

FFA: Unraveled

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Fluorescein

- Orange water soluble dye
- IV injection of sodium fluorescein

Fluorescein angiography

- Photographic surveillance of fluorescein as it passes through Retinal and choroidal vessels
- Integrity (dye leakage)
- Flow (Transit time)
- Planning retinal laser

Fluorescein binding

- 80% Bound to serum proteins
- 20% Unbound

Outer blood retinal barrier

- Major choroidal vessels: Impermeable
- Choriocapillaris
 - Multiple fenestrations
 - PERMEABLE to free fluorescein
- RPE: Impermeable

Inner blood retinal barrier

- Retinal blood vessels
 - Tight junctions
 - IMPERMEABLE to bound or free fluorescein
- Disruption of IBRB – Leakage of free and bound fluorescein

Fluorescence

The properties of certain molecules to emit a light of

Longer wavelength

when stimulated by light of a

shorter wavelength.

- Peak absorption at 490nm (Blue visible spectrum)
- *Blue* excitation filter
- Emits at 530nm (Yellow-Green visible spectrum)
- *Yellow-Green* barrier filter

Requirements

- Dilated pupil
- Clear media

Contraindications

- Renal impairment
 - Lower fluorescein dose if necessary
- Pregnancy
- Absolute CI: *Allergy to fluorescein*
- Iodine?

Side effects

- Skin discolouration
- N&V
- Pruritus
- Urine discolouration
- Vasovagal syncope (1 in 340)
- Severe anaphylaxis (1 in 1900)
- Fatal anaphylaxis (1 in 220,000)

- Ensure resuscitation facilities readily available.

Don't forget..

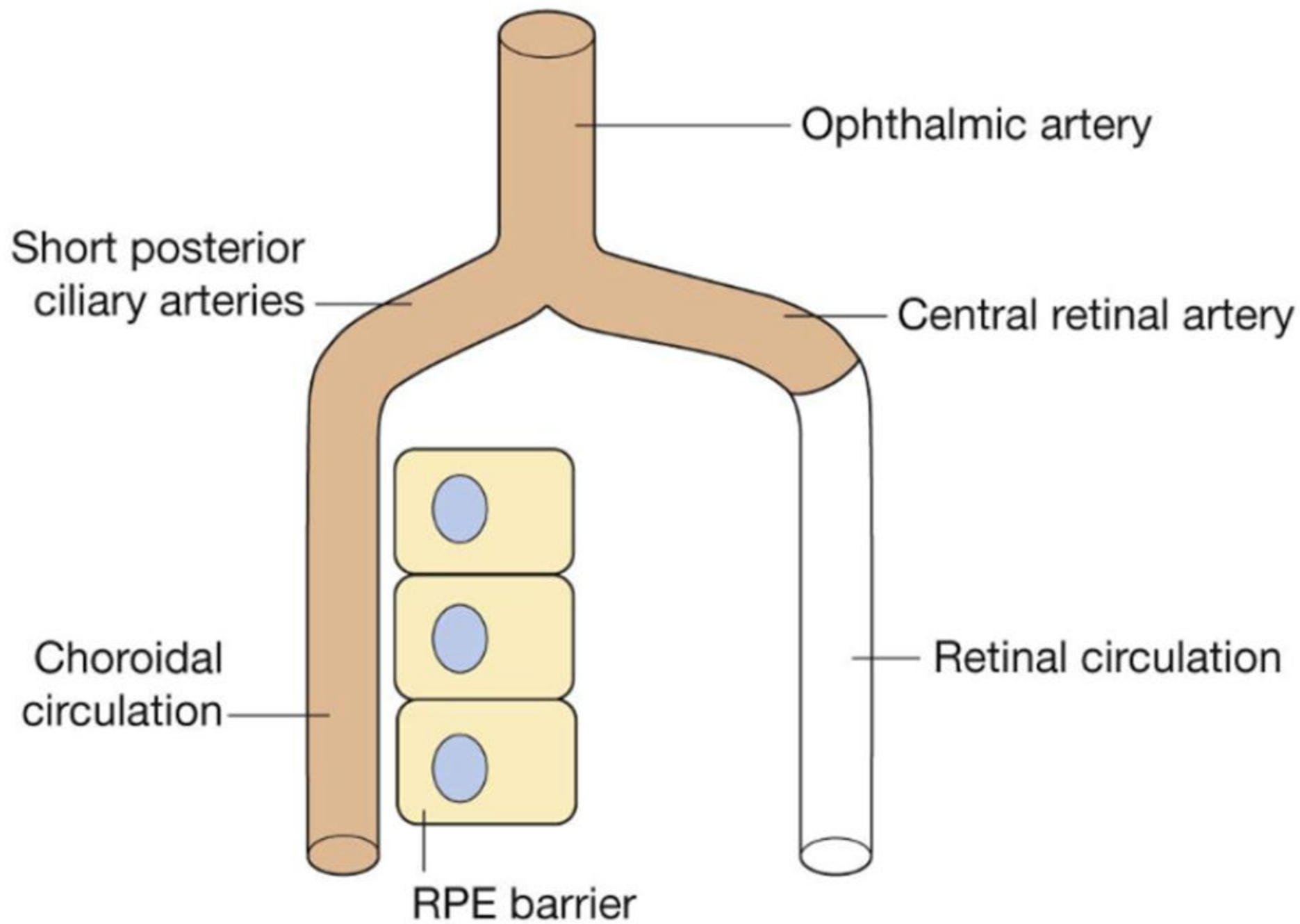


Steps

- Colour and 'red-free' fundus photographs
- Inform photographer which eye takes priority
- Inject IV Fluorescein (5ml of 10% solution)
- Rapid sequence photographs
 - 1s intervals for 25 seconds
- Photos of other eye
- Less frequent photographs for 5-10 minutes
- Late images may be taken

