

Diabetic Retinopathy Screening and referral

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Health Screening

- ▶ OED:
- ▶ “Protect (someone) from something dangerous or unpleasant”
- ▶ Medical Dictionary
- ▶ “The examination of a large sample of a population to detect a specific disease or disorder”



Diabetic eye screening?

NHS Choices

- ▶ *“Screening is a way of detecting the condition early before you notice any changes to your vision”*
- ▶ *“If retinopathy is detected early enough, treatment can stop it getting worse. Otherwise, by the time symptoms become noticeable, it can be much more difficult to treat”*
- ▶ Leading cause of blindness in working age population
- ▶ Already not the case
 - ▶ Liew, Michaelides, Bunce BMJ Open 12 February 2014



Screening Process

- ▶ VA
- ▶ Dilation
- ▶ Image capture
 - ▶ Two retinal images of each eye
 - ▶ Macular centred
 - ▶ Disc centred
 - ▶ Other images as appropriate
- ▶ Processing by software for grading
 - ▶ Priority
- ▶ Communication of results
- ▶ Referral for treatment?



Grading process

- ▶ **First Grade**
 - ▶ Urgent (R3) cases by-pass second grade
- ▶ **Second Grade**
 1. R1/R2/M1
 2. QA: 10% of R0
- ▶ **Arbitration grade**
 - ▶ Where first 2 grades disagree
- ▶ **Referral Outcome grade**
 - ▶ Referable retinopathy (R3/R2/M1)
 - ▶ Refer
 - ▶ Digital Surveillance
 - ▶ Annual recall



Screening Criteria

▶ Retinopathy

- ▶ R0
- ▶ R1
- ▶ R2
- ▶ R3A (active)
- ▶ R3S (stable)

▶ Maculopathy

- ▶ M0
- ▶ M1

▶ Photocoagulation

- ▶ P0
- ▶ P1



R0 (No Retinopathy)

- ▶ No lesions seen at all
- ▶ Over 72% of those screened last year
- ▶ Low risk of short-term progression to STDR
- ▶ Screening intervals to be extended

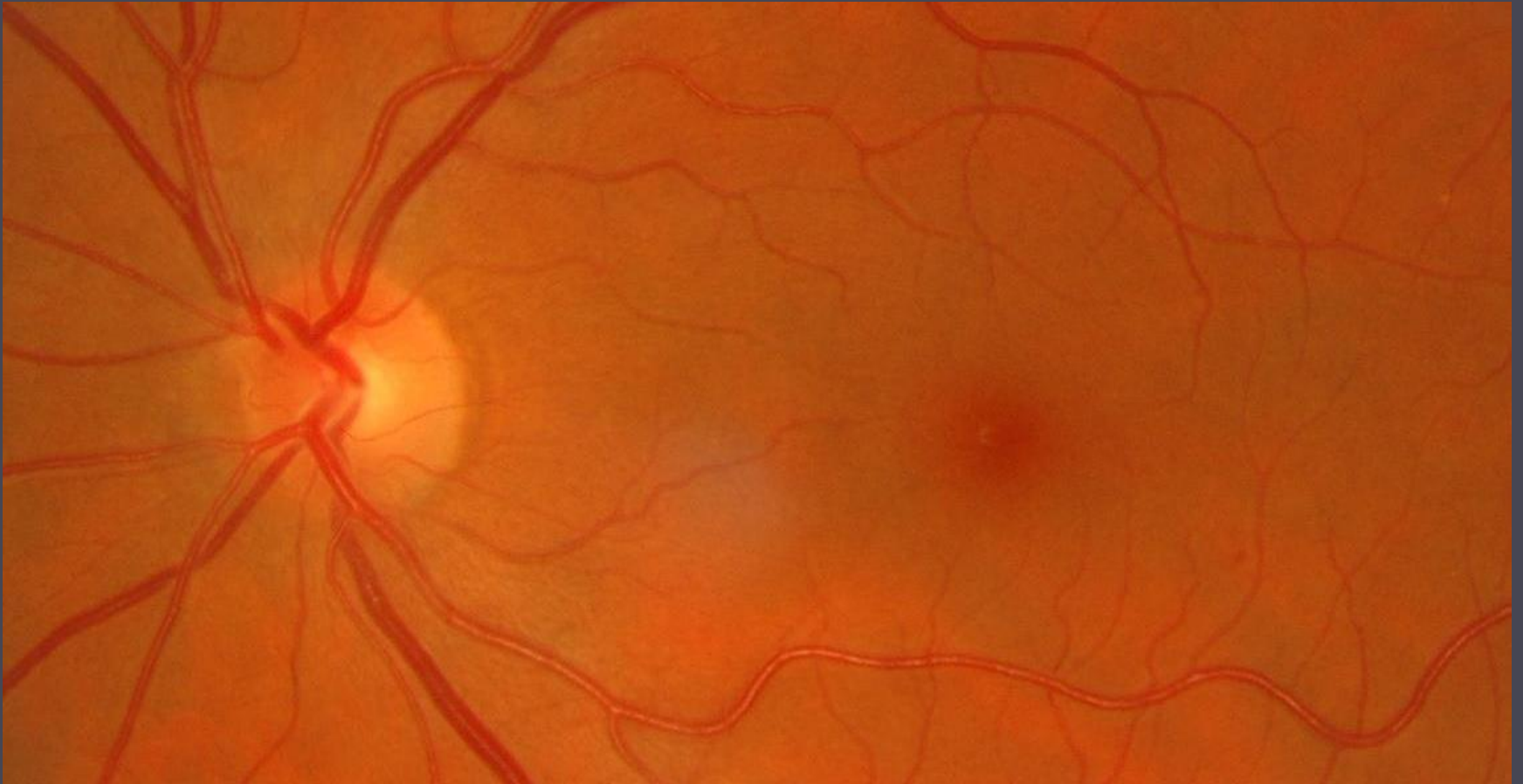


R1 (Background DR)

- ▶ Around 21%
- ▶ Microaneurysms
- ▶ Dot haemorrhages
- ▶ Small number of blot haemorrhages
- ▶ Exudation
 - ▶ >1 Disc Diameter from fovea/Small patch
- ▶ Venous loops
- ▶ Cotton-wool spots
 - ▶ Only if associated with DR
 - ▶ Not recorded, but noted if no other DR
 - ▶ January/Autumn: impaired control

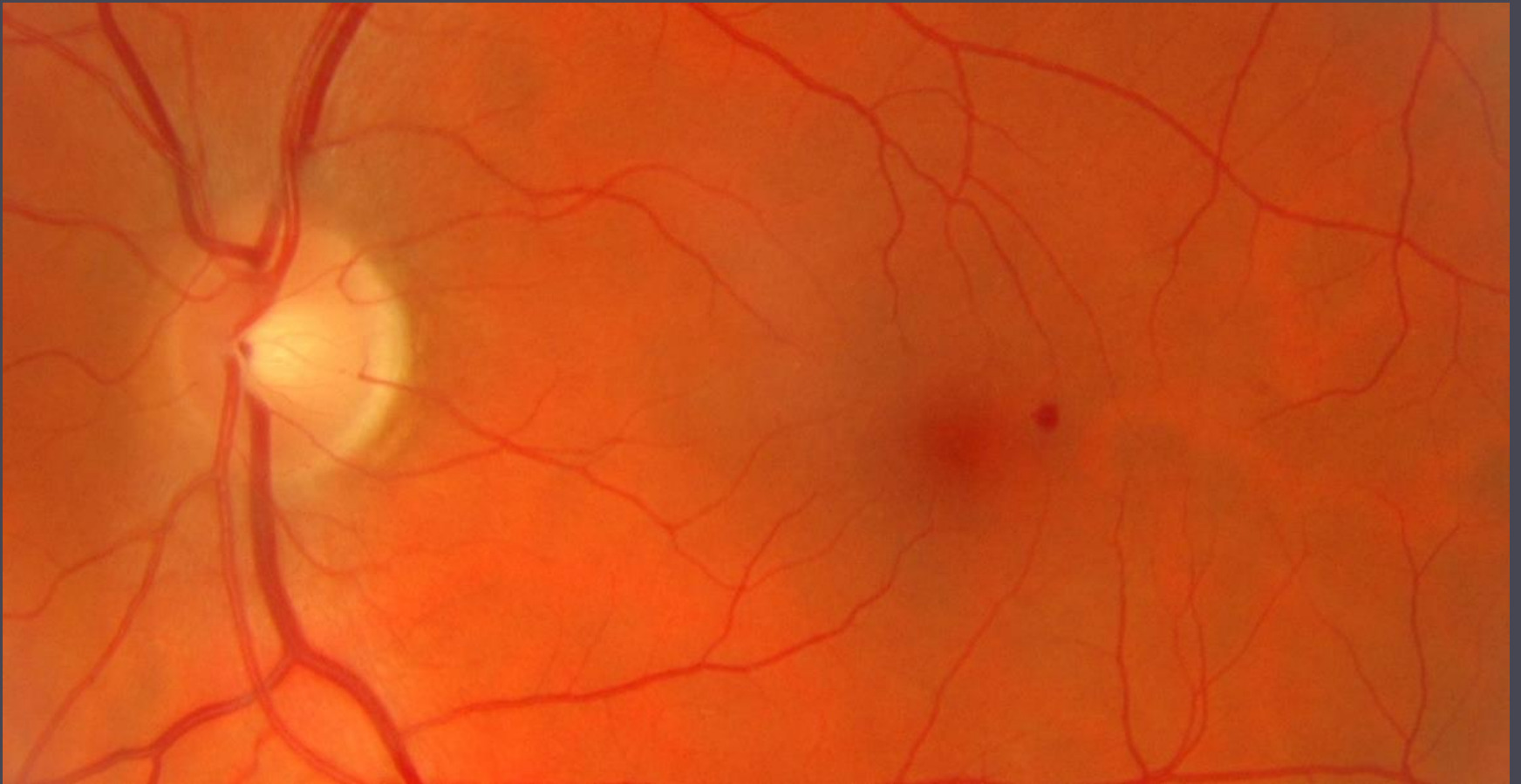


Faint Haemorrhage



R1 (Background DR)

Large dot/Small Blot/Leaking microaneurysm?



Dots and CWS

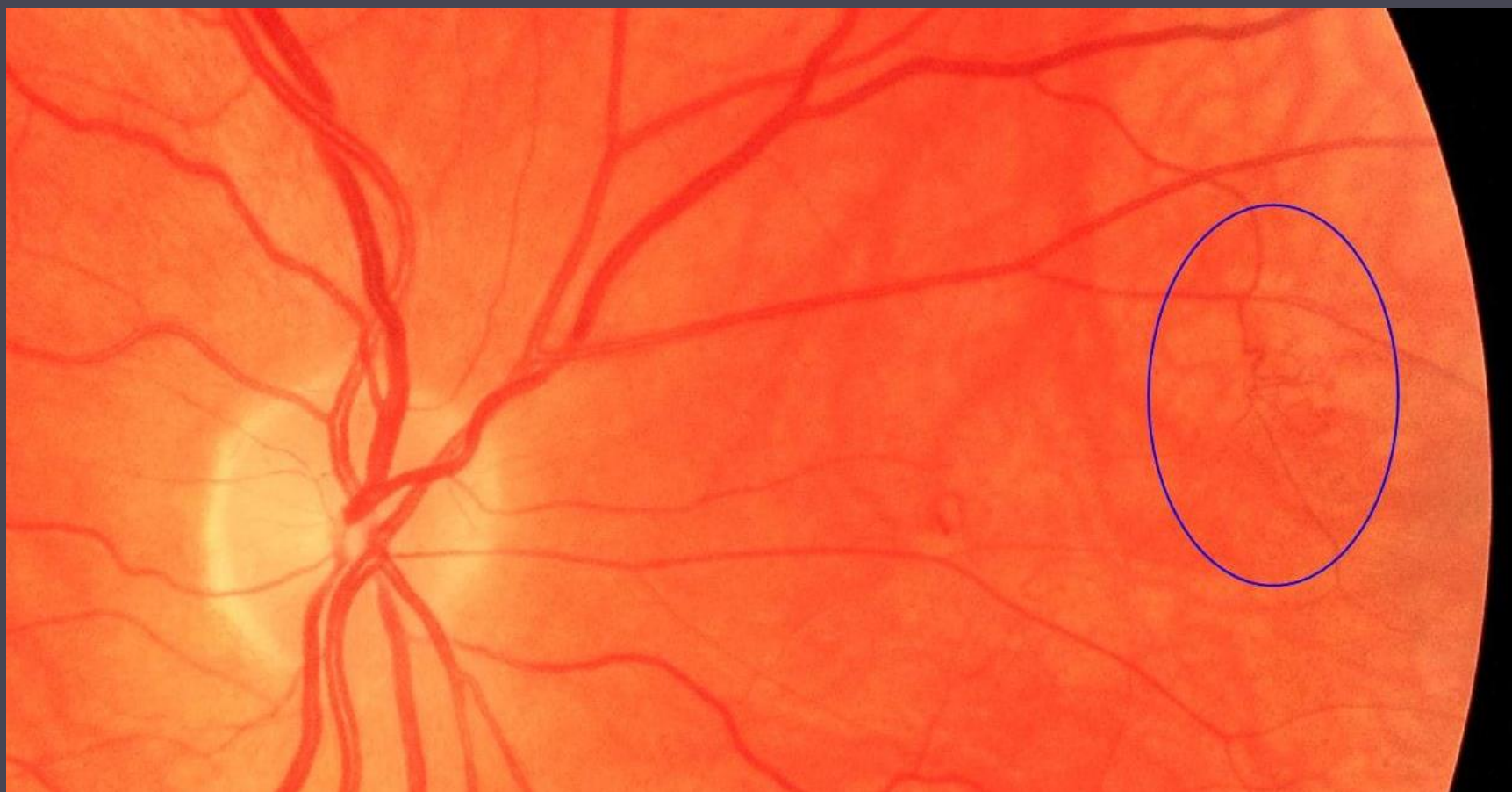


R2 (Pre-proliferative DR)

- ▶ Less than 1%
- ▶ Multiple blot haemorrhages
 - ▶ 8 to 10 per eye
- ▶ Venous Beading
- ▶ Venous reduplication
- ▶ Intra-retinal micro-vascular abnormalities (IRMA)
- ▶ Fairly urgent referral
- ▶ Consultation within 13 weeks
- ▶ Amber flag



