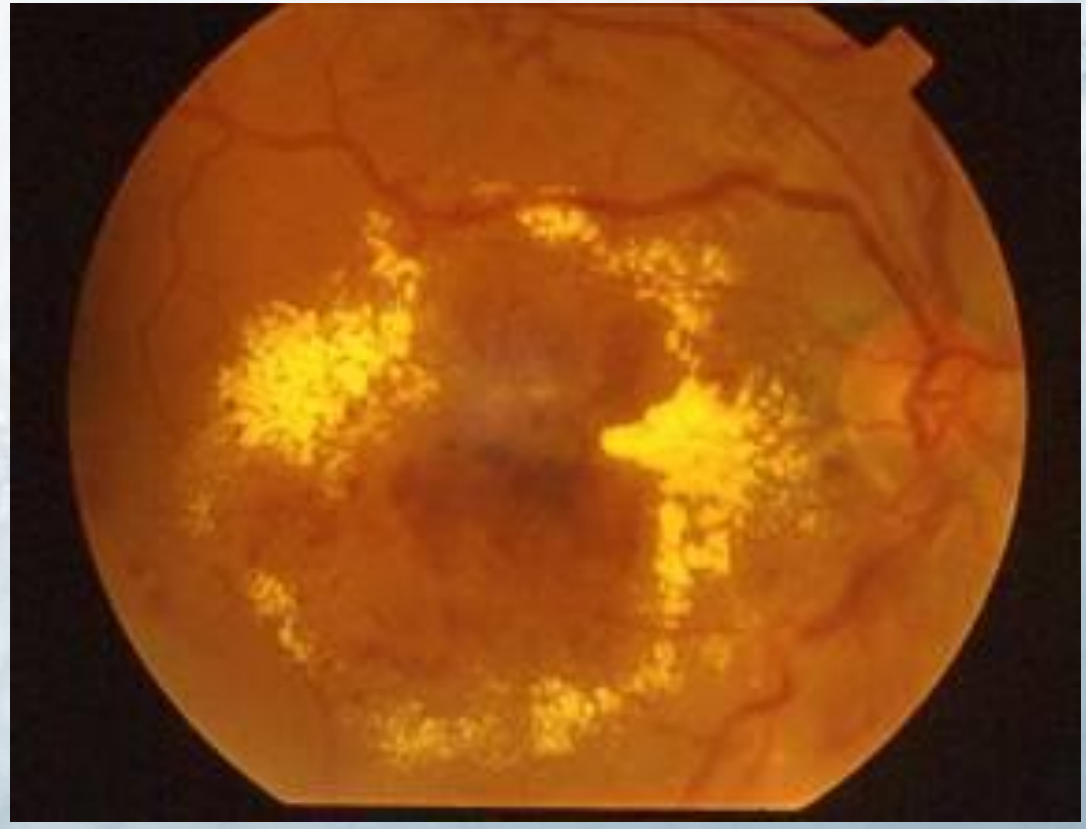
Diabetes and the Eye

MB Ch B IV Lecture- 8th February, 2016, University of Nairobi, LT III



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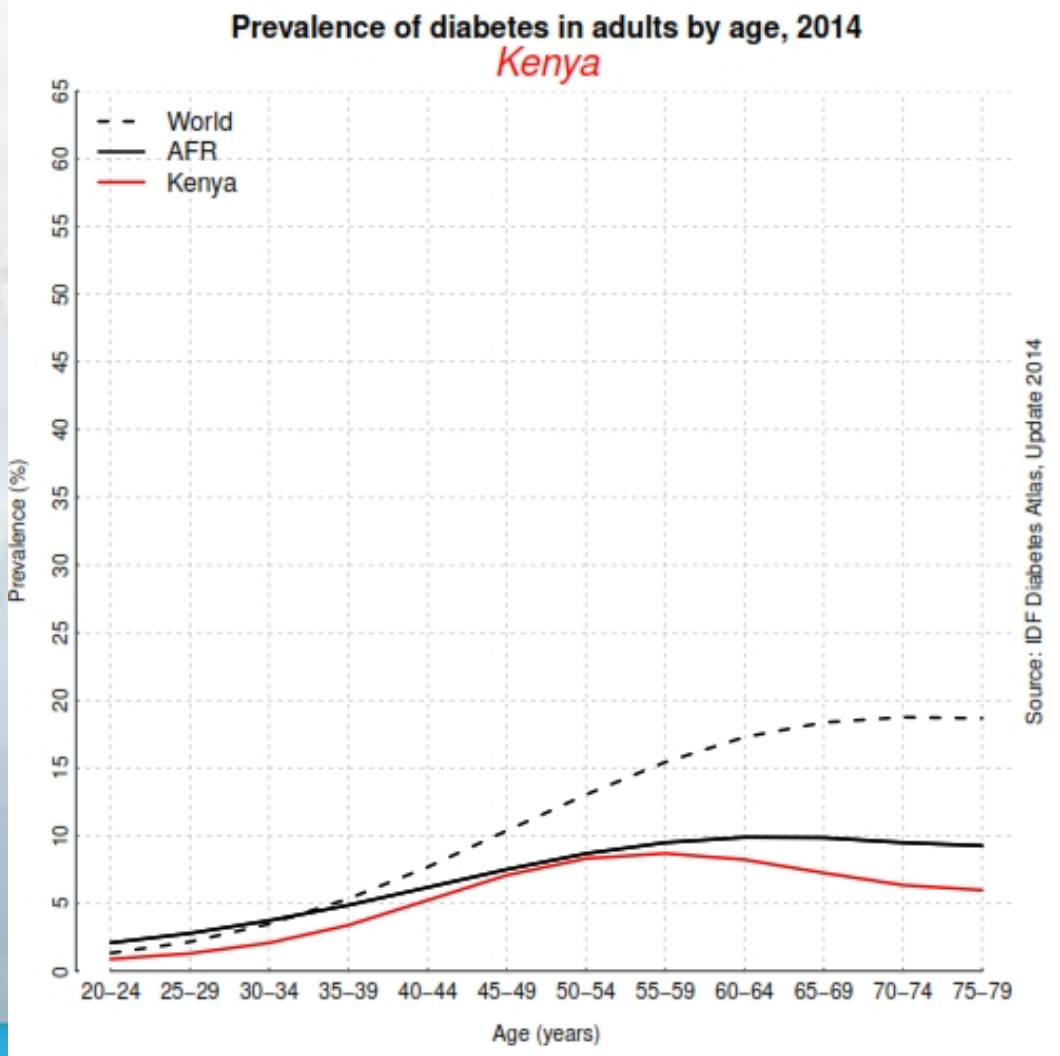
Outline: Diabetic Eye Disease

- Epidemiology
- Anterior Segment: Conjunctiva-Cornea-Lens
- Posterior segment:
  - Investigations
  - Diabetic Retinopathy & Maculopathy
- Clinical case examples, evidence-based
- Screening

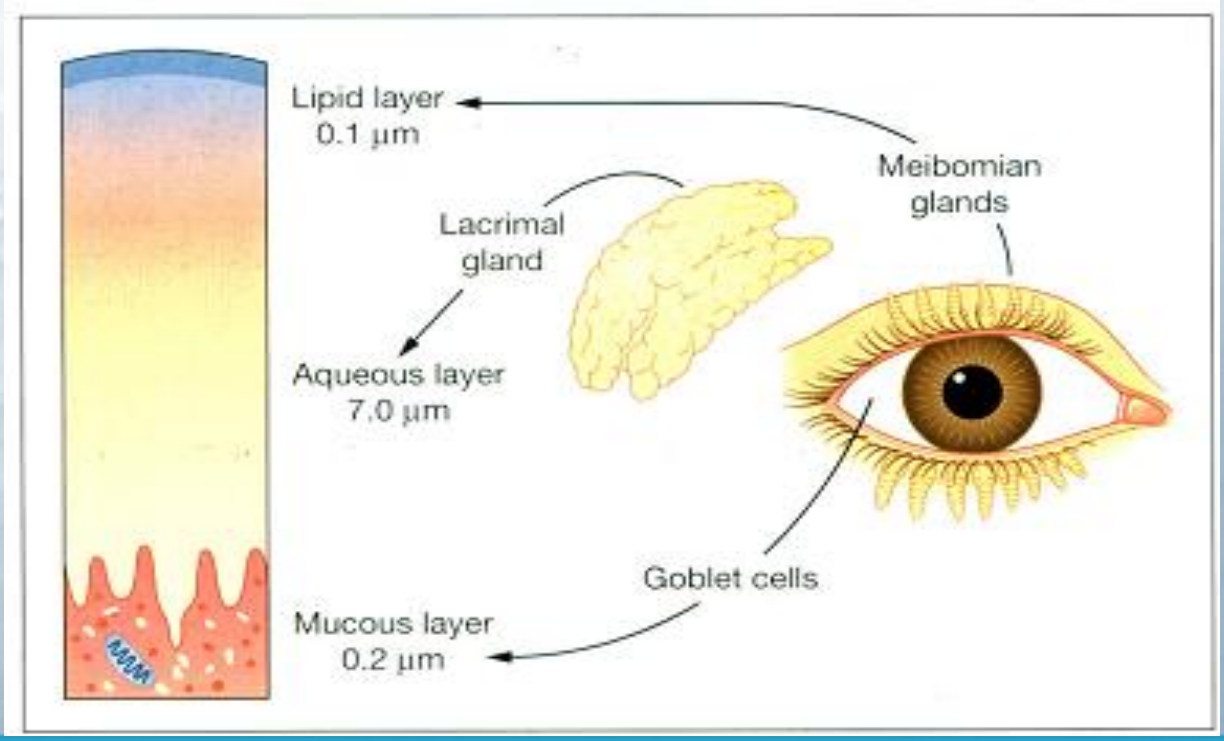
Epidemiology-Diabetic Eye Disease

- Globally
  - Most prevalent cause of legal blindness among 20-65 years
- Kenya
  - Population= 45 million
    - 22m are age 20-79yrs
  - Diabetics= 840,000
    - Prevalence=3.6
  - Retinopathy=268,000
    - Vision Threatened=84,000



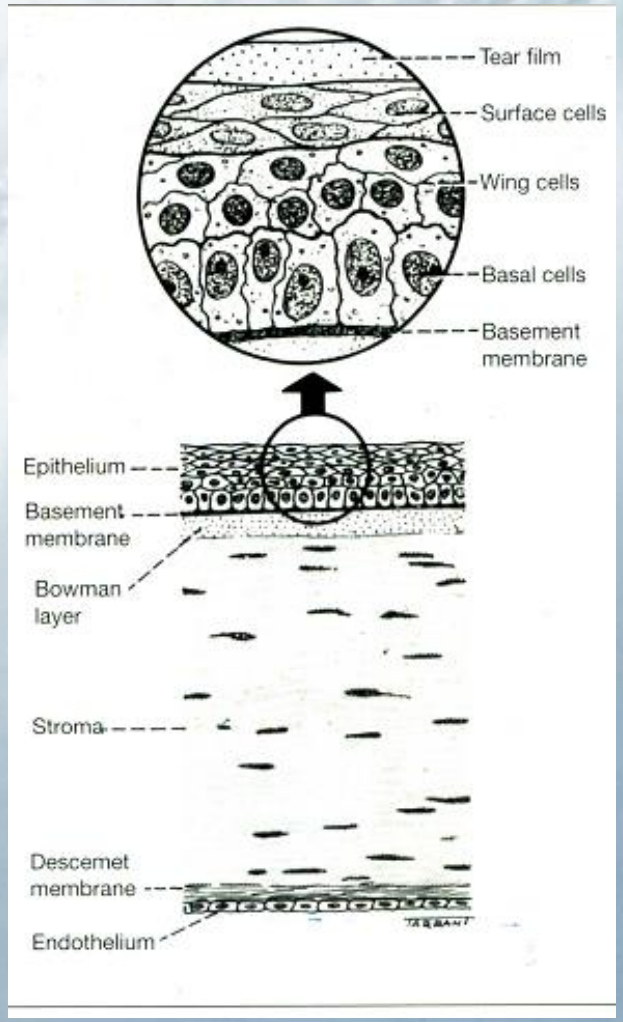
A. Conjunctiva/Cornea: Dry Eye Syndrome

- Meibomian gland dysfunction
- ↓Corneal sensitivity
- Neuropathy involving nerves to lacrimal glands
- Loss of goblet cells



