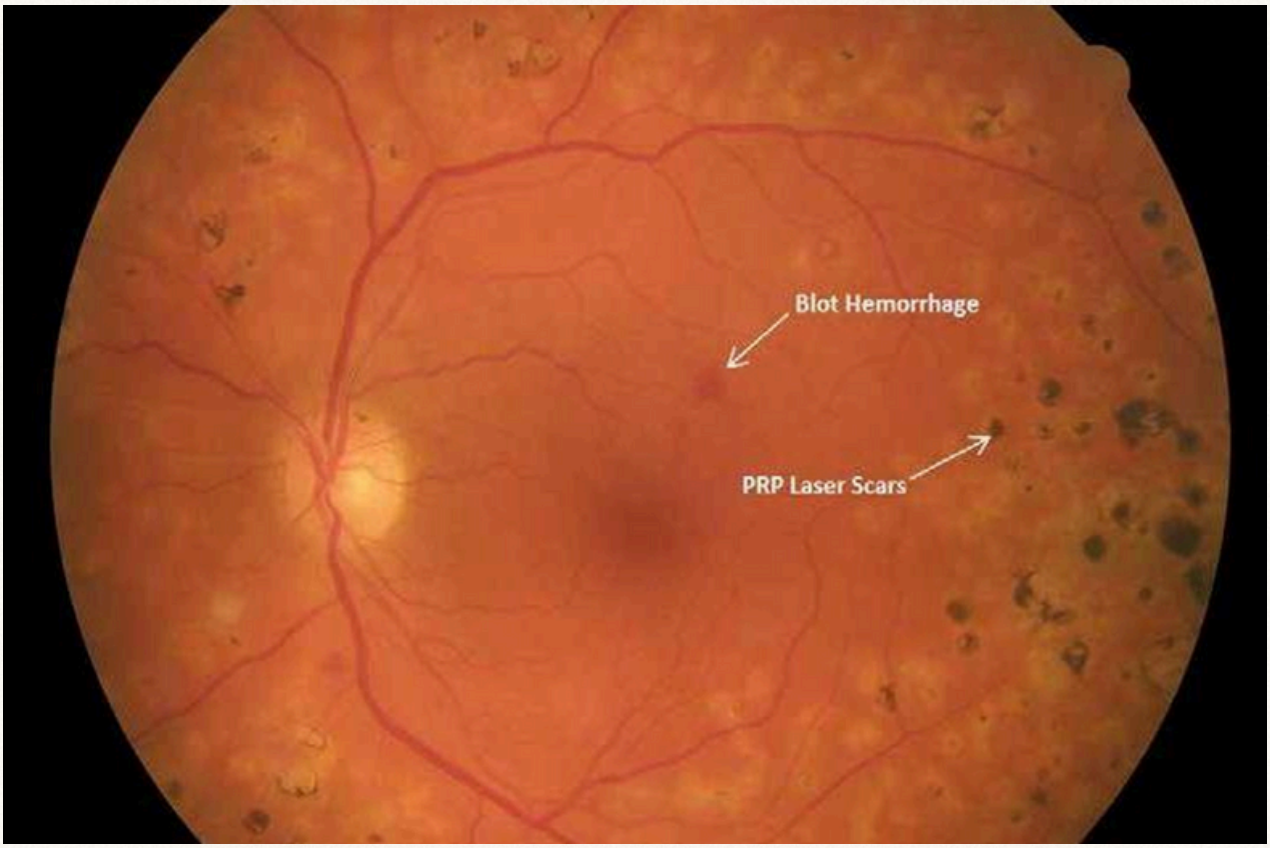
Guidelines for
Management of Diabetic Retinopathy in India

November 2025



Adapted from the Guidelines for Diabetic Eye Care in India, published by Vision 2020 India

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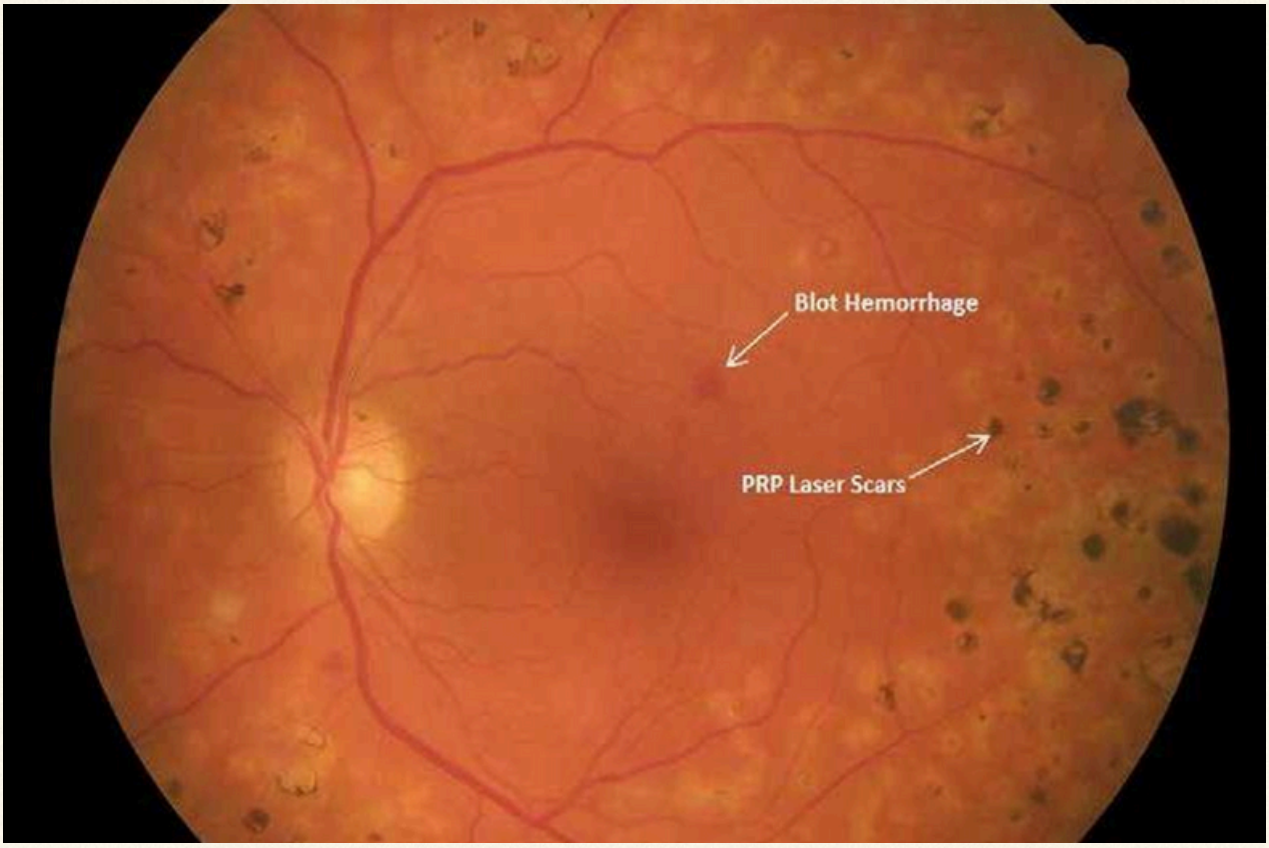

Guidelines for Management of Diabetic Retinopathy in India

NOVEMBER 2025

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Vision 2020: The Right to Sight - India

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Vision 2020: The Right to Sight - India

Preface

Diabetic Retinopathy (DR) is an often silent yet steadily rising cause of avoidable blindness in India. As the prevalence of diabetes continues to rise, its ocular complications are emerging as a major public health concern. In 2025, it is estimated that around 101 million adults in India live with diabetes, and this number could exceed 125 million by 2045. Among them, nearly 5–7%—approximately 4 to 6 million individuals—are already at risk of sight-threatening diabetic retinopathy (STDR).

India has made significant strides by recognizing DR as a priority under the national eye health agenda and initiating several promising screening and management models. However, the absence of a uniform, India-specific framework has resulted in inconsistencies in care delivery and outcomes across regions.

To bridge this critical gap, VISION 2020: The Right to Sight – India has taken a pioneering step by developing the Revised National Guidelines forthe Management of Diabetic Retinopathy in India (2025). This landmark revision marks a significant advancement in strengthening India's collective response to diabetic eye disease, reflecting the nation's evolving health priorities, integrating the latest global evidence, and building upon valuable lessons from national and regional DR programs implemented over the past decade. Anchored in the powerful theme "Breaking Barriers: Advancing Inclusion and Accessibility in Eye Care – A Step Towards Viksit Bharat 2047," this initiative reinforces our shared responsibility to ensure that quality eye care reaches every individual—irrespective of geography, gender, ability, or socio-economic background.

These guidelines mark a unified effort to bring consistency, quality, and accountability to diabetic retinopathy management across all levels of care. By aligning practice standards and promoting collaboration between government, professional bodies, and civil society, they aim to ensure that every person with diabetes in India receives timely and equitable eye care—irrespective of geography or access barriers.

The 2025 National Guidelines stand as a vital milestone in our collective journey toward eliminating avoidable vision loss from diabetic retinopathy. With this unified framework, India moves closer to a future where no one loses sight because of diabetes—a goal that embodies the vision and values of VISION 2020: The Right to Sight – India.

Dr. Rajesh Saini
President, VISION 2020: The Right to Sight – India

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6th November 2025

Foreword

Dear All,

As diabetes continues to rise rapidly across India, diabetic retinopathy (DR) poses a growing challenge — one that demands not just clinical excellence but also coordinated, standardized action across all levels of care. The launch of the ***Revised National Guidelines for the Management of Diabetic Retinopathy in India (2025)*** marks a pivotal moment in the nation's ongoing efforts to combat one of the leading causes of preventable blindness.

This revision reflects a collaborative and forward-looking effort to integrate clinical expertise, technological innovation, and public health strategy. By aligning with India's evolving healthcare landscape, the new guidelines provide a unified framework to ensure that every person with diabetes receives timely, evidence-based, and equitable eye care. Empowering healthcare professionals and patients alike, this comprehensive guide offers expert insights and practical strategies for managing DR — from early detection to treatment and long-term follow-up. It stands as a vital resource for strengthening service delivery, improving outcomes, and reducing the burden of diabetic blindness across the country.

I congratulate **VISION 2020: The Right to Sight – India**, along with all contributors and partners, for their leadership in developing this critical national resource. I am confident that the 2025 guidelines will serve as a cornerstone in our ongoing efforts to eliminate avoidable blindness due to Diabetic Retinopathy and to secure a clearer vision for the future of eye health in India.

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VISION 2020: The Right to Sight – India gratefully acknowledges the experts of the September 2025 Diabetic Retinopathy Consultative Meeting and other key stakeholders for their valuable contributions to these guidelines.

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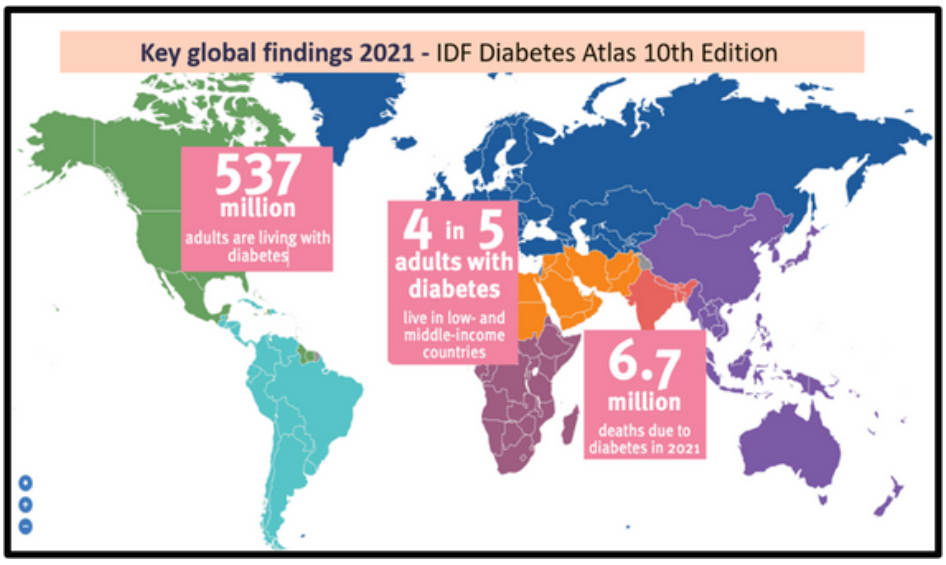
I. Introduction

Diabetes mellitus (DM) is a global epidemic with significant morbidity. Diabetic retinopathy (DR) is the specific micro vascular complication of DM and affects 1 in 6 persons with DM [1]. DR remains a leading cause of vision loss in working adult populations. Patients with severe levels of DR are reported to have poorer quality of life and reduced levels of physical, emotional and social well-being and they utilize more health care resources.

Epidemiological studies and clinical trials have shown that optimal control of blood glucose, blood pressure and blood lipids can reduce the risk of developing retinopathy and slow its progression. Timely treatment with laser photocoagulation and increasingly, the appropriate use of intraocular administration of vascular endothelial growth factor (VEGF) inhibitors & bispecific (ANG-2 /VEGF inhibitor) can prevent visual loss in vision-threatening retinopathy, particularly diabetic macular edema (DME). Since visual loss may not be present in the earlier stages of retinopathy, regular screening of persons with diabetes is essential to enable early intervention.

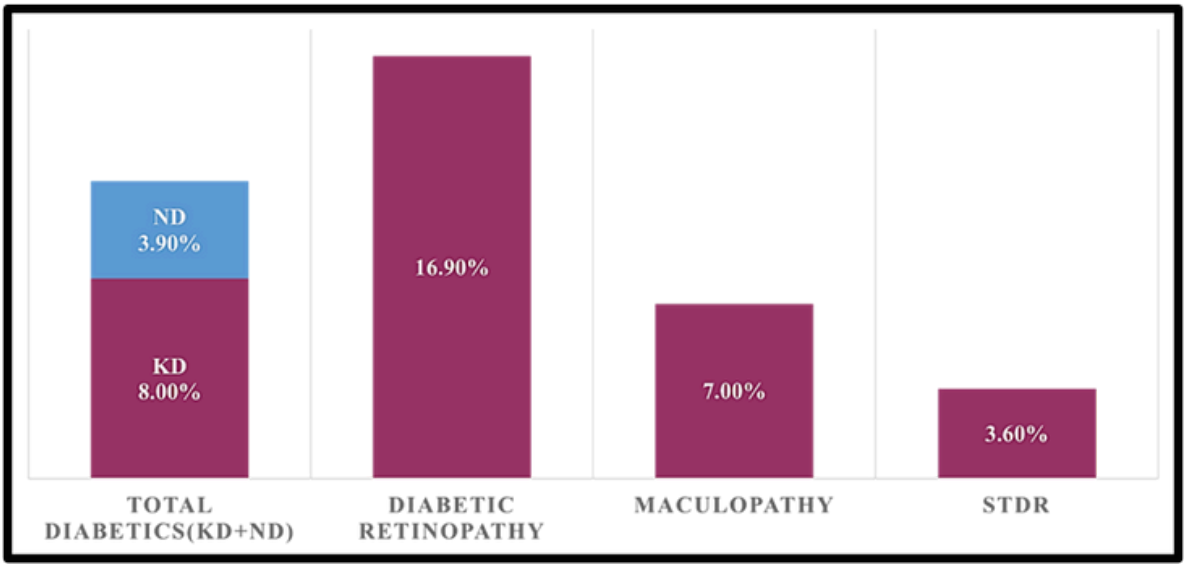
Global Epidemiology of Diabetic Retinopathy

DR remains a leading cause of preventable vision loss among working-age adults worldwide. Using Global Burden of Disease 2021 data, Meng et al.[2] estimate that in 2021 there were 2.85 million working-age people living with vision impairment due to DR and 250,117 YLDs, representing 2.8-fold and 3.0-fold increases since 1990. The burden is heaviest in Asia, with South Asia the most affected region and China the single most affected country and is concentrated in middle-SDI (sociodemographic index) settings; women consistently bear a higher burden than men. Forecasts indicate the absolute number of affected individuals and YLDs will continue to rise through 2035, underscoring the need for scale screening, timely treatment, and health-system strengthening in high-burden regions.



Epidemiology of Diabetic Retinopathy in India

India now has an estimated 101 million people with diabetes in (2021) projected to rise to more than 150 million by 2050 [3]. Among adults aged ≥40 years with diabetes, the national prevalence of vision impairment is 21.1% and blindness is 2.4%, equating to 21 million people with diabetes who are visually impaired and 2.4 million who are blind in India [4]. Among diabetics, the prevalence of DR is 16.9% and sight-threatening DR (STDR) is 3.6% [1]; DR/STDR is more common in known diabetes than in undiagnosed diabetes, with no significant urban–rural difference after national stratification [4]. Critically, 6.0% of adults (≥40 years) screened had undiagnosed diabetes, and 75% of those with known diabetes had sub-optimal glycaemic control, both of which amplify DR risk and late presentation [5]. For population context, among Indians aged ≥50 years 1.99% are blind and 26.68% are visually impaired (presenting VA<6/12), underscoring the need to integrate DR screening and treatment into national avoidable blindness strategies [6].



Prevalence of Diabetes and Diabetic Retinopathy in India

The overall prevalence of DR in a community is also influenced by the number of people diagnosed with early DM:

• In resource-rich settings with good health care systems, more people with early DM will have been diagnosed. The prevalence of DR in people with newly diagnosed DM will be low, resulting in a lower overall prevalence of DR.

• In resource-poor settings with less advanced health care systems, fewer people with early DM will have been diagnosed. People may be diagnosed with diabetes only when symptoms or complications have occurred. Thus, the prevalence of DR in people with newly diagnosed DM will be high, resulting in a somewhat higher overall prevalence of DR.

In general, meta-analysis of large-scale studies show that approximately one sixth of those with DM will have DR and approximately one fifth of those (or 3.6% of persons with DM) will have vision-threatening DR that requires treatment.

Classification of Diabetic Retinopathy

The classic retinal micro vascular signs of DR include Microaneurysms, Haemorrhages, hard exudates (lipid deposits), cotton-wool spots (ischemic retina related to accumulations of axoplasmic debris within adjacent bundles of ganglion cell axons), venous dilation and beading and intra retinal micro vascular abnormalities (i.e., dilated pre-existing capillaries). (Annex Figures). These signs can be classified into two phases of DR.

(1) Non-proliferative Diabetic Retinopathy

Non-proliferative DR is the early stage of DR. Recognition of non-proliferative retinopathy allows a prediction of risk of progression, visual loss and determination of a review interval. Annex Table 1 shows the signs of non- proliferative DR.

2) Proliferative Diabetic Retinopathy

Proliferative Diabetic Retinopathy (PDR) is a severe stage of DR and represents an angiogenic response of the retina to extensive ischemia and capillary closure. Neovascularization has been divided into 2 groups: new vessels on the disc (NVD) and new vessels elsewhere (NVE). Typically, NVE grow at the interface of perfused and non-perfused retina. Annex Table 2 shows the signs of PDR.

The stages of DR, from non-proliferative to proliferative DR, can be classified using the simple international classification of DR scale shown in Table 1.

DME is an important complication that is assessed separately from the stages of retinopathy, as it can be associated with any of the DR stages and can run an independent course.

Diabetic Macular edema

It is important to assess the presence and severity of diabetic macular edema (DME) separately from stages of DR. The stages of DR can be classified using the International Classification of DR Scale shown in Table 1. A simplified grading based on this with referral decision can be used in low-resource settings (Table 2). It is important to remember that a reduction in visual acuity may be the first detectable sign of early DME. An online self-directed course on the grading of diabetic retinopathy is available at: drgrading.iehu.unimelb.edu.au.