Opaque media

- 3mL of 25% fluorescein solution



Phases



Choroidal

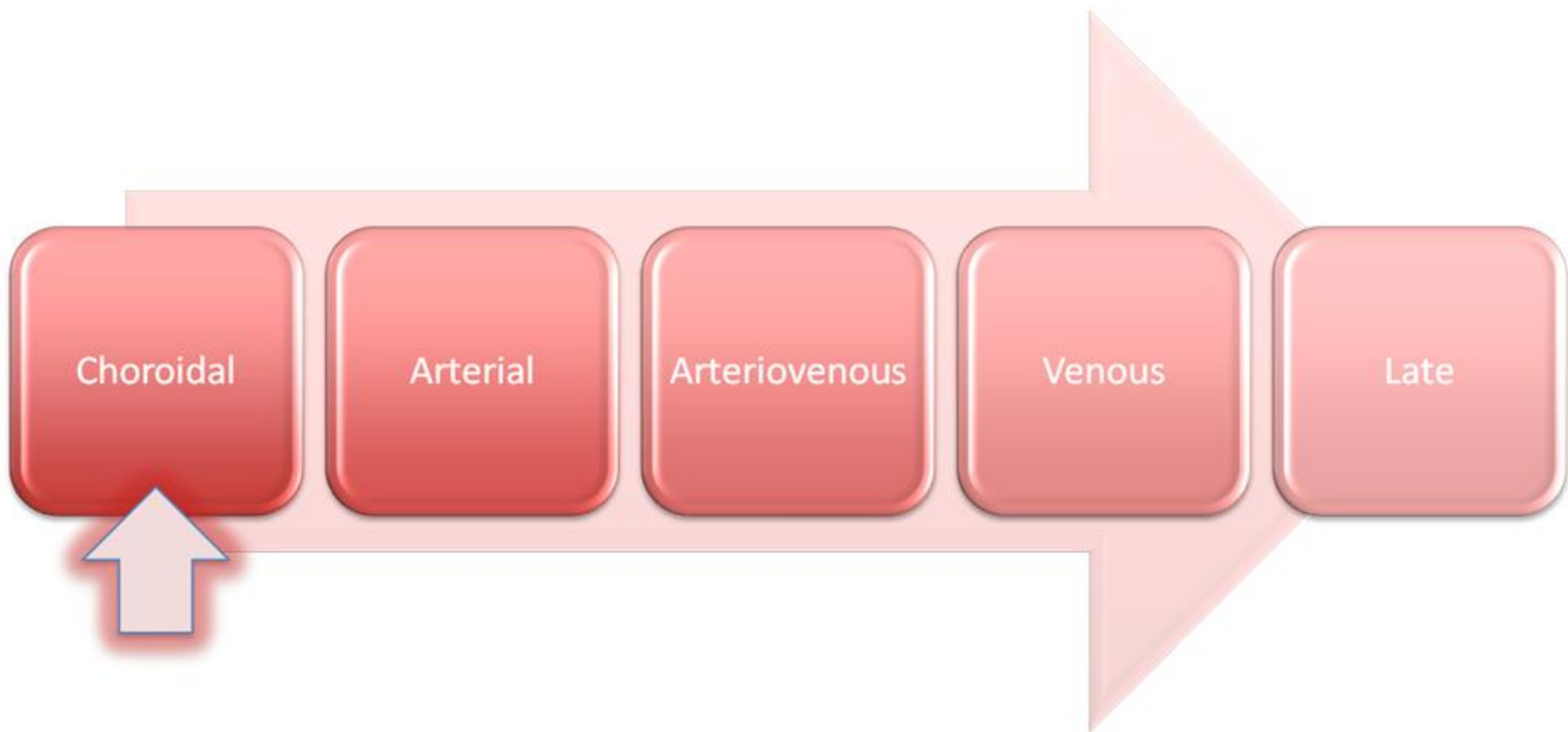
Arterial

Arteriovenous

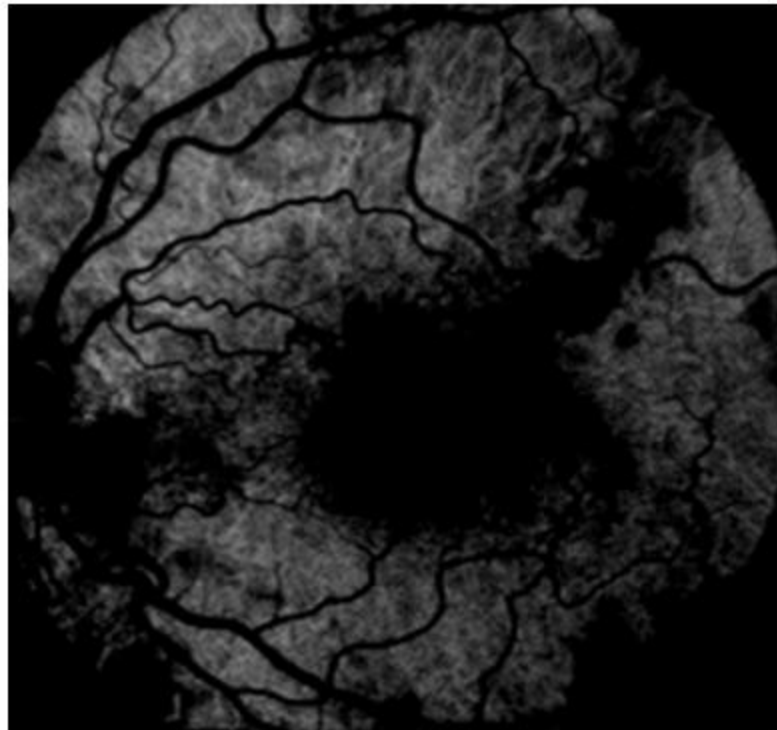
Venous

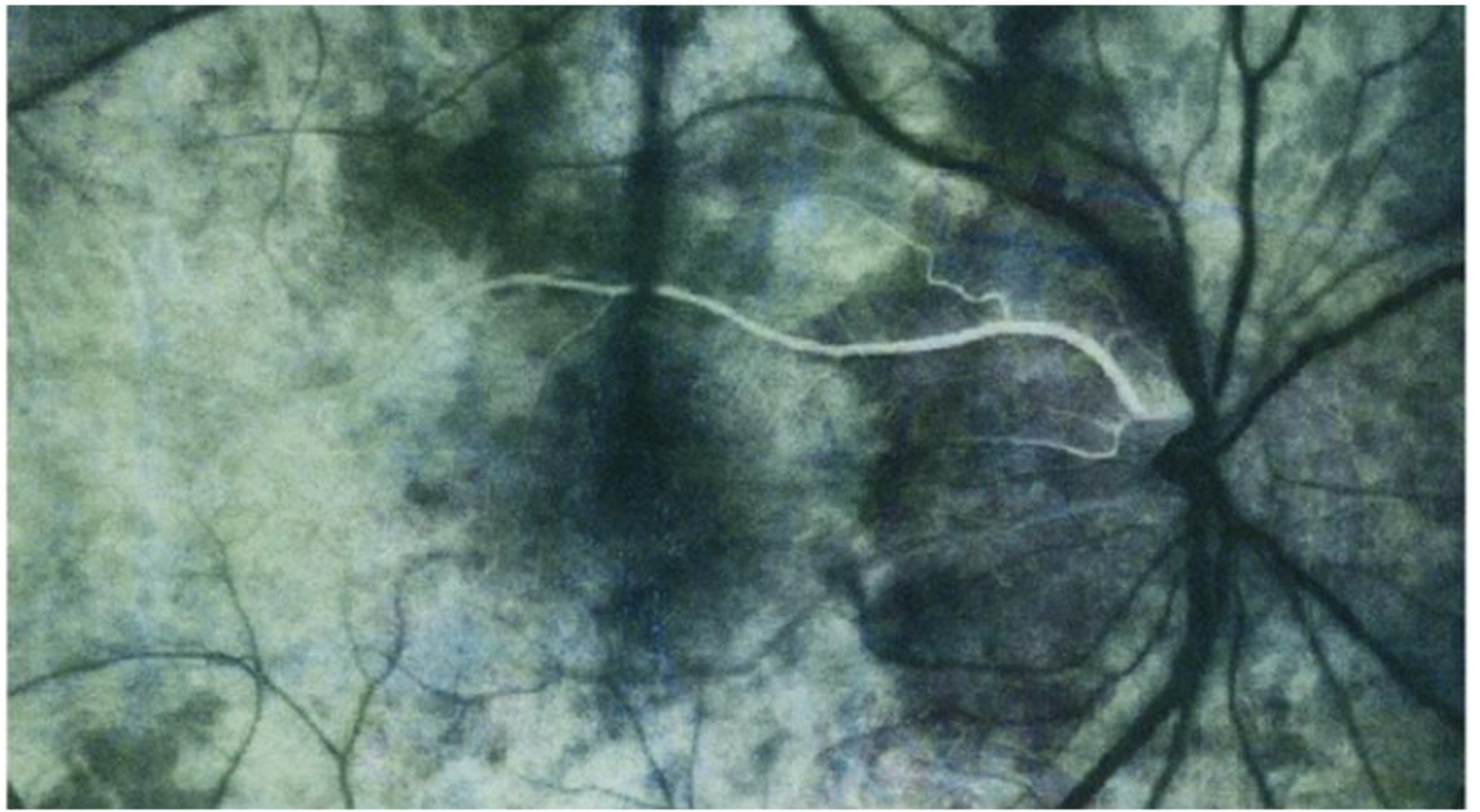
Late

Phases

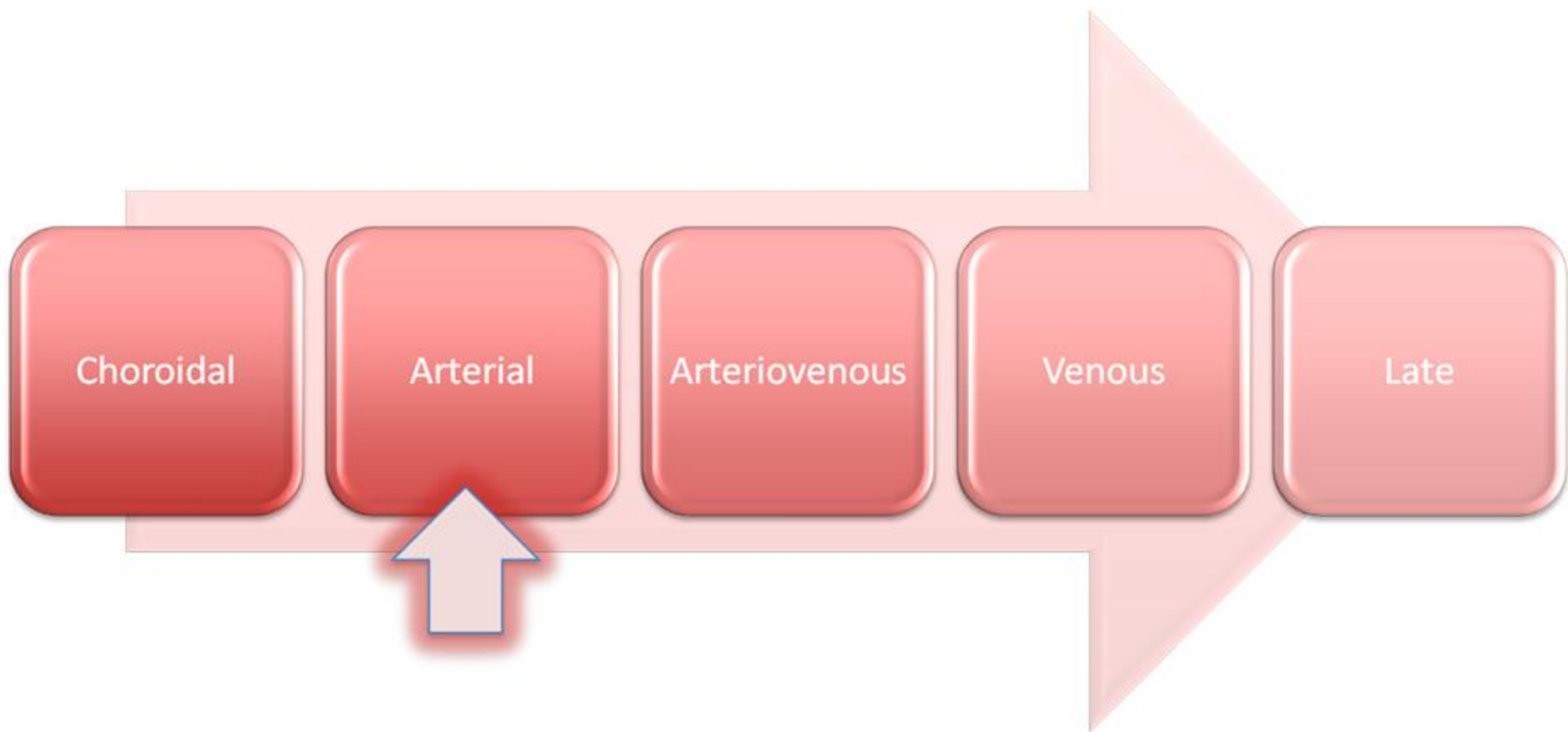


Choroidal phase

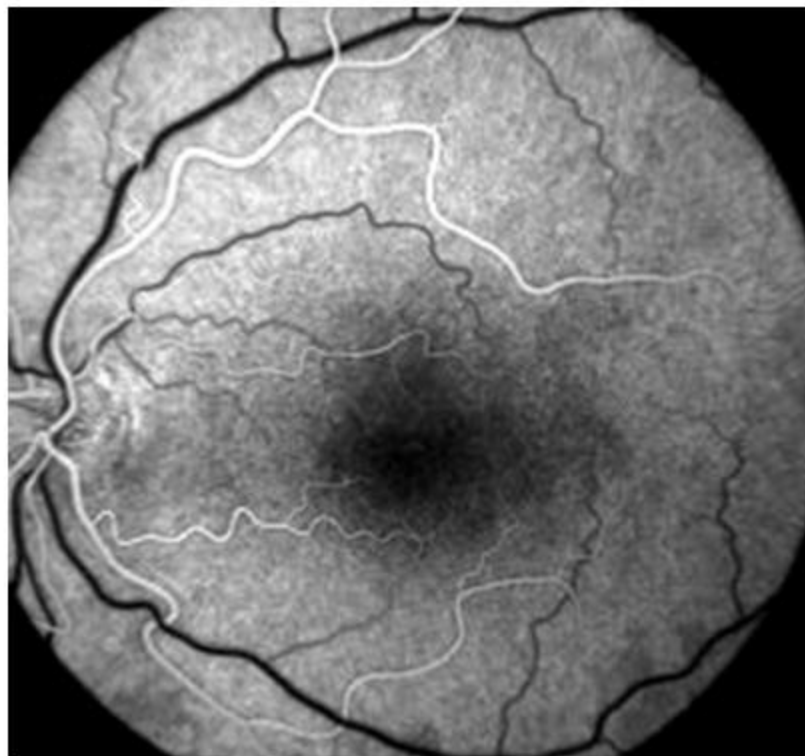




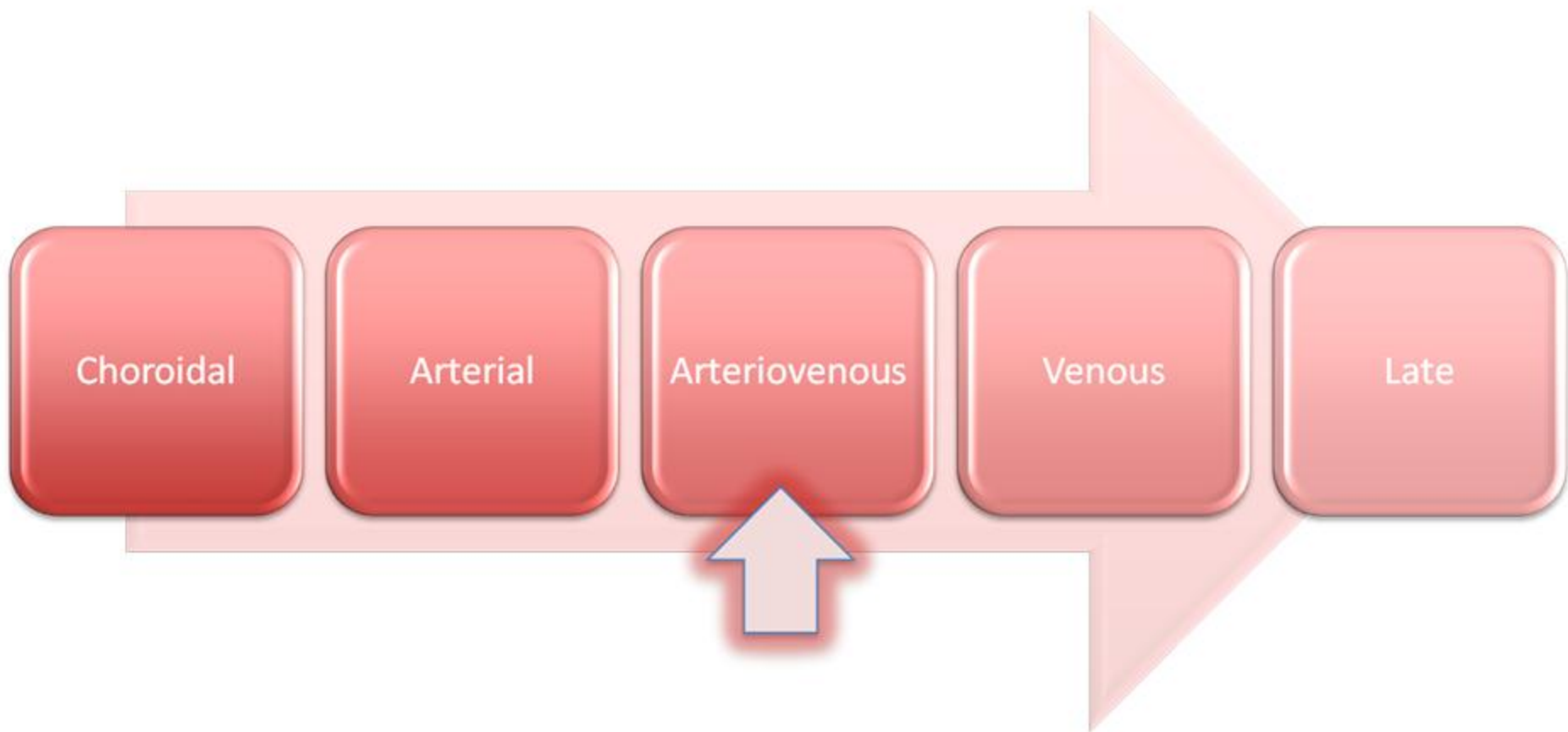
Phases



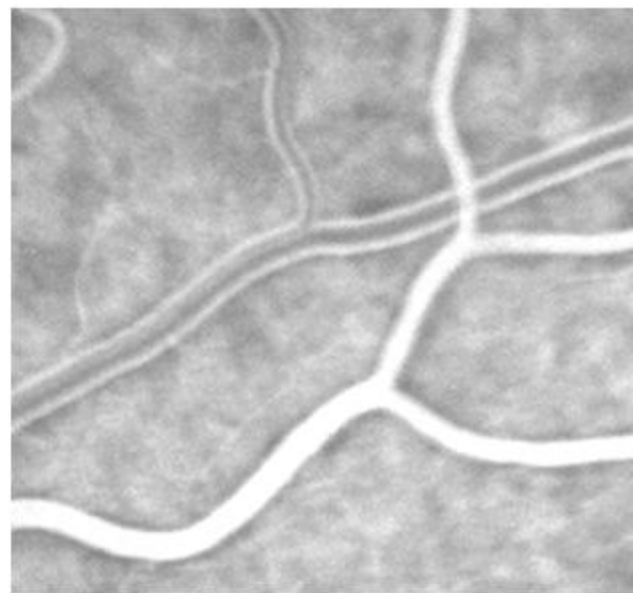
Arterial



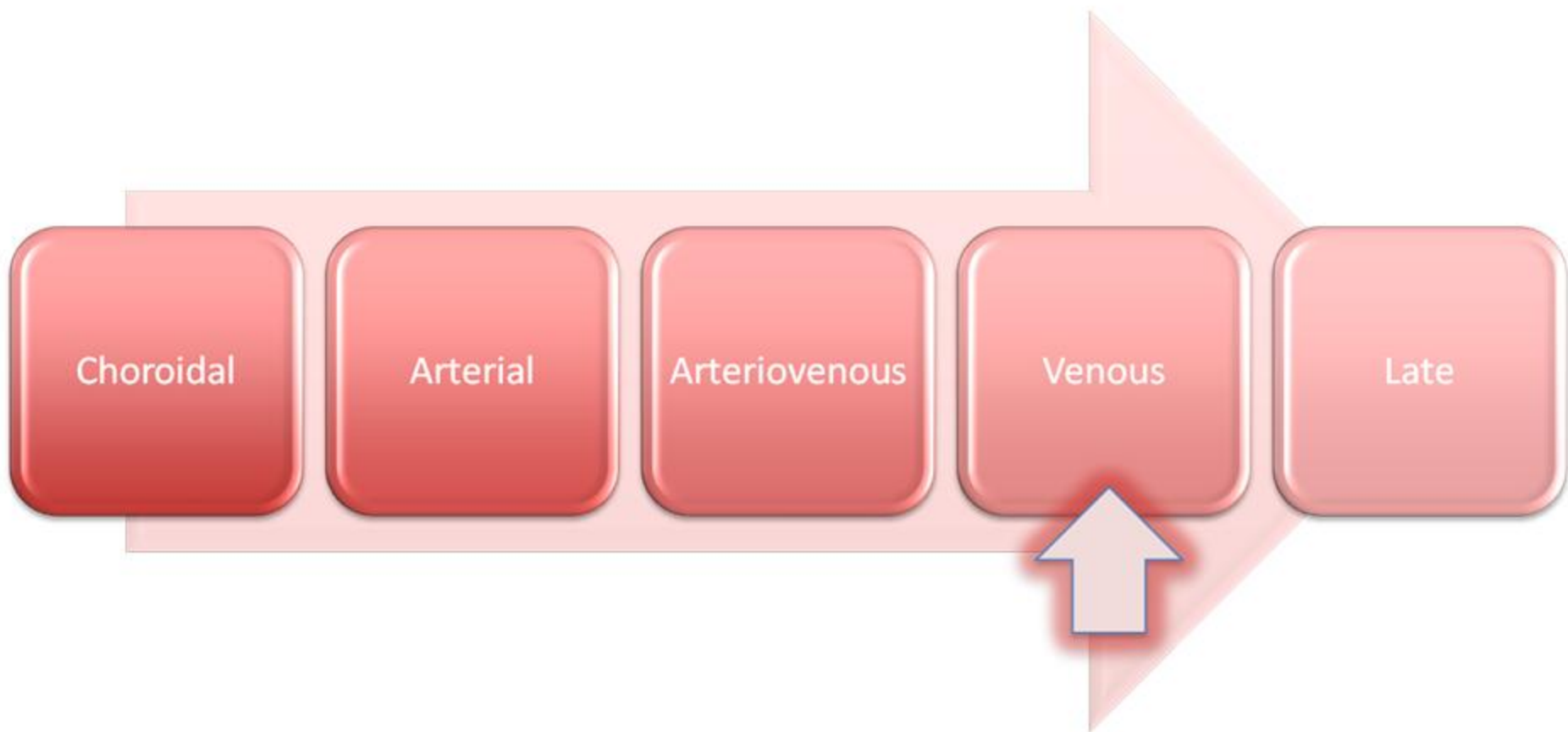
