

Reference Atlas for Intervention In Diabetic Retinopathy



Compiled by:

***Task Force On Diabetic Retinopathy
National Committee for Eye Health
Pakistan***



The **Fred Hollows**
Foundation



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Introduction

The National Committee for Health constituted “National Task Force on Diabetes Related Blindness (NTFDRB)” on 11th November 2002. After a pilot project (2006-2008) on “Prevention and Control of Diabetes Related Blindness” (PCDRB), it was realized that “Early Detection of Retinopathy through screening combined with early application of laser” was an effective solution to the management of “Diabetes Related Blindness” (DRB). To make the services easily accessible to the community, The National Committee on Eye Health recommended the management of DRB as an integral component of District Comprehensive Eye Care Program. Realizing the need to train the District Ophthalmologist in the management of Diabetic Retinopathy (DR), the NTFDRB was asked to prepare a guideline for the training of Ophthalmologists involved in the management of DR.

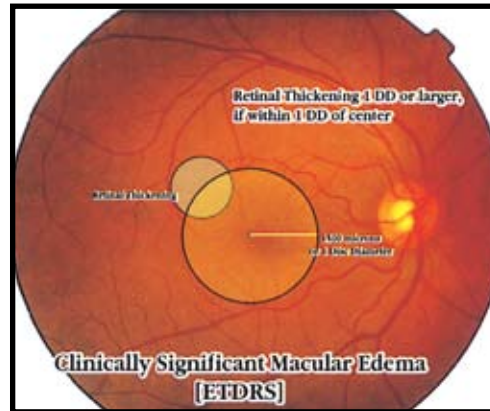
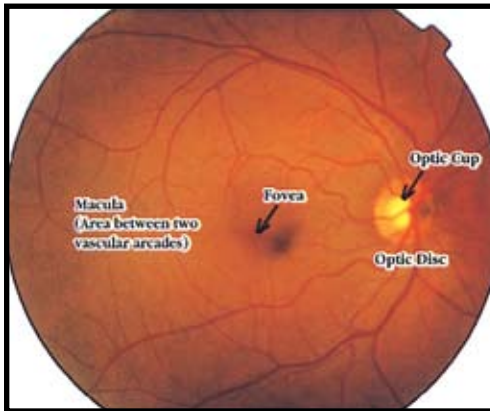
The Guidelines prepared for reference in DR will be useful to ophthalmologists in public & private sector and general practitioners too.

Although there has been increasing role of Anti-VEGFs in the management of DR in present literature, this document exclusively deals with the identification and treatment of patients that need laser as treatment tool in the management of DR at the District level.

Contributors

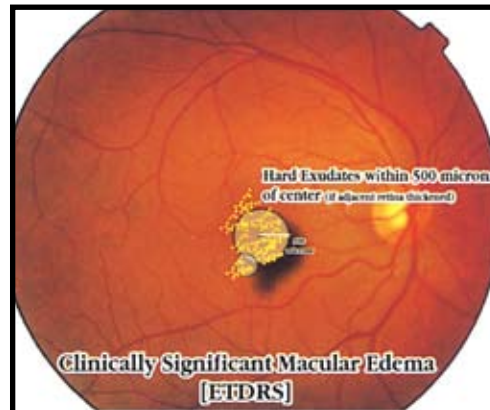
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REFERENCE ATLAS FOR INTERVENTION IN DIABETIC RETINOPATHY