Nasal to disc; Classic position



Subtle, but note significant BDR and Cotton-wool spot nearby



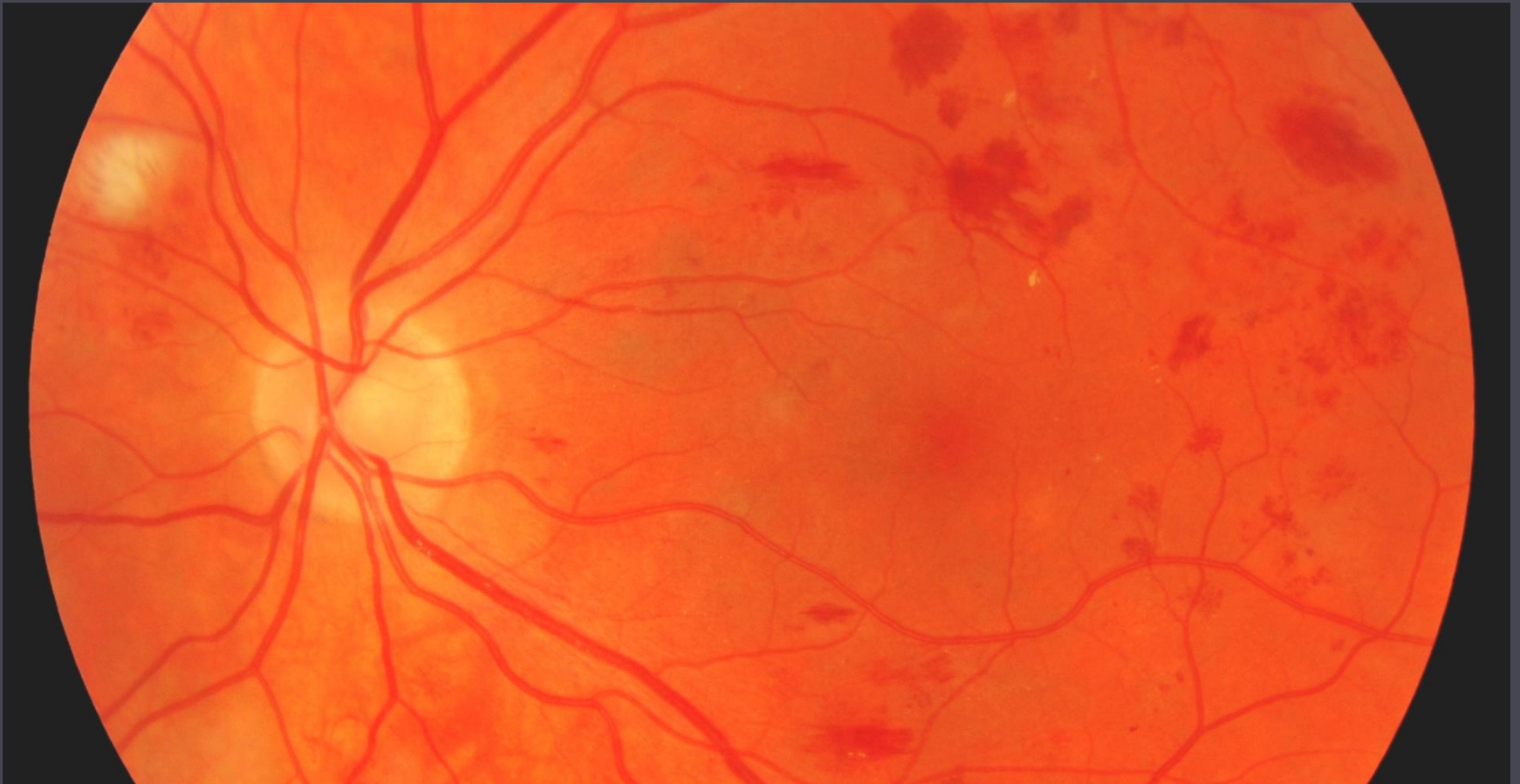
Larger and more numerous haemorrhages

Note some blots centrally; More significant DR



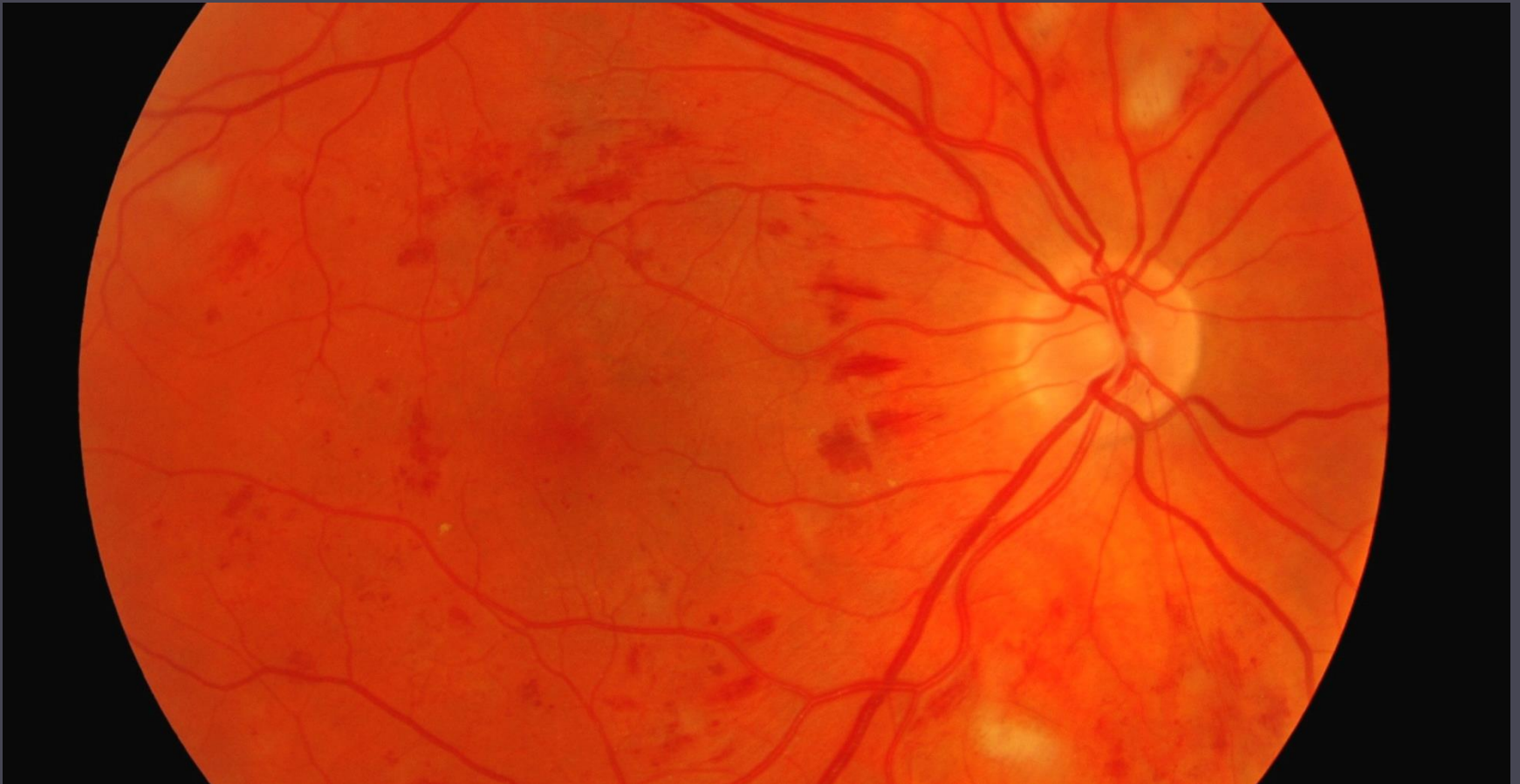
Multiple blots and CWS

Also, exudates



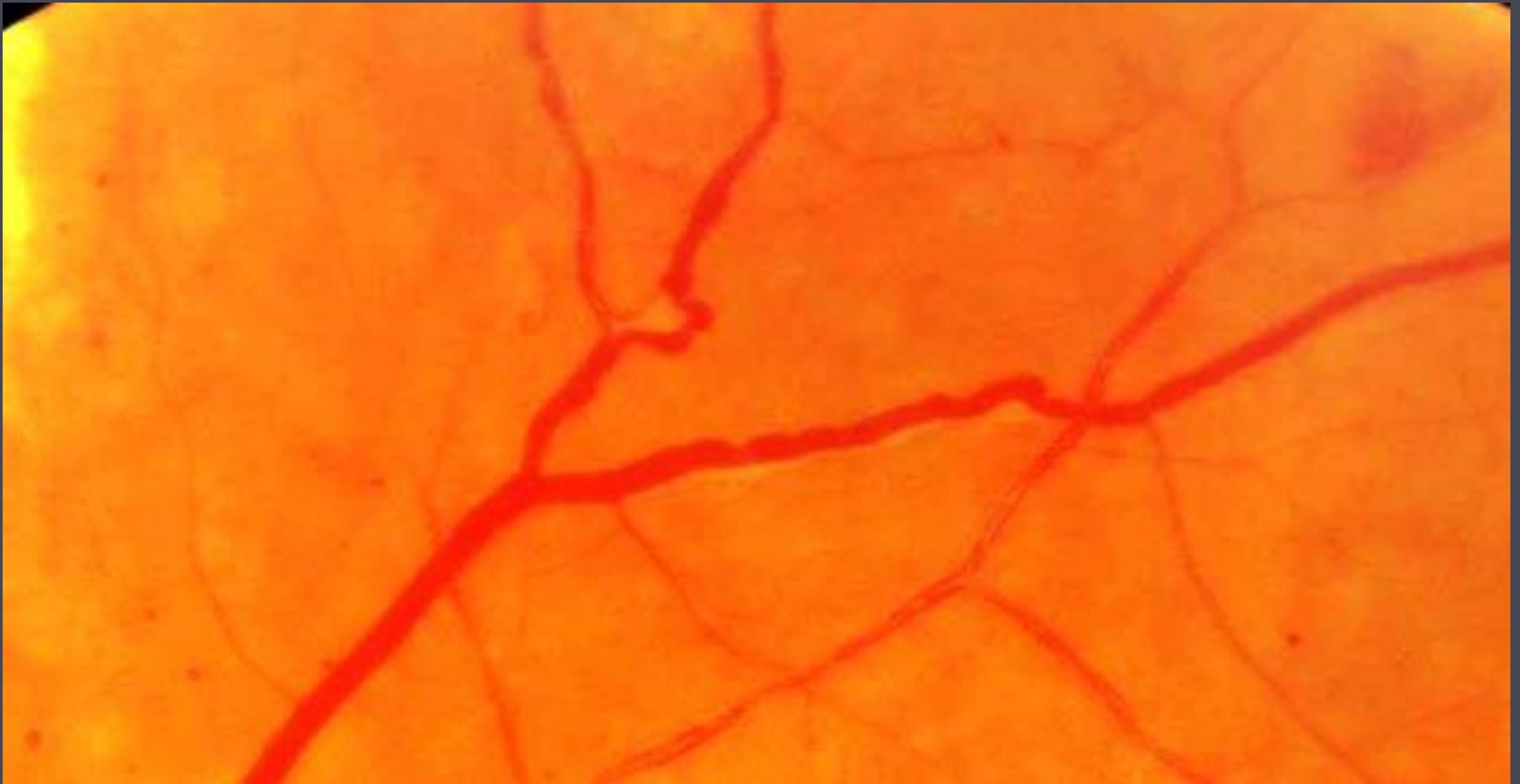
Multiple blots and cotton wool spots

Also exudate



Venous Beading

Note narrowing of vessel as well



Venous Beading

Also, dilated inferior vein



Nasal to disc



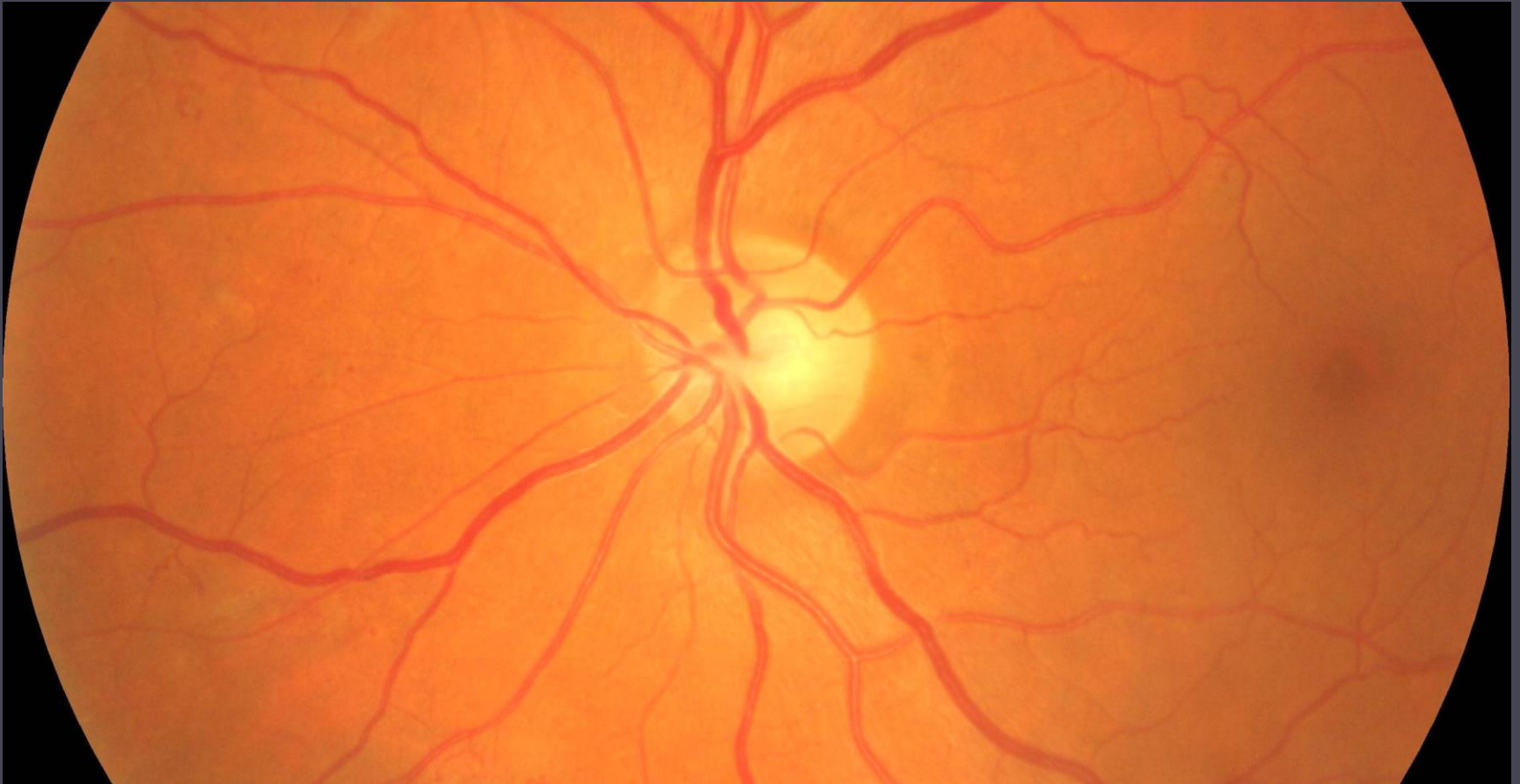
Multiple nasal vessel changes

Several IRMA, beading, venous dilatation, narrowing and sheathing



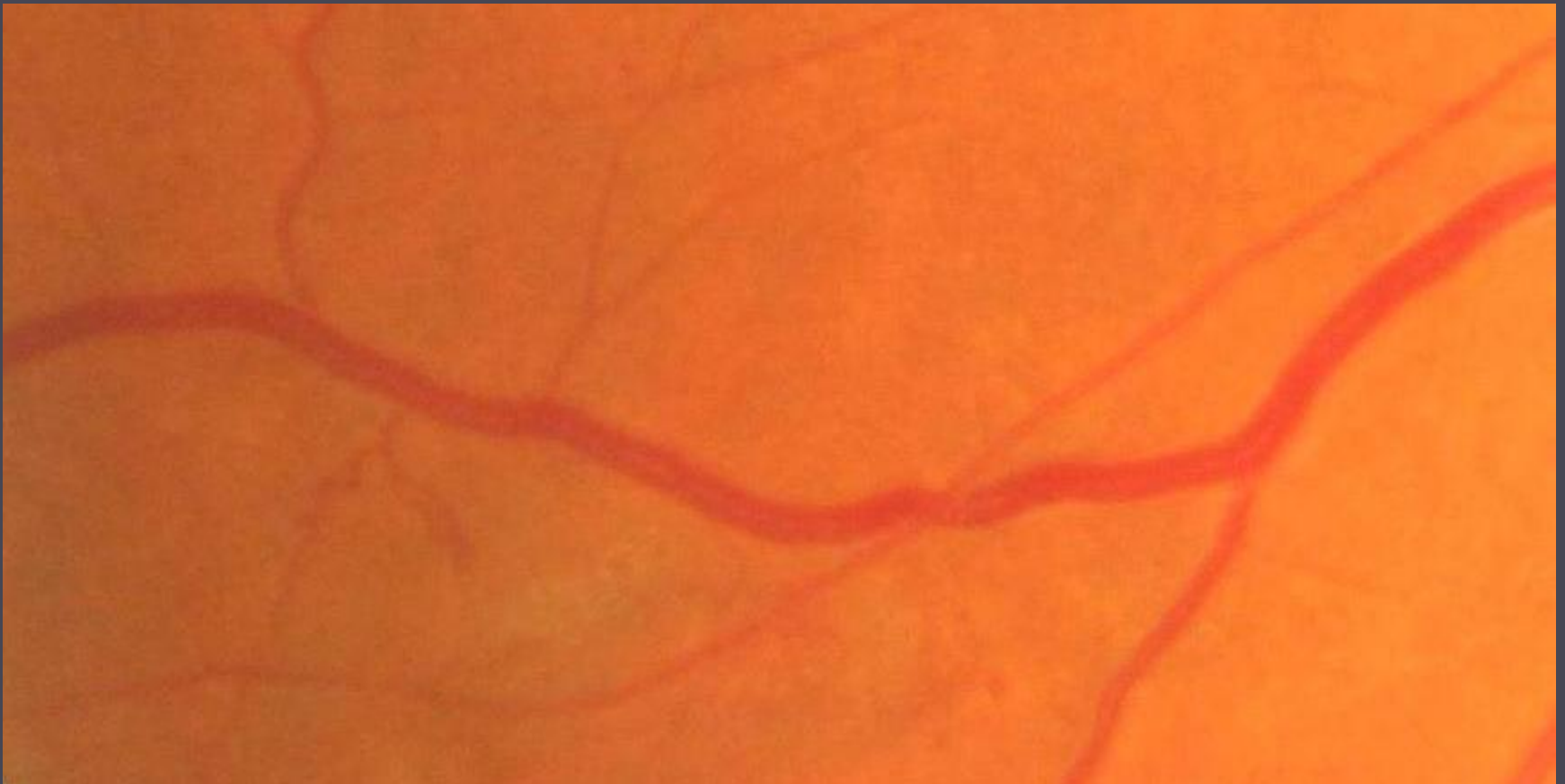
Reduplication with early beading

Nasal side of disc

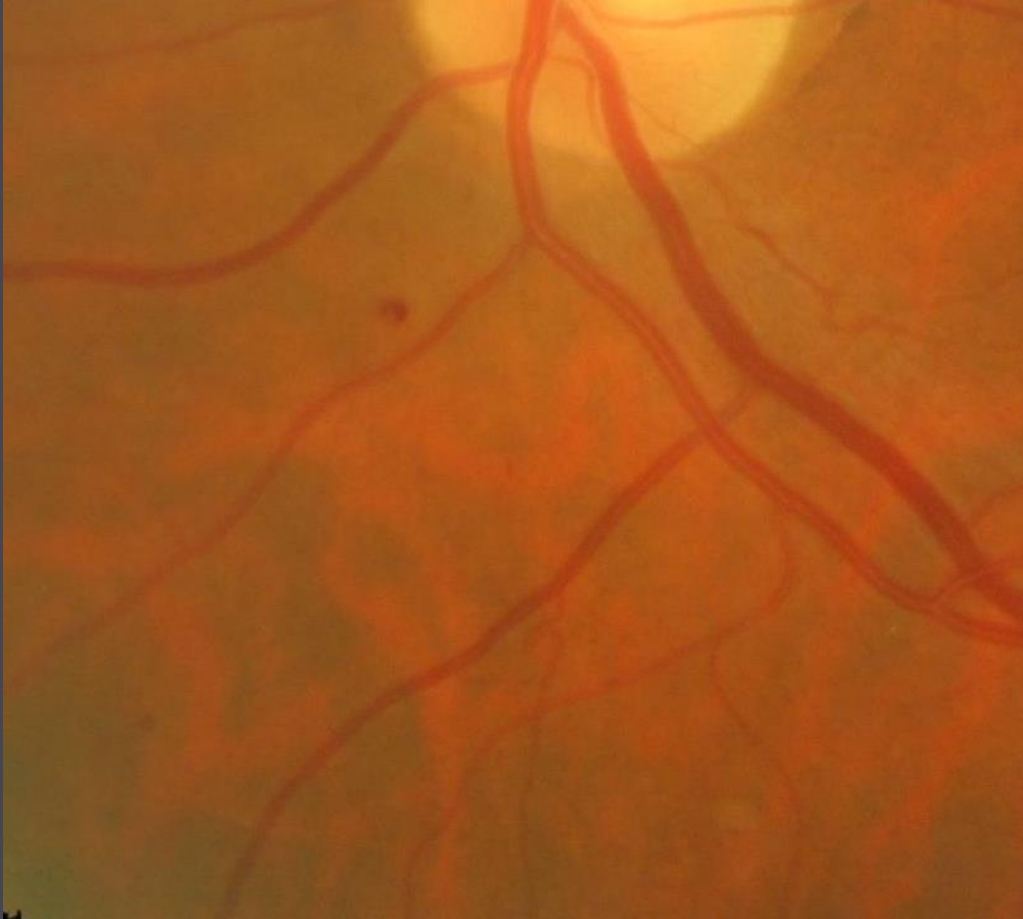


Reduplication

In more detail