Phases



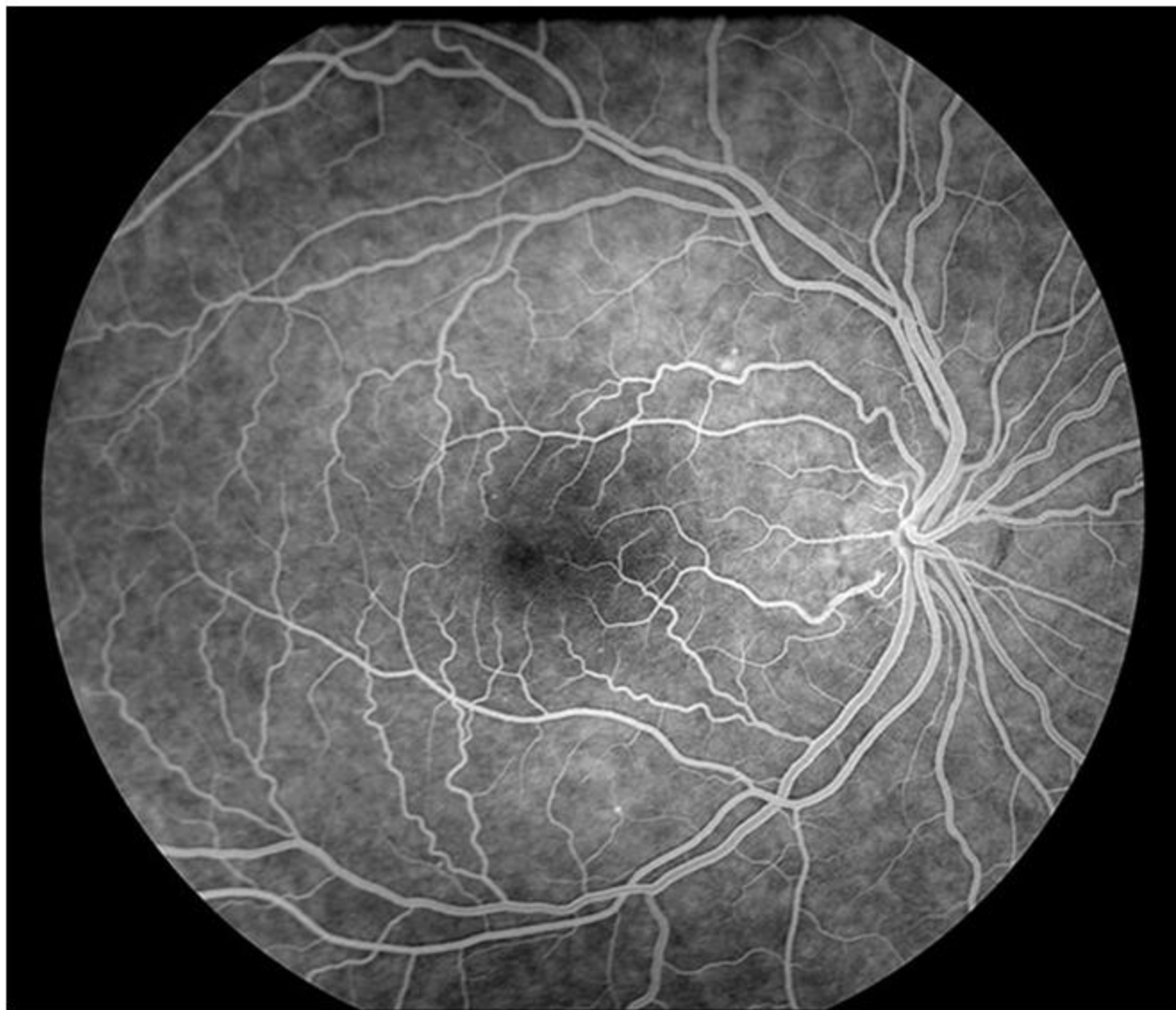
Arteriovenous phase



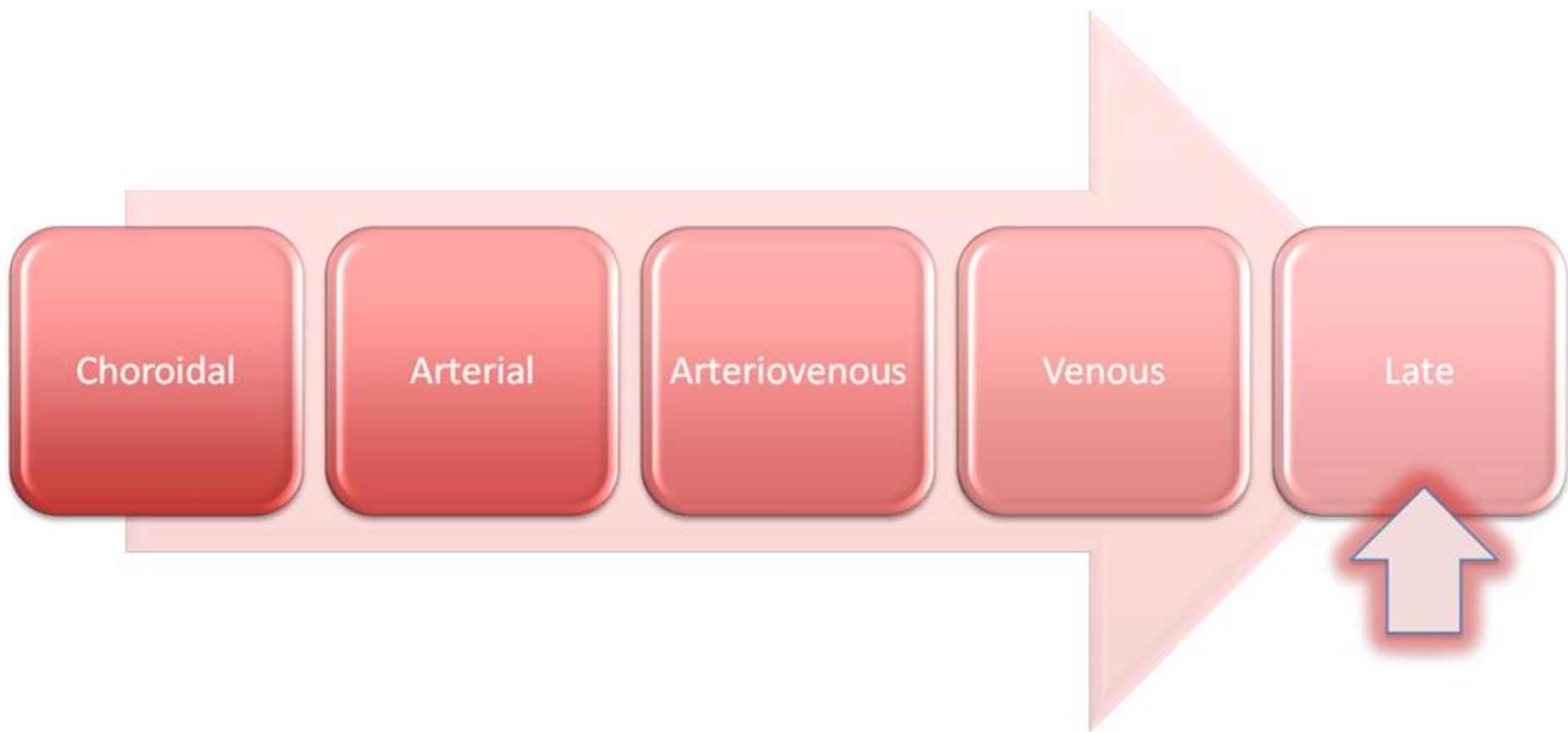
Phases



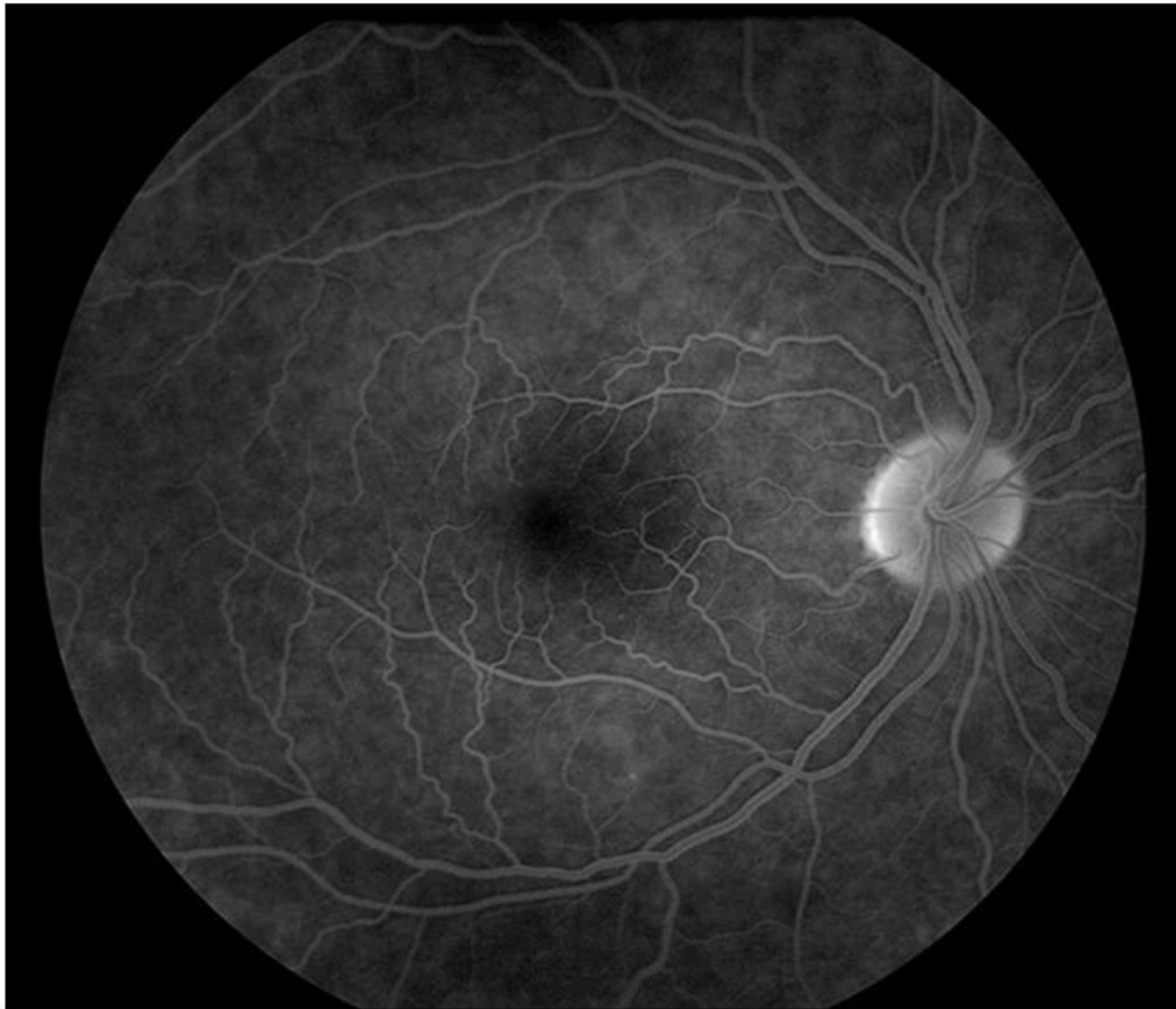
Venous Phase



Phases



Late Phase

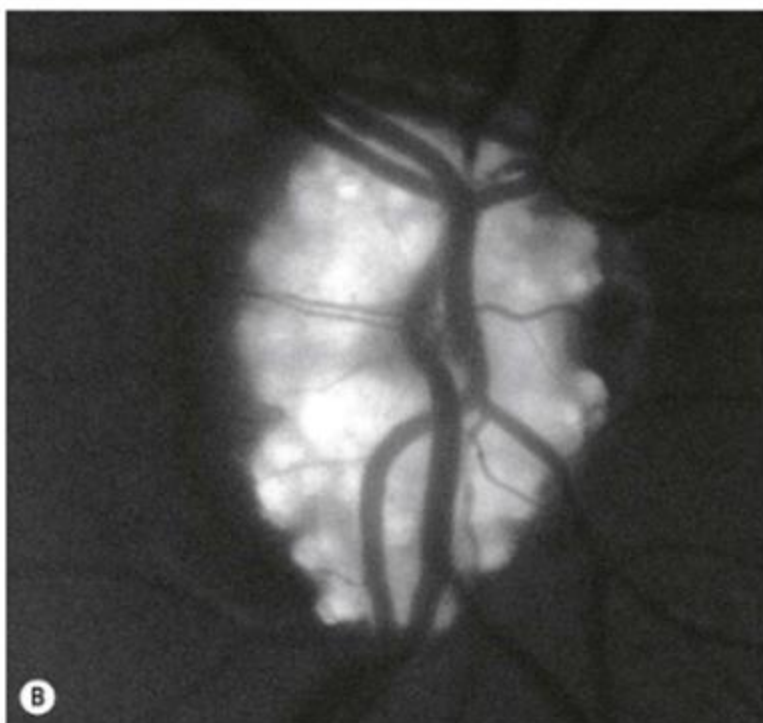
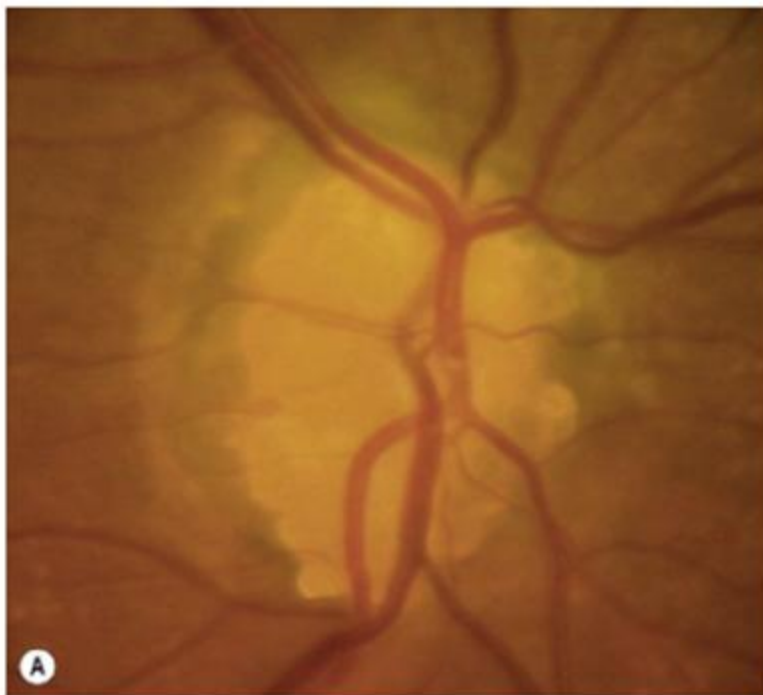


Reporting an FFA

- Red free photo
- Phase
- Hyper- and hypo-fluorescence
- Filling defects
- Distinctive features
- Change in area, intensity or fluorescence with time

