

# DIABETIC RETINOPATHY

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Diabetic retinopathy is the most serious eye manifestation of diabetes and is responsible for most of the blindness caused by diabetes. Diabetic retinopathy is the second most common cause of legal blindness and is the most common cause in the age group 30 - 65 years. Non-ophthalmologists have a very poor record of accuracy (< 50%) regarding the correct identification of the stage of retinopathy based on direct ophthalmoscopy. This is due, in part, to inexperience with direct ophthalmoscopy and the continued practice of examining the retina through undilated pupils. The goal of this seminar is to provide an update on the epidemiology and treatment of diabetic retinopathy, the appearance of key changes in the retina that constitute diabetic retinopathy, and to provide clear guidelines regarding referral of patients with diabetic retinopathy.

## WHAT IS DIABETIC RETINOPATHY?

Diabetic retinopathy is a microangiopathy affecting the retinal vasculature, primarily the capillaries and venules. Its onset often parallels that of kidney microangiopathy. It is generally classified into two categories: **NONPROLIFERATIVE** and **PROLIFERATIVE** retinopathy with the former subdivided into **BACKGROUND** and **PREPROLIFERATIVE** retinopathy.

### 1. BACKGROUND:

Microaneurysms, dot/blot hemorrhages, exudates, edema, retinal infarcts (cotton-wool spots), venous beading, intraretinal microvascular abnormalities (IRMA) are all components.

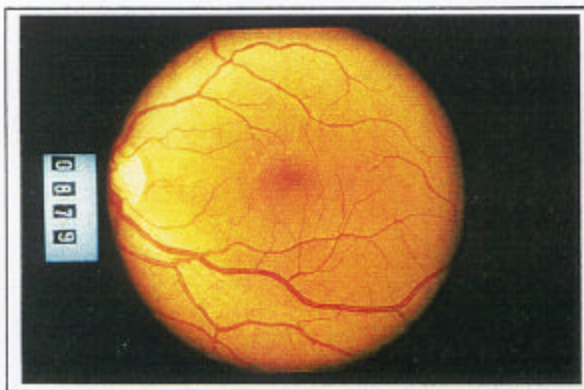


Figure 1: Mild background diabetic retinopathy with microaneurysms only and normal foveal contours.



Figure 2: Moderate nonproliferative diabetic retinopathy with dot/blot hemorrhages, exudates, and retinal infarcts (cotton-wool spots).

## 2. PREPROLIFERATIVE:

Severe amount of dot/blot hemorrhages, retinal infarcts, IRMA's, and venous beading without evidence of neovascularization. Changes seen in mid-peripheral retina. Risk of progression to proliferative retinopathy is 80% in 5 years!



Figure 3: Severe nonproliferative diabetic retinopathy with venous beading and IRMA's.

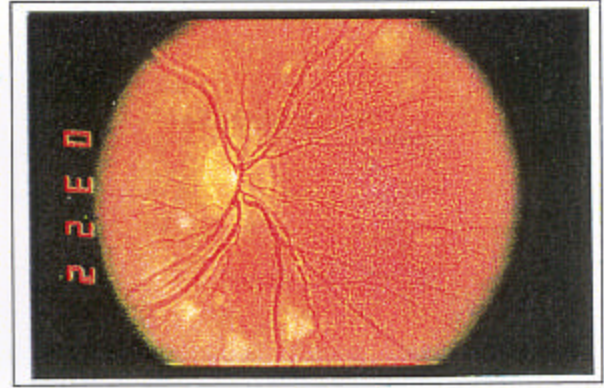


Figure 4: Preproliferative diabetic retinopathy demonstrating multiple nerve fibre layer infarcts and IRMA's.

## 3. PROLIFERATIVE:

The presence of *NEOVASCULARIZATION OF THE DISC (NVD)*, *NEOVASCULARIZATION ELSEWHERE (NVE)* [than the disc], *VITREOUS HEMORRHAGE* and/or *TRACTION RETINAL DETACHMENT* in addition to background changes.



Figure 5: Proliferative diabetic retinopathy with neovascularization of the disc (NVD).

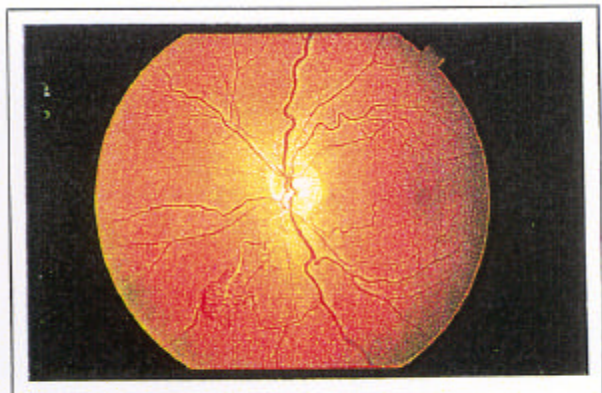


Figure 6: Proliferative diabetic retinopathy with neovascularization elsewhere (NVE) than on the disc.