Table 1 and 2: Indian Classification of Diabetic Retinopathy and Diabetic Macular edema and Referral Recommendations.

Table 1

Diabetic Retinopathy	Findings Observable on Dilated Ophthalmoscopy	Referral*
No apparent retinopathy	No abnormalities	Review in 1 year
Mild non proliferative DR	Micro aneurysms only	Review in 1 year
Moderate non proliferative diabetic retinopathy	More than just micro aneurysms, but less than severe non proliferative DR	Review in 6 months or refer to ophthalmologist
Severe non-proliferative DR	Any of the following: • Intra-retinal hemorrhages (≥20 in each quadrant); • Definite venous beading (in 2 quadrants); • Intra retinal micro vascular abnormalities (in 1 quadrant); and • no signs of proliferative retinopathy	Refer to ophthalmologist with training in medical/surgical retina/
Proliferative DR	Severe non proliferative DR and 1 or more of the following: • Neovascularization • Vitreous/ pre retinal hemorrhage	Refer to ophthalmologist with training in medical/surgical retina

Table 2

Diabetic Macular Oedema	Findings Observable on Dilated Ophthalmoscopy#	Referral*
DME absent	No retinal thickening or hard exudates in posterior pole	Review in 1 year
DME present	Retinal thickening or hard exudates in posterior pole	Refer to ophthalmologist with training in medical/surgical retina
Mild DME	Retinal thickening or hard exudates in posterior pole but outside the central subfield of the macula (diameter 1000 µm)	Refer to ophthalmologist with training in medical/surgical retina
Moderate DME	Retinal thickening or hard exudates within the central subfield of the macula but not involving the center point	Refer to ophthalmologist with training in medical/surgical retina
Severe DME	Retinal thickening or hard exudates involving the Centre of the macula	Refer to ophthalmologist with training in medical/surgical retina

* For Non-Ophthalmologist any DR should be referred to Ophthalmologist.

II. Public Awareness Guidelines

This section outlines *how effective DR control depends on raising community awareness and translating it into preventive action, timely diagnosis, and adherence to treatment. Because awareness of diabetes and diabetic retinopathy (DR) remains low in many parts of India, programmes should begin with a Knowledge, Attitude, and Practice (KAP) assessment to map what different groups know, feel, and do about diabetes/DR. KAP design involves expert-informed, largely open-ended questions covering epidemiology, symptoms, diagnosis, treatment options, risk factors, and service pathways; tools are pre-tested for validity and then administered to representative samples across medical, paramedical, and general community audiences.

Findings reveal knowledge gaps, misconceptions, and practice barriers and directly inform the content and targeting of subsequent messages.

Using KAP results, programmes craft IEC messages that are simple, accurate, consistent, culturally acceptable, linked to service delivery, and tailored to literacy and local context. Three complementary communication approaches are recommended: Mass (press/public meetings, radio/TV, newspapers, exhibitions) to build broad awareness; Group (seminars, lectures, discussions, patient interactions with booklets/pamphlets) to deepen understanding and influence attitudes; and Individual (counselling, flip charts/leaflets) to drive behavior change. Given that DR is often asymptomatic and vision loss is largely preventable with early detection and treatment, strategies should mix advocacy, training of medical practitioners and paramedical personnel, engagement of community partners, screening camps, targeted outreach to high-risk groups, counselling, and operational research.

**Guidelines for the Comprehensive Management of Diabetic Retinopathy in India, 2008 developed by Aravind eye care system*

Key Recommendations for Awareness

- Set clear targets: Reach ≥80% DR screening coverage among people with diabetes; achieve ≥50% follow-up compliance after screening.
- Prioritize audiences & channels: Mobilize chemists, Path labs, optical shops, physicians/ophthalmologists, PHC staff, paramedics, AYUSH, corporate worksites, parks/satsangs/panchayats, online pharmacies, and medical students; amplify via social/print/TV/radio/cinema PSAs.
- Make the core message ubiquitous: “Check yearly and See Clearly.”
- Build adherence systems: Counselling at point-of-care, integrated records, a call-centre/SMS reminder loop, and standard IEC materials; run regular provider training.
- Institutionalize advocacy moments: Anchor campaigns to World Retina Day, World Diabetes Day, and World Sight Day; engage brand ambassadors.
- Strengthen access narrative: Highlight limited specialist availability to justify task-sharing and tele-ophthalmology/AI-triage in awareness materials.
- Use economic models: Present a simple cost-of blindness model to unlock government and payer investment.
- Track & report: Publicly monitor screening coverage, follow-up completion, and stakeholder participation to drive accountability.

III. Screening Guidelines

Screening for DR is an important aspect of DM management worldwide as it often develops without any symptoms, yet can lead to irreversible vision loss if untreated. Early detection through regular eye exams or retinal photography allows timely intervention—such as laser therapy or injections—that can halve the risk of severe vision loss. For people with diabetes, DR screening is a key element of overall eye care: detecting the disease early means preserving sight, improving quality of life, and reducing long-term treatment costs.

A screening exam could include a complete ophthalmic examination with refracted visual acuity fundus photography. However, in a low-resource setting, the minimum examination components to assure appropriate referral should include a screening visual acuity exam and retinal examination adequate for DR classification. Vision should be tested prior to pupil dilation. Annex Figure 1 shows an example of the screening process for DR.

Who Should Screen?

Diabetic retinopathy (DR) screening can be effectively implemented through task sharing and task shifting, as defined by the World Health Organization (WHO).

- **Task sharing** involves the rational distribution of tasks among health workforce teams, allowing different cadres to work collaboratively within their scope of competence.
- **Task shifting** refers to the delegation of specific tasks, where appropriate, from highly qualified health workers to those with shorter training or fewer qualifications to make efficient use of available human resources.

Accordingly, DR screening can be performed by the following categories of trained personnel:

1. Ophthalmologist- Responsible for confirming diagnoses, grading DR and diabetic macular edema, and determining treatment needs.
2. Physician/Diabetologist – Plays a key role in identifying eligible individuals for screening and ensuring systemic control of diabetes and associated risk factors.
3. Optometrist/ Ophthalmic assistant: Who have skill of screening of DR learnt either during his training or after training and certification by a doctor/Institution engaged in screening.
4. Any field level worker or health volunteer: Who either had training and certified for procuring gradable quality AI fundus images or grading of fundus images at any institution or has been trained with doctor engaged in active screening for at least 3 months.
5. Enable skilled non-physicians (optometrists, nurses, paramedics, AYUSH staff, medical trainees) to perform imaging and AI triage after certification.

These cadres form an integral part of a tiered DR screening model, ensuring expanded coverage, improved accessibility, and early detection of sight-threatening diabetic retinopathy through an integrated approach to primary and secondary eye care.

How to Screen?

1. Indirect Ophthalmoscopy
2. Slit-lamp bio microscopic examination
3. Dilated Direct Ophthalmoscopy

- Non-Mydriatic photography- Deploy validated non-mydriatic fundus cameras, possibly with AI for fast and accurate grading; dilate only when images are ungradable. Use of AI applications cleared by CDSCO / MoHFW e-Health with on-device or web inference for speed and scale.

4. Mydriatic photography
5. Hand held fundus cameras/ AI assisted cameras

The screening vision exam should be completed by trained personnel in any of the following ways, depending on resources:

- Refracted visual acuity examination using a 3- or 6-meter distance visual acuity chart and a high contrast visual acuity chart.
- Presenting visual acuity examination using a near and distance vision chart and a pin-hole option if visual acuity is reduced.
- Presenting visual acuity examination using a 6/12 (20/40) equivalent handheld chart consisting of at least 5 standard letters or symbols and a pin-hole option if visual acuity is reduced.

A retinal examination may be accomplished in the following ways:

- Direct or indirect ophthalmoscopy or slit-lamp bio microscopic examination of the retina.
- Retinal (fundus) photography (including any of the following: wide field to 30°; mono- or stereo-; dilated or undilated). (Annex Table 3). This could also include telemedicine approaches.
- For the retinal examination, a medical degree may not be necessary, but the examiner must be well trained to perform ophthalmoscopy or retinal photography and be able to assess the severity of DR either manually or based on the AI fundus imaging.

Using adequate information from the visual acuity and retinal examinations, one can decide on an appropriate
management plan, as outlined in Table 2. The plan may be modified based on individual patient requirements.

Patients with less than adequate retinal assessment should be referred to an ophthalmologist unless it is obvious that there is no DR, or at the most, only mild non-proliferative DR (i.e., Microaneurysms only). In addition, persons with unexplained visual-acuity loss should be referred.

As part of a screening exam, persons with diabetes should be asked about their diabetes control, including blood glucose, blood pressure and serum lipids. In addition, women should be asked if they are or could be pregnant. Inadequate control and pregnancy may require further appropriate medical intervention. Doctor also should adopt holistic approach for the People with diabetes and instruct nurses, dieticians, counsellors and other cadres to take care of other diabetes related complications as well.

Whom to Screen?

- People with known diabetes.
- Opportunistic screening: Screening for DR in all patients who are above the age of 40 years who are visiting eye clinics and all diabetics attending diabetes clinics/ NCD clinics/PHCs/ vision centres.
- Mass screening: Having specific camps for DR screening as an outreach activity in individuals who are known Diabetics or those having 2 hour- post prandial Glucose (PP2BS) >140 mg/dl or fasting blood sugar (FBS) >110 mg/dl.
- Targeted screening: People with diabetes more than 5 years/ family history of diabetes / Other comorbid risk factors like diabetic nephropathy/ cardiopathy/neuropathy etc/Obesity /metabolic syndrome.

Referral Guidelines

Minimum referral guidelines are as follows:

- Visual acuity below 6/12 (20/40) or symptomatic vision complaints. [Note: While using AI- enabled fundus camera or telemedicine approach Visual acuity is not mandatory]
- If DR can be classified according to the International Classification of DR or a Simplified scheme, they should be referred accordingly (Table 1 and 2)
- If retinal exam or retinal imaging is available but only a less detailed classification of DR is possible:
- No retinopathy or only a few small red spots: return for screening exam in 1 year
- Dot or blot Haemorrhages or possible neovascularization: refer to ophthalmologist
- White spots in the retina: refer to ophthalmologist
- If visual acuity or retinal examination cannot be obtained or ungradable retinal images at the screening examination: refer to ophthalmologist
- Patients who have had laser treatment, anti VEGF, bispecific or steroid injections or surgery should also be referred for ophthalmic review.

Key Recommendations for Screening

- **Expand screening to all diabetics** through NCD/diabetes clinics, PHCs, vision centres, and private/NGO facilities, with fixed “diabetes days” for high throughput.
- **Strengthen referral chains** linking primary centres to district hospitals, RIOs, and tertiary institutions with clear timelines for treatment initiation.
- **Adopt AI-assisted, digitally integrated screening** to reduce reliance on specialists and expand reach.
- **AI-driven triage** to refine referrals: urgent referral for severe NPDR, DME, reduced vision, or ungradable images; mild cases rescreened at risk-based intervals.
- Integrate tele-ophthalmology hubs and digital records, making retinal-screening fields mandatory in diabetes care workflows; use SMS/call reminders for follow-up.
- Ensure financing and incentives: cover AI screening, lasers, anti-VEGF injections/ Bispecific injections and OCT under public schemes; provide per-screening incentives for field staff.

- **Regular audits** of program performance, AI accuracy, and image quality, along with **public dashboards** to track coverage and equity. Regular monitoring of successful initiation of treatment and adherence to follow up.
- National Capacity Building through training of CHO, ASHAs, lab technicians, physicians, nurses, PMOs, optometrists, pharmacists, counsellors and AYUSH staff with tailored modules for **Decentralized screening.**

IV. Detailed Ophthalmic Assessment of Diabetic Retinopathy

- **Initial Patient Assessment**

Detailed patient assessment should include a complete ophthalmic examination, including visual acuity and the identification and grading of severity of DR and presence of DME for each eye. The patient assessment should also include the taking of a patient history focused on diabetes, other systemic comorbidities and its modifiers.

a. **Patient History (Key Elements)**

- Duration of diabetes
- Past glycemic control (hemoglobin A1c)
- Medications (especially insulin, oral hypoglycemics, anti-hypertensives, and lipid-lowering drugs)
- Systemic history (e.g., renal disease, systemic hypertension, serum lipid levels, pregnancy)
- Ocular history including treatment taken for diabetic retinopathy or other eye ailments like cataract, glaucoma, corneal diseases.

b. Initial Physical Exam (Key Elements)

- Visual acuity
- Measurement of intraocular pressure (IOP)
- Gonioscopy when indicated (e.g., when neovascularization of the iris is seen or in eyes with increased IOP)
- Slit-lamp biomicroscopy
- Fundus examination

c. Fundus Examination Assessment Methods

Currently, the two most sensitive methods for detecting DR are retinal photography and slit-lamp biomicroscopy through dilated pupils. Both depend on interpretation by trained eye health professionals. Other methods are listed in Annex Table 2.

Fundus photography has the advantage of creating a permanent record and for that reason, it is the preferred method for retinopathy assessment.

However, ophthalmologists/ ophthalmologist with training in medical/ surgical retinas can identify DR without photography and documentation of an observation in form of diagram in absence of Fundus photograph can be done but in hands of non-ophthalmologists, the documentation has to be in the form of photographs.

The use of all instruments requires training and competence but more skill is needed for indirect ophthalmoscopy and slit-lamp biomicroscopy than for fundus photography. Non mydriatic fundus cameras can be very easy to use. Media opacities will lead to image/ view degradation and all photographs/ images must be reviewed by trained personnel. However, the newer AI-enabled fundus cameras helps in automated grading diabetic retinopathy and prompt referral of sight threatening DR.

In case an AI device is used for DR screening, device validation should be conducted at regular intervals to assess AI performance in terms of sensitivity and specificity, as per the manufacturer's recommendations. A human in the AI loop is a must — the final DR diagnosis for the patient should be given by a physician.

Refresher training for users should also be conducted from time to time by the institutes.

Key Recommendations for Diagnosis

1. Comprehensive history taking; with stronger emphasis on patient-centred education- mental health, self-management, and importance of early detection.
   - Adopt a tiered diagnostic approach:
   - Primary level: AI-enabled fundus camera (45°)
   -Secondary level: Fundus camera with montage (120°), OCT
   -Tertiary level: Wide-field fundus imaging, FFA, OCTA

Inclusion of DR Metrics in National and Global Targets: Embed DR-specific indicators within global diabetes targets (e.g., diagnosis rates, control of glycemia and blood pressure, screening coverage) and invest in data systems to monitor burden, service coverage, and outcomes.

Follow-up Examination of Patients with Diabetic Retinopathy

In general, the follow-up history and examination should be similar to the initial examination. The assessment of visual symptoms, visual acuity, measurement of IOP and fundus examination are essential.

a Follow-up History

- Visual symptoms
- Glycemic status (Hemoglobin A1c), recent blood sugar levels including home glucose levels if HbA1c is not available
- Systemic status (e.g., pregnancy, blood pressure, serum lipid levels, renal status)
- Anemia, cardiac conditions, stroke, history of COVID, malignancy

b. Follow-up Ophthalmic Evaluation

- Visual acuity
- Measurement of IOP
- Gonioscopy when indicated
- Rule out iris neovascularization
- Slit-lamp biomicroscopy using a non-contact lens
- Fundus examination

Ancillary Tests

- Fundus pictures must be taken at all follow-up visits and the retinopathy is to be graded as per the Disease severity scale classification
- Fluorescein angiography can be used as a guide for treating DME and as a means of evaluating the cause(s) of unexplained decreased visual acuity. Fluorescein angiography can also identify macular capillary non-perfusion or sources of capillary leakage resulting in DME as possible explanations for visual loss.
- OCT is the most sensitive method to identify sites and severity of DME.
- Optical coherence tomography angiography (OCTA): a more recent non-invasive imaging tool Octa, may be done if FFA is contraindicated.

Patient Education

- -Discuss results of the ocular examination and implications.
- Encourage patients with DM but without DR to have annual screening eye exams.
- Inform patients that effective treatment for DR depends on timely intervention, despite good vision and no ocular symptoms.
- Educate patients about the importance of maintaining near-normal glucose levels, near-normal blood pressure and to control serum lipid levels.
- Communicate with the general physician (e.g. family physician, internist or endocrinologist) regarding eye findings.
- Inform about retinal facilities [who are part of vision 2020/ certified network] wherein patients could seek treatment and periodic follow up
- Provide patients whose conditions fail to respond to surgery and for whom treatment is unavailable with proper professional support (i.e. offer referrals for counseling, rehabilitative, or social services as appropriate).
- Refer patients with reduced visual function for vision rehabilitation and social services.

Table 3: Follow-up Schedule and Management for Diabetic Retinopathy Severity in the Indian context. For all patients, regardless of DR severity, optimize medical treatment for glycemic control, hypertension, and dyslipidemia.

Follow up Schedule	In Indian Settings
No apparent DR	Repeat examination annually
Mild non proliferative DR	Repeat examination annually
Moderate non proliferative DR	Repeat examination within 6 months
Severe non proliferative DR or proliferative DR	Pan-retinal photocoagulation
DME	Laser / Intra-vitreal injections of anti-VEGF agents /Bispecific IVI/Steroids

V. Treatment of Diabetic Retinopathy

Pan-retinal laser photocoagulation should be performed urgently in patients with proliferative DR. There are benefits of early panretinal photocoagulation at the severe non proliferative DR stage for patients with type 2 diabetes and should be considered in at least one eye of the patient.

Other factors, such as poor compliance with follow up, impending cataract extraction or pregnancy and status of fellow eye will help in determining the timing of the panretinal photocoagulation.

Panretinal Photocoagulation (PRP)

- Pretreatment Discussion with Patients
- Patients usually need numerous follow-up visits and may require supplementary laser treatment.
- PRP reduces the risk of visual loss and blindness.
- Although laser treatment is effective, some patients may still develop vitreous haemorrhage. The Haemorrhage is caused by the diabetes and not by the laser; it may mean the patient needs more laser treatment, anti VEGF injections ,Bispecific injection or surgery.
- Laser treatment often reduces peripheral and night vision; similarly, there can be a temporary drop in vision due to macular edema after PRP which may resolve spontaneously, or may require intravitreal injections. However, this short-term side effect is compensated by the significant long-term reduction in severe vision loss and blindness in laser-treated patients.

Lenses for PRP

- The three-mirror Goldmann contact lens has a central lens for treating the posterior pole and side mirrors for treating the mid peripheral and peripheral retina. Disadvantages: small field of view, which requires continual manipulation of the lens to complete treatment. Spot size is set at 500µm.

- Newer wide-angle contact lenses are often used. Although the image is inverted, there is a large field of view allowing for many burns with the field while easily maintaining orientation to the disc and macula. The optics of these wide-angle lenses will affect the laser spot size on the retina **(Table 4).**

- Wide-angle indirect ophthalmoscopy lenses provide an inverted image, but show a large field of view and a magnification of the spot in the retina (Table 4). Scatter treatment can be applied to a large area of retina in a single image, and it is easy to visualize the disk and the macula.

