Grading Diabetic Retinopathy
R2 - dots, blots and multiple headaches!

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English National Grading System

Harding SP, Greenwood RM, Aldington A, Gibson JM, Owens DR, Taylor R, Kohner E, Scanlon P, Leese GR. Diabet Med 2003; 20:965-971

Retinopathy

R0	no retinopathy	annual rescreen
R1	haemorrhages and/or microaneurysms (HMa)	annual rescreen
R2	venous abnormality IRMA multiple deep, round or blot haemorrhages (CWS - careful search for above)	refer HES
R3	proliferative advanced	urgent refer HES

English National Grading System

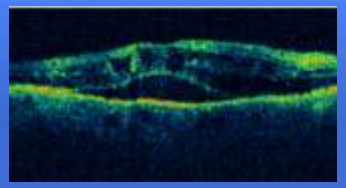
Maculopathy

M0	none	annual rescreen
M1	circinate /group of ex within arcades exudate ≤ 1DD no stereo: HMa ≤ 1 DD + best VA <6/9 stereo: CSMO	refer to HES

Photocoagulation

P0	none	annual rescreen
P1	focal/grid macular/peripheral scatter	local protocols

Referable retinopathy working party



Clarification of definitions

- **multiple deep, round or blot haemorrhages**
- **presence of scars of photocoagulation**
- **group or circinate exudates**
- **IRMA**

Simon Harding, Richard Greenwood, Peter Scanlon, Steve Aldington, Clare Bailey, Jon Gibson, Roger McPherson, Rob Johnston, Deborah Broadbent, David Taylor, Roger Gray, Stella Waller, David Steel, Paul Dodson, Roy Taylor, Irene Stratton

Early Treatment Diabetic Retinopathy Study

colour standard 2A

part of definition of levels of non-proliferative retinopathy

level 35,43,47,53

4-2-1 rule quadrants of involvement

~5x increased risk of ↓VA at 3 years (ETDRS)

BUT

30° not 45°

7 field not 2 field

Multiple deep, round or blot haemorrhages

Objectives

1. Standard definition

2. Set of examples

3. Measure consensus amongst clinicians

Cases which the majority of experienced specialists in England would retain in medical retina clinics

Proposed definition

Any area of retina
with HMa
≥ ETDRS Std 2AR

Proposed definition

- Grade the eye as R2 if any zone of retina within the images meets this criterion
- Graders should have the standard image available when grading MDRBH and mentally adjust for magnification.
- Consider both density and extent
- Include all punctate and blot haemorrhages and all microaneurysms
- But exclude superficial (nerve-fibre layer) and pre-retinal haemorrhages

Consensus panels

	cons/ assoc spec	cons phys	grader	fellow
Birmingham	3		4	
Bristol/Taunton	8			
Liverpool	9		3	
Newcastle	1	1	2	
South Wales	11		1	
Sunderland	4			1

R1/R2 : 6 training images, 20 test images

Consensus panels

Disregard lesions other than blot and dot haemorrhages/microaneurysms and microaneurysms

A. Senior graders and clinicians:

grade no HMA; HMa<MDRBH or ≥MDRBH

B. Graders

"I would expect this patient to be referred to the hospital eye service"

C. Clinicians only

On the basis of the photographs -

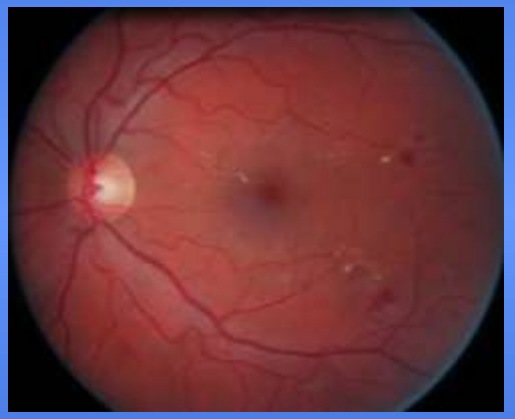
"I would expect this patient to be referred to the medical retina clinic for observation/treatment"

"I would retain this patient in the medical retina clinic for observation/treatment"

("I would wish to review this patient in xx months")