B. Cornea Epithelium: Defects

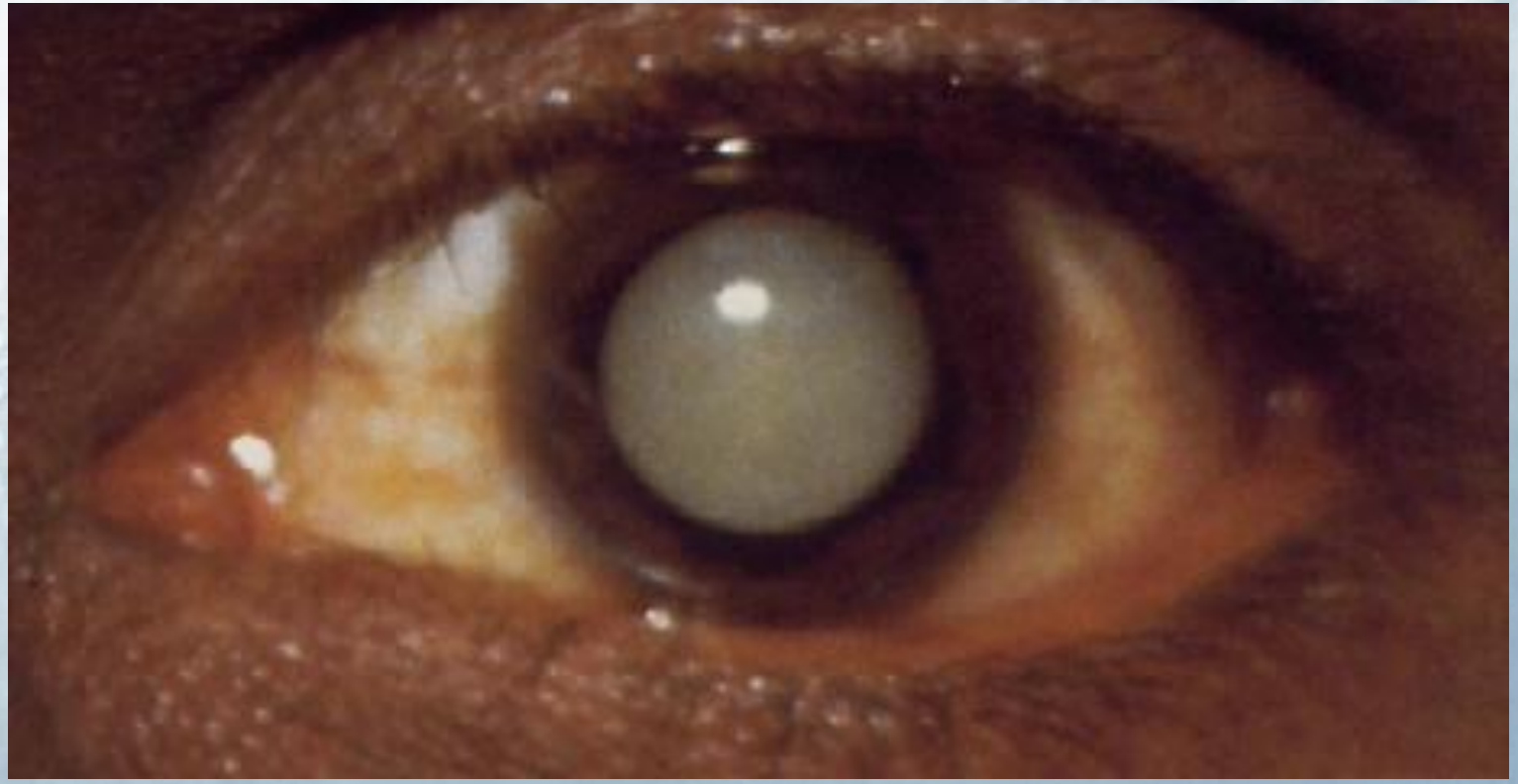
- Persistent epithelial defects
  - Reduced formation of desmosomes and anchoring fibrils at basement membrane
- Corneal ulcers increased risk
  - Poor wound healing
  - Viral: HSV



C. Lens: Cataract

1.Glucose→sorbital retained→Cataract.

2. Glycosylation of lens proteins



D. Diabetic Retinopathy

Retinal vessels are affected by hyperglycemia.

Prevalence:

- Type 1 DM: Rare at diagnosis…90% at 15 yrs.

- Type 2 DM: 20% at diagnosis...60% at 15 yrs.

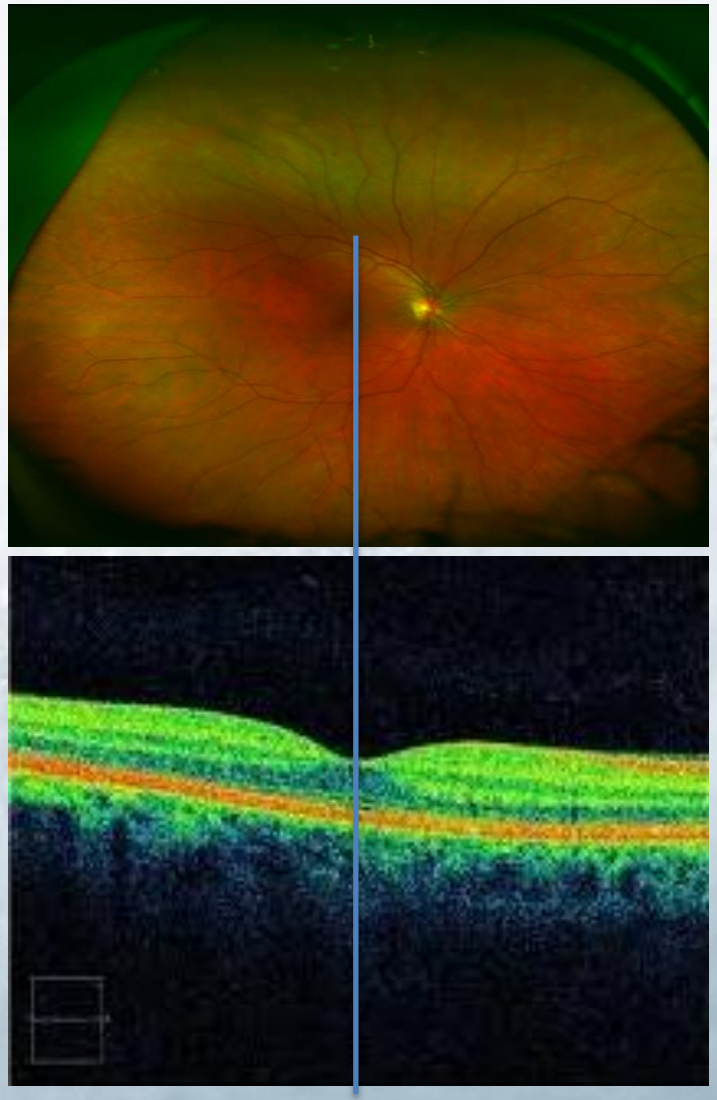
….therefore physician should **refer diabetics to the eye clinic**

Investigations: Retina Imaging for Diabetes

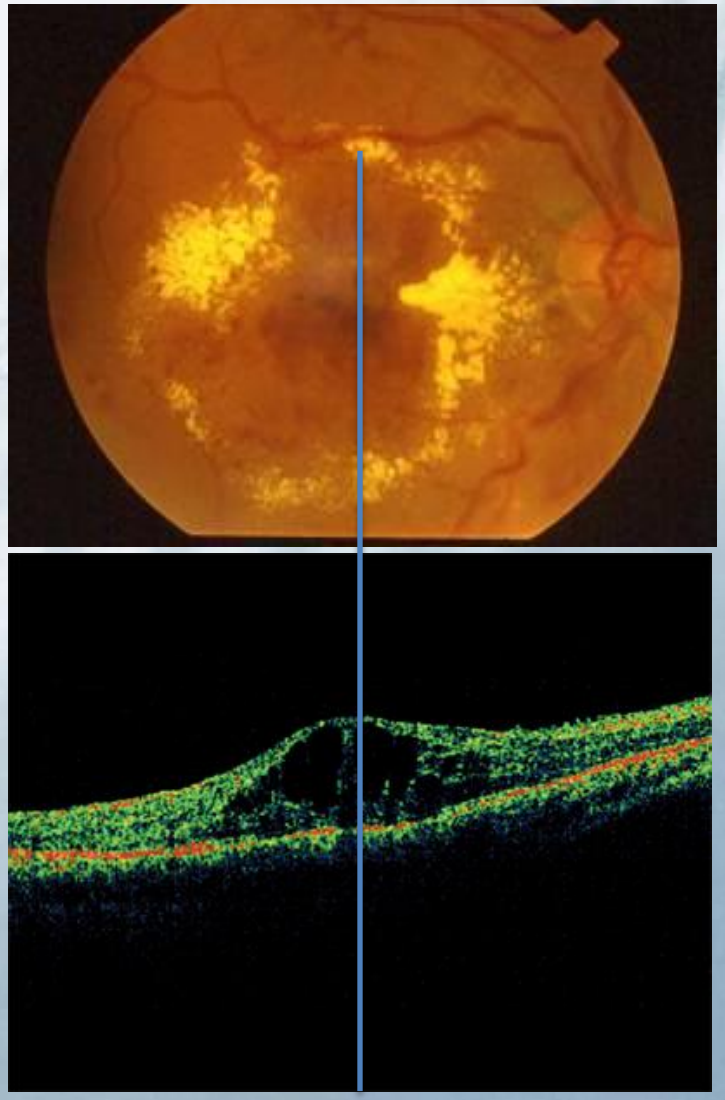
- **Optical Coherence Tomography**, Retina scan