## **WHAT ARE IMPORTANT EPIDEMIOLOGICAL FACTORS IN DIABETIC RETINOPATHY?**

### **1. DURATION OF DIABETES**

- 50% of Type 1's have retinopathy at 7 years
- 90% of Type 1's have any retinopathy at 15 years with 25 - 30% having NVD or NVE

#### ***REFER TYPE 1'S BETWEEN 5 AND 9 YEARS DURATION FOR EYE EXAMINATION***

- 25% of Type 2's have retinopathy at 1 year
- 85% of Type 2's have any retinopathy at 15 years with 10 – 15% having NVD or NVE

#### ***REFER TYPE 2'S DURING THEIR FIRST YEAR OF DIAGNOSIS***

### **2. CONTROL:**

The Diabetes Control Complications Trial (DCCT) has shown that tight glycemic control (average HbA1C levels of 7.5) can reduce both the rate of development of diabetic retinopathy as well as the rate of progression of established diabetic retinopathy:

- the rate of development of retinopathy is reduced by 76% compared to conventional management (average HbA1C levels of 10)
- the rate of progression of retinopathy reduced by 54% compared to conventional management

### **3. HYPERTENSION:** known to be directly associated with greater prevalence and greater severity of diabetic retinopathy.

## WHAT ARE TREATABLE CAUSES OF VISUAL LOSS IN DIABETIC RETINOPATHY?

### 1. MACULAR EDEMA:

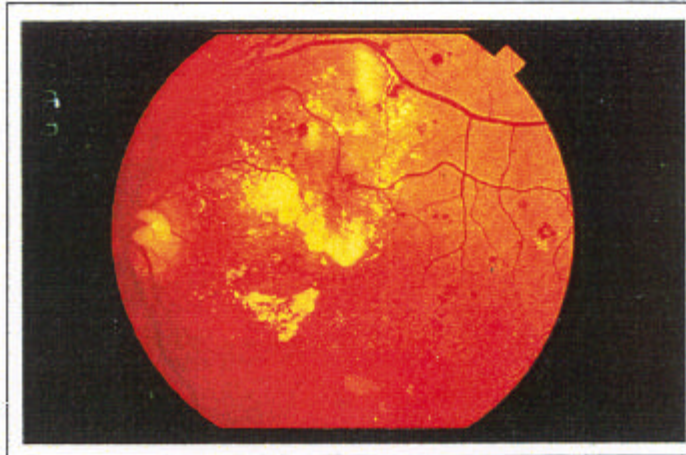


Figure 7: Nonproliferative diabetic retinopathy with severe macular exudate and edema.

The Early Treatment Diabetic Retinopathy Study (ETDRS, 1986) demonstrated the risk of moderate visual loss to be 6% per year untreated in patients with macular edema.

EXUDATE IS A MARKER FOR MACULAR EDEMA, THEREFORE, IF PRESENT IN THE MACULAR AREA, REFER

### 2. VITREOUS HEMORRHAGE:

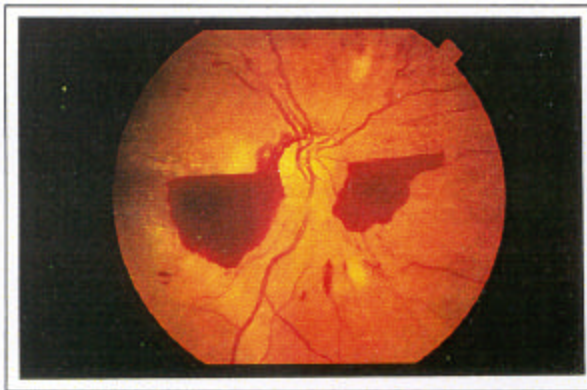


Figure 8: Boat-shaped pre-retinal hemorrhage.



Figure 9: Extensive vitreous hemorrhage secondary to diabetic retinal neovascularization.

### 3. TRACTION RETINAL DETACHMENT:

Vitreous hemorrhage and traction retinal detachment are complications of proliferative retinopathy. The Diabetic Retinopathy Study (DRS, 1976) demonstrated the risk of major visual loss in patients with proliferative diabetic retinopathy to be 16% per year untreated. Vitreous hemorrhage and traction retinal detachment are.

The ETDRS (1990) demonstrated an 80% risk of progression to proliferative diabetic retinopathy in those patients with preproliferative diabetic retinopathy.

***REFER ALL PATIENTS WITH PREPROLIFERATIVE OR PROLIFERATIVE DIABETIC RETINOPATHY AND THOSE WITH VITREOUS HEMORRHAGE OR RETINAL DETACHMENT***

### WHAT ARE CURRENT TREATMENT EXPECTATIONS FOR DIABETIC RETINOPATHY?

#### 1. MACULAR EDEMA:

The ETDRS (1986) demonstrated that *focal* photocoagulation (laser) reduces the risk of moderate visual loss from 6% per year to 3% per year in diabetic macular edema.

#### 2. PROLIFERATIVE DIABETIC RETINOPATHY:

The DRS (1976) demonstrated that *pan retinal photocoagulation* reduces the risk of major visual loss from 16% per year to 6% per year in proliferative diabetic retinopathy.



Figure 10: Proliferative diabetic retinopathy with extensive NVD.

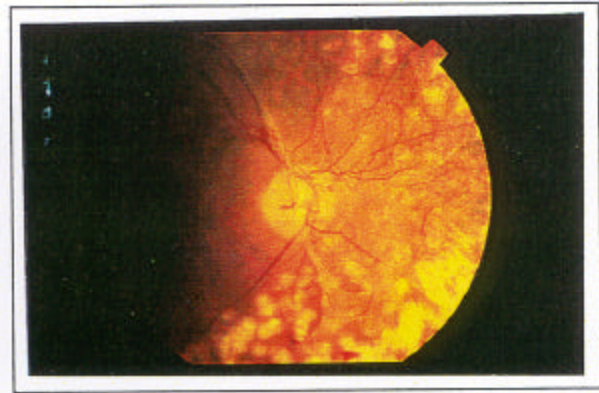


Figure 11: Same fundus as in Figure 10 after pan retinal photocoagulation (PRP). Note regression of NVD.