Reduplication



R3A (Proliferative DR)

- ▶ 0.12%
- ▶ New vessels on the disc (NVD)
- ▶ New vessels elsewhere (NVE)
- ▶ Pre-retinal haemorrhage
- ▶ Pre-retinal fibrosis
- ▶ Vitreous haemorrhage
- ▶ Tractional Retinal detachment
- ▶ Reactivation of old R3S eye
- ▶ Urgent Referral (within 2 weeks)
- ▶ **RED FLAG = SAME DAY**



New Vessels on the Optic Disc (NVD)

Large NVD with some fibrosis and CRVO?



Large NVD

Nasal image



New Vessels on the Optic Disc (NVD)

Several, small new vessels



New Vessels on the Optic Disc (NVD)

Several, small new vessels



New Vessels on the Optic Disc (NVD)

Fellow eye to last image



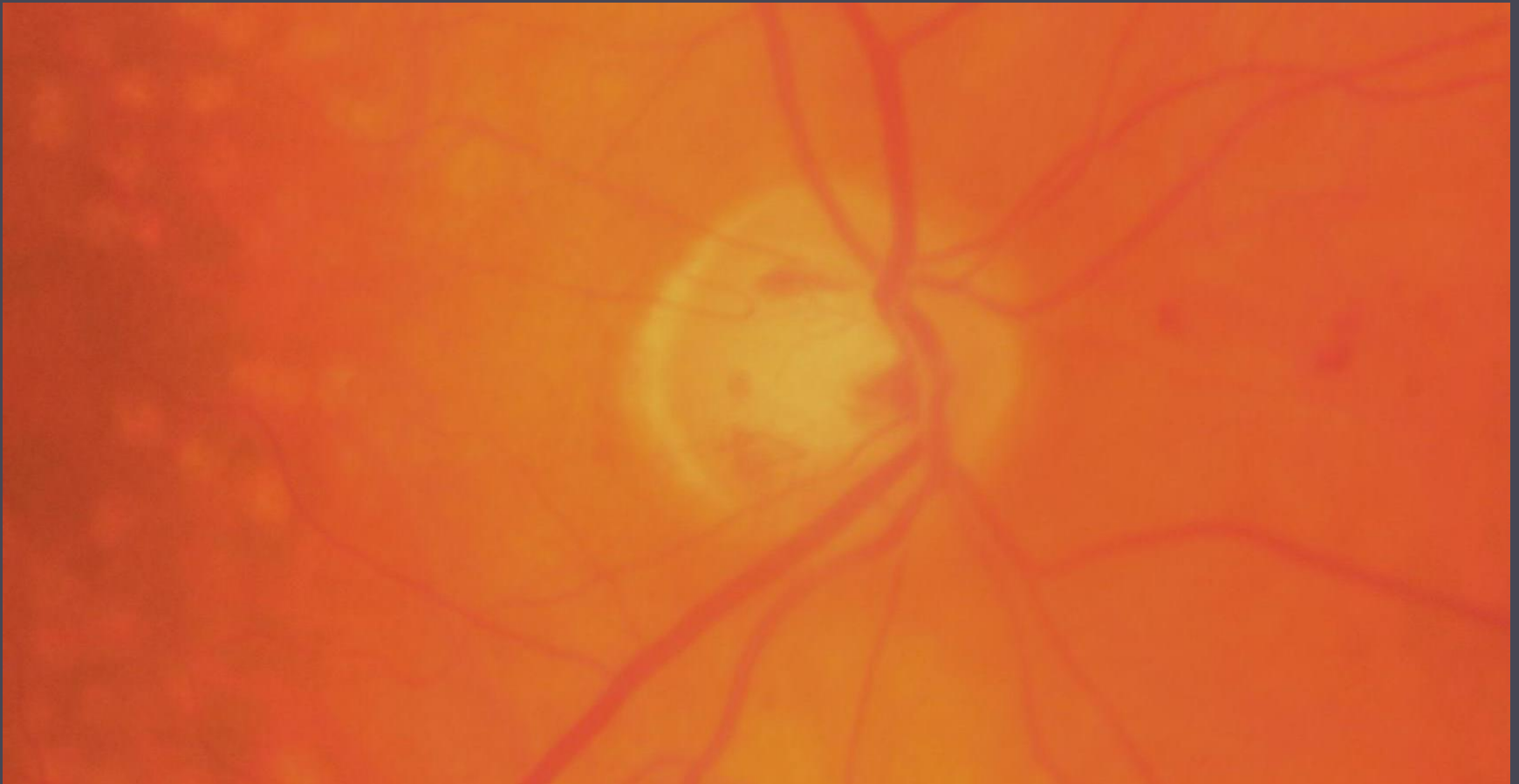
New Vessels on the Optic Disc (NVD)

New vessels trailing off the disc



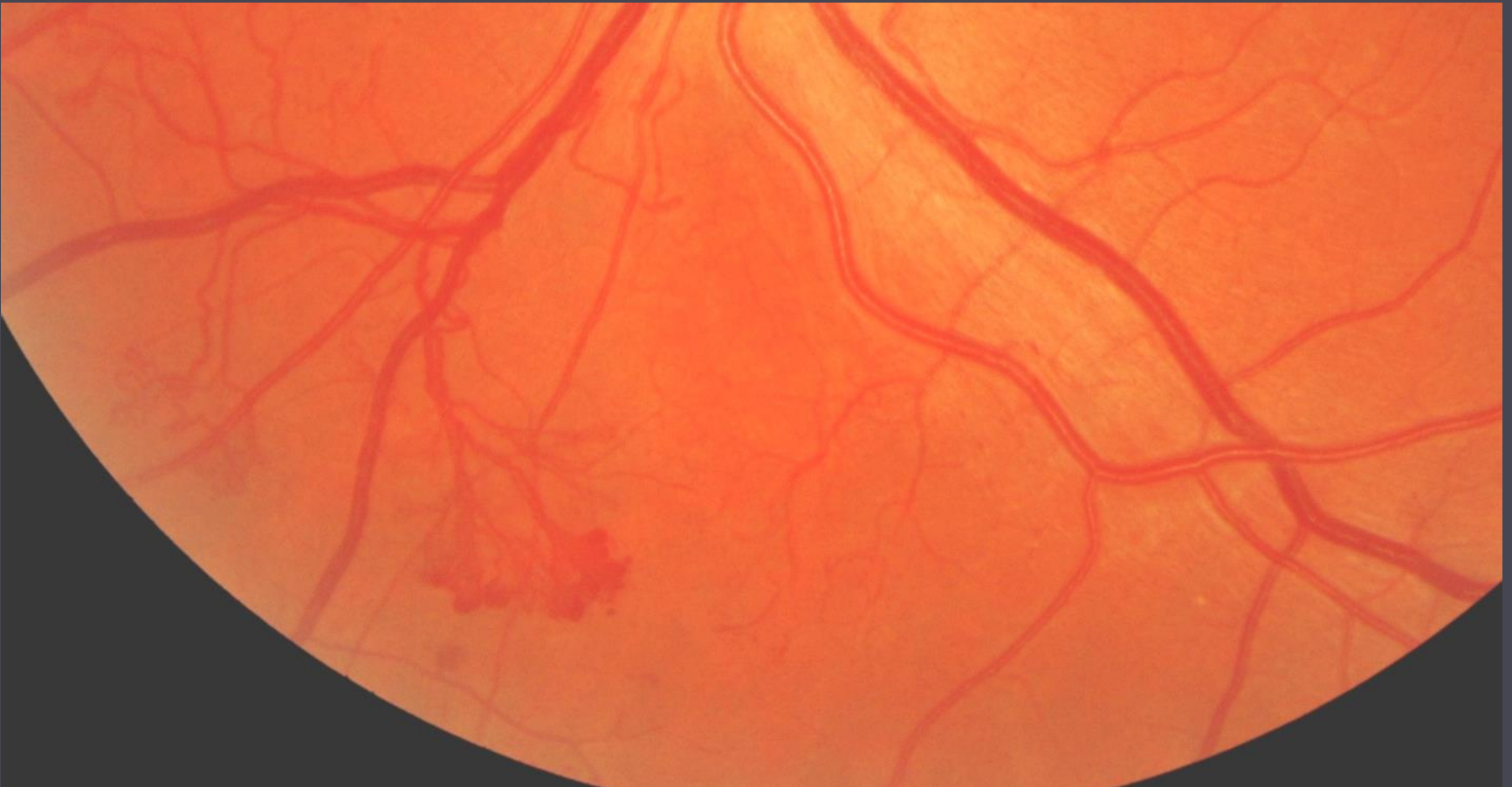
New Vessels on the Optic Disc (NVD)