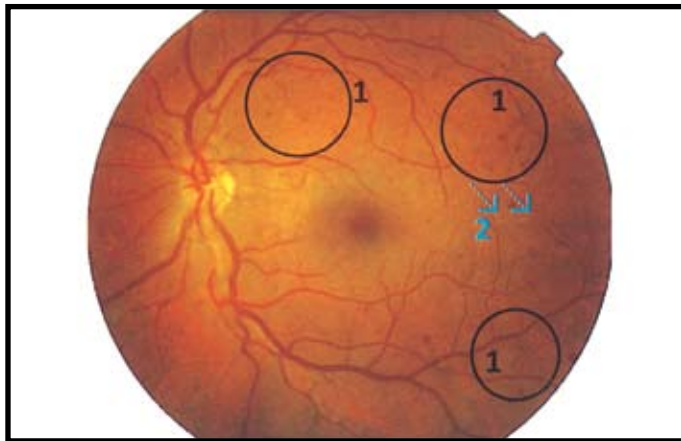
- ➡ **Normal Retina**
- Normal Posterior Pole
 - No micro-aneurysms
 - No superficial or deep
 - No areas of leakage or Bleeding haemorrhages

Recommendations: Annual follow up



➡ CSME in Diabetic Retinopathy

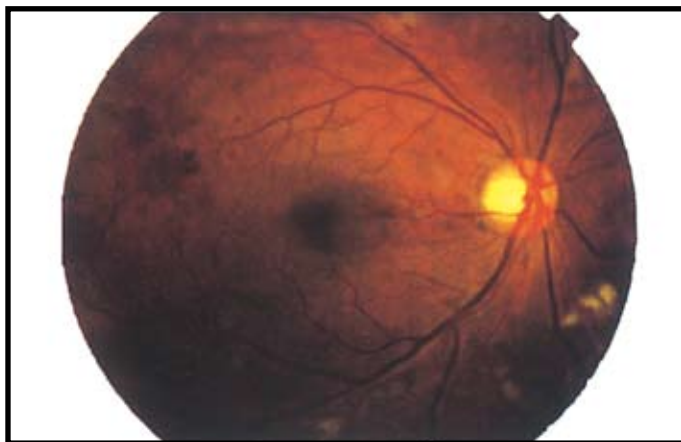
1. Area of macular thickening within 500 microns ($1/3^{\text{rd}}$ Disc Diameter) of center of fovea
2. Hard exudates within 500 microns of center of fovea
3. 1500 microns (1 Disc Diameter) area of retinal thickening, part of which lies within 500 microns of center of fovea



➡ **Non-Proliferative Diabetic Retinopathy (NPDR)**

1. Micro-aneurysms & Dot/Blot Haemorrhages
2. Hard Exudates making early circinate ring

Recommendations: Annual Follow up



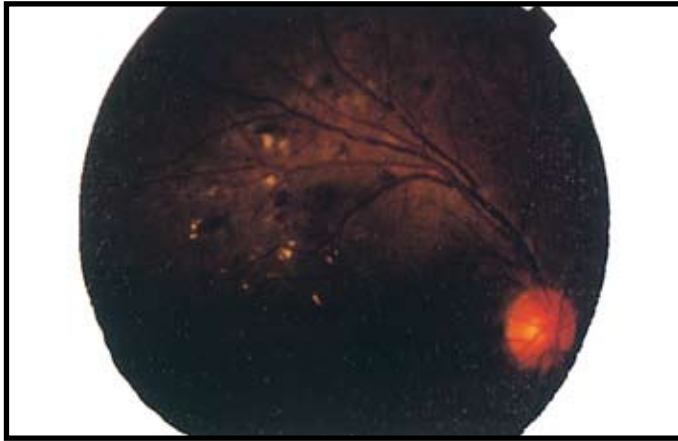
➡ **Moderate NPDR**

(Findings more than mild NPDR & less than severe NPDR)

1. Multiple Haemorrhages
2. Venous Dilatation
3. No involvement of macula

Recommendations:

- FFA Desirable, but not mandatory
- PRP (considering patient compliance)
- 1000 to 1500 burns