- **Cameras**: Photo, Angiography

1. Optical Coherence Tomography(OCT) scan

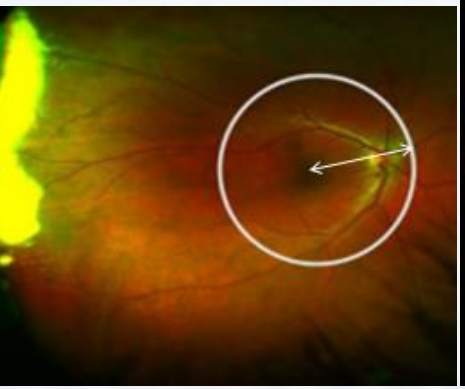


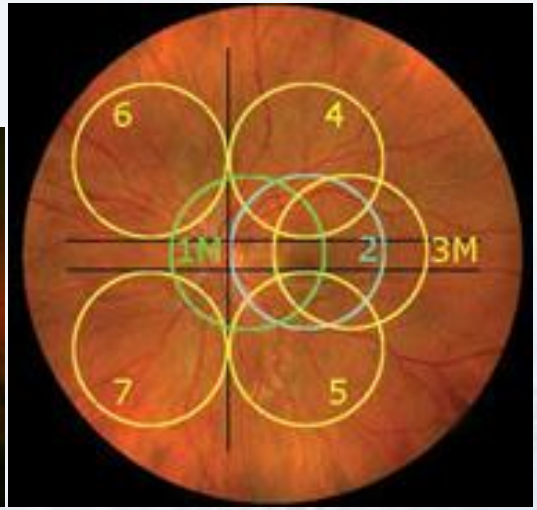
OCT-Normal Macular

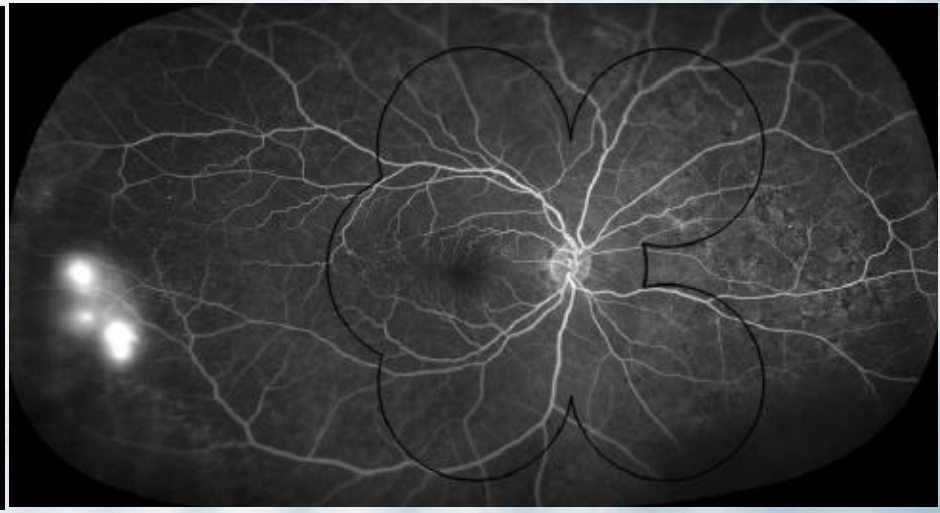


OCT-Macular Oedema

2. Camera: Fluorescein Angiography







- **Standard**: 50^0, **7 field EDTRS** 75^0
  - **Miss** periphery
  - Montages need expertise
  - Patient gaze-control
  - Must dilate
- **Optos 200TX UWF™:** 200°
  - Ultra wide field, **>80**% retina
  - Photo/auto/angio-graphic
  - 0.25s, 14um, **friendly** single-shot
  - Non-mydriatic, non-contact

Risks For Diabetic Retinopathy

- ↑ **Long duration** of DM
- **Poor glycemic control**

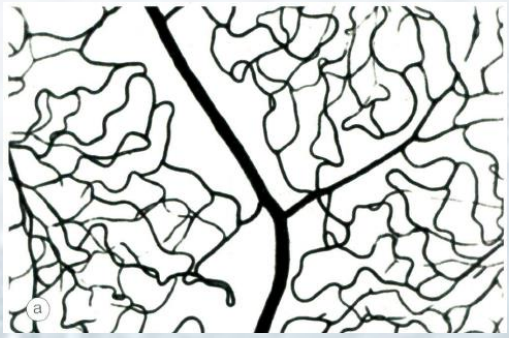
Other:

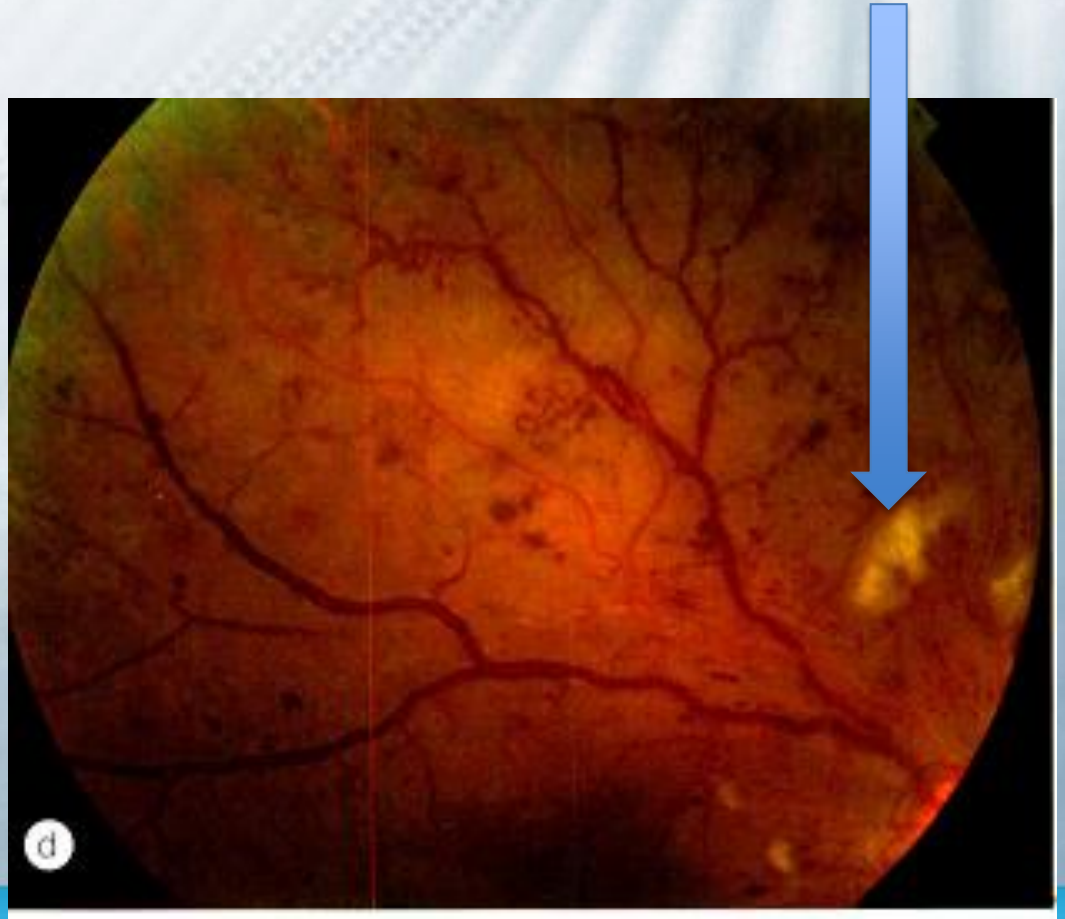
- Hypertension
- Hypercholesterolaemia
- Severe nephropathy
- Pregnancy
- Obesity

Pathogenesis: 1. IRMA

- Small vessel **Occlusion**, Intraretinal microangiopathy (IRMA)
- Cotton wool spots: infarcts of retinal Nerve Fibres

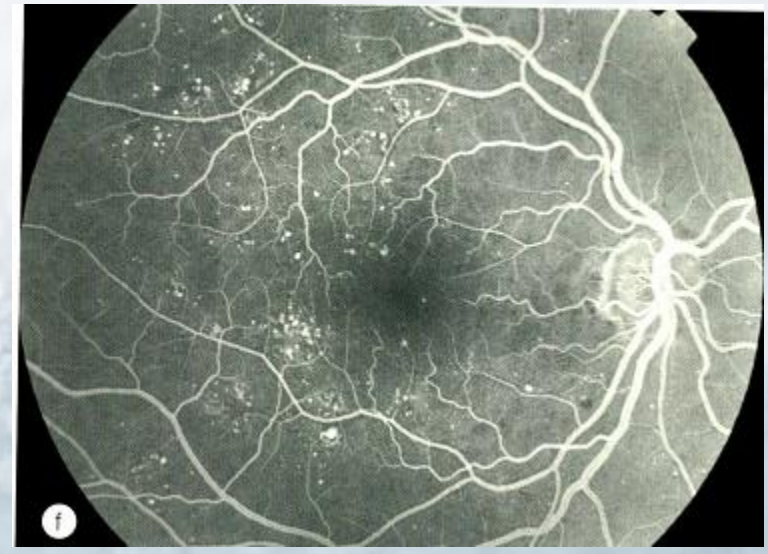
" the pipes are blocked… no flow"