Some doubt if they are definitely NVD, but flag as Red



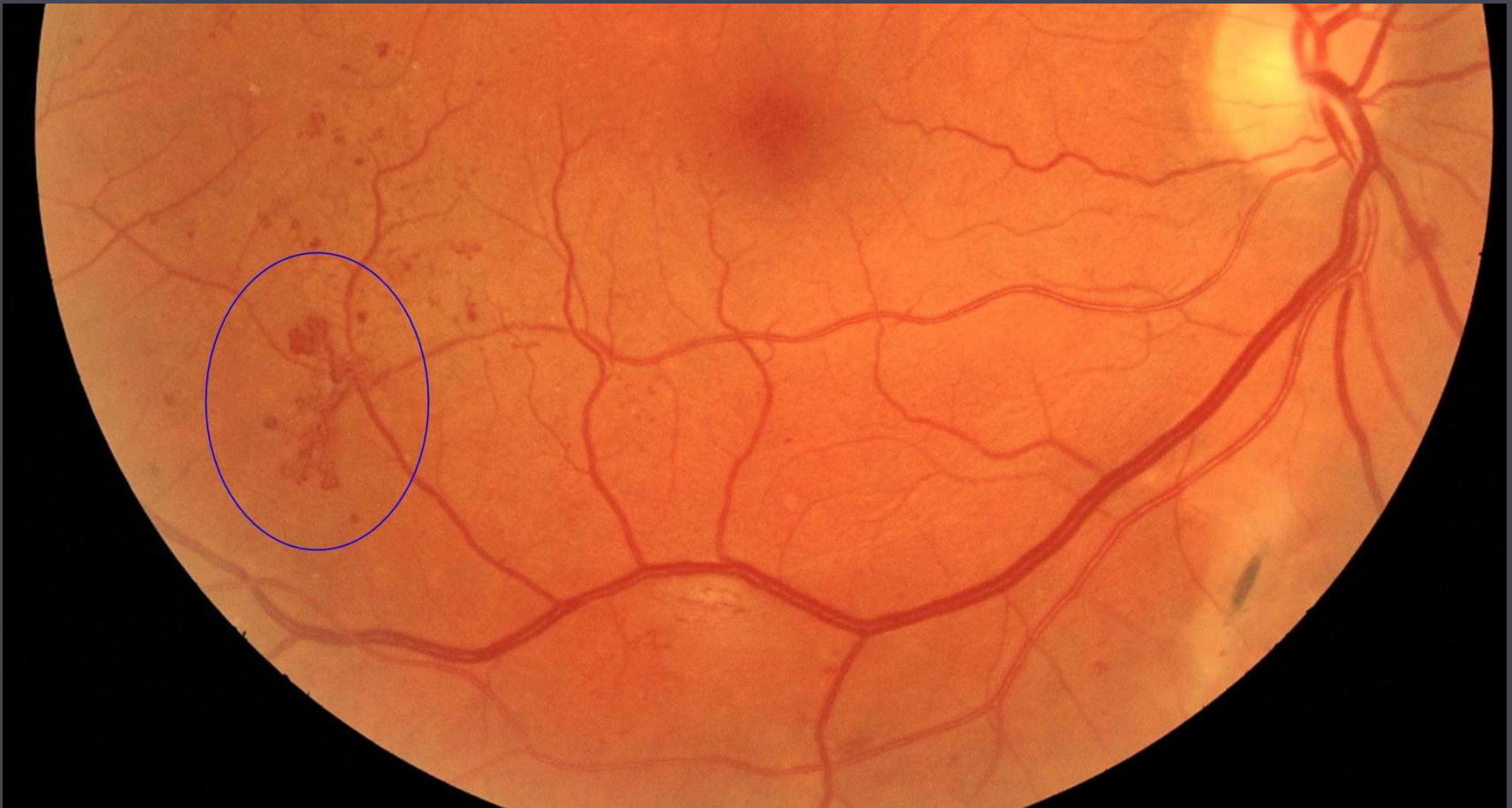
New vessels Elsewhere (NVE)

Florid nasal NVE



New vessels Elsewhere (NVE)

Typical NVE at inferior arcade



New vessels Elsewhere (NVE)

Temporal frond with early fibrosis



New vessels Elsewhere (NVE)

Temporal fronds with laser scars



New vessels Elsewhere (NVE)