Autofluorescence

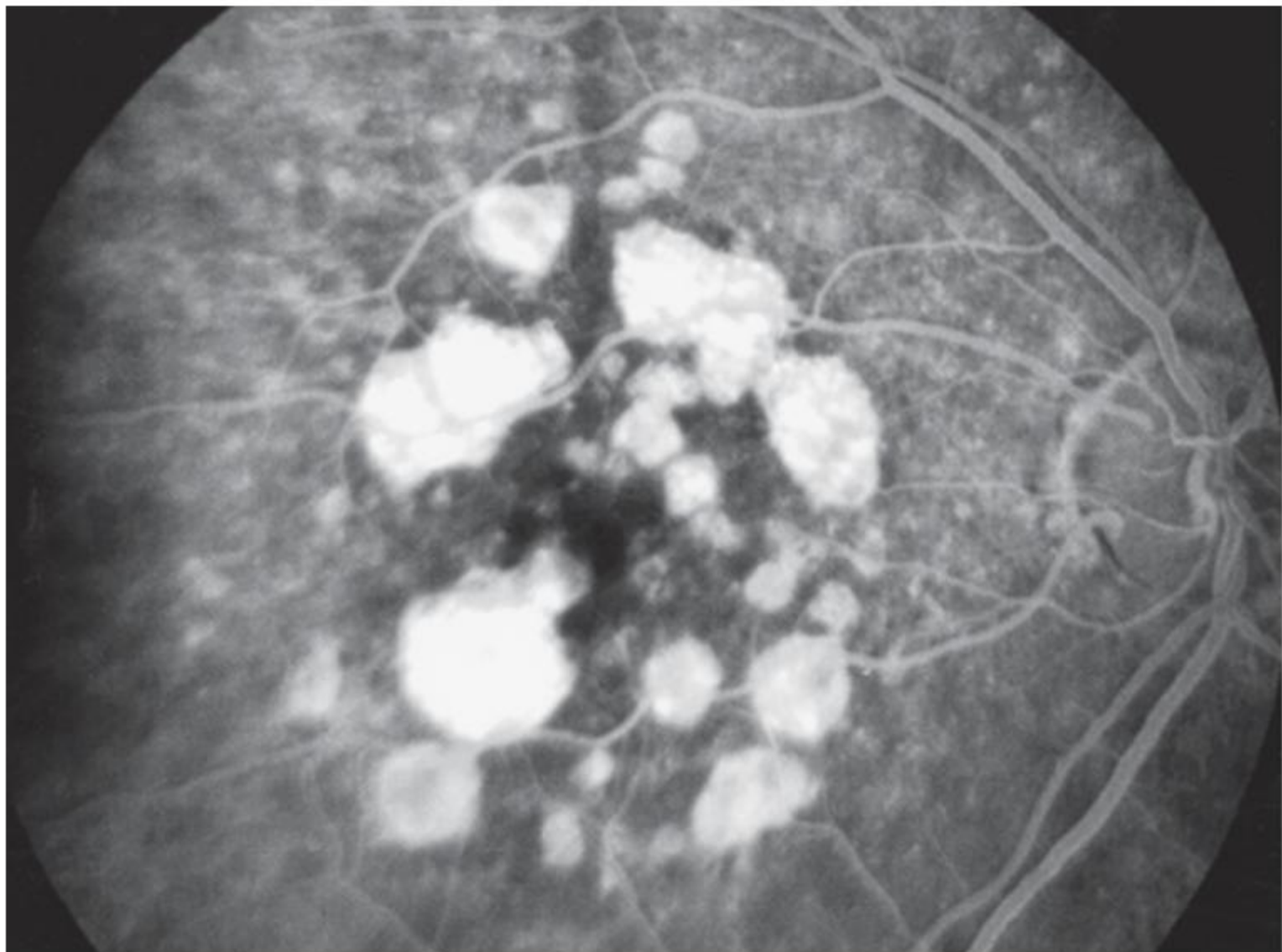


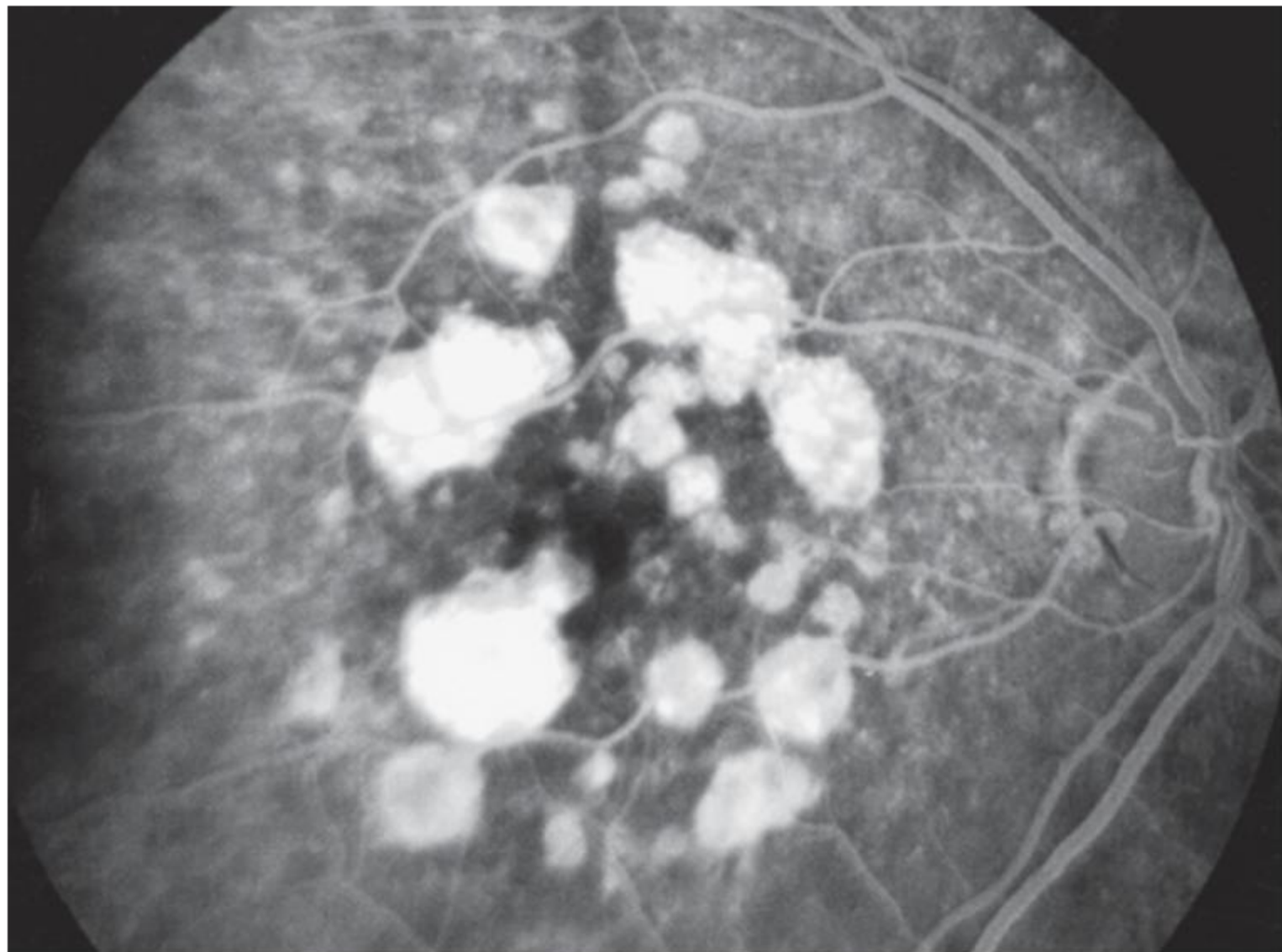


Red Free



Hyperfluorescence





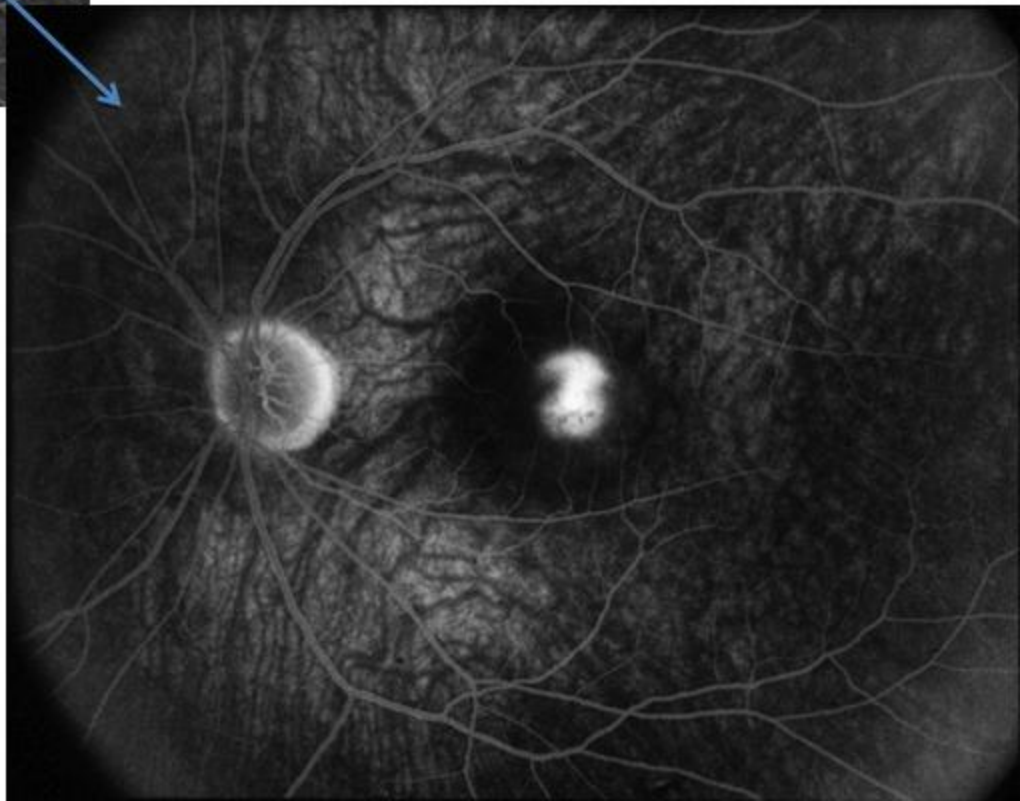
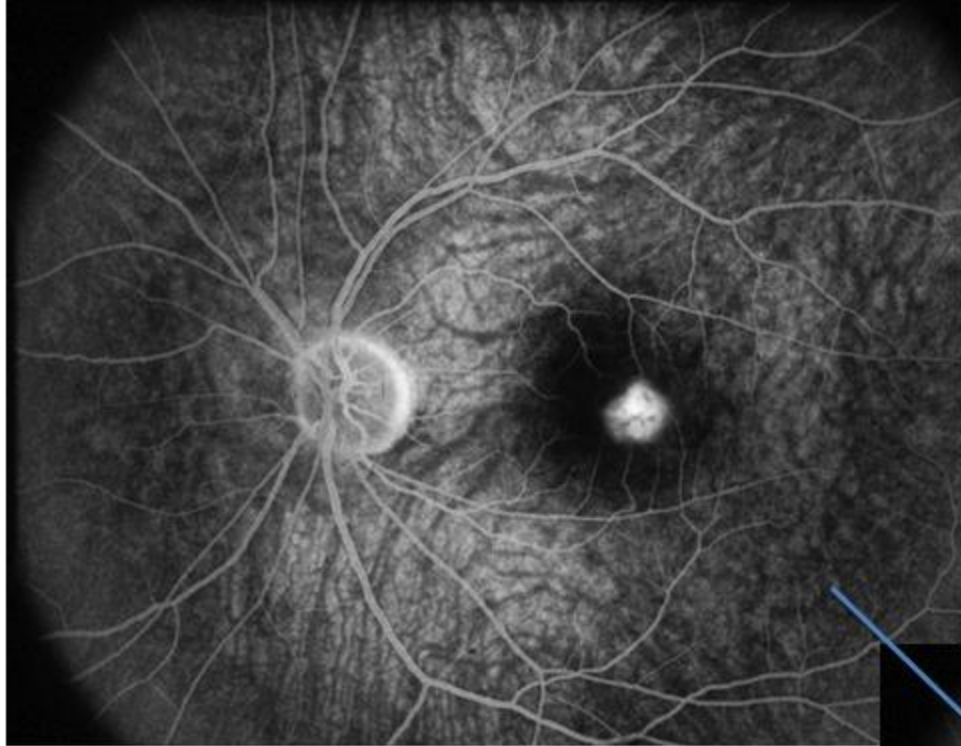
Atrophy/absence of RPE

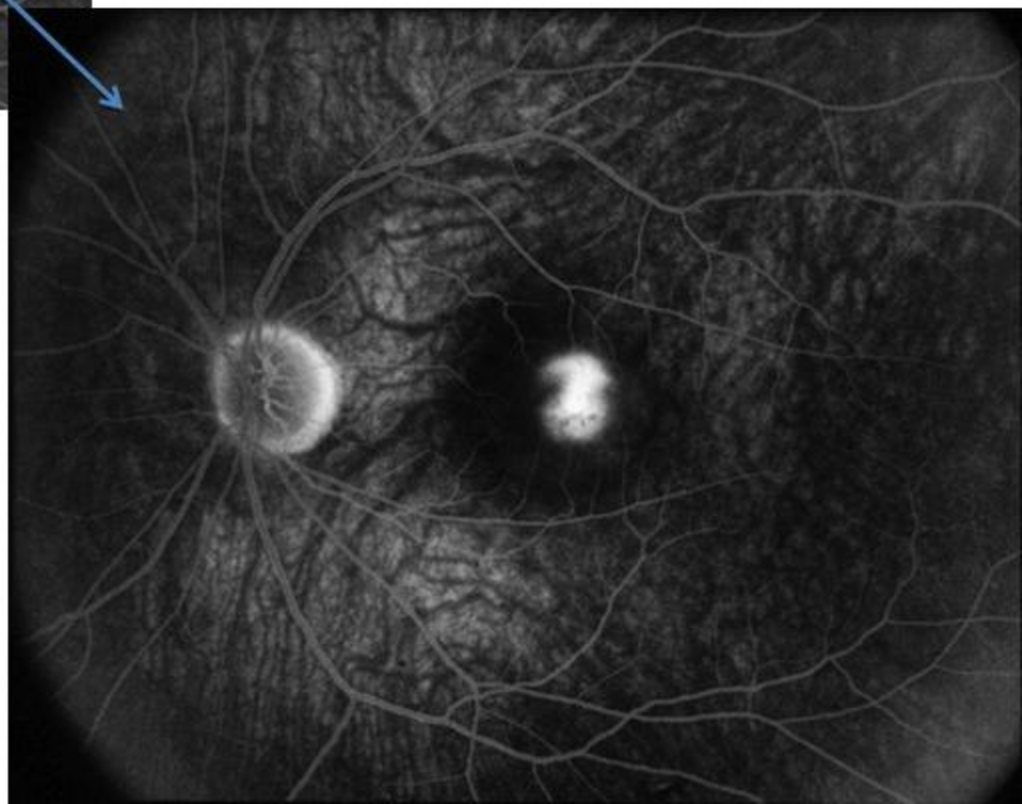
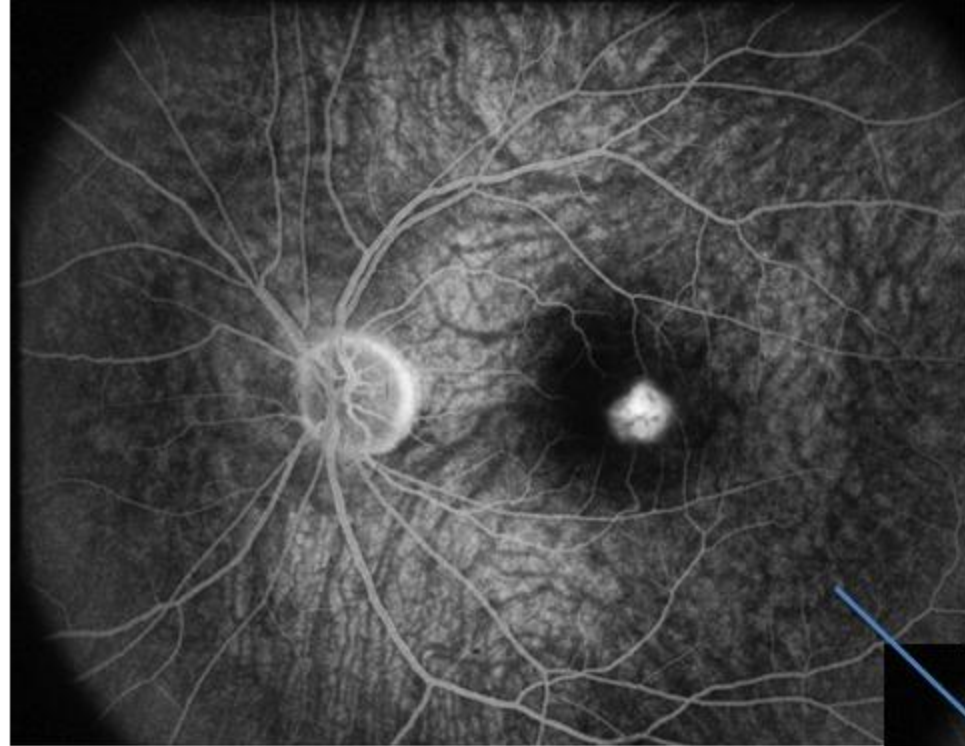
Atrophy/absence of RPE

- Atrophic AMD
- FTMH
- RPE tears

- Early hyper-fluorescence which then fades
- No change in size or shape

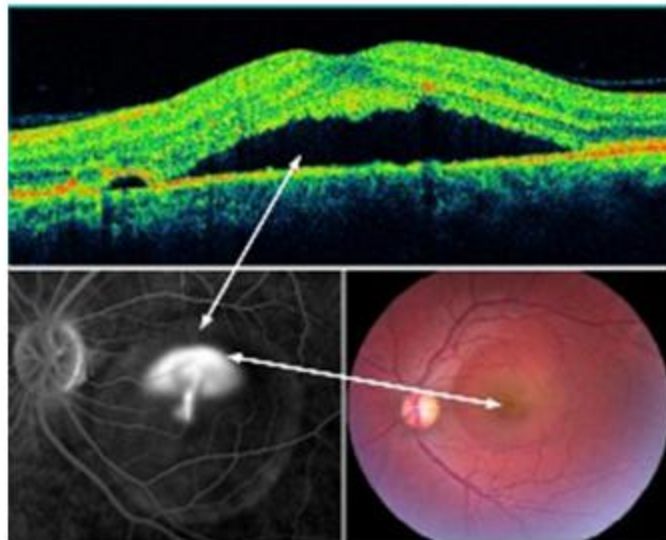
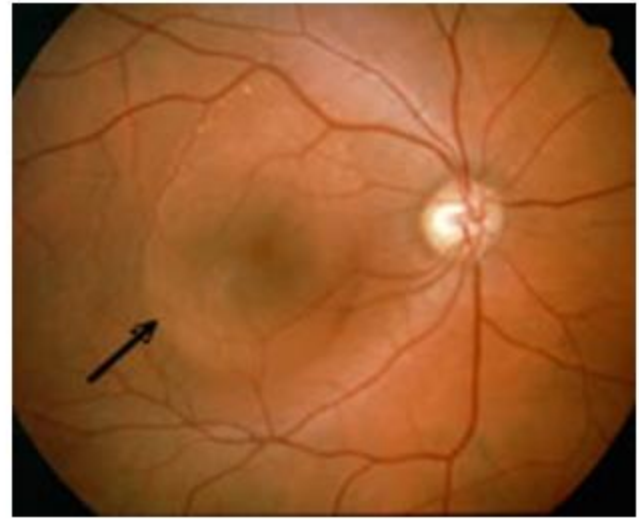