Table 4: Laser Spot Size Adjustment Required for Different Lenses Contact

Lens	Field of Vision	Axial magnification	Spot magnification	Spot Size Setting for ~500 µm
Mainster Wide-Field	125°	0.46	1.50x	300µm
Volk TransEquator	120-125°	0.49	1.43x	300µm
Volk Quad/Aspheric	130-135°	0.27	1.92x	200 to 300µm
Mainster PRP 165	160°	0.27	1.96x	200 to 300 µm

Technique for PRP

- The pupil should be fully dilated and topical anesthesia is used. Retrobulbar or sub tenons anesthesia to reduce pain and decrease eye motion can be employed as necessary.
- The most common wavelengths used are Argon green, blue green (generally avoided currently) and 532 green laser, using the slit-lamp or indirect ophthalmoscopic delivery system. In case of hazy media, Krypton red or diode red laser (814 nm) can be used. Slit lamp delivery requires the patient to be seated and is a contact procedure. Indirect ophthalmoscopic delivery has the advantage of being non contact hence useful in post operative patients and those who cannot sit up.
- Typical initial settings on the Argon laser would be 500 µm spot size, a 0.1 second exposure and 250-270 mw power. The power is gradually increased until a whitish reaction is obtained on the retina. The lesions are placed 1 burn width apart. (Table 5)
- A total of 1600-3000 burns are placed in 1 or more sittings, carefully avoiding the macular area and any areas of tractional elevation of the retina. The burns are placed 2 to 3 disc diameters away from the centre of the macula and 1 disc diameter away from the disc, usually outside the arcades and extended peripherally up to the equator and beyond.
- Laser treatment should not be applied over major retinal vessels, pre retinal Haemorrhages, darkly pigmented chorio retinal scars, or within 1 DD (200-300 µm) of centre of macula, so as to avoid risk of Haemorrhage or large scotomas.
- Other considerations:
- Additional photocoagulation is needed if there is evidence of worsening of proliferative DR.
- Add laser burns in between scars of initial treatment further peripherally and also at the posterior pole, sparing the area within 500-1500 µm from the centre of the macula.
- Favour quadrants with active new vessels or areas with intra retinal micro vascular abnormalities where scars are more widely spaced and areas of severe ischemia not previously treated, such as the temporal part of the posterior pole.
- Direct treatment of NVE in between scars is possible.

Panretinal (Scatter) Photocoagulation Technique Following Diabetic Retinopathy Clinical Research Network (DRCRNet) Consensus

Panretinal (scatter) photocoagulation initially consists of 1200 to1600 burns (or the equivalent area treated with a multi-spot laser), with a spot size on the retina of approximately 500 µm, delivered over 1 to 3 sittings and completed within eight weeks (56) days of initiation. (Table 5)

Table 5: The burn characteristics for panretinal photocoagulation:

Size (on retina):	500 µm
Exposure:	0.1 seconds recommended, 0.05 to 0.2 allowed
Intensity:	mild white (i.e. 2+ to 3+ burns)
Distribution:	edges 1 burn width apart
Number of sessions/sittings:	1 to 3
Nasal proximity to disk:	No closer than 500 µm
Temporal proximity to centre:	No closer than 3000 µm
Superior/inferior limit:	No further posterior than 1 burn within the temporal arcades
Extent:	Arcades (~3000 µm from the macular centre) to at least the equator
Total number of burns:	1200 – 1600 There may be instances where 1200 burns are not possible such as the development of vitreous haemorrhage or inability to complete a sitting precluding completion of the PRP session. Similarly, there may be clinical situations in which more than 1600 burns are needed such as initial difficulty with laser uptake due to media opacity.
Wavelength:	Green or yellow (red can be used if vitreous haemorrhage is present)

2. Treatment for Diabetic Macular Edema

Indian Settings

- **Optimize medical treatment:** Systemic control- Improve glycemic control if HbA1c > 7.5% as well as associated systemic hypertension, nephropathy or dyslipidemia should be emphasized for all patients with diabetic macular edema (DME) at the time of initiating treatment. Steroids are indicated in pregnant women with DME, in cases of diabetic retinopathy with a significant tractional component, and in refractory cases that show inadequate response to anti-VEGF therapy.

- Mild or moderate DME without centre involvement (e.g., circinate HE ring threatening the centre of the macula or when no vision loss has occurred in spite of centre involvement): Consider focal laser to leaking Microaneurysms. No treatment is applied to lesions closer than 300 µm from the centre of the macula.

- Severe DME with centre involvement and associated vision loss*: intra-vitreal anti- VEGF treatment (e.g., with ranibizumab [Lucentis] 0.3 or 0.5mg, bevacizumab [Avastin] 1.25mg, or Aflibercept [Eylea]) 2mg therapy) and new advanced bispecific IVI Faricimab [Vabysmo] 6mg.

Consideration should be given to monthly injections followed by treatment interruption and re-initiation based on visual stability and OCT. Patients should be monitored almost monthly with OCT to consider the need for treatment. Persistent retinal thickening and leaking points: consider laser treatment after 24 weeks. Treatment with intra-vitreal triamcinolone (1mg) or dexamethasone implant (Ozurdex) may be considered, especially in pseudophakia eyes. (Annex Figures 3 and 4). Injections are to be given with all sterile precautions (Annexure).

- DME associated with proliferative DR: combined intra-vitreal anti-VEGF therapy and PRP should be considered.
- Vitreomacular traction or epiretinal membrane on OCT: pars plana vitrectomy may be indicated.

Laser Technique for Macular edema

- Focal macular treatment includes focal laser treatment of Microaneurysms and grid treatment of areas of diffuse leakage and focal non-perfusion within 2DD of the centre of the macula. **(Table 6)**
- Laser parameters used are 50-100 µm spot size, 120-150 mW energy and very light gray intensity of the burn. Care is taken to demarcate and avoid the foveal avascular zone.
- If DME is associated with large areas of macular ischemia, only the areas of retinal thickening are treated.

Table 6: Modified-ETDRS and the Mild Macular Grid Laser Photocoagulation Techniques

Burn Characteristic	Direct/Grid Photocoagulation (Modified-ETDRS technique)	Mild Macular Grid Photocoagulation Technique
Direct treatment	Directly treat all leaking Microaneurysms in areas of retinal thickening between 500 and 3000 µm from the centre of the macula (but not within 500 µm of disc)	Not applicable
Change in MA colour with direct treatment	Not required, but at least a mild gray-white burn should be evident beneath all Microaneurysms	Not applicable
Burn size for direct treatment	50-100 µm	Not applicable
Burn duration for direct treatment	0.05 to 0.1 sec	Not applicable
Grid treatment	Applied to all areas with diffuse leakage or nonperfusion with retinal thickening within the area described below for treatment. In addition, direct treatment to microaneurysms is performed using the technique described above	Applied to entire area described below for treatment (includingunthickened retina)

Area considered for grid treatment	• 500 to 3000 µm superiorly, nasally and inferiorly from centre of macula • 500 to 3500 µm temporally from macular centre • No burns are placed within 500 µm of disc	• 500 to 3000 µm superiorly, nasally and inferiorly from centre of macula • 500 to 3500 µm temporally from macular centre • No burns are placed within 500 µm of the disc
Burn size for grid treatment	50-100 µm	50 µm
Burn duration for grid treatment	0.05 to 0.1 sec	0.05 to 0.1 sec
Burn intensity for grid treatment	Barely visible (light gray)	Barely visible (light gray)
Burn Separation for Grid Treatment	Two visible burn widths apart	200 to 300 total burns evenly distributed over the treatment area outlinedabove (approx. two to three burn widths apart)
Wavelength (grid and focalTreatment)	Green to yellow wavelengths	Green/ Yellow

3. Indications for Vitrectomy

- Severe vitreous haemorrhage of 1–3 months duration and that does not clear spontaneously.
- Advanced active proliferative DR that persists despite extensive PRP.
- Traction macular detachment of recent onset.
- Combined traction-rhegmatogenous retinal detachment.
- Tractional macular edema or epiretinal membrane involving the macula.

Key Recommendations for Treatment

- Primary level: Focus on diabetes awareness, systemic control, and timely referral
- Secondary level: Continue systemic control; initiate anti-VEGF, Bispecific IVI ,steroids where indicated, and PRP if trained/equipped
- Tertiary level: Advanced DR management, including PRP for severe NPDR/PDR and surgical interventions.
- Support research in emerging investigational therapies: Tyrosine Kinase inhibitors, Gene therapy-potential single treatment cure.
- Mobile laser units and task-sharing to rural/underserved areas to improve equitable access.
- National and insurance scheme coverage for essential treatments (including anti-VEGF, Bispecific IVI and OCT monitoring) and quality assurance.
- Integrate ABHA ID for continuum of care
- Implement image-based documentation systems
- Strengthen treatment capacity in public hospitals including anti-VEGF injections, Bispecific intra vitreal injections and OCT under AB PM-JAY minimizing out-of-pocket costs. Support low-income patients through public-private and non-profit partnerships.
- Promote intersectoral collaboration by linking DR care with NCD, Ayush, and PPPs, supported by district-wise referral and recall systems (SMS alerts).
- Develop national Diabetes and DR registries for monitoring and planning.

Annexures

VISION 2020: RIGHT TO SIGHT-INDIA GUIDELINES FOR DIABETIC RETINOPATHY

Annexure 1: Tables

Table 7: Features of Diabetic Retinopathy (also see the photographs continued in the annex)

Feature	Description	Assessment Considerations
Micro aneurysms	Isolated, spherical, red dots of varying size. They may reflect an abortive attempt to form a new vessel or may simply be a weakness of capillary vessel wall through loss of normal structural integrity.	They are easiest seen on fluorescein angiography
Dot haemorrhages	Dot haemorrhages cannot always be differentiated from micro aneurysms as they are similar in appearance but with varying size.	The term dot haemorrhage/ Micro aneurysm (H/Ma) is often used
Blot haemorrhages	Formed where clusters of capillaries occlude leading to formation of intra retinal blot haemorrhages.	The lesion can be seen to be in the outer plexiform layer on fluorescein angiography where it does not mask the overlying capillary bed unlike dot and flame haemorrhages, which lie more superficially in the retina.
Cotton wool spots Intra retinal micro vascular anomalies	These represent the swollen ends of interrupted axons where build-up of axoplasmic flow occurs at the edge of the infarct. These are dilated capillary remnants following extensive closure of capillary network between arteriole and venule. Associated features include: • venous beading (foci of venous endothelial cell proliferation that have failed to develop into new vessels), • Venous reduplication (rare), • Venous loops (thought to develop due to small vessel occlusion and opening of alternative circulation)	These features are not exclusive to DR and do not in themselves appear to increase the risk of new vessel formation. For example, they may occur in hypertension HIV/AIDS. They are easiest seen on fluorescein angiography.

Macular changes in non-proliferative retinopathy – Macular oedema	Thickening of retina takes place due to accumulation of exudative fluid from damaged outer blood-retina barrier (extracellular oedema) or as a result of hypoxia, leading to fluid accumulating within individual retinal cells (intracellular oedema). It may be focal or diffuse. Flame hemorrhage and cotton wool spot formation. May occur due to arteriolar occlusion, without capillary occlusion, which frequently affects the horizontal nerve fiber layer of the retina.	The appearance of macular oedema can be appreciated on stereoscopic examination or inferred by the presence of intra-retinal exudate.
Optic disc changes	Occasionally swollen optic discs may be seen (diabetic papillopathy) in people with diabetes.	In diabetic papillopathy, vision is usually not significantly impaired.

Table 8: Features of Proliferative Diabetic Retinopathy

Feature	Description	Assessment Considerations
New vessels at the disc (NVD)	New vessels at the discs usually arise from the venous circulation on the disc or within 1-disc diameter of the disc NVD.	In order to differentiate NVD from fine normal small blood vessels note that the latter always taper to an end and do not loop back to the disc, while NVD always loop back, may form a chaotic net within the loop, and have the top of the loop of wider diameter than the base.
New vessels elsewhere (NVE)	New vessels, which usually occur along the border between healthy retina and areas of capillary occlusion.	Not to be confused with intra retinal micro vascular abnormalities, which occur within areas of capillary occlusion.
Other sites of new vessels	New vessel formation on the iris (NVI) is uncommon but represents potentially more advanced ischemic changes. New vessel formation on the anterior hyaloid surface occurs rarely postvitrectomy if insufficient laser has been applied to the peripheral retina.	It is useful to perform gonioscopy in such cases to exclude new vessels in the anterior chamber angle (NVA), which can lead to neovascular glaucoma.
Fibrous proliferation	In proliferative retinopathy, new vessels grow on a platform of glial cells.	

Adapted from British The Royal College of Ophthalmologists Diabetic Retinopathy Guidelines December 2012.

Table 9: Available Assessment Instruments and Their Advantages and Disadvantages

Technique	Advantages	Disadvantages	Recommendation
Direct ophthalmoscopy	• Mobile • Inexpensive	• Requires pupil dilation • Small field • Low sensitivity: even with a trained practitioner and red free illumination, small micro vascular abnormalities may be difficult to detect • Less effective than slit-lamp bio microscopy through dilated pupils • No ability to retrospectively audit	• Optional for screening • Pupils must be dilated

Indirect ophthalmoscopy	• Mobile • Large field • Relatively inexpensive	• Requires pupil dilation • Even with a trained practitioner and red free illumination, small micro vascular abnormalities may be difficult to detect • Less effective than slit-lamp bio microscopy through dilated pupils • No ability to retrospectively audit	• Optional for screening • Pupils must be dilated
Slit-lamp bio microscopy	Large field	• Requires pupil dilation Immobile • Requires special lenses • No ability to retrospectively audit	Required for ophthalmic examination
Non mydriatic retinal photography with or without AI-enabled cameras	• Large field • Can be used by non-medically trained staff • No dilation required in 80-90% of cases • Some are portable - can be transported to the community in mobile units • Can be linked to computers and images can be stored for the long term • Allows objective comparison of the same person, or between different groups of people, examined at different times or by different professionals • Can be used as a patient education tool, giving immediacy and personal relevance • Readily recalled for evaluation of screener performance and audit of grading	• Relatively expensive • A dark space is required for maximum pupil dilation • Auditable	Recommended for screening
Non mydriatic retinal photography used with mydriasis	As above except pupils are dilated for better quality photos	• As above • Requires pupil dilation	Optional only if ungradable images

Mydriatic retinal photography (conventional fundus camera)	• Large field	• Requires pupil dilation • Expensive • Bright flash constricts the pupil for a long time	• Optional • Desirable in ophthalmic centre
OCT/ *Wide field OCT angiography	• One of the best ways to assess macular oedema (retinal thickening and Intra-retinal oedema) • Non-invasive, assess the severity of diabetic retinopathy (DR) and monitor the treatment response of proliferative diabetic retinopathy (PDR) to laser therapy • Dye-free method to document foveal avascular zone (FAZ), perifoveal and capillary nonperfusion areas, and the presence of neovascularization elsewhere (NVE) and neovascularization of the disc (NVD)	• Expensive • Dilatation needed • Cannot be used by non-medically trained staff • Expensive • Requires trained personnel	• Desirable in ophthalmic centre
Fluorescein angiography	Only method of assessing capillary non-perfusion, leaking microaneurysms and neovascularization	• Invasive and needs general health status assessment • Expensive • Dilatation needed • Cannot be used by non-medically trained staff	• Desirable in ophthalmic centre
Fundus autofluorescence	A form of functional imaging, giving insights into the metabolic activity of the retinal pigment epithelium.	• Role not clearly understood	• Optional high-resource settings

Equipment

Core/essential: for screening, initial assessment, and follow up:

- Slit-lamp biomicroscope.
- AI assisted Non-mydriatic retinal (fundus) photography (recommended for screening).
- Indirect ophthalmoscopy (preferable for screening, panoramic view, low magnification). Pupils must be dilated.
- Noncontact biconvex indirect lenses used with the slit lamp (90 D for screening, 78 D for more magnification).
- Direct ophthalmoscopy (optional for screening). Pupils must be dilated.
- Three-mirror contact lens used with slit lamp for stereoscopic and high-resolution images of the macula (evaluation of macular edema). Pupils must be dilated.
- Laser equipment: Currently, the most used lasers are (1) The green laser 532 nm, frequency-doubled Nd:YAG or 514 nm argon laser. The 810 nm infrared laser, or diode laser – this causes deeper burns with a higher rate of patient discomfort, but tend to be cheaper, is effective, and requires less maintenance.

Desirable in reference centres:

- OCT/ wide field OCT angiography.
- Fluorescein angiography
- Mydriatic retinal photography (large field conventional fundus camera)
- Green lasers are the most used, but the pattern-laser method, with a predetermined multi-spot treatment cascade and the 577 nm yellow laser can be used in selected cases.

IAPB Standard List of Equipment

- The online version of the International Agency for the Prevention of Blindness (IAPB) Standard List provides information for eye health providers on a carefully evaluated range of eye care technologies, supplies, and training resources suitable for use in settings with limited resources.
- For more information and to get access, please register and log on at IAPB.standardlist.org.
- Only registered users have access to the IAPB Standard List catalogue. Please be aware the registration process may take a few days for approvals to be granted.

Annexure 2: Suggested Indicators for Evaluation of DR Programs

- Prevalence of diabetic retinopathy related blindness and visual impairment*
- Proportion of blindness and visual impairment due to DR*
- Last eye examination for DR among known persons with diabetes (males/females)*
- Never had eye examination for DR
- 0–12 months ago
- 13–24 months ago
- >24 months ago
- Could be simplified as: never/0-12 months ago/>12 months ago
- Number of patients who were examined for DR during last year
- Number of patients who received laser and/or anti-VEGF treatment during last year
- Maintenance of diabetes and DR registries - electronically maintained should be given preference

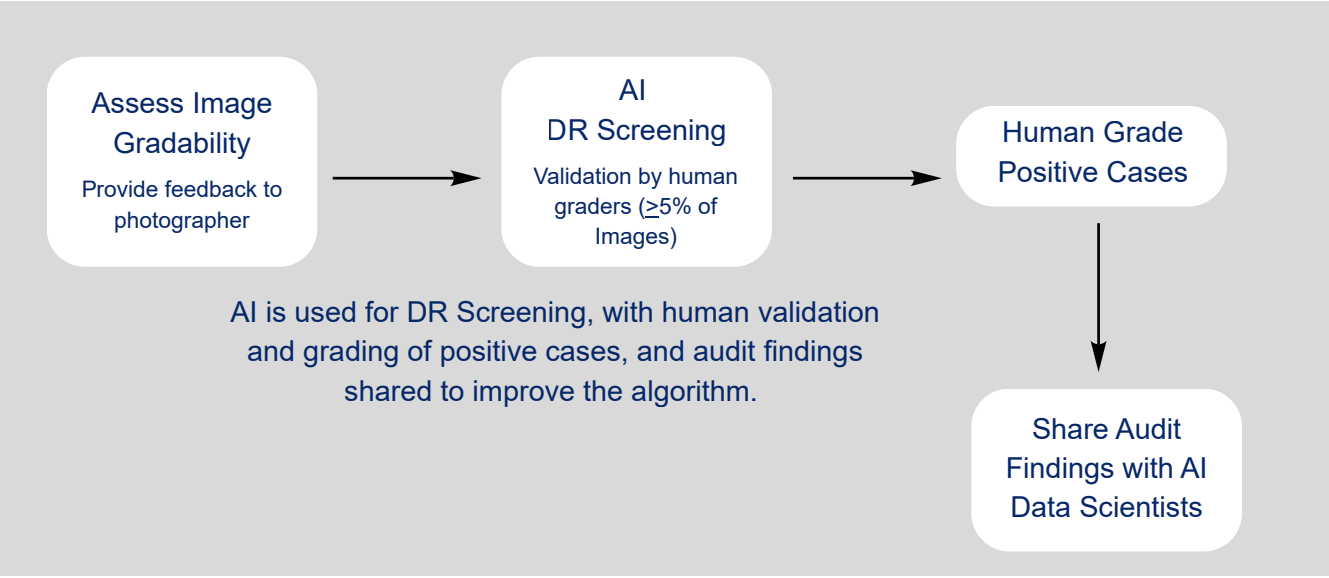
This absolute number could be used to define ratios such as:

- Number of patients who received laser and/or anti-VEGF treatments per million general population per year [equivalent to Cataract Surgical Rate (CSR)]
- Number of patients who received laser and/or anti-VEGF treatments per number of patients with diabetes in a given area (hospital catchment area, health district, region, country)
- Numerator: number of laser and/or anti-VEGF treatments during the last year
- Denominator: number of patients with diabetes (population x prevalence of DM; source: IDF Atlas)
- Number of patients who received laser and/or anti-VEGF treatments per number of persons with vision-threatening DR in a given area (hospital catchment area, health district, region, country)
- Numerator: number of laser and/or anti-VEGF treatments during the last year
- Denominator: number of patients with vision-threatening DR (population x prevalence of DM x 0.117 [9]; source: IDF Atlas)

*** Data available from RAAB surveys**

Annexure 3: Flowcharts

Figure 1: AI usage for DR Screening



Assess Image Gradability

- AI checks image quality and provides real-time feedback to the photographer or technicians if needed.