Nasal NVE, with fibrosis



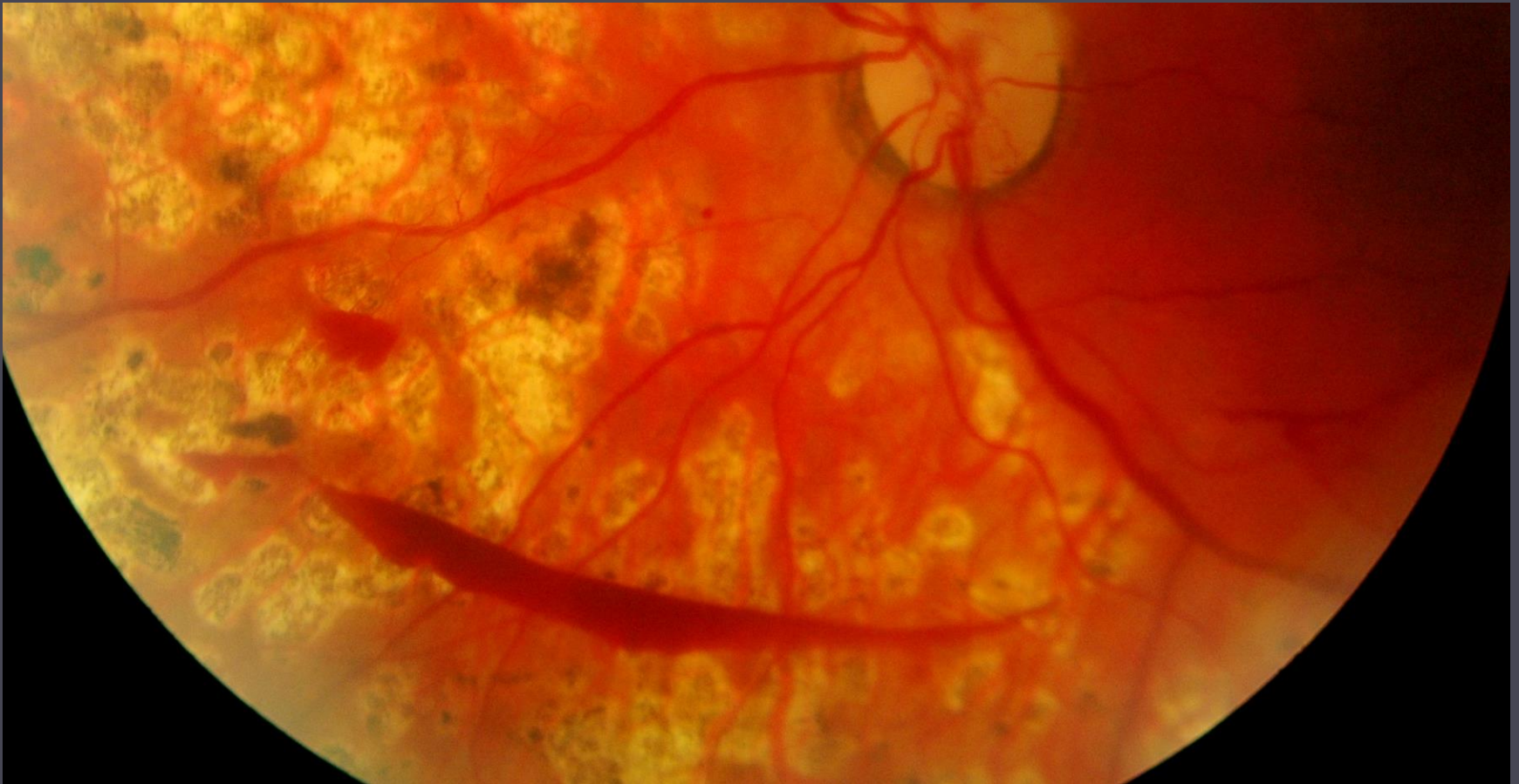
Pre-Retinal Haemorrhage

Larger than retinal haemorrhages and floating over other features



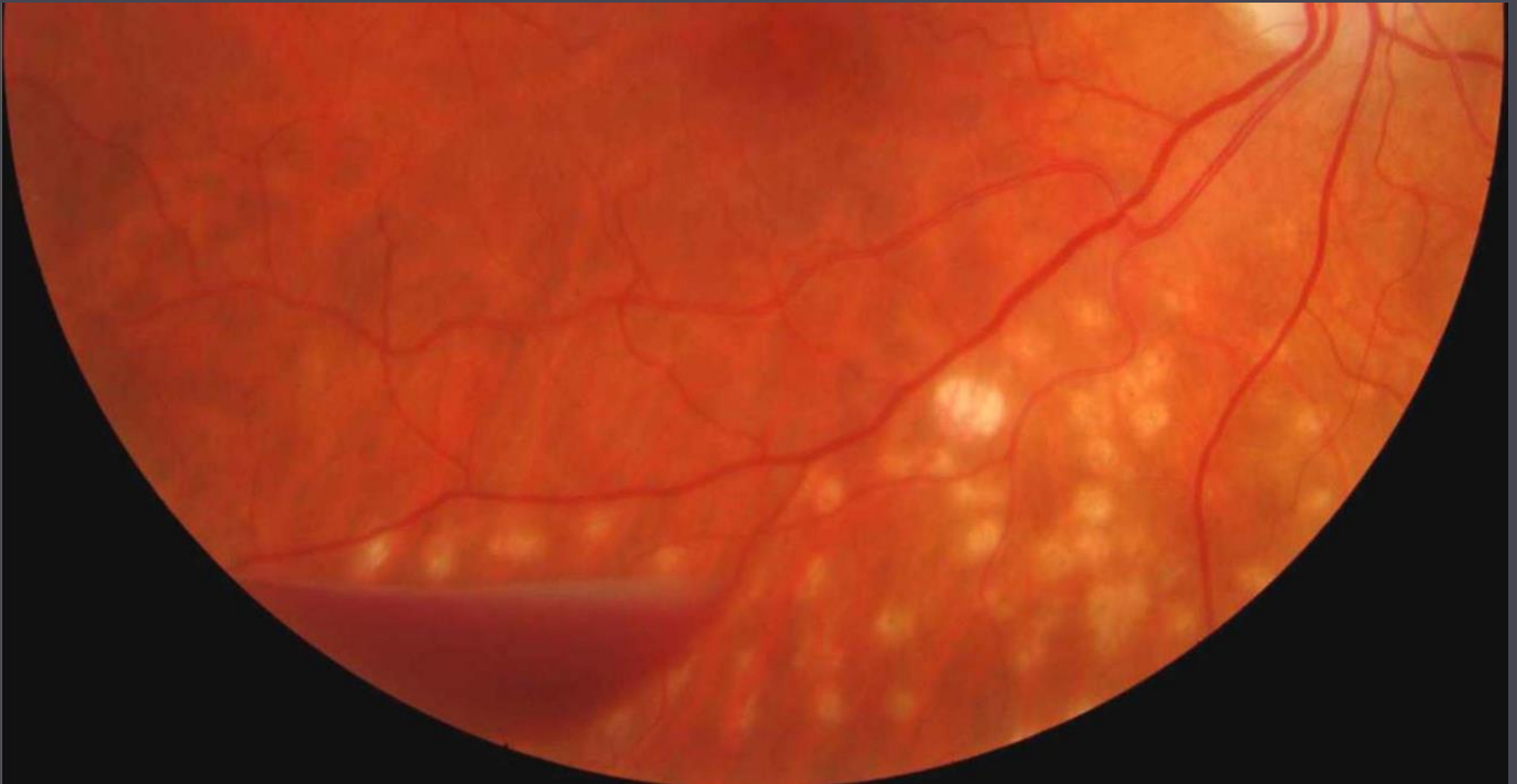
Pre-Retinal Haemorrhage

Typical, boat like appearance, due to blood dropping with gravity



Pre-Retinal Haemorrhage

Shows fluid level



Pre-Retinal Haemorrhage

Thick and dense, but still floating over the retina



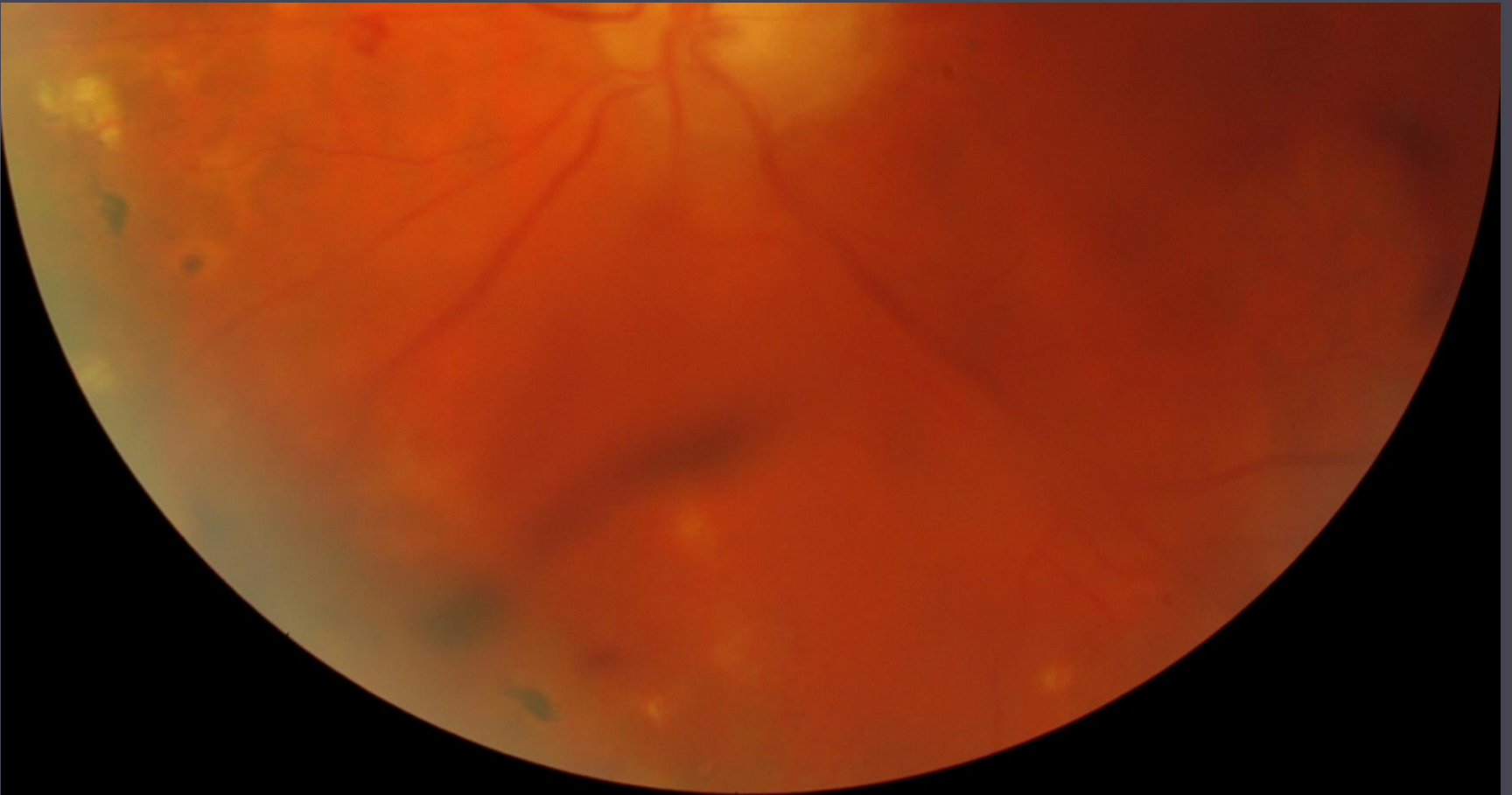
Pre-retinal Haemorrhages

Multiple, large pre-retinal haemorrhages with significant NVD and NVE

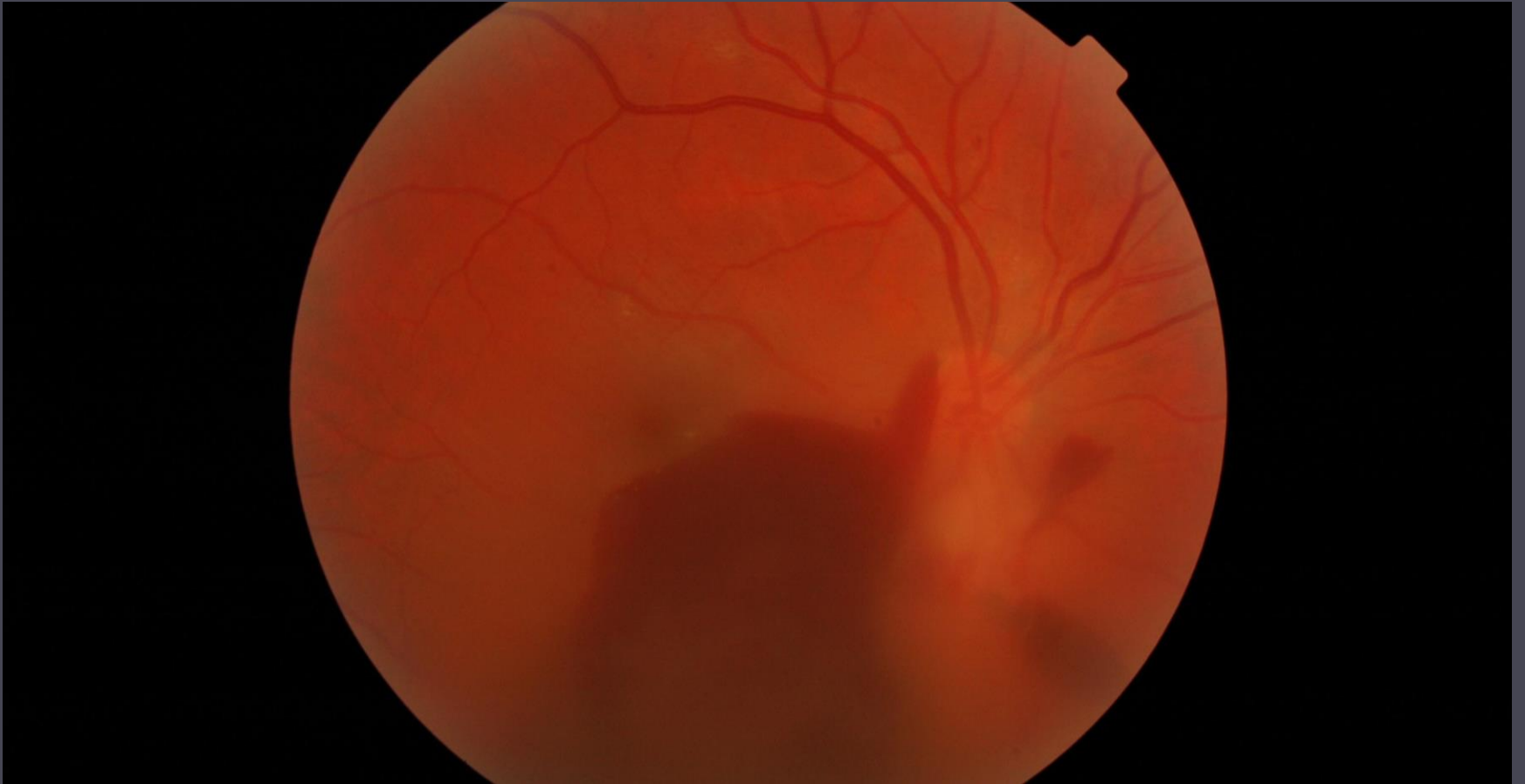


Vitreous Haemorrhage

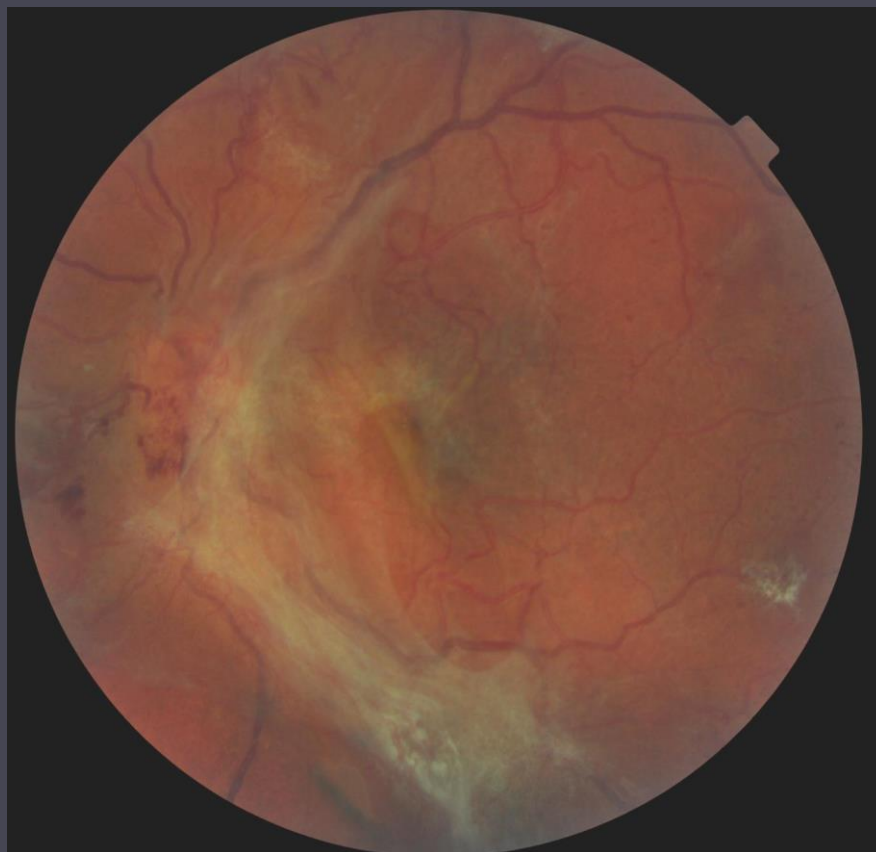
Note clouding and out-of focus haemorrhage



