

# Diabetic Eye Disease

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# Introduction

- Retinopathy is a major cause of morbidity in patients with diabetes.
- It is the leading cause of blindness among adults aged 20-74 years
- Vision loss is preventable and treatable if managed in a timely way.
- Sight-threatening DR is a prognostic marker for life-threatening diabetic complications in other organs such as the renal and cardiovascular systems

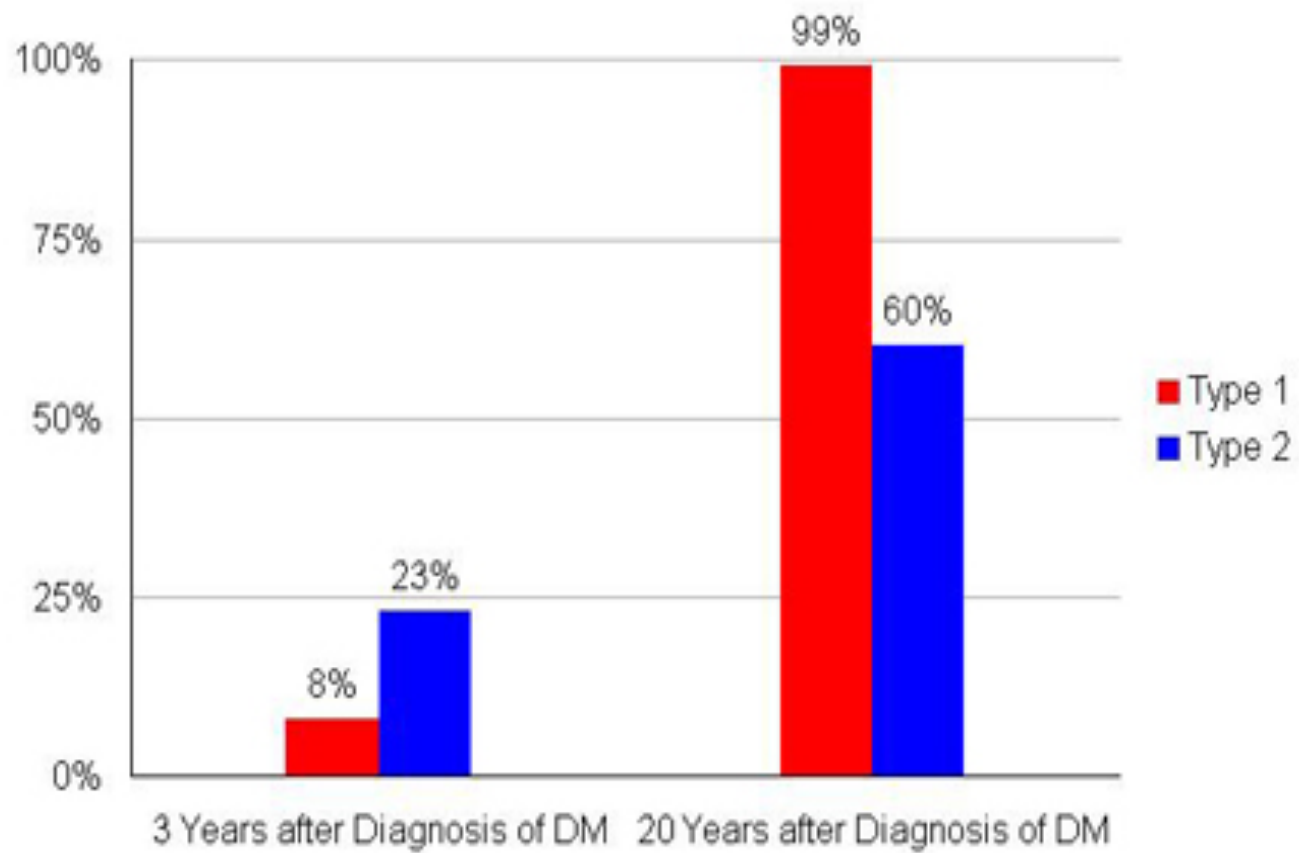


- **Types of diabetes mellitus:**

- **Type I:** which develops most frequently before age of 30
- **Type II:** develops after age of 30y

# Risk factors for diabetic retinopathy

- 1. The duration of diabetes** is the most important factor.
  - In patients diagnosed as having diabetes before the age of 30 years, the incidence of DR after 10 years is 50% and after 30 years 90%.
- 2. Good metabolic control** of diabetes will not prevent DR, although it delays its development by a few years. Conversely, poorly controlled patients may develop DR sooner.






**Miscellaneous factors** which may have an adverse effect on DR include:

- ***Pregnancy*** is occasionally associated with rapid progression of proliferative DR.
- ***Hypertension***, if poorly controlled, is associated with worsening of DR and particularly the development of proliferative disease.
- ***Renal disease***, if severe, is associated with worsening of DR.
- ***Other adverse factors*** include obesity, hyperlipidaemia, smoking and anaemia.

# Pathogenesis of diabetic retinopathy

- Retinopathy has features of both *microvascular occlusion* and *leakage*.
- **MICROVASCULAR OCCLUSION**
  - *(a) Capillary changes*, which consist of *thickening of the basement membrane, endothelial cell damage and proliferation*.
  - *(b) Deformation of red blood cells*, which leads to decreased oxygen transport.
  - *(c) Changes in platelets*, which lead to increased stickiness and aggregation.

- 
- **The consequence** of retinal capillary non-perfusion is retinal ischaemia which, in turn, causes retinal hypoxia.
  - The two main effects of retinal hypoxia are:
    - *Arteriovenous shunts*
    - *Neovascularization*

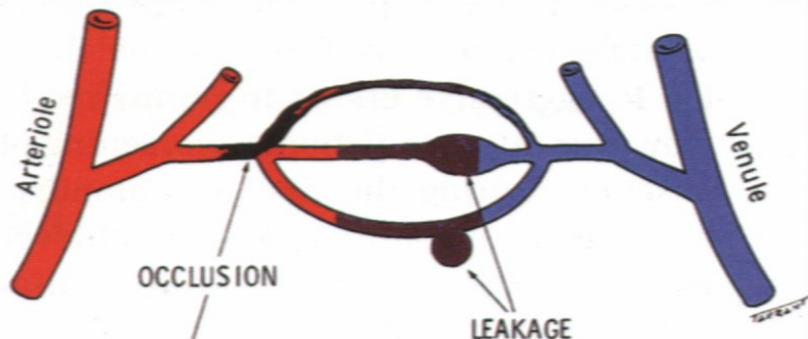




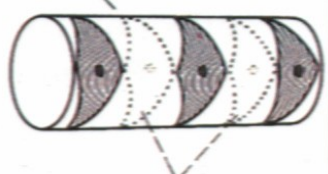
- **MICROVASCULAR LEAKAGE:**

- in diabetic patients, there is a reduction in the number of pericytes
- This reduction in pericytes is thought to be responsible for *distension of capillary walls* and a *breakdown of the blood-retina barrier, leading to leakage of plasma constituents into the retina.*
- **The consequences** of increased vascular permeability are intraretinal haemorrhage and oedema which may be either diffuse or localized.

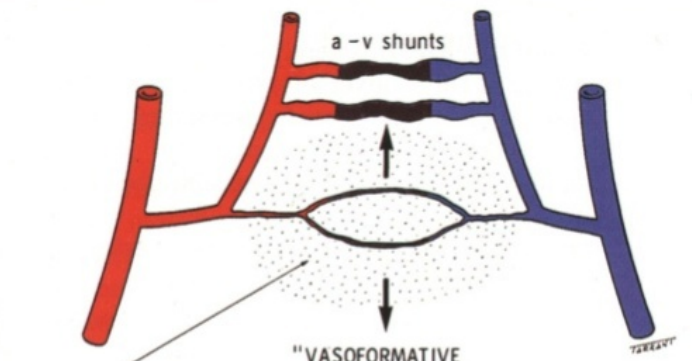




1. Basement membrane thickening
2. Endothelial cell damage
3. R. B. C. changes
4. Platelet stickiness increased

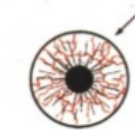


Loss of pericytes

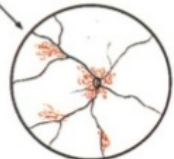


Hypoxic retina

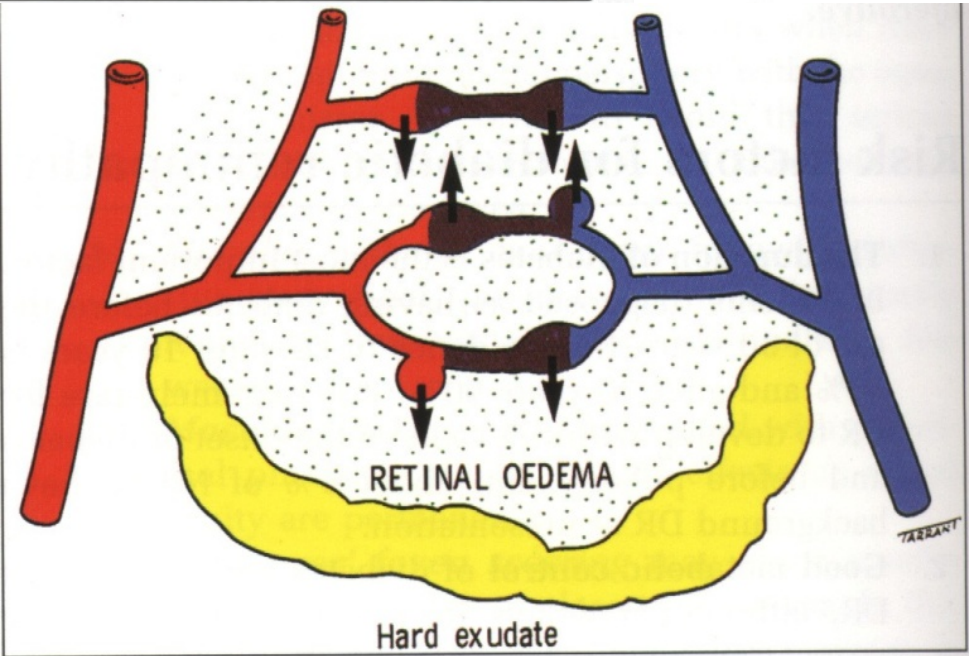
"VASOFORMATIVE SUBSTANCE"



Rubeosis iridis

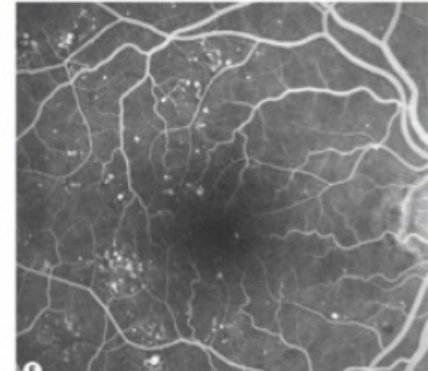
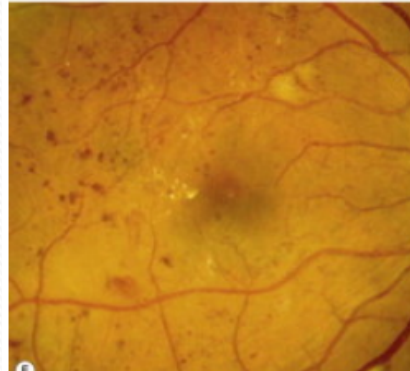
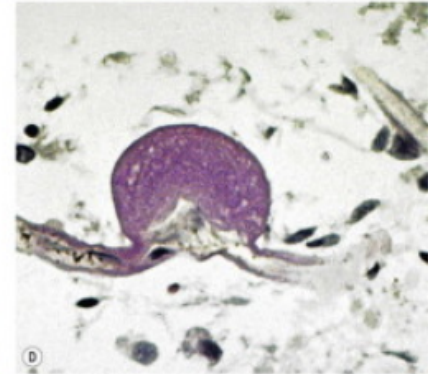
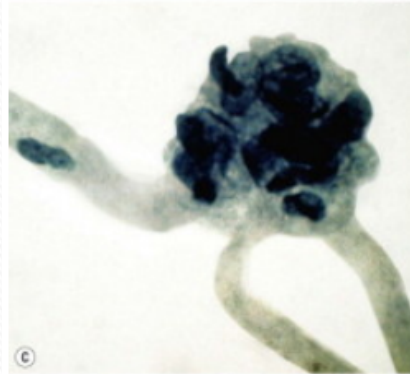
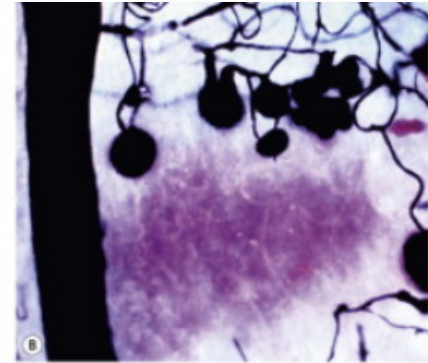


Proliferative retinopathy

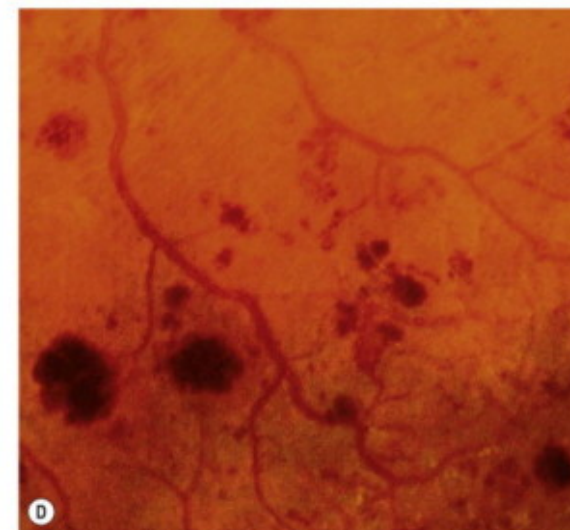
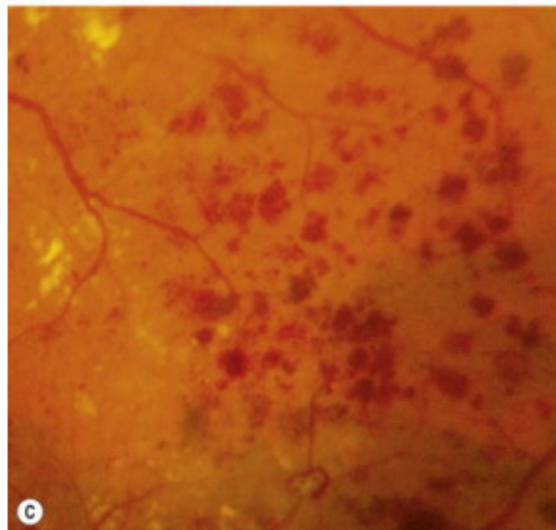
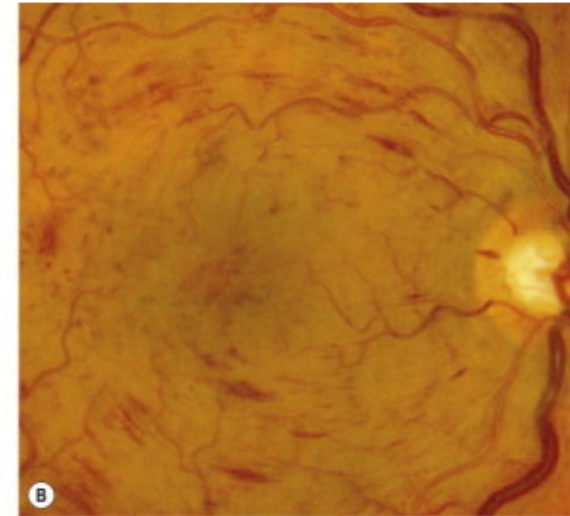
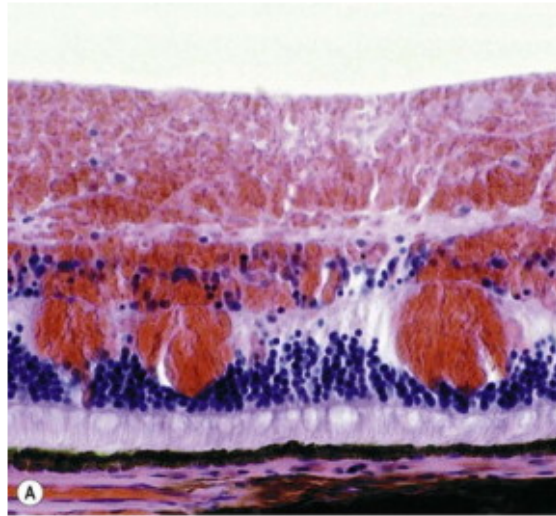