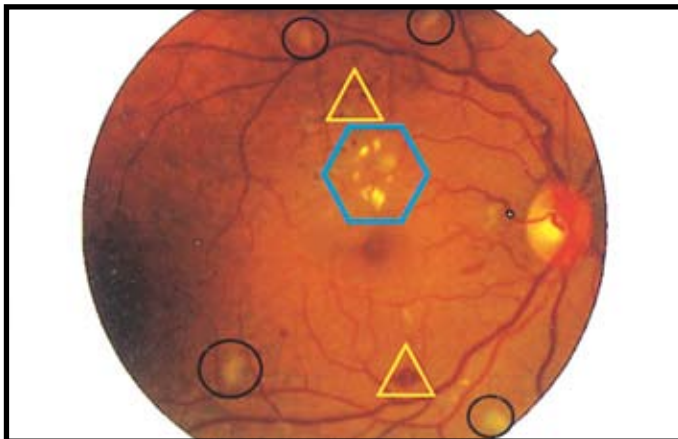


➡ **Severe NPDR**

1. Multiple haemorrhages (>20)
2. Venous beading (crucial sign)
3. Soft Exudates

Recommendations:

- FFA Desirable, but not mandatory
- PRP 1500 to 2000 burns

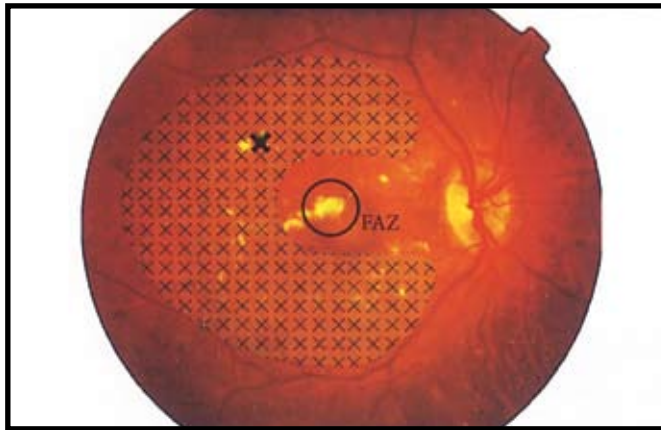


➡ **Mild NPDR+CSME**

- **Circles:** Soft Exudates
- **Polygon:** Hard Exudates encroaching FAZ, causing CSME
- **Triangle:** Dot/Blot Haemorrhages

Recommendations:

- FFA desirable
- Focal/Grid Laser
- 6-8 weeks follow up till complete resolution

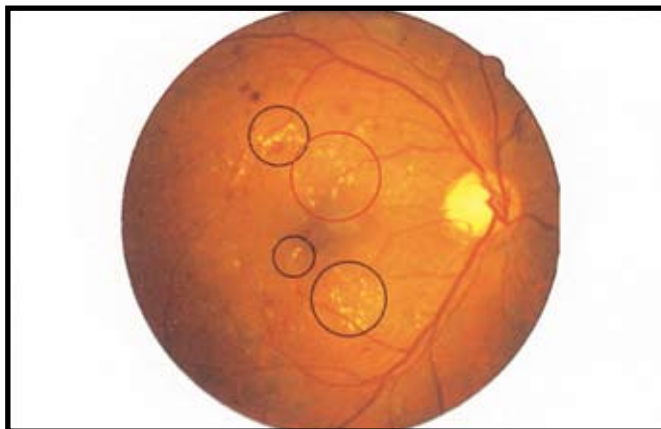


➡ **Mild NPDR + CSME**

➔ Hard Exudates in Diffuse & Circinate Exudative Maculopathy, causing CSME

Recommendations:

- FFA desirable, but not mandatory (to exclude macular ischemia)
- Grid Laser (cross shaded)
- 6-8 weeks follow up till complete resolution

