DIABETIC RETINOPATHY

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Introduction

- Diabetes mellitus ---------- group of metabolic diseases.

- Affect various organs of the body including eye.

National / Local data

Community Based Survey: HbA1c (screening test)

18856 Participants (Aged 20 yr or more), Pakistan (16 Districts)

- **Diabetics Type II Diabetes "n = 3201"** **16.98%** (95% CI 16.44-17.51)
- **Pre-diabetics "n = 2057"** **10.91%** (95% CI 10.46 - 11.36)

Diabetic Population **19 million** **Pakistan (IDF)**

Aamir AH et al. Diabetes prevalence survey of Pakistan (DPS-PAK).BMJ Open 2019

Diabetes in Pakistan

- 537 million (53.7 crore) diabetics (world) **IDF 2021**
  By 2045 this will rise to 135.7 million

- Total adult population Pakistan (123,526,400/12.356 crore)

- Prevalence in adults 26.7 %
- Total cases in adults 32,964,500 / 3.296 crore

DIABETIC RETINOPATHY

- DIABETIS MELLITUS
- COMPLICATIONS

  RETINOPATHY

  NEPHROPATHY

  VASCULOPATHY

  PERIPHERAL NEUROPATHY

  DIABETIC FOOT

DIABETIC OCULAR MANIFESTATIONS

- LIDS & ADNEXA
- OCULAR SURFACE & CORNEA
- UVEA (Iris, CB, Choroid)
- Pupil
- LENS & GLAUCOMA
- VITREOUS, RETINA
- ORBIT & OPTIC NERVE
- CRANIAL NERVES & OCULAR MUSCLES

National / Local data:

Hospital based studies

- **DR in diabetics (NIDDM) Eye OPD (LRH) 38.4 % Yr 2003**

- **Retinal Digital Imaging Type II DM 38.34% Yr 2012 (DR) 2123 patients Endocrinology Unit/HMC**

- **DR in diabetics Retina Clinic 68.61% Yr 2018**

- **Amer AH & Sanaullah jan**. Frequency of DR in a tertiary care hospital using Digital Retinal Imaging Technology. **JPGMI 2012**; 26(1): 29-33.
- Khan MN, Naseem A, **Sanaullah jan et al.** Presentation of Diabetic Retinopathy. **JPGMI, 2003** Vol 17 (1): 26—31.
- **Sanaullah Jan et al.** Status of DR & its presentation patterns in diabetics at ophthalmology clinics. **JPGMI 2018**; 32(1):24-26.

Diabetic Retinopathy: Challenge

Remember

One third

Diabetic Population -- Diabetic Retinopathy -- Vision-threatening DR

Recent studies suggests DR progression and vision loss is lower in the modern era due to improvements in systemic control and treatment advances

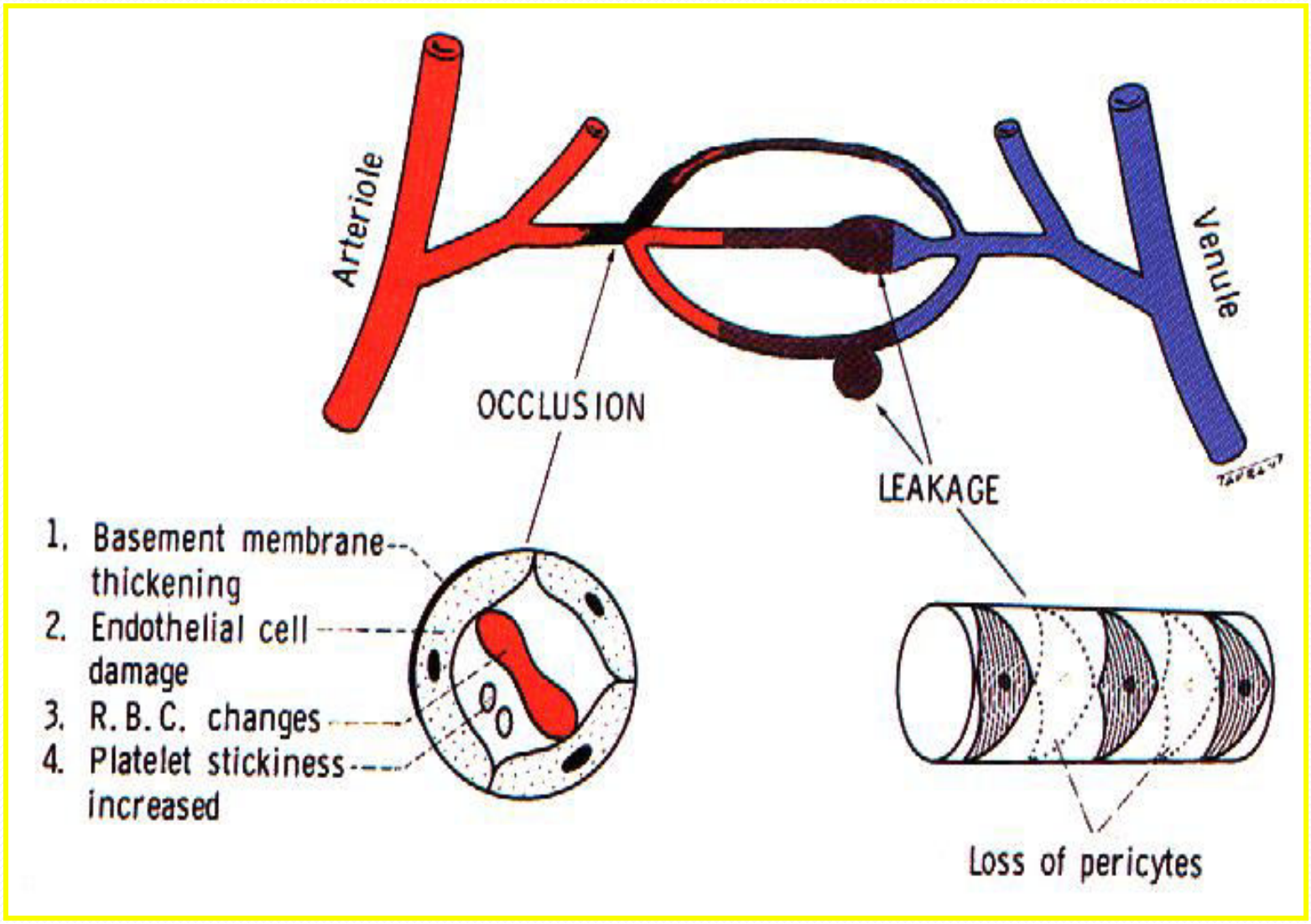
Introduction

- Diabetic retinopathy------ leading cause of preventable blindness
- Early detection and treatment---- prevent visual loss and blindness.
- One third of diabetic people :
  - Never had any ophthalmoscopic examination and that more than half of these individuals have eye disease.

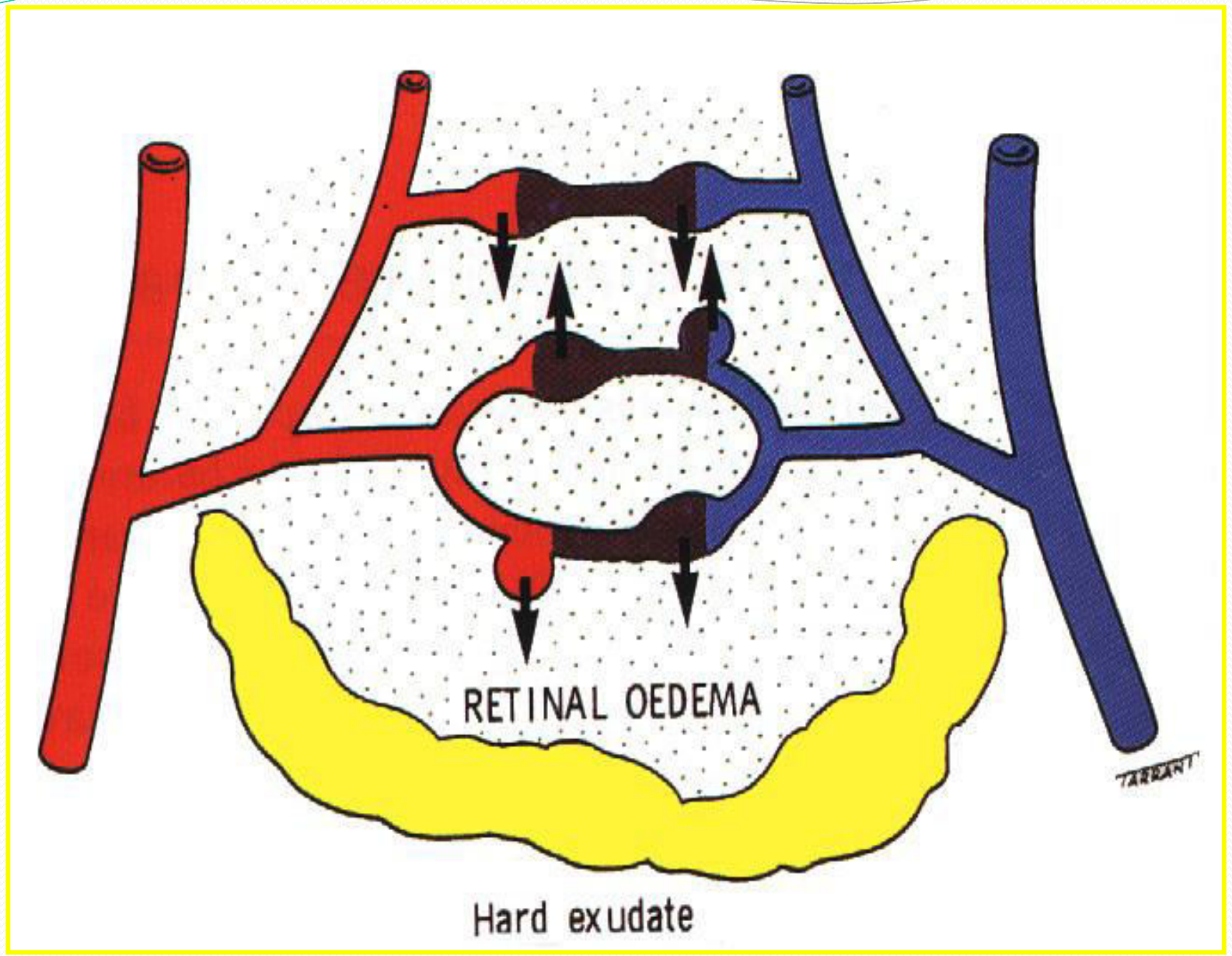
IDENTIFIED RISK FACTORS FOR DR

- Hyperglycemia
- Type of DM
- Duration of DM
- High blood pressure
- Hypercholesterolemia
- Nephropathy
- Anemia
- Pregnancy
- Puberty
- Cataract surgery
- Smoking

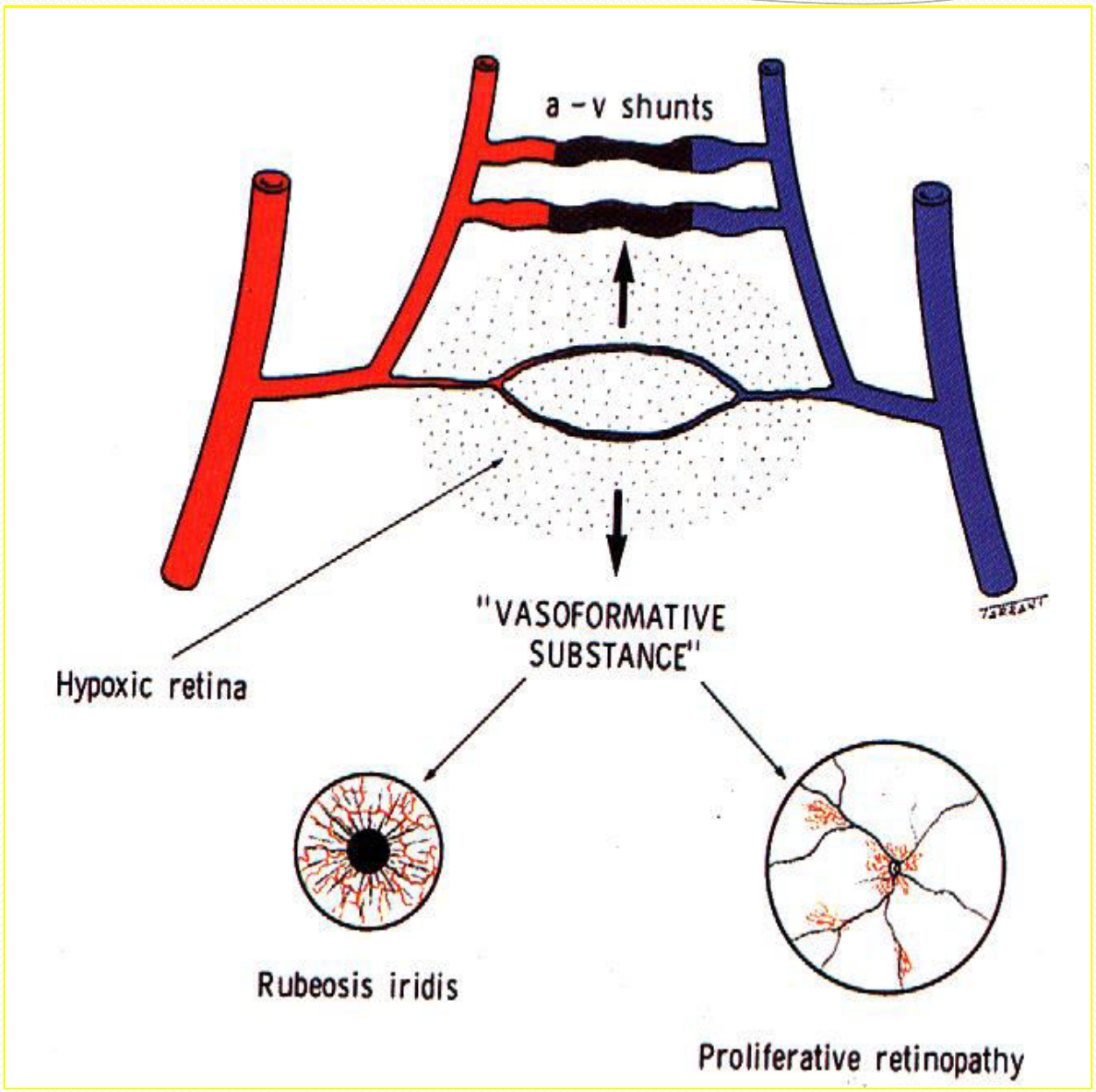
DIABETIC RETINOPATHY: Pathogenesis



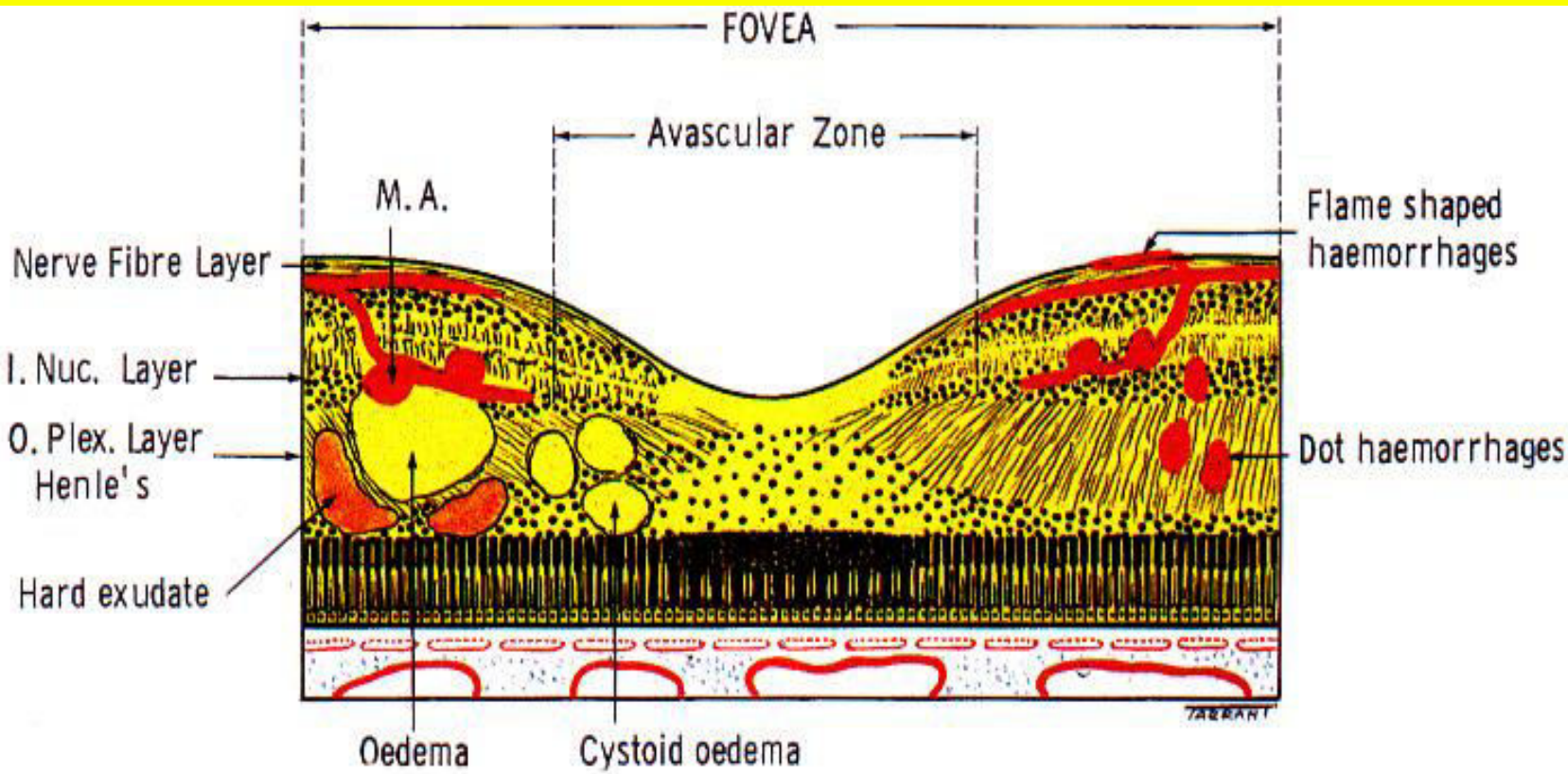
Consequences of chronic leakage



RETINAL ISCHEMIA



Location of lesions in Non-Proliferative diabetic retinopathy



Non-proliferative diabetic retinopathy (NPDR)