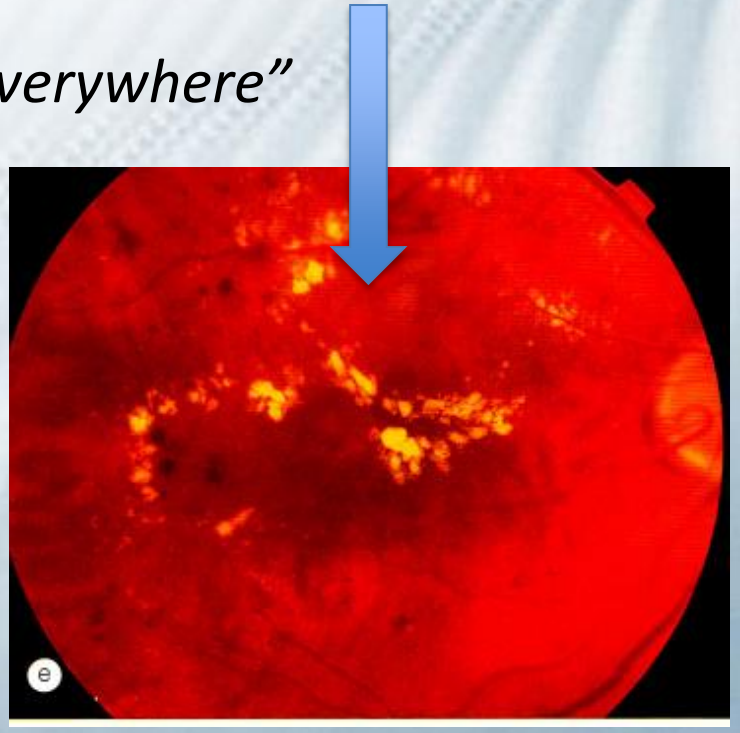




Pathogenesis: 2. Microvascular leakage

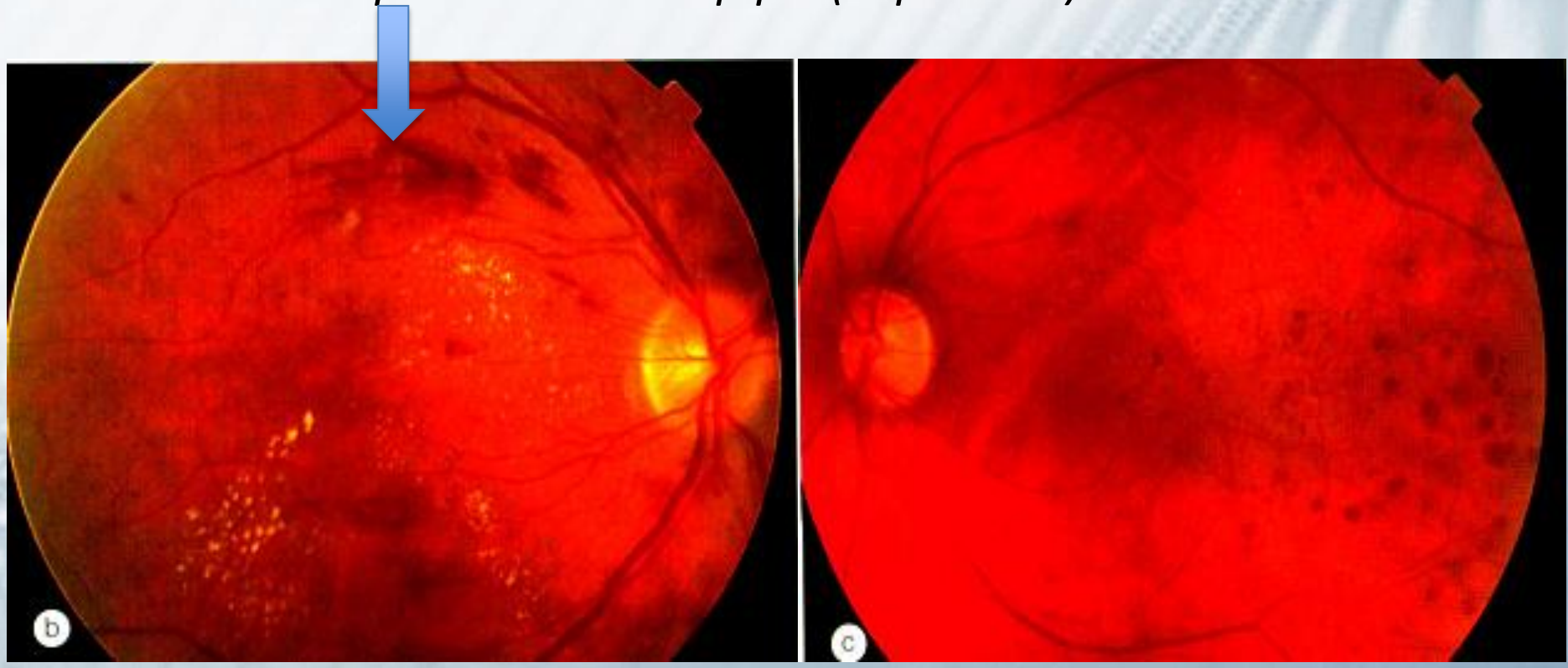
- Breakdown of vessel wall→microaneurysms, bleeding, exudates, edema
- *“the pipes are leaking …wet everywhere”*





Pathogenesis: 3.Haemorrhages

- *“blood escapes outside the pipes(capillaries)”*



Pathogenesis: 4. Neovascularization

- *"Abnormal fragile new vessels growth"* due to angiogenic factors (**VEGF**)

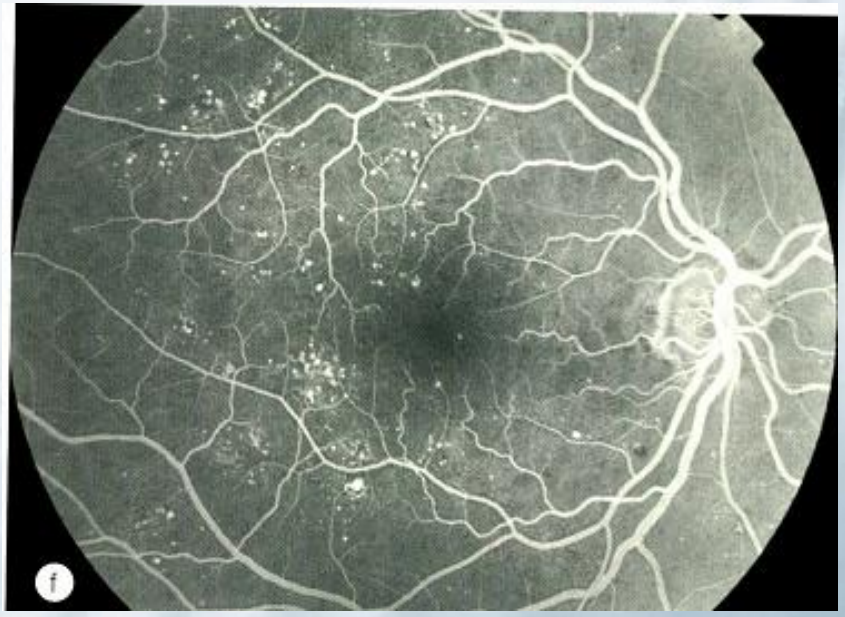
Stages of diabetic retinopathy

Importance of staging:

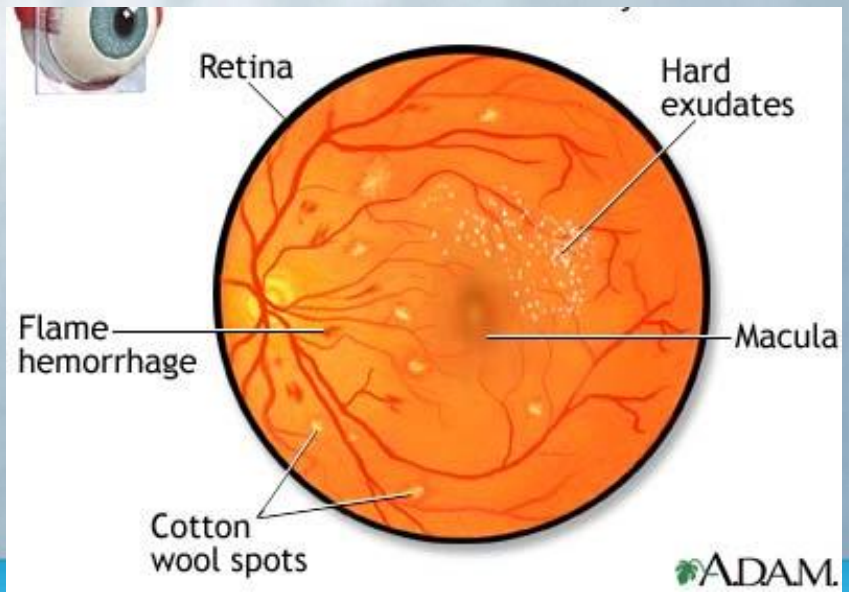
- Severity: Mild-Moderate-Severe.
- Risk for visual loss and cardiovascular
- Management and Follow-up

A. Non-Proliferative Diabetic Retinopathy (NPDR)

- **Mild**:
  - Microaneurysms (MAs)
  - Review every **9-12 months**



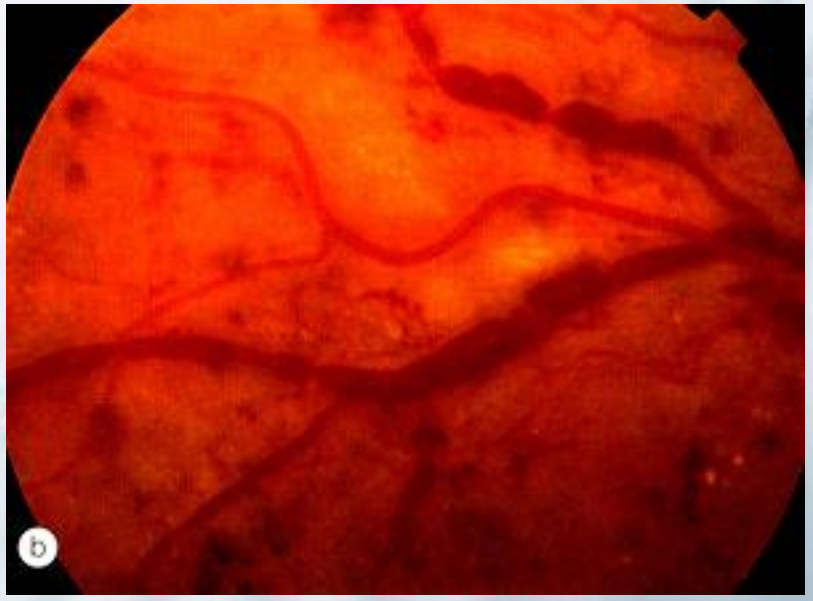
- **Moderate**:
  - MAs, dot/blot hemorrhage, hard exudates, CWS.
  - Review **6 monthly** (16% progress to PDR in 4yrs)



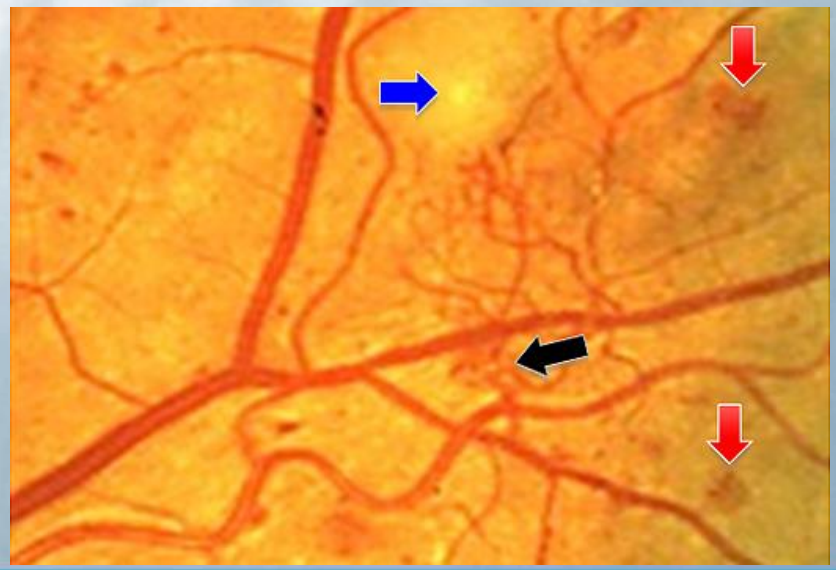
NPDR continued…

- **Severe** NPDR, **4-2-1 rule**
  - 4 quadrants **hemorrhages**
  - Or ≥2 quadrants venous **beading**
  - Or ≥1 quadrant **IRMA**.