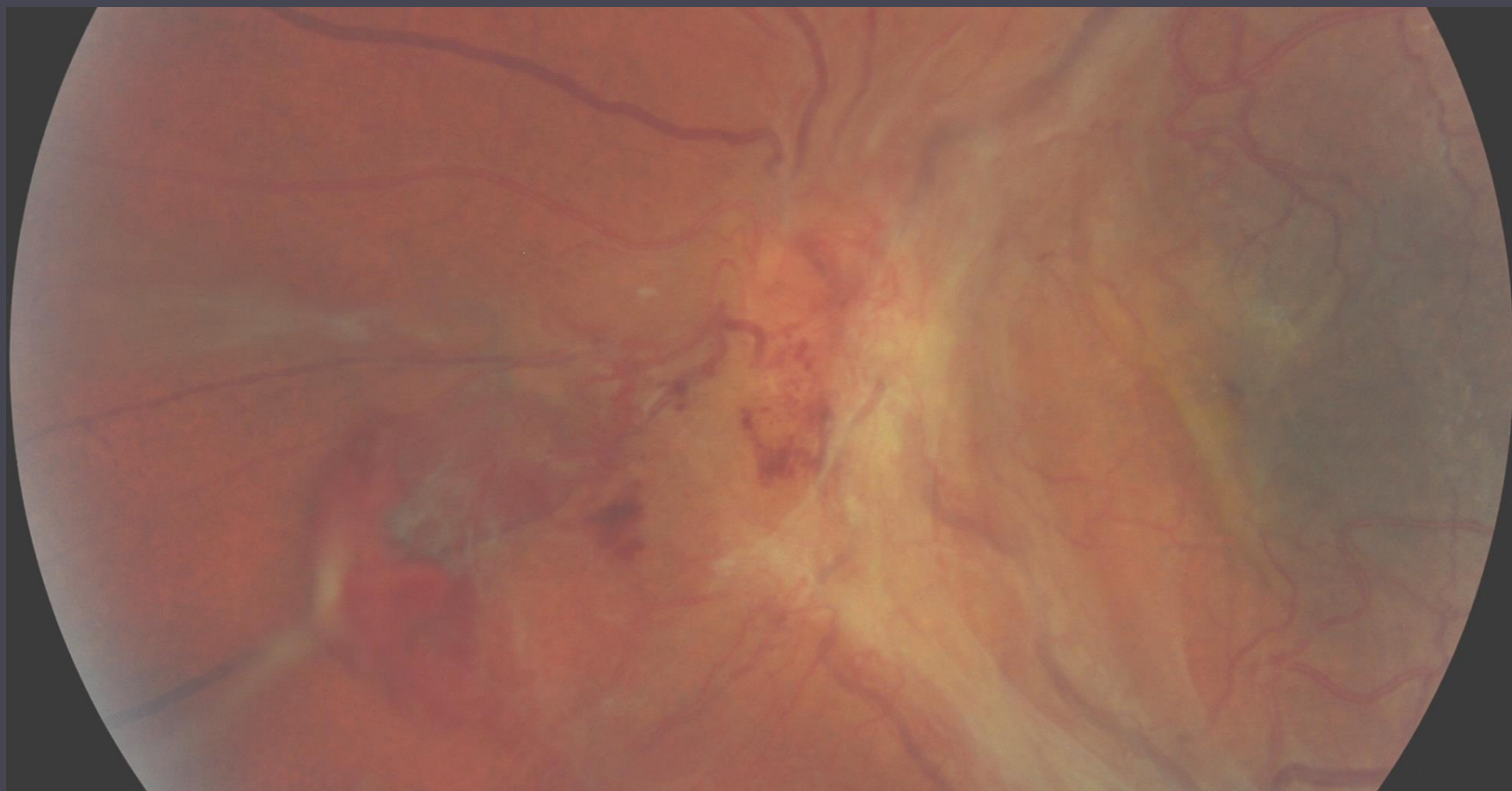
Large Vitreous haemorrhage



Extensive central fibrosis



Extensive central fibrosis; Close up



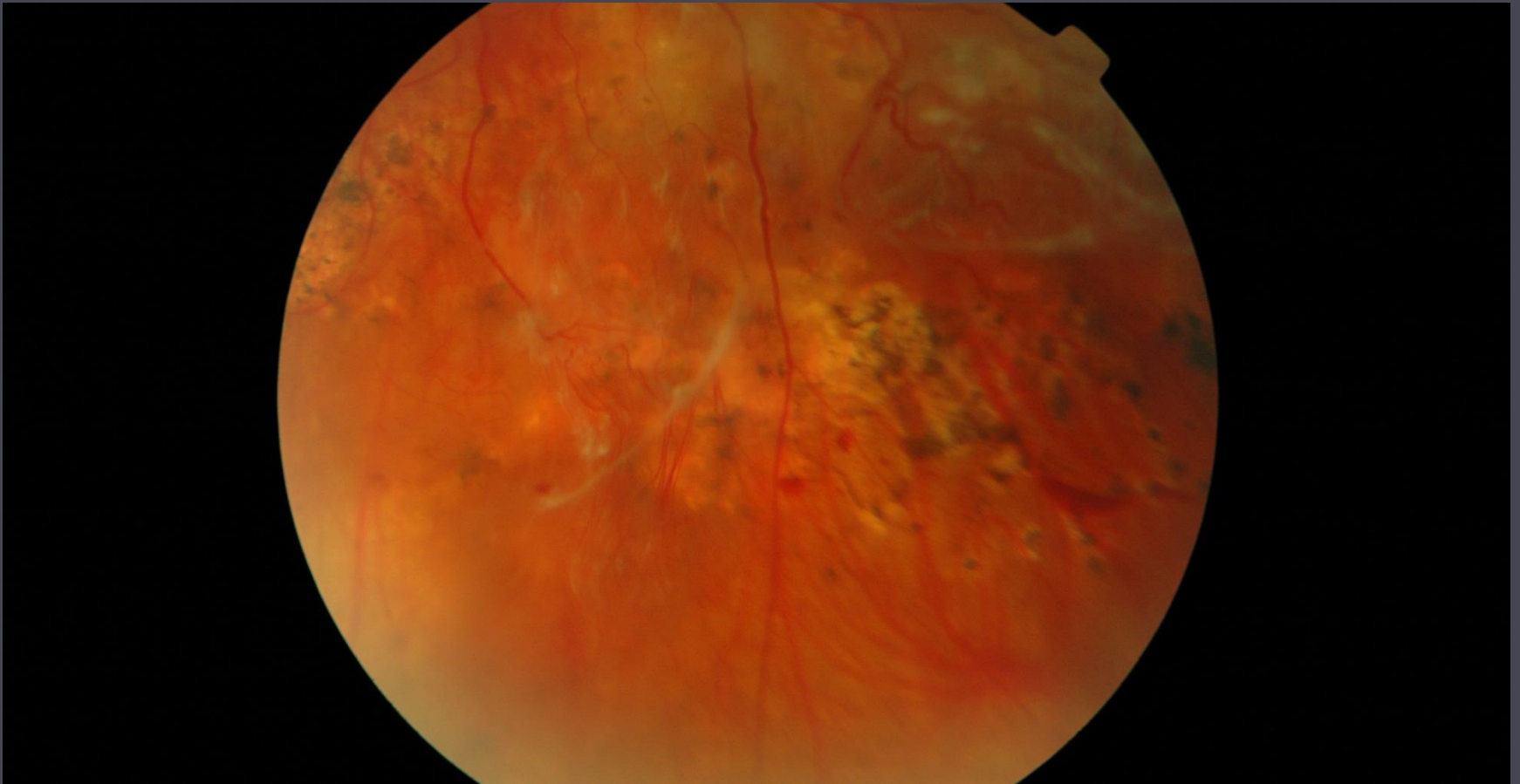
Fibrosis

Subtle, vertical strand with Pre-retinal Haemorrhage



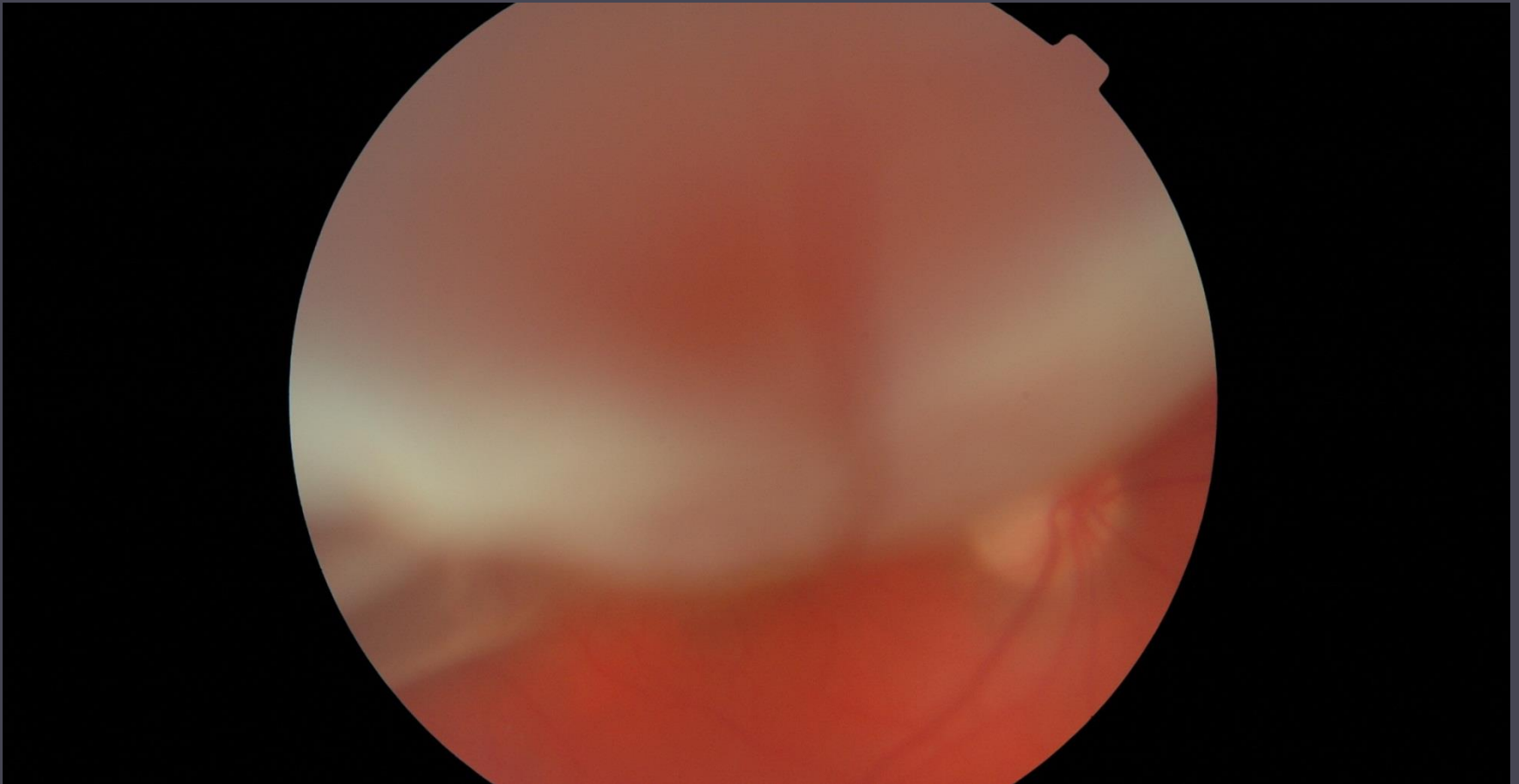
Fibrosis

Subtle fibrosis with old NVE and previous laser scars



Retinal Detachment

Superior detachment



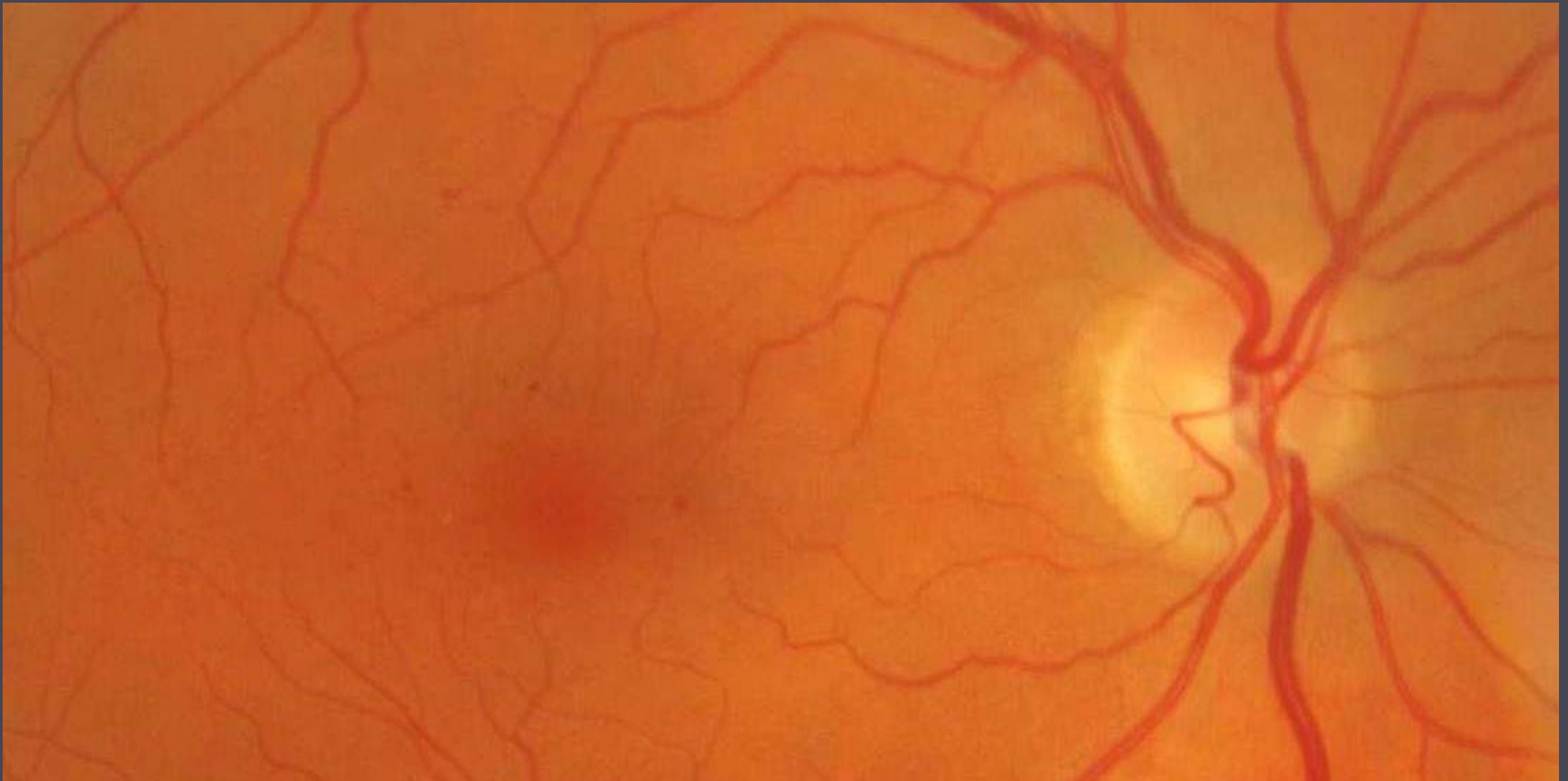
Maculopathy

- ▶ 2.19%
- ▶ NB: overlap with other DR
- ▶ Exudate within 1 DD of centre of fovea
- ▶ Group of exudates within the macula
- ▶ Dot haemorrhage or microaneurysm < 1 DD of centre of fovea, where the VA is 6/12 (+0.30) or worse
 - ▶ Unless the VA is reduced by non DR, e.g. Amblyopia