Training image set 1

Training image set 6

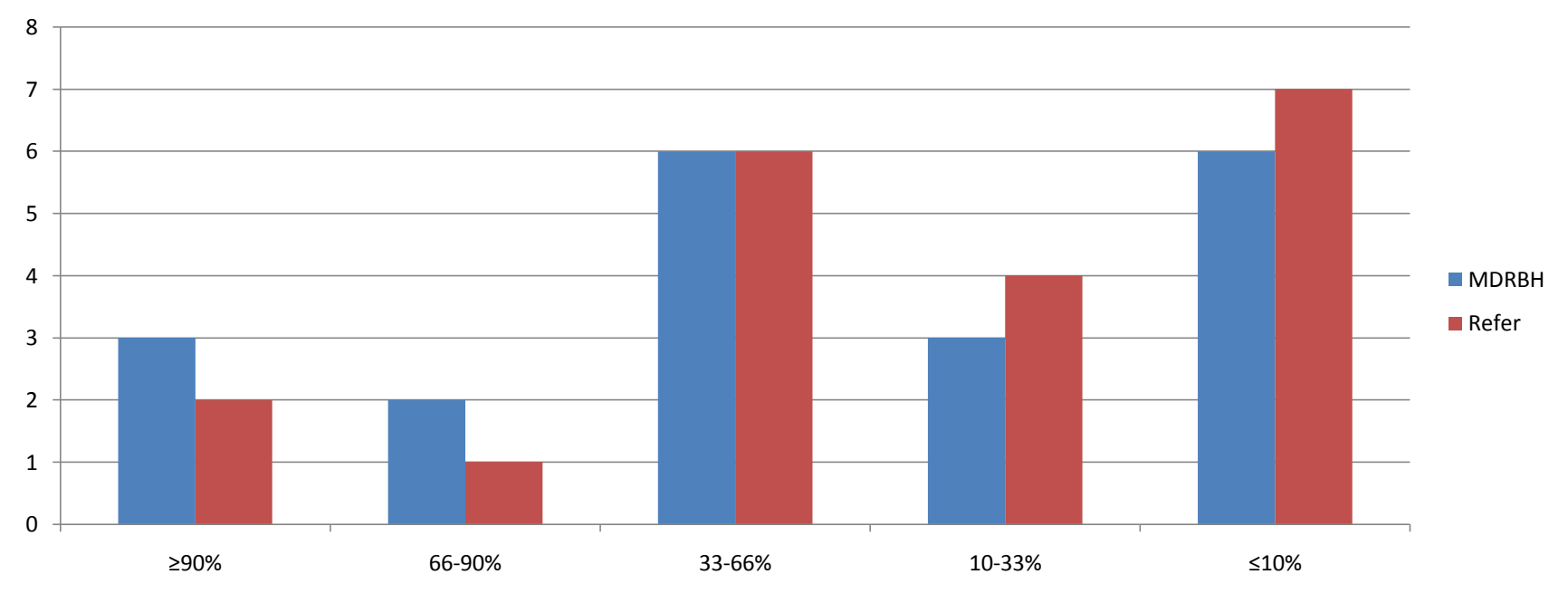


Training image set 4

Results

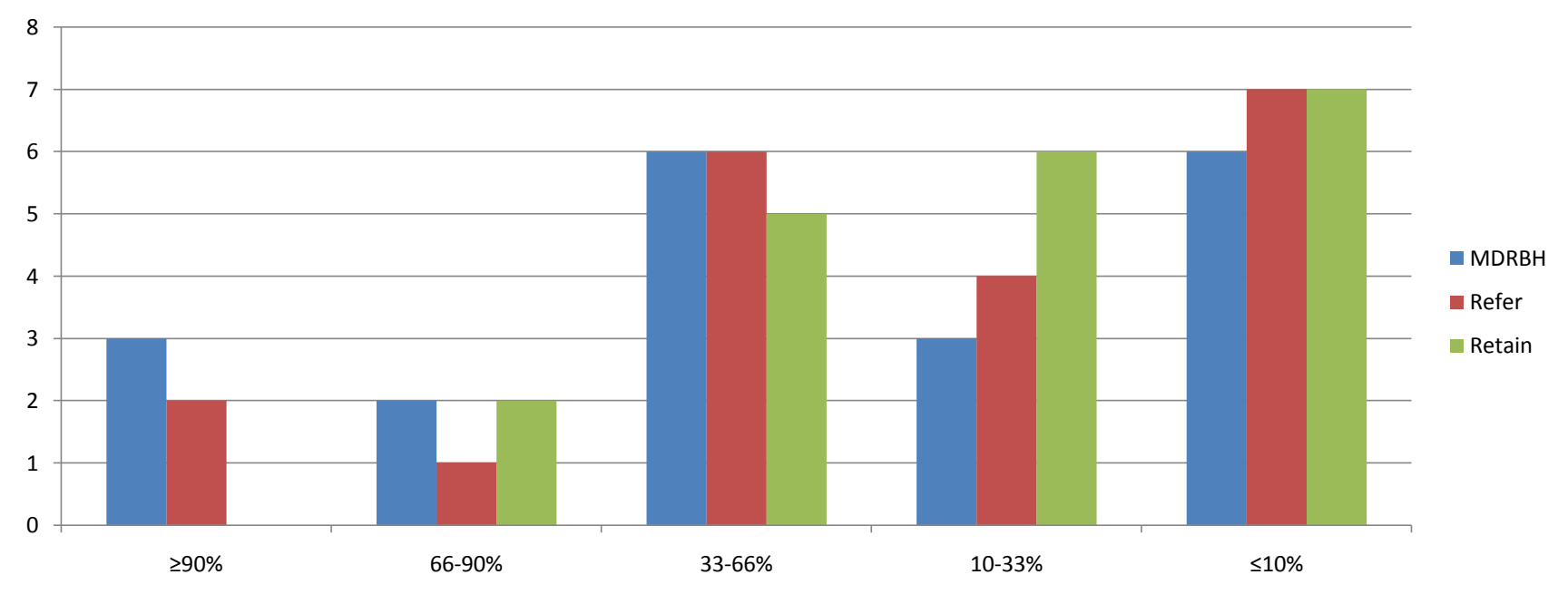
% graders grading as ≥ MDRBH	Image set
≥ 90%	5, 15, 17
≥66-90%	2, 20
≥33 - <66%	1, 4, 6, 10, 11, 14
10-33%	3, 12, 13,
≤10%	7, 8, 9, 16, 18, 19

% graders who would refer to HES	Image set
≥ 90%	5, 15
≥66-90%	17
≥33 - <66%	1, 2, 4, 6, 14, 20
10-33%	10, 11, 12, 13
≤10%	3, 7, 8, 9, 16, 18, 19



For most image sets graders exhibit a greater willingness to grade as ≥ MDRBH compared to willingness to refer.

% clinicians who would retain in HES	Image set
≥ 90%	
≥66-90%	5, 15
≥33 - <66%	4, 6, 14, 17, 20
10-33%	1, 2, 10, 11, 12, 13
≤10%	3, 7, 8, 9, 16, 18, 19



For most image sets graders were more likely to refer compared to clinicians being prepared to retain in the HES

5 image sets - large difference between grading and referral thresholds

Example image set

5,15	> MDRBH standard
17	>50% of clinicians would retain in HES
4, 6, 14	~ 50% of graders will refer to the HES but <50% clinicians would retain
1, 2, 10, 11	frequently graded as ≥ MDRBH but <50% of experienced graders would refer and <50% of clinicians would retain.

These cases are examples of cases that should not be graded as ≥ MDRBH

12, 13	some graders grade as ≥ MDRBH.
	should be graded as < MDRBH
3,7,8,9,16,18,19	definitely less than the standard.
20	inconsistent

Test image set 5

39 graded

39 HMA ≥2A
38 (97%) would refer, 1 would not refer
27 (82%) would retain, 6 would not retain
next appt: 2 mnth=2, 3 mnth=4, 4 mnth=11, 7 mnth=1