*Increase in size of area of
fluorescence*

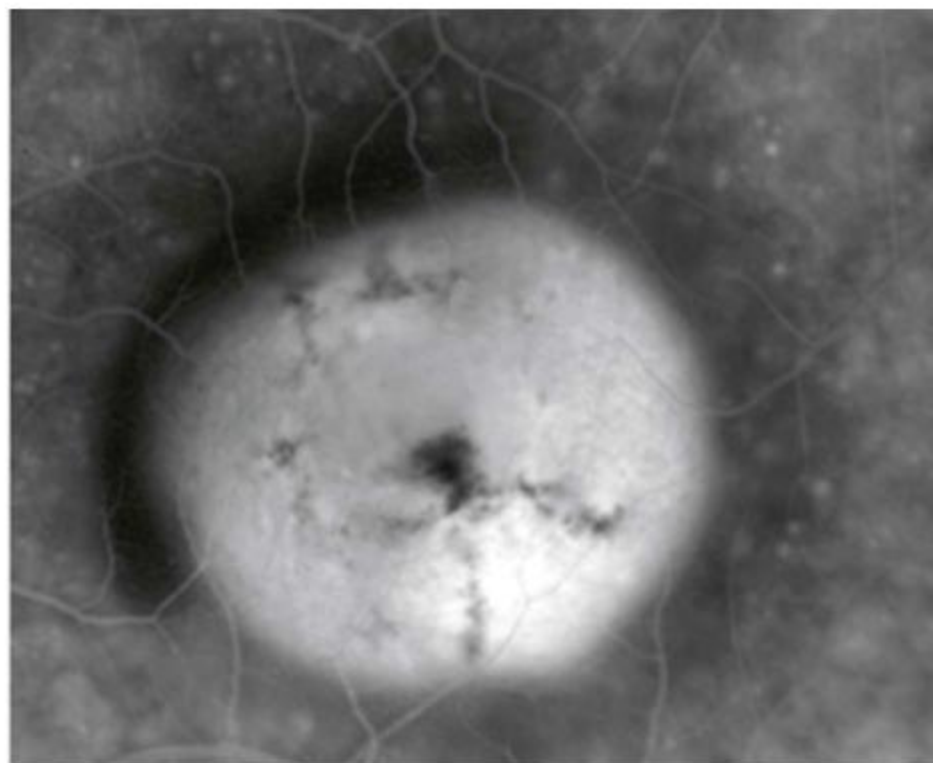
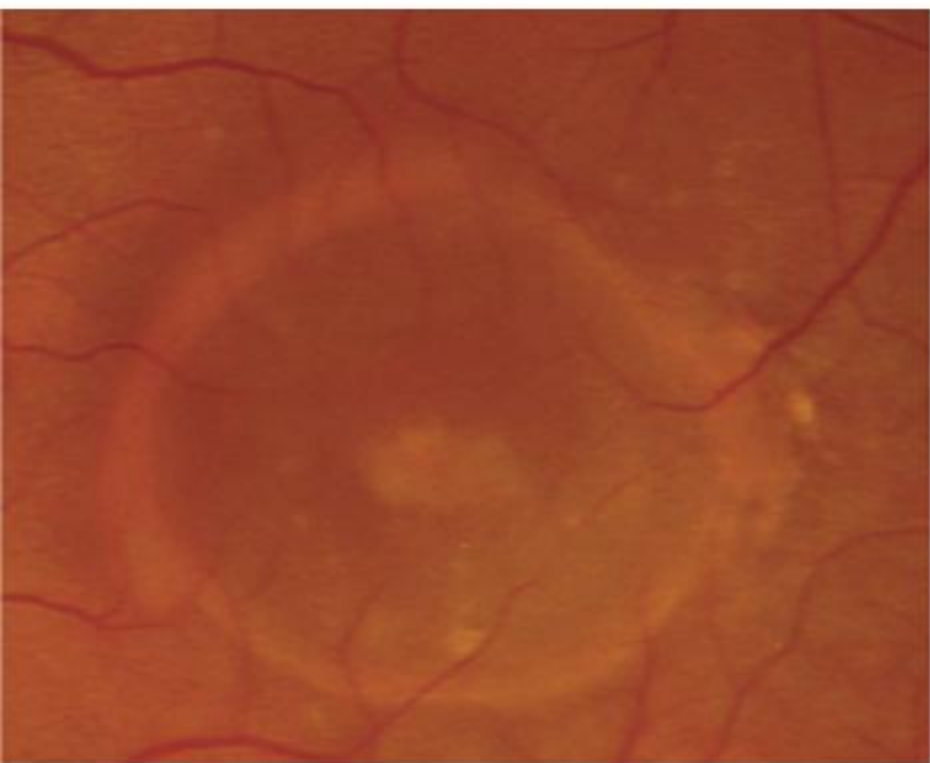
CSR



Sub-RPE Space

- Hyperfluorescence:
 - Increase in INTENSITY
 - Not in SIZE
 - Pooling of dye

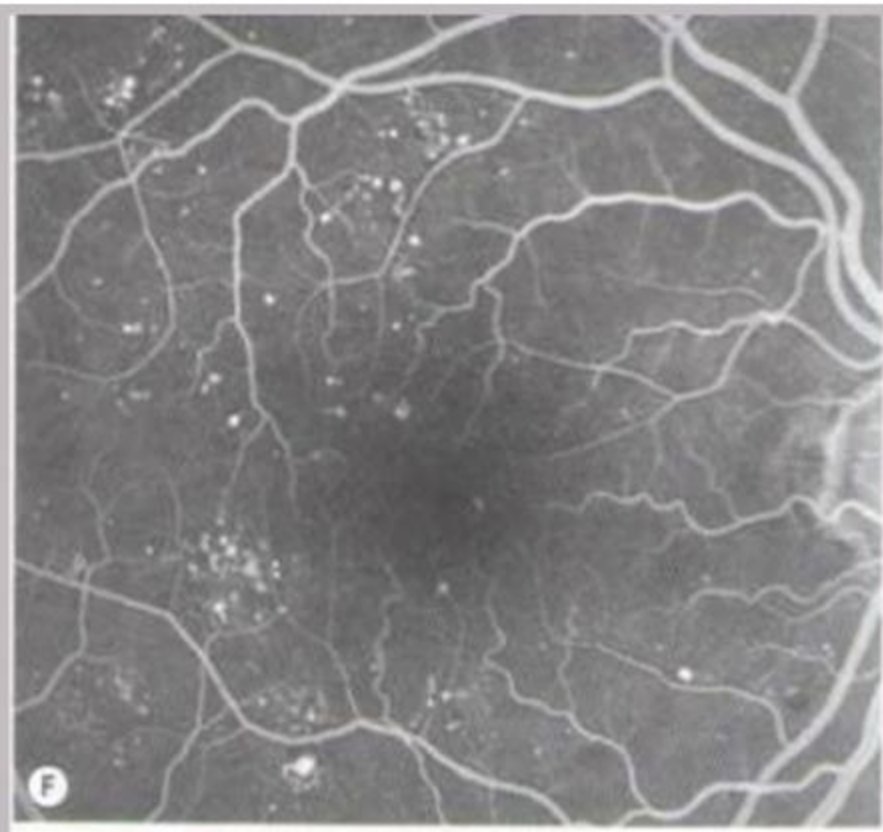




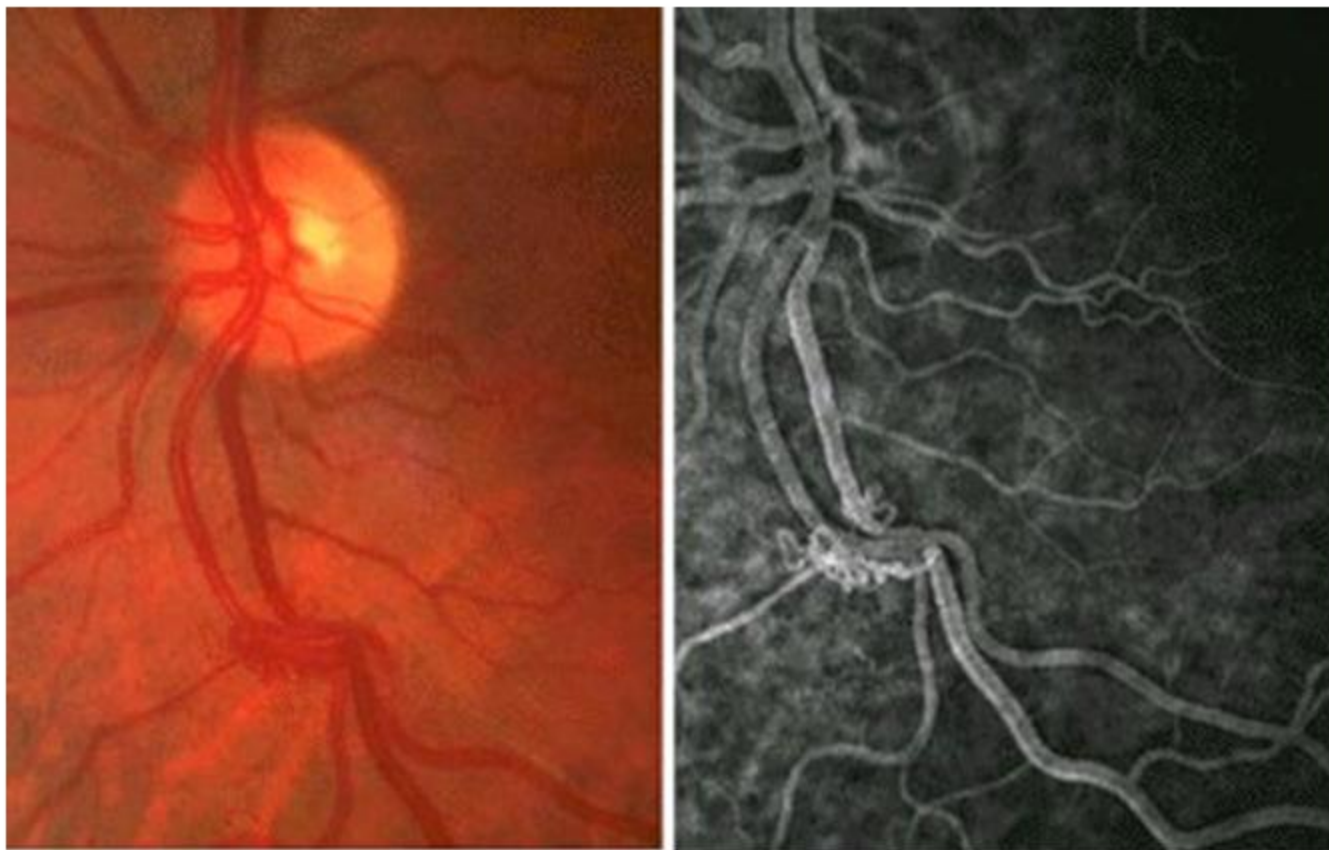
FFA in Diabetic Retinopathy

- Locating area of fluid leak
- Haemorrhages or microaneurysms?
- Exudative or ischaemic maculopathy?
- IRMA or New vessels?

Dots or microaneurysms?

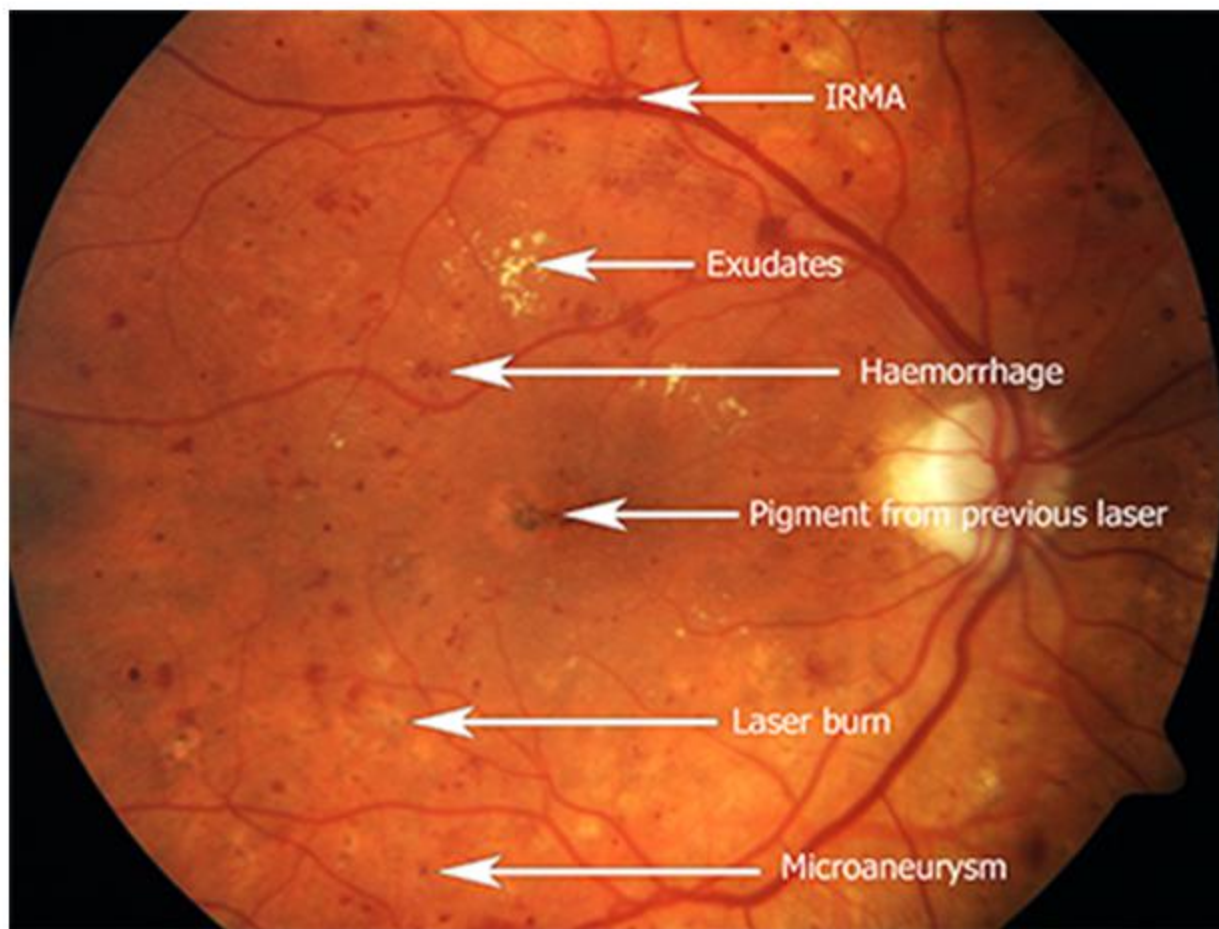


IRMA or NV?

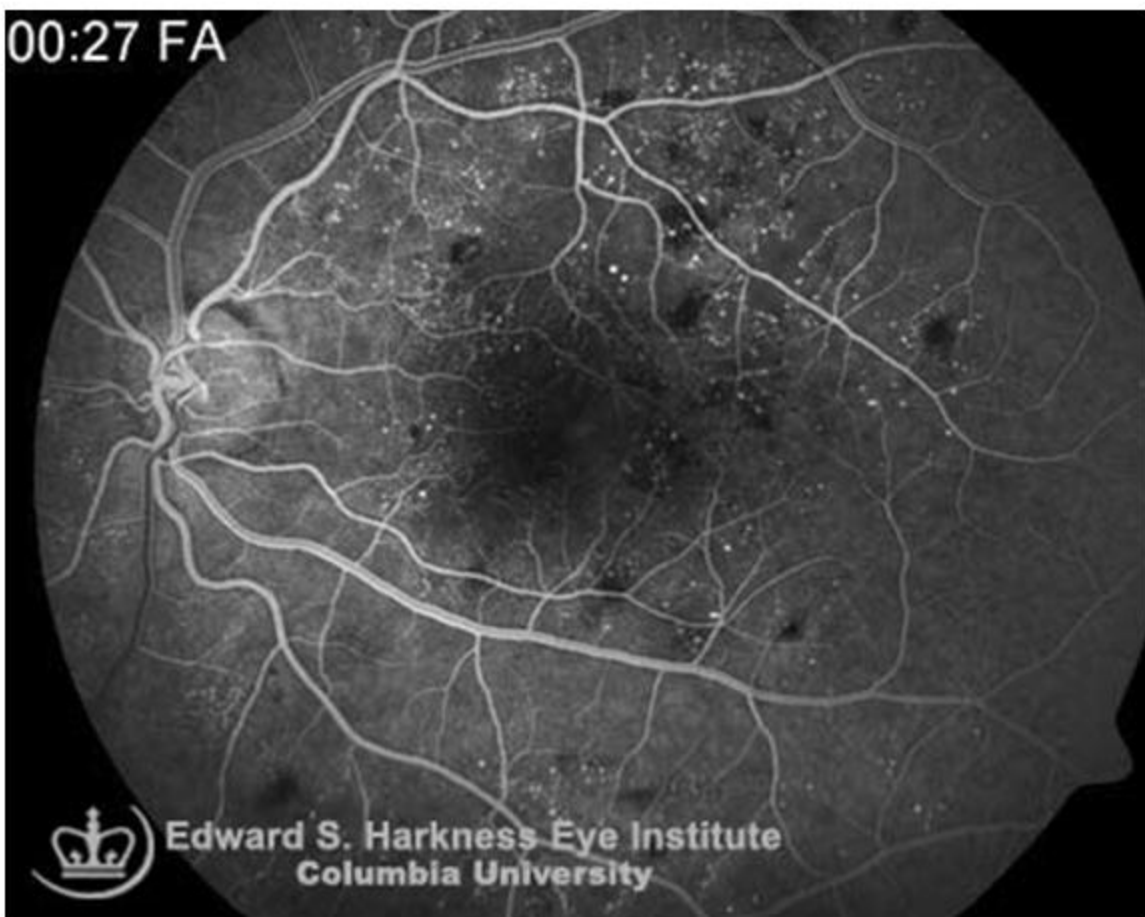


Cause of diabetic maculopathy?