No DR

Very mild NPDR

Microaneurysms only

Mild NPDR

Any or all of: microaneurysms, retinal haemorrhages, exudates, cotton wool spots, up to the level of moderate NPDR. No intraretinal microvascular anomalies (IRMA) or significant beading

Moderate NPDR

- Severe retinal haemorrhages (more than ETDRS standard photograph 2A: about 20 medium–large per quadrant) in 1–3 quadrants or mild IRMA
- Significant venous beading can be present in no more than 1 quadrant
- Cotton wool spots commonly present

Severe NPDR

The 4–2–1 rule; one or more of:

- Severe haemorrhages in all 4 quadrants
- Significant venous beading in 2 or more quadrants
- Moderate IRMA in 1 or more quadrants

Very severe NPDR

Two or more of the criteria for severe NPDR

Proliferative diabetic retinopathy (PDR)

Mild–moderate PDR

New vessels on the disc (NVD) or new vessels elsewhere (NVE), but extent insufficient to meet the high-risk criteria

High-risk PDR

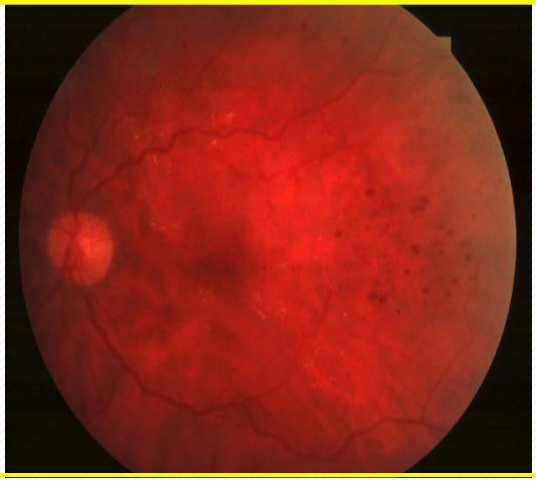
- New vessels on the disc (NVD) greater than ETDRS standard photograph 10A (about ⅓ disc area)
- Any NVD with vitreous haemorrhage
- NVE greater than ½ disc area with vitreous haemorrhage

Advanced diabetic eye disease

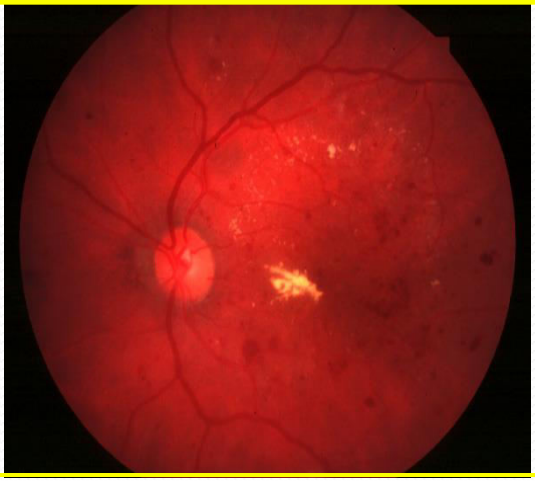
1. Persistent vitreous hemorrhage
2. Tractional retinal detachement
3. NVG

ETDRS Classification of Diabetic retinopathy

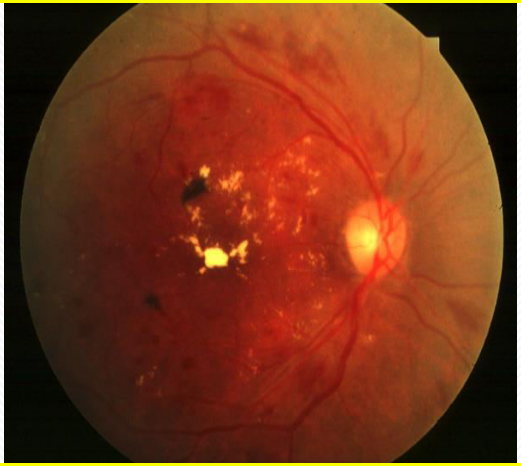
Diabetic retinopathy: NPDR



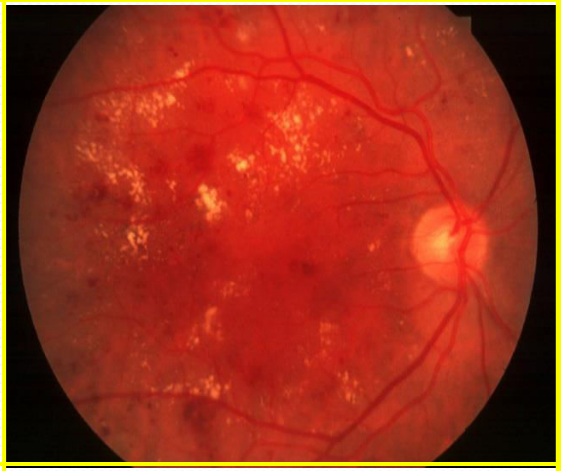
Microaneurysms



Intraretinal dot and blot haemorrhages



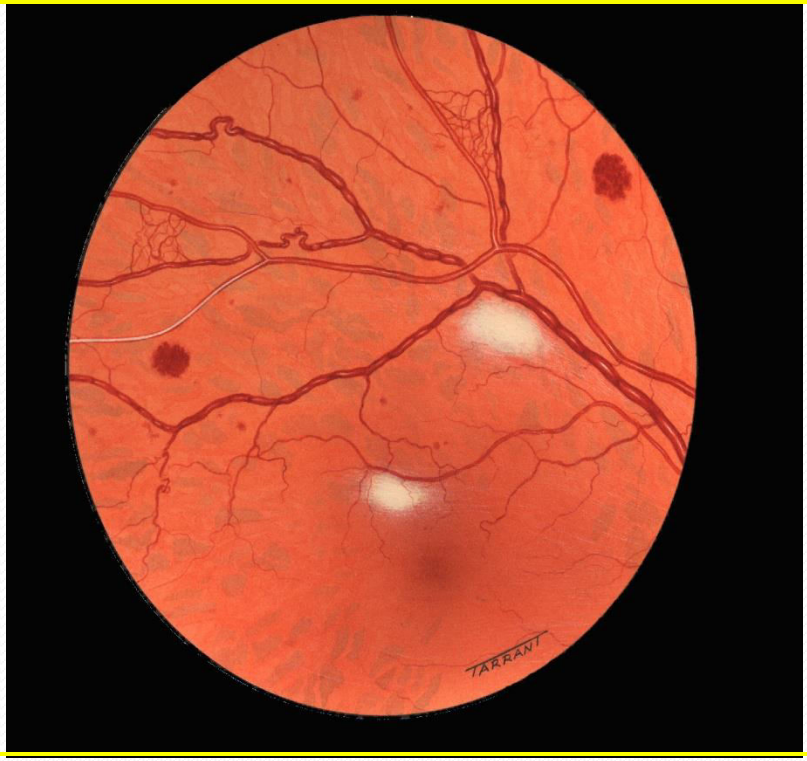
Hard exudates



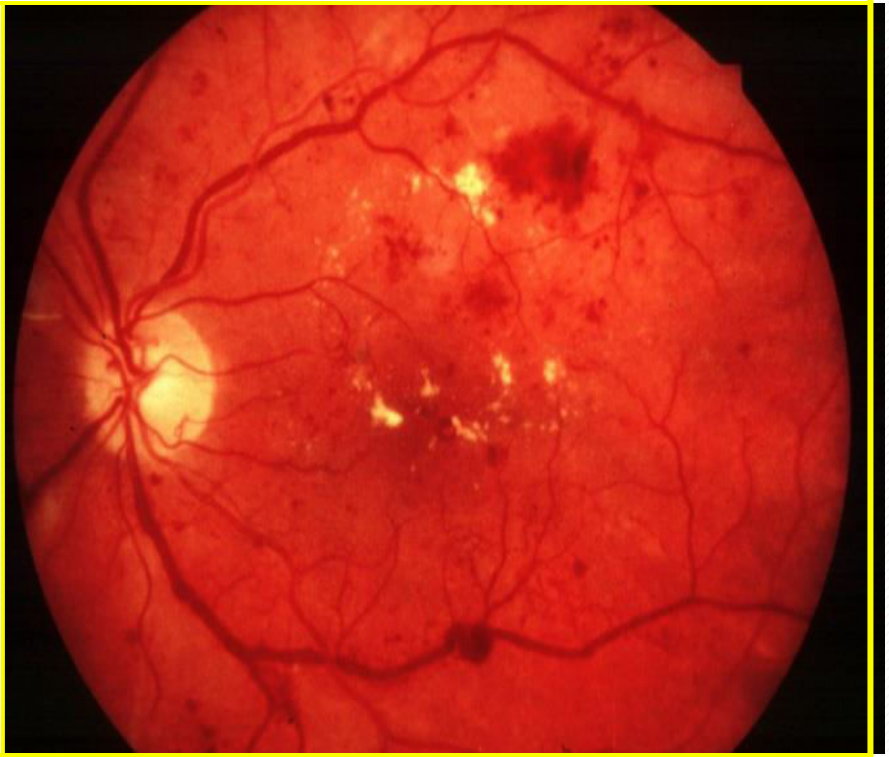
Retinal edema

Non-Proliferative diabetic retinopathy

Signs



- Cotton-wool spots
- Venous irregularities



- Dark blot haemorrhages
- Intraretinal microvascular abnormalities (IRMA)

Treatment - watch for proliferative disease

Proliferative diabetic retinopathy

- Affects 5-10% of diabetics
- IDD at increased risk (60% after 30 years)

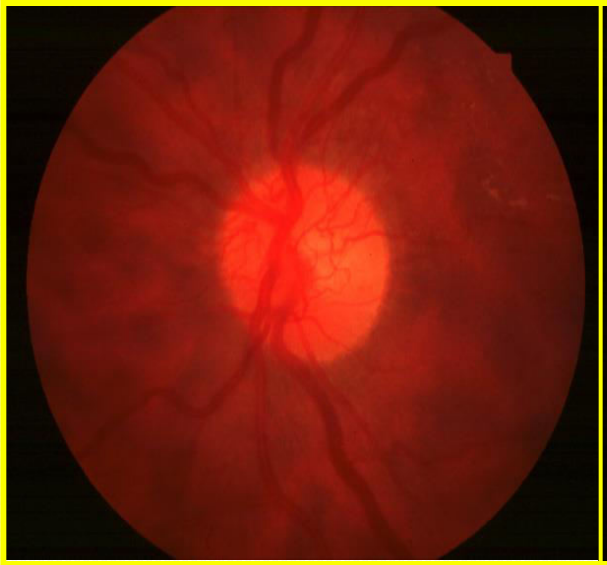
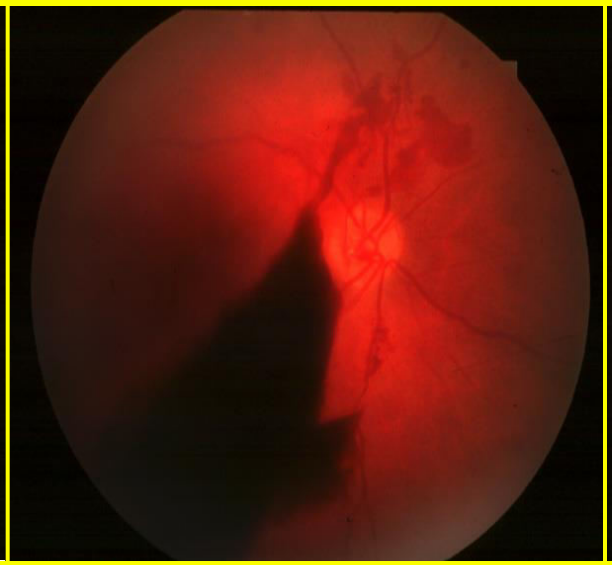
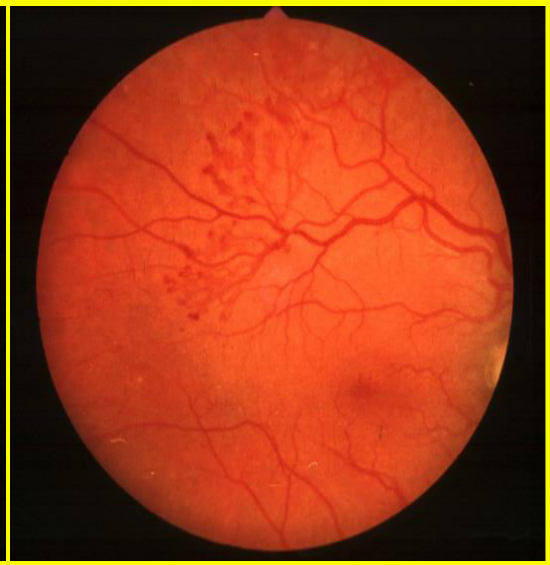
Neovascularization

- Flat or elevated
- Severity determined by comparing with area of disc

Neovascularization of disc

Neovascularization elsewhere

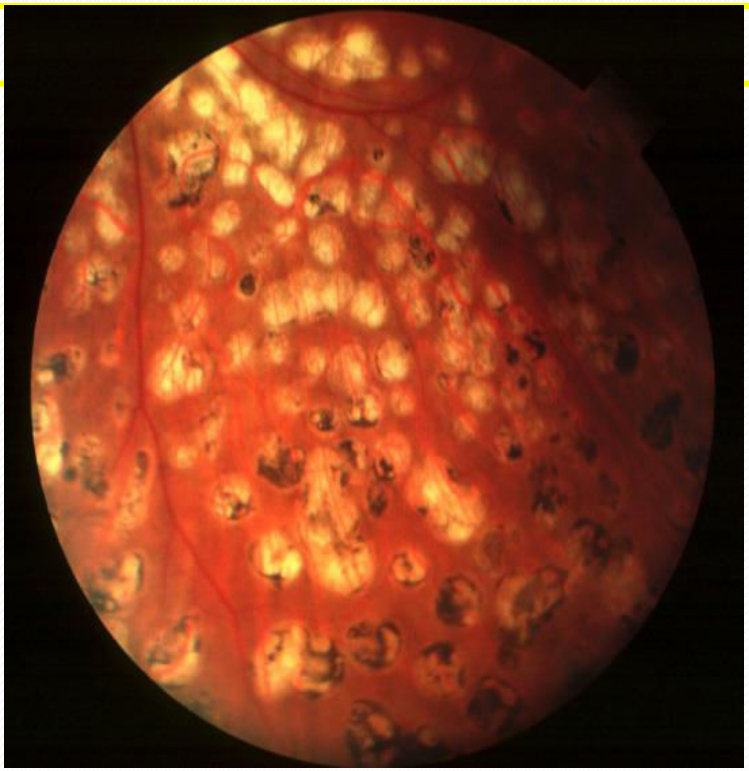
Indications for treatment of proliferative diabetic retinopathy

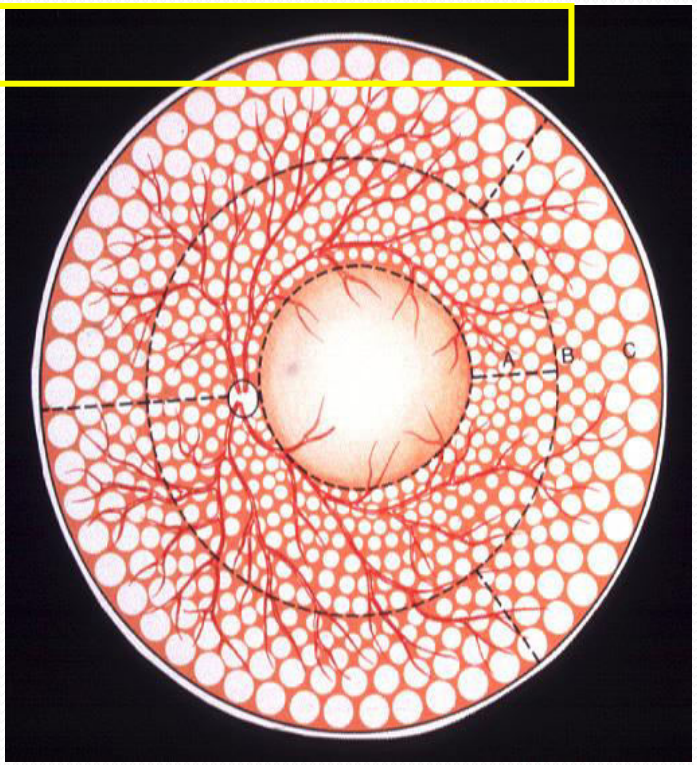
		
NVD > 1/3 disc in area	Less extensive NVD + haemorrhage	NVE > 1/2 disc in area + haemorrhage

Proliferative diabetic retinopathy

50% of untreated patients with proliferative retinopathy------- legally blind -----five years

Laser Pan-Retinal Photocoagulation

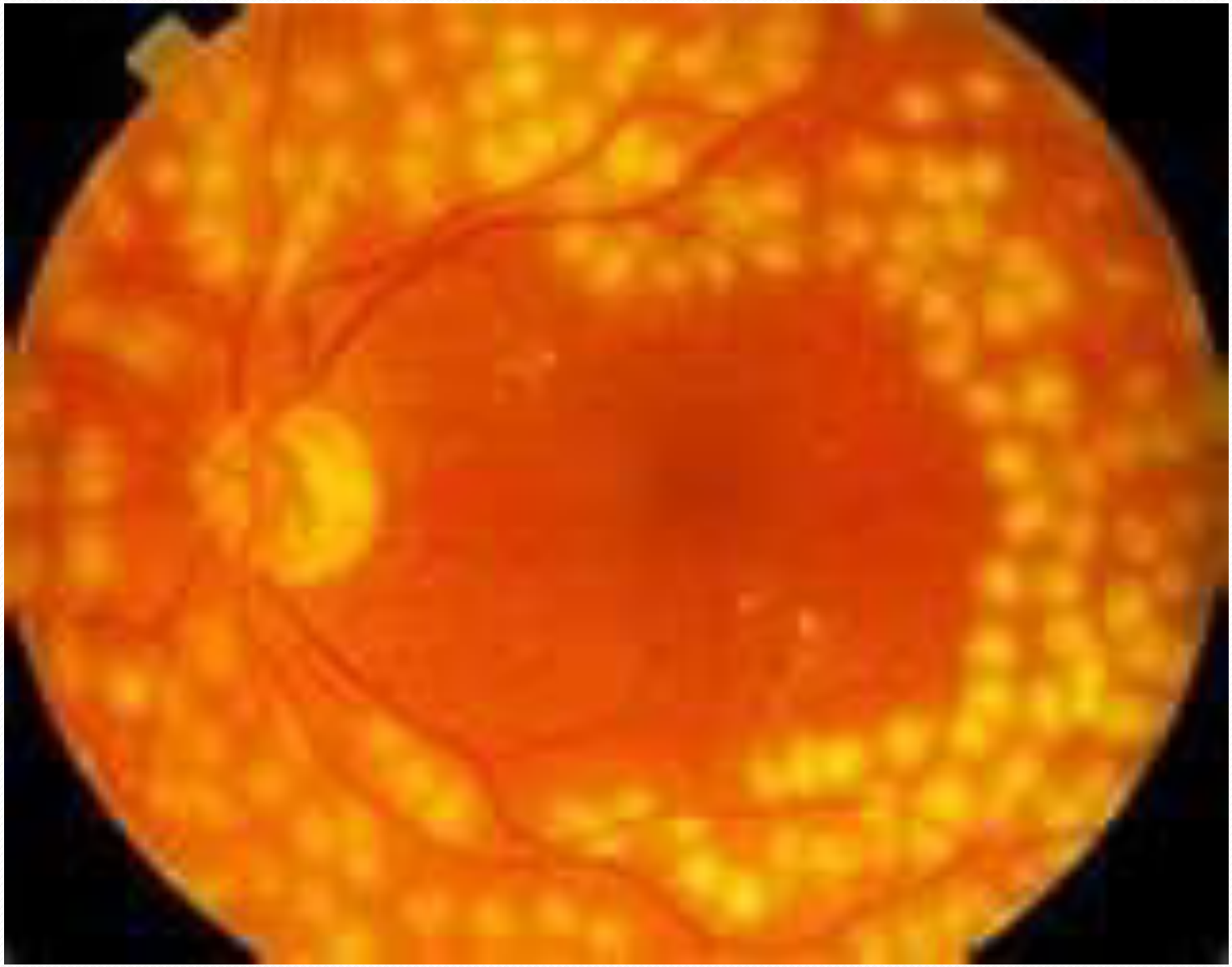




- Initial treatment is 2000-3000 burns
- Spot size (200-500 µm) depends on contact lens magnification
- Gentle intensity burn