Test image set 15

37 graded

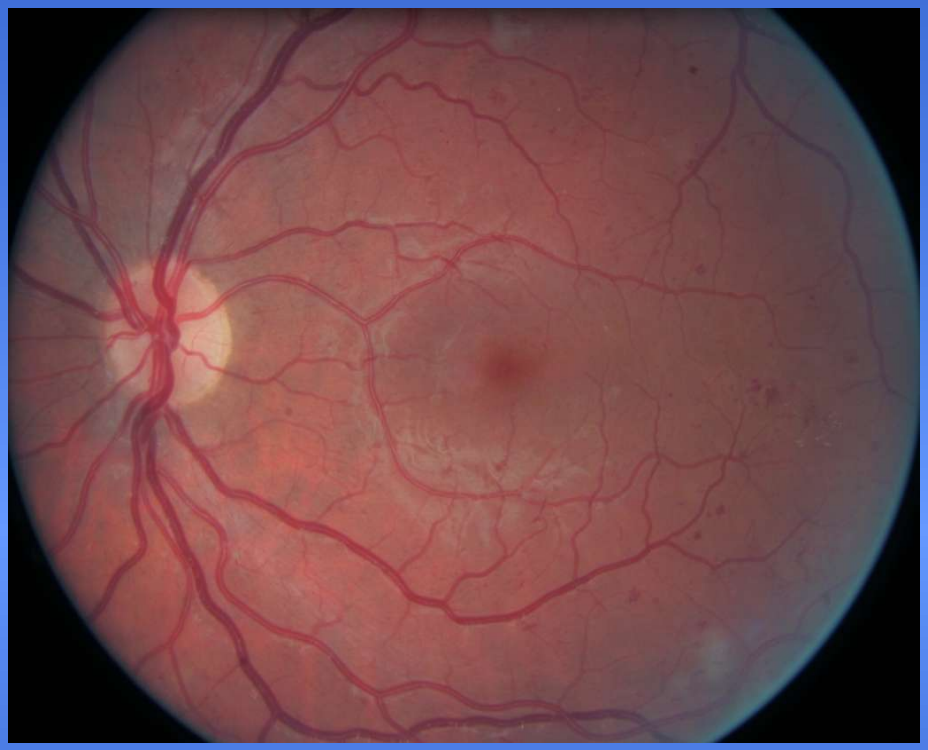
36 (97%) HMa ≥2A; 1 no HMa
37 (100%) would refer
26 (84%) would retain, 5 would not retain
next appt: 1 mnth=7, 2 mnth=4, 3 mnth=13, 4 mnth=1

Test image set 17

36 graded

36 (92%) HMa ≥2A; 3 <HMa
24 (67%) would refer; 12 would not refer
17 (57%) would retain, 13 would not retain
next appt: 3 mnth=1, 4 mnth=2, 6 mnth=12, 9 mnth=2

Test image set 4



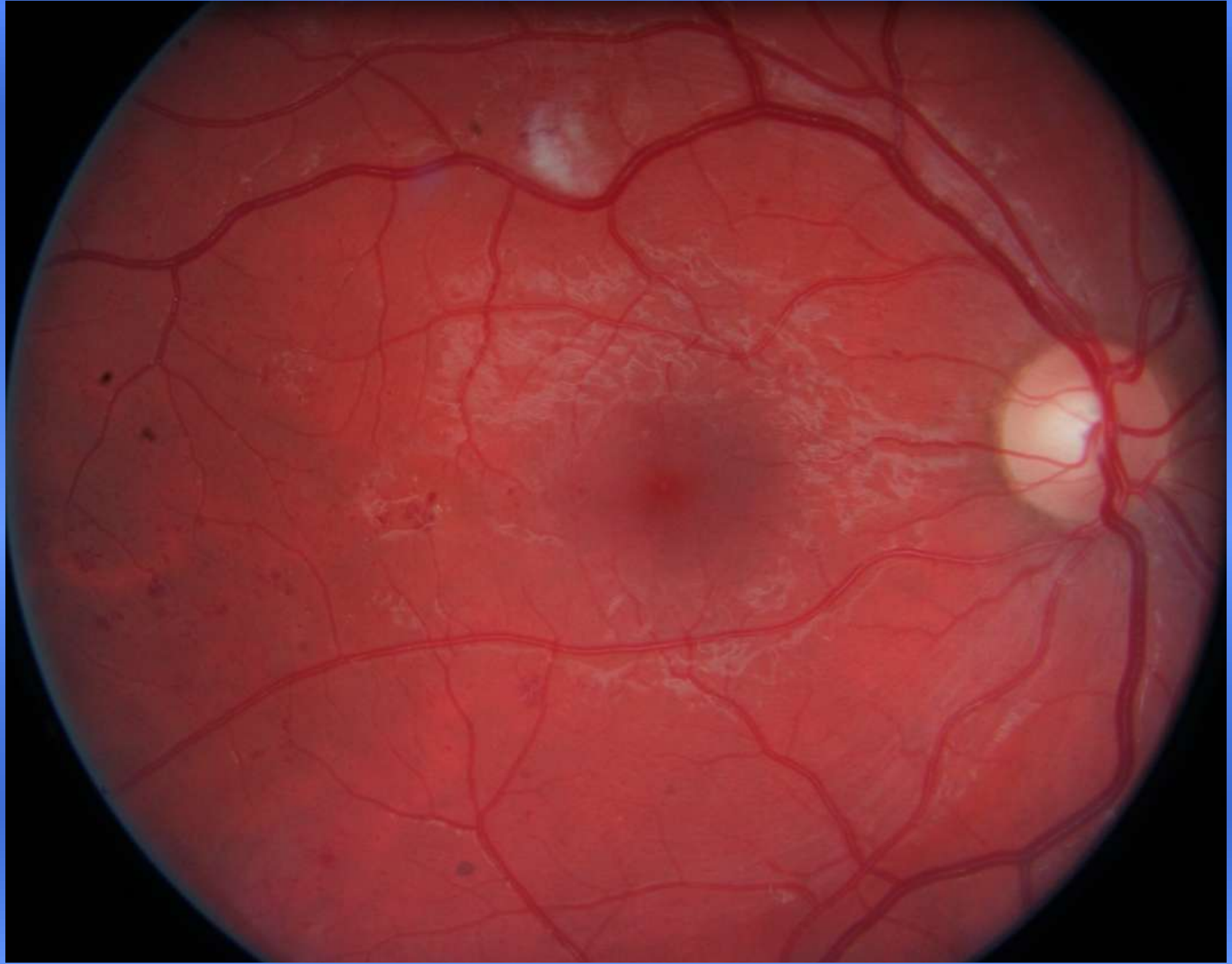
39 graded

25 (64%) HMa ≥2A; 14 <HMa
19 (49%) would refer; 20 would not refer
14 (44%) would retain, 18 would not retain