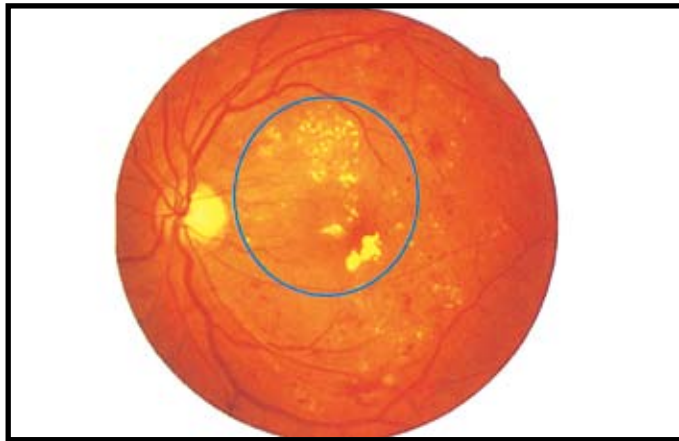


➡ **Clinically Significant Macular Edema (CSME)**

- Circinate rings in the making at several Places
- Ring causing CSME (Red)

Recommendations:

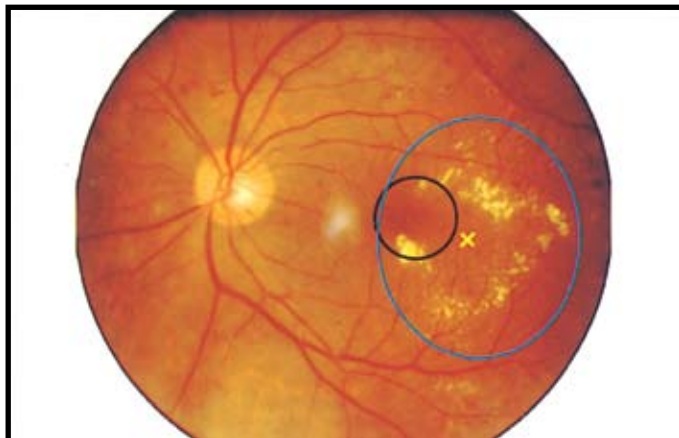
- Focal laser in the center of rings
- 6-8 weeks Follow up till resolution/ further intervention



➡ **Mild NPDR + CSME** ➔ Circinate and Diffuse exudates in the posterior pole (within in Vascular Arcade), causing CSME
Treatment required is Focal and Grid Laser

Recommendations:

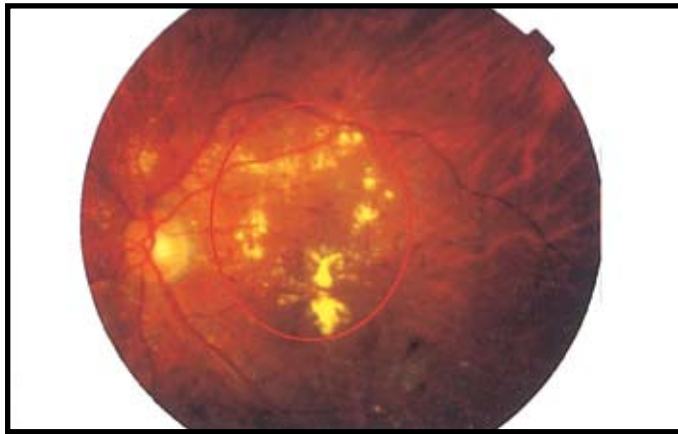
- FFA desirable
- Focal/Grid Laser
- 6-8 weeks follow up till complete resolution



➡ **Mild NPDR + CSME**
➔ Large circinate exudates causing CSME

Recommendations:

- FFA to identify central leaking Micro-aneurysm
- Focal Laser advised at the center of ring exudate (crossed area), away from FAZ (black circled area)
- 6-8 weeks follow up till complete resolution

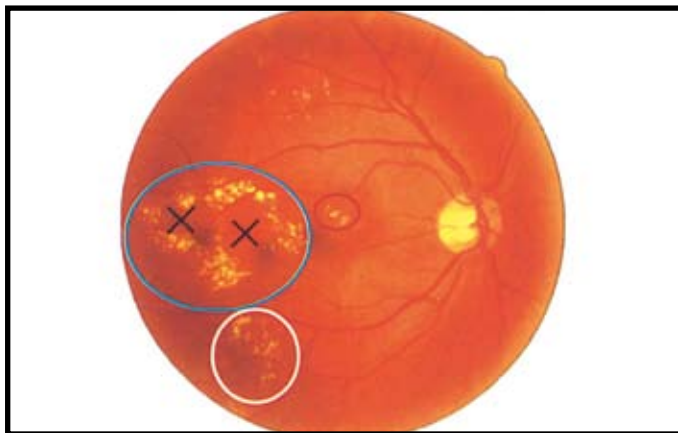


➡ Moderate NPDR + CSME

➔ Diffuse exudative maculopathy, causing CSME

Recommendations:

- FFA to see overall ischemia
- Grid Laser
- PRP (as per our recommendations)
- 6-8 weeks follow up till complete resolution

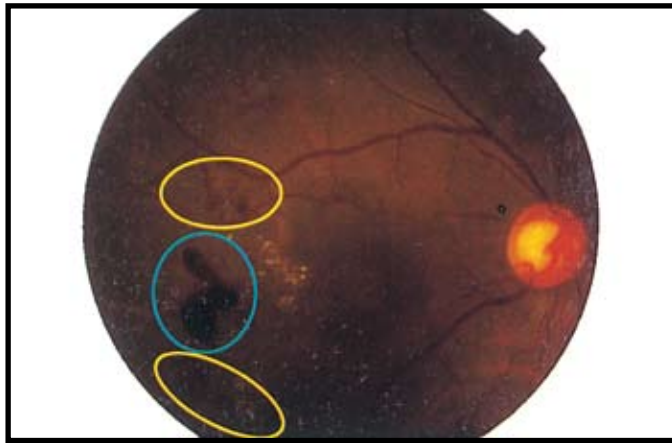


➡ CSME

➔ Hard Exudates causing circinate maculopathy (blue) and CSME (reds)

Recommendations:

- Needs Focal (crossed areas)
- Grid Laser
- Circinate retinopathy outside macular arcade (white circle) does not need intervention



➡ Proliferative Diabetic Retinopathy (PDR)+NVE

- **Blue Circle:** Subhyaloid/Pre-Retinal Haemorrhage
- **Yellow Circle:** Intra-Retinal Microvascular Abnormalities (IRMA) / New Vessels Elsewhere (NVE)

Recommendations:

- FFA desirable
- PRP of at least 1500 - 2000 burns (the burns 1-burn apart) in multiple sessions, till regression of NVE

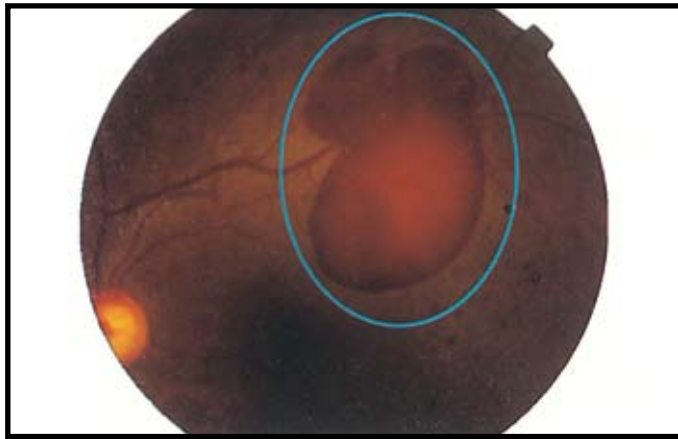


➡ PDR

- ➔ New Vessels on Disc (NVD) (Yellow)
- ➔ Venous Loop (Red)

Recommendations:

- PRP in multiple sessions. Each session should of 1500-2000 burns @ 1-burn apart. Continue laser application till NVD completely regress.

