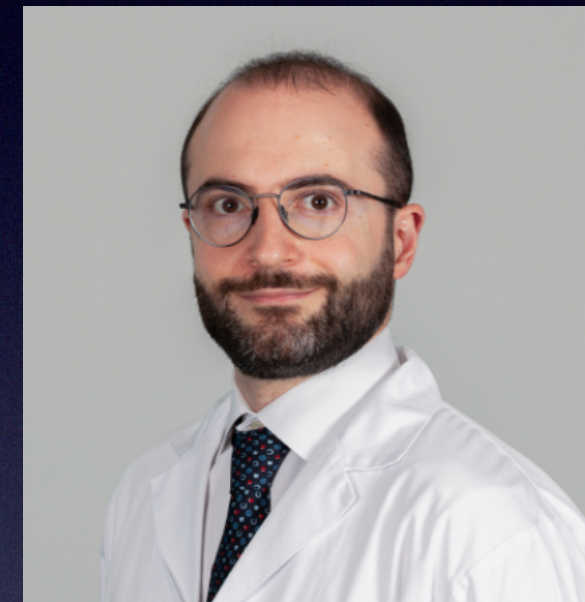
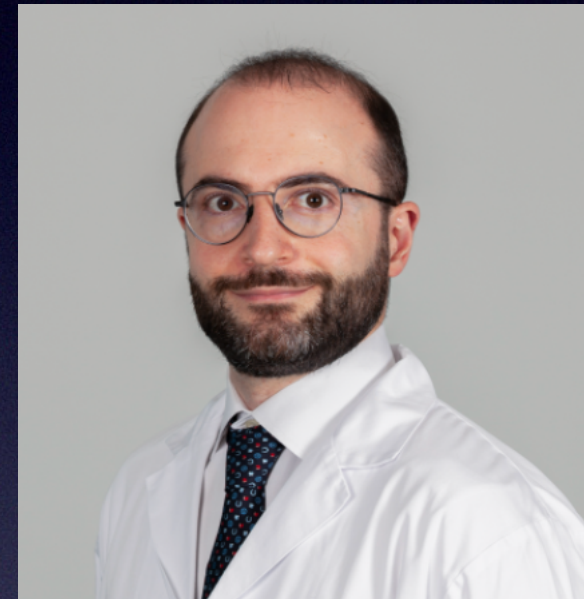
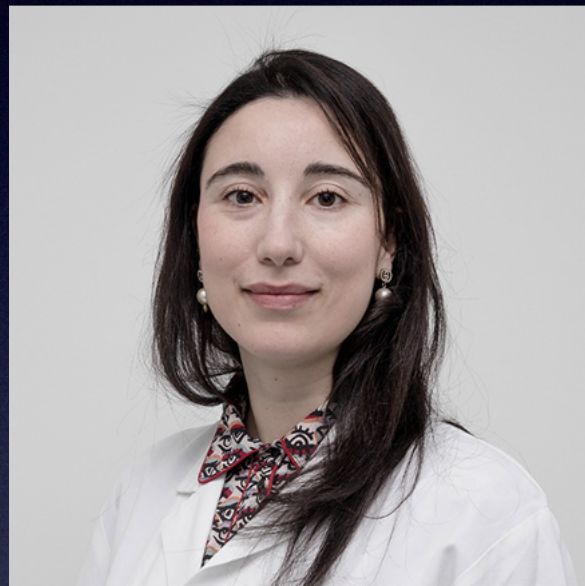
**Neuro-  
ophthalmology**



**Uveitis**



**Pediatric  
Ophthalmic Service**



**Dr. Simone  
Bruschi**