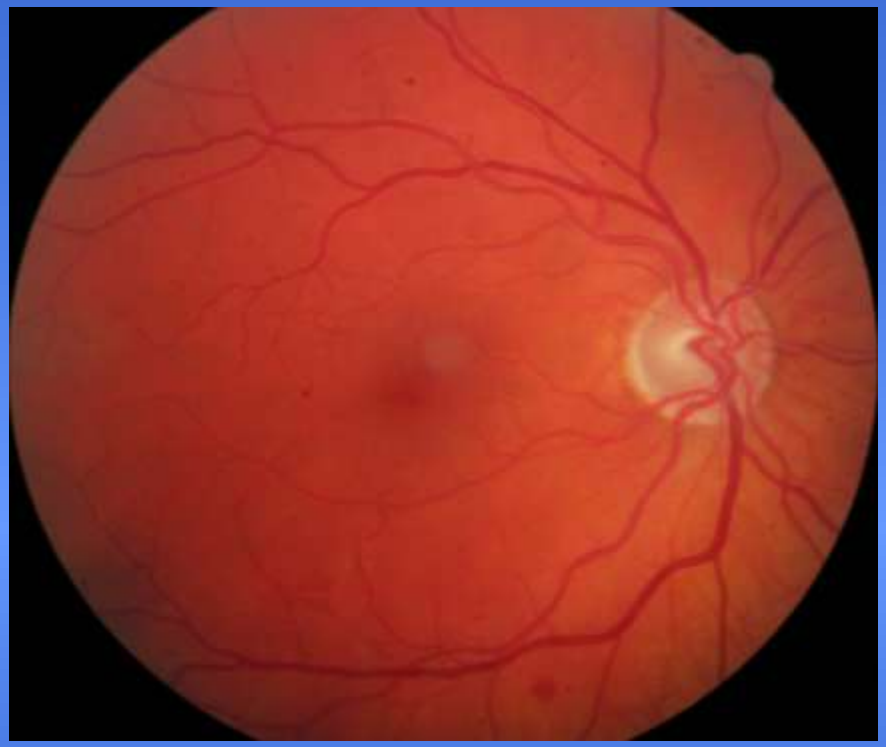
Test image set 14

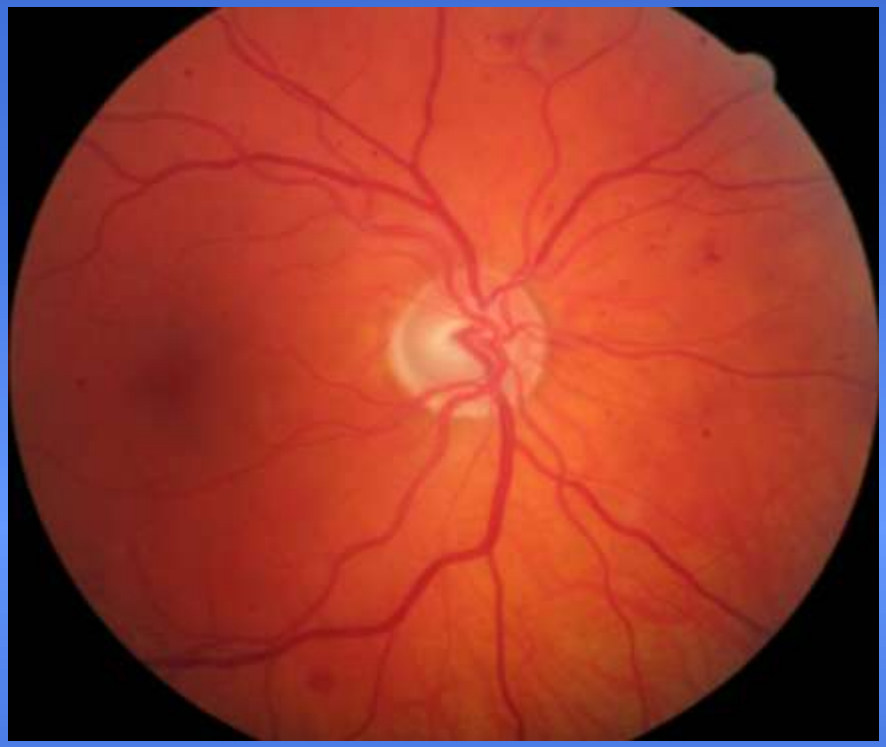
37 graded

18 (49%) HMa ≥2A, 19 HMa <2A
15 (41%) would refer, 22 would not refer
11 (35%) would retain, 20 would not retain