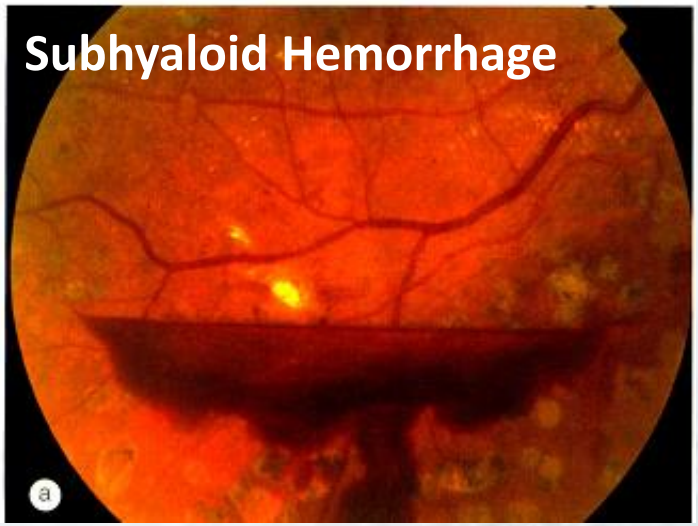
  *75% progress to PDR within 1 year

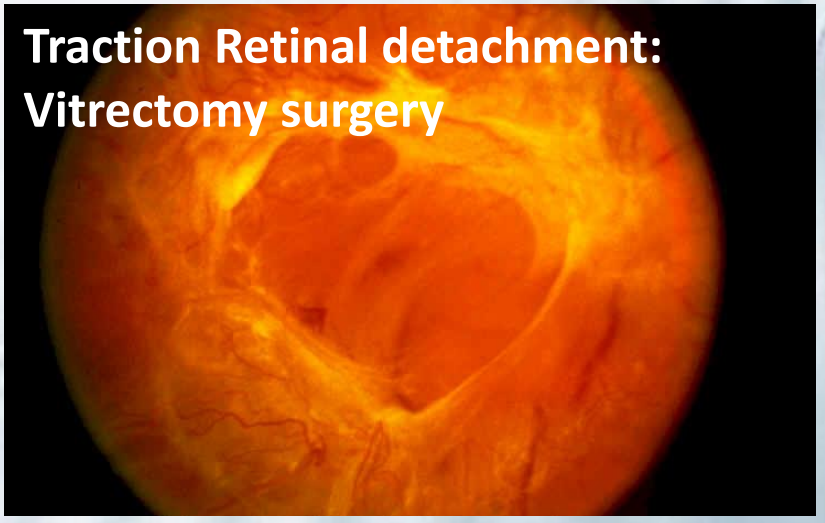


- Rx: **LASER** is useful (DRS study)
  - **Very severe**: 2 of the 4-2-1
  - Rx: LASER panretinal

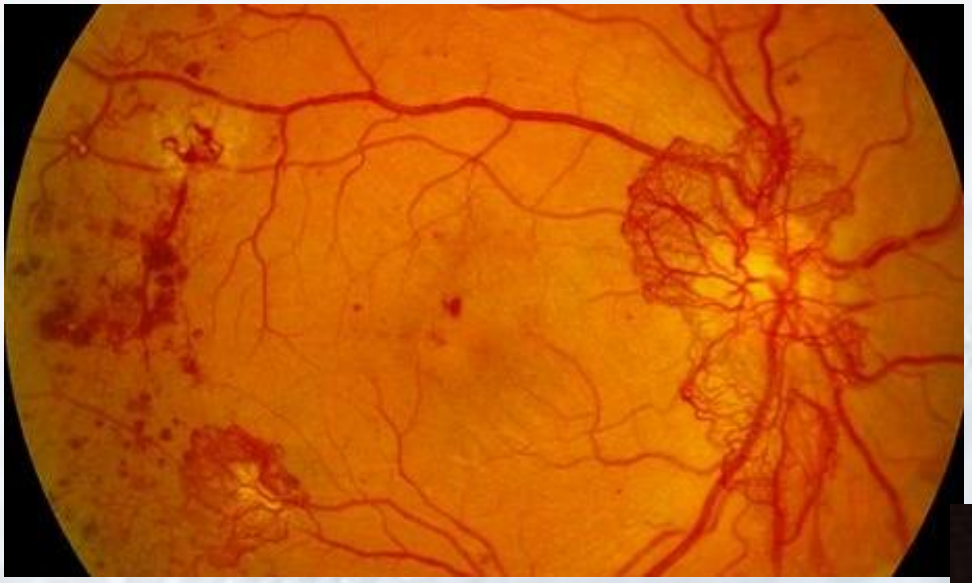


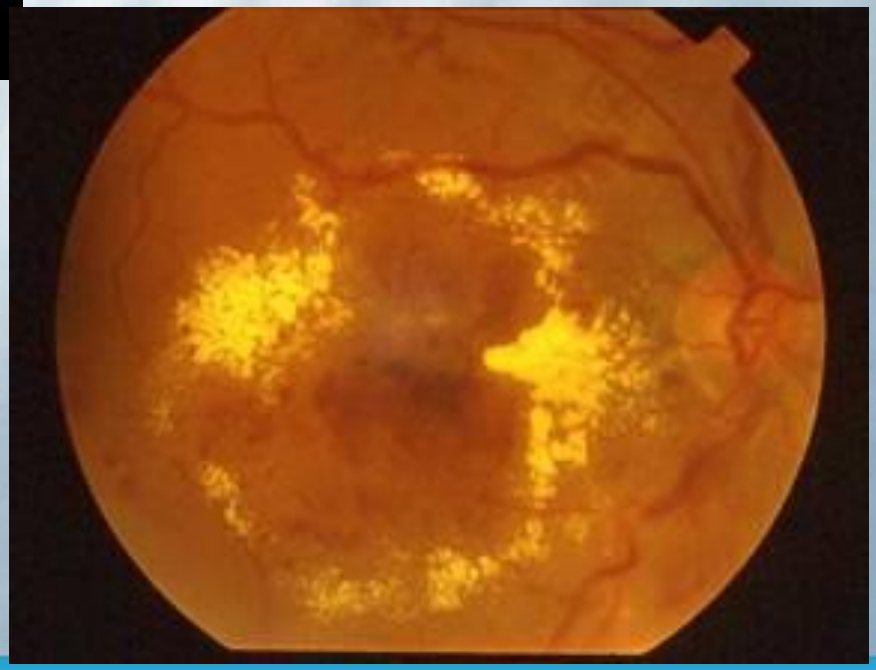
B. Proliferative Diabetic Retinopathy



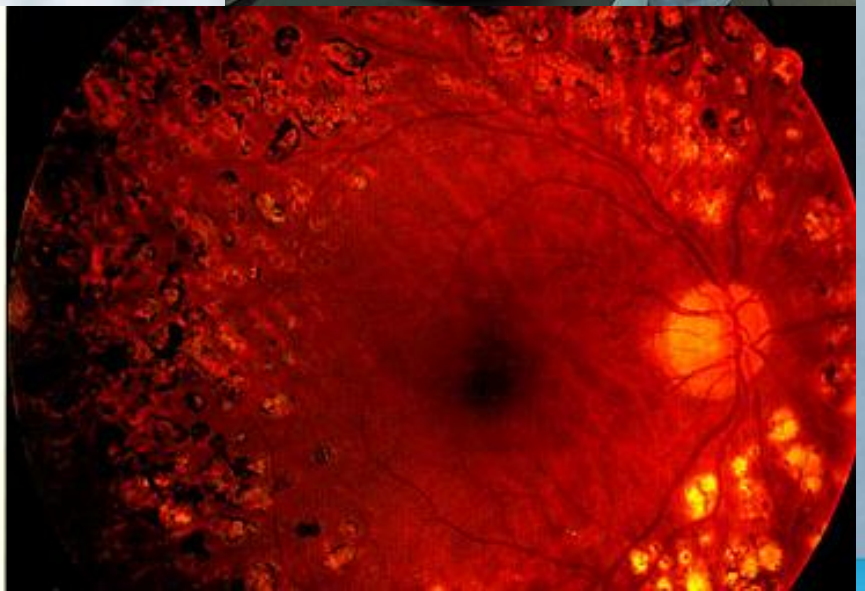


Vision Threatening Retinopathy: Rx Laser





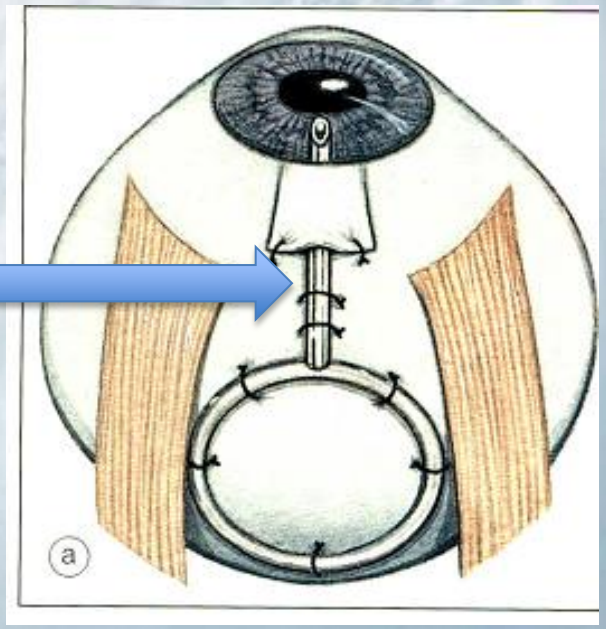
Laser Panretinal Photocoagulation (PRP)



Therapy for Iris Neovascularization

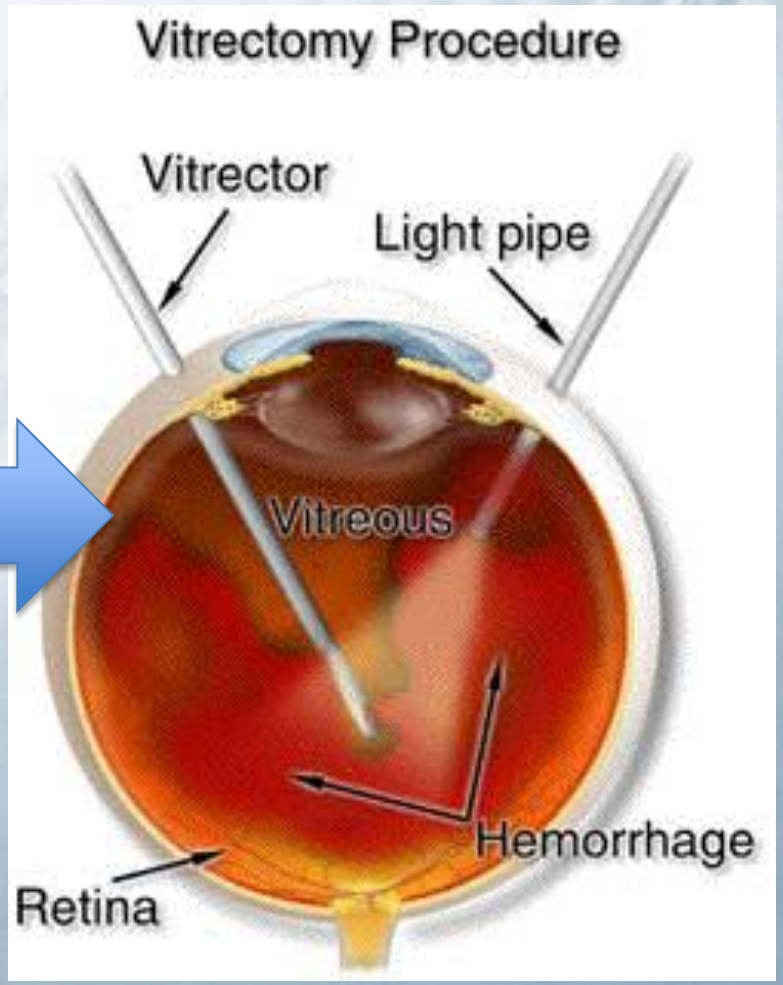
1. Laser Pan Retinal Photocoagulation(PRP)

2. Treat **Neovascular glaucoma:**
   - PRP+/- Drainage device eg Ahmed Valve.



Therapy for Vitreous haemorrhage

- Laser-PRP
- Ocular Ultrasound + wait
- If persistent eg 3 months: Vitrectomy + endolaser