# Pathologic findings

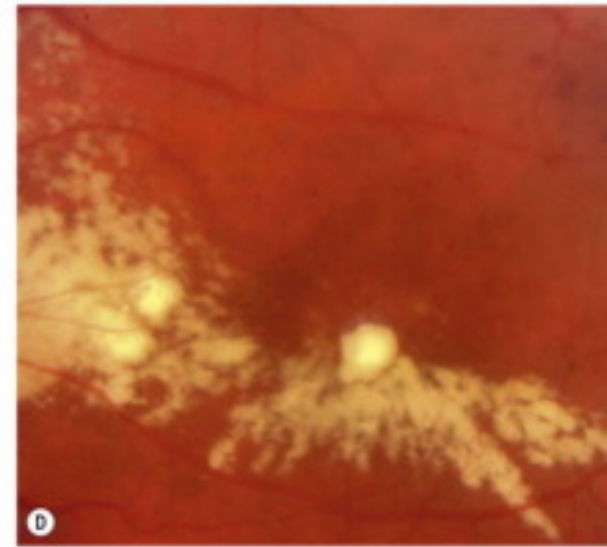
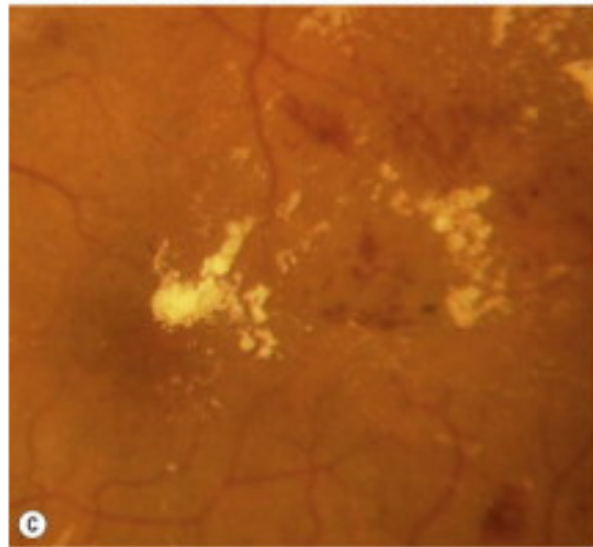
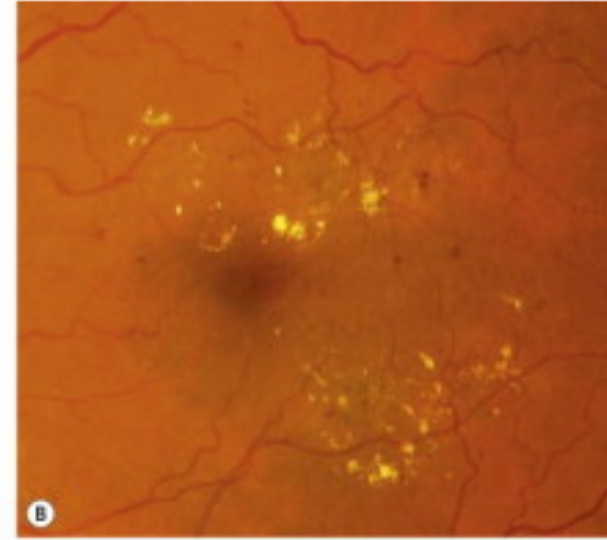
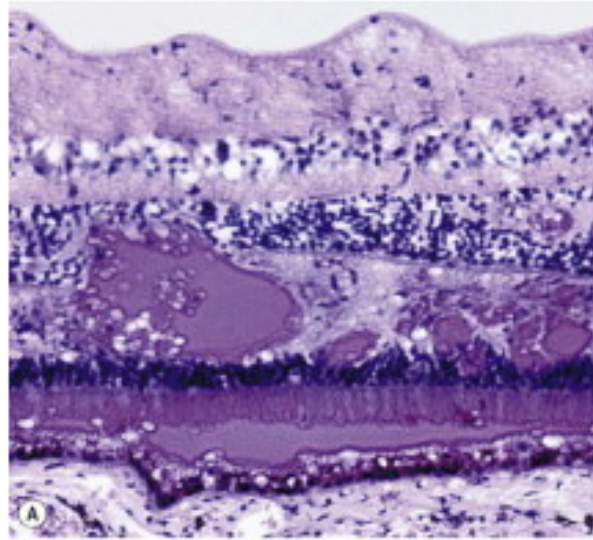
- Microaneurysms:



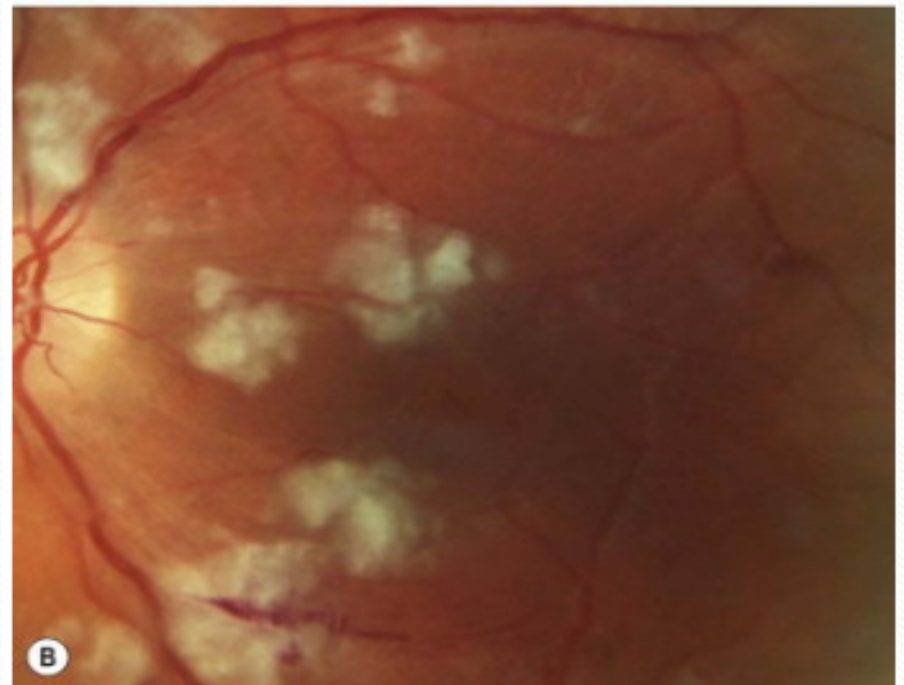
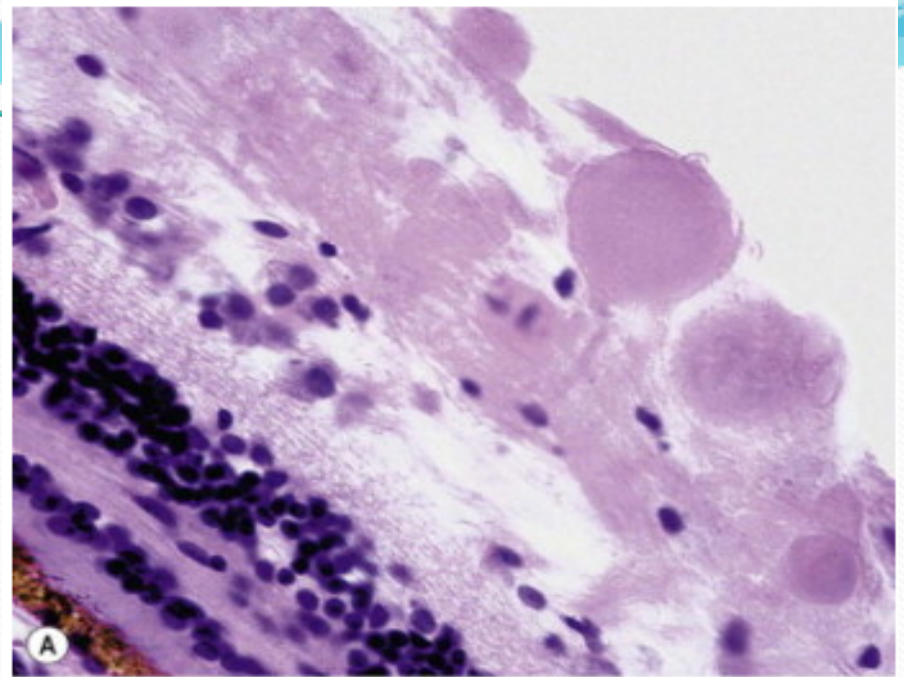
- Hemorrhages



- Exudates

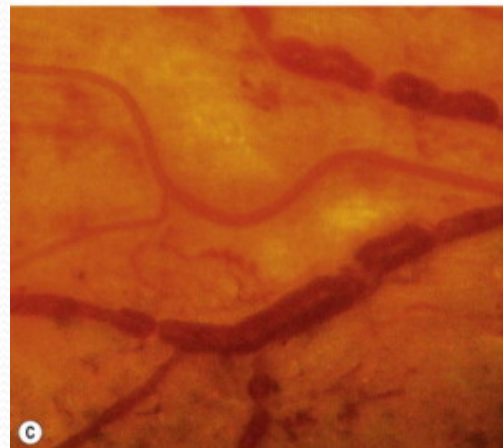
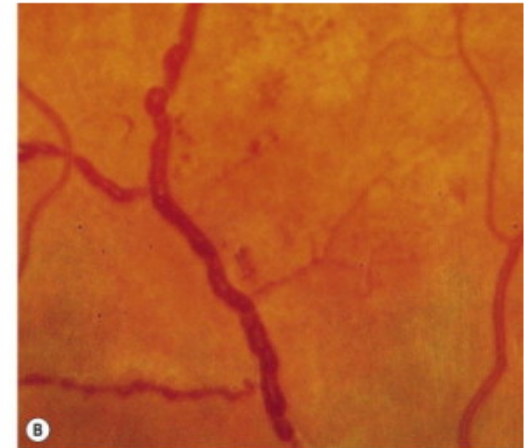
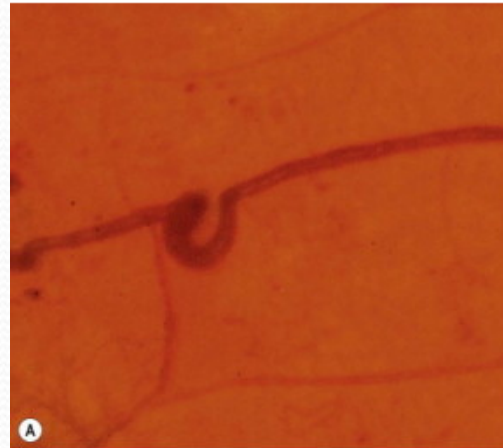


- Cotton Wool spots



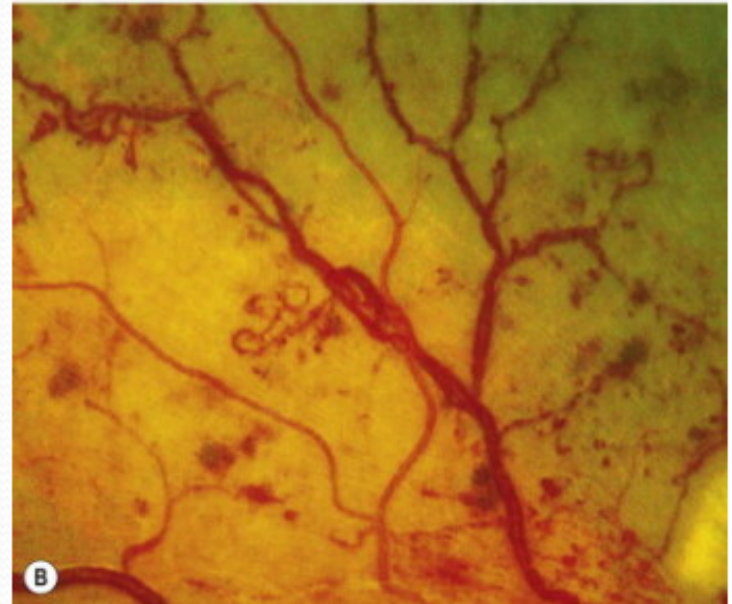
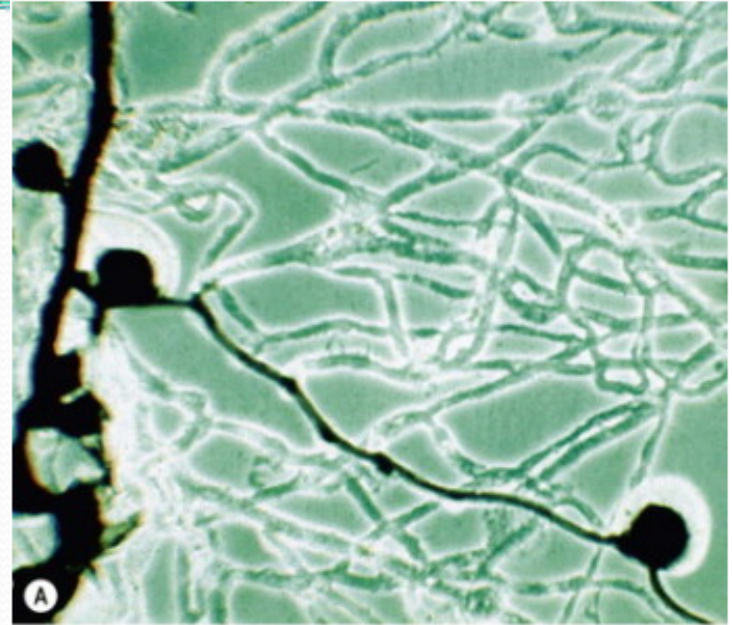
- Venous Changes:

- Loops
- Beading

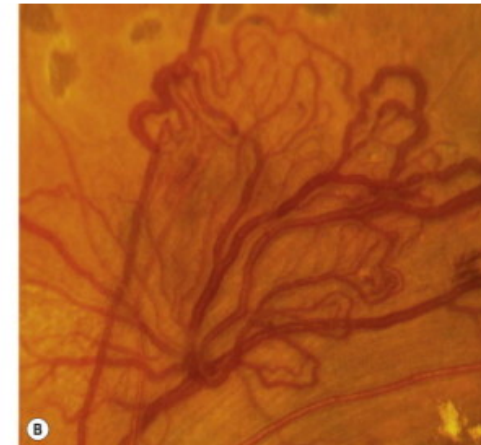
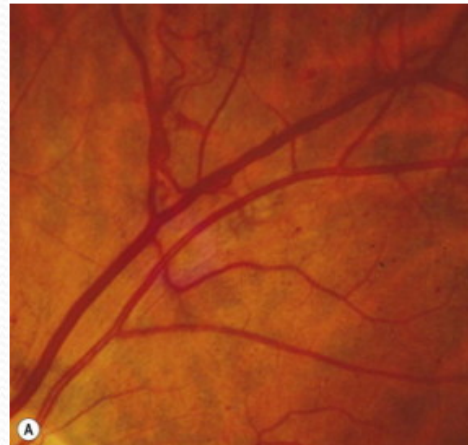
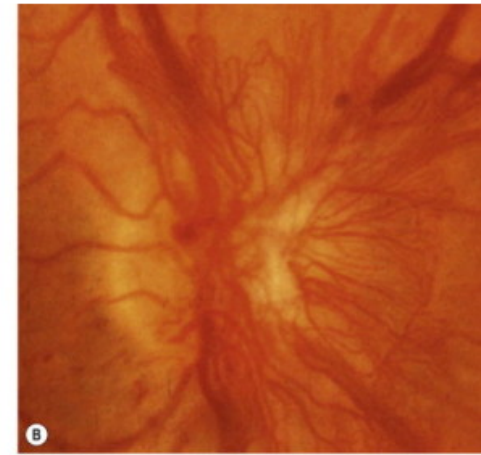
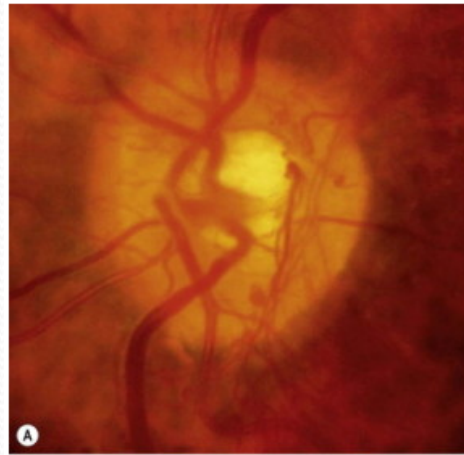