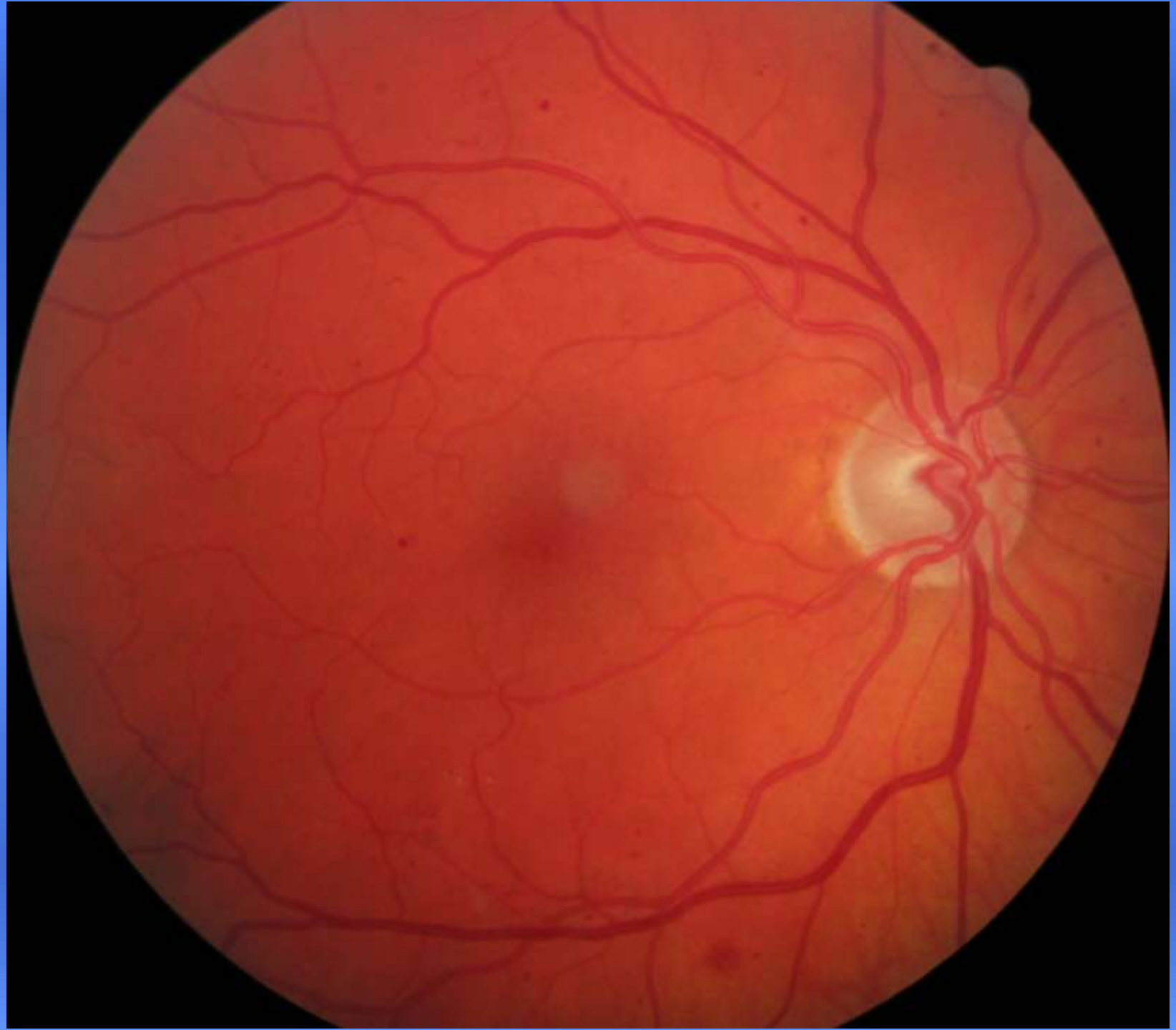
Test image set 10





37 graded

22 (59%) HMa ≥2A; 15 <HMa
10 (27%) would refer; 27 would not refer
7 (23%) would retain, 24 would not retain



Test image set 2

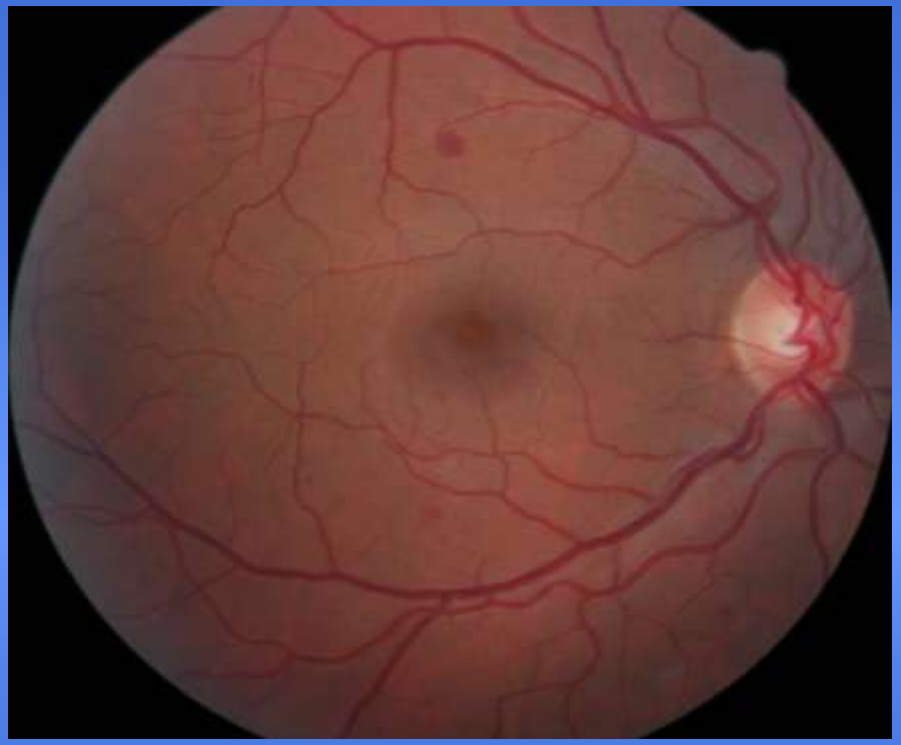
39 graded

27 (69%) HMa ≥2A; 12 <HMa

14 (36%) would refer; 25 would not refer

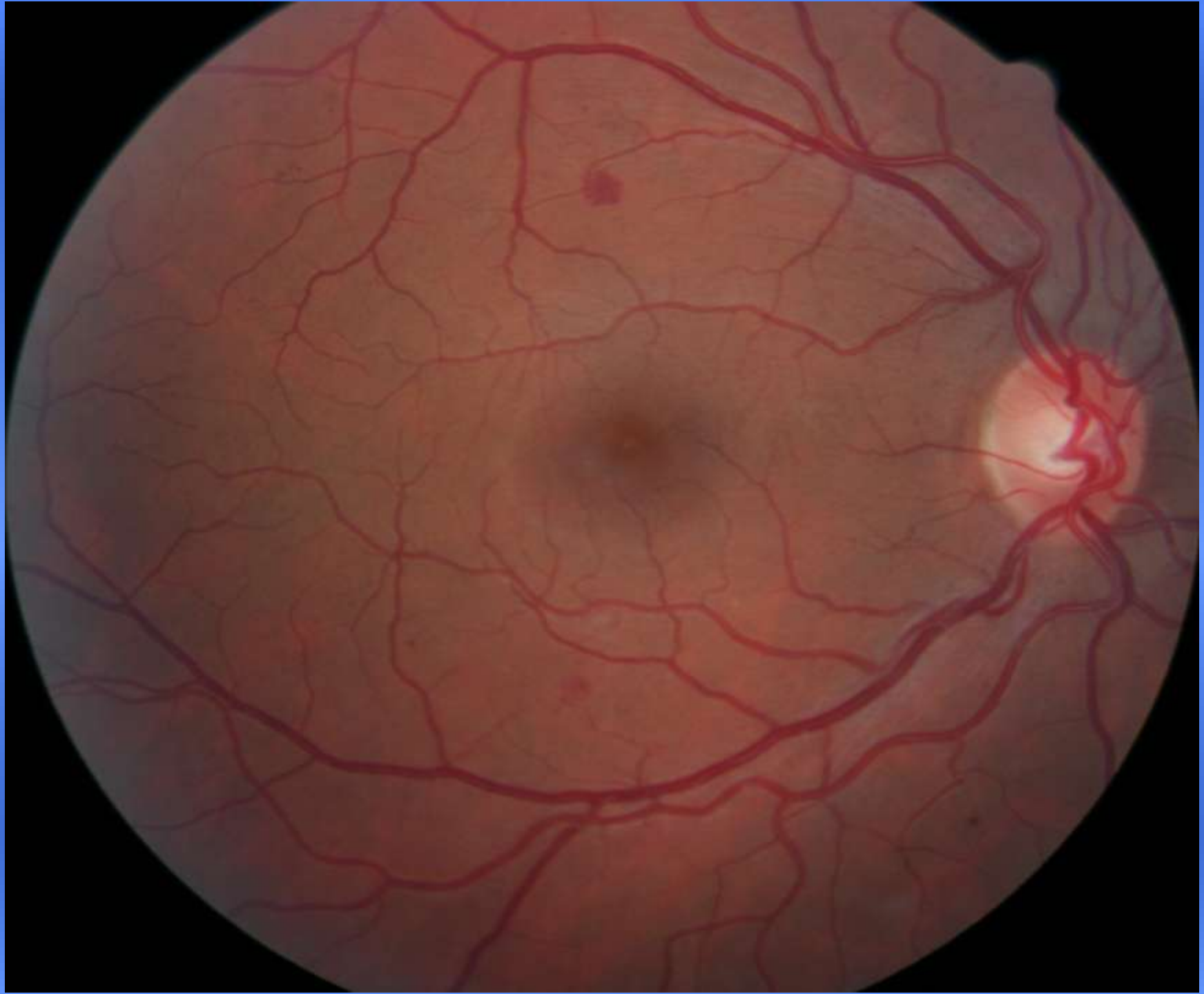
8 (26%) would retain, 23 would not retain