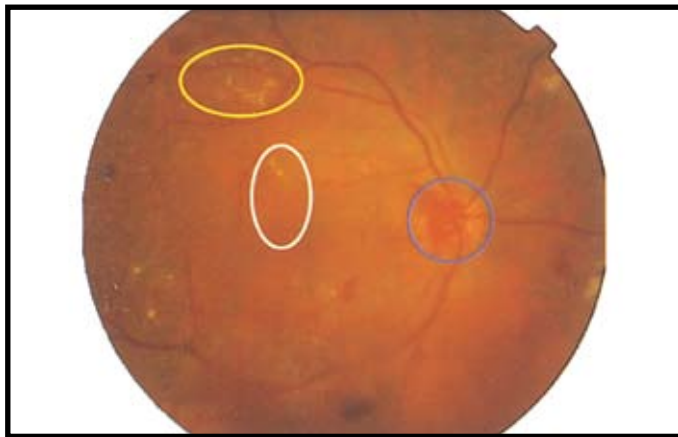


➡ **PDR**

➔ Massive Subhyaloid (Pre-Retinal) haemorrhage. Cause is underlying NVE

Recommendations:

- PRP: 1500 or more burns in one session.
- Will need multiple laser sessions.
- If no regression, this patient may be a candidate for VR surgery.

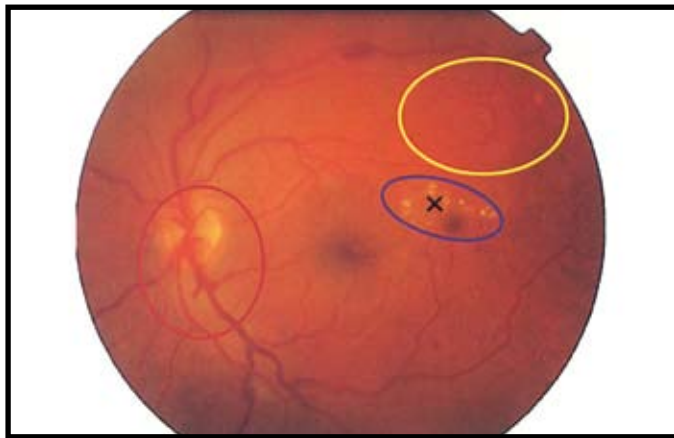


➡ **PDR**

- NVD (blue circle)
- CSME (white circle)
- Circinate Retinopathy (yellow circle)

Recommendations:

- FFA to outline the overall Ischemia
- Grid Laser first
- PRP: 1500-2000 burns.
- Will need multiple sessions fill NVDs completely regress



➡ PDR

- NVEs (yellow circle)
- NVDs (red circle)

Recommendations:

- FFA
- Grid Laser first
- PRP: 1500-2000 burns.
- Will need multiple sessions till NVDs completely regress

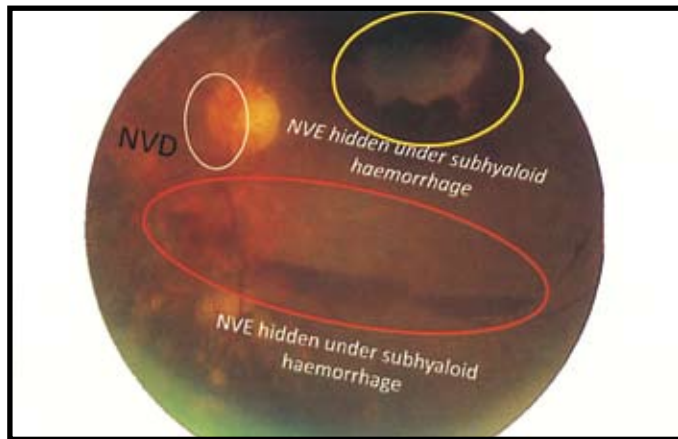


➡ Advanced Diabetic Eye Disease

➔ Traction bands in the macular area

Recommendations:

- Lasers and Anti-VEGFs (Vascular Endothelial Growth Factors) would make things worse
- Candidate for Vitreo Retinal (VR) Surgery