- IRMAs: Intraretinal Microangiopathies
  - AV shunts



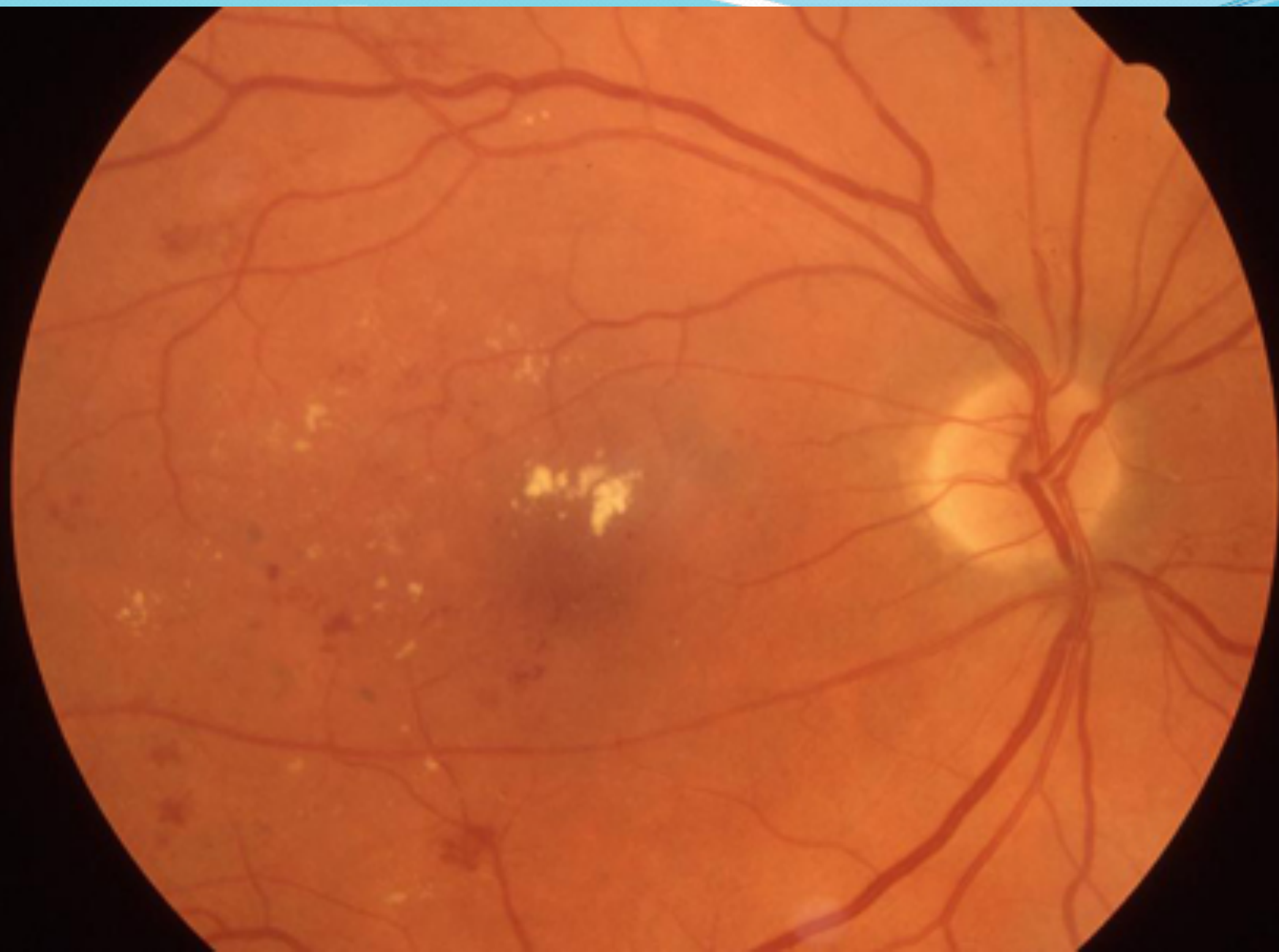
- Neovascularizations:
- NVD: at Disc
- NVE: Elsewhere
- NVI: Iris
- NVA: angle

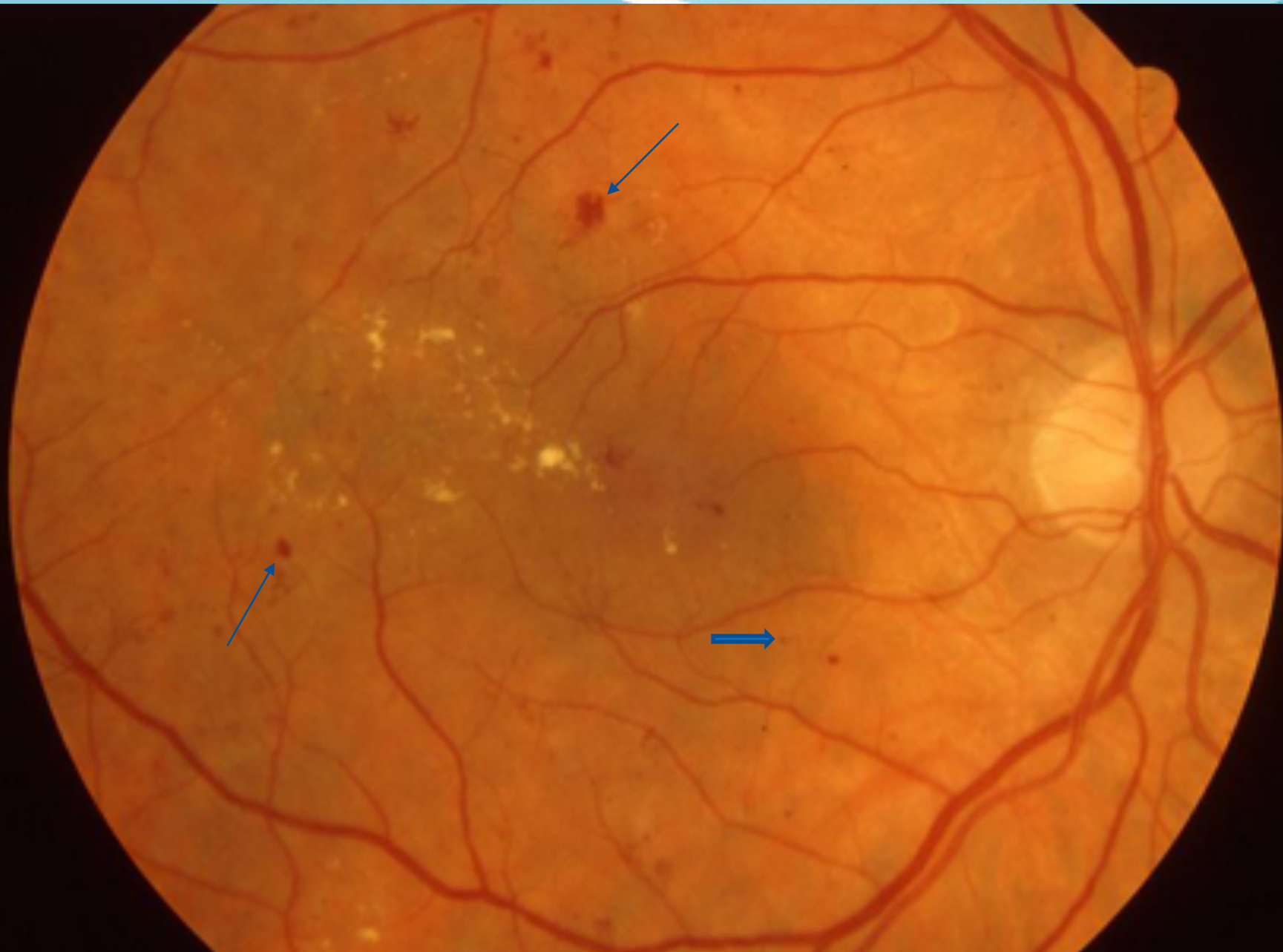


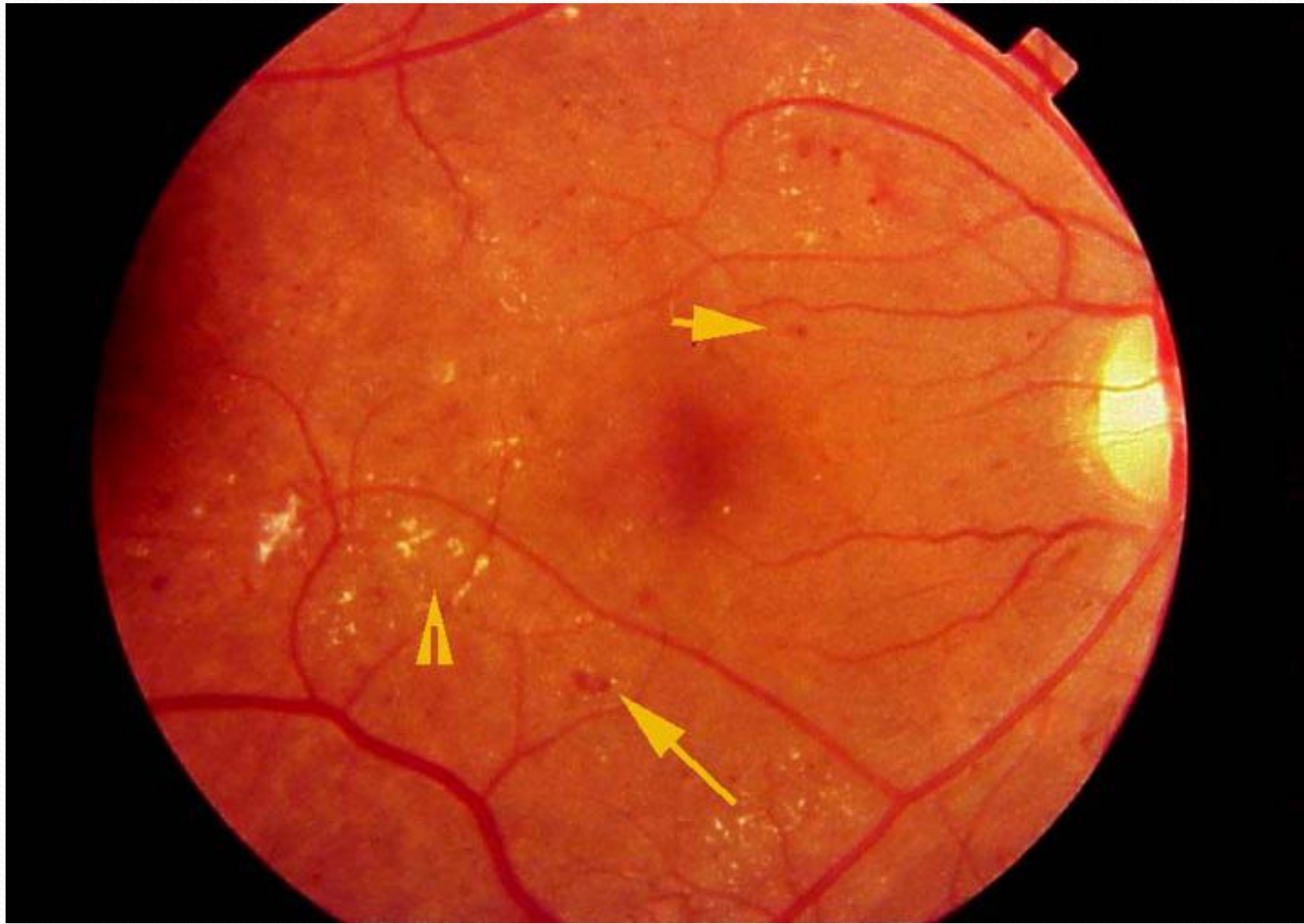
# Classification of DR:

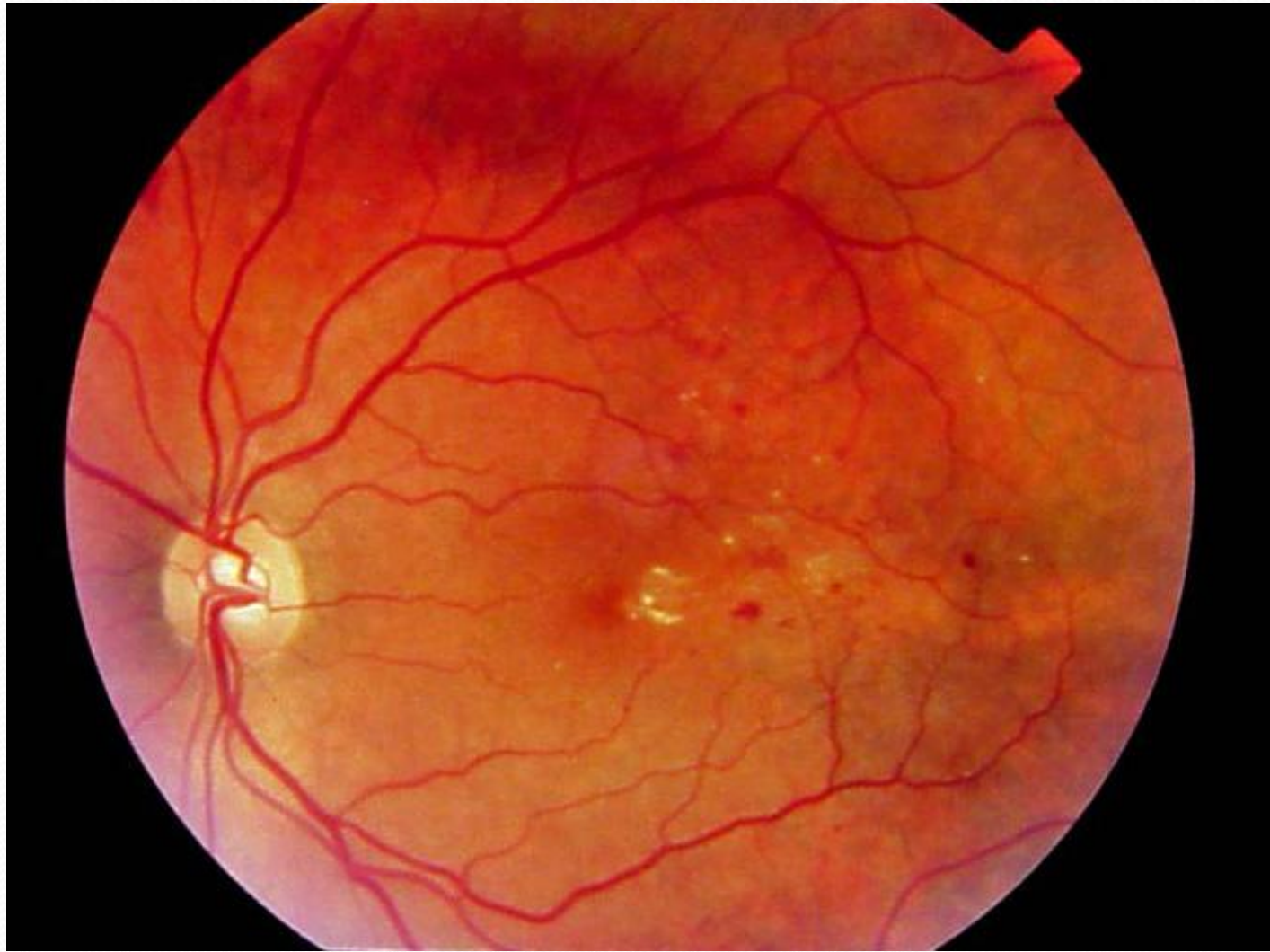
- **Nonproliferative DR (NPDR):**

- Vascular lesions such as microaneurysms and dot-blot hemorrhages are manifestations of nonproliferative DR (NPDR).
- It is classified according to severity to:
  - Mild: microaneurysms or hemorrhages less than 20 lesions in all quadrants.
  - Moderate:
    - Along with microaneurysms, signs of increasing retinal nonperfusion, such as venous beading and intraretinal microvascular abnormalities (IRMA) appear
    - IRMA represent shunt vessels that connect the arterioles and venules and are indicative of capillary closure.
    - Any hemorrhages or microaneurysms more than mild, or venous beading or IRMA less than severe