AI DR Screening

- AI screens for diabetic retinopathy (DR). At least 5% of screened images are validated by human graders to estimate false positives and false negatives.

Human Grade Positive Cases

- Human graders re-evaluate all AI-positive cases at the screening point to eliminate false positives.

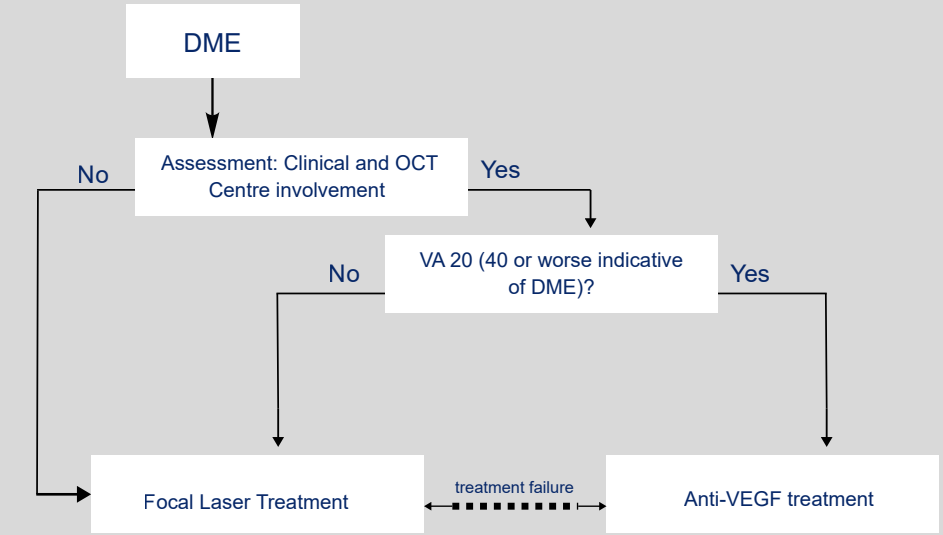
Share Audit Findings with AI Data Scientists

- Audit results are shared with AI developers to enable real-time algorithm retraining and improve diagnostic accuracy.

Concise Summary

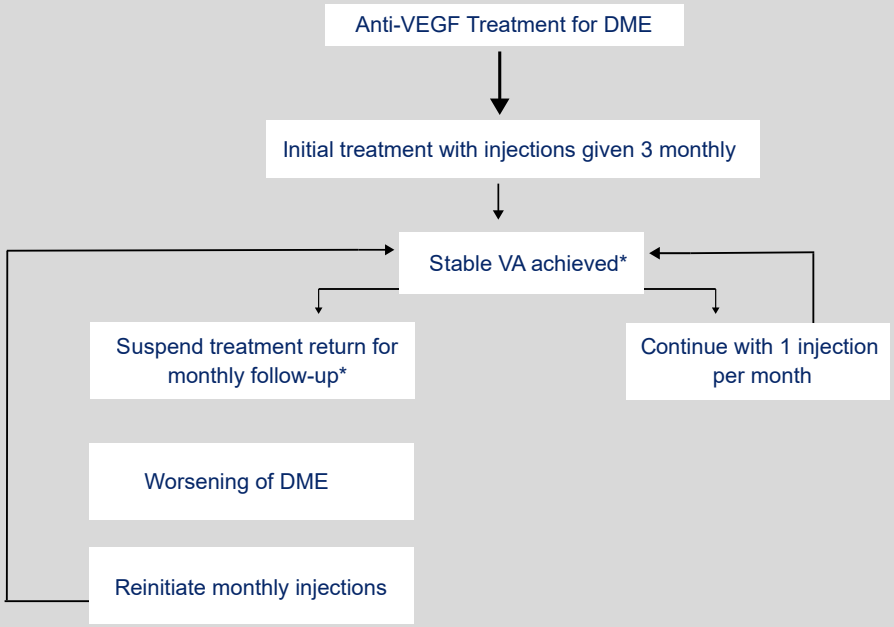
- An AI-enabled, human-in-the-loop DR screening pathway uses AI to assess image quality and detect DR, validated by human graders. Continuous feedback and audit findings guide real-time AI model improvement for more accurate and reliable screening outcomes.

Figure 2: Treatment decision tree of DME based on Centre-Involvement and Vision



DME - diabetic macular edema
VA visual- acuity

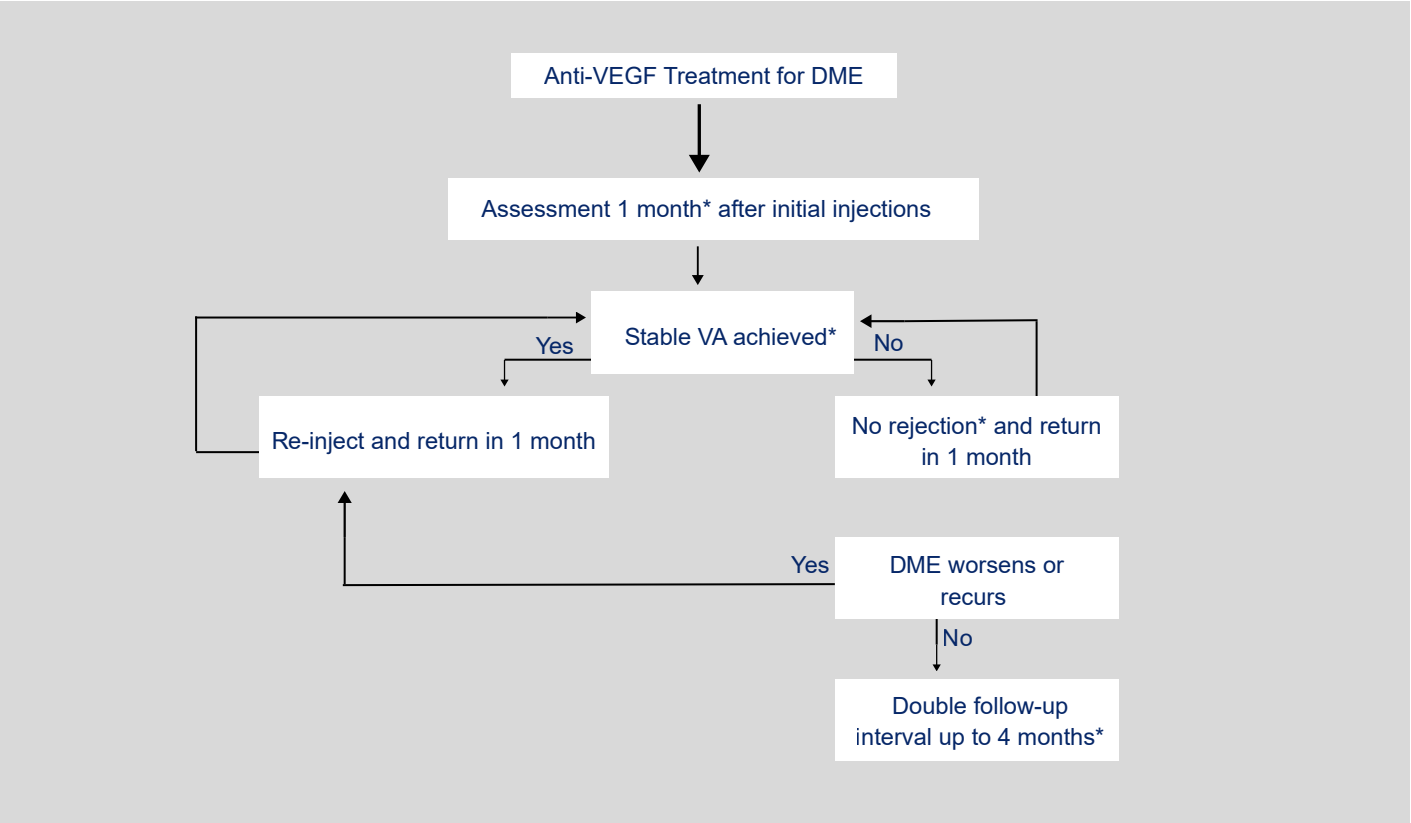
Figure 3: Anti-VEGF treatment decision tree based on the RESTORE study treatment and re-treatment schedule



VA was considered to have stabilized if there was no further improvement in best corrected visual acuity (BCVA) at the last two consecutive visits or if a BCVA letter score of 6/6 was observed at the last two consecutive visits.
Decrease in BCVA and confirmed by OCT and/or other anatomical and clinical assessments.

- VEGF – Vascular Endothelial Growth Factor
- DME – Diabetic Macular Edema
- VA – Visual Acuity

Figure 4: Anti-VEGF treatment decision tree based on the DRCR.net re-treatment and follow-up schedule



a. In the DRCR.net study, 4-week, not 1 month, intervals were used.

b. The DRCR.net study required 4 injections of intravitreal ranibizumab every 4 weeks, initially it is not known whether a different number of injections initially would have worked as well. DRCR.net also required 2 additional injections at 5 and 7 if edema persisted and success had not been met, even in the absence of improvement.

c. Relevant details from DRCR.net study 1) DRCR.net "improvement" on Zeiss Stratus OCT >10% decrease in central subfield thickness 2) Even if no longer improving on OCT, injections continue if VA "improvement" (unless 6/6 or better); 3) VA improvement defined as 5 or more letter increase on Electronic ETDRS Visual Acuity Test.

d. In the DRCR.net study, if focal/grid laser was deferred at baseline, it was added at or after 24 weeks if edema still present and OCT central subfield and vision no longer improving.

e. In the DRCR.net study, all patients received at least 4 injections 4 weeks apart. The decision to re-inject was at investigator discretion, starting at 16 weeks for "success" defined as VA better than 6/6 or OCT central subfield <250 µm. Starting at 24 weeks, re-injection was also at investigator discretion if no improvement in OCT central subfield or vision.

f. The DRCR.net study continued follow-up every 4 weeks through the 52-week visit and did not permit extension of follow-up until after the 52-week visits. If injection was withheld due to no improvement or success at 3 consecutive visits following the week 52 visit, follow-up interval was doubled to 8 weeks and then again to 16 weeks if still no change.

VEGF – Vascular Endothelial Growth Factor
DME – Diabetic Macular Edema
VA – Visual Acuity

Annexure 4: Intra-vitreal technique for Anti-VEGF or steroids

Location of the Procedure – A sterile Operation theatre-based procedure is strongly recommended.
Pre-operative Assessment – A thorough pre-injection check of the eye and ocular adnexa to rule out ocular infections is mandatory. High risk patients, especially those receiving Intravitreal Bevacizumab (Avastin), preferably, ought to be assessed by a physician for fitness for the procedure.

Surgeons and Staff – The personnel involved in the procedure need to follow the sterile precautions as mandated for a regular surgical procedure. This involves the conventional wearing of sterile surgical gowns and the use of sterile surgical gloves, cap and masks for the procedure. The patient's identity, case record and adequate pupillary dilation is verified prior to the procedure.

Local Asepsis & Anesthesia– The patients need to be draped using a standard surgical drape after the conventional betadine cleansing of the external lids. 2-3 drops of 5% Povidone-Iodine Solution (Betadine) may be instilled into the conjunctival sac and flushed with saline after 30 seconds. Local anaesthesia may be achieved using 4% Lignocaine drops. Alternatively, a cotton pledget/swab soaked in 4% lignocaine may be dabbed onto the site of injection.

The Injection procedure – A sterile syringe containing the drug mounted with a 30 Gauge needle is used. The preferred site of injection is the inferotemporal quadrant (4mm from the limbus for phakic patients; 3.5mm for pseudophakia patients; 3mm for aphakic patients). The drug is injected into the mi vitreous cavity after visualizing the needle tip. The injection site is tamponade with a sterile cotton pledget to reduce reflux. Indirect ophthalmoscopy may be done to assess for central retinal artery pulsations (which would necessitate an anterior chamber paracentesis to relieve the same), to confirm drug delivery and check the site of injection.

Postoperatively, topical antibiotics may be prescribed for 5 days.

Bilateral simultaneous Intra-vitreal injections are to be avoided barring exceptional cases such as pediatric patients or mentally challenged patients requiring general anesthesia for the procedure.

The standard doses for the conventional pharmacotherapies are:
Ranibizumab (Lucentis) – 0.5mg/0.05 ml
Bevacizumab (Avastin) – 1.25mg/0.05ml
Triamcinolone – 4mg/0.1ml or 2mg/0.05ml
Aflibercept (Eylea)- 2mg/0.05 ml
Faricimab (Vabysmo)- 6mg /0.05ml

Annexure 5: Photographs

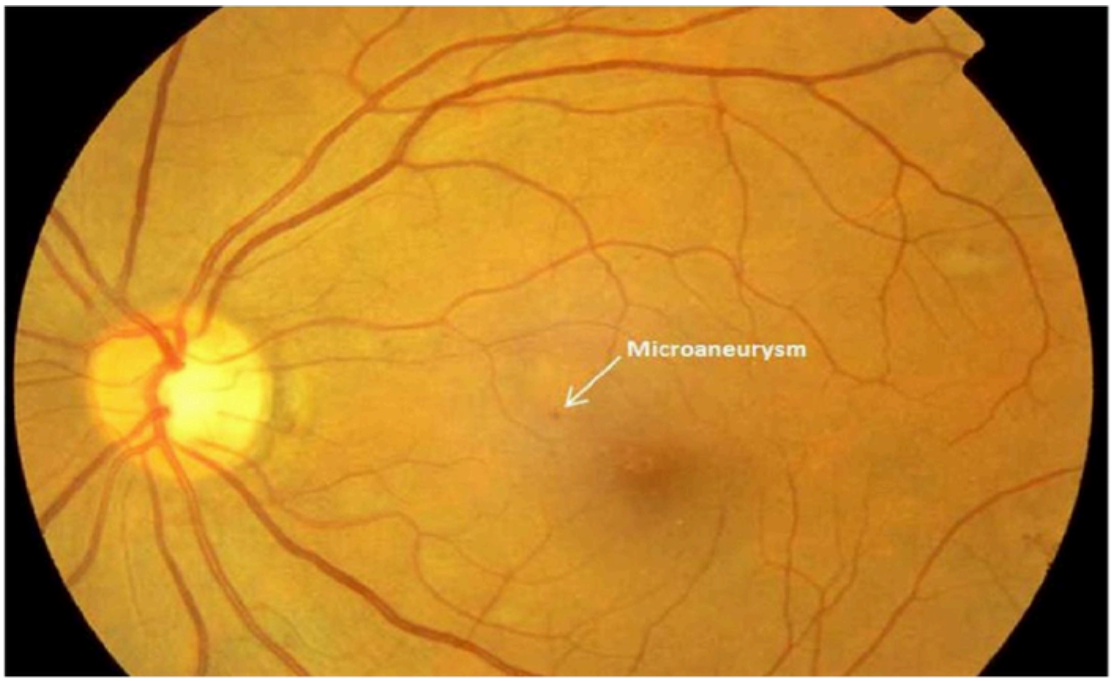


Figure 1: Mild non-proliferative diabetic retinopathy with Microaneurysms

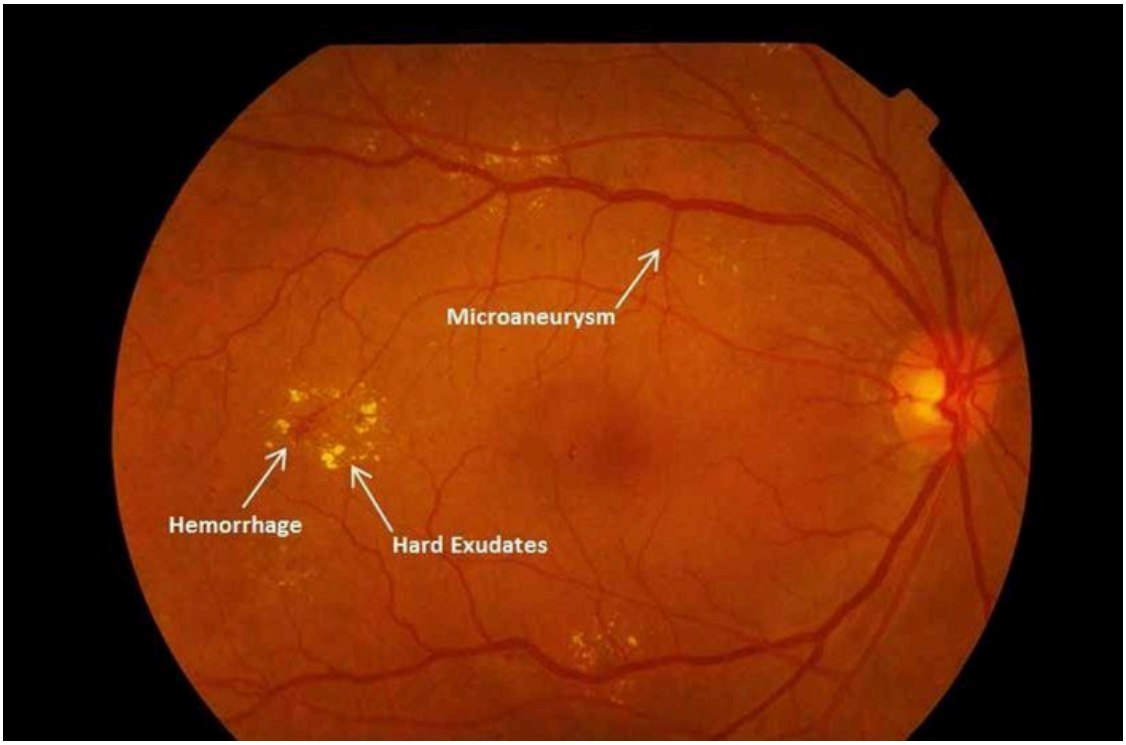


Figure 2: Moderate non-proliferative diabetic retinopathy with haemorrhages, hard exudates and Microaneurysms

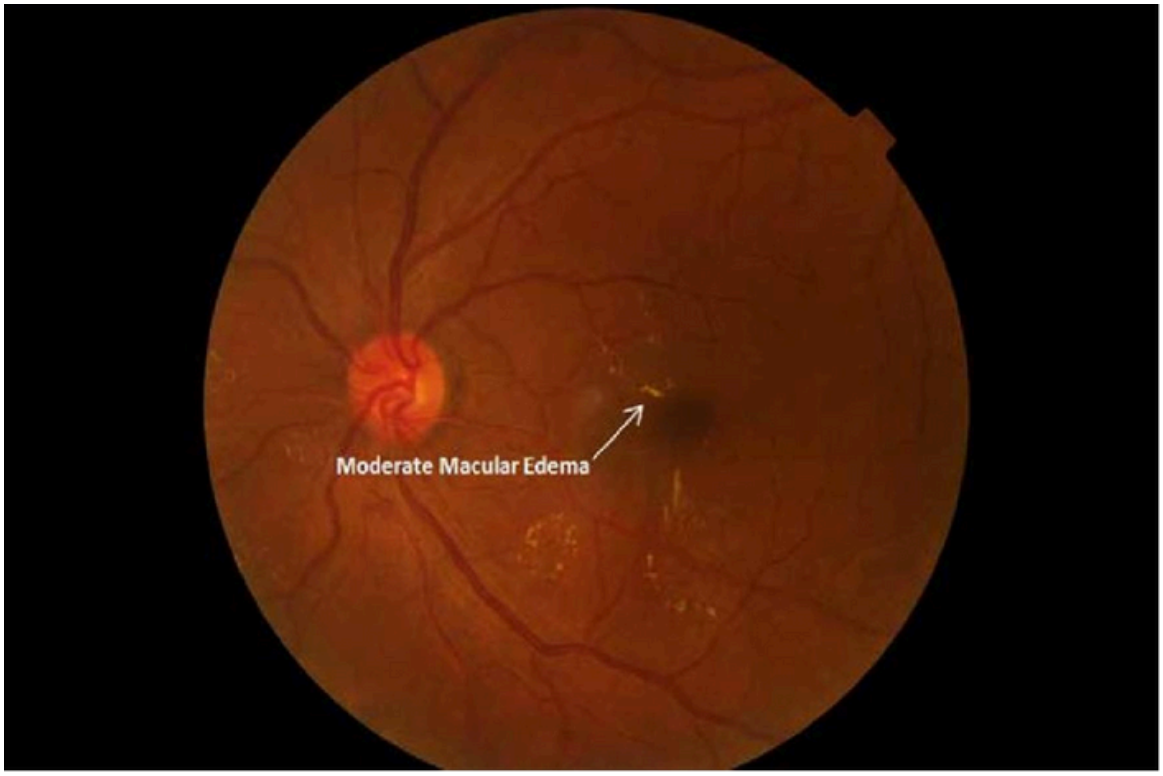


Figure 3: Moderate non-proliferative diabetic retinopathy with moderate macular edema, with hard exudates approaching the centre of the macular.