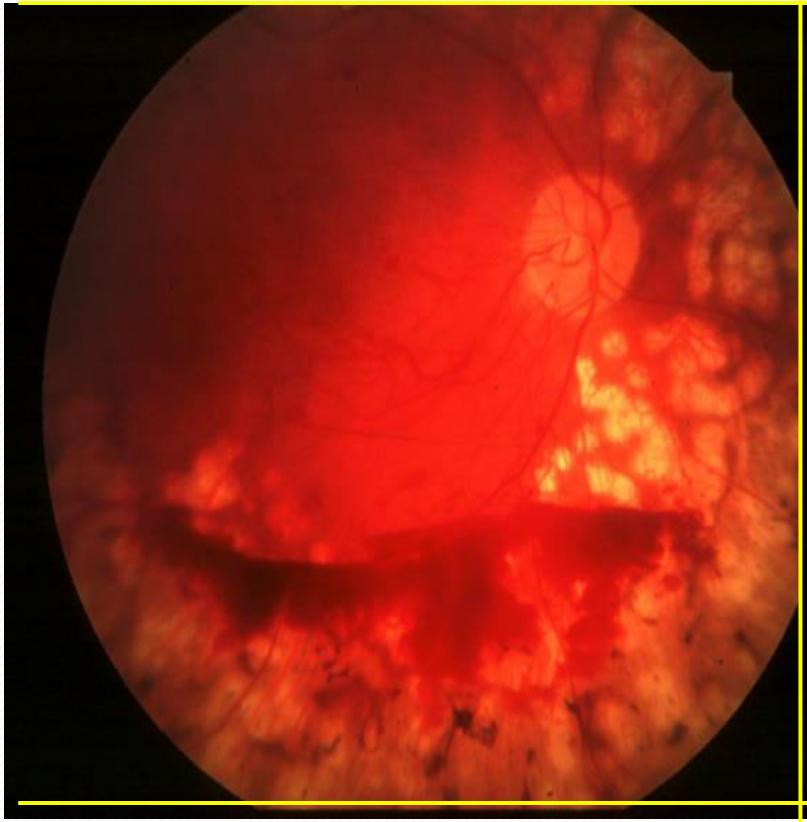
Area covered by complete PRP

Follow-up 4 to 8 weeks



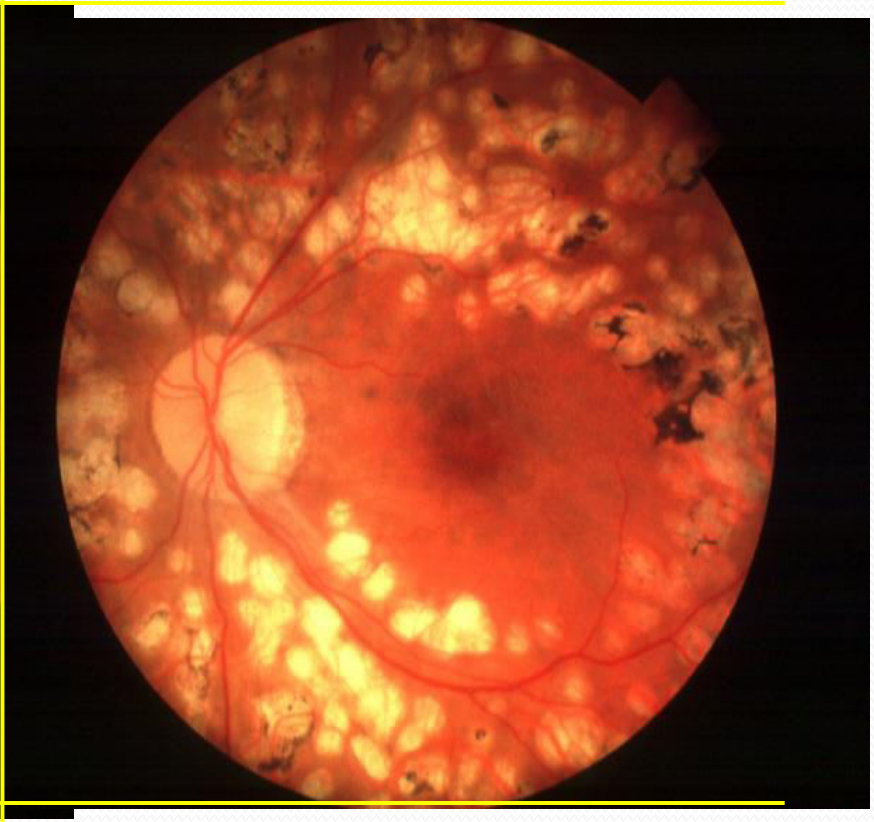
Assessment after photocoagulation

Poor involution



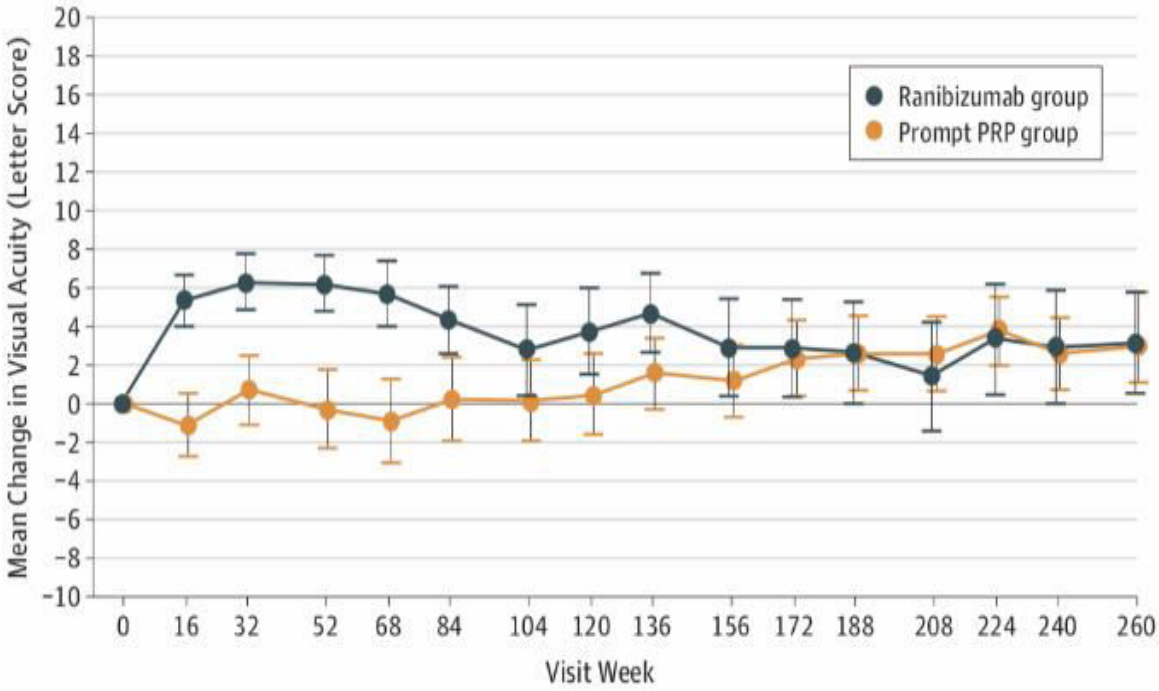
- Persistent neovascularization
- Haemorrhage
- Re-treatment required

Good involution



- Regression of neovascularization
- Residual ‘ghost’ vessels or fibrous tissue
- Disc pallor

Protocol S: 5 yr Results Visual Acuity Change



No. of eyes					
Ranibizumab group	191	160	139	124	117
Prompt PRP group	203	168	146	134	123
Change in visual acuity, mean (SD)					
Ranibizumab group		2.8 (15.2)	2.9 (14.9)	1.4 (15.7)	3.1 (14.3)
Prompt PRP group		0.2 (13.7)	1.2 (11.4)	2.6 (11.0)	3.0 (10.5)
Adjusted difference (95% CI)		2.2 (-0.5 to 5.0)	1.6 (-1.1 to 4.3)	-0.7 (-4.0 to 2.5)	0.6 (-2.3 to 3.5)
P value		.11	.24	.66	.68

Ocular & Systemic Adverse Effects

Variable	No. (%) Participants With 2 Study Eyes (1 in Each Group)	Ranibizumab Group	PRP Group	*P* Value
Systemic Adverse Events[a,b]				
No. of participants	89	102	114[c]	NA
Vascular events defined by APTC criteria occurring at least once through 5 y[d]				
Nonfatal myocardial infarction[e]	3 (3)	6 (6)	4 (4)	.64
Nonfatal stroke[e]	3 (3)	6 (6)	7 (6)	.65
Death due to potential vascular cause or unknown cause[f]	6 (7)	7 (7)	2 (2)	.13
Any event	12 (13)	18 (18)	12 (11)	.31
Prespecified events occurring at least once through 5 y				
Death from any cause	8 (9)	13 (13)	7 (6)	.24
Hospitalization	54 (61)	66 (65)	61 (54)	.24
Serious adverse event	56 (63)	68 (67)	63 (55)	.21
Hypertension	28 (31)	38 (37)	28 (25)	.13
Ocular Adverse Events[a,g]				
No. of eyes	NA	191	203	NA
No. of injections	NA	3132	981	NA
Ocular adverse events occurring at least once through 5 y				
Endophthalmitis	NA	1 (<1)	0	NA
Inflammation[h]	NA	3 (2)	10 (5)	.05
Retinal tear	NA	1 (<1)	0	NA
Cataract surgery	NA	31 (16)	38 (19)	.62
Elevation in IOP (met any of the criteria)[i]	NA	30 (16)	36 (18)	.58
Increase of IOP ≥10 mm Hg from baseline at any visit	NA	17 (9)	29 (14)	.10
IOP ≥30 mm Hg at any visit	NA	6 (3)	11 (5)	.39
Initiation of glaucoma medications at any visit	NA	18 (9)	21 (10)	.67
Received glaucoma procedure at any visit	NA	6 (3)	4 (2)	.37

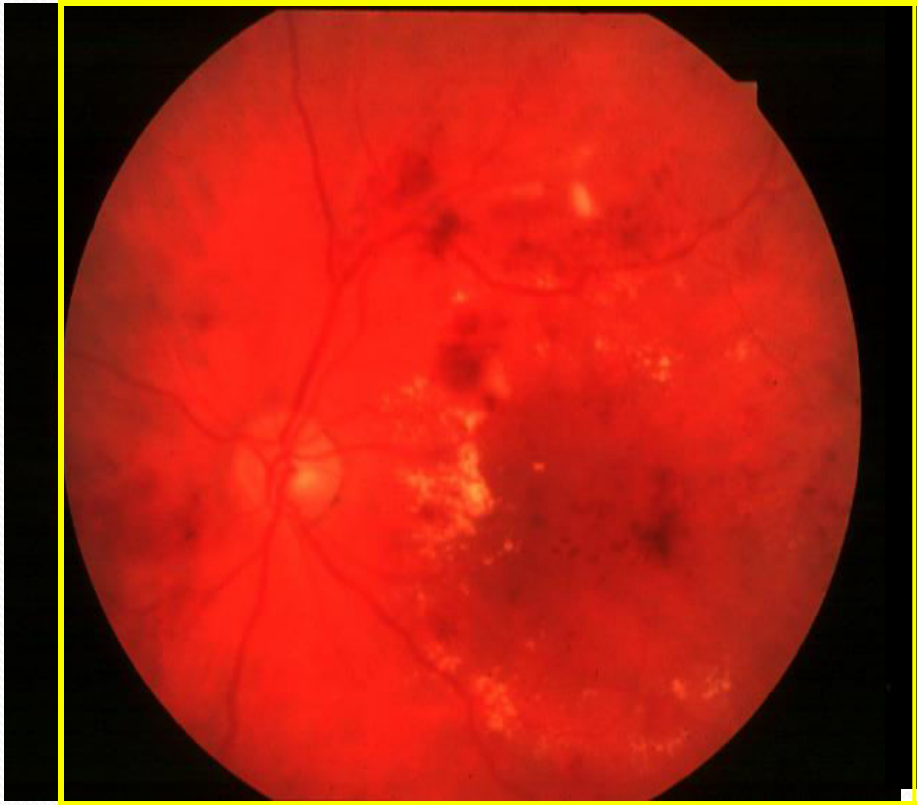
PDR: How to treat?

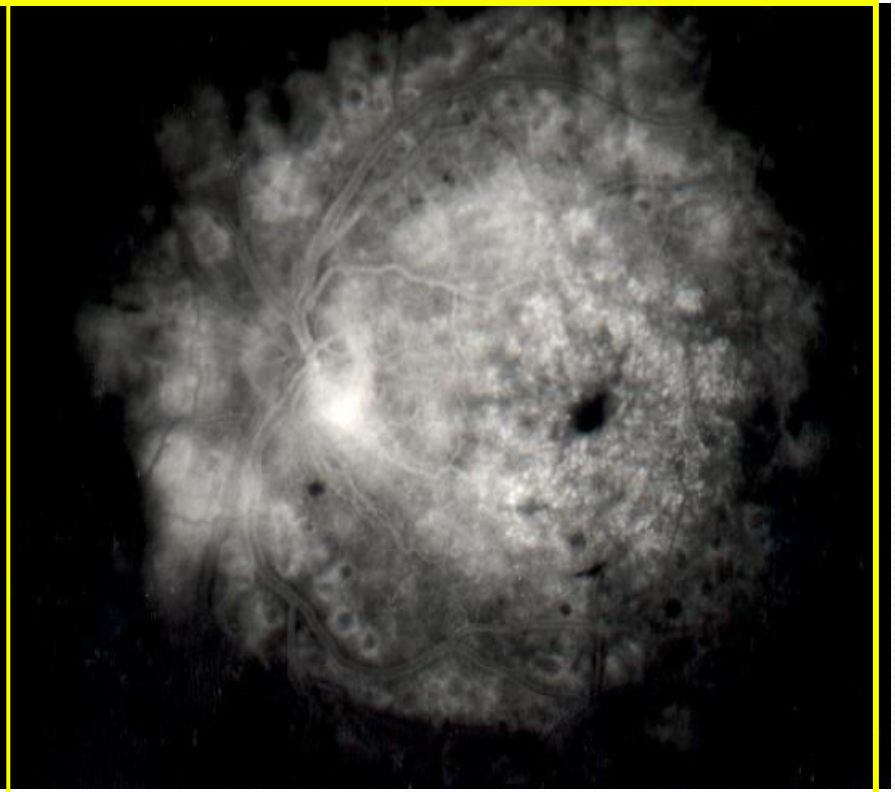
Protocol *S* : Individualized your patients

This should be based on

- **Systemic risk factors control**
- **Cost**
- **Compliance**
- **Presence of DME**