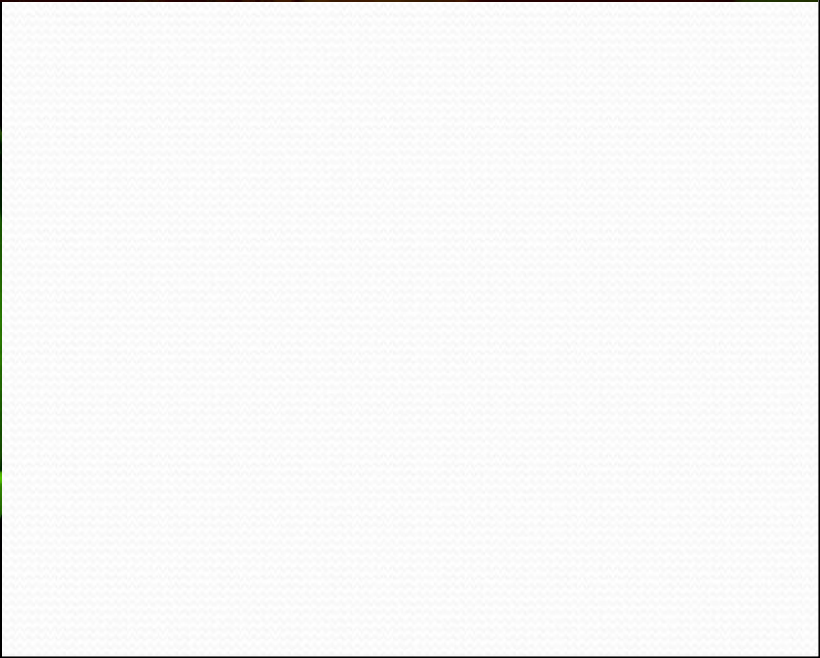
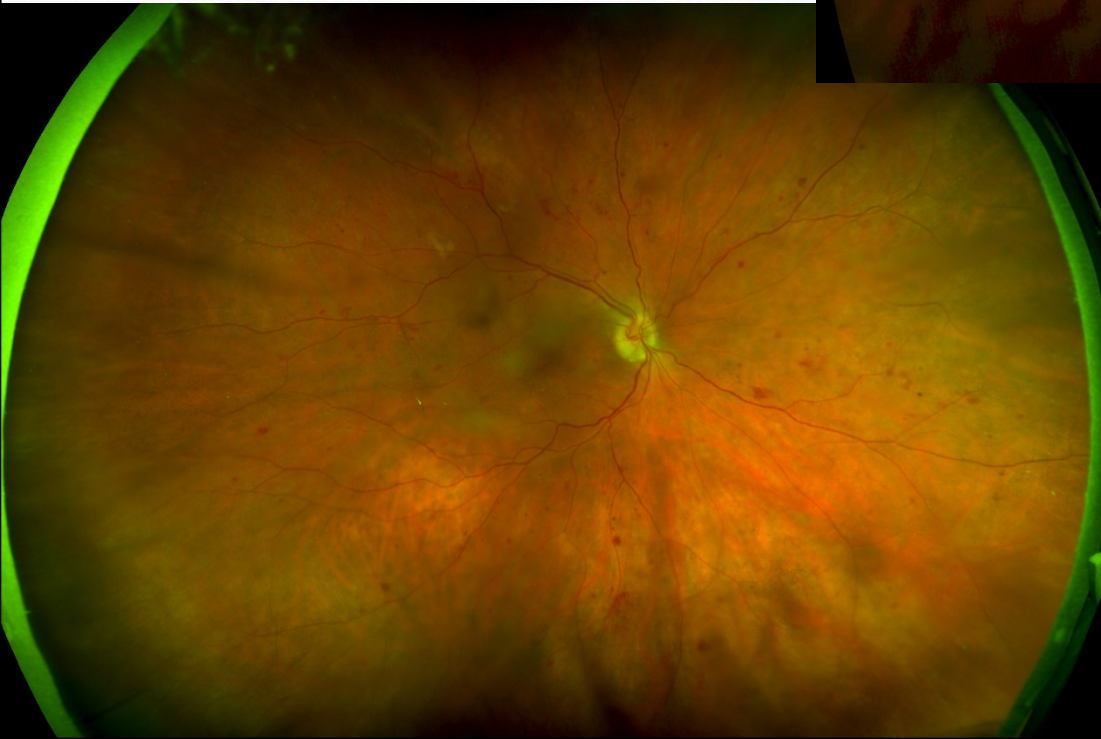


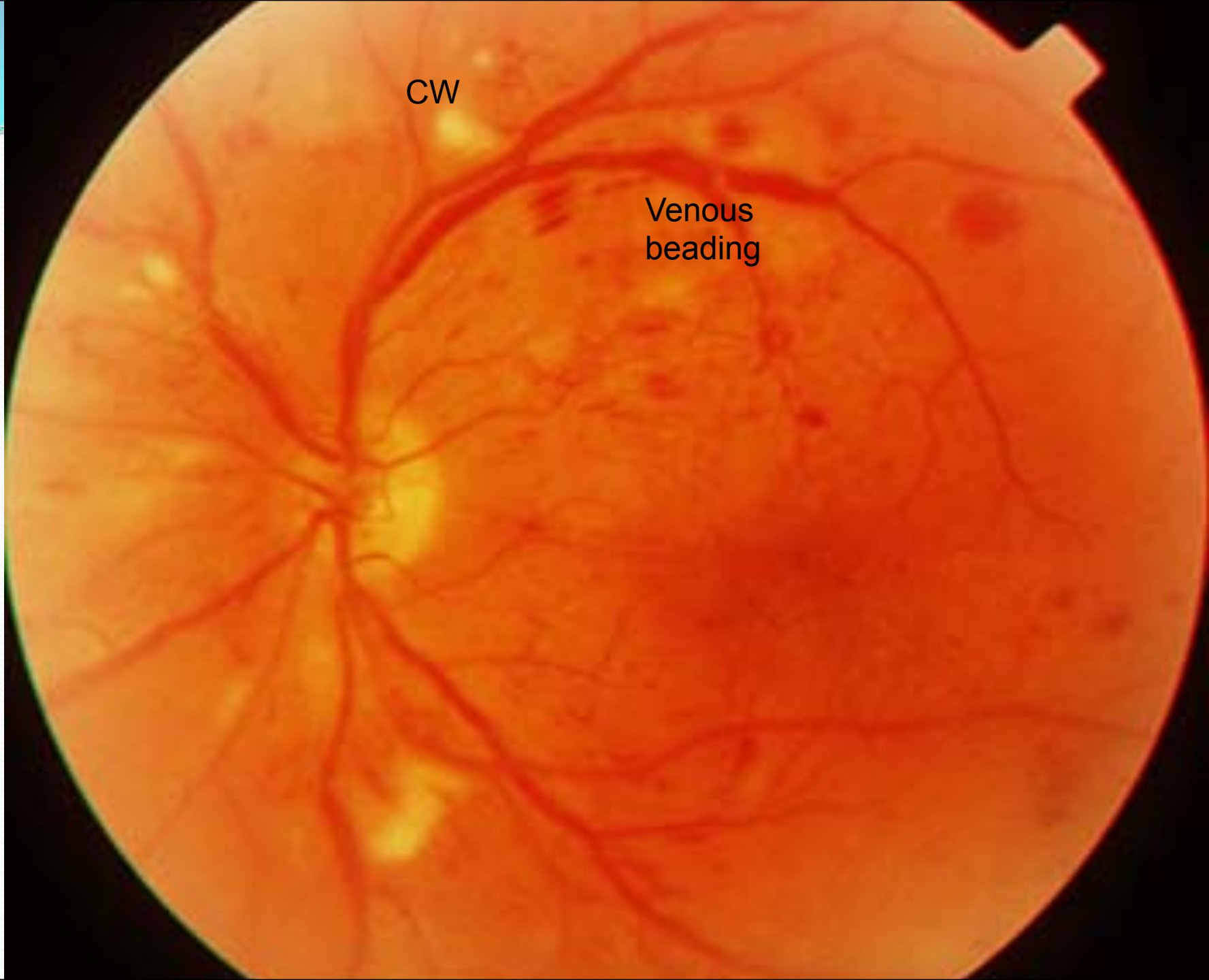


- **Severe and Very Severe NPDR :**

- Severe NPDR is represented by marked capillary loss and increasing retinal ischemia.
- Retinal examination shows: more than 20 intraretinal hemorrhages in each of the 4 quadrants, definite venous beading in 2 or more quadrants, and prominent IRMA in 1 or more quadrants.
- Patients may have poor vision due to associated macular edema.
- In addition to macular edema, all patients with diabetes, but especially those with type 1 diabetes, may develop ischemia involving the macula, which carries a grave prognosis.
- These patients need follow-up examinations on a more frequent basis.
- They should be monitored for development of proliferative changes so that treatment can be initiated when they appear





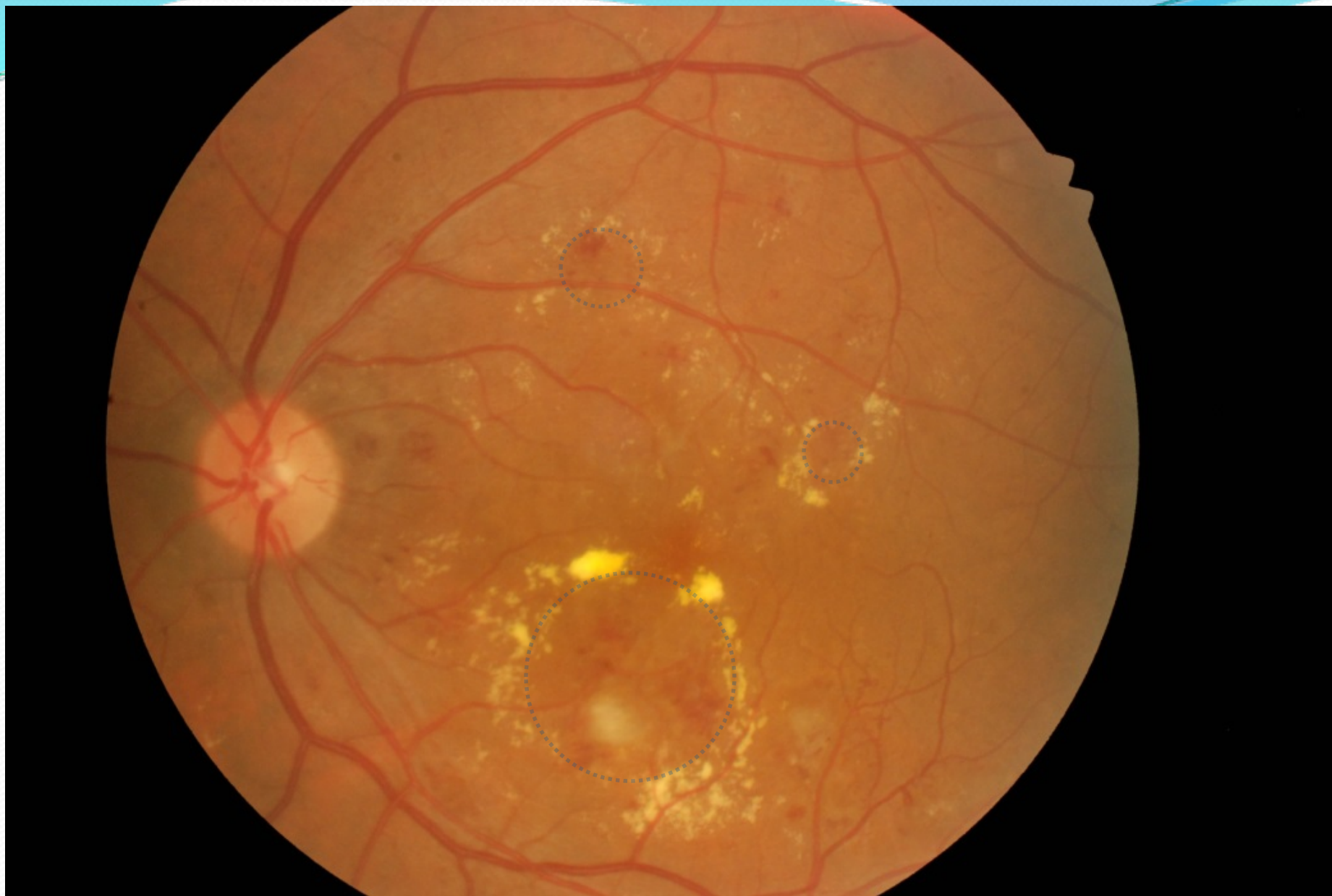


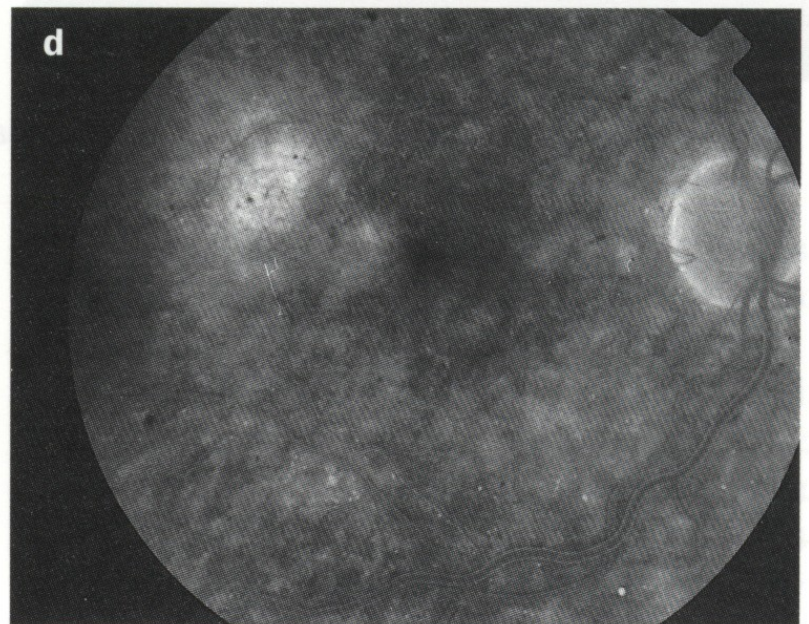
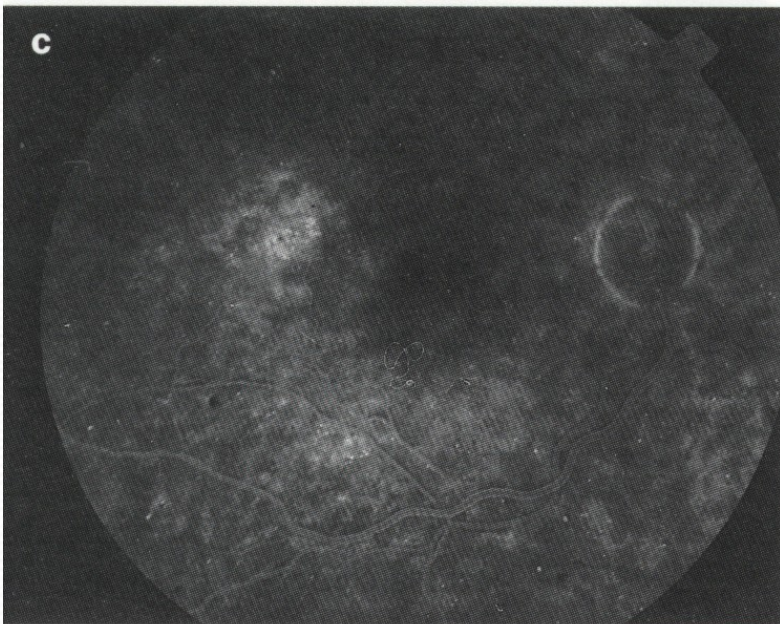
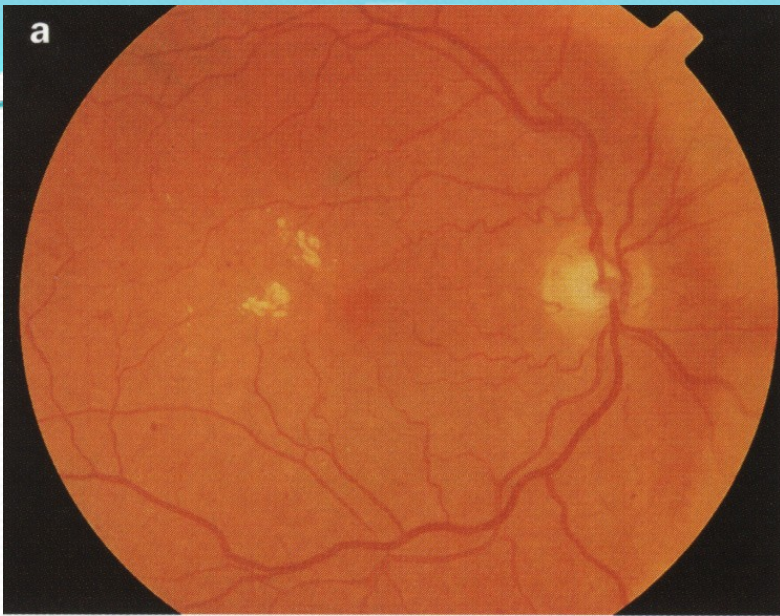
CW