Test image set 16

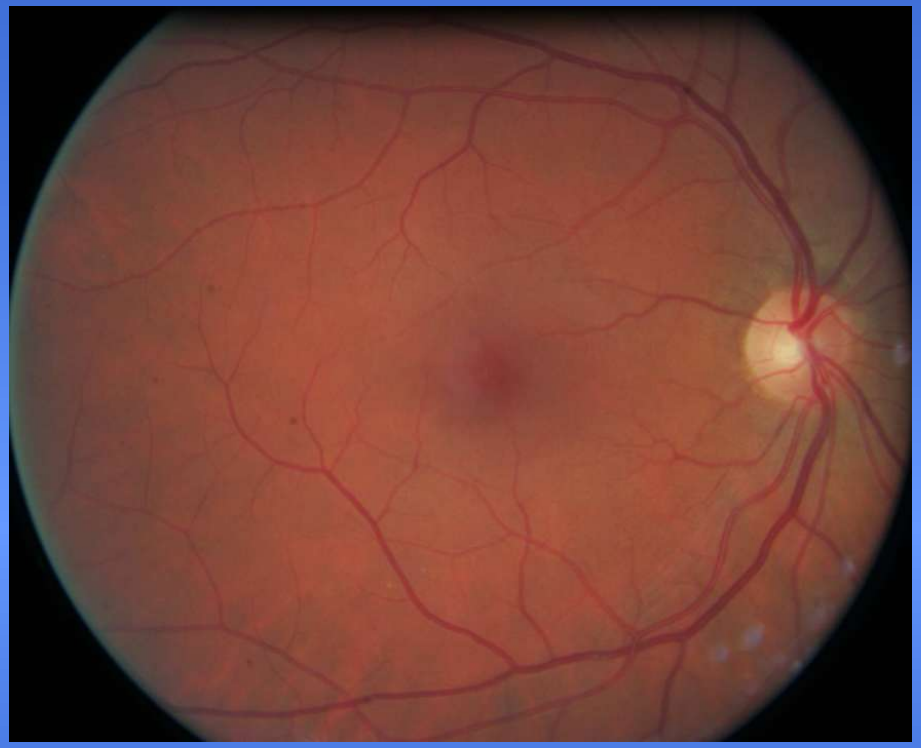


40 graded

0 (0%) HMA ≥2A
0 (0%) would refer
0 (0%) would retain

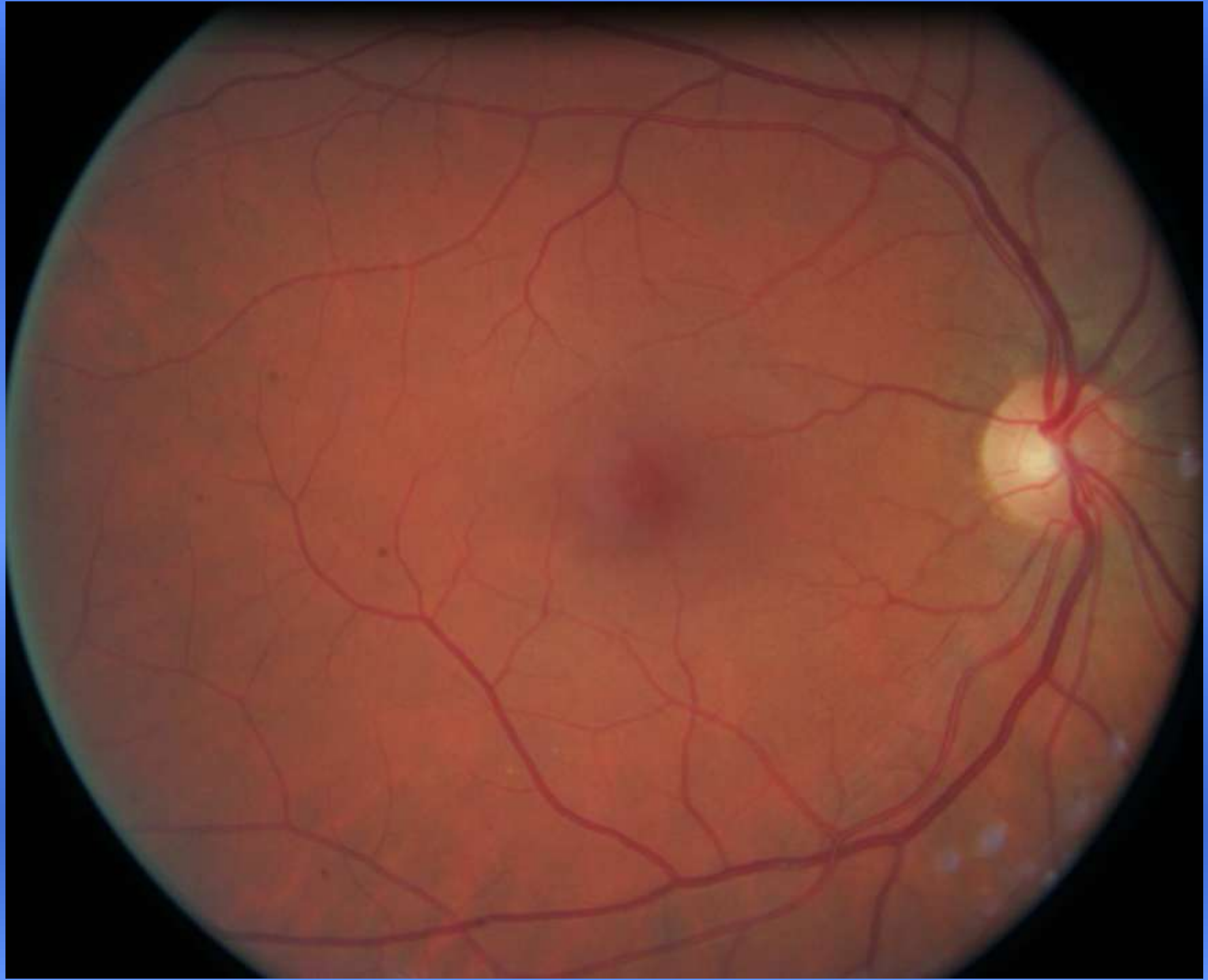


Test image set 8



37 graded

33 (89%) HMA <2A; 4 no HMa
0 (0%) would refer
0 (0%) would retain



MDRBH

presence in any part of the retina of a zone of haemorrhages/microaneurysms (HMa) greater than or equivalent to ETDRS standard #2AR in density and extent

use NSC examples as a guide to avoid over-referral

Better name?