Diffuse diabetic maculopathy

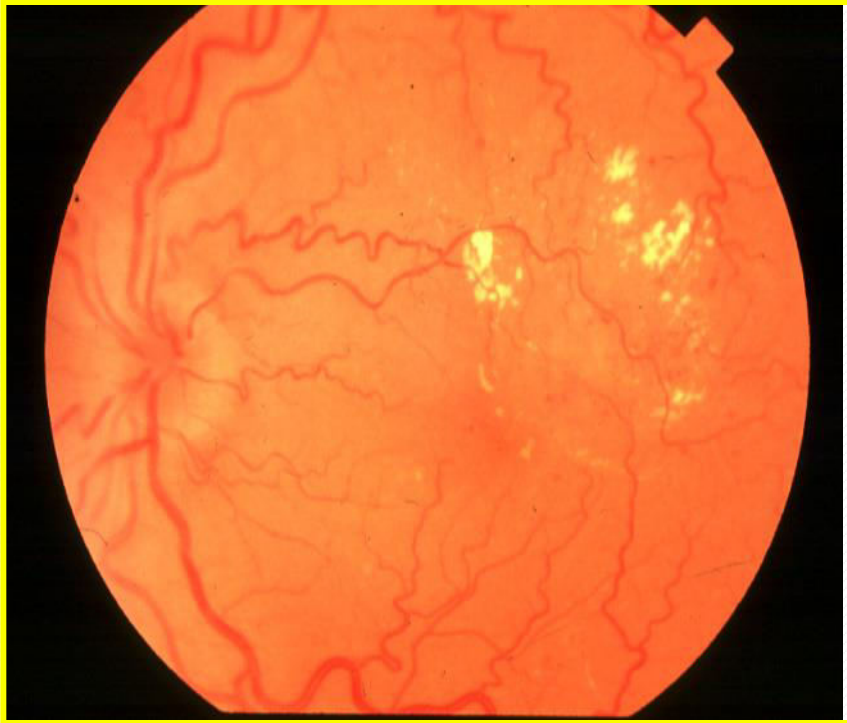




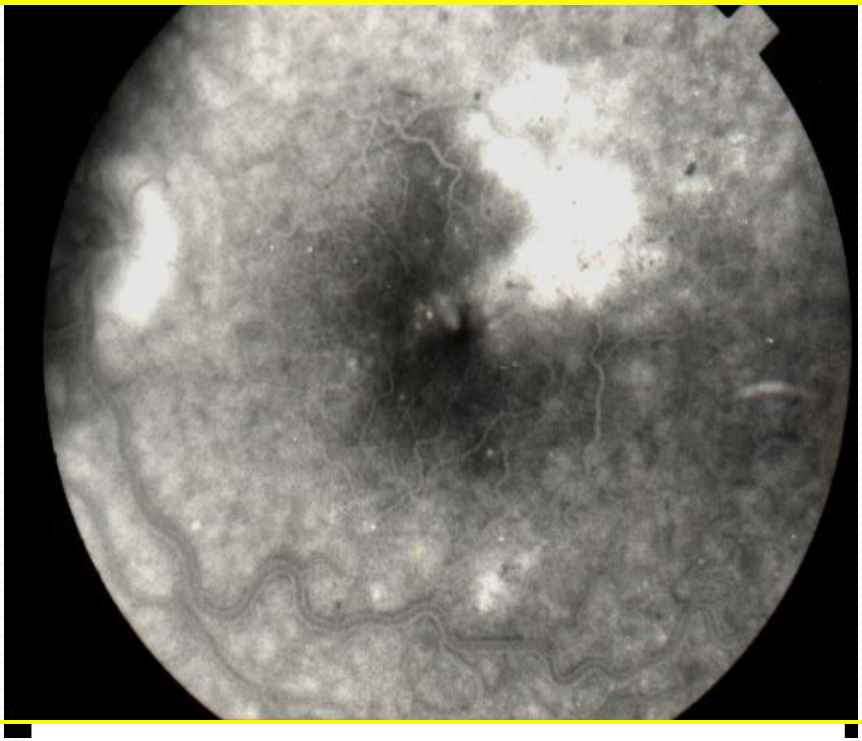
- Diffuse retinal thickening
- Cystoid macular oedema
- Impairment of visual acuity

- Generalized leakage on FA
- Grid photocoagulation ??
- Anti-VEGF

Focal diabetic maculopathy

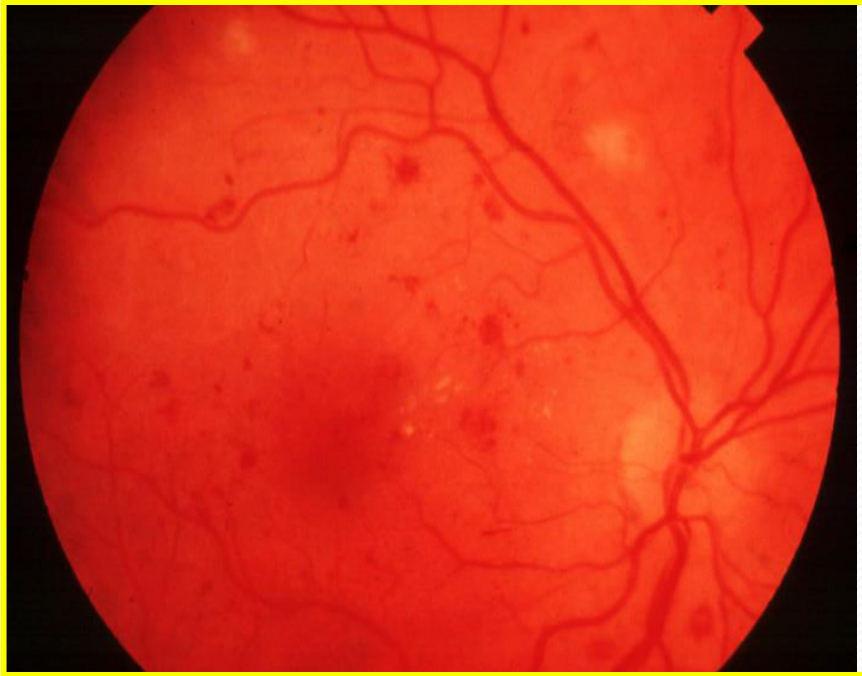


- Circumscribed retinal thickening
- Complete or incomplete circinate hard exudates

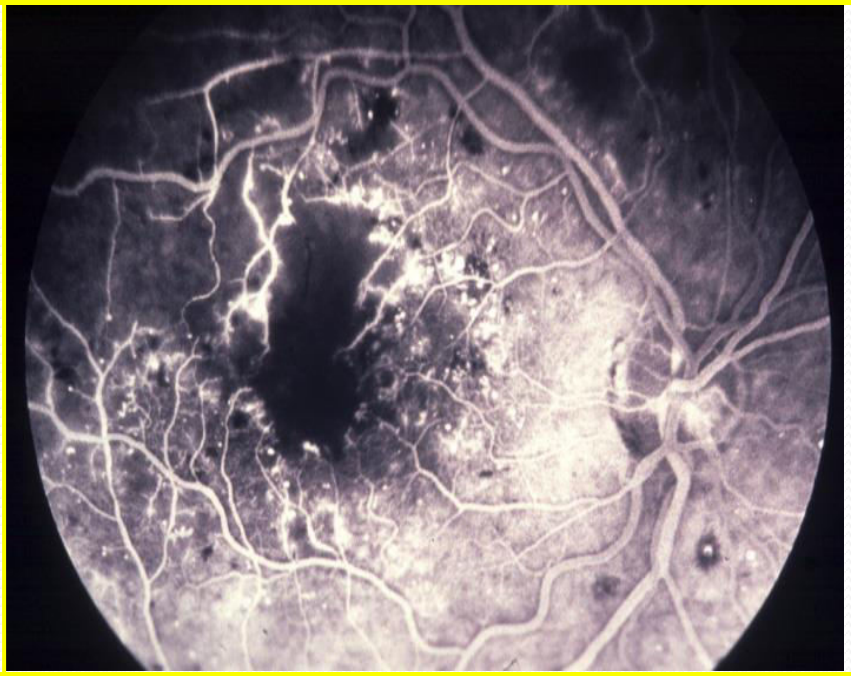


- Focal leakage on FA
- Focal photocoagulation
- Good prognosis

Ischaemic diabetic maculopathy

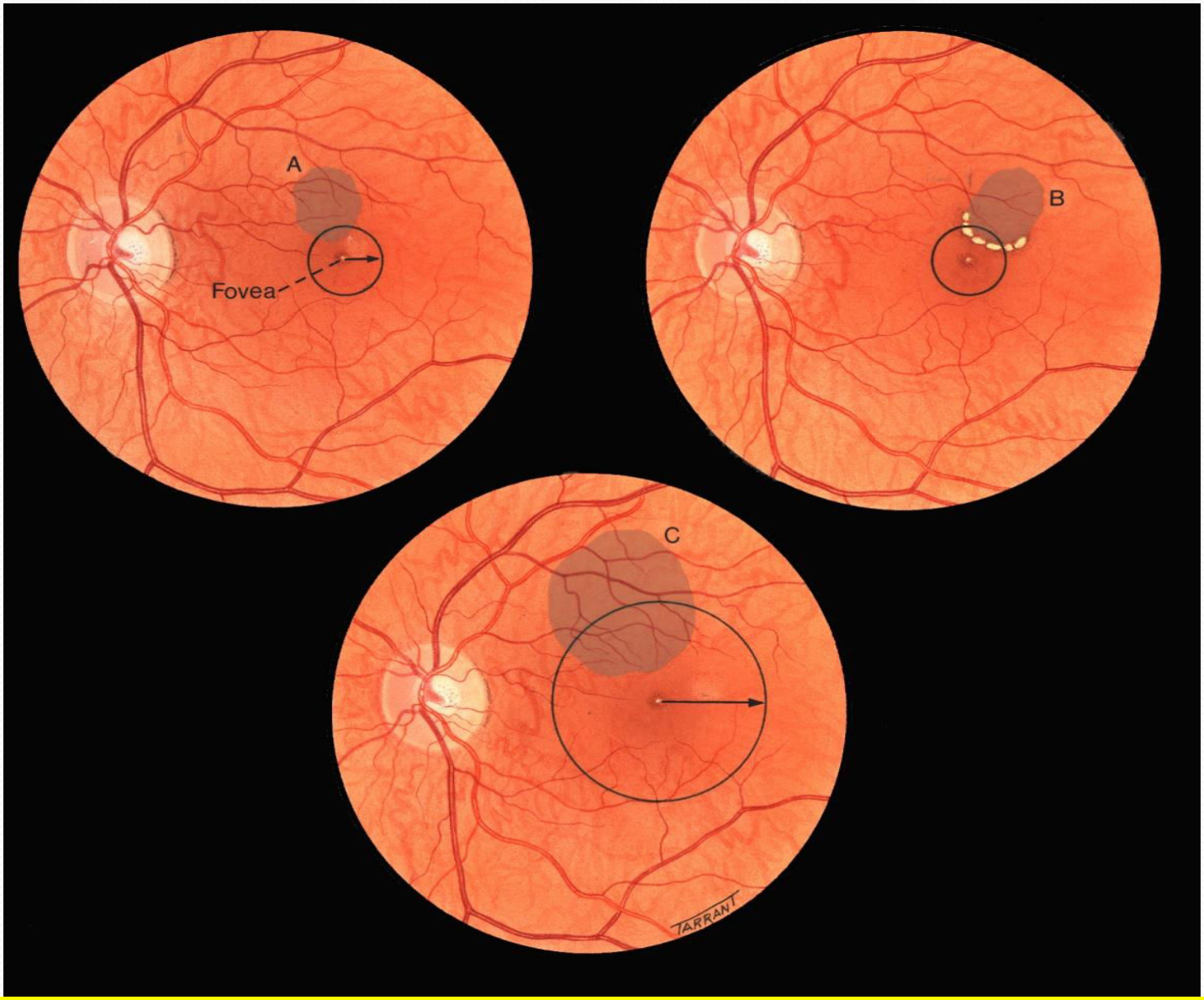


- Macula appears relatively normal
- Poor visual acuity

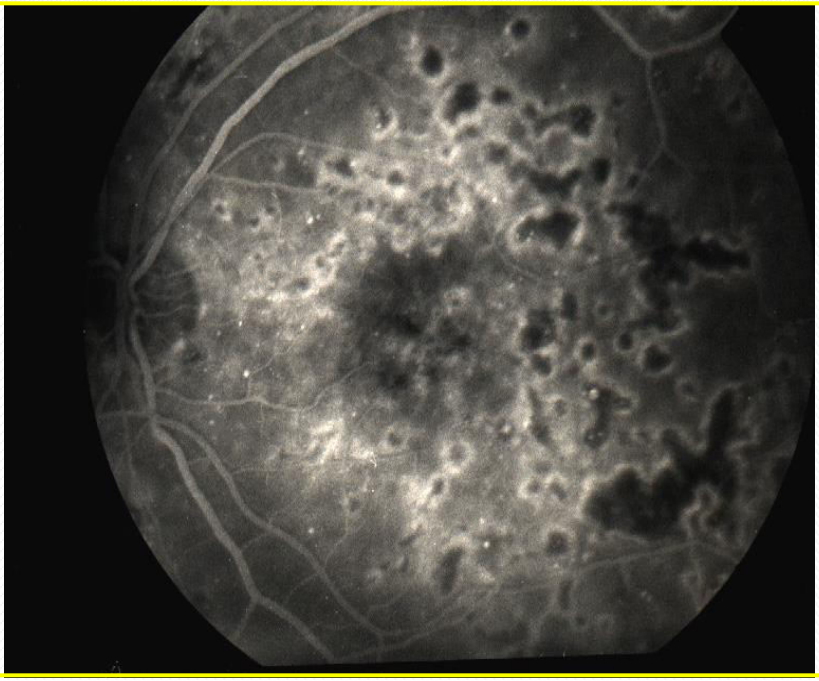
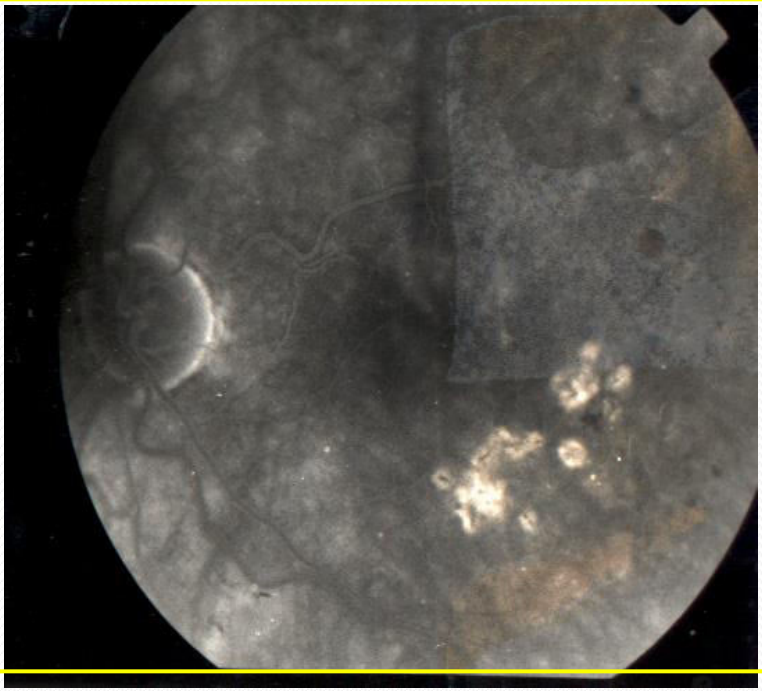


- Capillary non-perfusion on FA

Clinically Significant Macular Edema



Treatment of clinically significant macular edema

Grid treatment	Focal treatment
	
·Grid Pattern 500 µm from temporal margin of disc 500 µm away from centre of fovea · Gentle burns (100-200 µm, 0.10 sec), one burn width apart	· For microaneurysms in centre of hard exudate rings

Diabetic Macular Edema

- Macular Edema ….. No traction
- Center involving DME … CI DME
- Non-Center involving DME … NCI DME
- Anti VEGF

  Avastin

  Lucentis

  Eyelea

Intra vitreal Anti VEGF

Intra vitreal Steriods

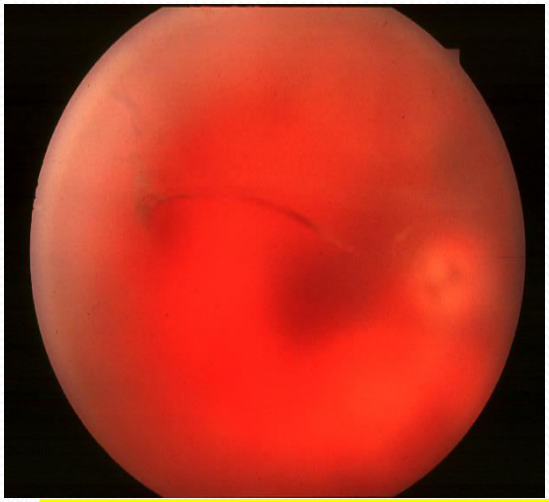
(TA, Ozerdex,Retisert)

Laser/Micropulse Laser

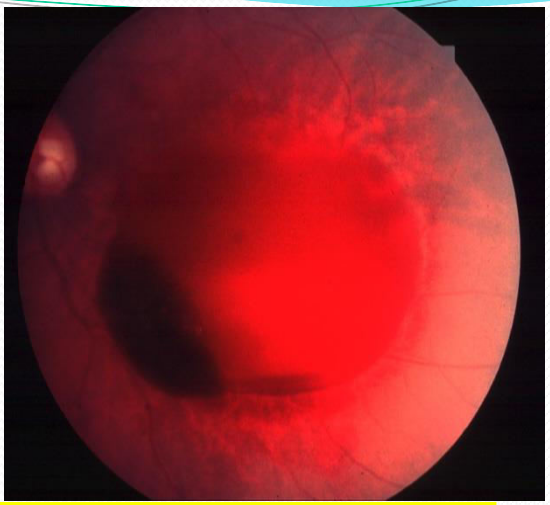
Risk factors control

Follow up

Indications for vitreoretinal surgery

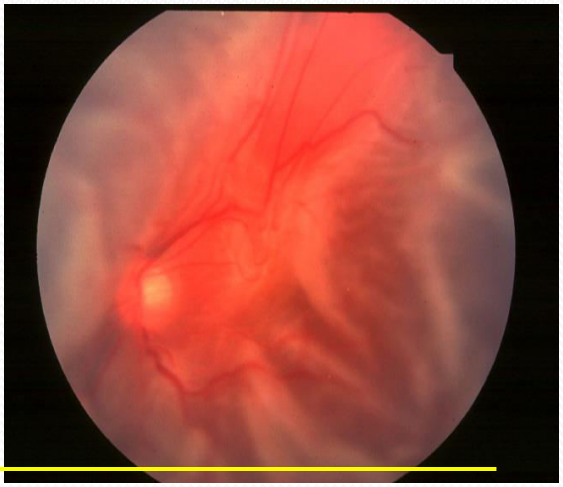


Severe persistent vitreous haemorrhage



Dense, persistent premacular haemorrhage

Progressive proliferation despite laser therapy



Retinal detachment involving macula

National / Local data:

Hospital based studies

Diabetic Control

80% DM not controlled HBA1C

Poor controlled 62.62% , Controlled 19.62%, Borderline 17.76%

Presentation to Ophthalmologist

Referrals by physicians/endocrinologist/GP/Knew about DR **Only 29 %**

71% presented with DR /complications/with irrelevant symptoms

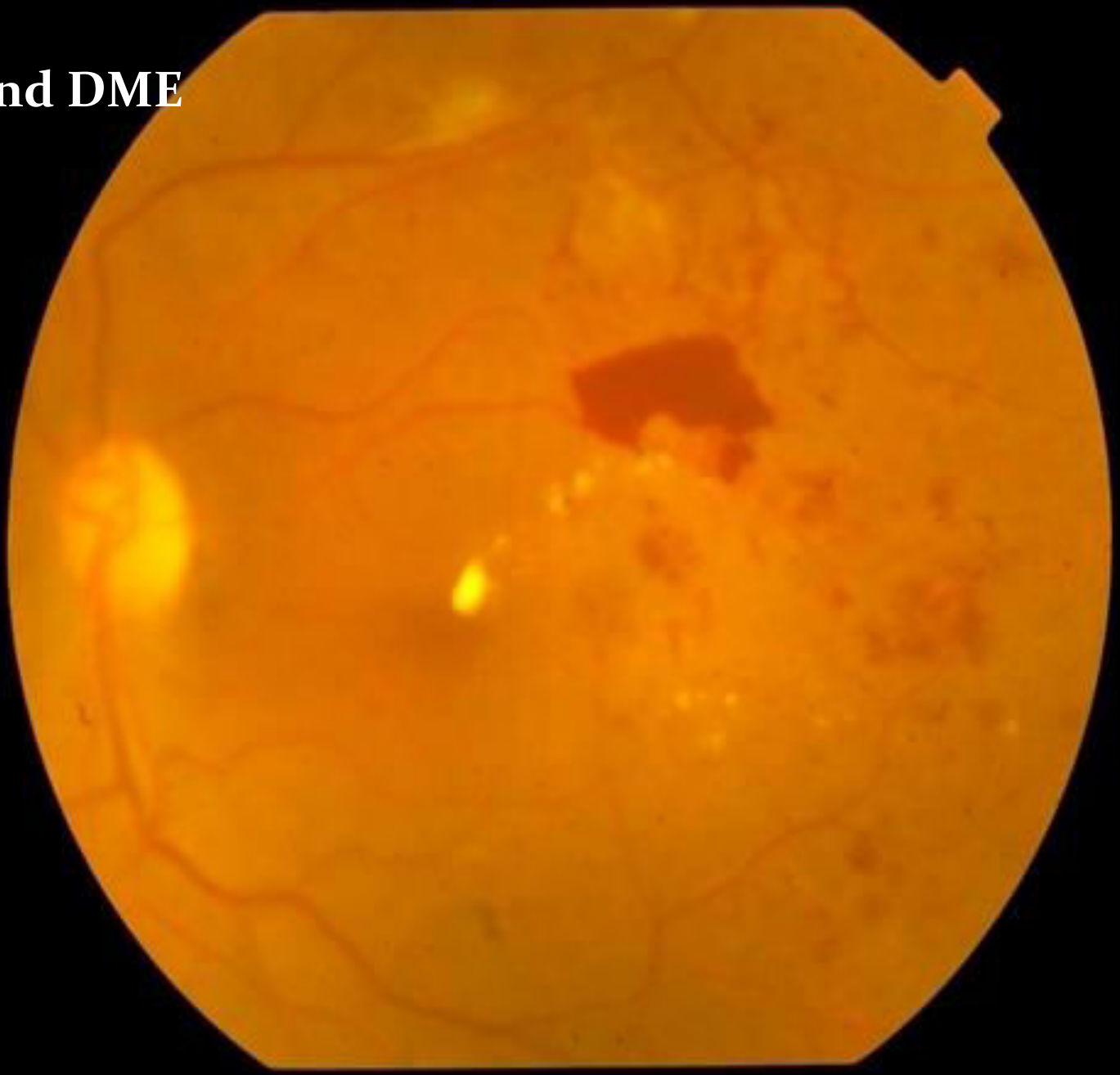
Risk factors Awareness

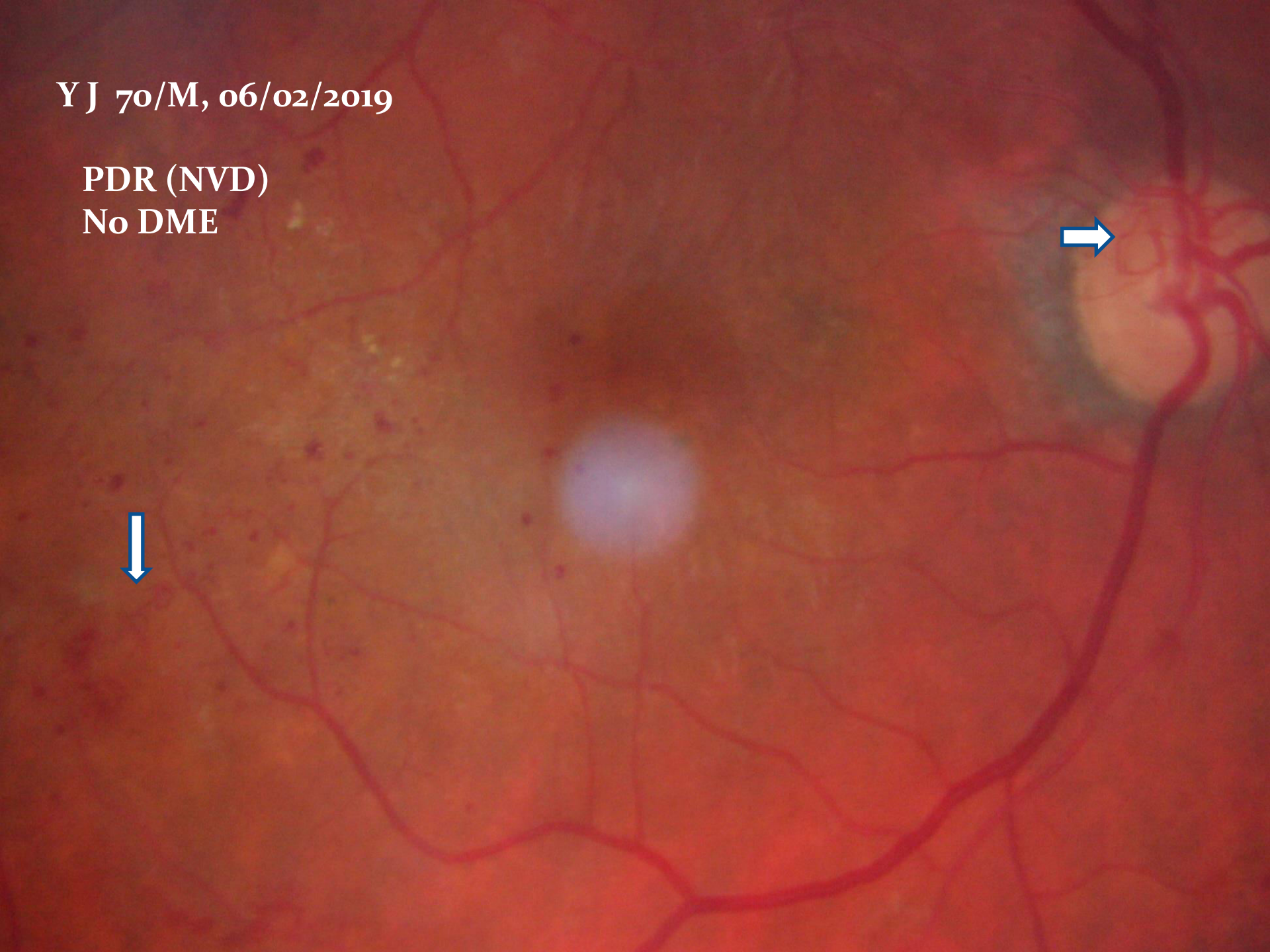
80% or more had no clue regarding any DR risk factors

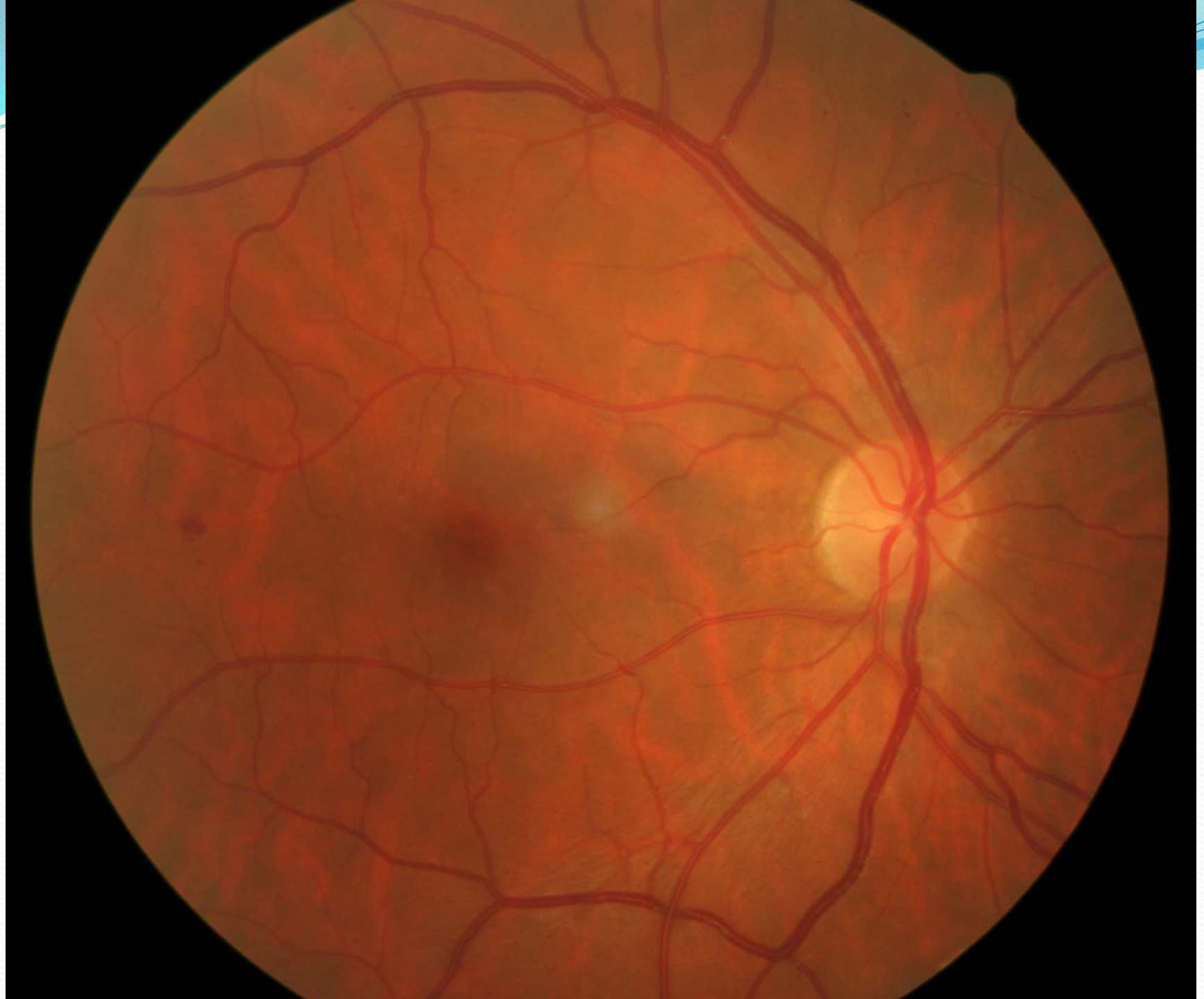
Sanaullah Jan et al. Status of Diabetic Retinopathy and its presentation patterns in diabetics at ophthalmology clinics. J Postgrad Med Inst 2018; 32(1):24-26.

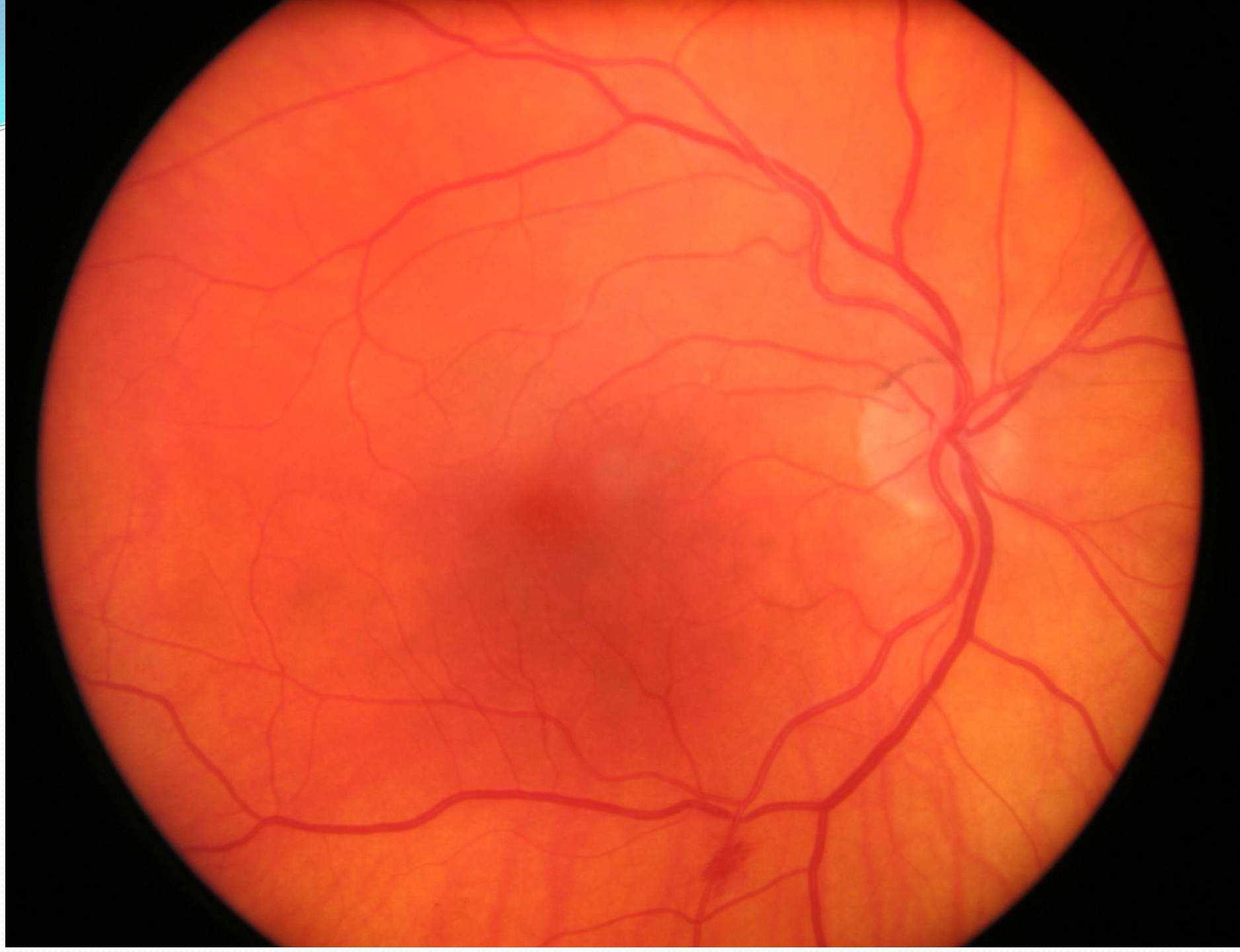
Sanaullah Jan et al. Diabetic retinopathy: Risk Factors Awareness and Presentation. OAJ Ophthalmol 2017; 2(2):000122