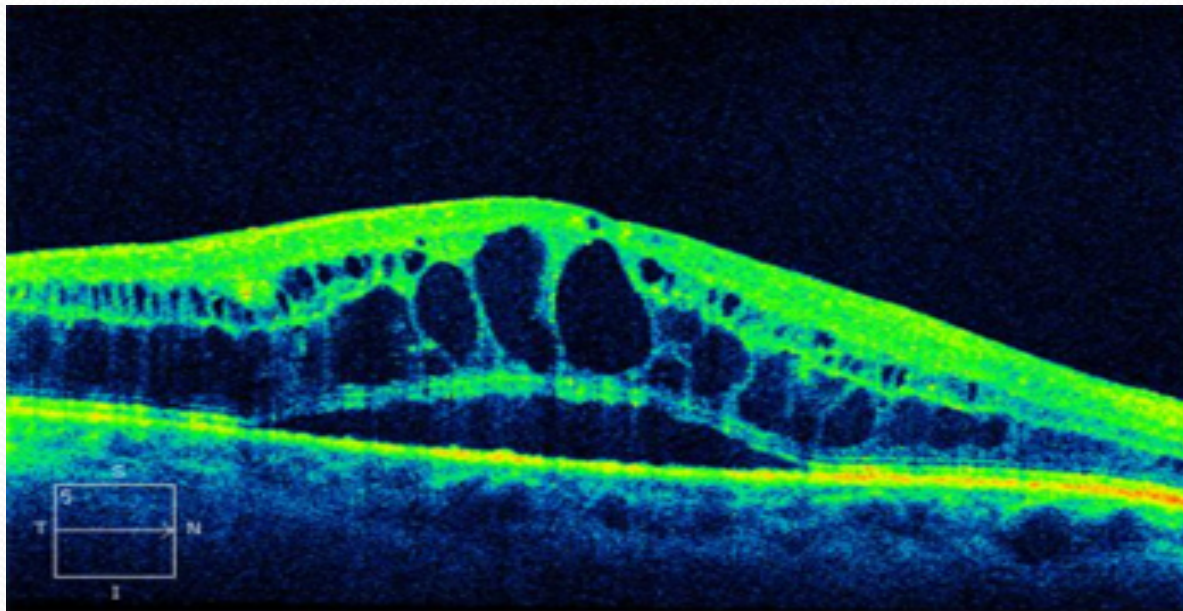
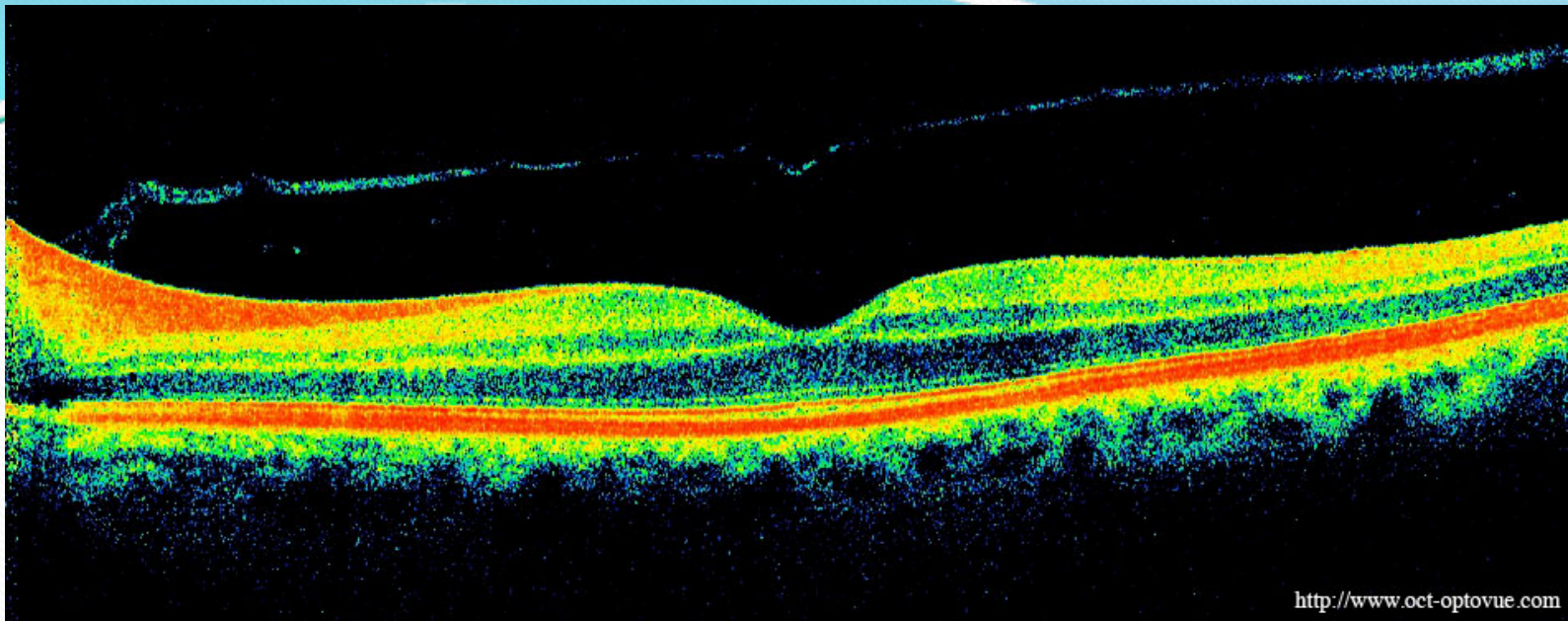
Venous  
beading

# Diabetic maculopathy

- Involvement of the fovea by oedema and/or hard exudates (diabetic maculopathy) is the most common cause of visual impairment in diabetic patients, particularly those with NIDD.
- Clinical Types:
  - Focal edema
  - Diffuse edema
  - Macular ischemia
  - Clinically significant maculopathy ( CSME)

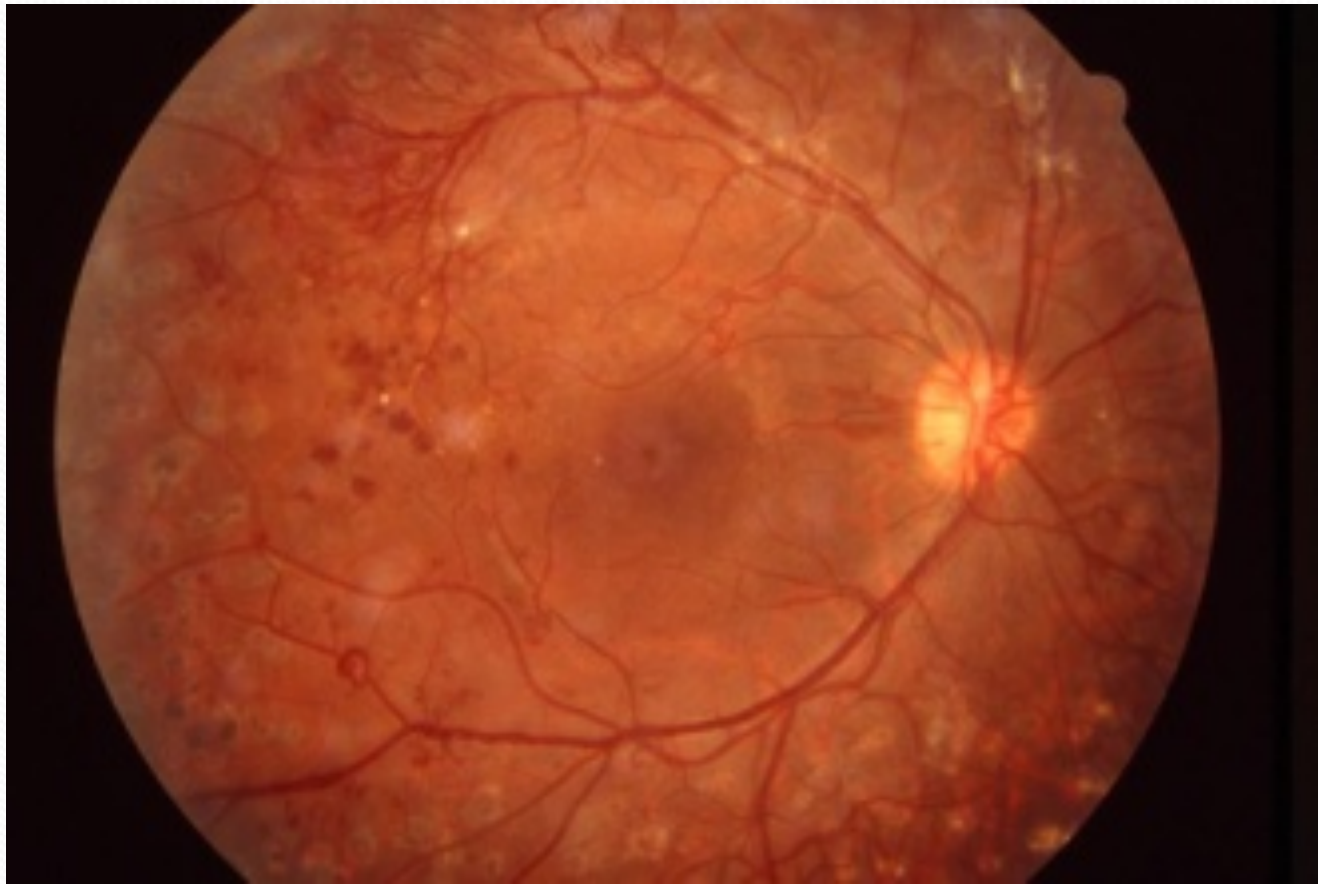




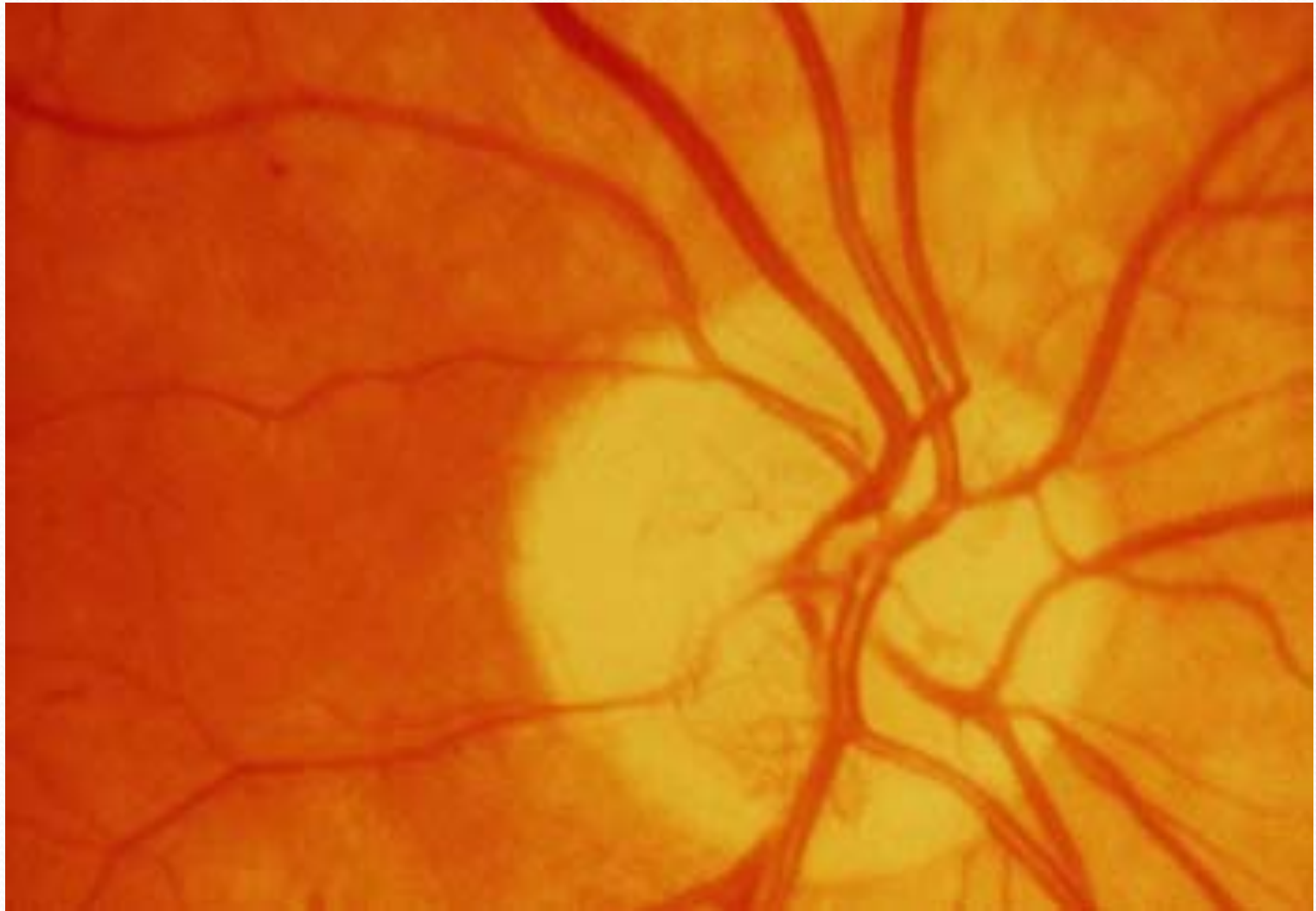


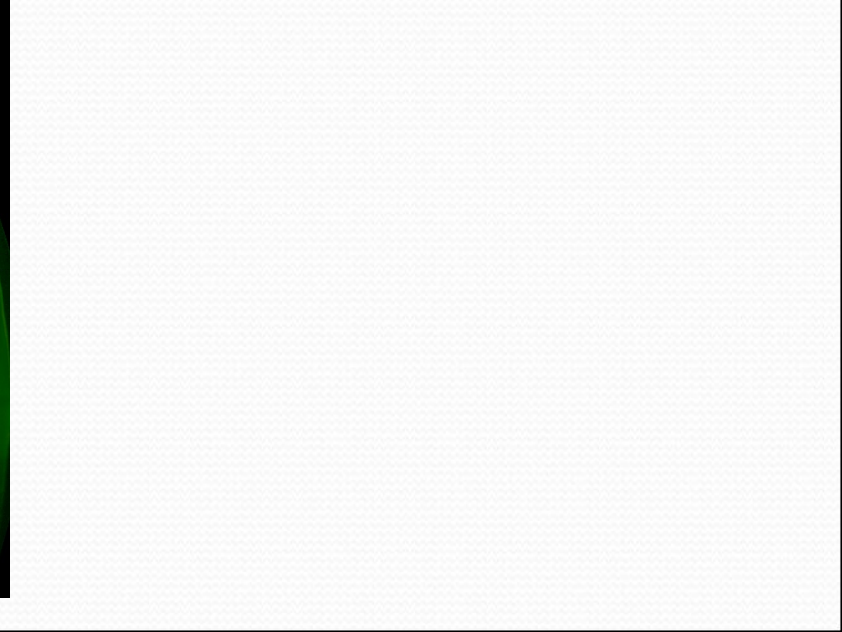
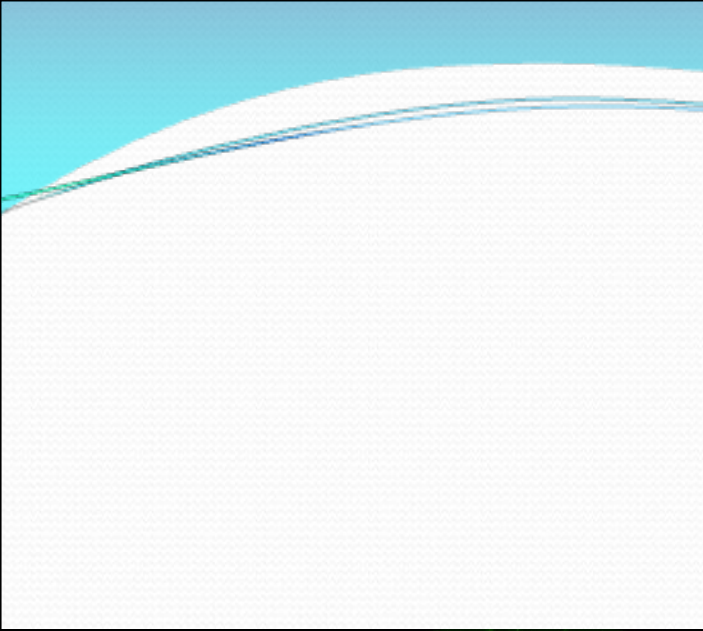
- **Proliferative DR ( PDR):**