Diabetic Maculopathy

- DME introduction video…

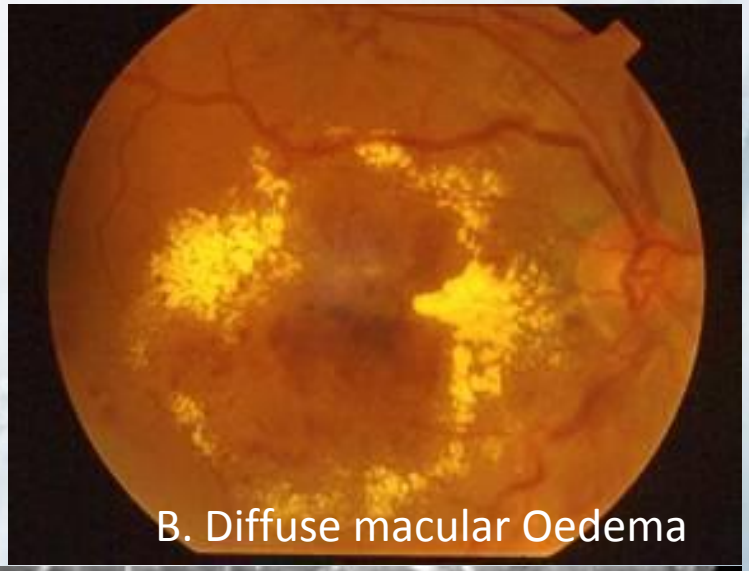
E. Diabetic Maculopathy

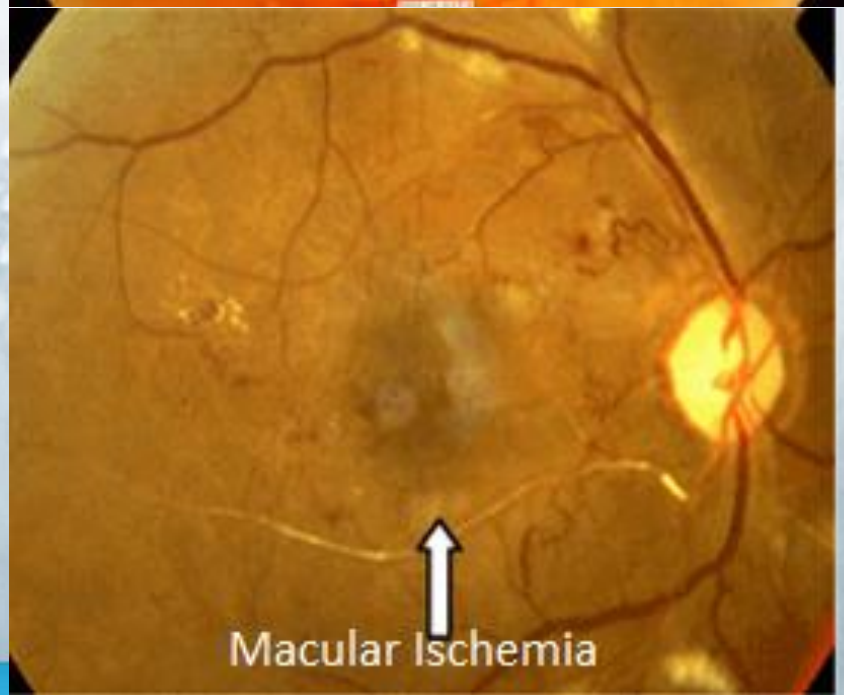
- Most common cause of visual impairment in Diabetes

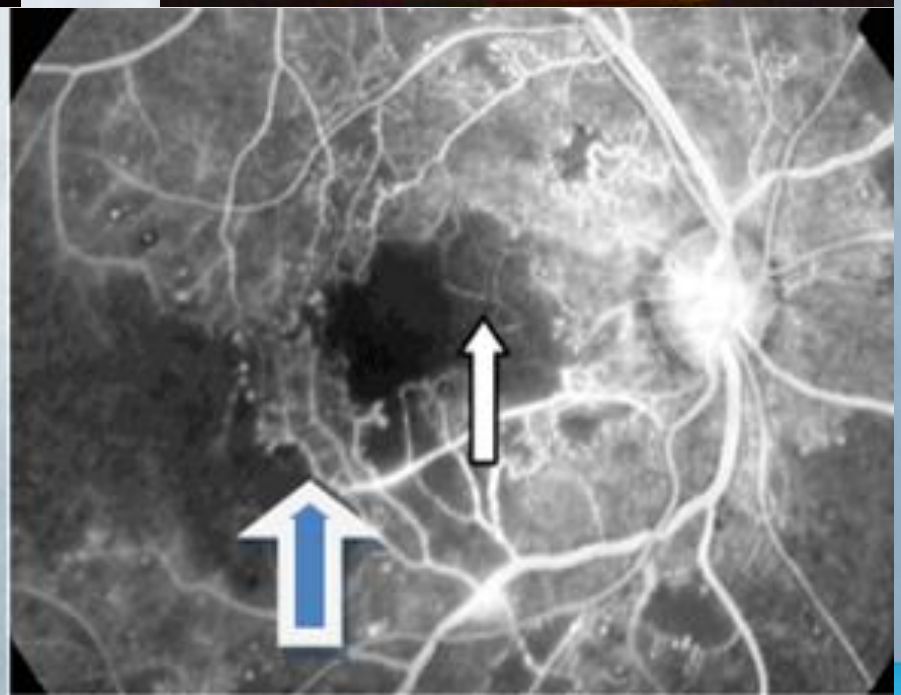
Classification:

- **Focal** edema/exudates
- **Diffuse** edema
- **Ischaemic**

Diabetic maculopathy

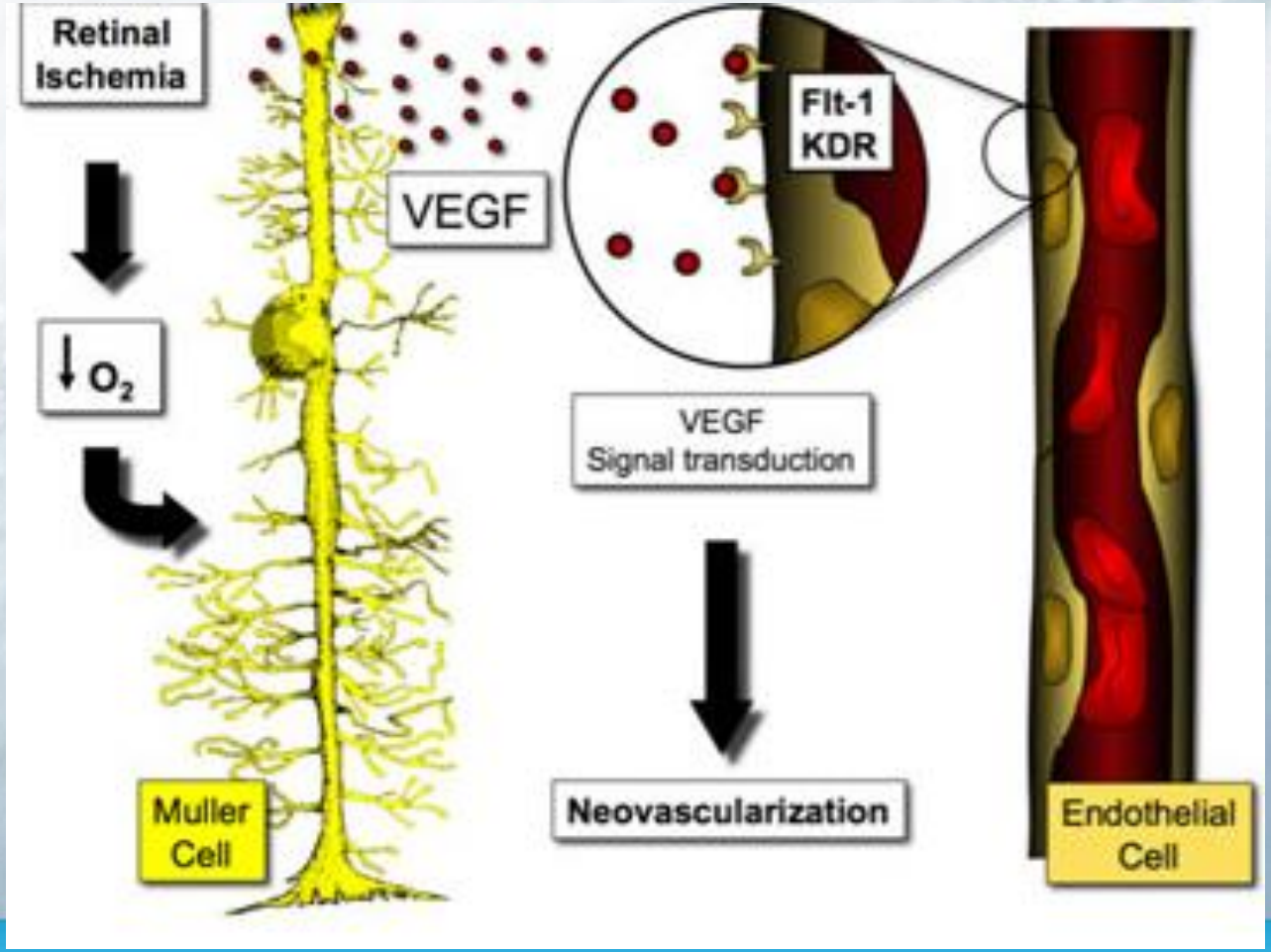




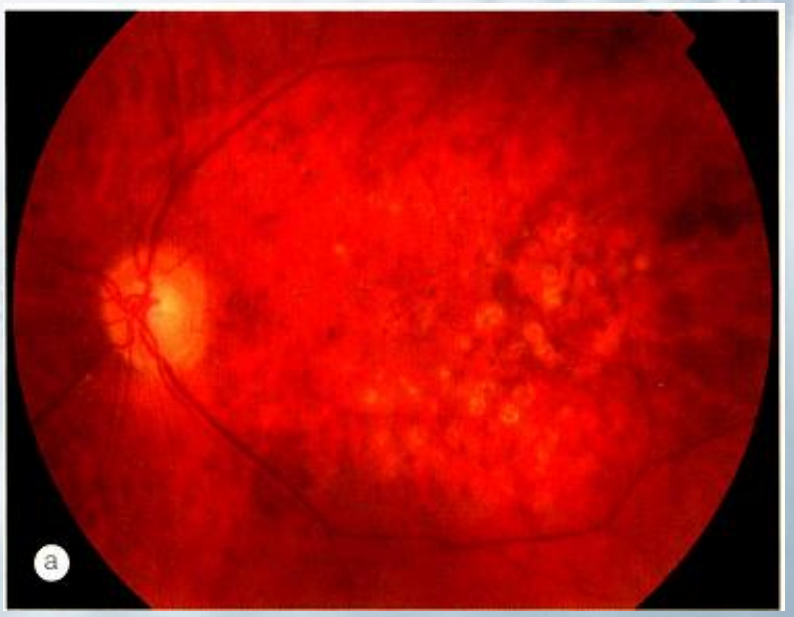


Diabetic maculopathy-pathogenesis

- Oedema, exudates, or ischaemia are mediated by:
  - Vascular Endothelial Growth factor (**VEGF**)