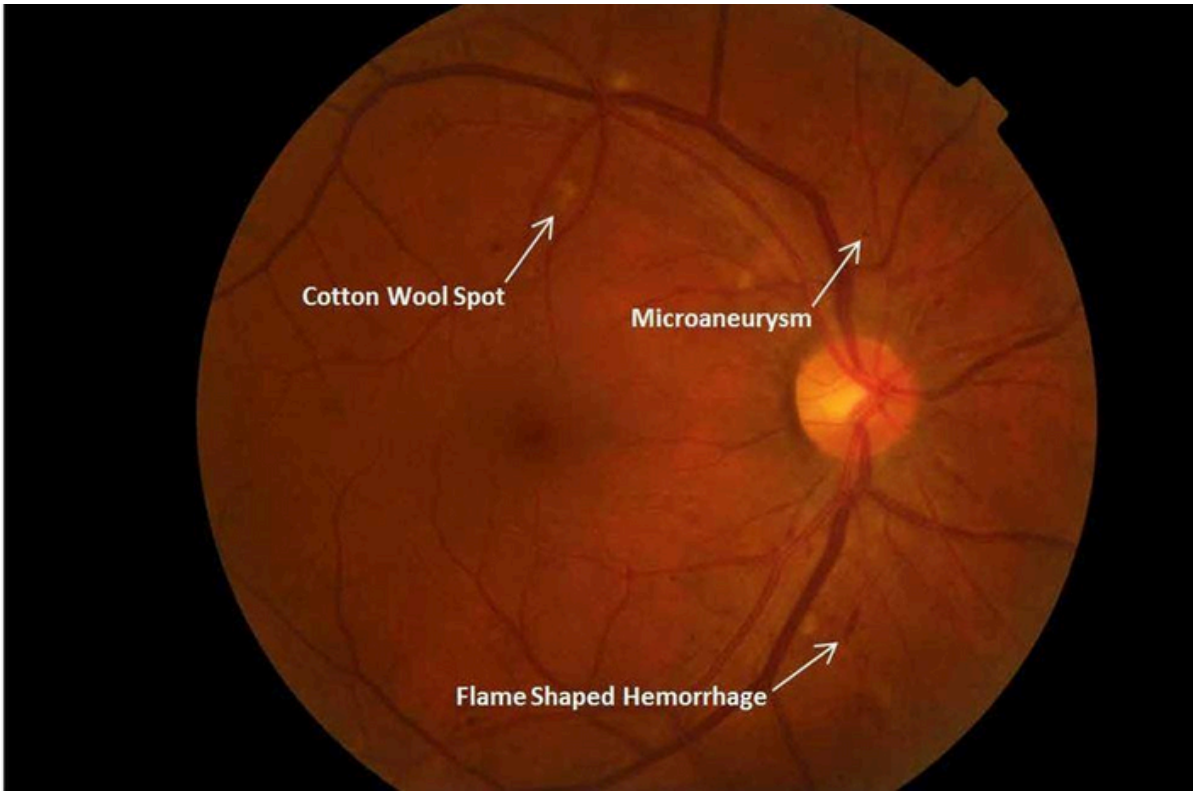


Figure 4: Moderate non-proliferative diabetic retinopathy with no diabetic macular edema

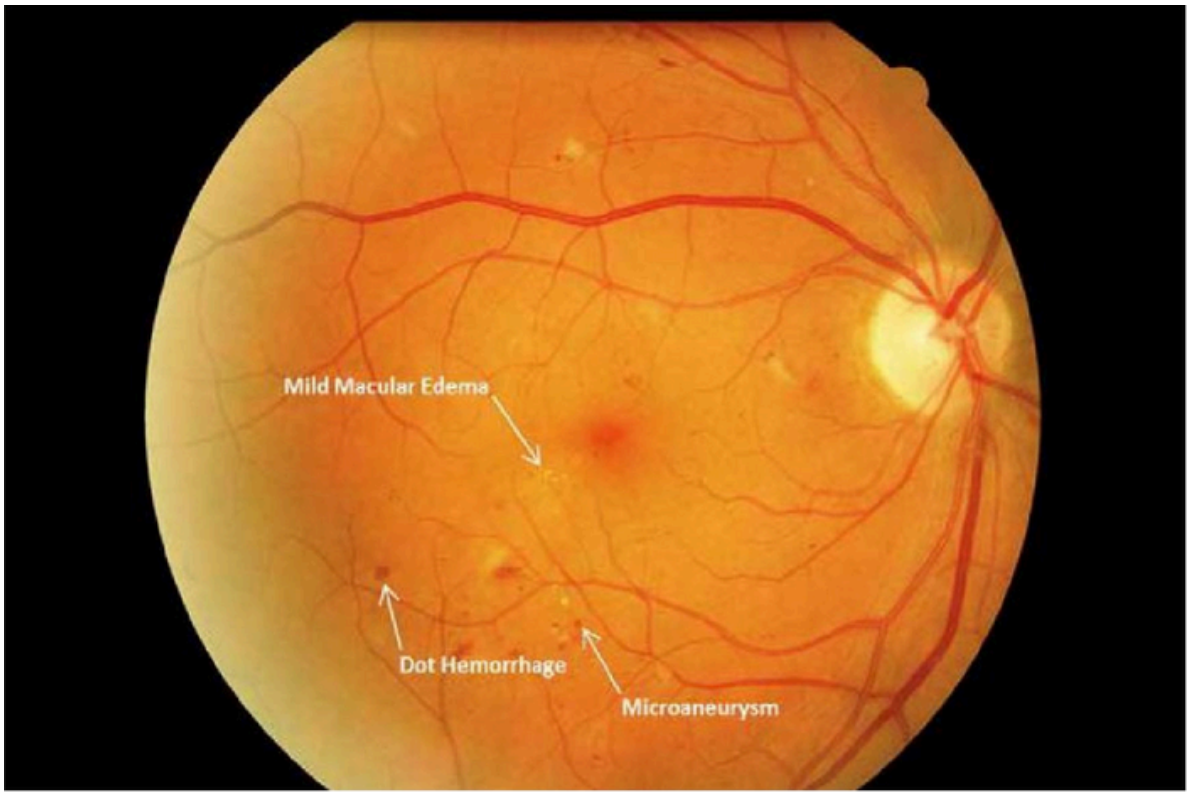


Figure 5: Moderate non-proliferative diabetic retinopathy with mild diabetic macular edema

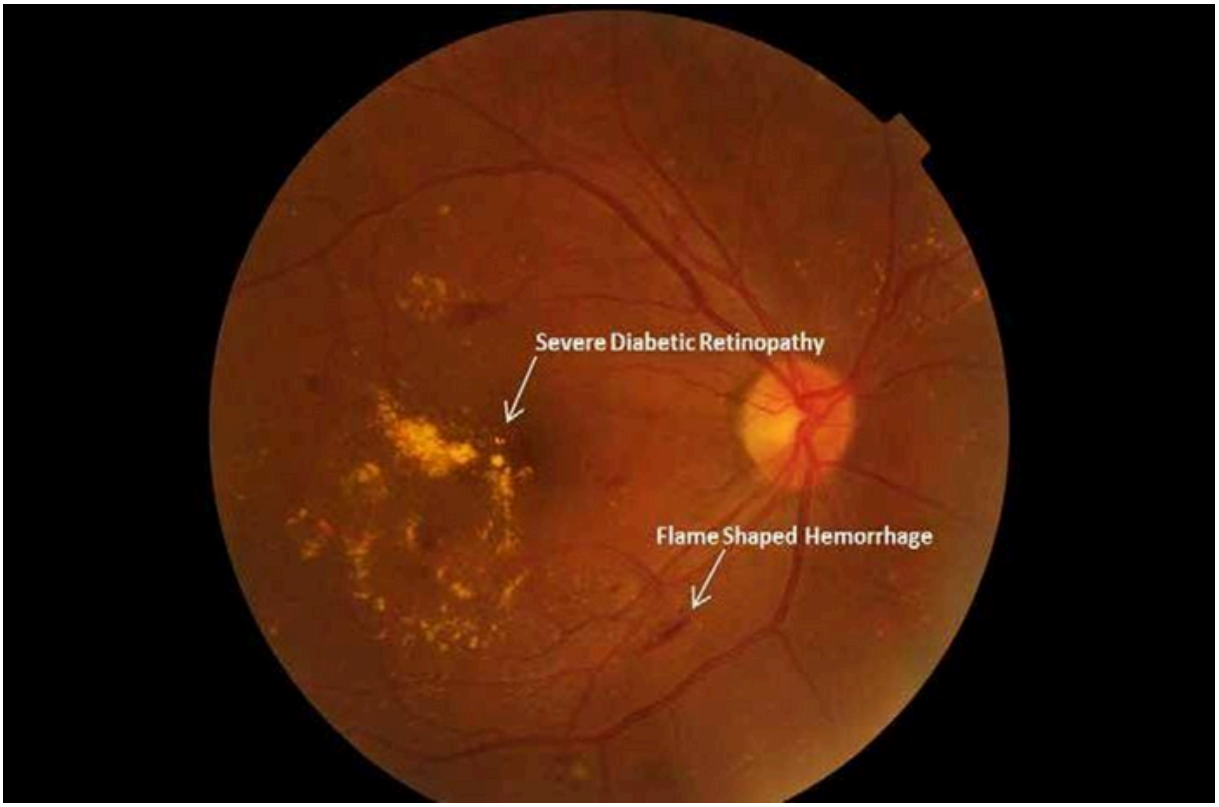


Figure 6: Moderate non-proliferative diabetic retinopathy with severe macular edema

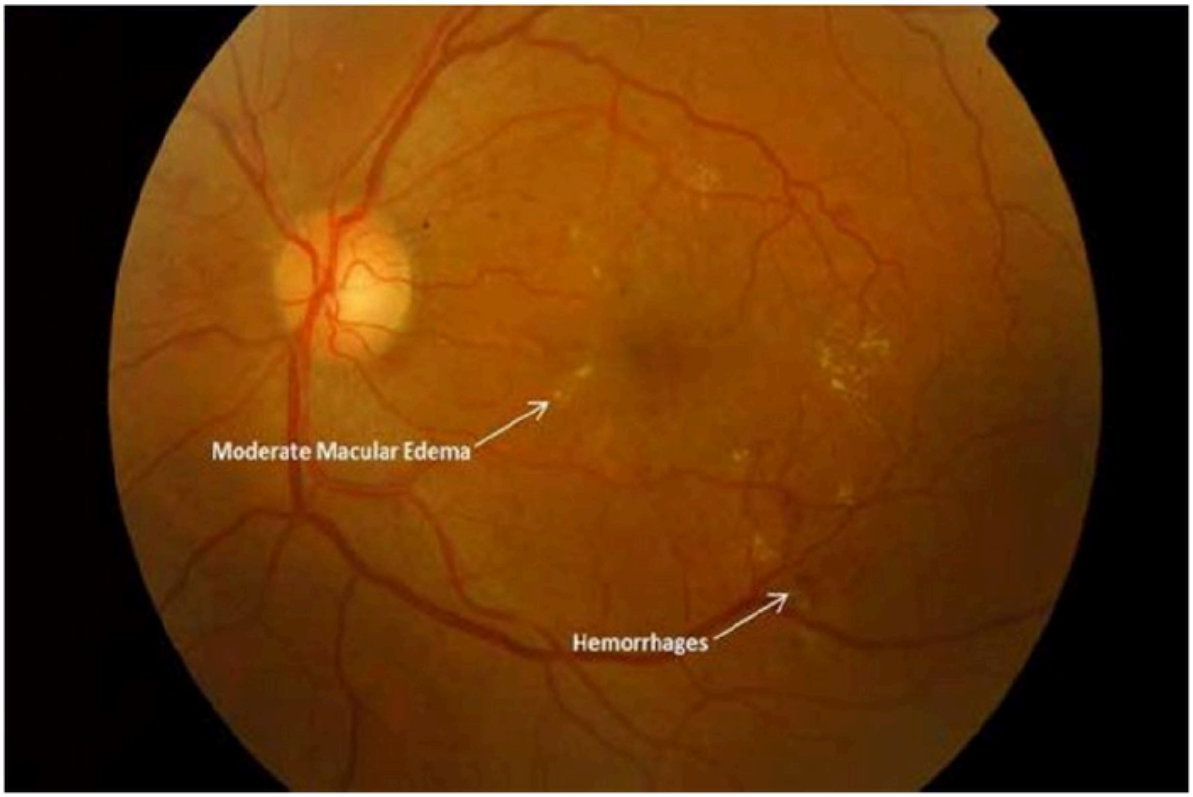


Figure 7a: Moderate non-proliferative diabetic retinopathy with moderate macular edema

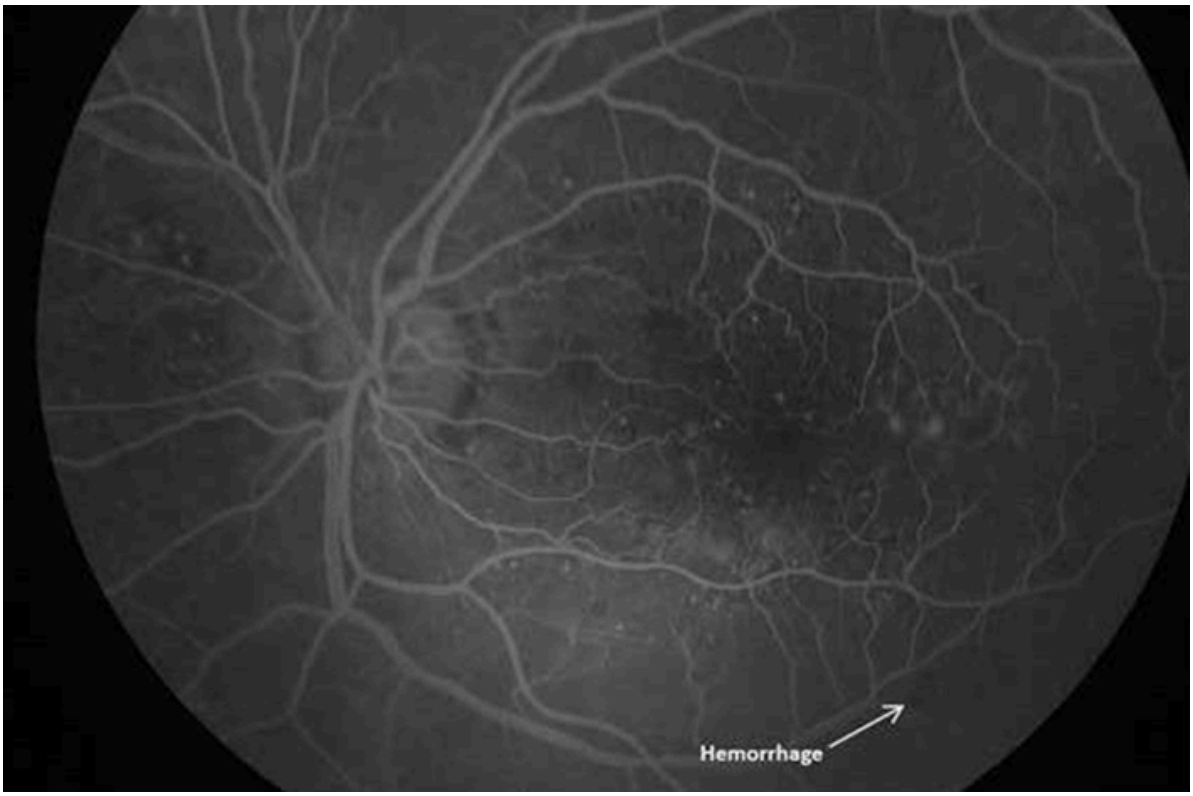


Figure 7b: Fundus Fluorescein Angiogram showing moderate non-proliferative diabetic retinopathy with moderate macular edema

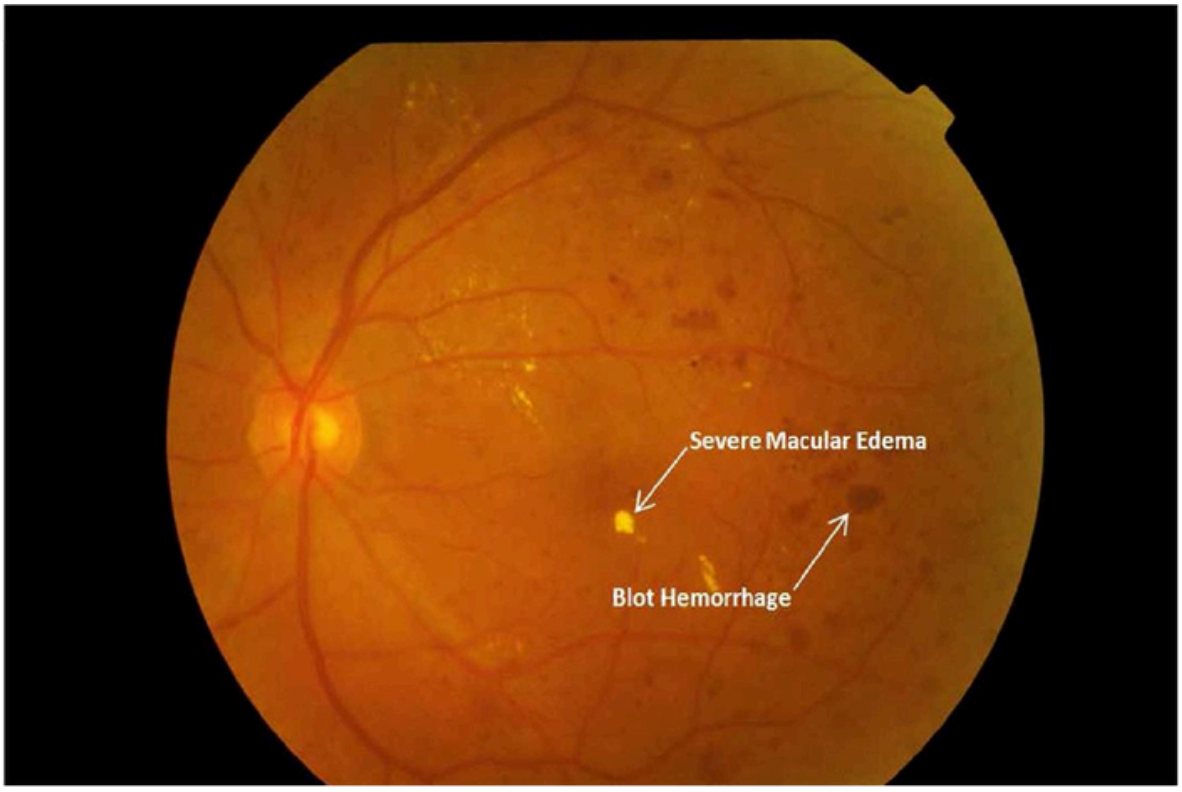


Figure 8: Severe non-proliferative diabetic retinopathy with severe diabetic macular edema