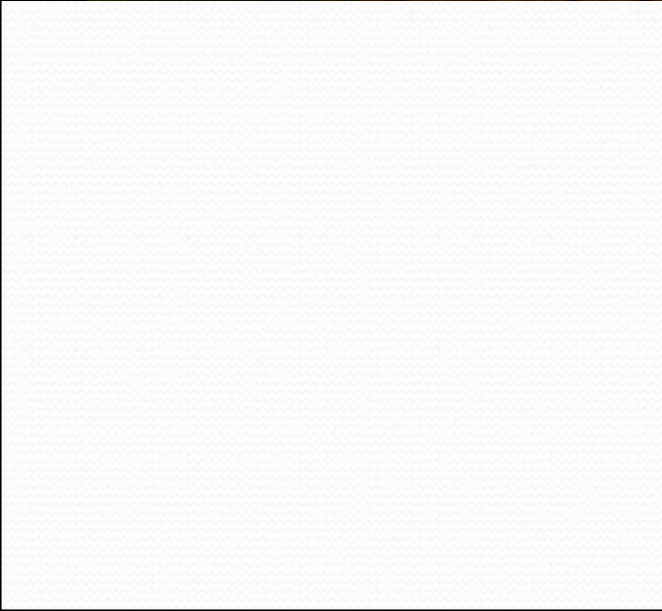
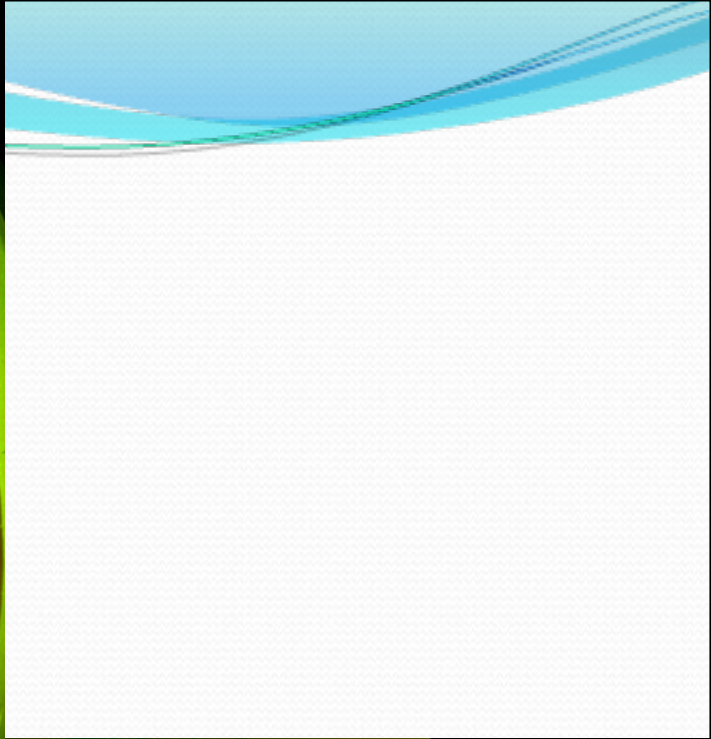
- Proliferative DR represents development of new vessels and/or fibrous proliferations on the retinal surface or iris.
  - NVD: NeoVessels at the Disc
  - NVE: NeoVessels Elsewhere
  - Rubeosis iridis: new vessels on the iris
- they also grow along the posterior vitreous face where leakage can cause preretinal (between the retina and vitreous) or *vitreous hemorrhage*
- As these vessels become more organized (their fibrous tissue content increases), they tether the retina to the vitreous, making it prone to *detachment* with changes in vitreal consistency and volume.
- Hence, these patients may develop severe and sudden visual loss.





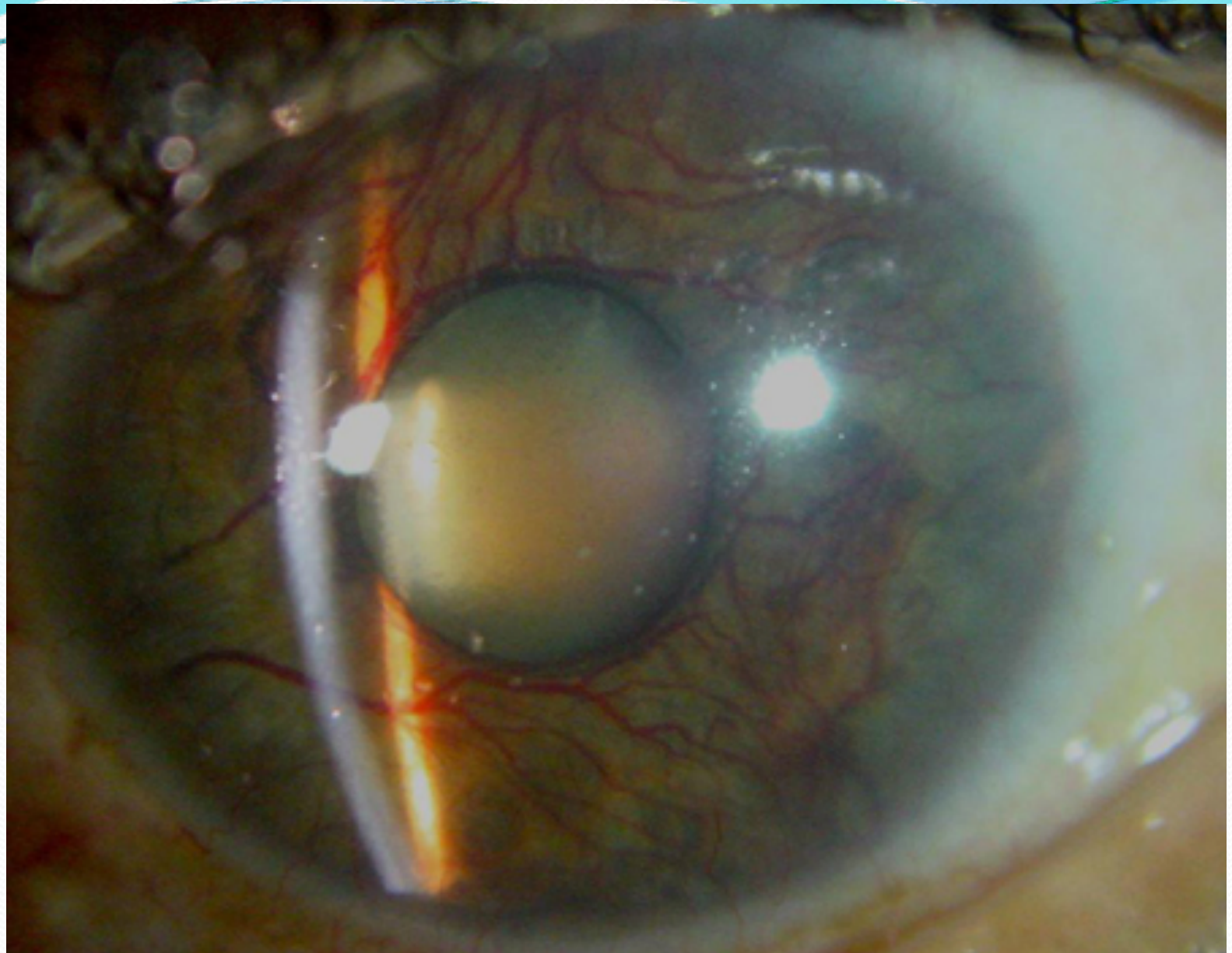




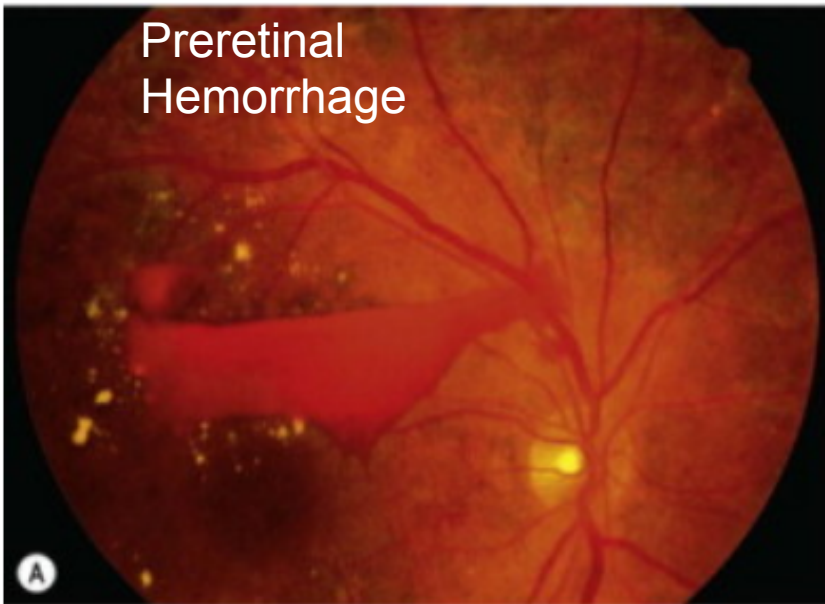


# Advanced Diabetic Eye Disease

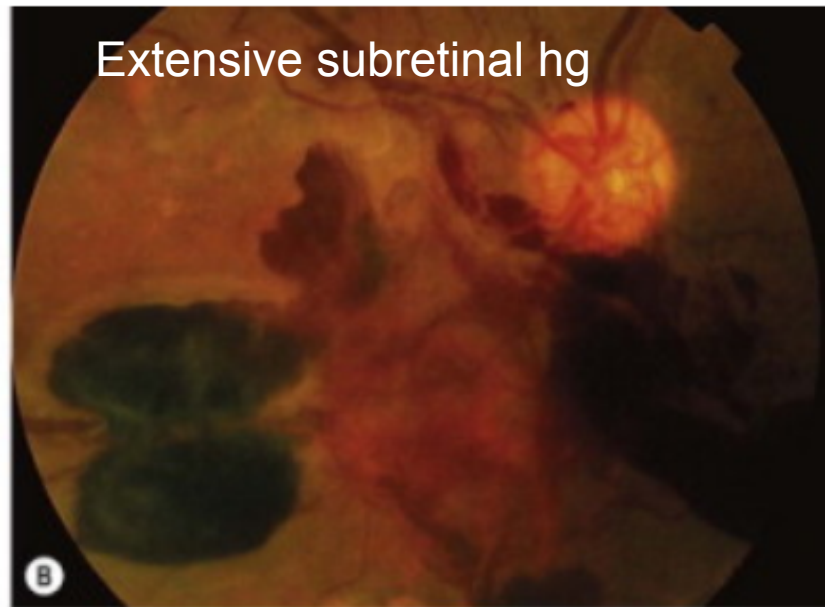
- If PDR is left untreated, additional complications such as:
  - neovascular glaucoma,
  - nonclearing vitreous hemorrhage,
  - tractional retinal detachment may develop.