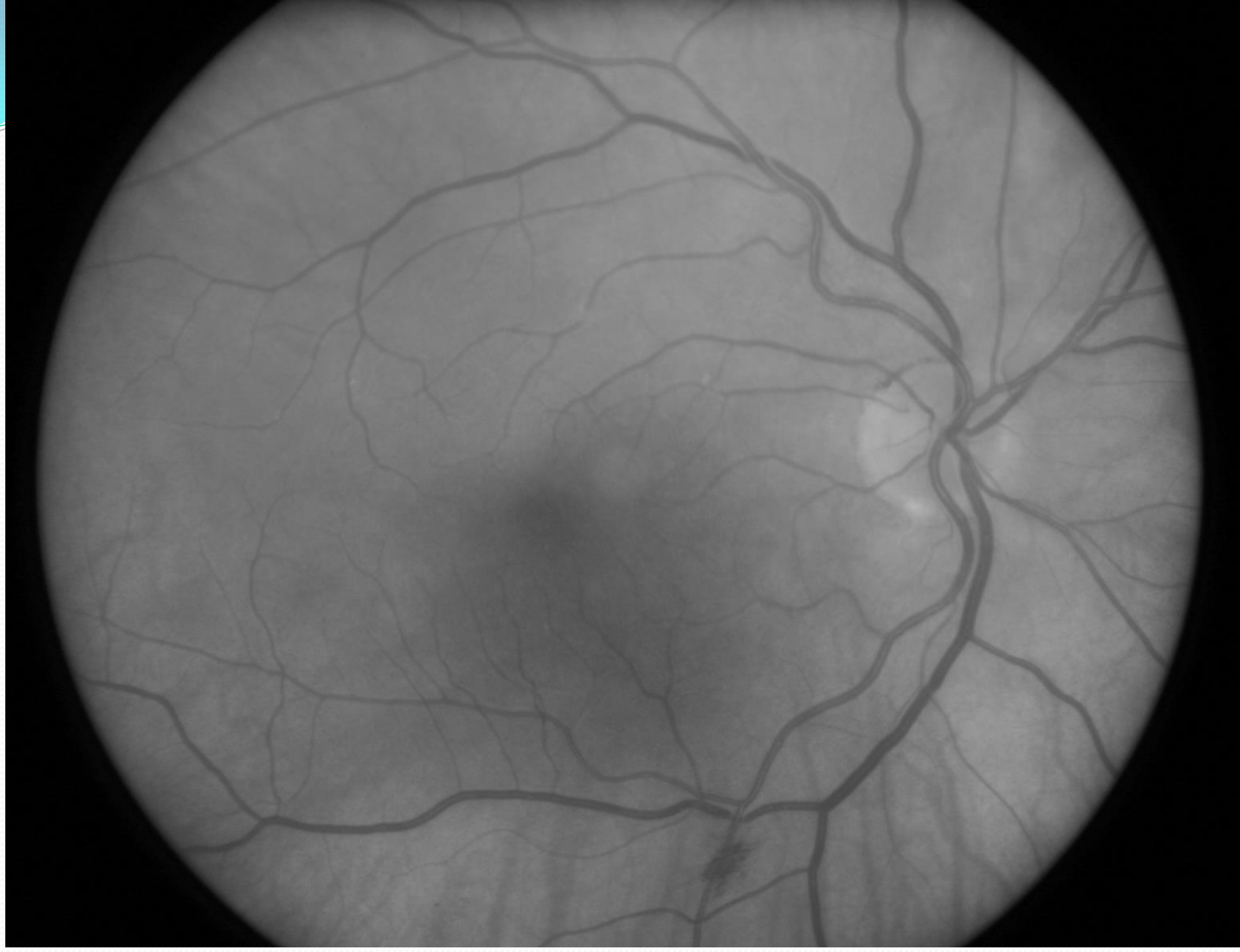
PDR and DME

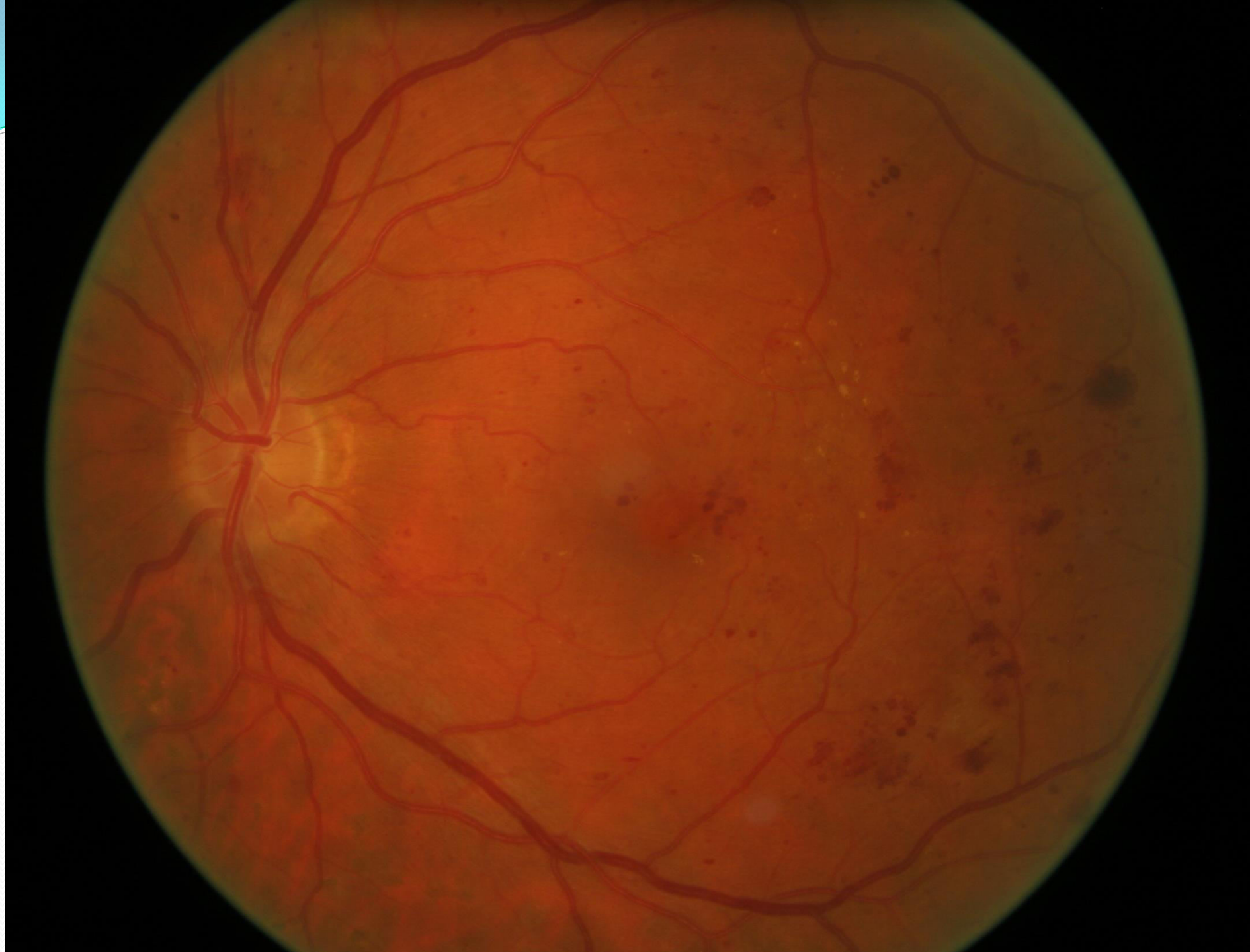


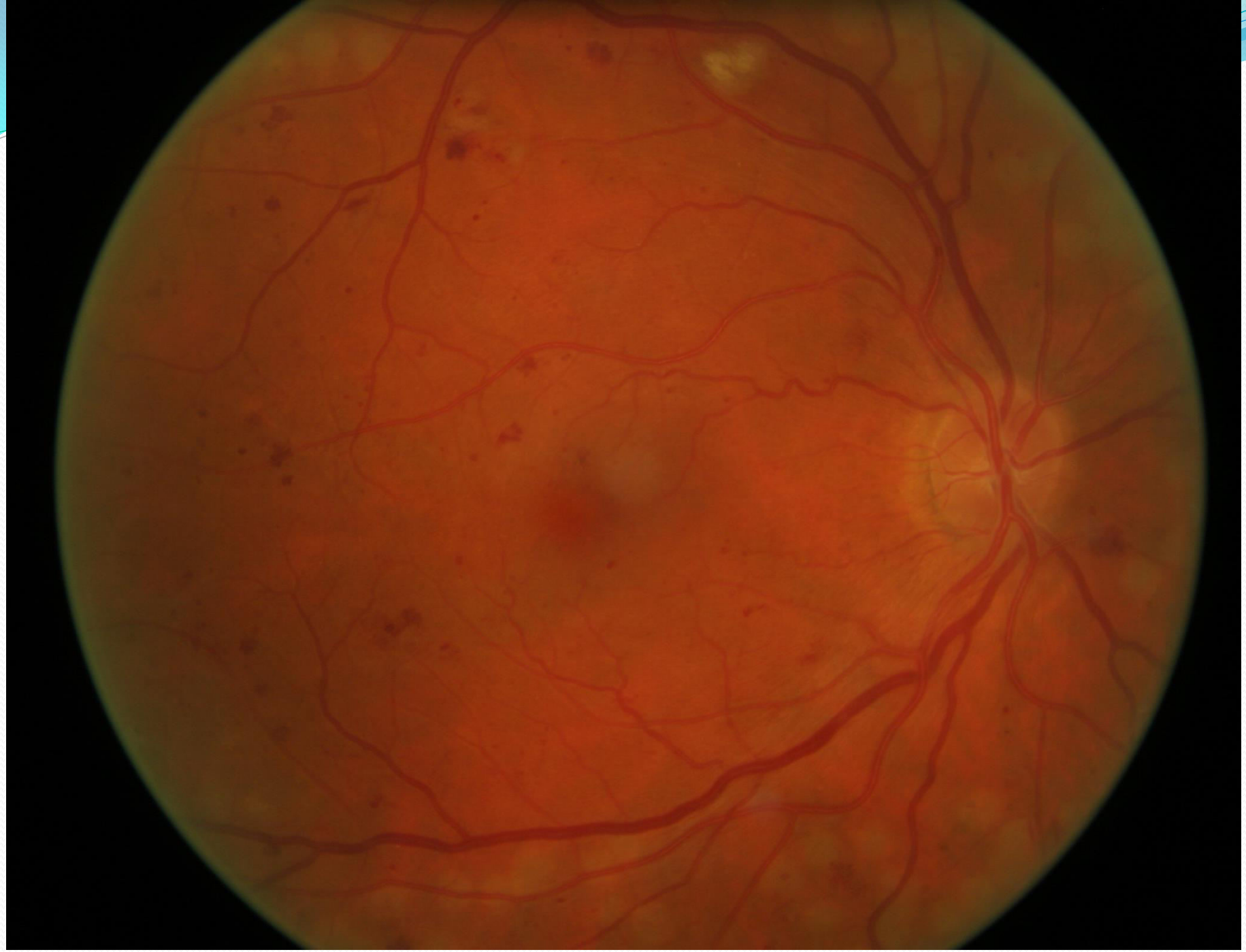

Y J 70/M, 06/02/2019
PDR (NVD)
No DME

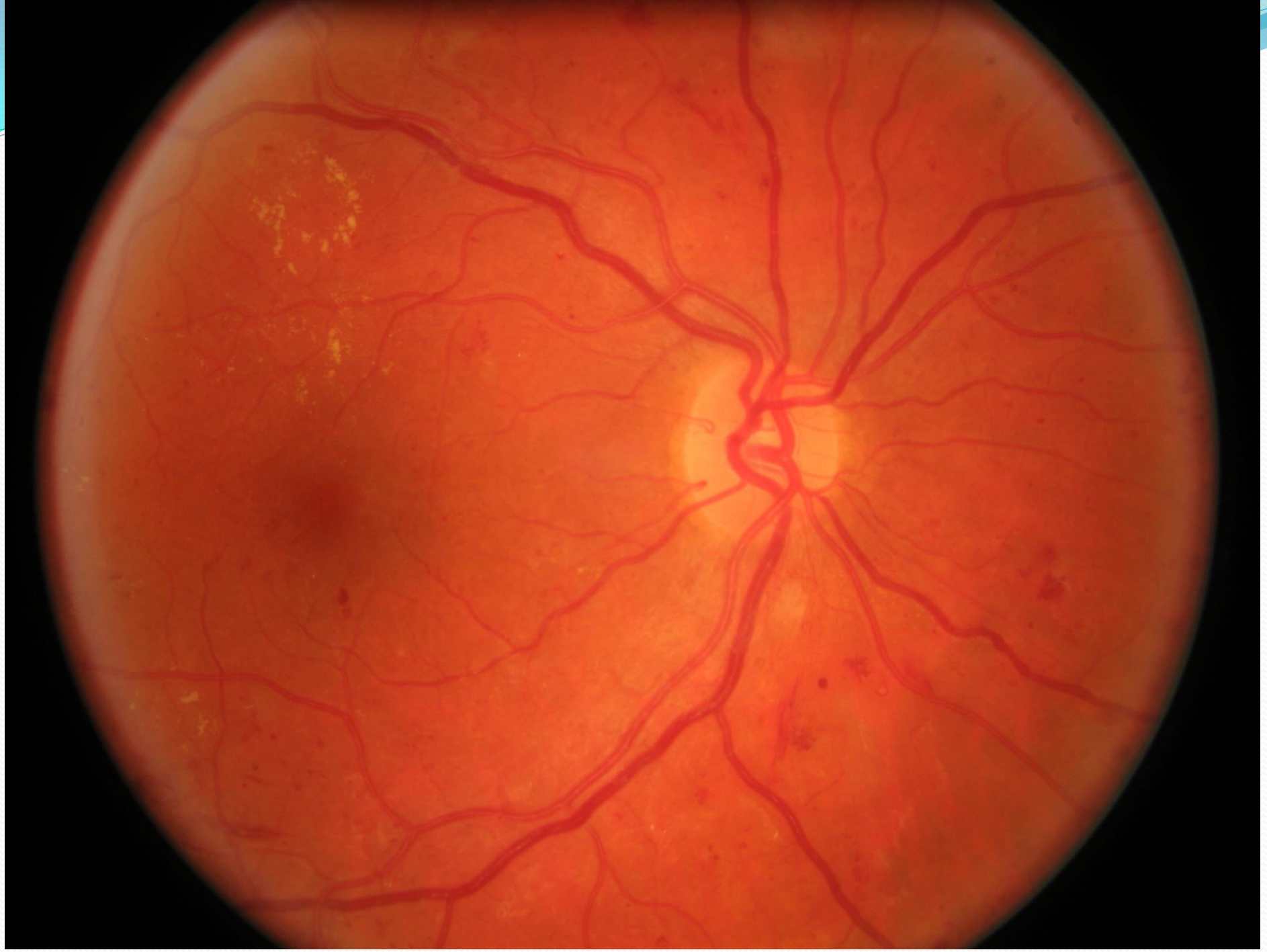


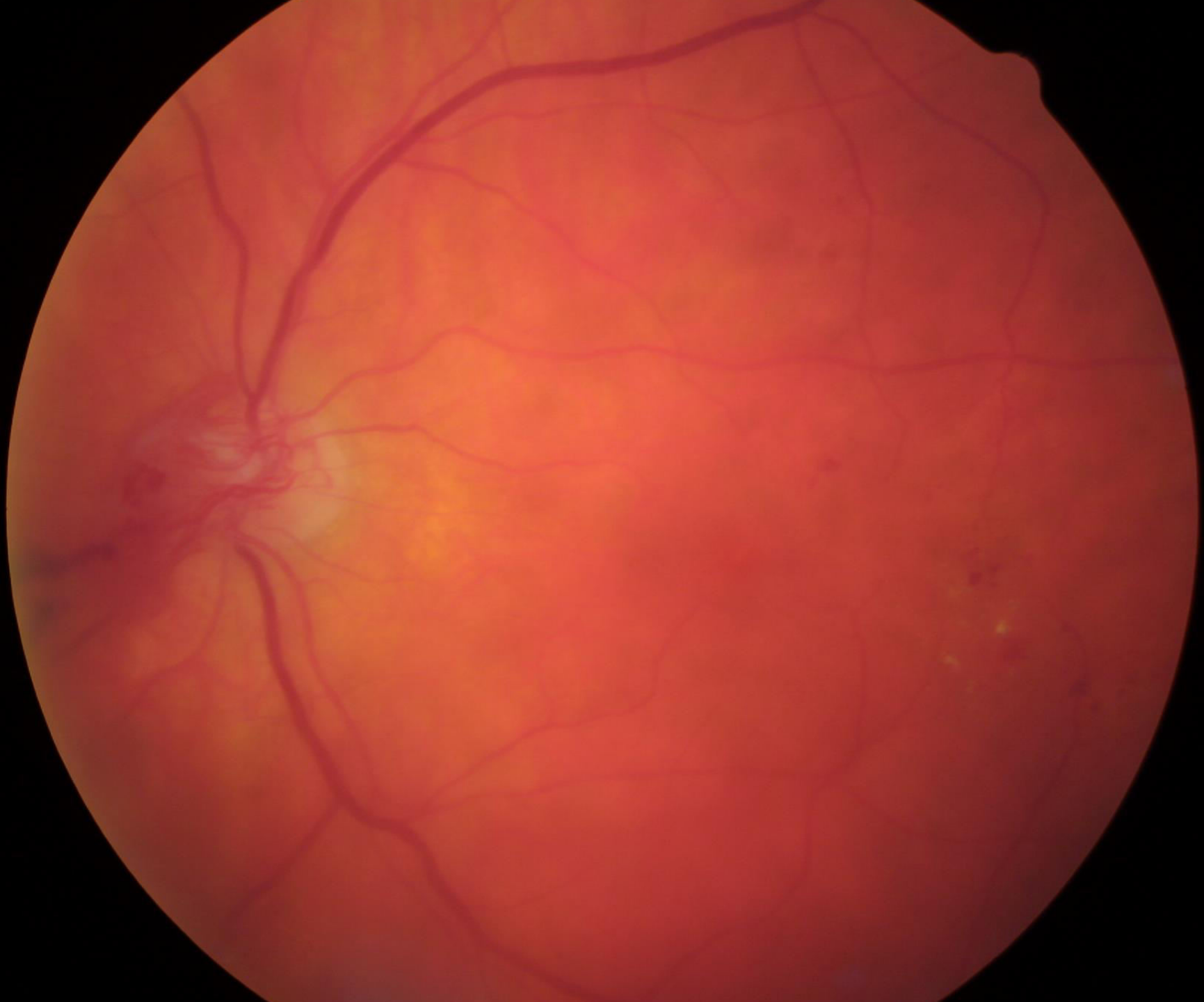


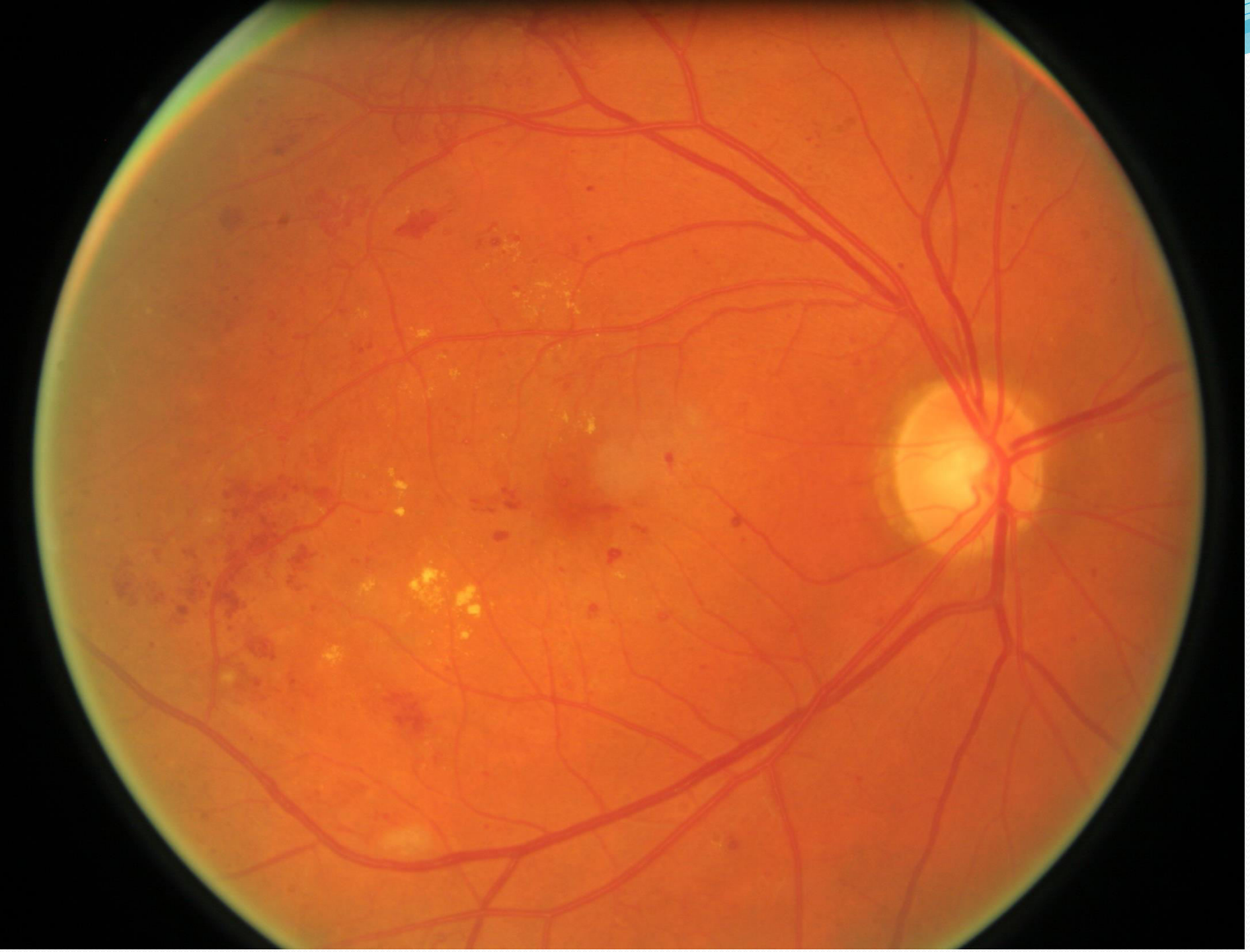








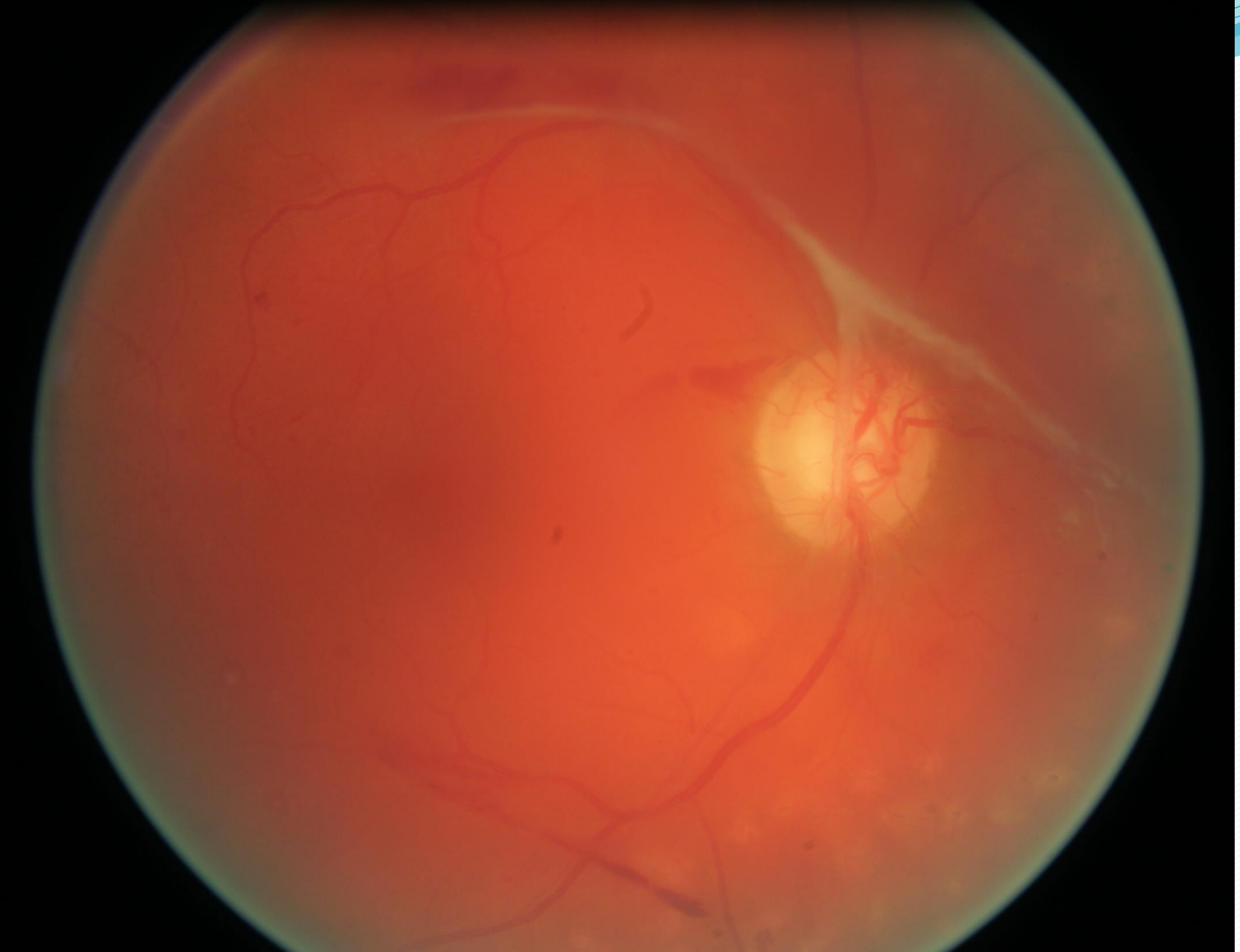


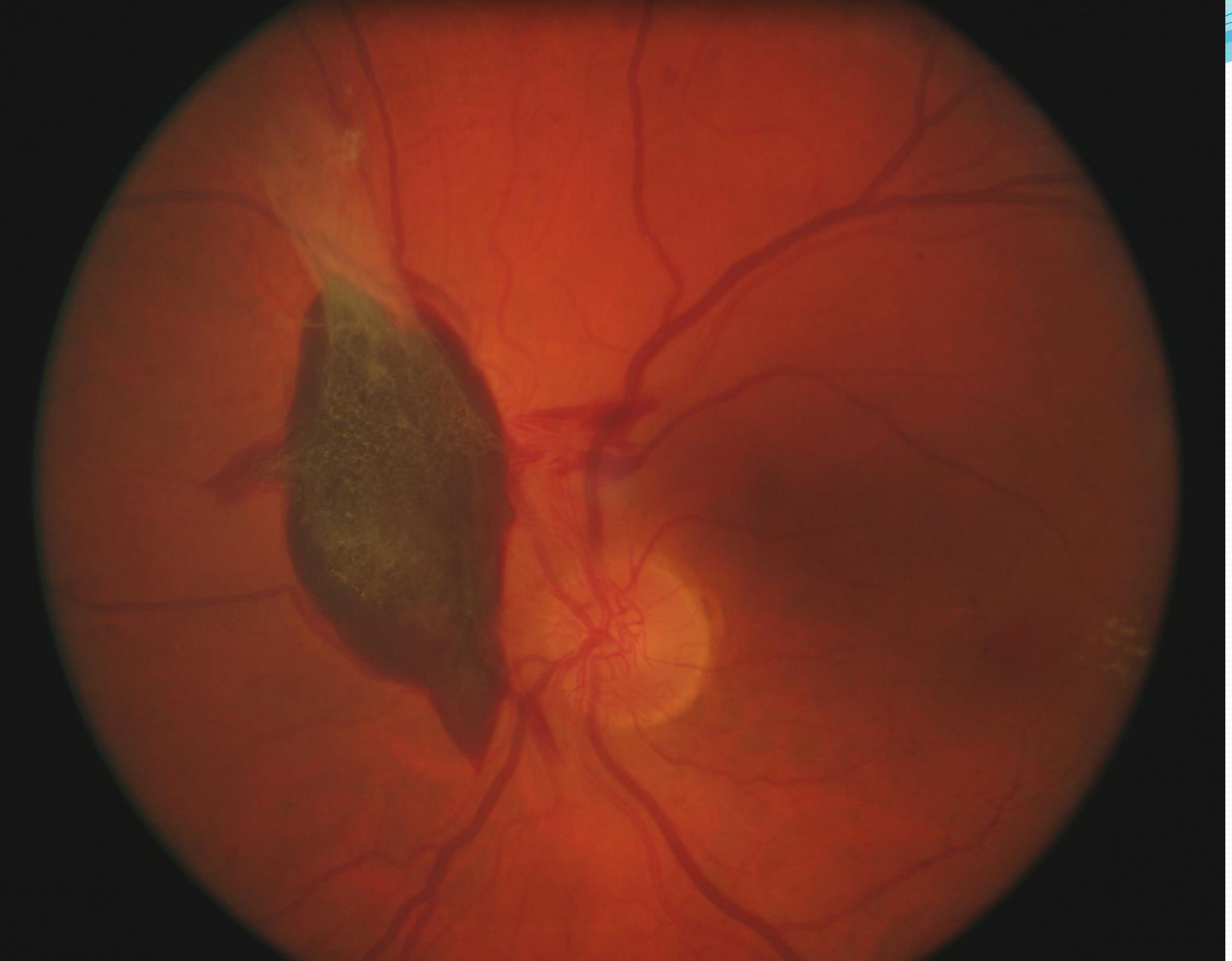


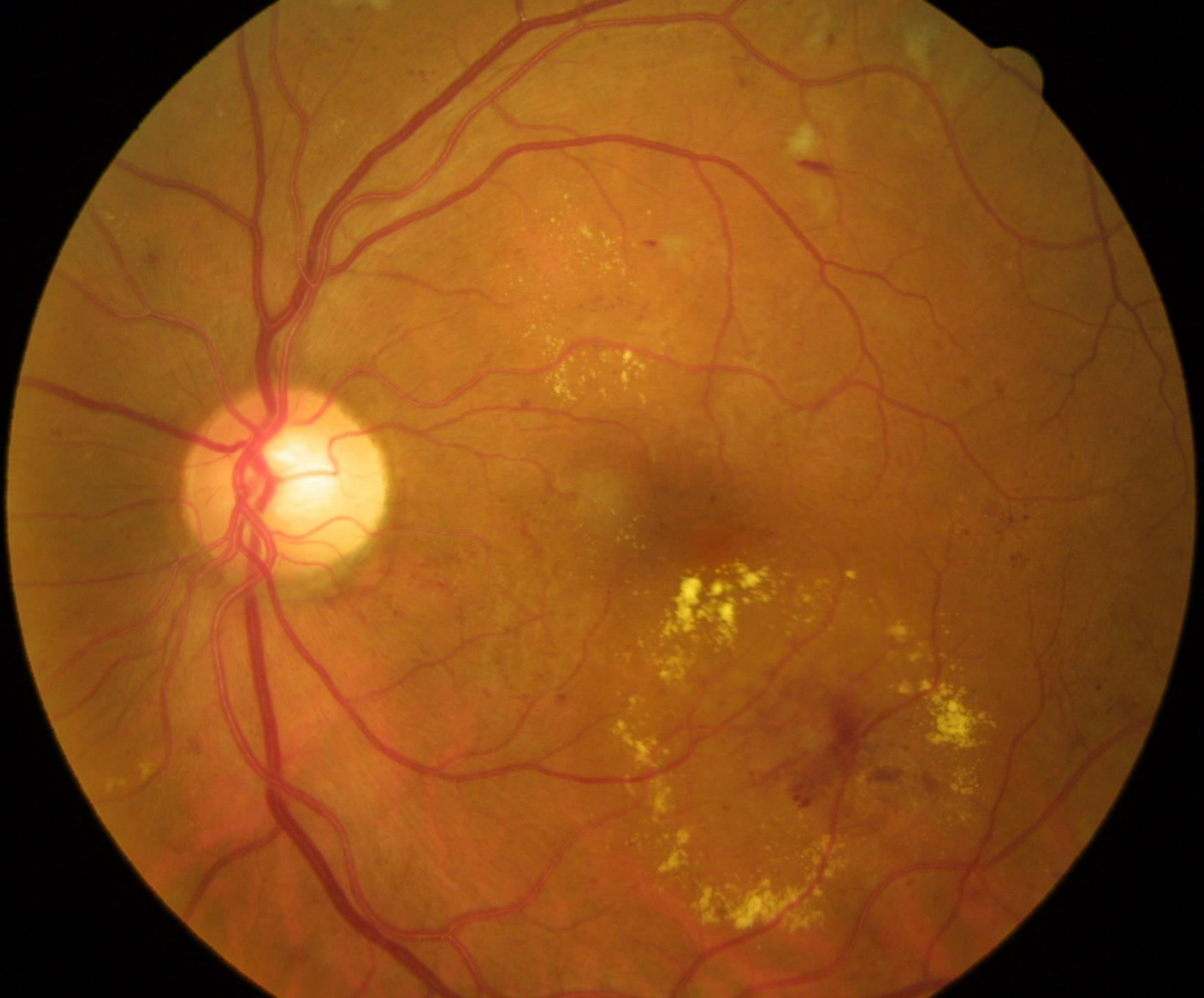