Multiple deep round blot haemorrhages

but:

we ask graders to consider all HMA not just blots

so:

multiple dot and blot haemorrhages

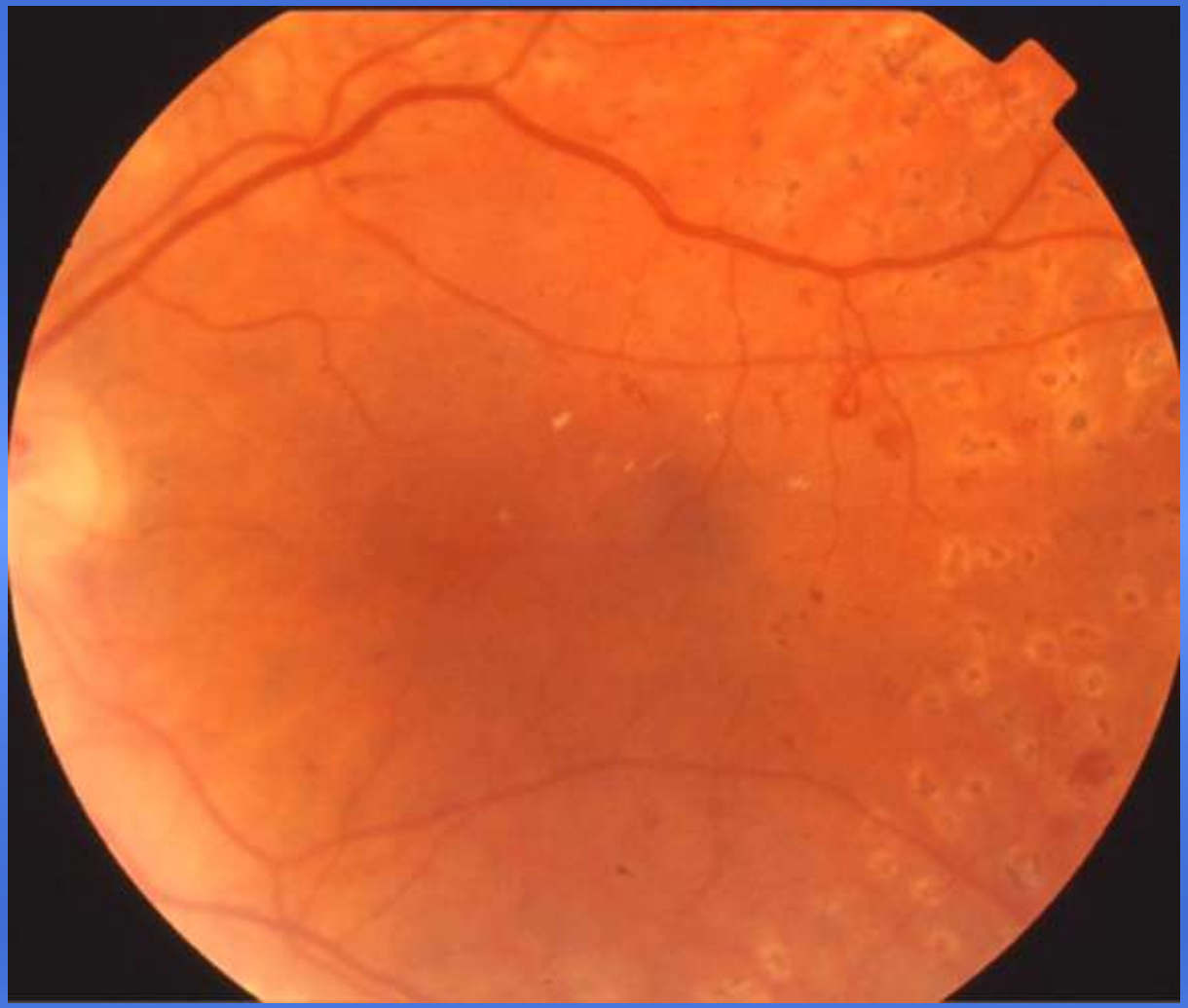
HMa ≥ NSC standard

HMa ≥ NSC #17

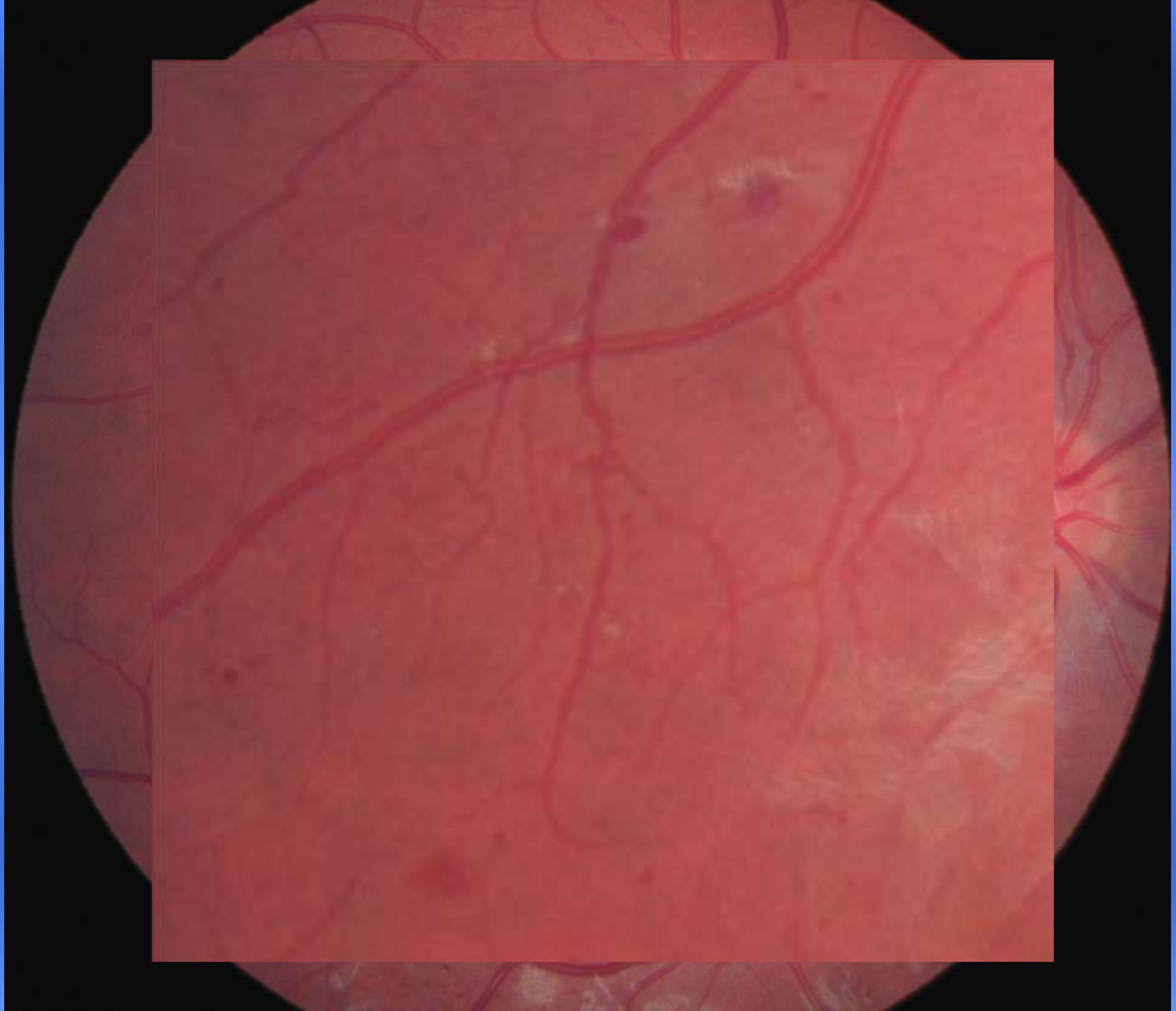
HMa and deeper haemorrhages

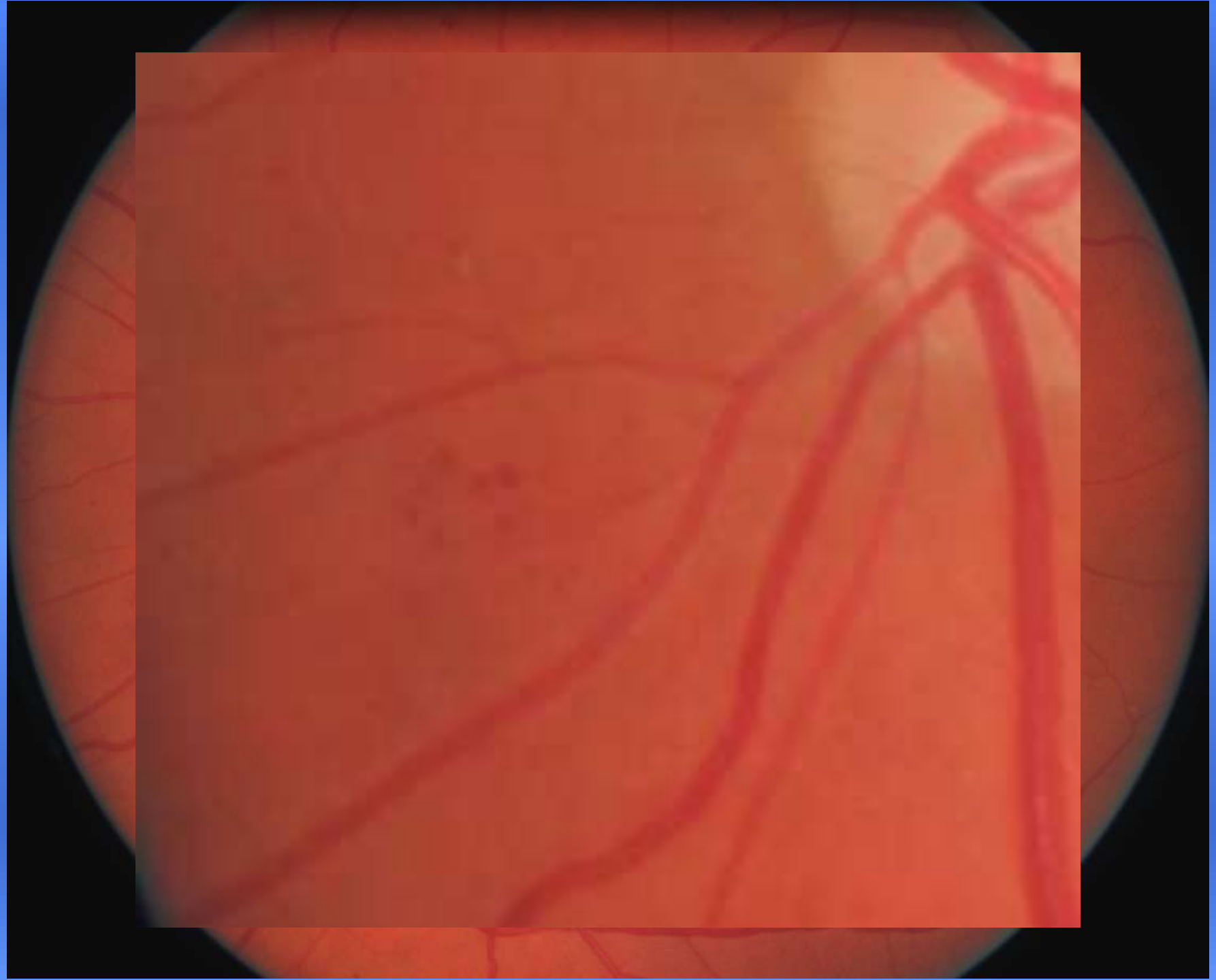
Other issues - Photocoagulation

- incidental to classification of “R”
- report presence of visible laser
- P1 macular
- P2 peripheral
- grade retinopathy seen



IRMA





Next steps

Grading and disease management subcommittee

Web based consensus process

Use evidence from screening programmes to recalculate risk based classification

www.retinalscreening.nhs.uk

Thankyou