Maculopathy

Exudate and Microaneurysms



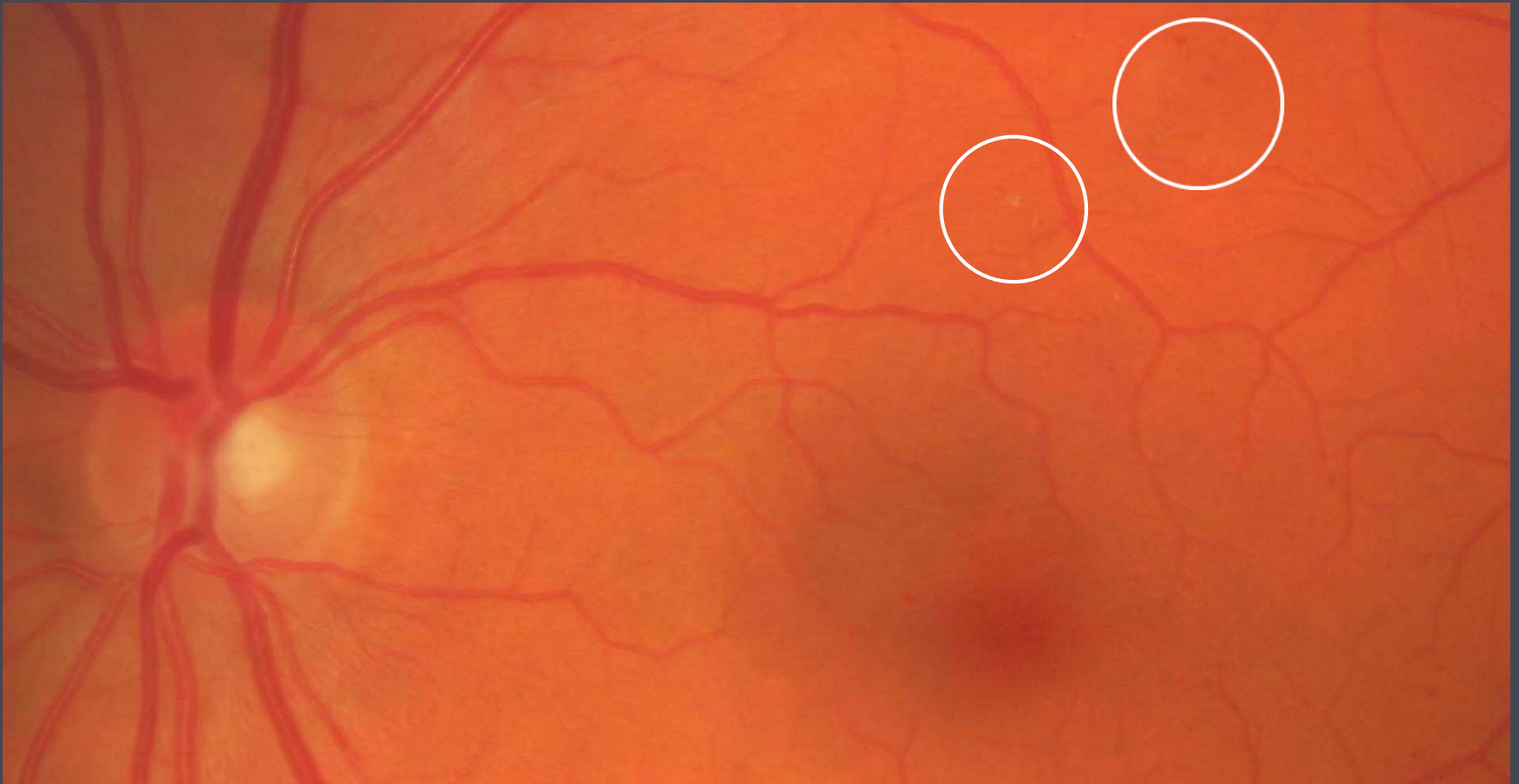
Exudates

Inner Circle: <IDD; Outer Circle: rough confines of the macula



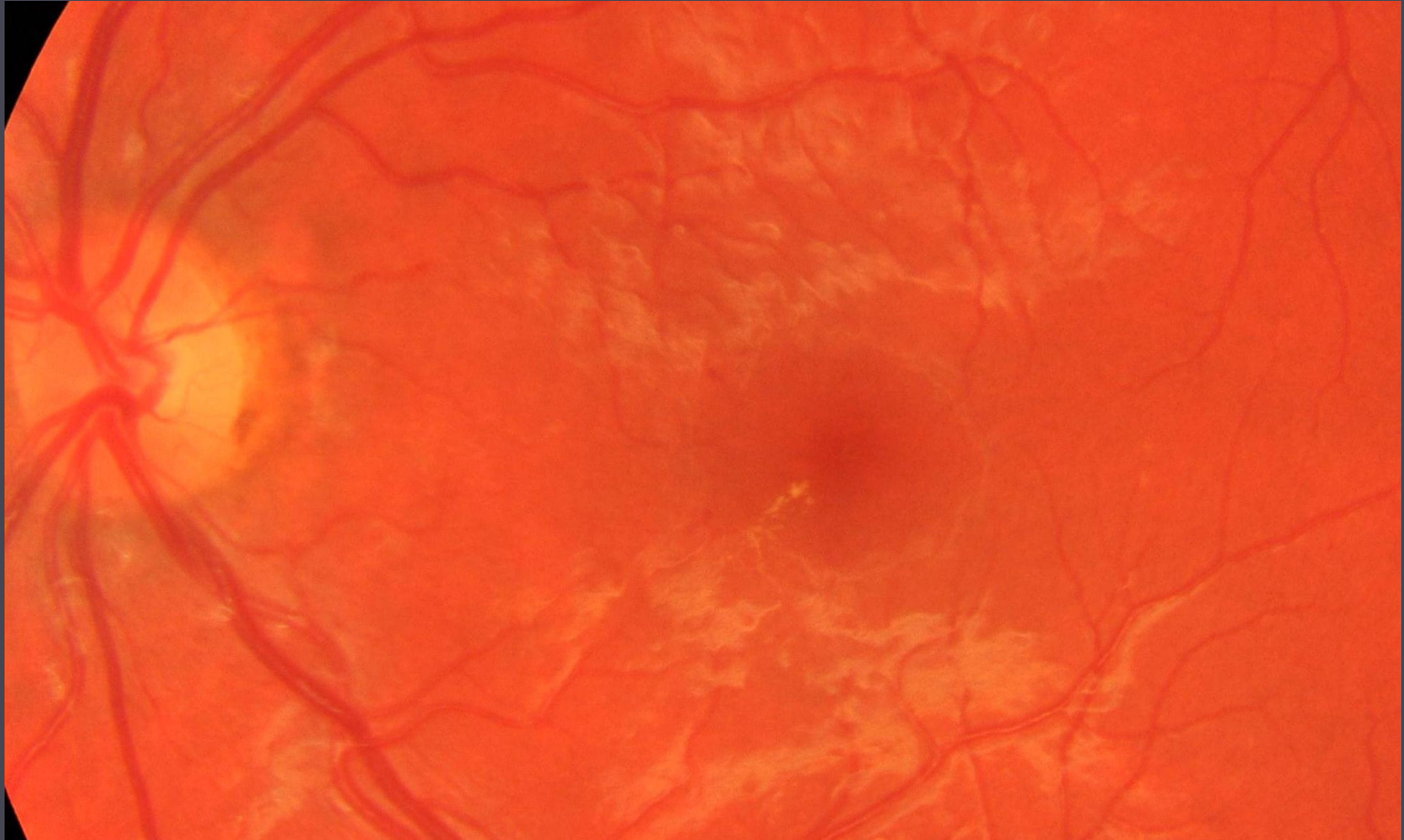
Subtle Exudates

Within 1 DD of fovea



Para-foveal exudate

VA still good; Younger patient with prominent surface reflexes



Exudate patch

>IDD from fovea; $\frac{1}{2}$ DD in area?

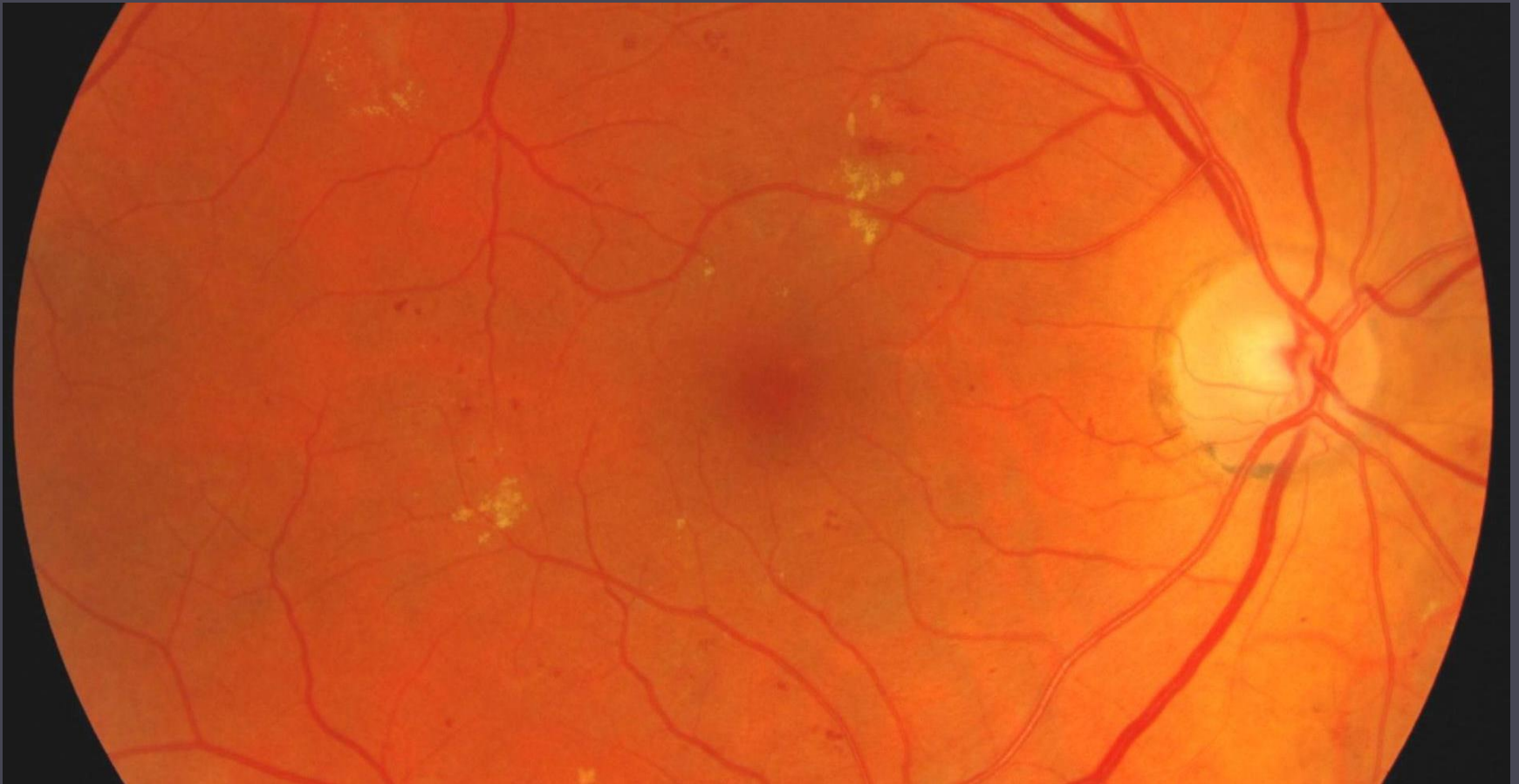


Exudates, trailing towards fovea



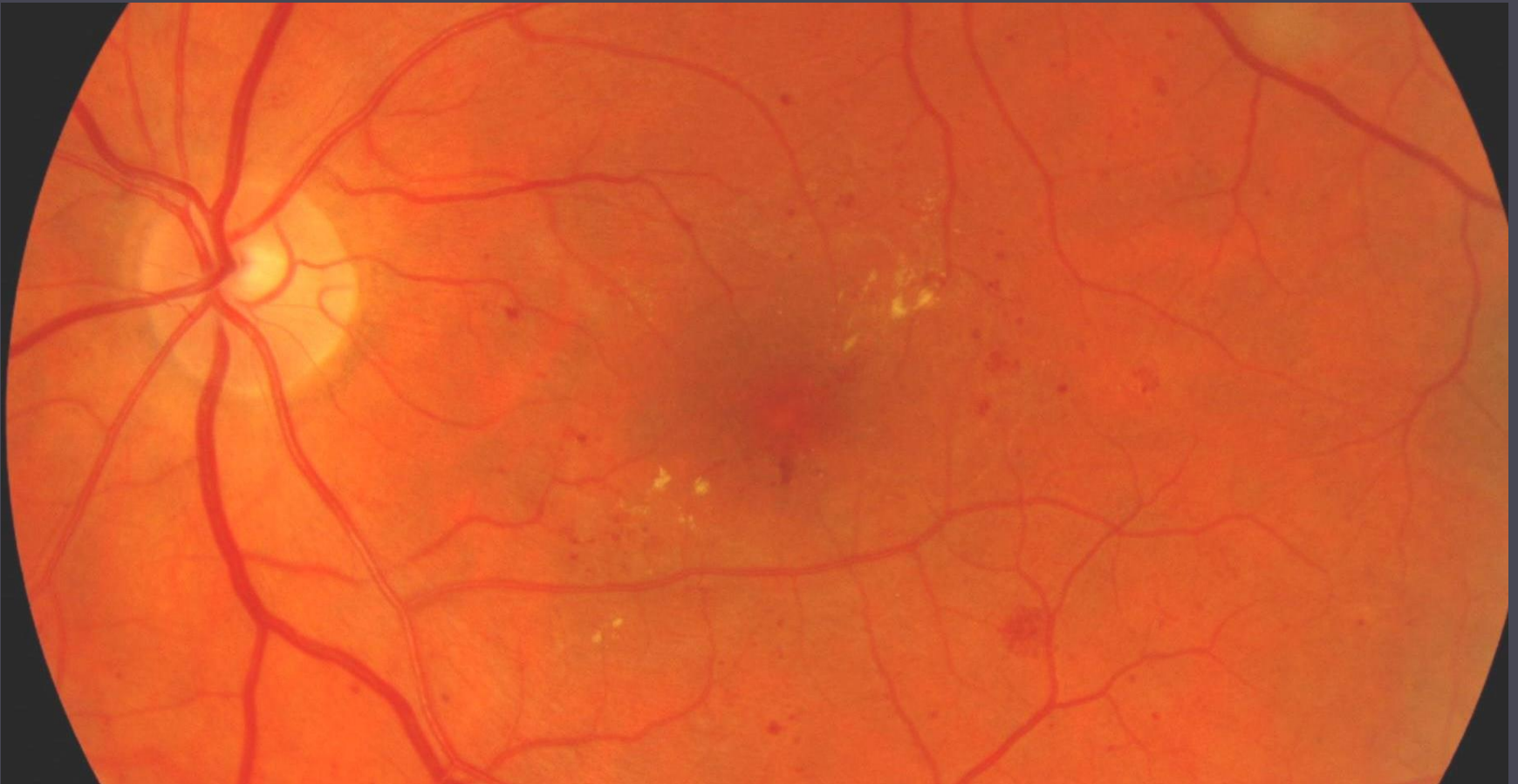
Exudates

Multiple exudate patches



Exudates

Fellow eye; Note larger blot haemorrhages as well



Photocoagulation

- ▶ P0: Absent
- ▶ P1: Present
- ▶ Macular grid
- ▶ Peripheral scatter

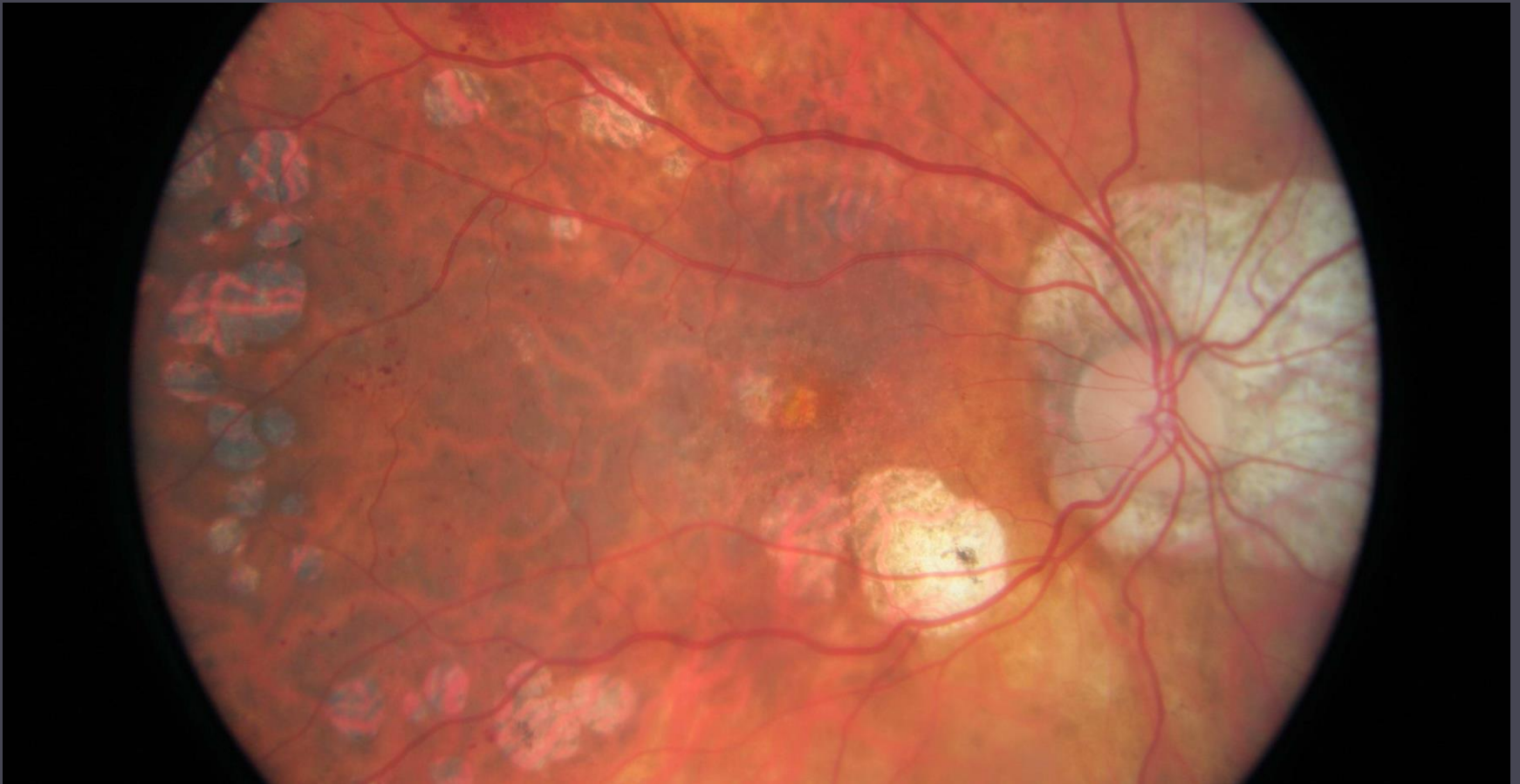


Peripheral scatter



Macular Grid

Also, some peripheral scatter



R3S (Stable)