00:27 FA



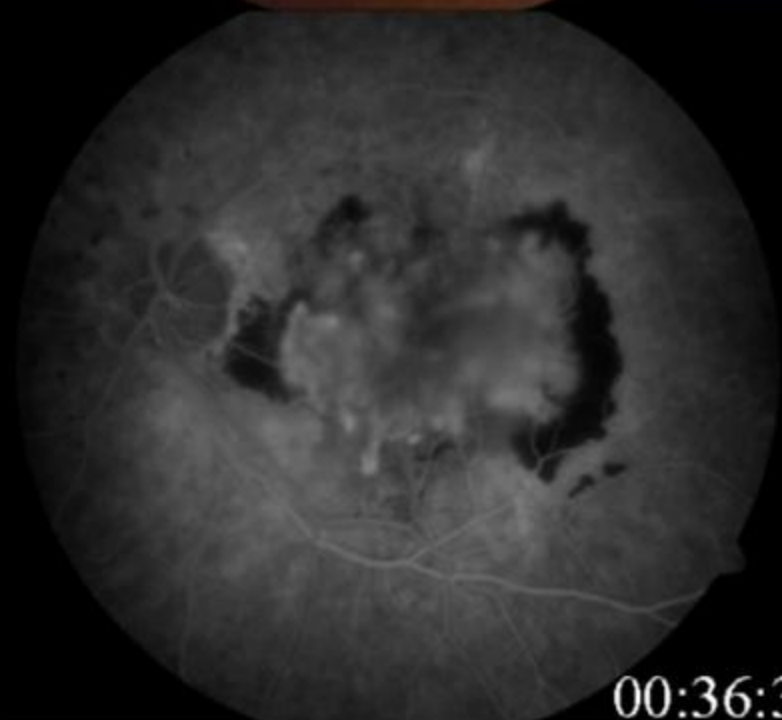
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Leakage

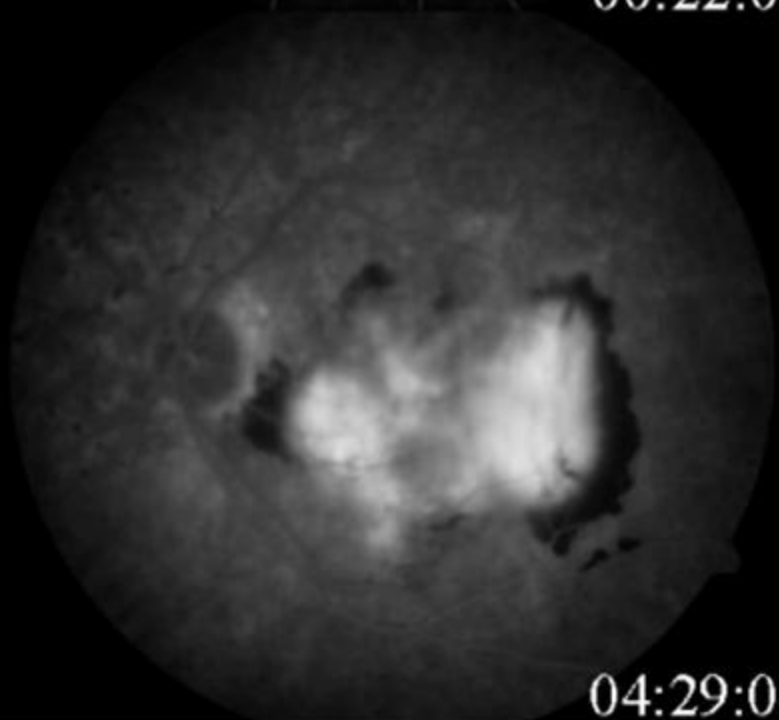
- Choroidal and retinal new vessels are structurally abnormal and do not have intact endothelial tight junctions.
- Fundal tumours such as choroidal malignant melanoma, have their own blood supply which may leak.



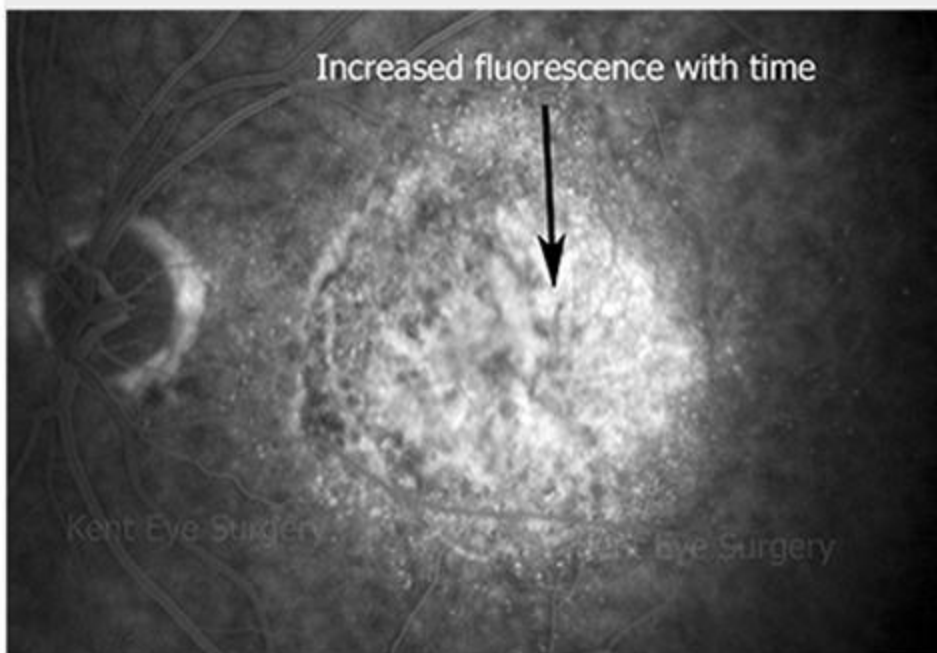
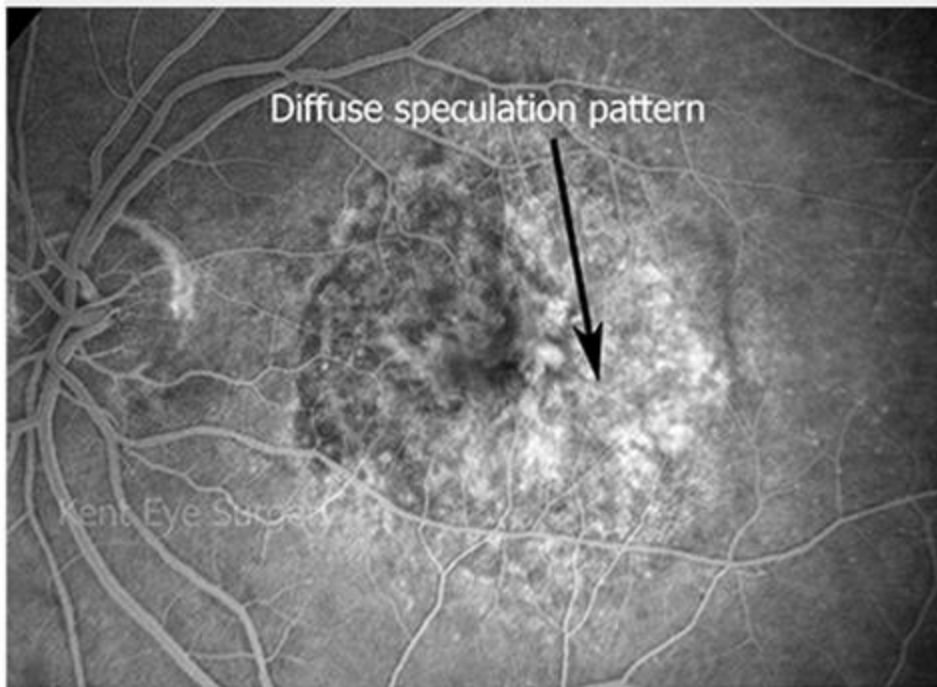
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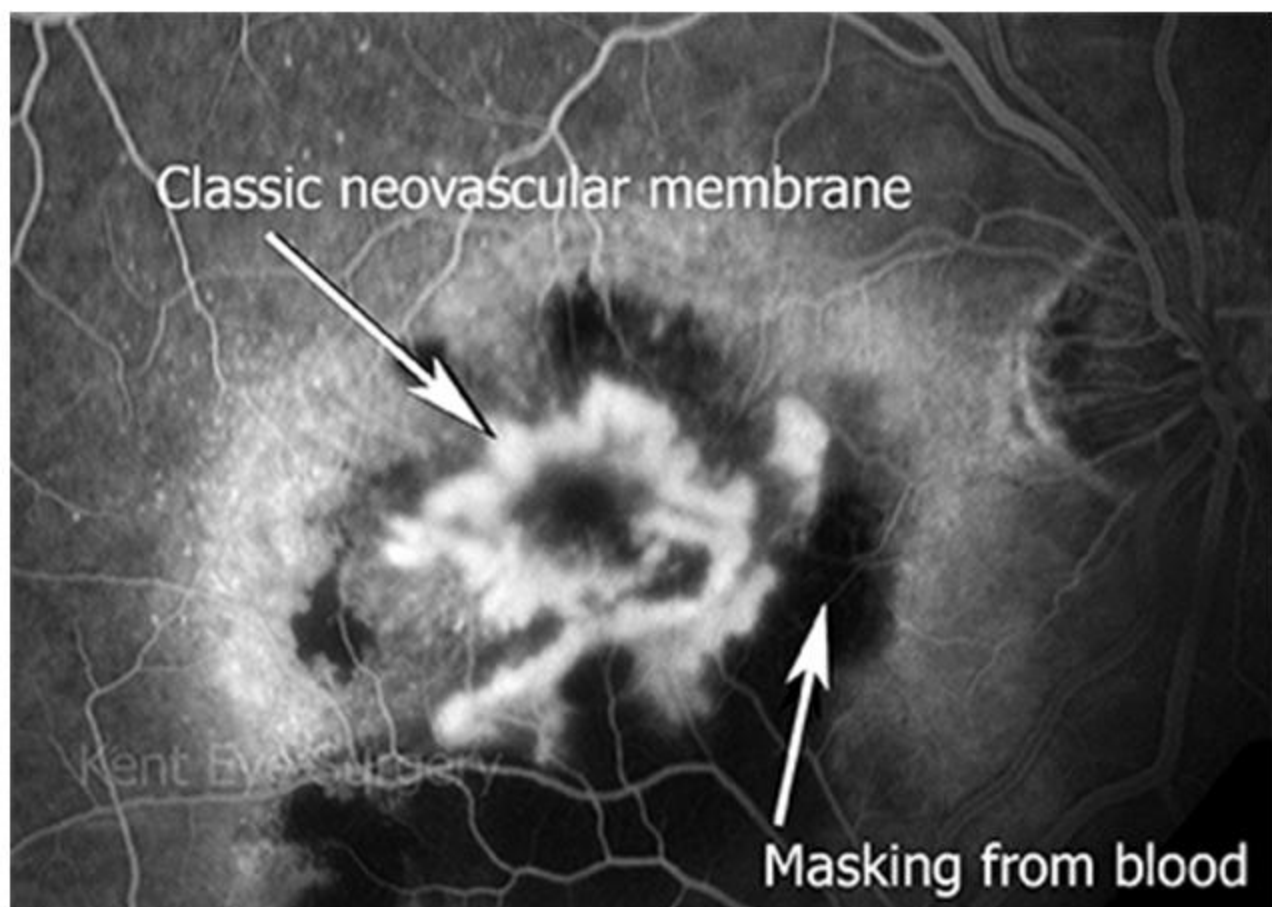