Preretinal  
Hemorrhage



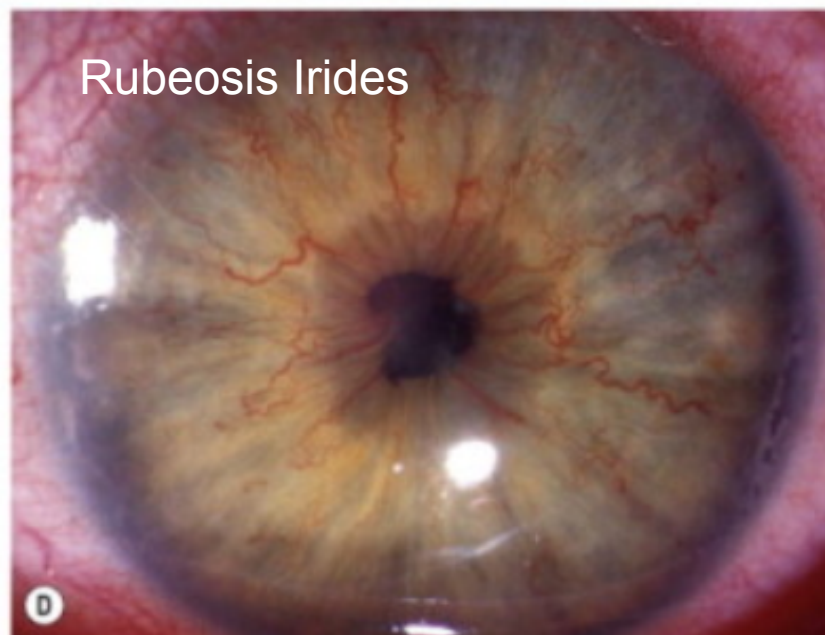
Extensive subretinal hg



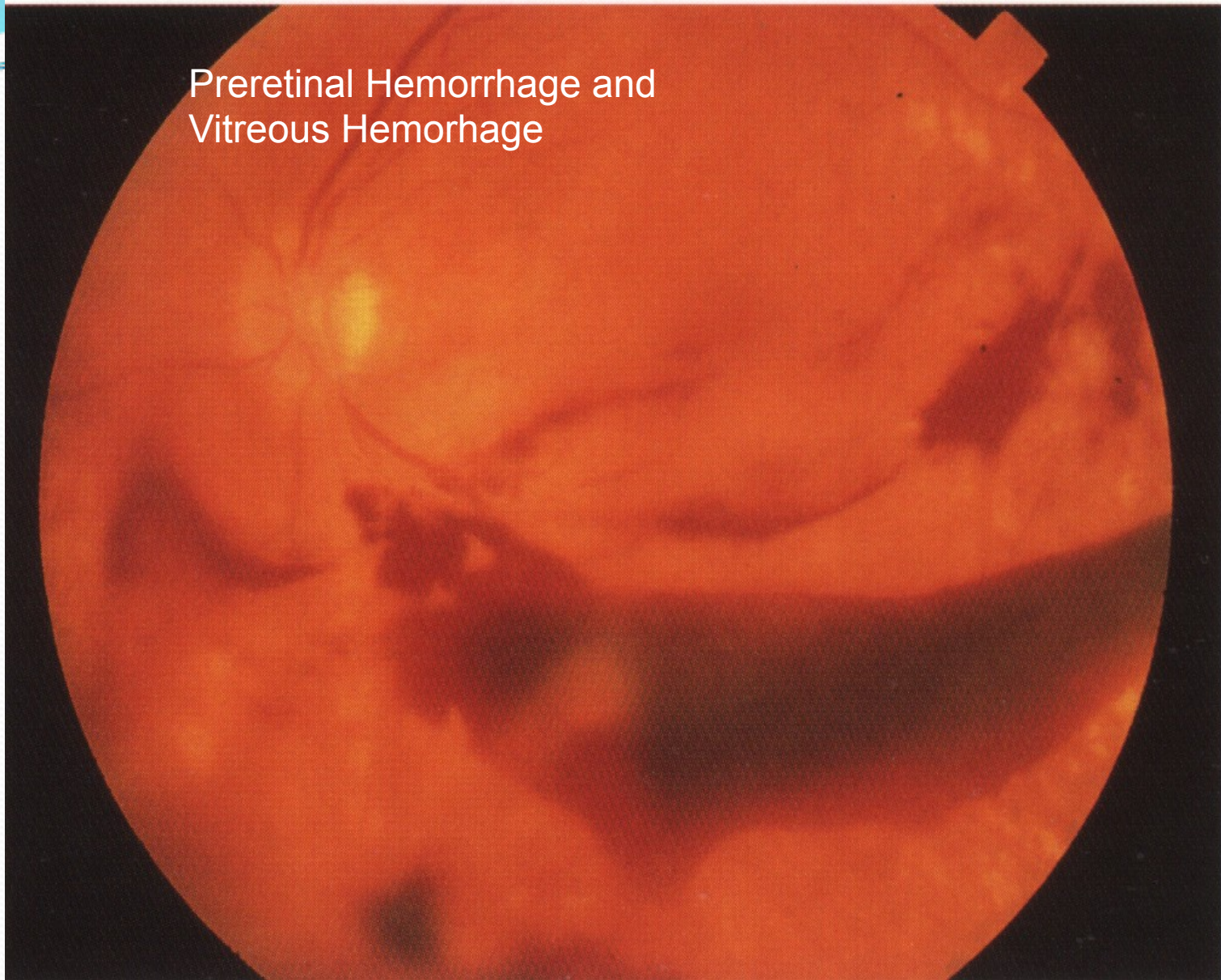
Tractional RD

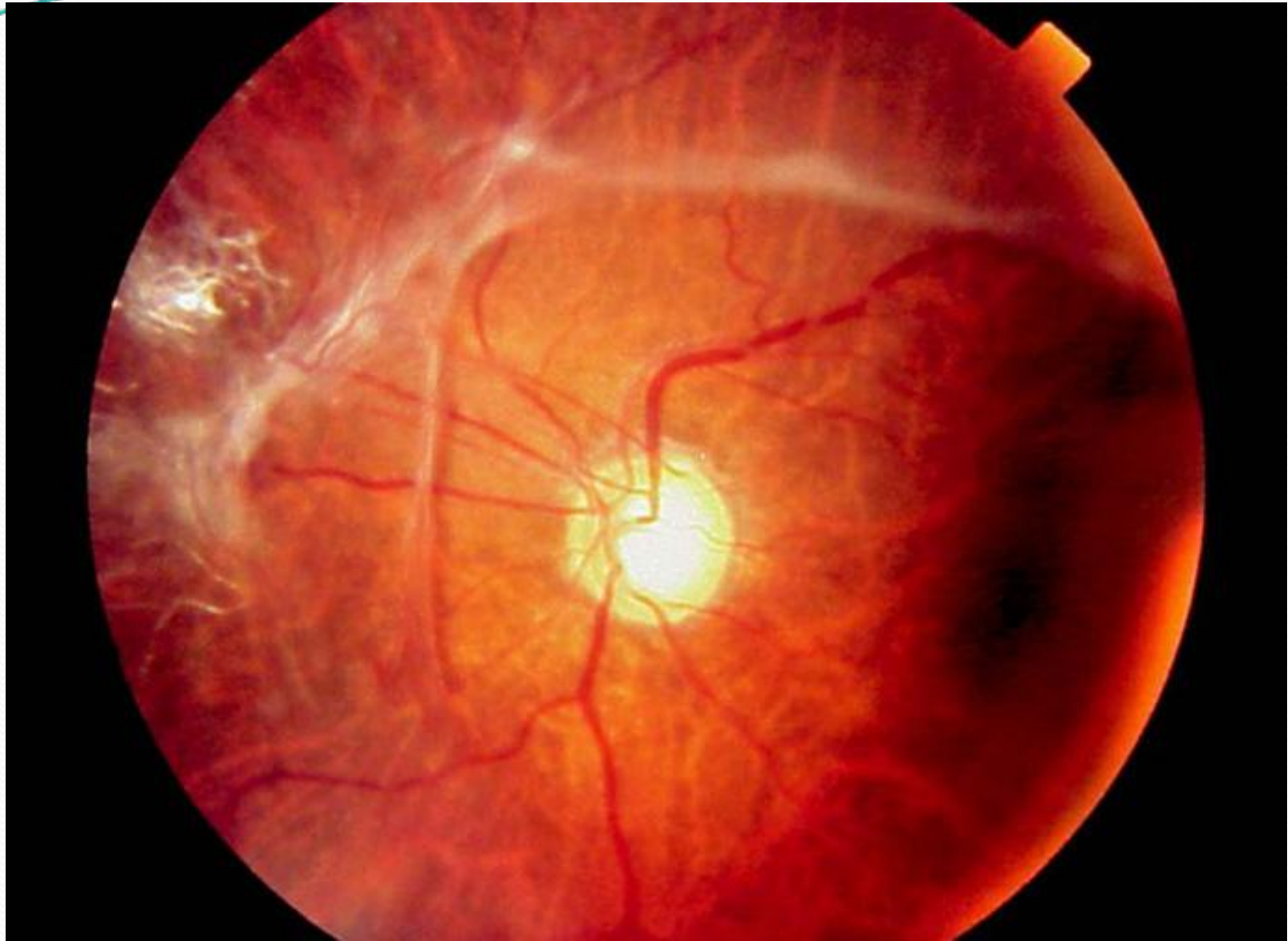


Rubeosis Irides

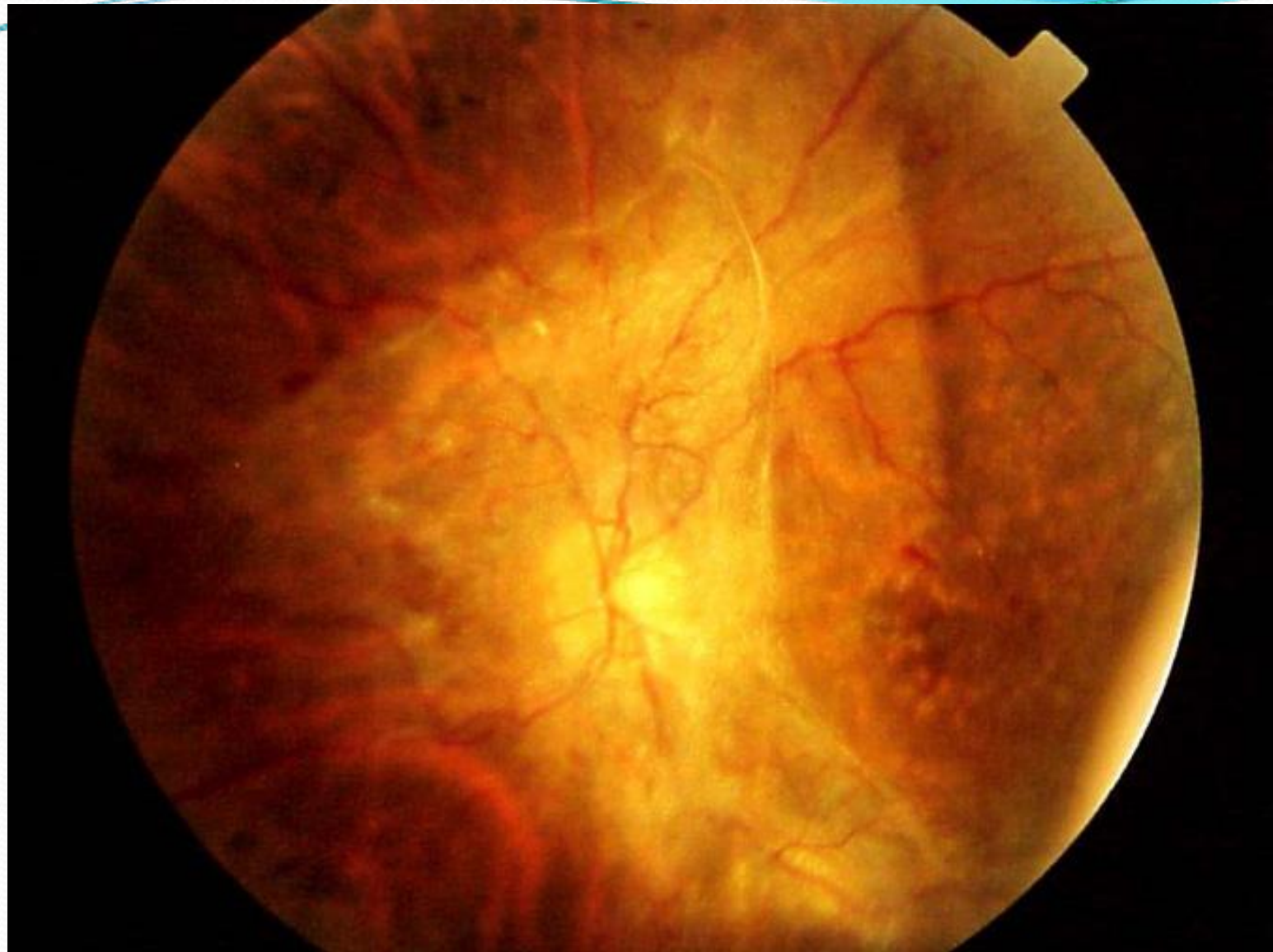


Preretinal Hemorrhage and  
Vitreous Hemorrhage









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**Table 4. Causes of Visual Impairment in Diabetes**

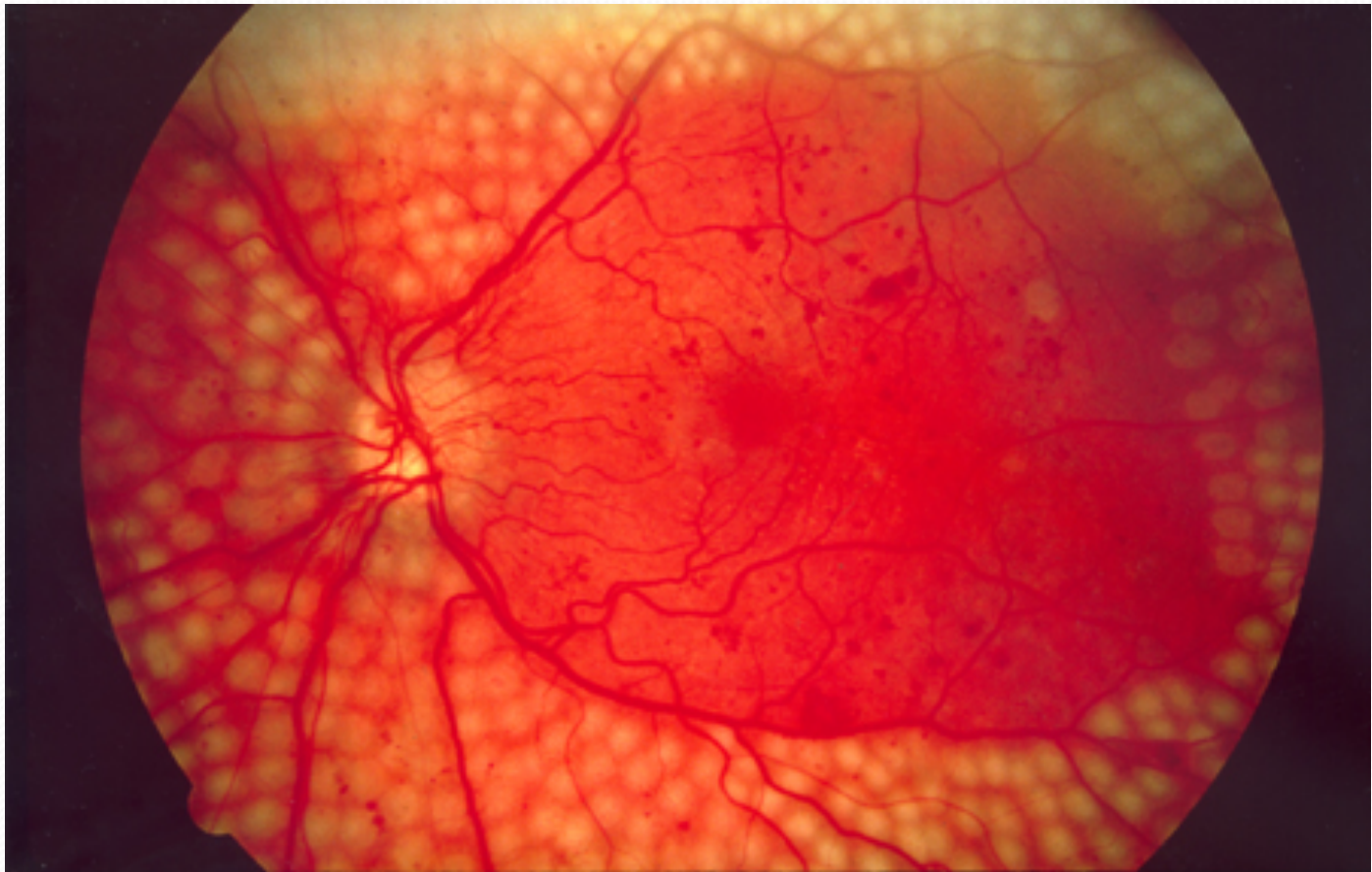
Retinal	PDR	Vitreous hemorrhage  Retinal detachment  Fibrovascular proliferation growing in front of macula  Macular edema or macular ischemia, especially involving center of macula
	NPDR	Macular edema or macular ischemia, especially involving center of macula
Nonretinal	Related ocular conditions	Glaucoma  Cataract  Corneal problems  Extraocular muscle palsy due to diabetic neuropathy

# Treatment:

- Conservative measures:
  - *Metabolic control*
  - *Control of blood pressure*
  - *Control of serum levels*
  - *Exercise*


# Treatment, cont:

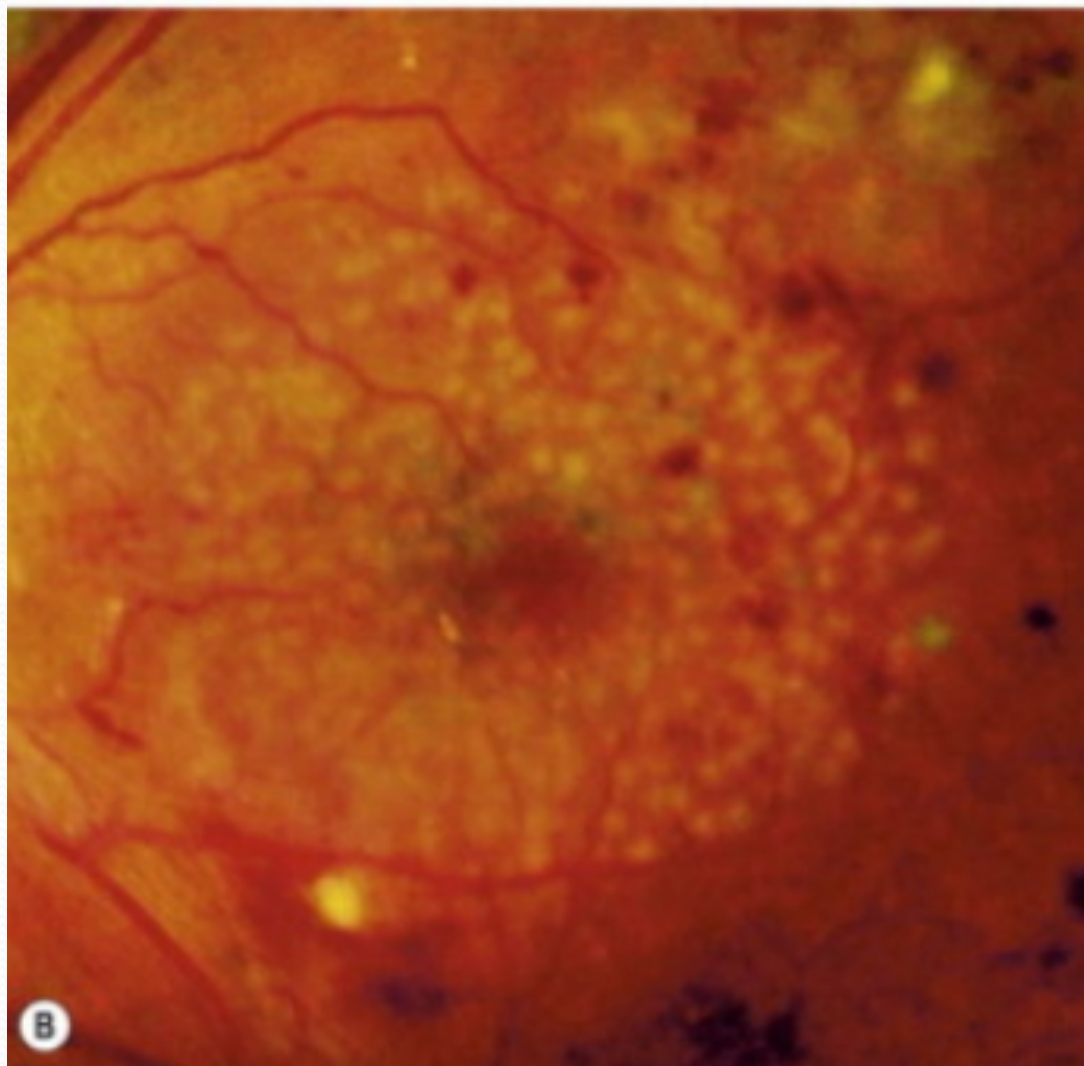
- Nonproliferative DR:
  - Conservative
  - Frequent followups.
- Proliferative:
  - Argon laser Photocoagulation (PRP) or scatter laser.
  - Advanced diseases: Pars Plana Vitrectomy.