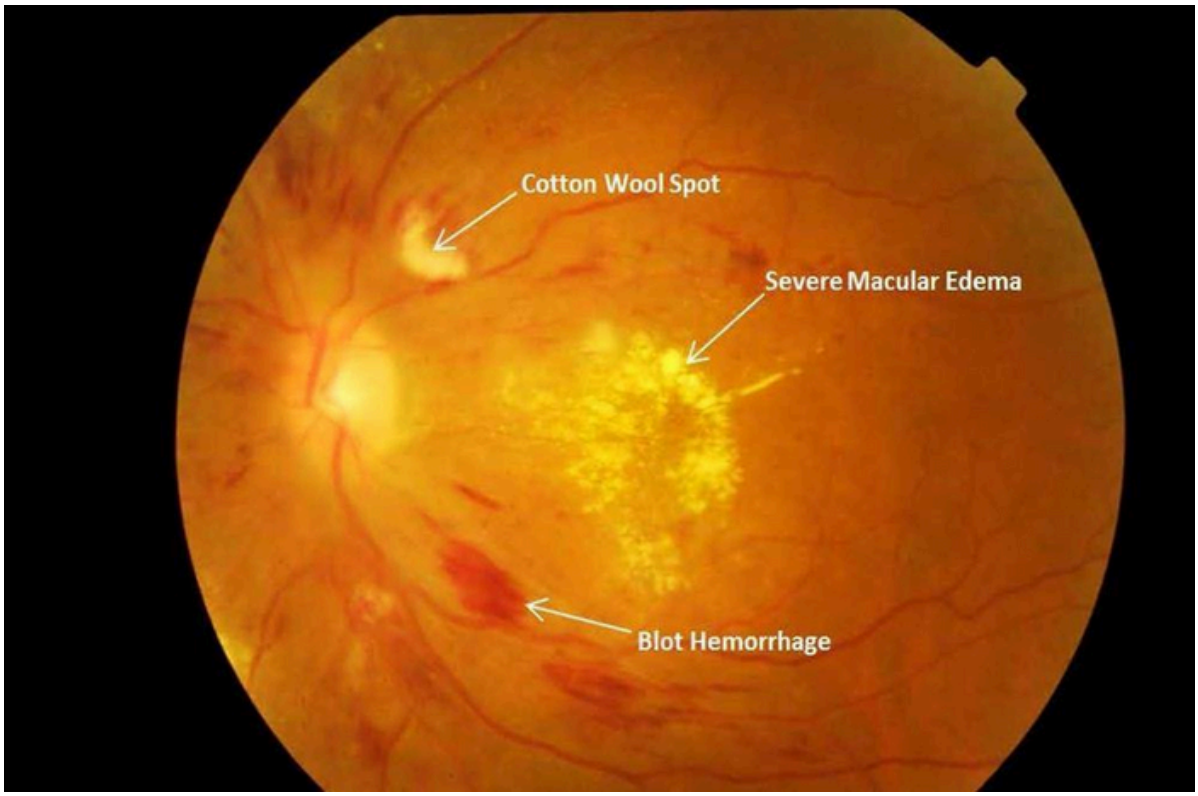


Figure 9: Severe non-proliferative diabetic retinopathy with severe diabetic macular edema

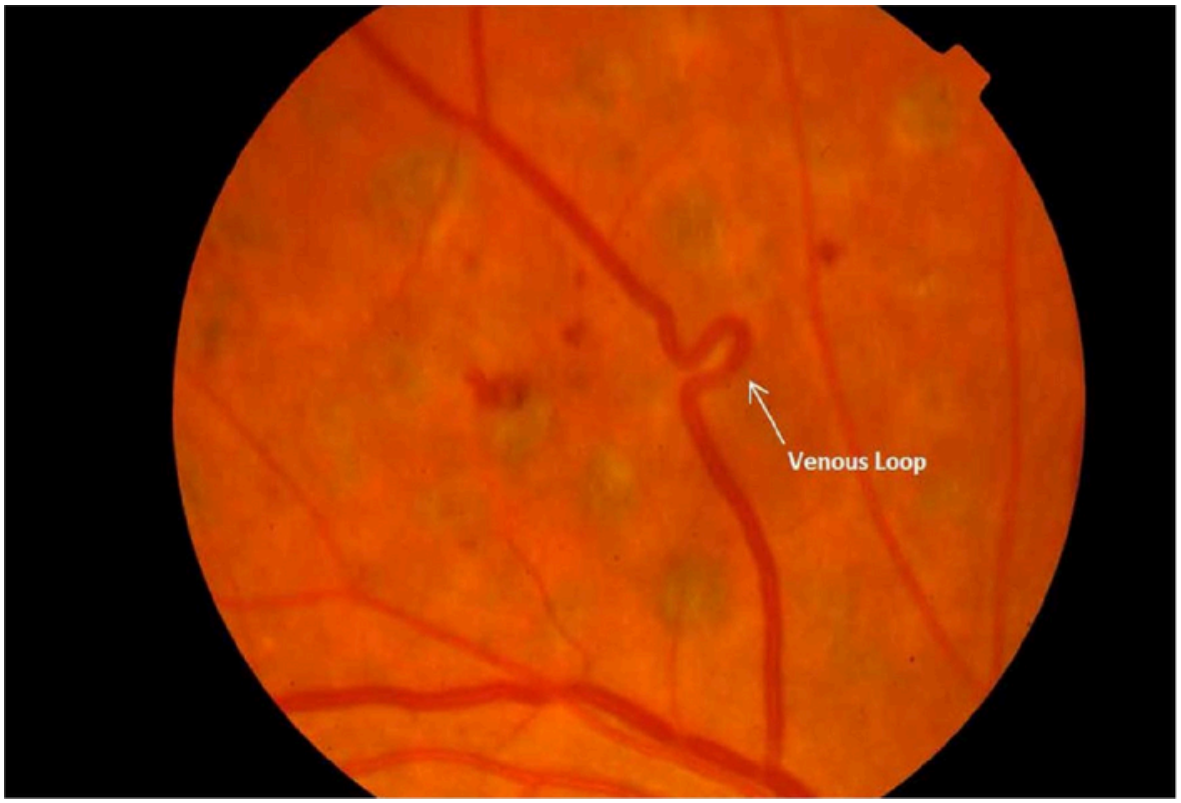


Figure 10: Severe non-proliferative diabetic retinopathy with venous loop

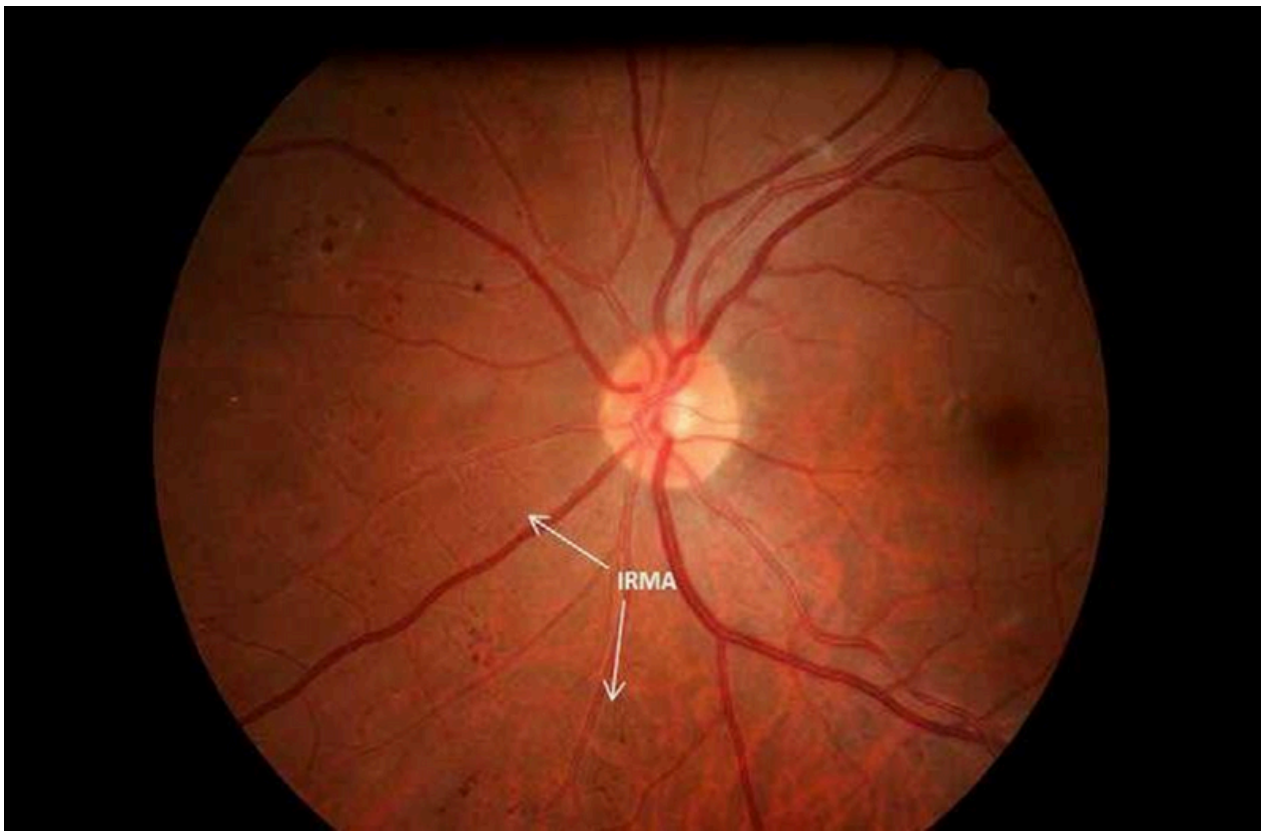


Figure 11: Severe non-proliferative diabetic retinopathy with intra–retinal micro vascular abnormality (IRMA)

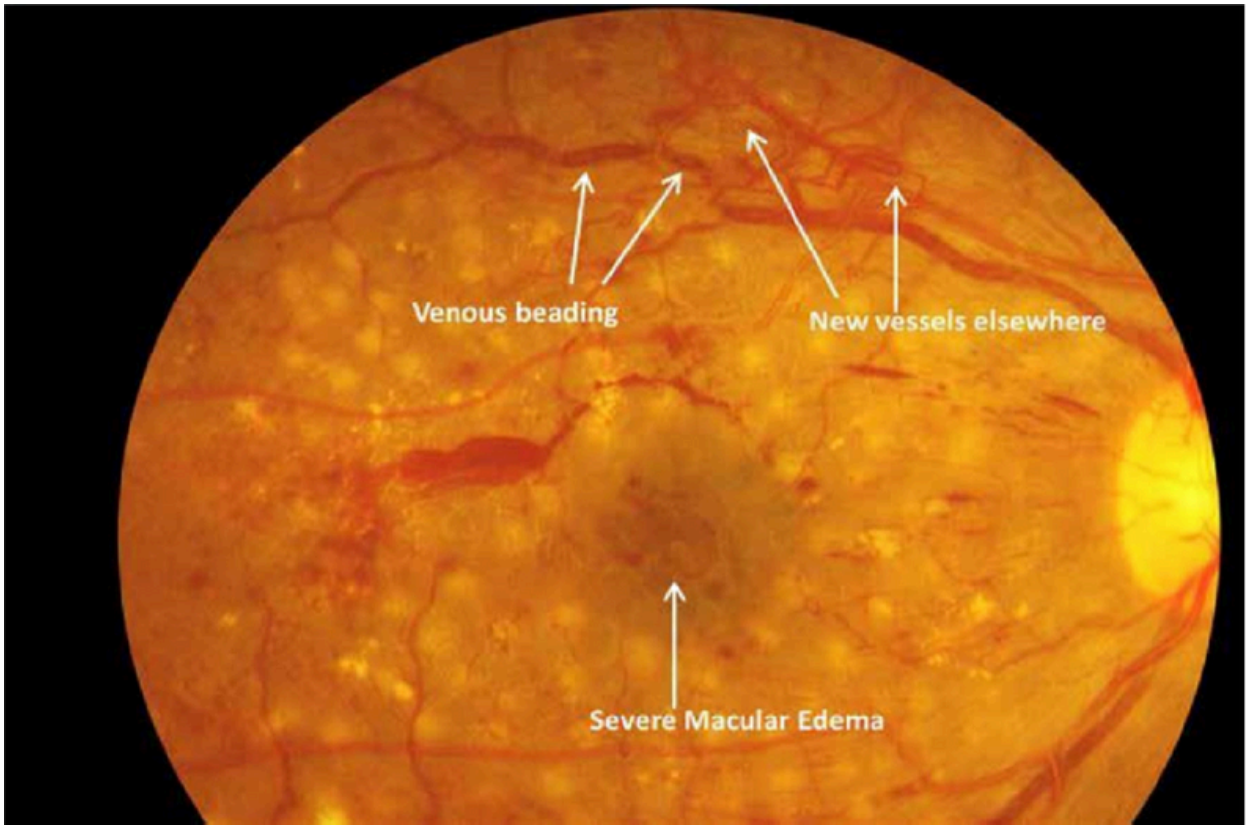


Figure 12: Severe non-proliferative diabetic retinopathy with venous loop

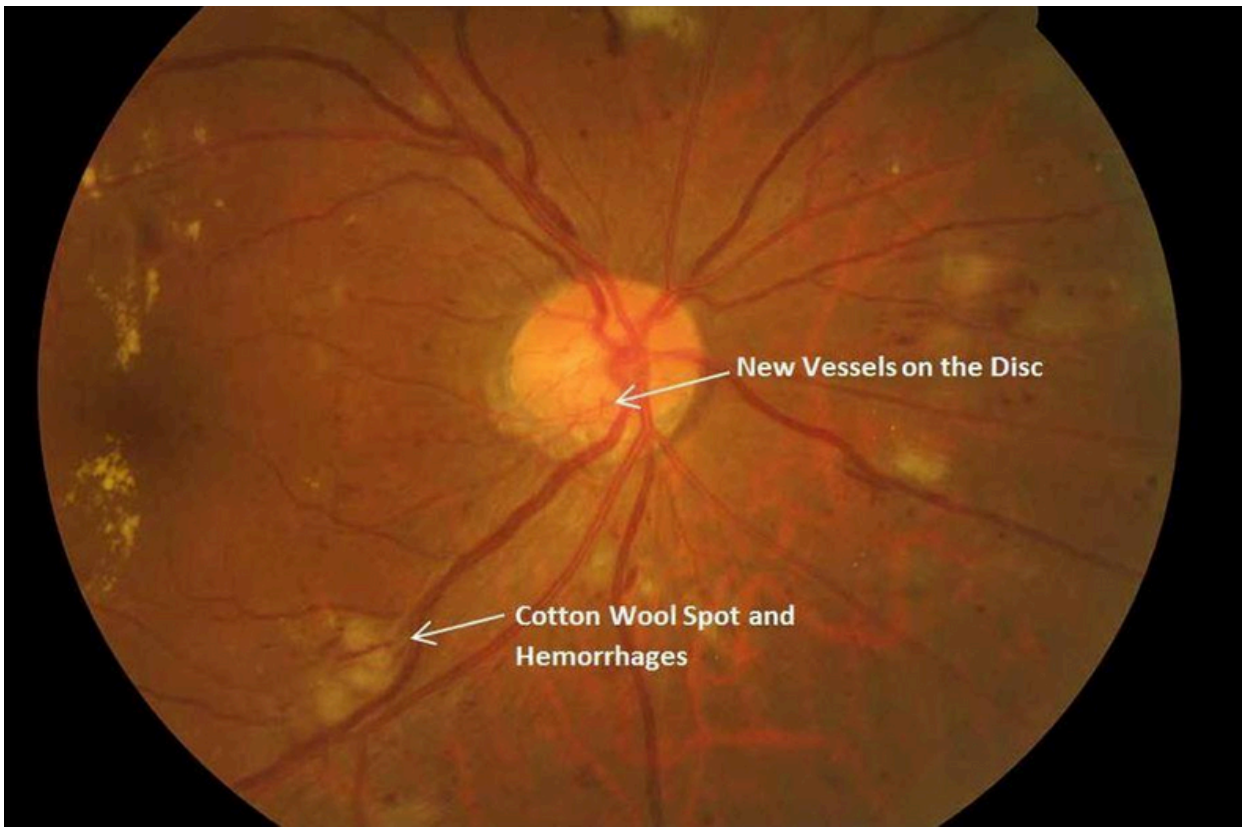


Figure 13: High risk proliferative diabetic retinopathy with new vessels at the disc

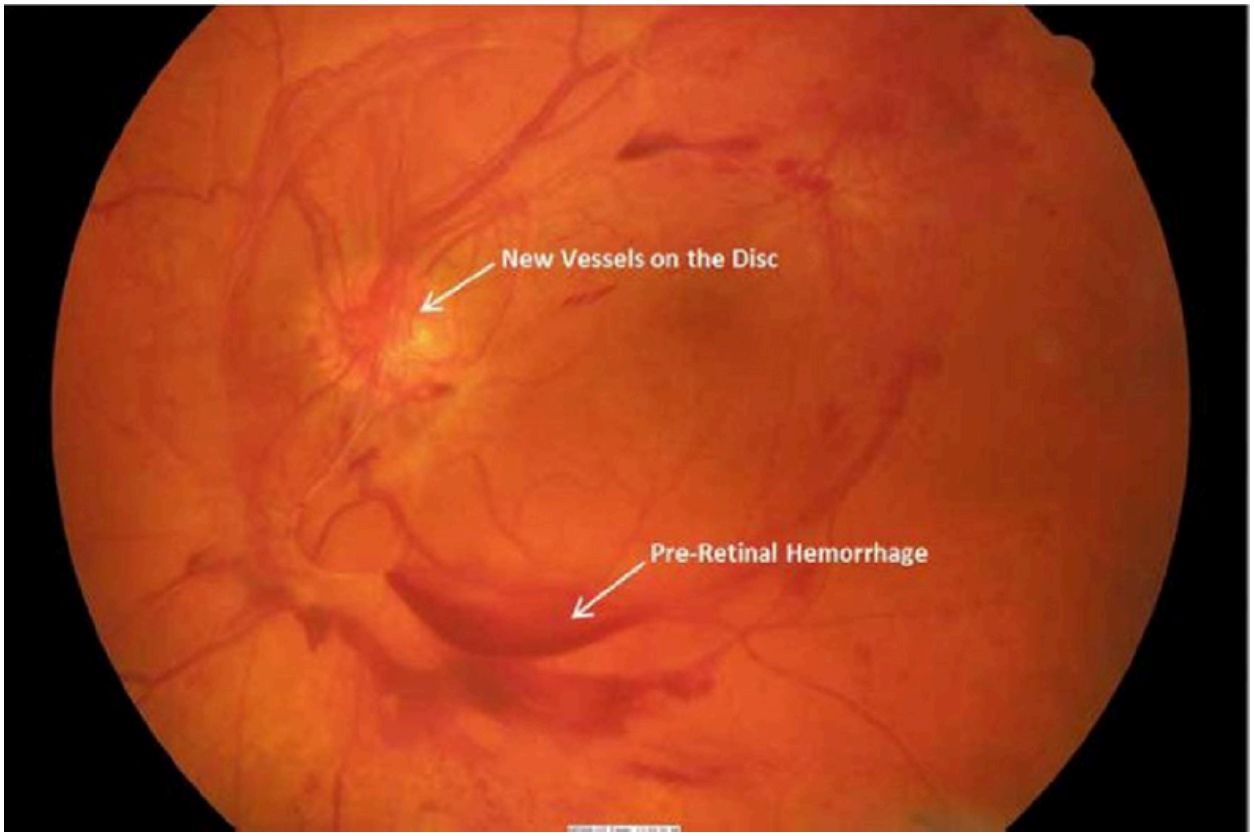


Figure 14a: High risk proliferative diabetic retinopathy. Pre-retinal haemorrhage before with new vessels on the disc.