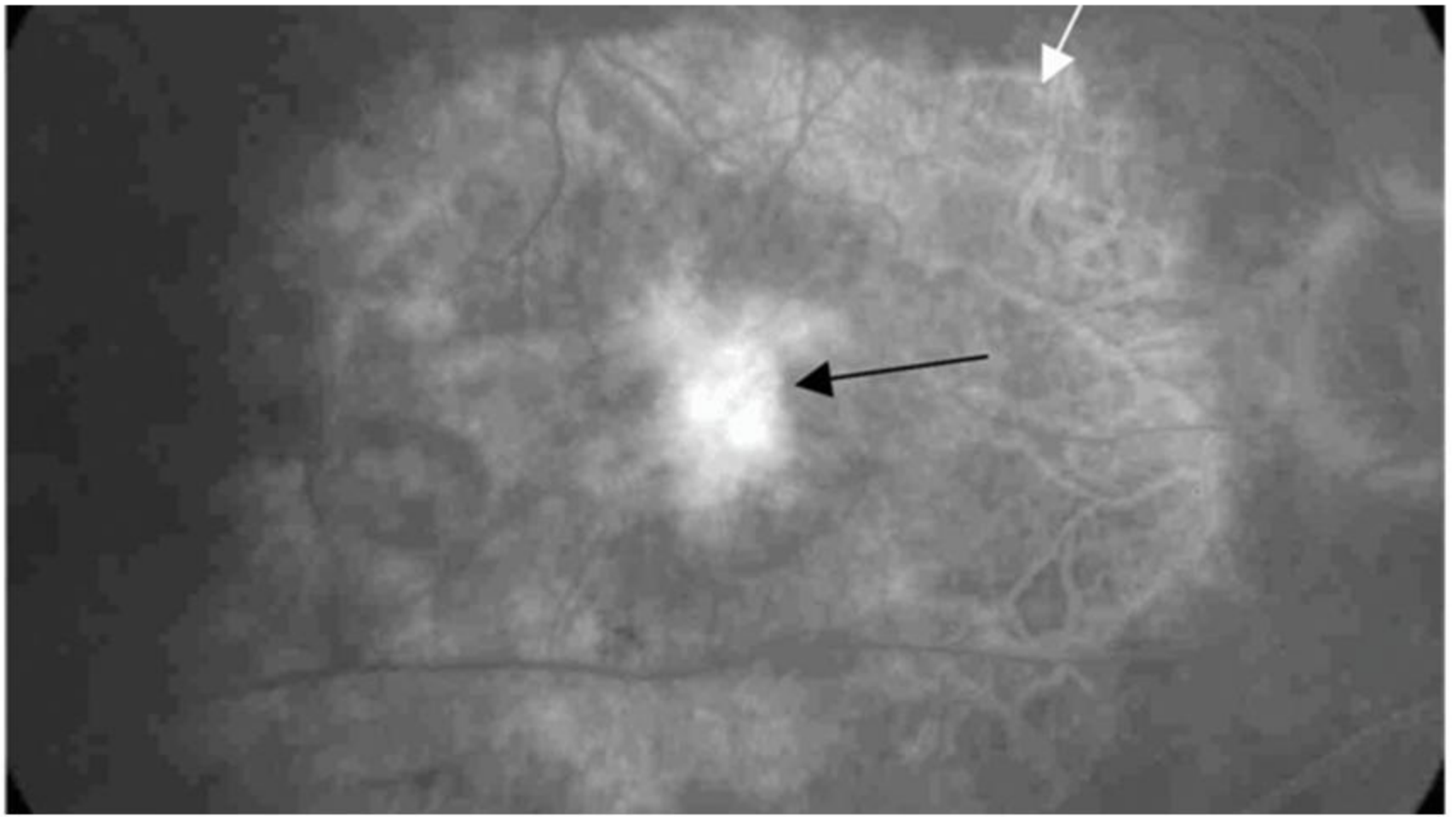
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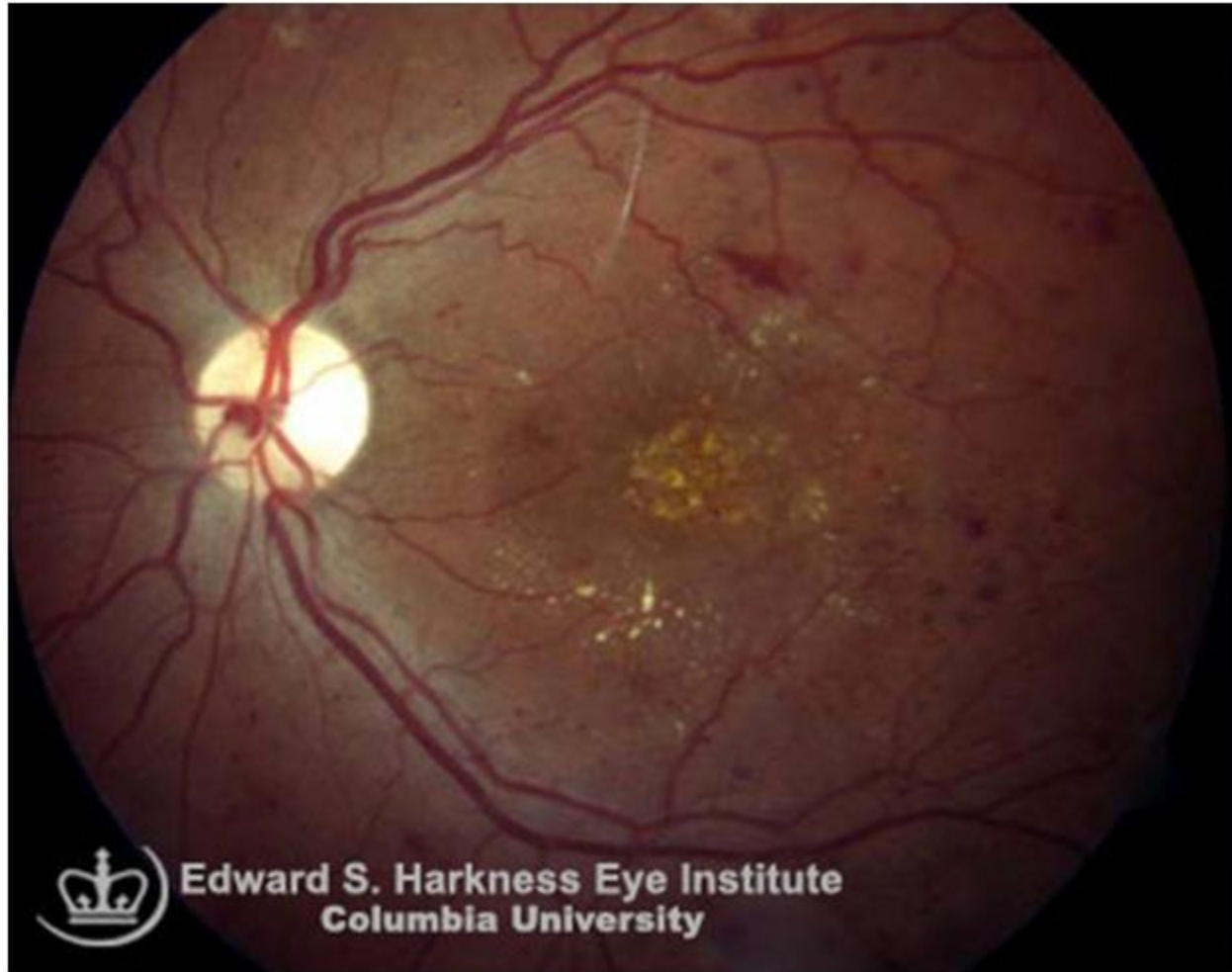
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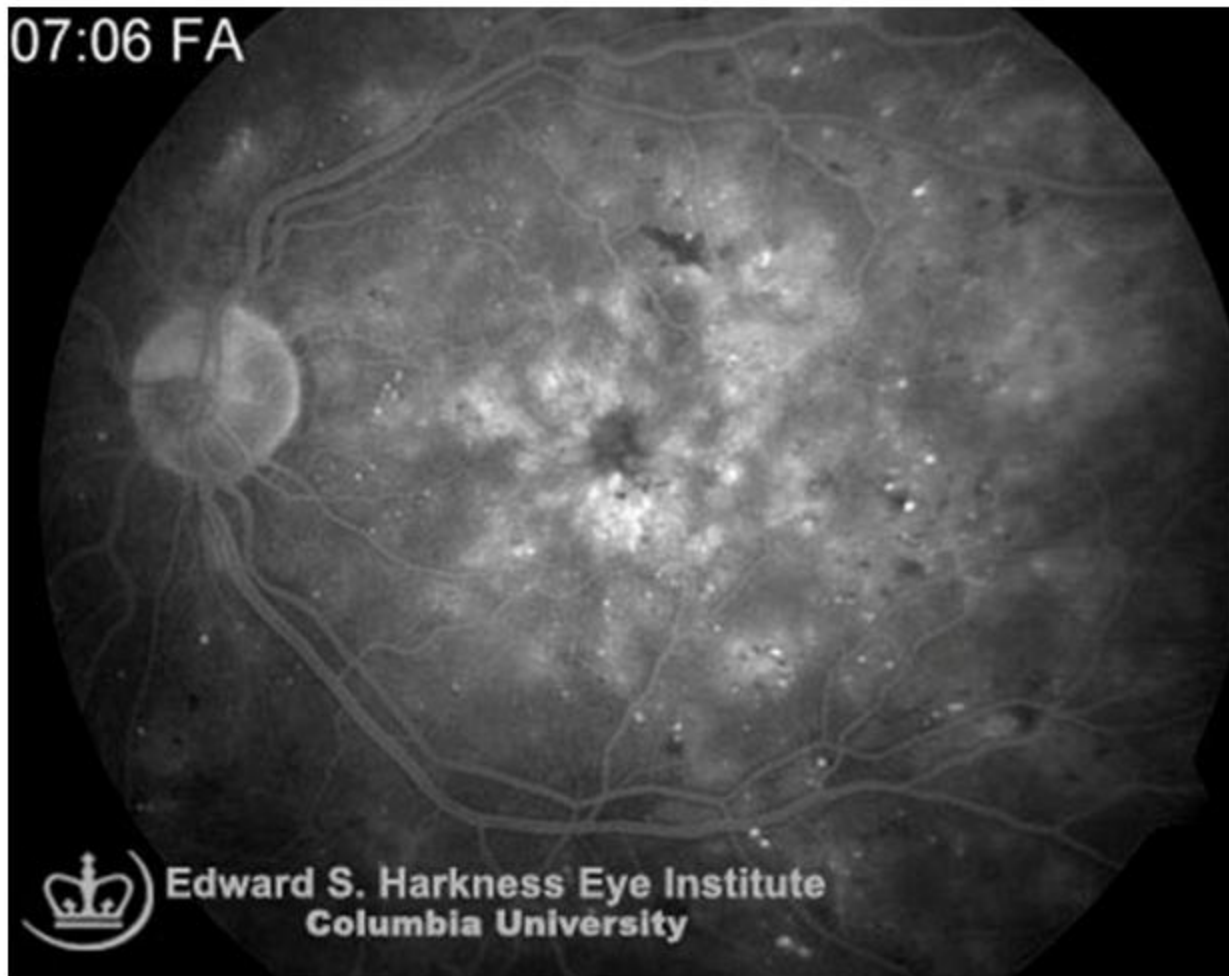




Macular oedema?

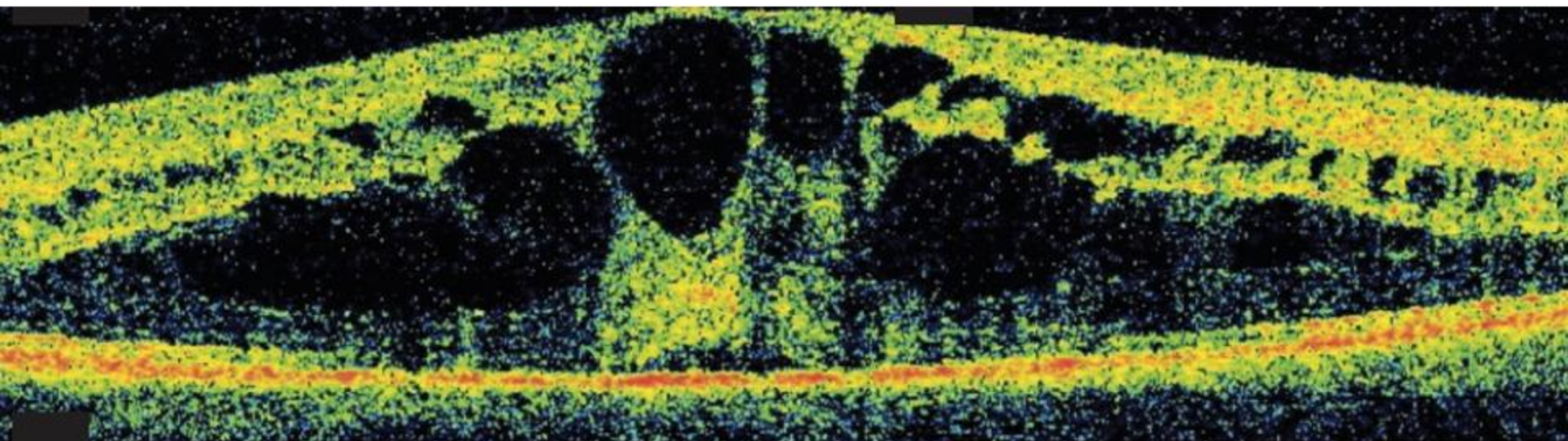


07:06 FA



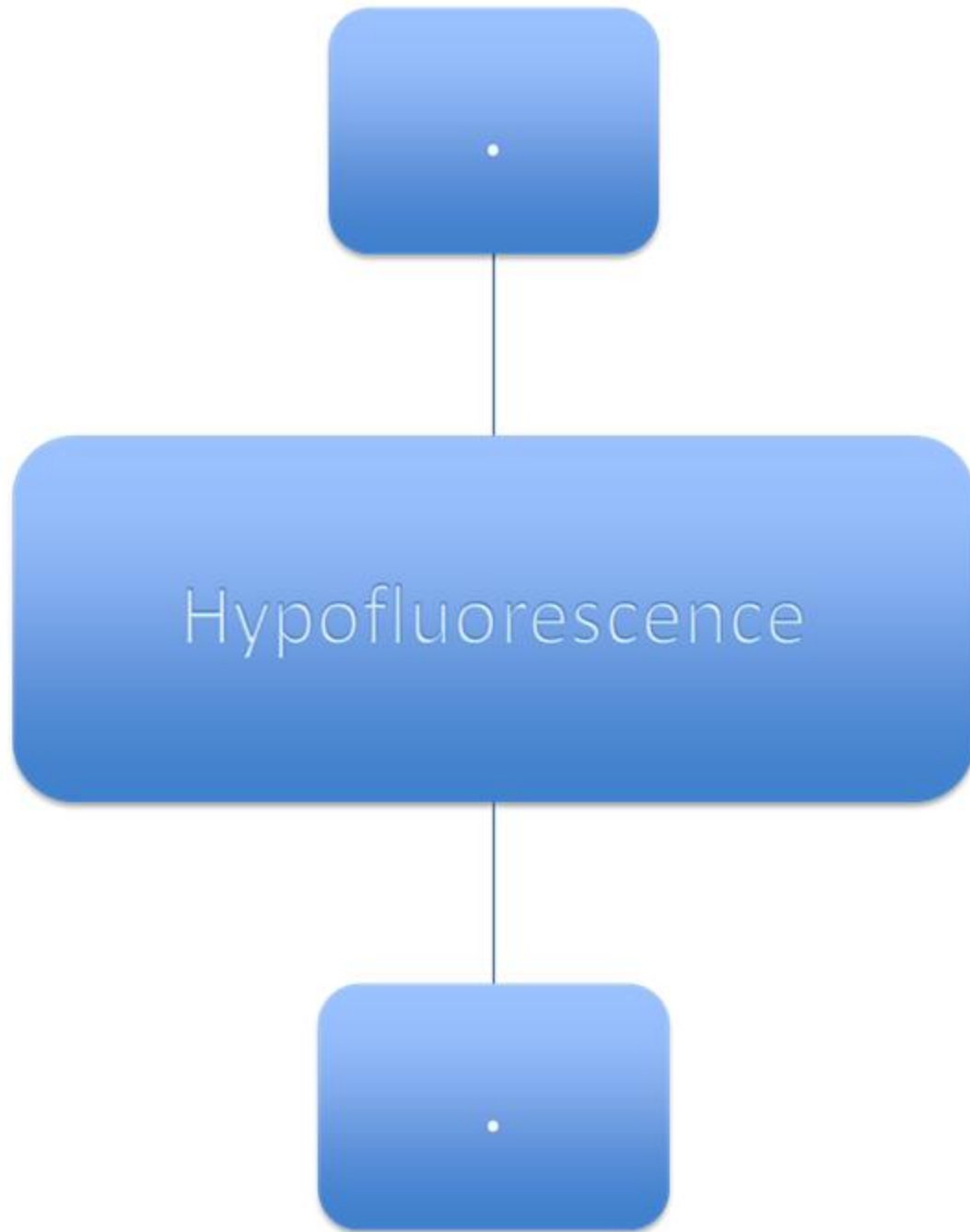
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Hyperfluorescence

- Window defect (RPE defect)
- Leakage of dye (SRNVM and new retinal vessels)
- Pooling of dye (RPE detachment)
- Staining of dye (damaged blood vessels; drusens)



Masking

Hypofluorescence

Filling
defect

Hypofluorescence

- Pre-retinal opaque structures superficial to the retinal circulation will mask BOTH the retina and choroidal circulation

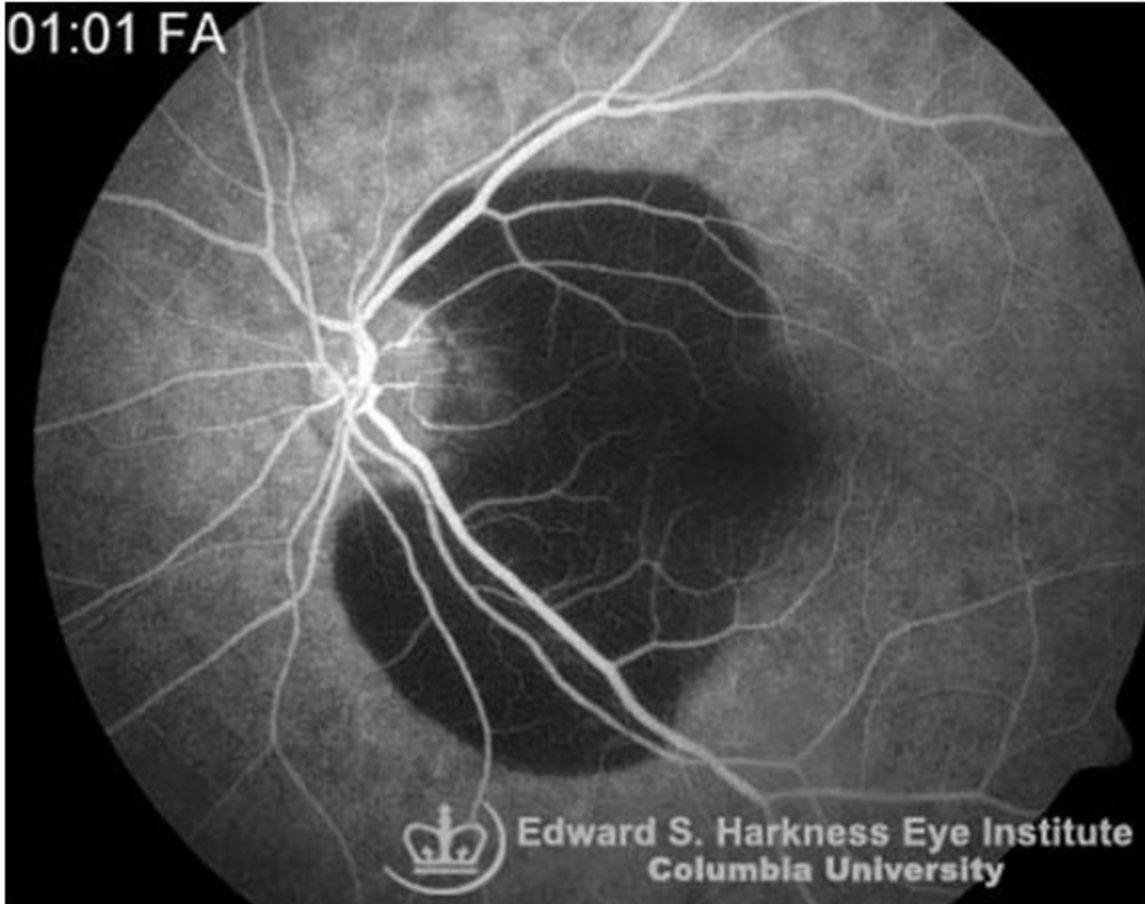


02:07 FA



- Pre-choroidal opaque structures deep to the retinal circulation but superficial to the choroidal circulation will mask only the choroidal circulation