❖**PRP versus PRP plus Anti-VEGF (Avastin)**

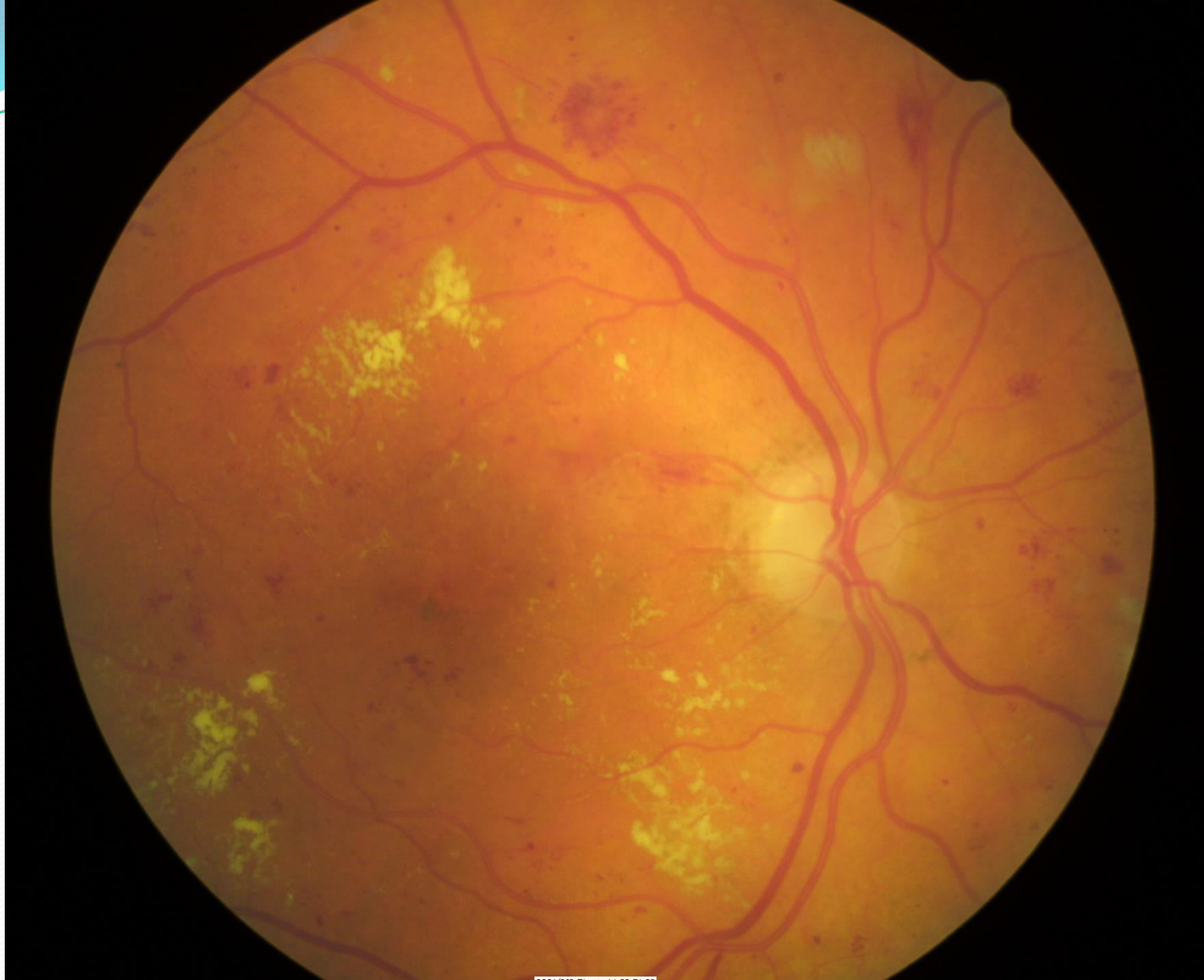
❖ **Earlier & high rate of regression of neovessels in combination group**

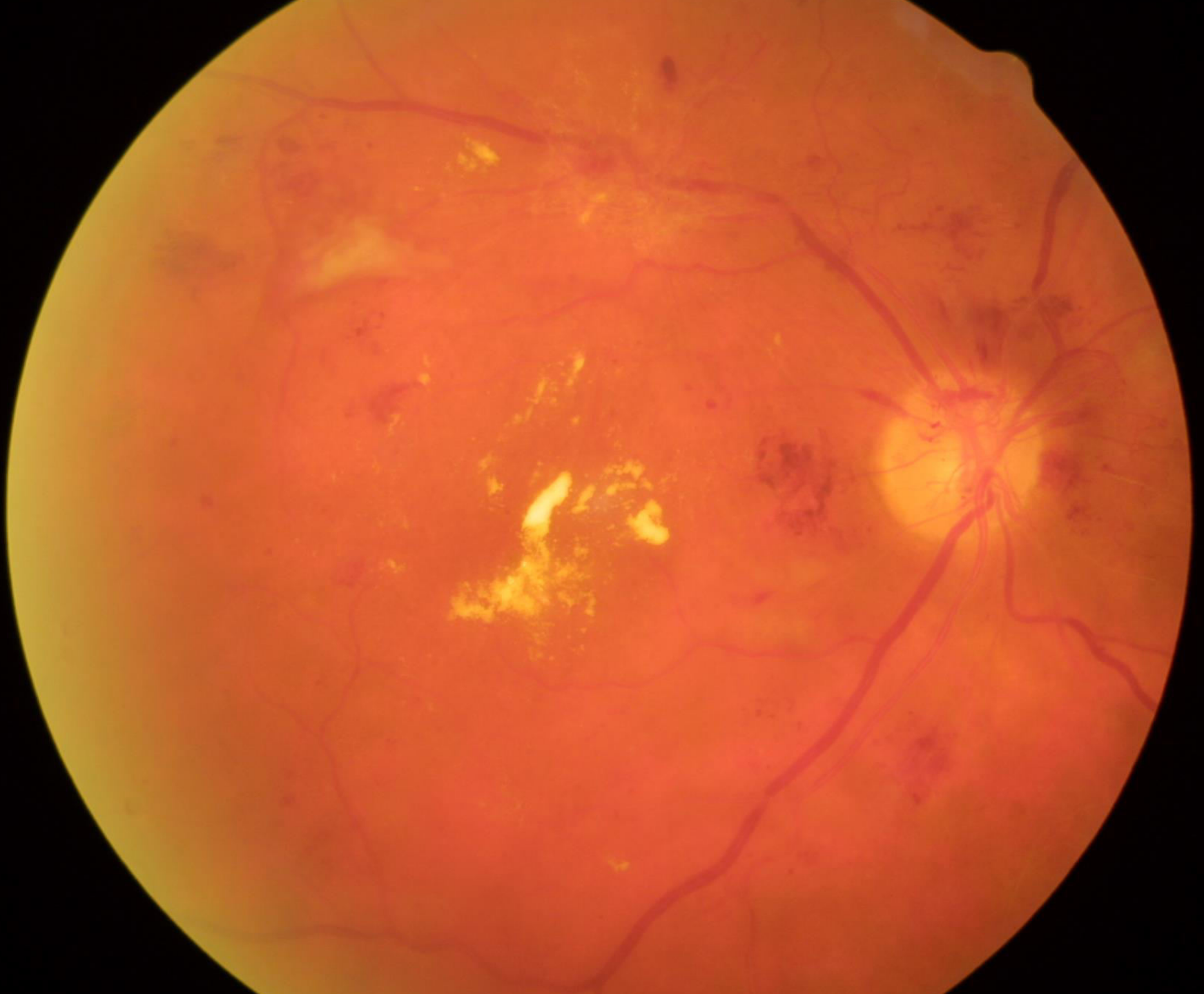
❖Mushtaq M, **Sanaullah jan. Comparison between Pan-retinal photocougulation** and **Pan-retinal photocoagulation plus intravitreal bevacizumab in Proliferative diabetic retinopathy. Journal of Ayub Medical College** 2012; 24:3-4.