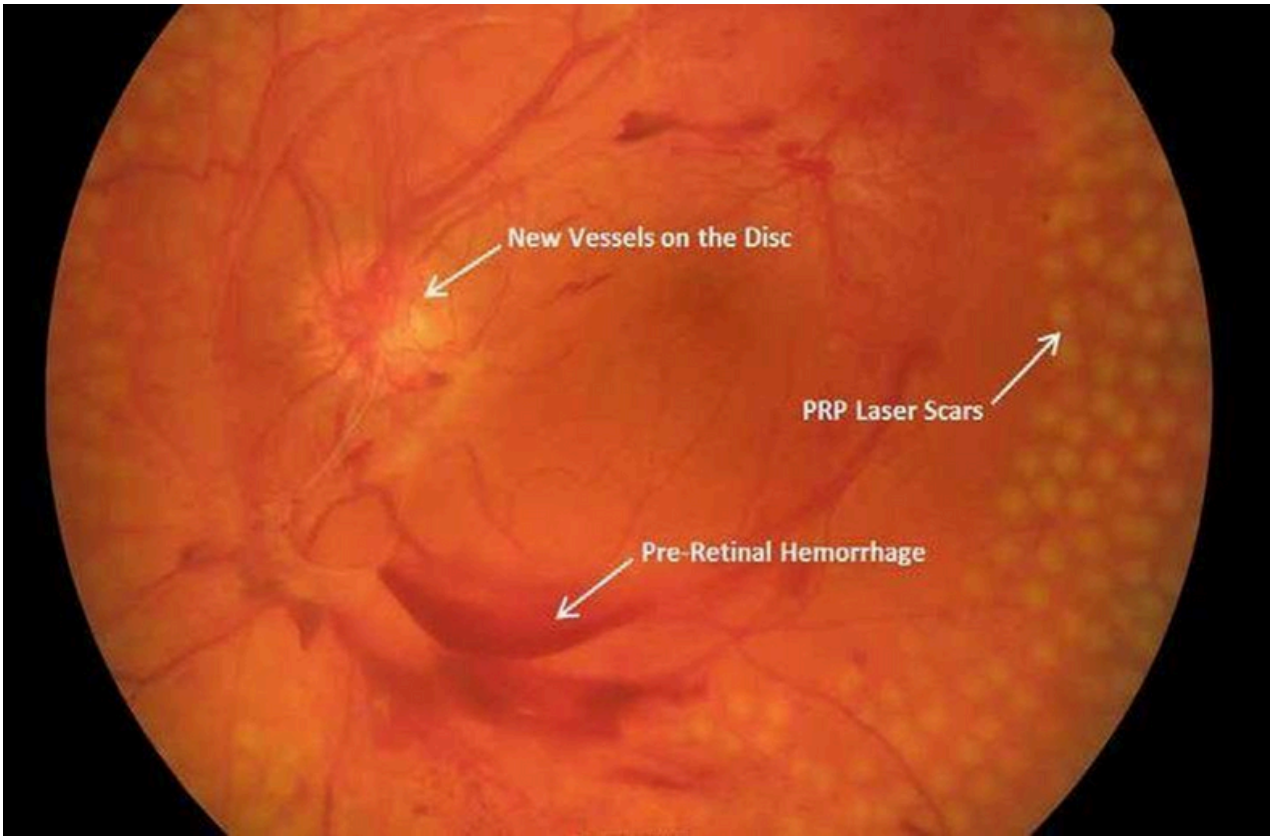


Figure 14b: High risk proliferative diabetic retinopathy, with new panretinal photocoagulation (PRP) scars

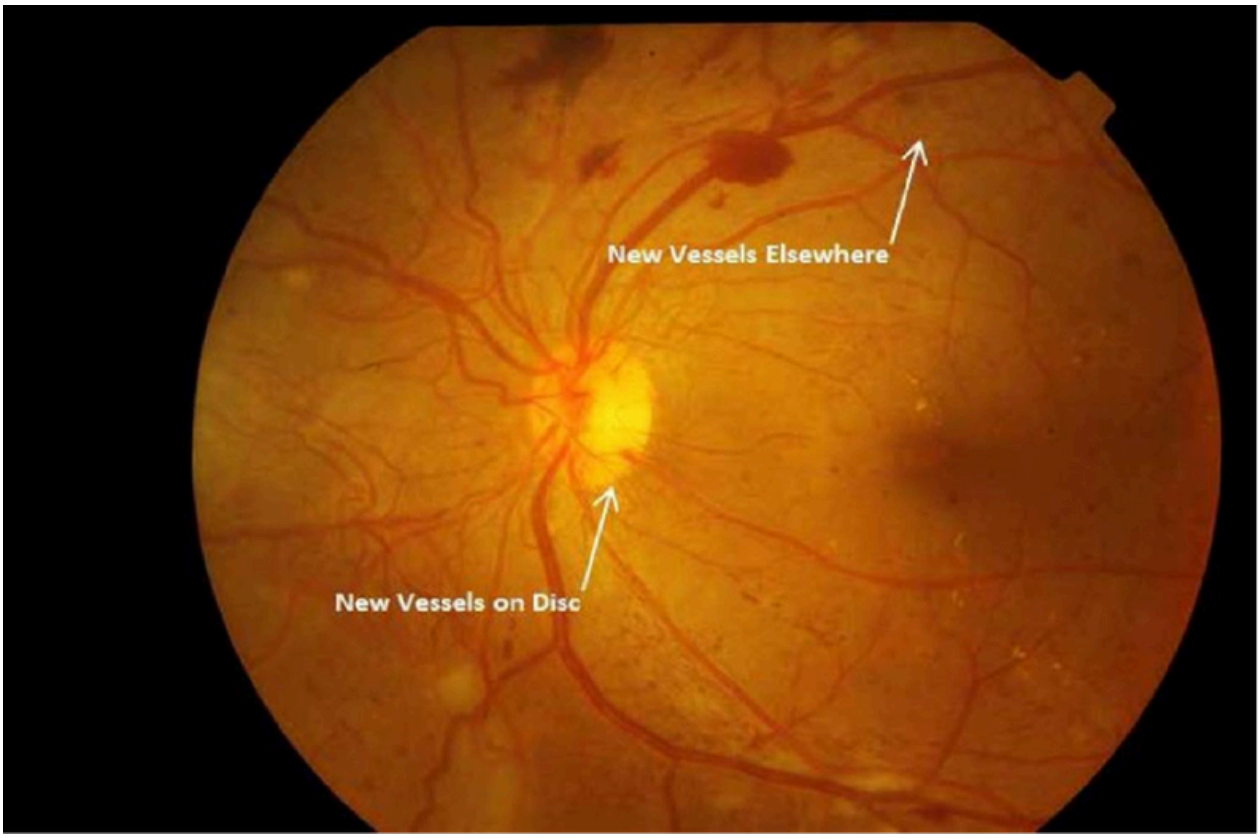


Figure 15a: Proliferative diabetic retinopathy. New vessels on the disc and elsewhere

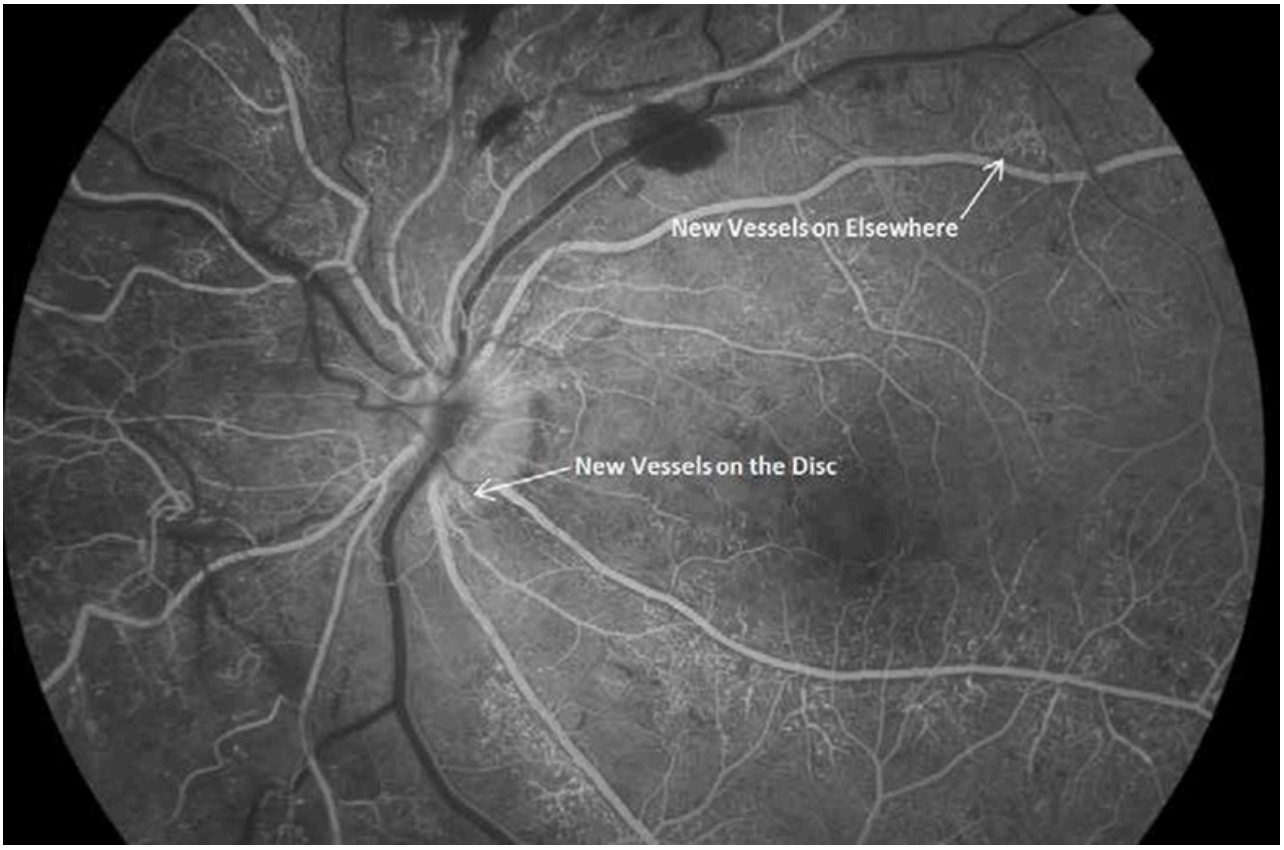


Figure 15b: Proliferative diabetic retinopathy. New vessels on the disc and elsewhere on fluorescein angiogram

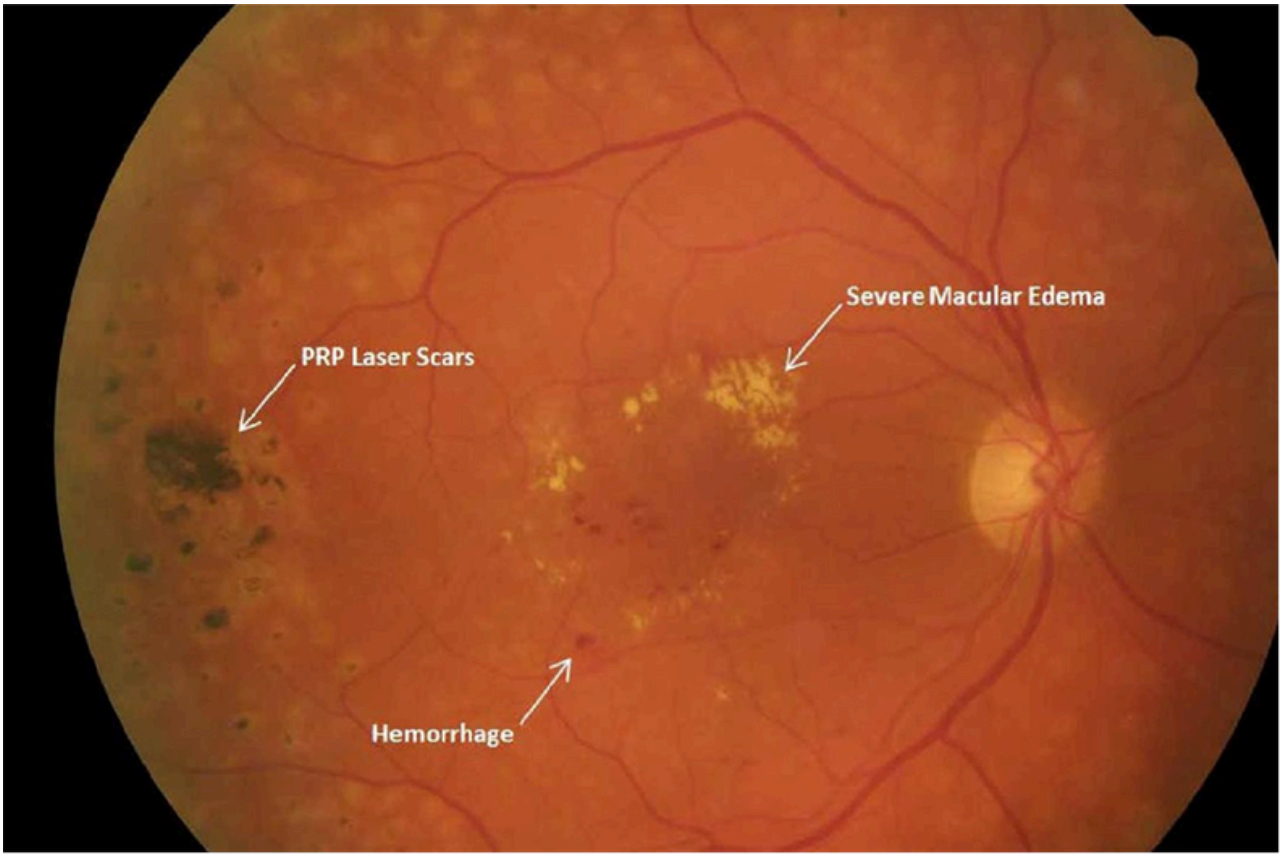


Figure 16a: Diabetic macular edema with panretinal photocoagulation (PRP) (right eye)

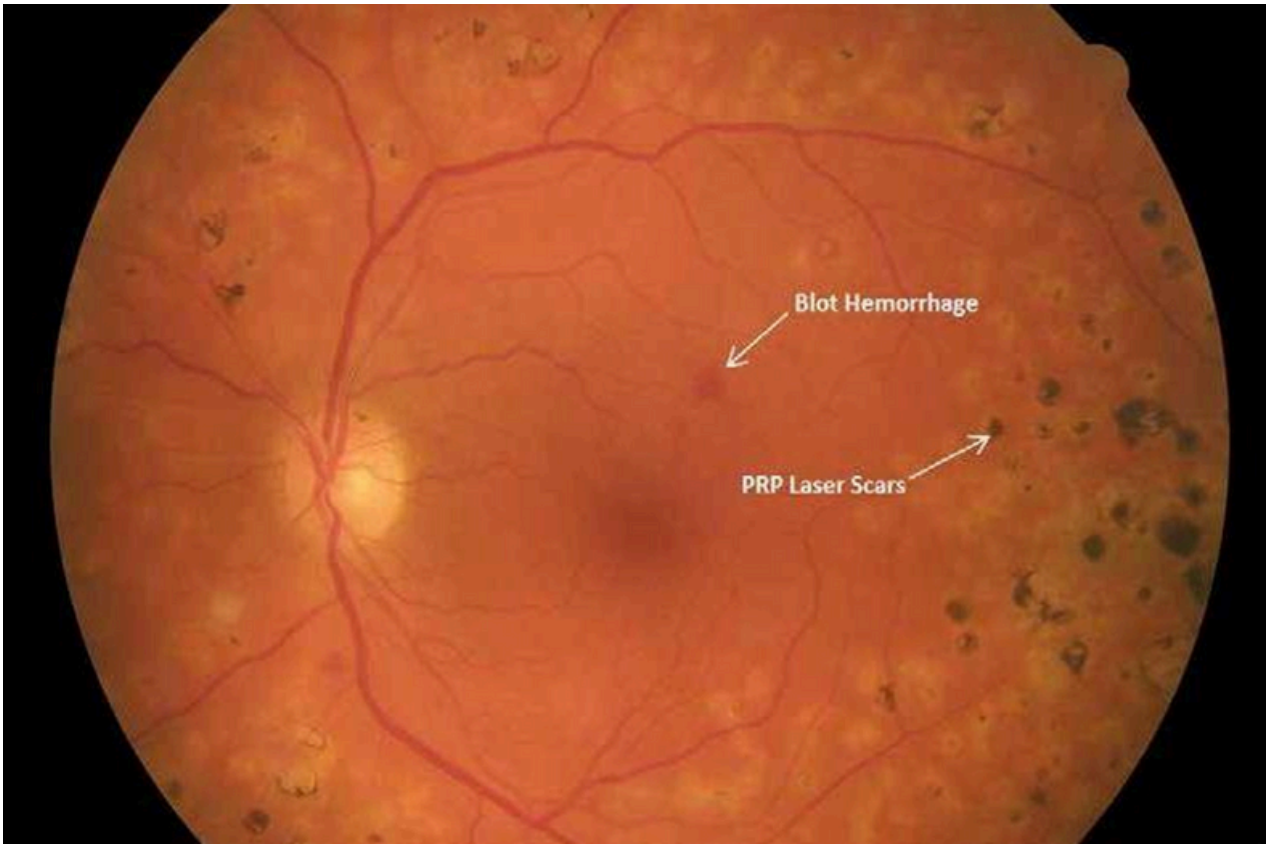


Figure 16b. Diabetic macular edema with panretinal photocoagulation (PRP). (left eye)