- ▶ Stable, post-treatment proliferative DR
 - ▶ 0.038%
 - ▶ Stable pre-retinal fibrosis
 - ▶ Stable fibrosis proliferation (Disc or elsewhere)
 - ▶ Laser scarring
 - ▶ Also,
 - ▶ Stable R2 and R1 features
 - ▶ Discharged by HES
 - ▶ Digital Surveillance
 - ▶ Referral Outcome grades
-



Old Fibrosis

Evidence of previous laser treatment, but no other DR



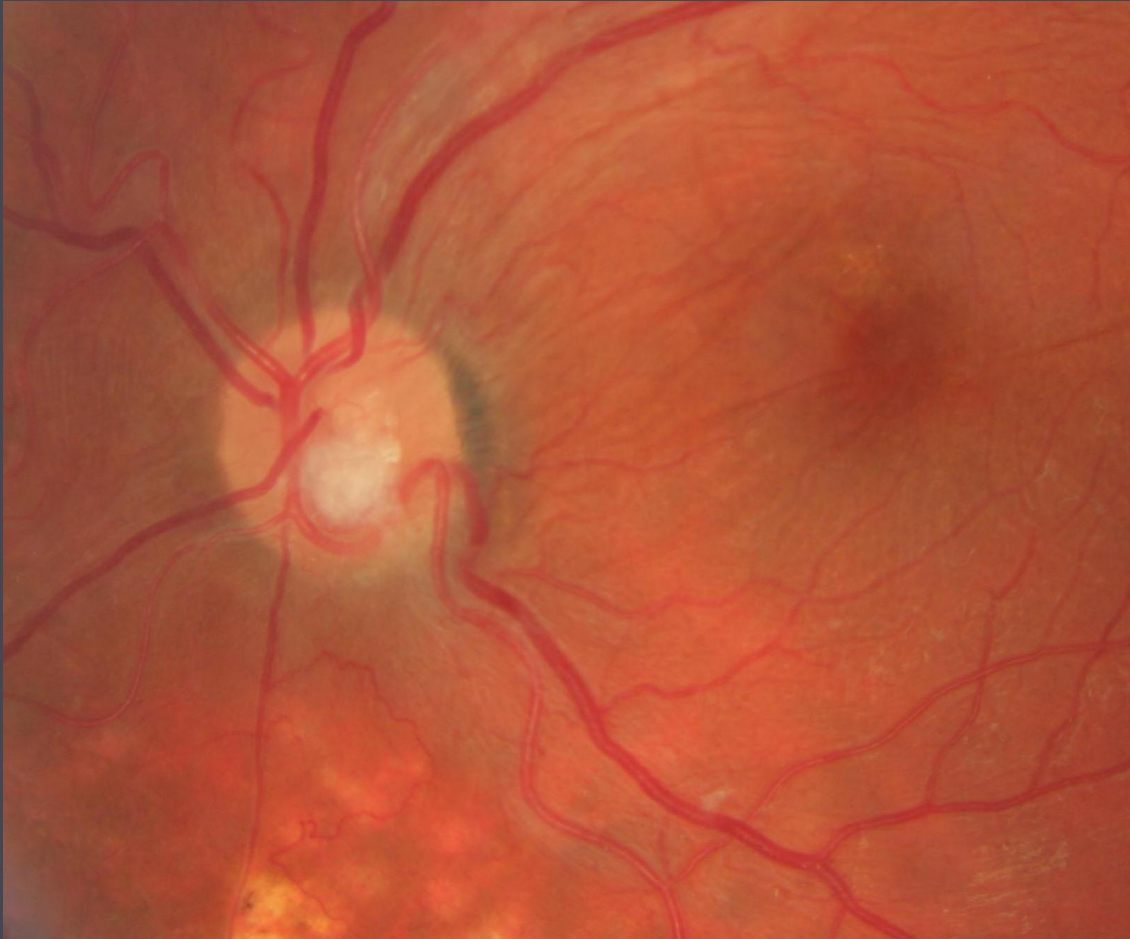
Old fibrosed NVD/NVE

Laser scars also visible

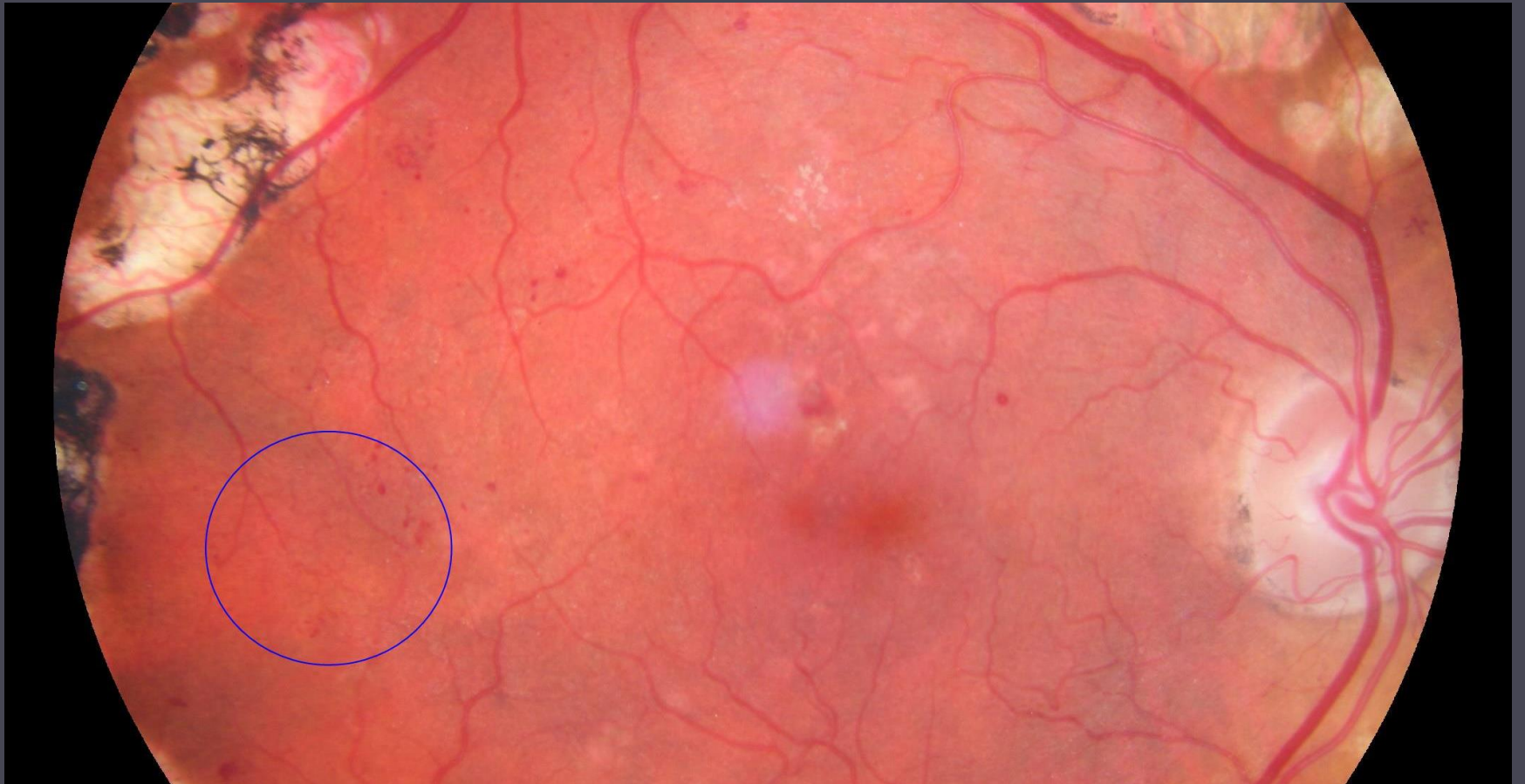


Old, fibrosed NVD

Closer detail: NB Vitreous pucker

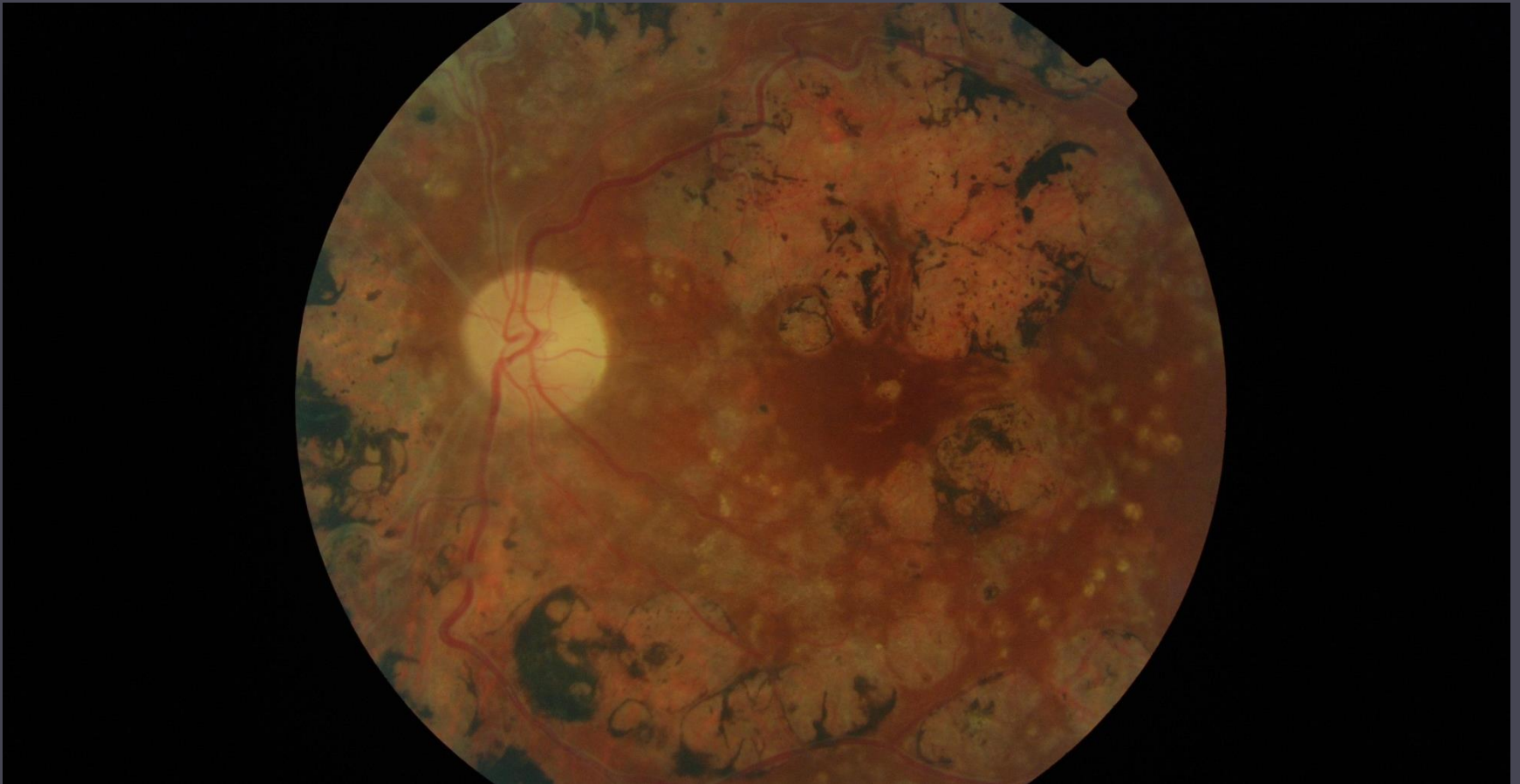


Old IRMA



Multiple laser scarring with fibrosis

Note sheathing of occluded vessels



Screening KPIs

- ▶ **80% screened of the eligible population**
 - ▶ Diabetes diagnosed
 - ▶ 12 years and over
 - ▶ Light Perception in both eyes
 - ▶ Exclusions may apply
- ▶ **Result letter to patient/GP within 3 weeks**
- ▶ **Staff appropriately trained and managed**



Referral

- ▶ **R3: referred to HES within 2 weeks**
 - ▶ Urgent/Same day as first grade/by fax, where possible
- ▶ **R2/MI: Consultation at HES within 13 weeks**
 - ▶ Same day as ROG, where possible
- ▶ **Non-DR conditions**
 - ▶ Faxed as appropriate-mostly urgent



Extended Intervals

- ▶ **No signs of Retinopathy (R0)**
 - ▶ In either eye
 - ▶ In the last 2 consecutive screenings
- ▶ **Reliant on assurance of good, consistent grading**
- ▶ **Needs software update**
 - ▶ Out to tender
- ▶ **90% take up rate**
 - ▶ Hard to reach
 - ▶ At risk



Diabetic Retinopathy Screening and referral

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