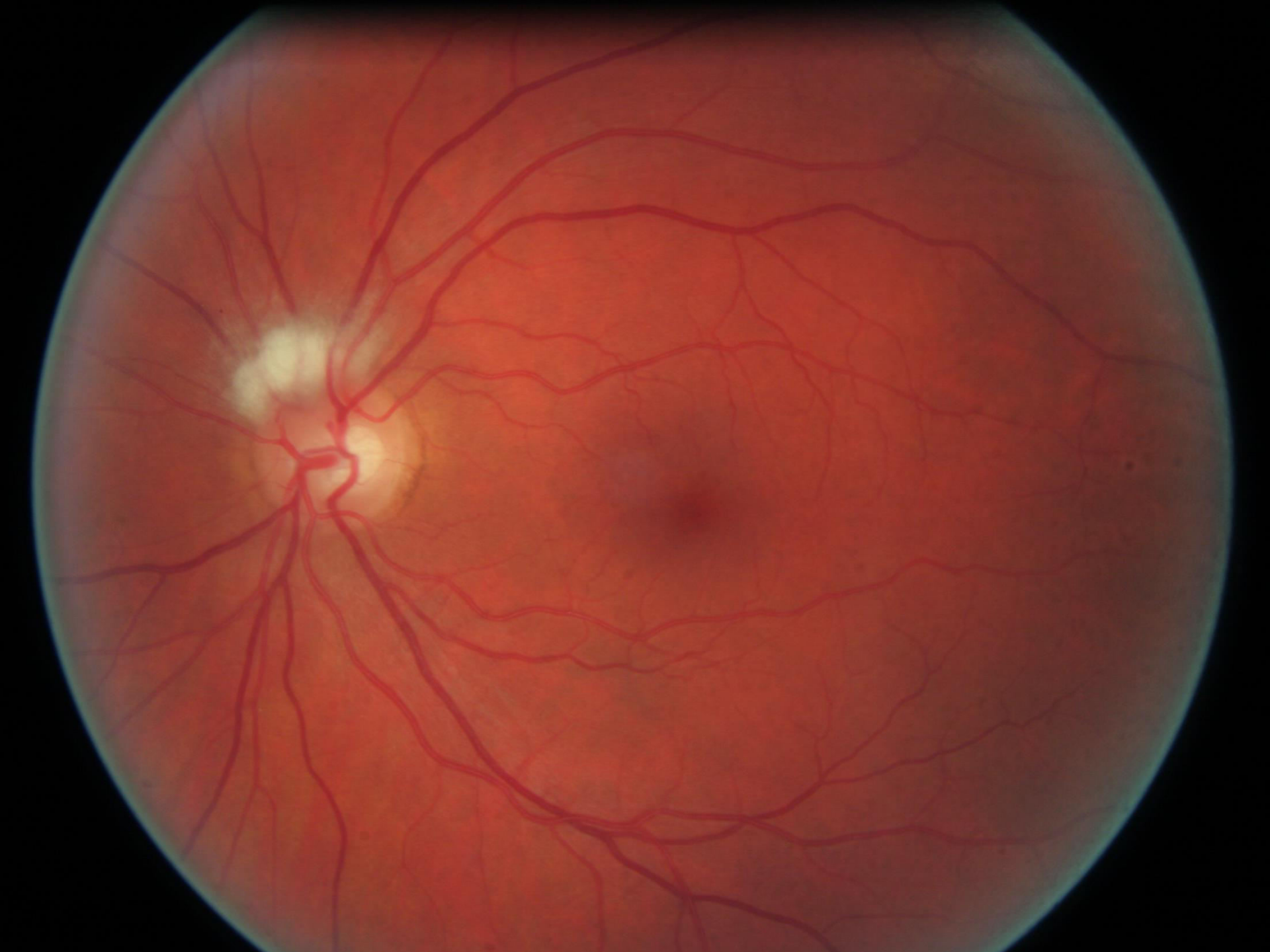


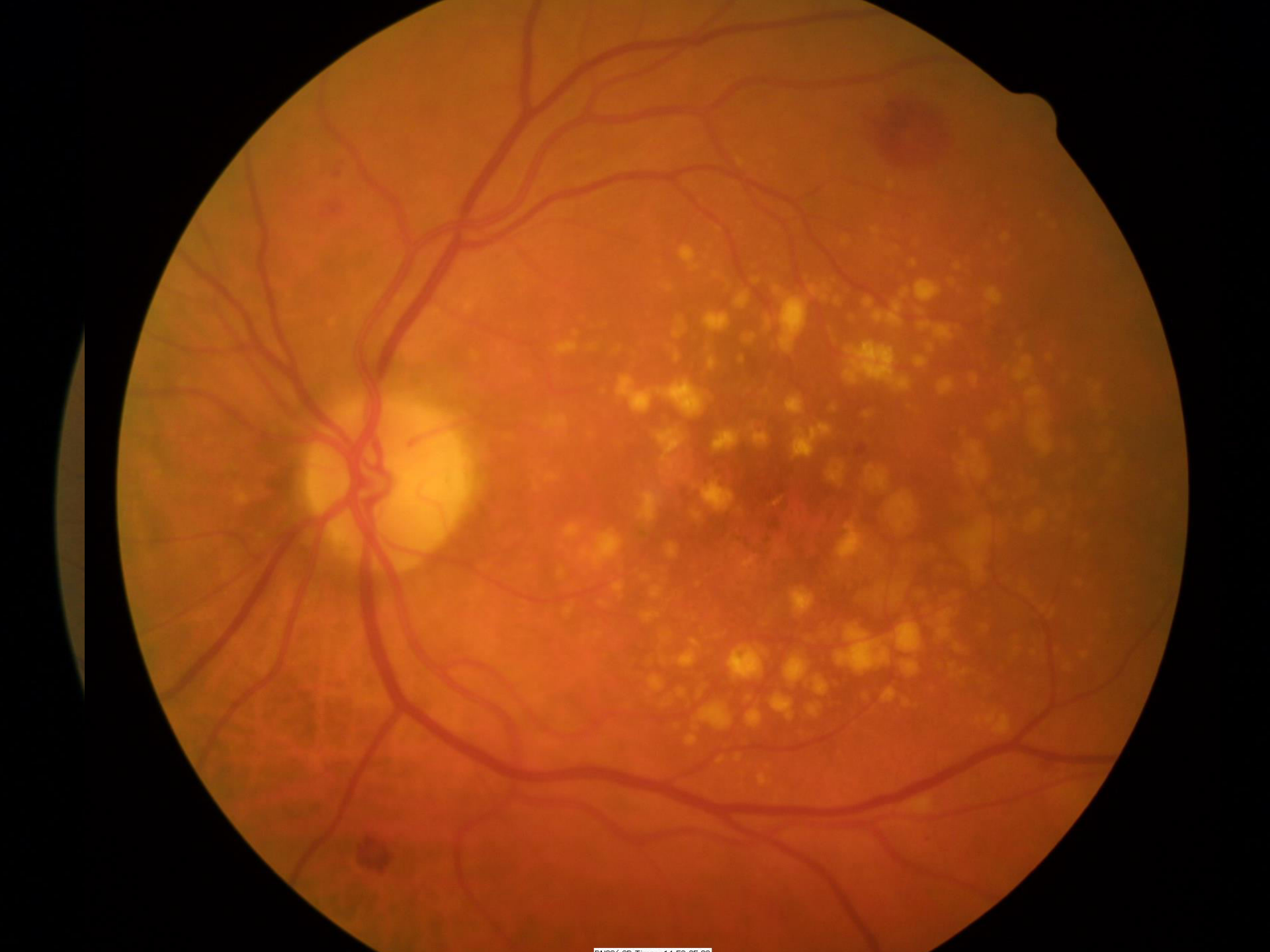


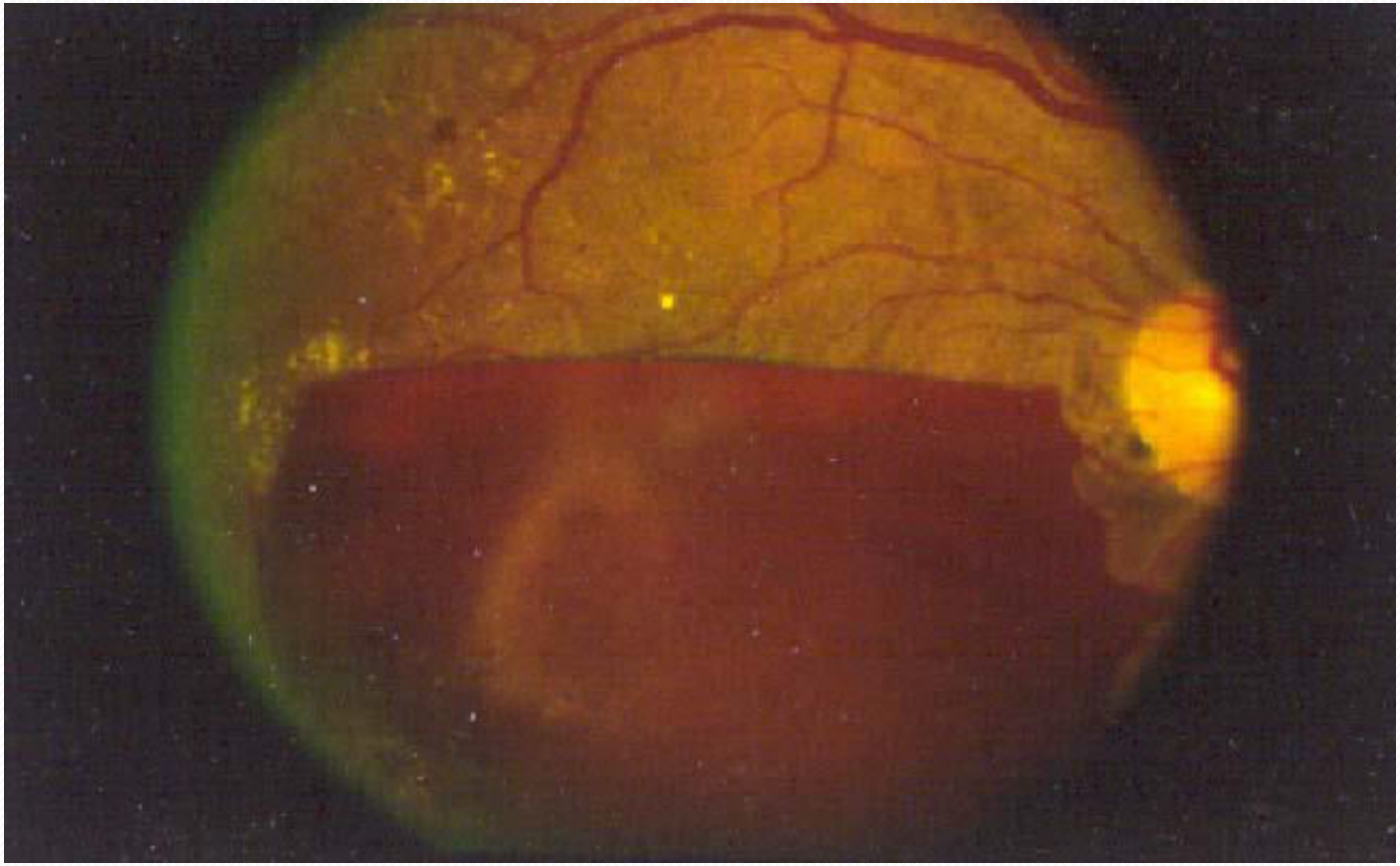


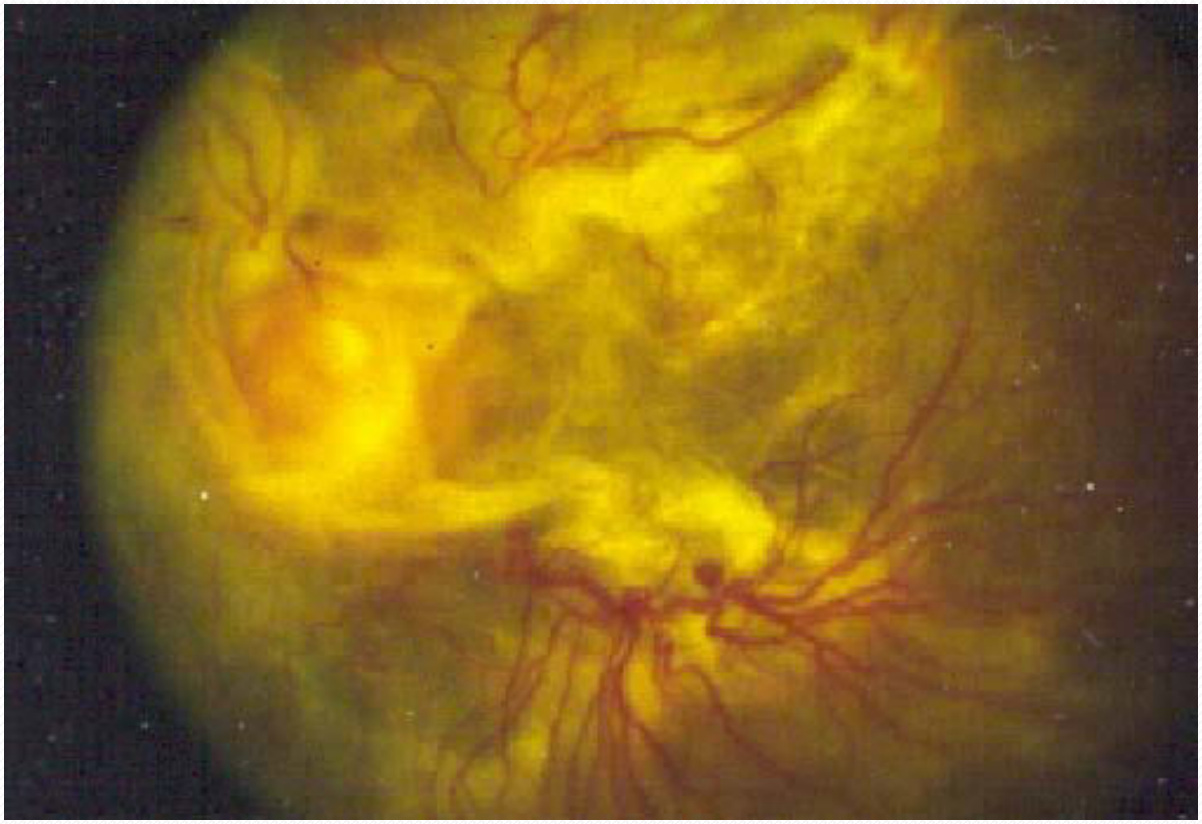


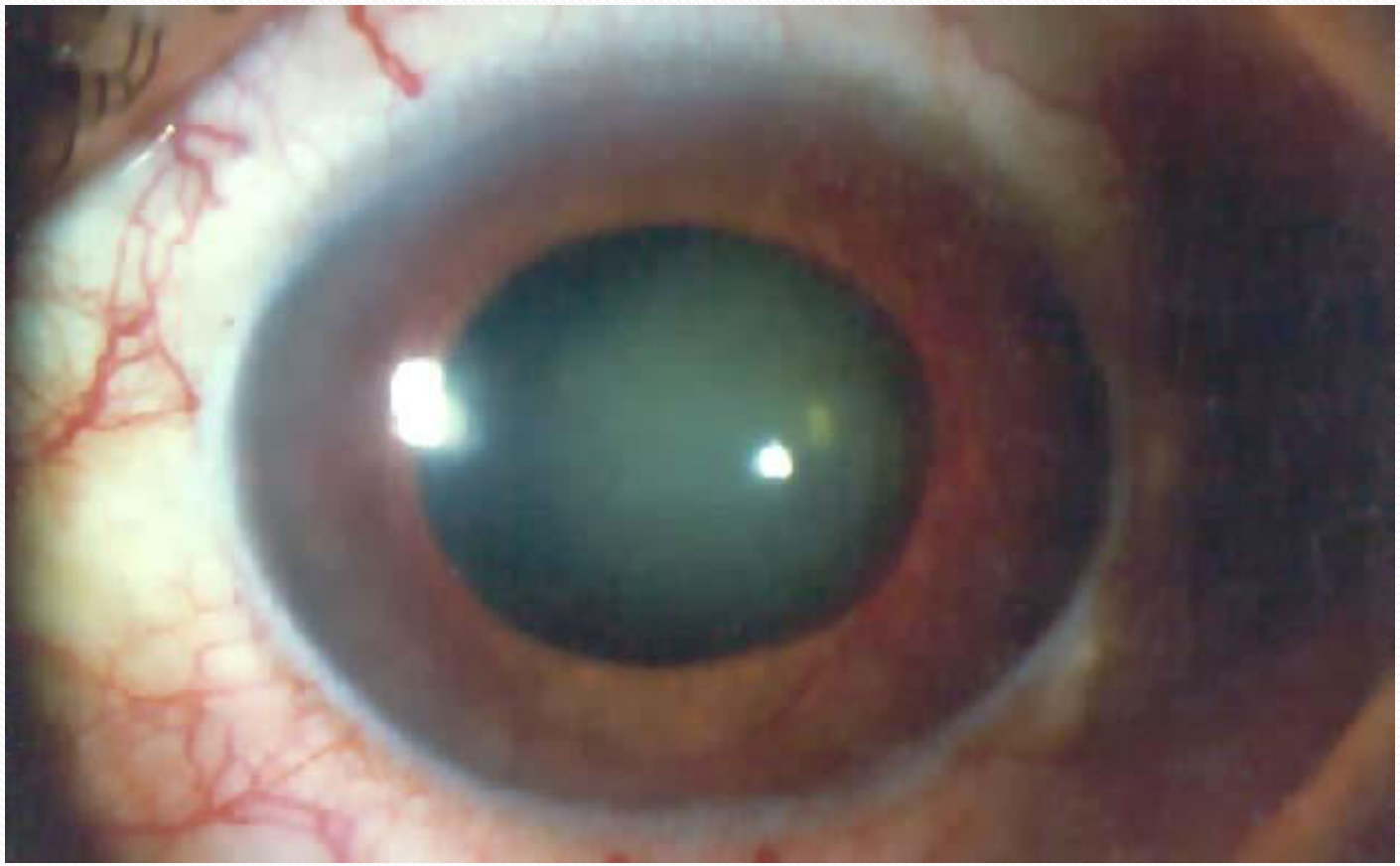












THANKS