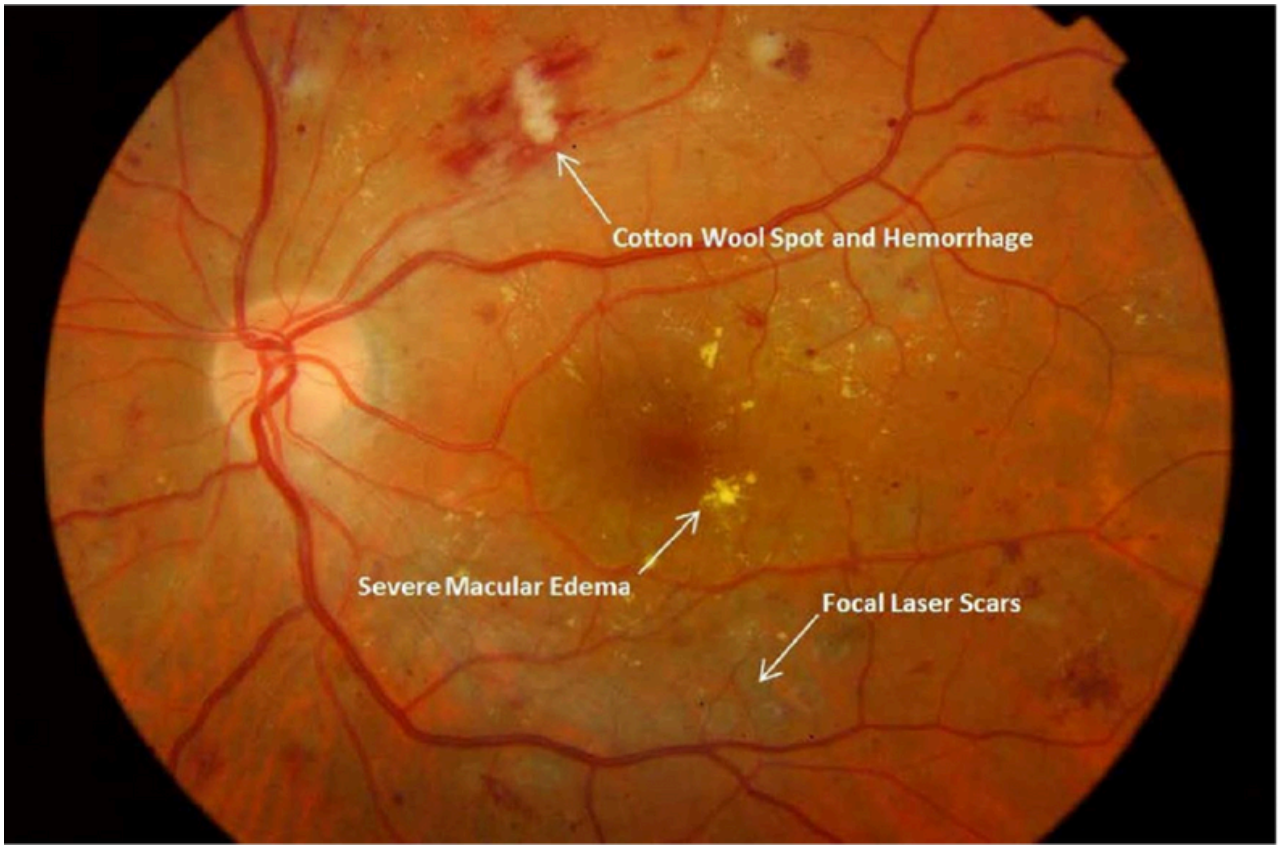


Figure 17a: Persistent diabetic macular edema after focal laser treatment

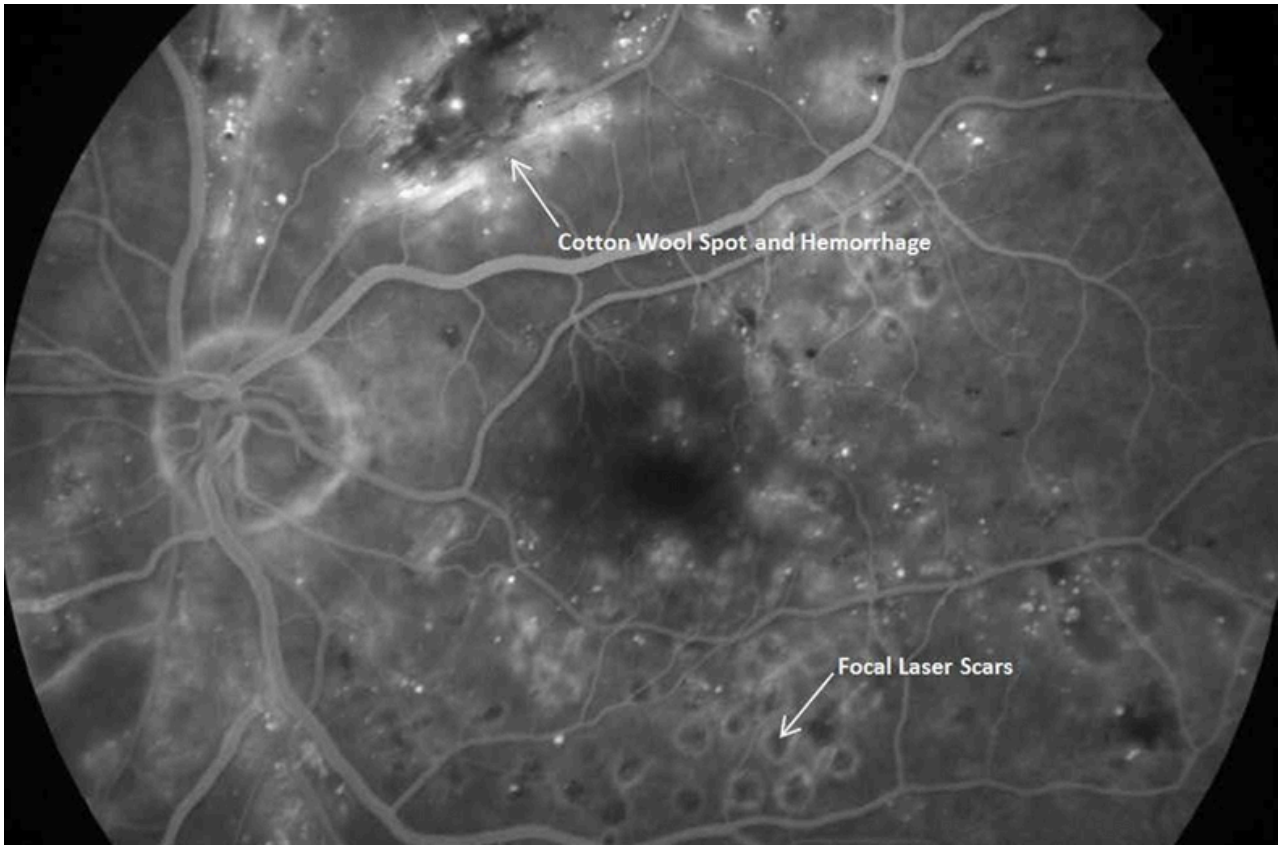


Figure 17b: Persistent diabetic macular edema after focal laser treatment on fundus fluorescein angiogram

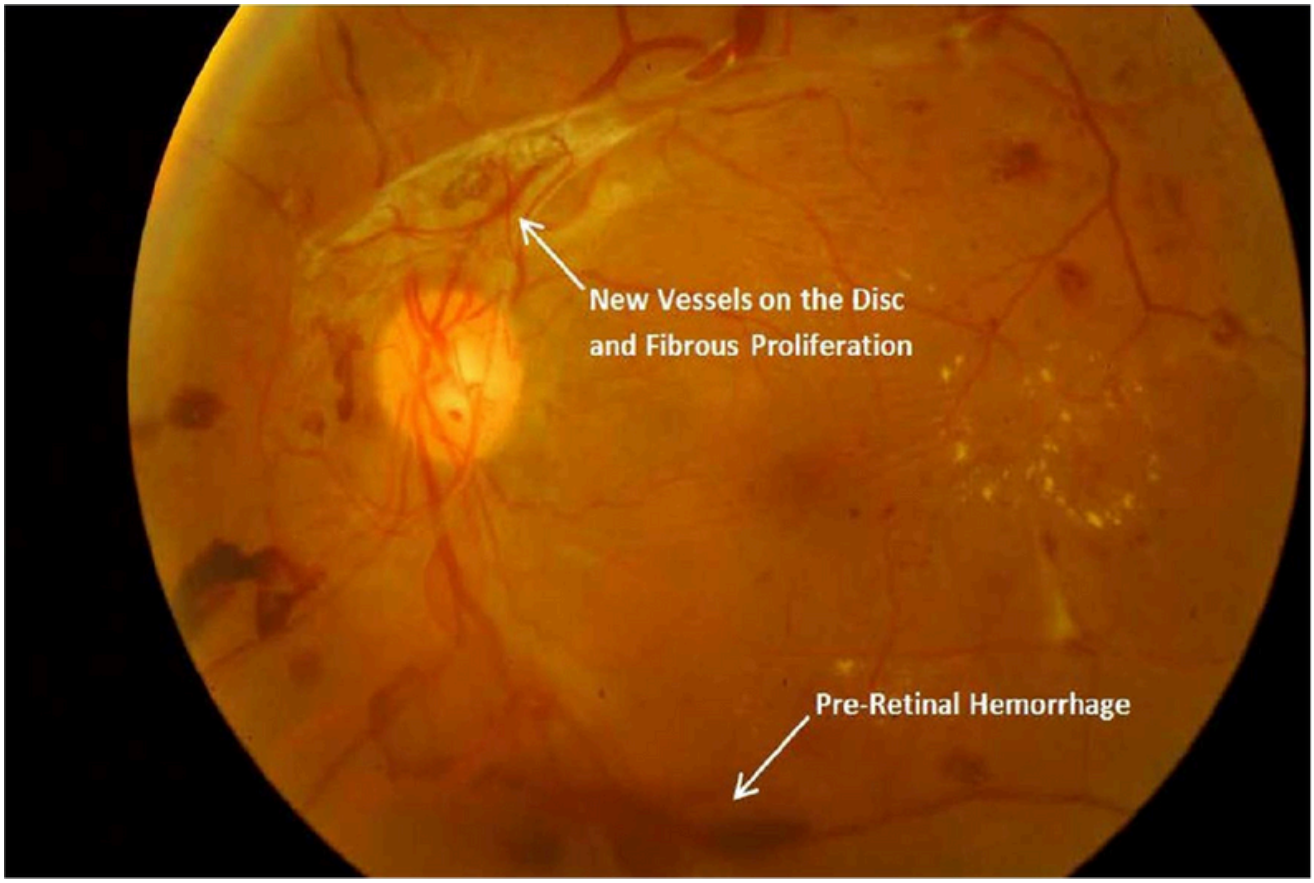


Figure 18a: Proliferative diabetic retinopathy with pre-retinal Haemorrhage

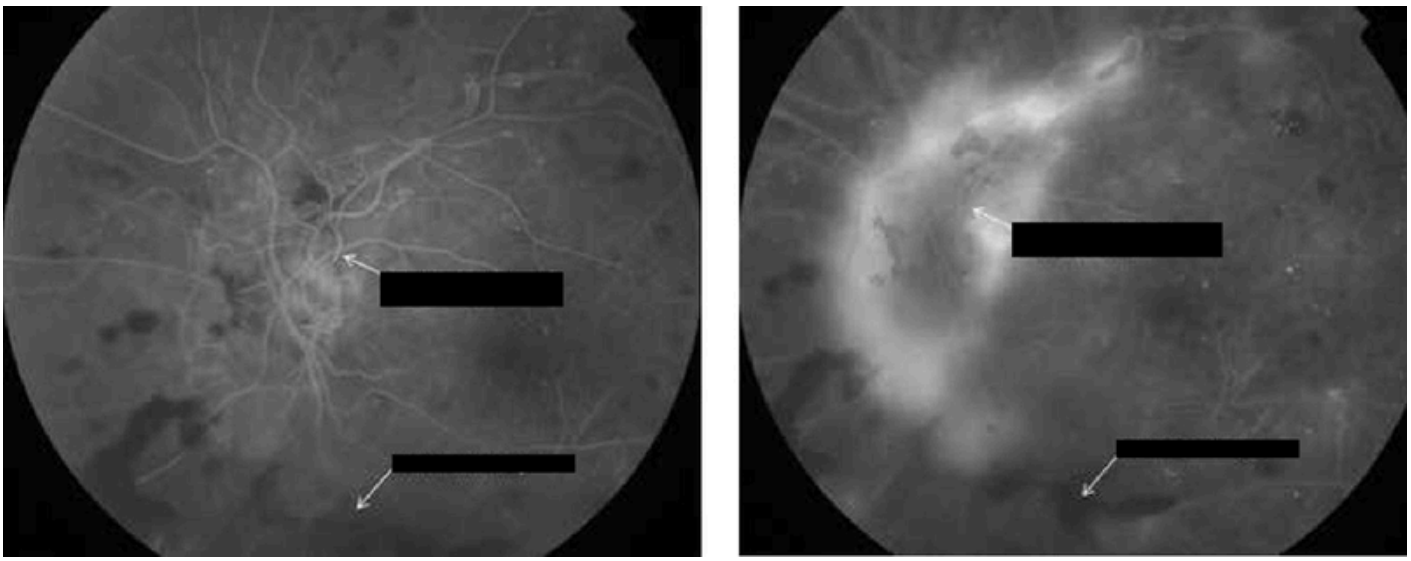


Figure 18b: Proliferative diabetic retinopathy with pre-retinal haemorrhage on fundus fluorescein angiogram

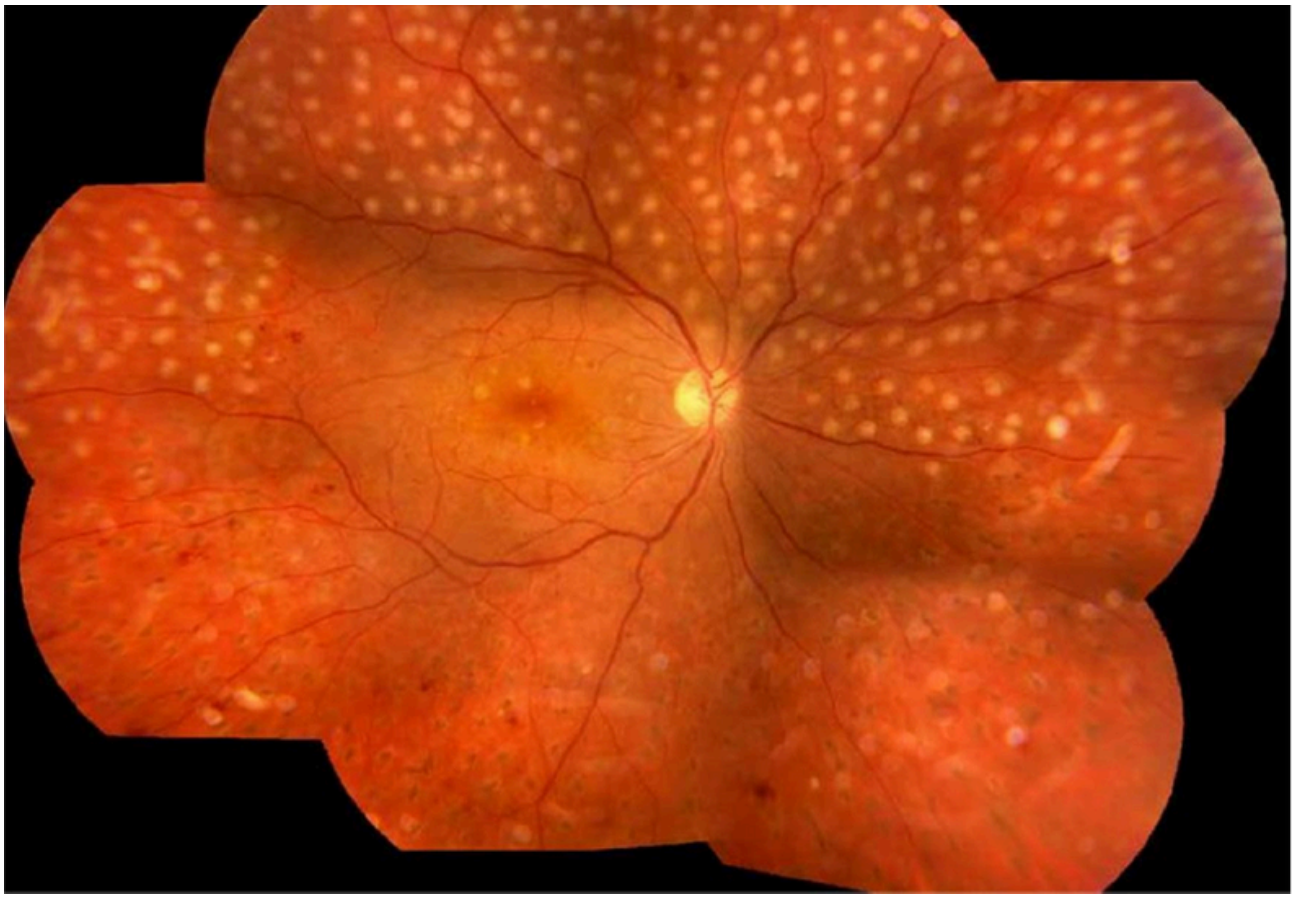


Figure 19: Panretinal (PRP) photocoagulation. First session: inferior retina (laser scars). Second session: superior retina (fresh burns). A third session will be needed to complete PRP.

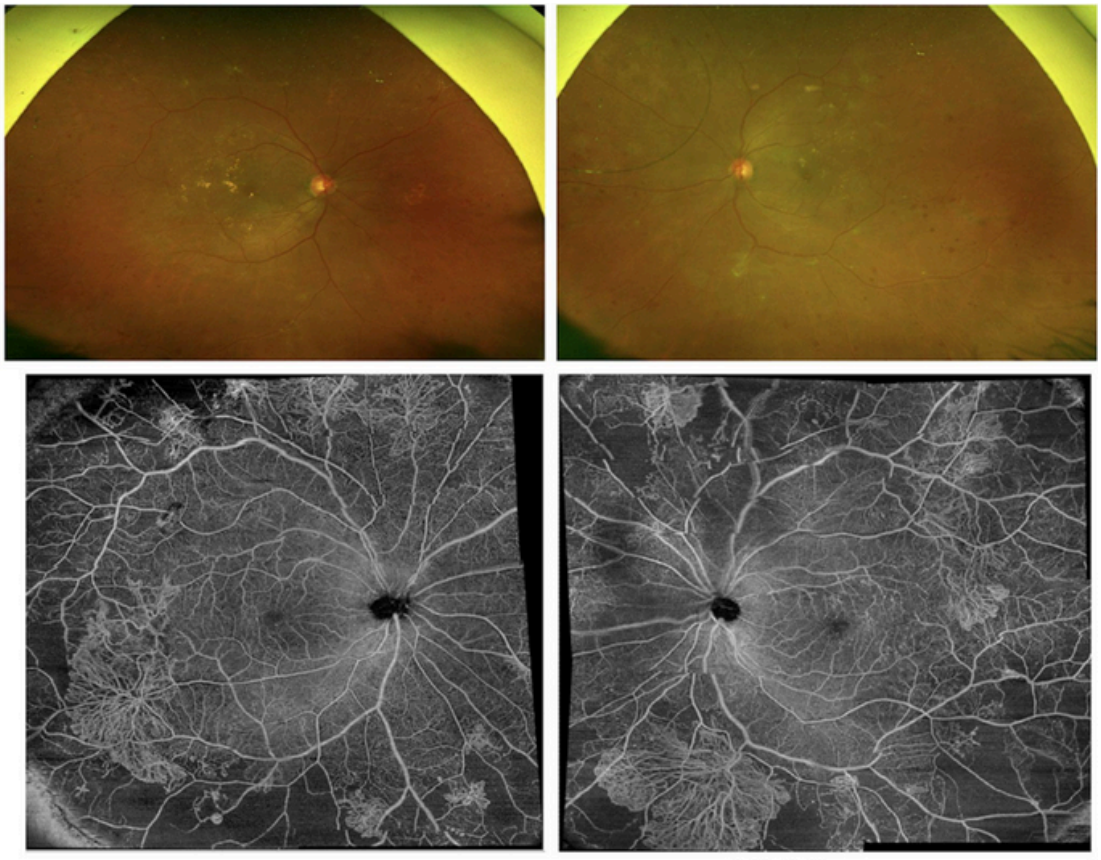


Figure 20: Wide angle Optical Coherence Tomography Angiography (OCTA)

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It is a collaborative effort of INGOs, NGOs, eye care organisations in India and the Government to coordinate and advocate for improved eye care programs; gaining and sharing knowledge and develop solutions together to achieve quality, comprehensive and equitable eye care.

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