01:01 FA



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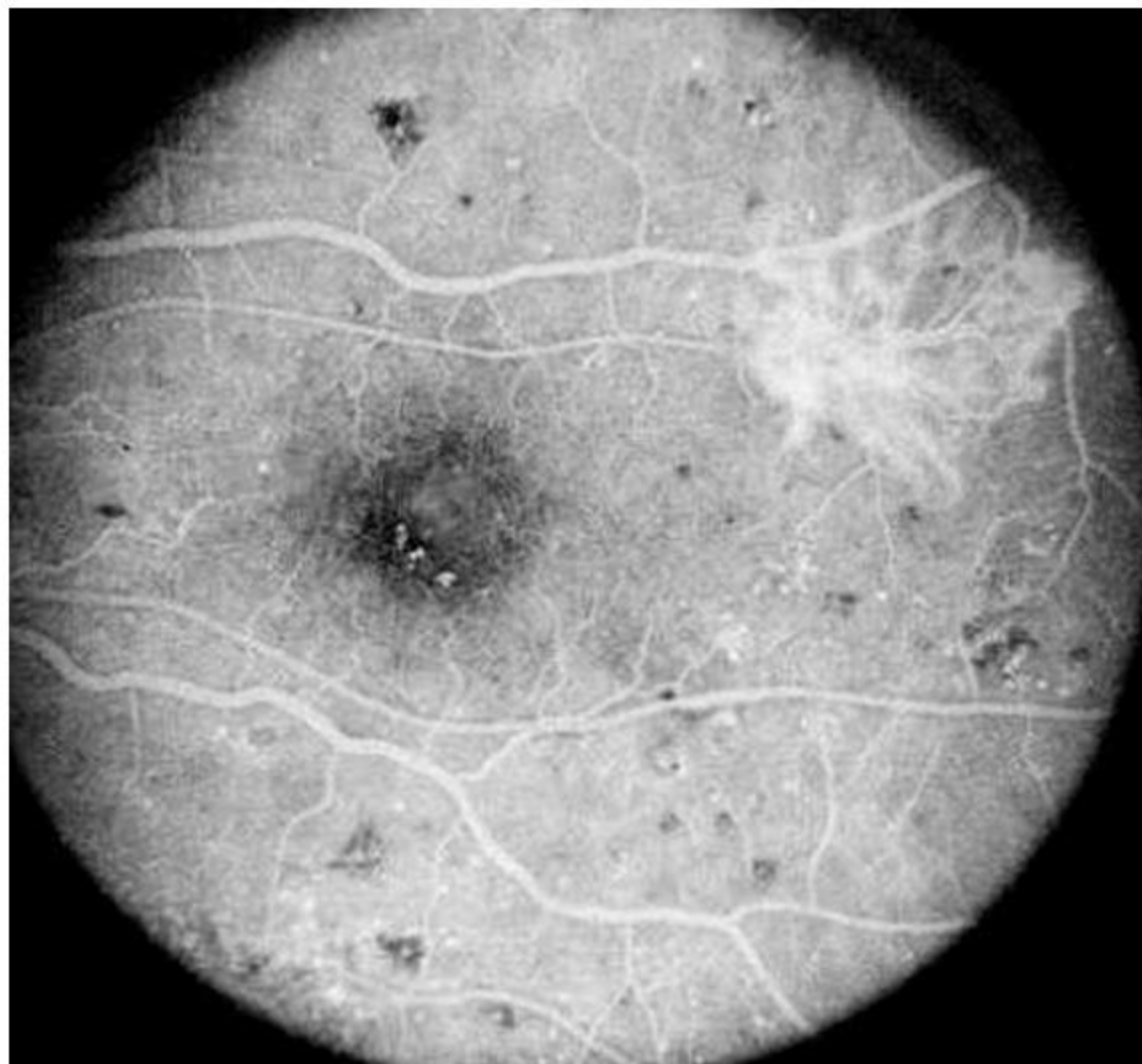


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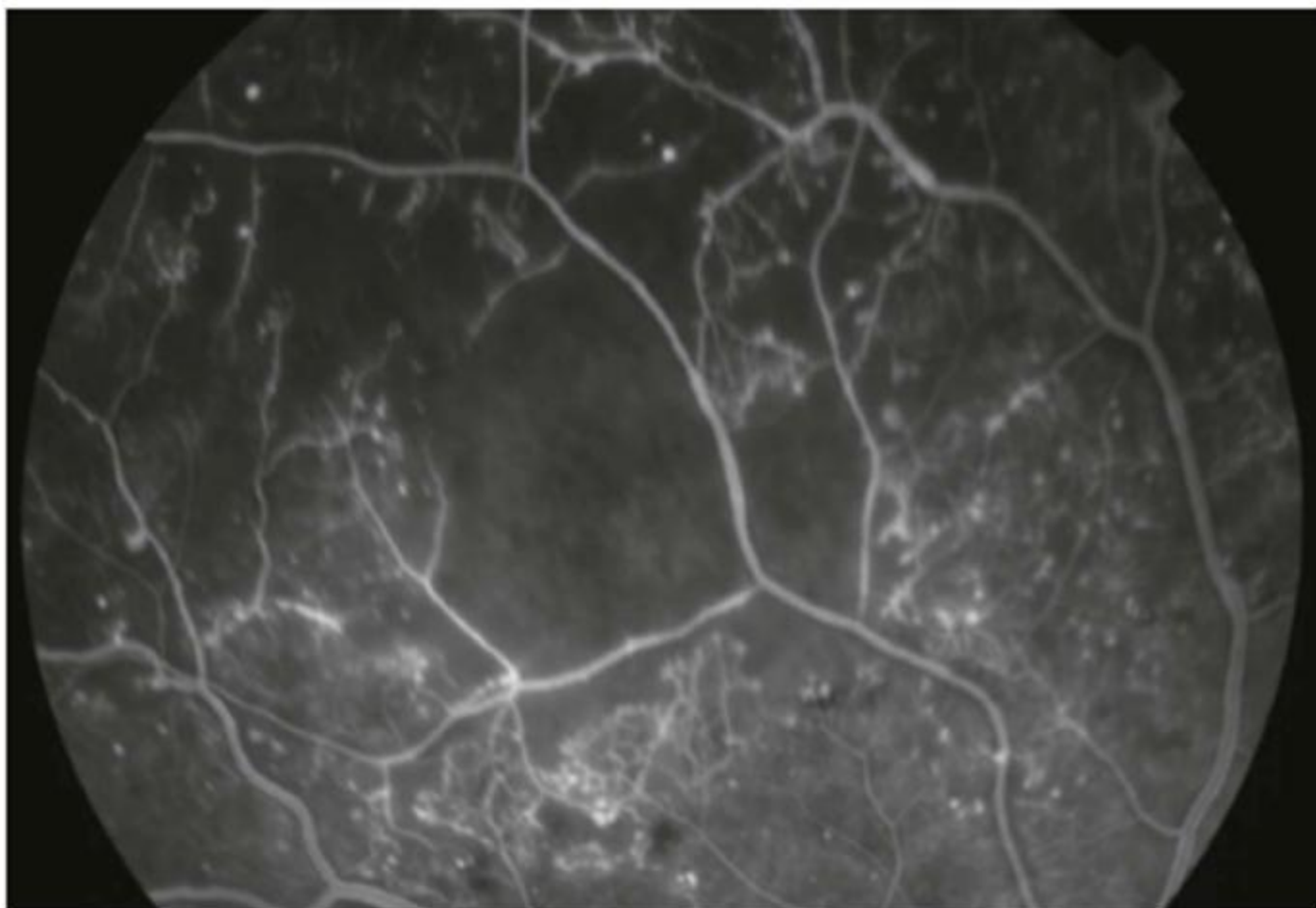


Reduced Transmission

- Retinal haemorrhages
- Subretinal blood from choroidal new vessels
- Exudates
- Cotton wool spots
- Melanin- in hyperpigmented areas of RPE
- Choroidal naevus
- Xanthophyll pigment - in the area of the macula



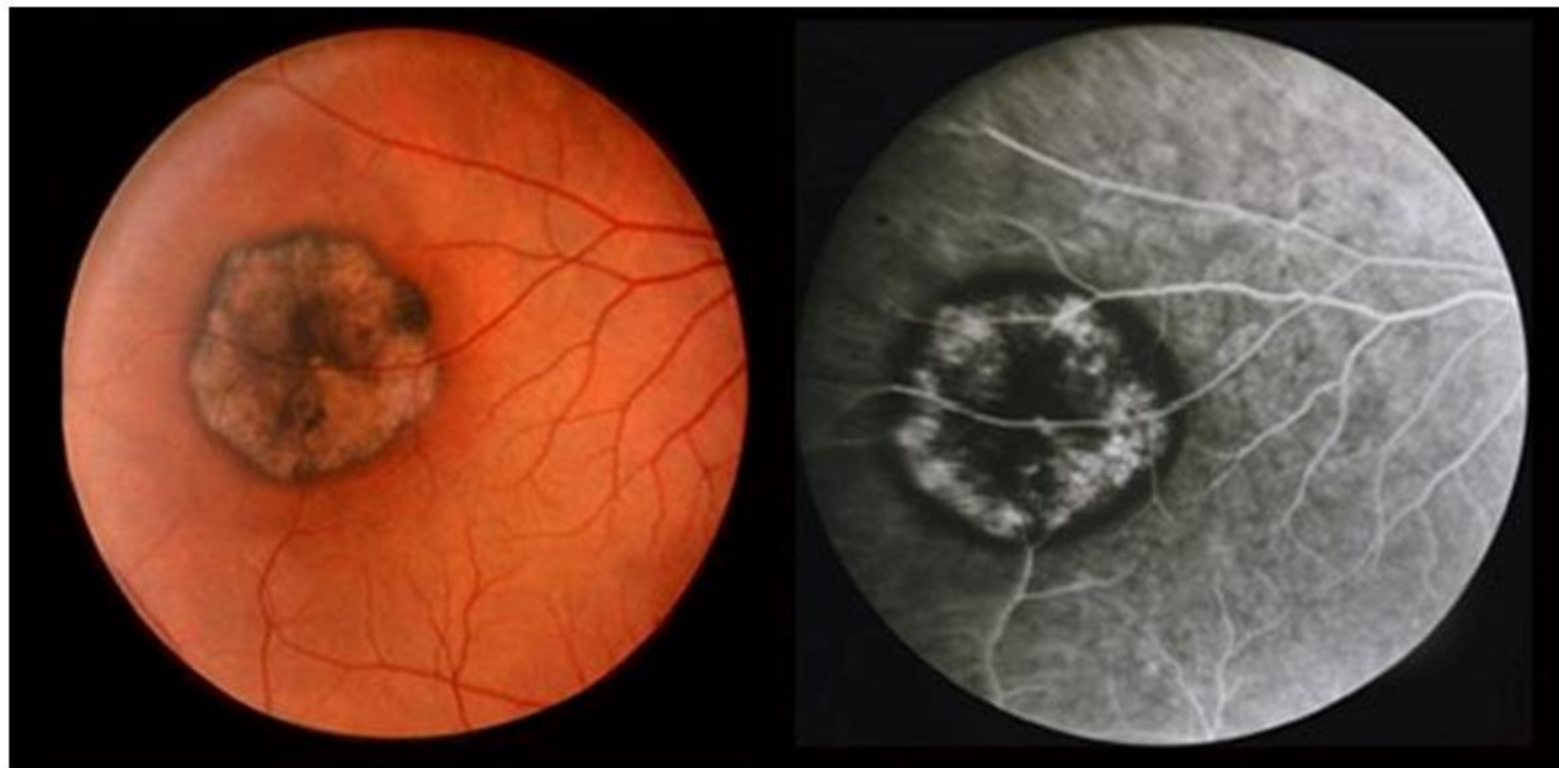
Filling defects

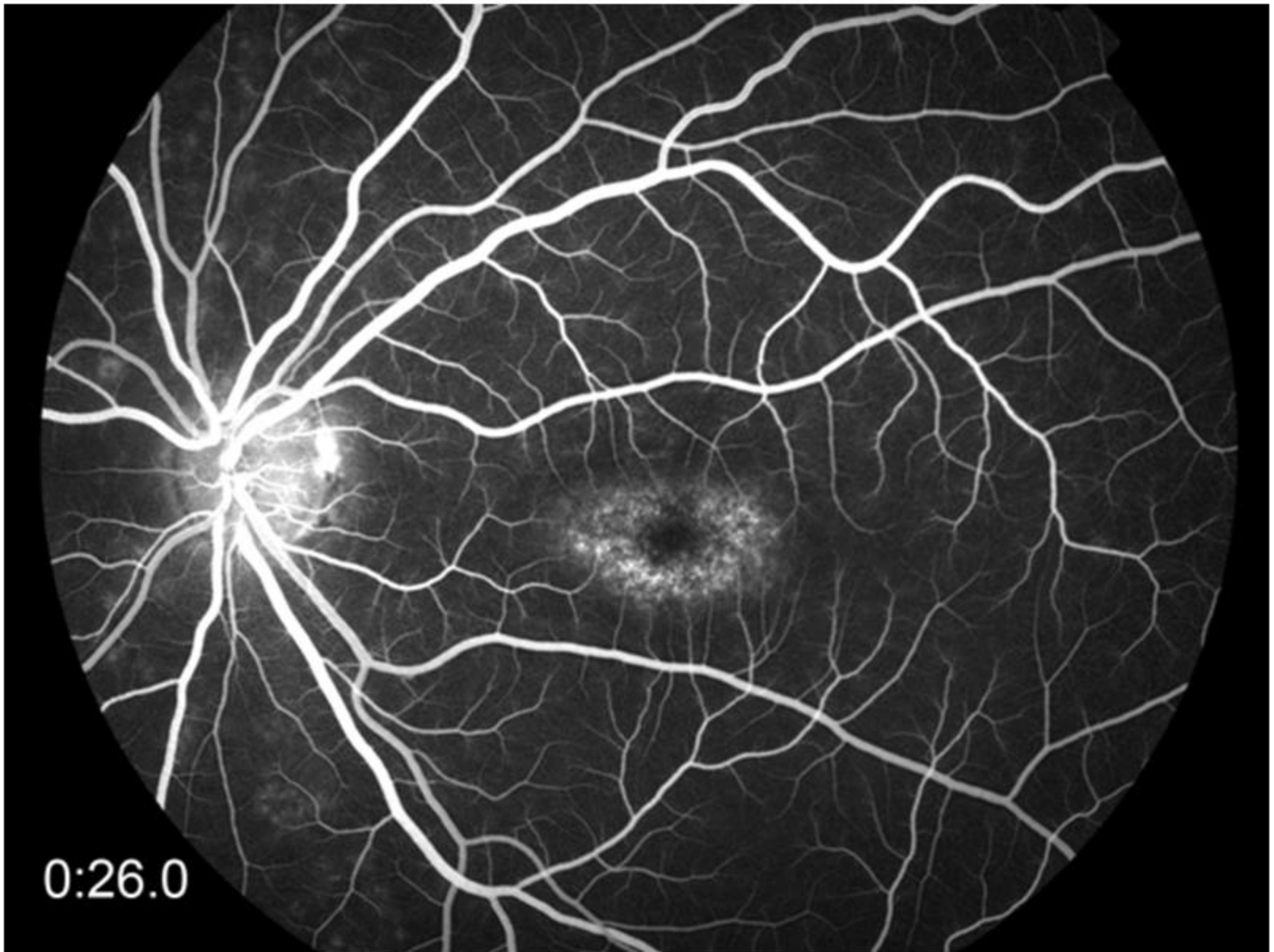


Capillary drop out

- Blockage may be caused by the accumulation of pigment, naevi, exudate or abnormal material (eg, the yellow flecks in patient with Stargardt's disease)

Diagnosis?





0:26.0