Management of Maculopathy

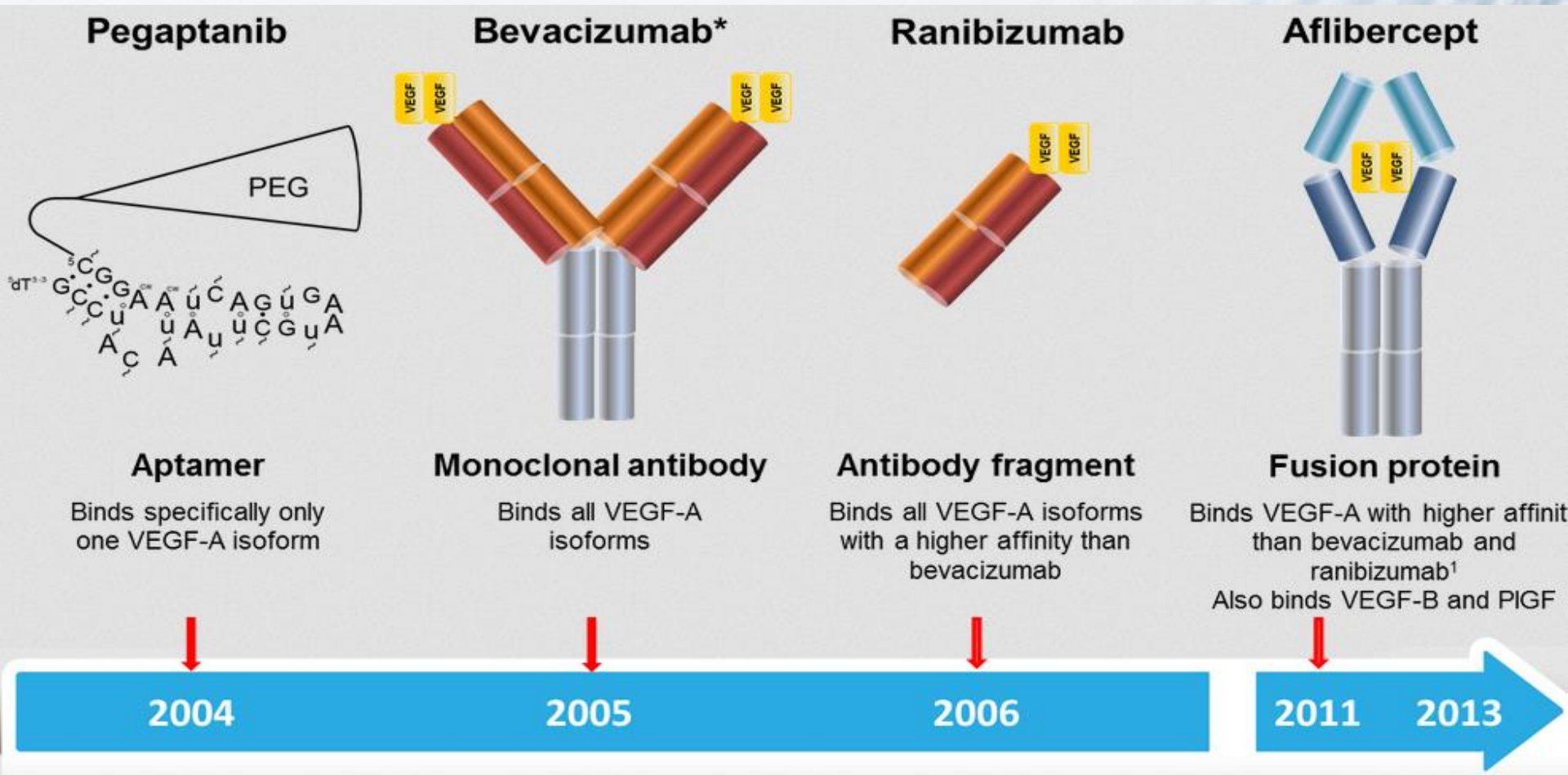


- Focal oedema: Focal **laser**.
- Diffuse oedema: Grid **laser**.
- Macula Centre edema:
  - Never laser the fovea !
  - **Intravitreal Anti-VEGF** or **Triamcinolone (Kenalog)**
- Ischaemic maculopathy: No role for laser.

Current Management – Diabetic Maculopathy

- Standard care has shifted **from laser to Anti-VEGF** injections
  - **Intravitreal Steroids** cause cataract, glaucoma, floaters

The Anti-VEGF medication



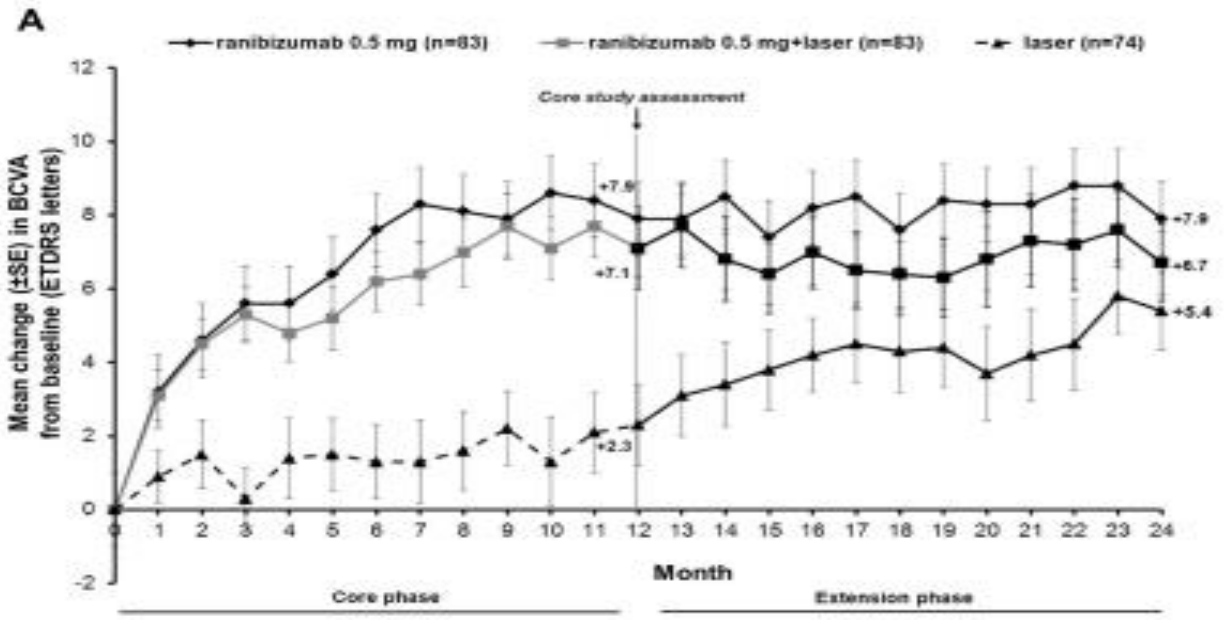
Bevacizumab

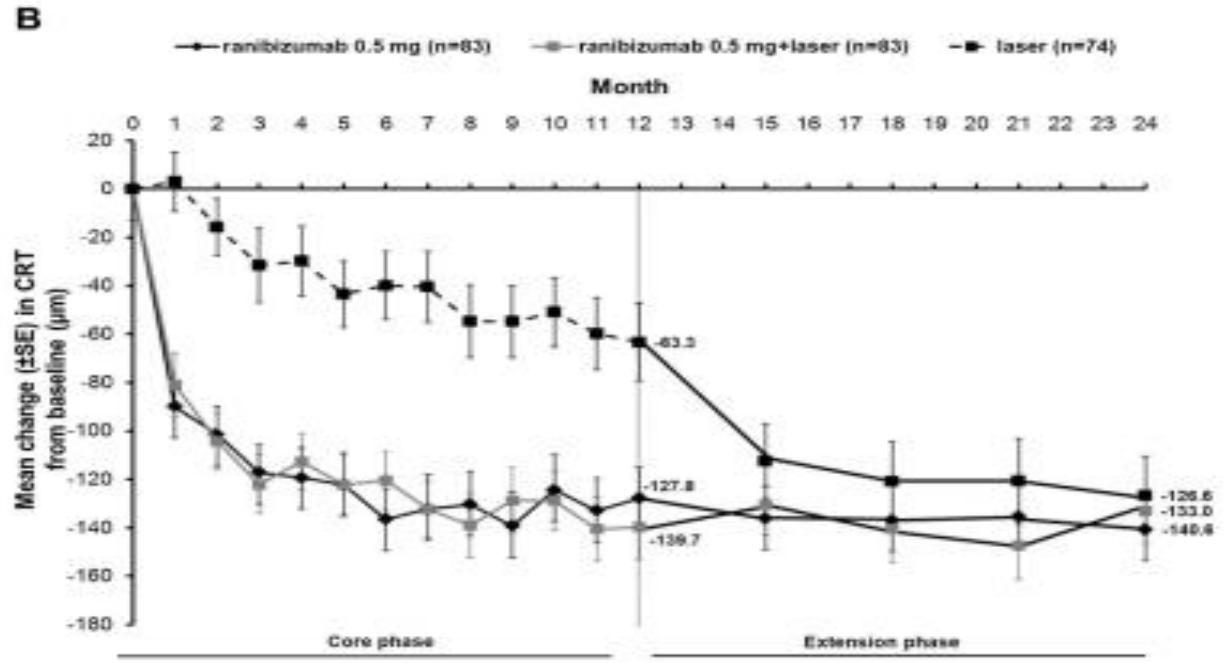
- Avastin:
  - Usually for Cancer of the colon
  - "Off label" for retina
  - Tachyphylaxis, **Endophthalmitis risk**
- Fewer Trials

Ranibizumab (Lucentis)

- **FDA approved intravitreal**
  - Sterile solution assured
  - Safety, Efficacy in most Trials
  - Treat and extend vs Fixed monthly dose
- Gold Standard eg N.America
- Also for Age related Macular degeneration