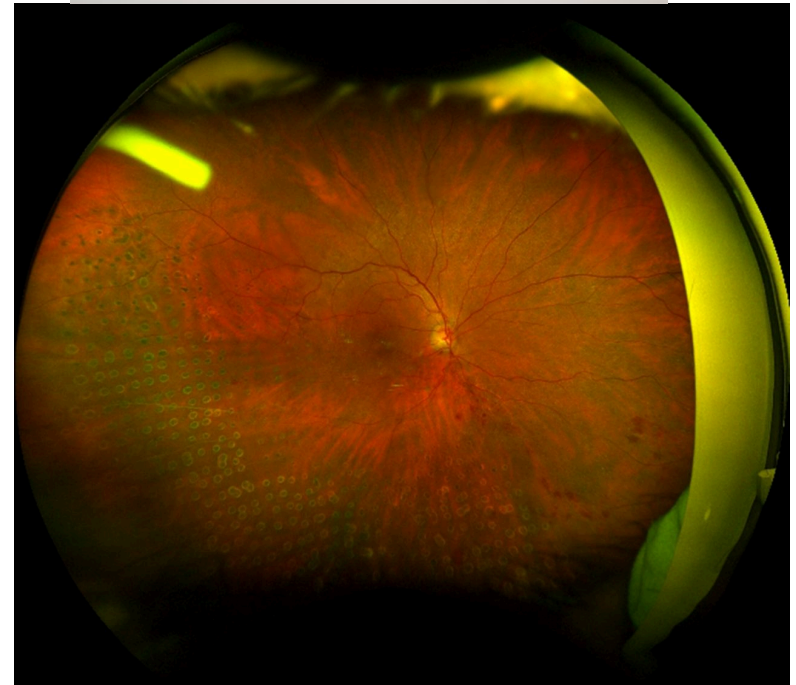
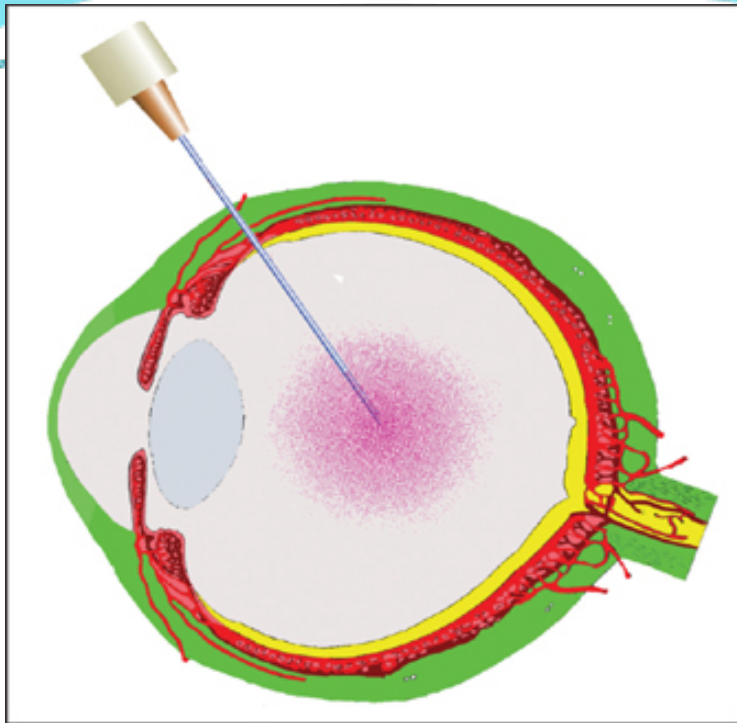




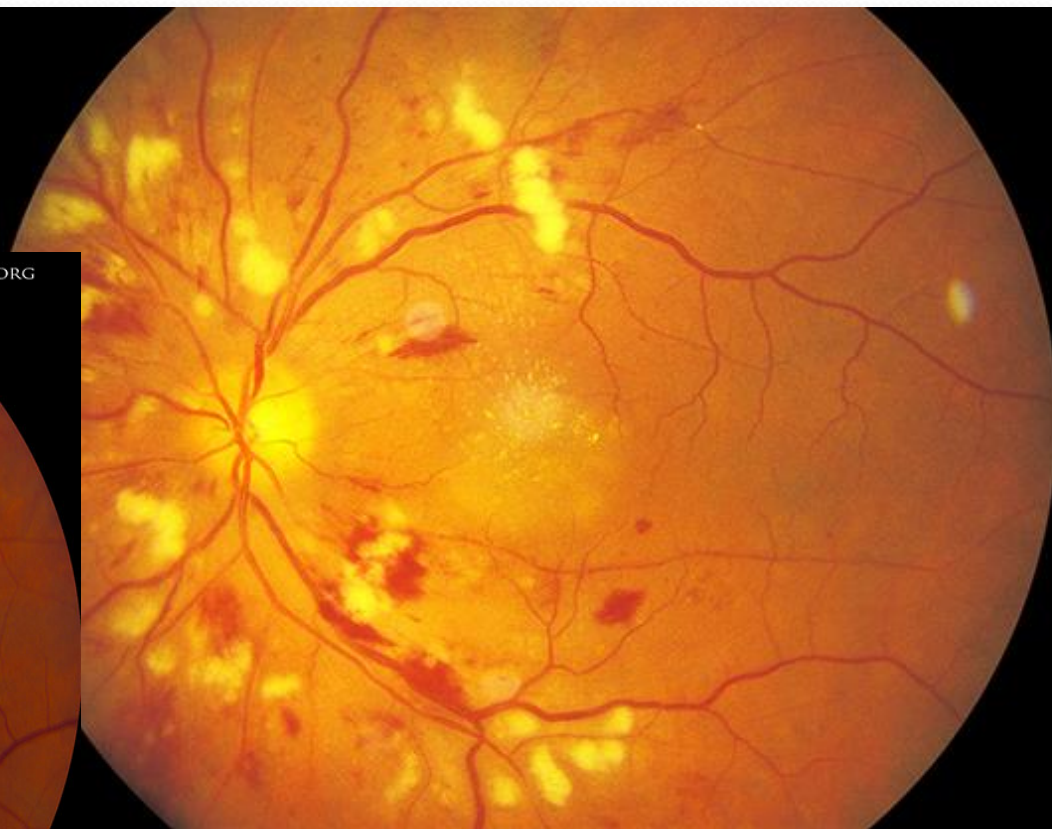
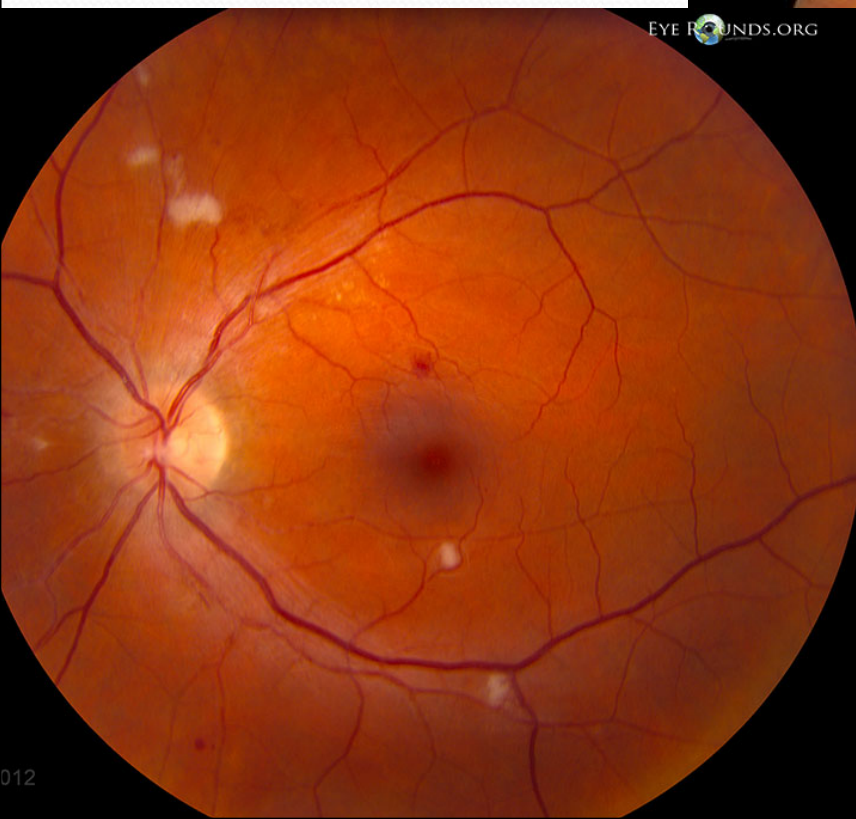


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- Maculae Edema
    - Intravitreal AntiVEGF
    - Intravitreal Steroids
    - Argon laser: focal/grid
    - Vitrectomy

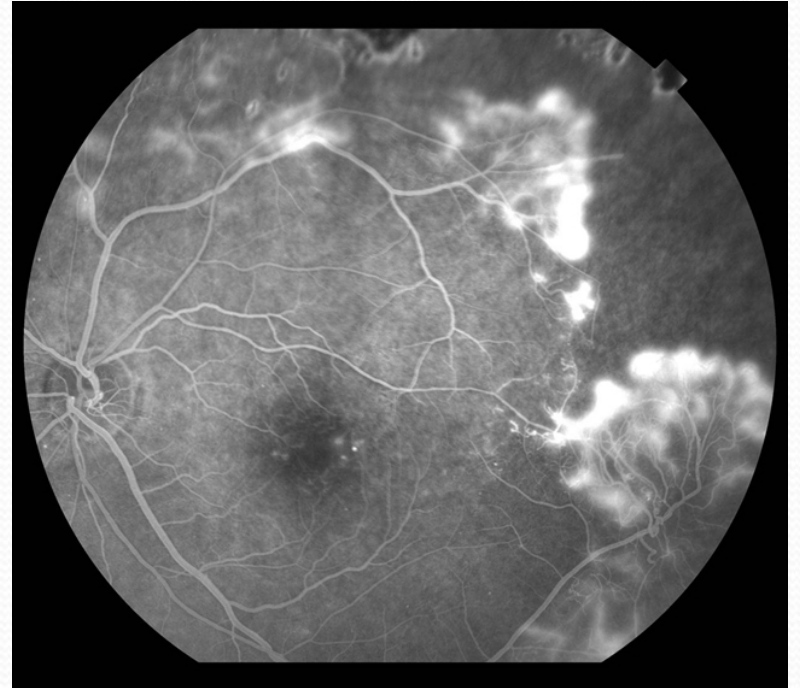
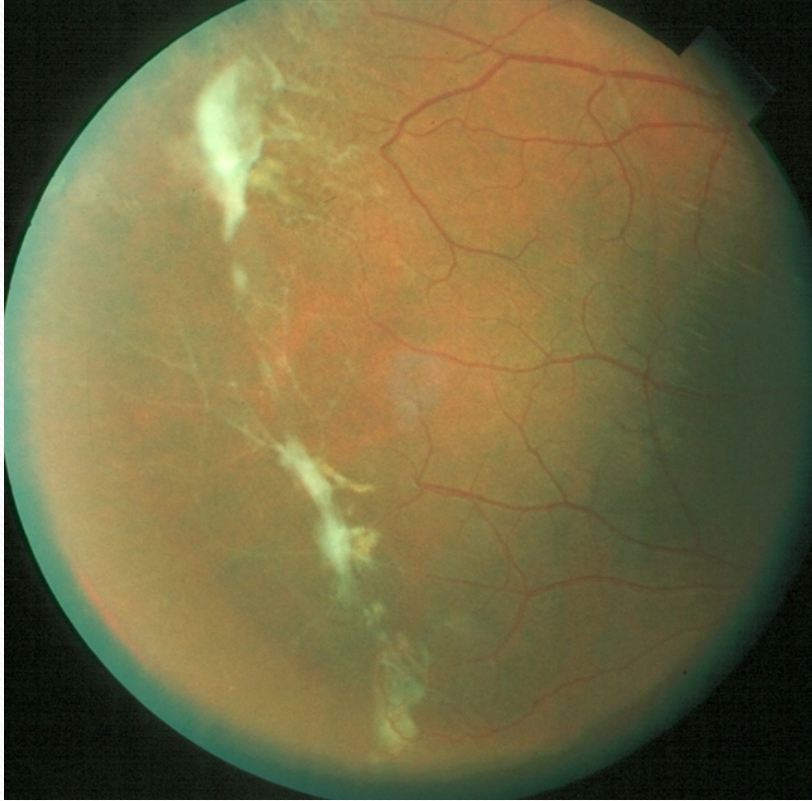




# Differential Diagnosis

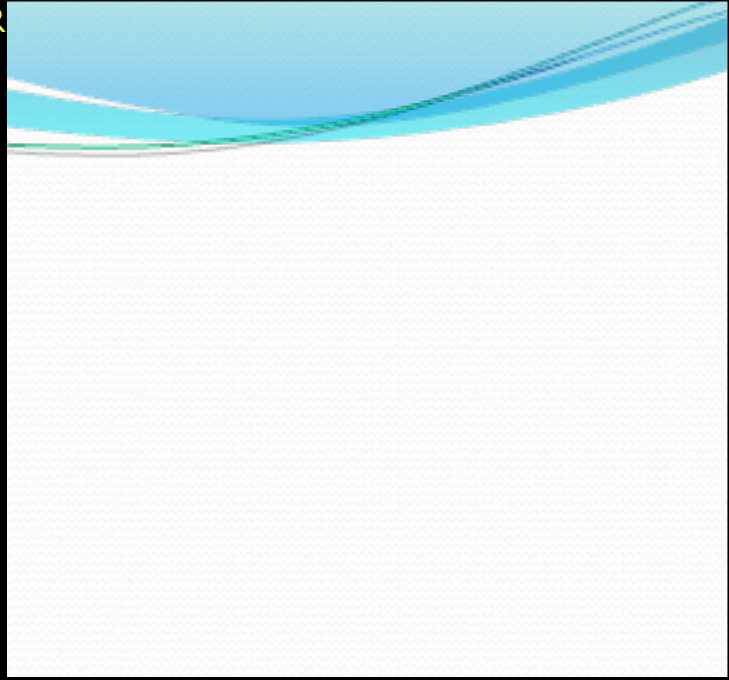




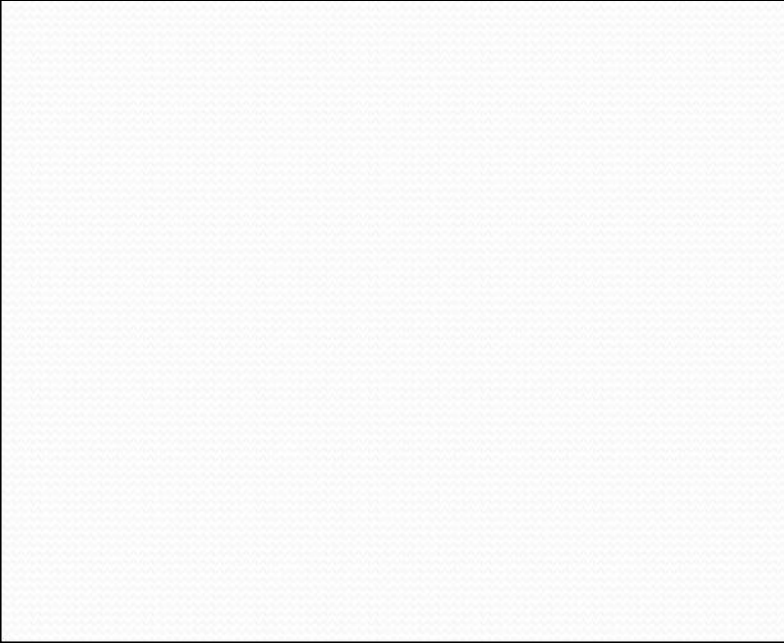




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Thank You.....