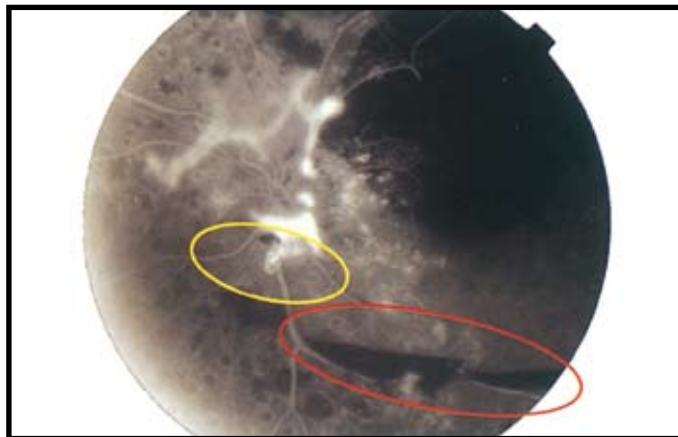


➡ Advanced Diabetic Retinopathy not responding to Laser

- ➔ Multiple areas of Subhyaloid (Pre-Retinal) haemorrhages with NVD and NVE underlying Subhyaloid haemorrhage

Recommendations:

- Candidate for VR Surgery



➡ FFA of the above patient

- showing:
- NVDs
 - Subhyaloid Haemorrhage
 - NVEs

References:

1. *The Early Treatment Diabetic Retinopathy Study Research Group. Early Treatment Diabetic Retinopathy Study design and baseline patient characteristics. ETDRS report number 7. Ophthalmology 1991;98:742.*
2. *Early Treatment Diabetic Retinopathy Study Research Group. Grading diabetic retinopathy from stereoscopic color fundus photographs--an extension of the modified Airlie House classification. ETDRS report number 10. Ophthalmology 1991;98:786-806.*
3. *Indian Health Diabetes Best Practice Diabetes Eye Care Revised July 2009*
4. *Early Treatment of Diabetic Retinopathy Study Report No. 10: Grading diabetic retinopathy from stereoscopic colours, fundus photographs. An extension of the modified Airlie House classification. Ophthalmology 1991; 98: 786-806.*
5. *Schiffman R M et al. Comparison of a digital retinal imaging system designed for detection of diabetic retinopathy in the primary care physician's office to stereo seven field color fundus photography. Ophthalmic Surgery, lasers & Imaging. November 4, 2004.*
6. *Early Treatment of Diabetic Retinopathy Study Report No. 1: Photocoagulation for diabetic macular edema. Arch Ophthalmol 1985; 103: 796-806.*
7. *Early Treatment of Diabetic Retinopathy Study Report No. 2: Treatment techniques and clinical guidelines for photocoagulation for diabetic macular edema. Ophthalmology 1987; 94: 761-774.*
8. *Early Treatment of Diabetic Retinopathy Study Report No. 3: Techniques for scatter and low core photocoagulation treatment of diabetic retinopathy. Int Ophthalmol Clin 1987; 27: 254-264.*
9. *Early Treatment of Diabetic Retinopathy Study Report No. 4: Photocoagulation for diabetic macular oedema. Int Ophthalmol Clin 1987; 27: 265-272.*
10. *Early Treatment of Diabetic Retinopathy Study Report No. 9: Early photocoagulation for diabetic retinopathy. Ophthalmology 1991; 98: 766-785.*

ANNEXURE

Guidelines for Laser Application In Diabetic Retinopathy

Recommendations by National Retina Specialists Panel

Any ophthalmologist intending to treat Diabetic Retinopathy (DR) with laser is expected to know:

1. How to use both contact and noncontact lenses on the slit lamp.
2. The pathogenesis of Diabetic retinopathy
3. How to recognize various lesions due to Diabetic retinopathy including macular edema
4. Interpretation of the angiographic findings found in Diabetic retinopathy
5. The use of laser for photocoagulation
6. The role of new management techniques of DR, e.g. intravitreal injections

1) Guidance for application for laser:

a) No Diabetic retinopathy:

- Follow up once a year with advice of strict control of diabetes and blood pressure

b) Mild NPDR:

- Follow up every 9 months-1 year with advice of strict control of diabetes and blood pressure

c) Moderate NPDR:

- Follow up every 6 months with advice of strict control of diabetes and blood pressure
- If follow up is doubtful or not possible, Pan Retinal Photocoagulation (PRP) with up to 1500 burns. (This is a variation from the normal practice due to poor compliance for follow up under prevalent practices. If the ophthalmologist is confident about the patient's follow up, he can defer the treatment.)
- Laser burns of mild to moderate intensity, just resulting in mild white discoloration of retina. The normal setting of the laser is: 300 microvolt (μv) power of 0.1 second duration, of 250 - 500 microns in size. These burns are applied 1-burn apart.
- It is advisable to follow the patients of Diabetic Retinopathy with Fundus Photograph, if available. In absence of facility of fundus camera, the ophthalmologist should make a drawing of fundus and show the areas of Diabetic Retinopathy.

d) Severe NPDR:

- PRP 1500-2000 burns in one to two sessions. Laser burns of mild to moderate intensity, just resulting in mild white discoloration of retina.
- The normal setting of the laser is: 300 microvolt (μv) of 0.1 second duration, of 250 - 500 microns in size. These burns are applied 1-burn apart.

e) PDR (NVD/NVE):

- PRP 2000-3000 burns in one to two sessions depending upon the patient's compliance.
- The normal setting of the laser is: 300 microvolt (p) of 0.1 second duration, of 250 - 500 microns in size. These burns are applied 1-burn apart. If there is no response or if the PDR is severe, the space between burns could be lessened to 1/3-burn apart.

f) Macular Edema (ME) associated with Circinate (ring) Exudates:

- Laser is to be applied to the leaking spot, best identified on FFA. In absence of FFA facility, the laser can be applied in the center of the circinate ring of exudate.
- The normal setting of the laser is: 200 microvolt (p) of 0.1 second duration, of 50 -100 microns in size.
- Laser burns of mild to moderate intensity, just resulting in mild white discoloration of retina.
- As the laser burn in edematous retina is not easily visible, the power can be increased, but never more than 300 μ v.

g) Macular Edema not associated with Circinate (ring) Exudates:

- These patients are classified as patients with '**Clinically Significant Macular Edema**' (CSME). Please refer to the photographic reference guide (page 3).
- If the ophthalmologist is not trained in Grid Laser Application, the patient should be referred to the tertiary center.
- Grid laser for CSME is not recommended for district ophthalmologist by the panel of retina specialists. However, if the ophthalmologist is well trained in the laser application, there is no harm in doing grid laser.
- The normal setting of the laser is: 200 microvolt (μ v) of 0.1 second duration, of 50 -100 microns in size. These burns are applied 1-burn apart.
- The Foveal Avascular Zone (FAZ) and Papillomacular Bundle should be avoided (page 5, picture 2).

In case of DR where Macular Edema is associated with Severe NPDR and High-risk PDR, the macular edema is to be treated before PRP is done.

2) Guidance for Referral of DR patients to Retina Specialist by District Ophthalmologist:

- a). Progressive PDR not responding to maximum laser
- b). Macular edema not associated with circinate Maculopathy (if the district ophthalmologist is not trained in grid laser application)
- c). Persistent macular edema not responding to laser treatment
- d). Vitreous/sub hyaloids hemorrhage.
- e). Unexplained loss of vision with patients of Diabetic retinopathy where Fundus picture does not explain visual loss, and Macular edema without exudates
- f). TRD / complicated RD
- g). Rubeosis iridis and thrombotic glaucoma

3) Role of Emerging New Techniques in Management of DR:

- This panel does not recommend the use of intra vitreal or subtenon “Triamcinol Acetate” at the peripheral hospital level.
- This panel also does not recommend the use of Anti-VEGFs (Macugen, Lucentis or Avastin) at the peripheral hospital level.

Before thcould be allowed to start using the adjuvants that are coming into practice in present evidence-based medical practice, the district ophthalmologists need supervised training for intra-vitrear injections.