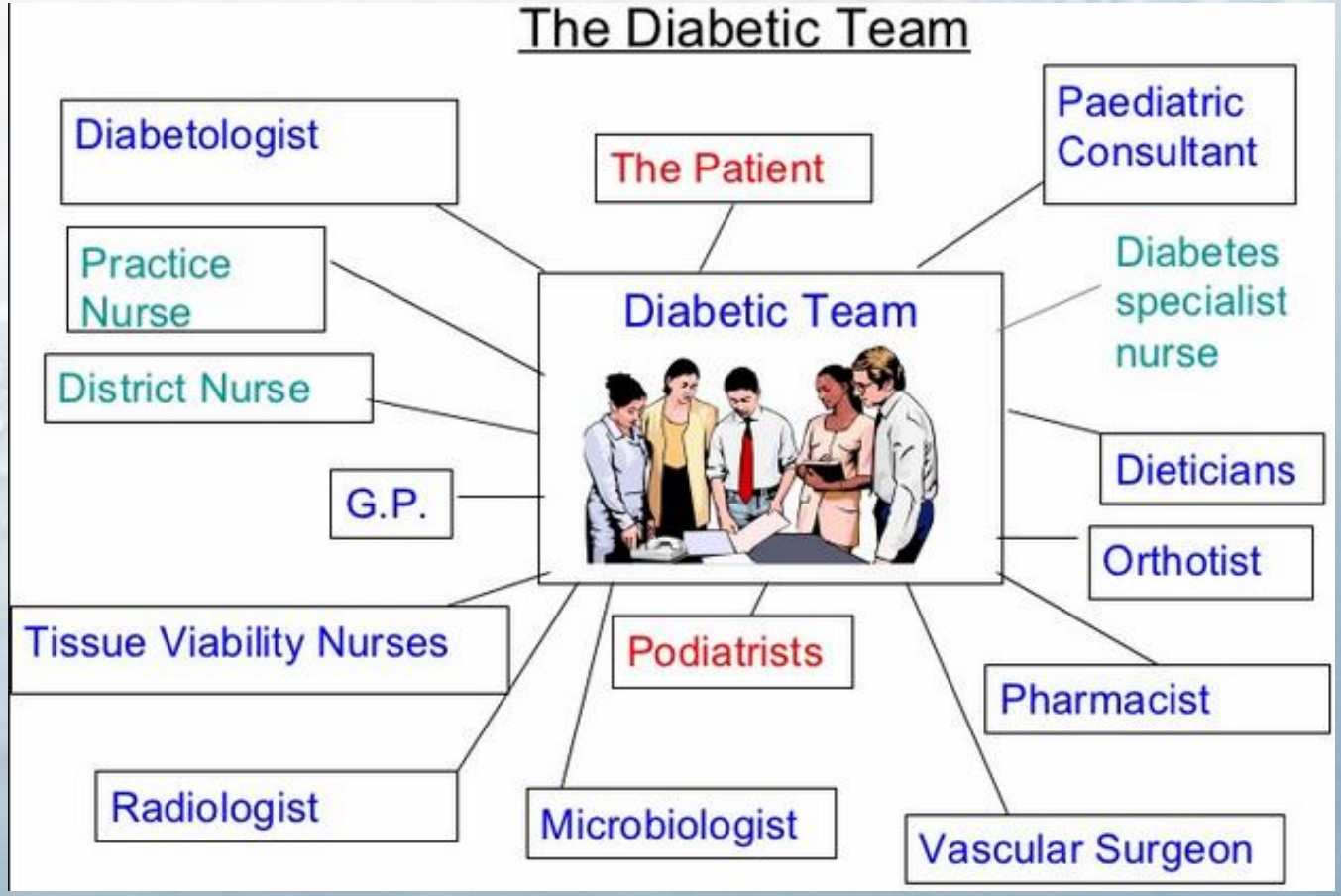
RESTORE study:
Lucentis Efficacy





Teamwork: Learning Point

- Differential Diagnosis: Diabetes with comorbidity
- Role of **Angiography** and **Multidisciplinary** approach



Diabetes Retinopathy: Studies in Kenya

	DR	CSME	FUNDOSCOPY	LASER
Kariuki et al 1999 (KNH)	49.8%	40.3%	18%	0%
Wambugu et al 2011 (KNH)	31.9%	8.5%	47.2%	5.5%
Kibata et al(Rural)	18.3%	4.5%		

↑DR with ↑ BP.

↑ DR with ↑ HbA1c (not statistically significant).

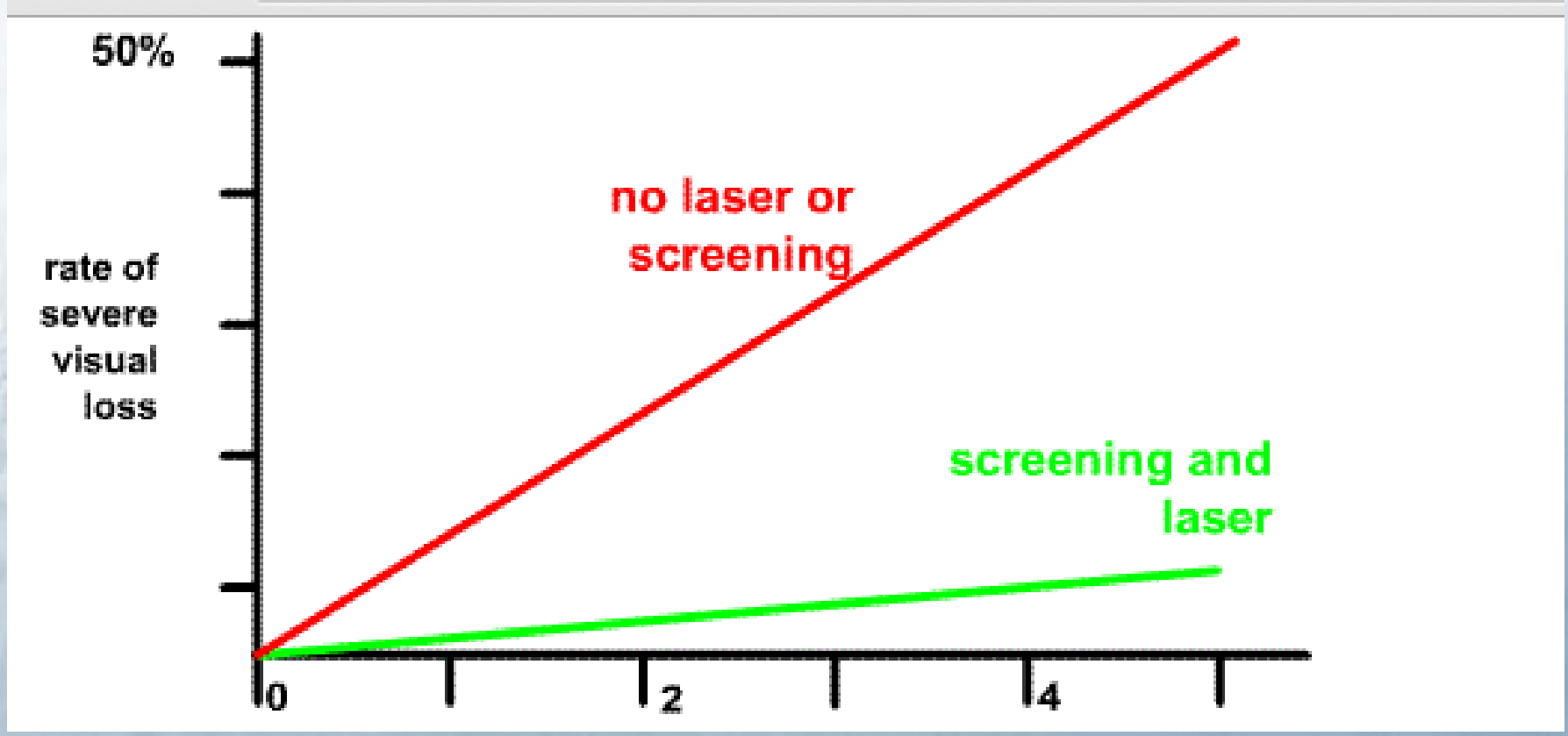
Assoc with Duration/BP/Total Chol

Diabetic Screening

- Diabetic Patient population

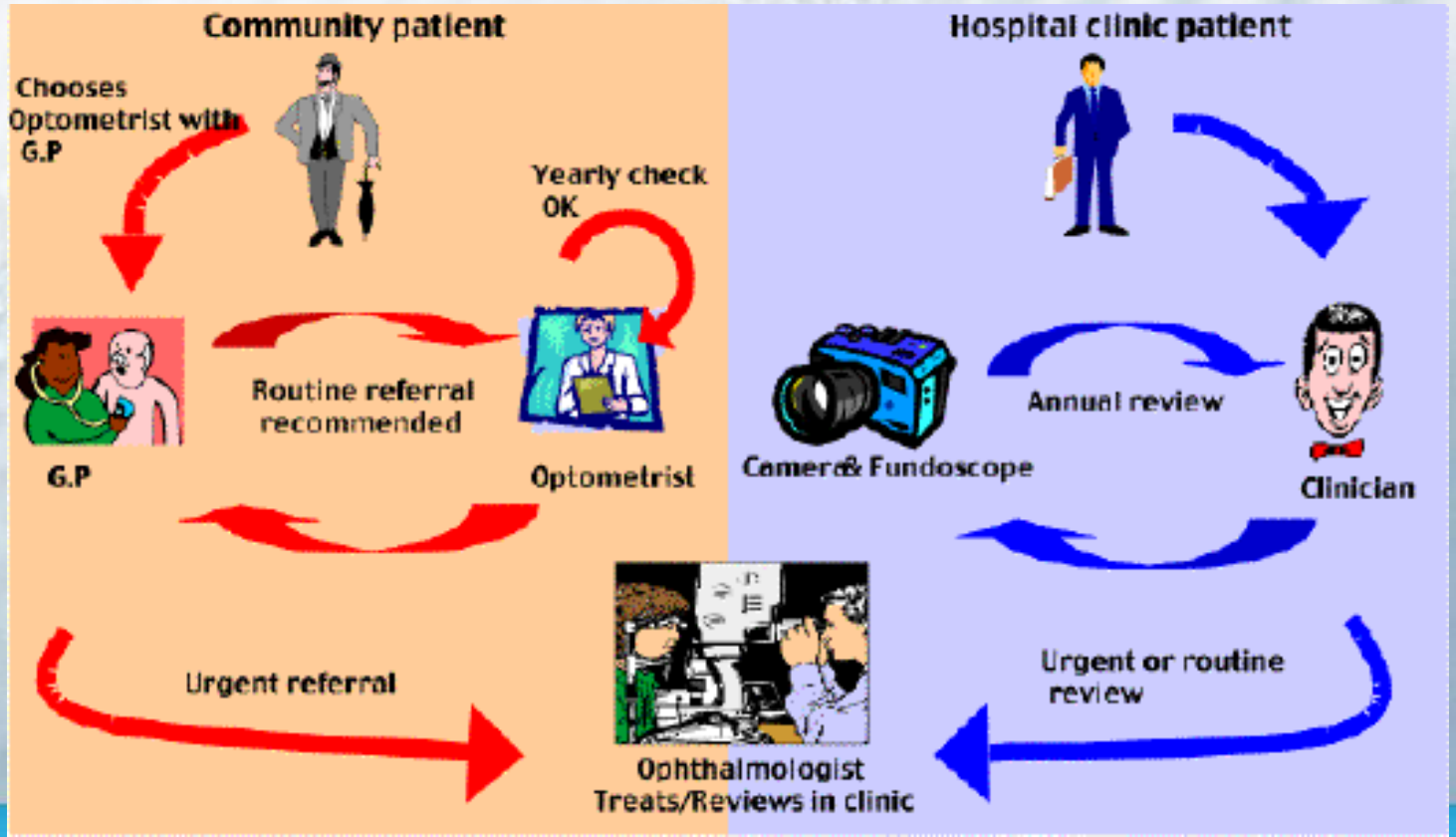
- Doctors clinics

Role of Physician-Ophthalmologist Collaboration



Role of Physician/MO/Intern

- Send all diabetics to Eye clinic for screening, annually
  - Do not wait for Eye symptoms, HbA1c, Fasting Blood Sugar
- Same-day fundoscopy/camera photography



Where to refer your Diabetics for eye exam?

- Nearest Ophthalmologist
- Public Retina Clinics:
  - Public: KNH, University Of Nairobi
  - Kikuyu eye Unit, Nairobi
  - Sabatia eye Hospital, Vihiga
  - Tenwek Hospital, Bomet
  - Lions eye Hospital, Loresho
- Private Retina Specialists:
  - Few <10, most in Nairobi

Role of ophthalmologist

- **Screen** and **treat** diabetic eye disease: LASER, Injections
- **Refer/update** physician on retinopathy/risk factors
- **Attend** concurrent same-day Diabetes Medical + Eye clinics