DIABETIC RETINOPATHY SCREENING

TRAINING MODULE FOR HEALTHCARE PROVIDERS

MOH Diabetic Retinopathy Screening Team

MINISTRY OF HEALTH MALAYSIA

SECOND EDITION 2017

DIABETIC RETINOPATHY SCREENING

TRAINING MODULE FOR HEALTHCARE PROVIDERS

MOH Diabetic Retinopathy Screening Team

MINISTRY OF HEALTH MALAYSIA

SECOND EDITION 2017

Editors

Dr. Nor Fariza Bt. Ngah
Head of Service Ophthalmology Malaysia
Medical Retina Consultant
Head of Ophthalmology Department,
Hospital Shah Alam

Pn. Noor Zahirah Bt. Husain
Head of Optometry Profession Malaysia
Hospital Kuala Lumpur

Dr. Zalifa Zakiah Bt. Asnir
Consultant Ophthalmologist,
Hospital Ampang

Dr. Nor Anita Bt. Che Omar
Consultant Ophthalmologist,
Hospital Sultanah Nur Zahirah,
Kuala Terengganu

Dr. Mimi Marina Bt. Mior Ibrahim
Consultant Ophthalmologist,
Hospital Teluk Intan

Dr. Roslin Azni Bt. Abdul Aziz
Medical Retina Consultant,
Hospital Shah Alam

Dr. Nor Azita Bt. Ahmad Tarmidzi
Medical Retina Consultant,
Hospital Kuala Lumpur

Dr. Azian Bt. Adnan
Medical Retina Consultant,
Hospital Selayang

Dr. Norwazilah Bt. Mohd Ansul
Senior Ophthalmologist,
Hospital Putrajaya

Dr. Fazlina Bt. Mohamed Yusoff
Family Medicine Specialist,
KK Seksyen 7 Shah Alam

Dr. Izwan Effendy B. Ismail
Family Medicine Specialist,
KK Puchong

Pn. Narjis Bt. Satar
Senior Optometrist,
Hospital Sungai Buloh

Pn. Rosmainiza Bt. Saien
Senior Optometrist,
Hospital Putrajaya

Sr. Nomarisa Bt. Zakaria
Ophthalmology Clinic,
Hospital Shah Alam

REVIEWER

Dr. Zanariah Bt. Hussein
Head of Service Endocrine Malaysia
Consultant Endocrinologist, Hospital Putrajaya

Dr. Masni Bt. Mohamad
Consultant Endocrinologist, Hospital Putrajaya

Table of Content

MODULE 1

Diabetes Mellitus & Diabetic Retinopathy - An Overview

MOH Diabetic Retinopathy Screening Team

Diabetes Mellitus

Diabetes mellitus is a major global public health problem (Non - Communicable Disease)

Diabetes Mellitus is an epidemic due to

- Longer life-span
- Modern lifestyle (urbanization)
- Environmental and social factors:
    - Diet, obesity and physical activity

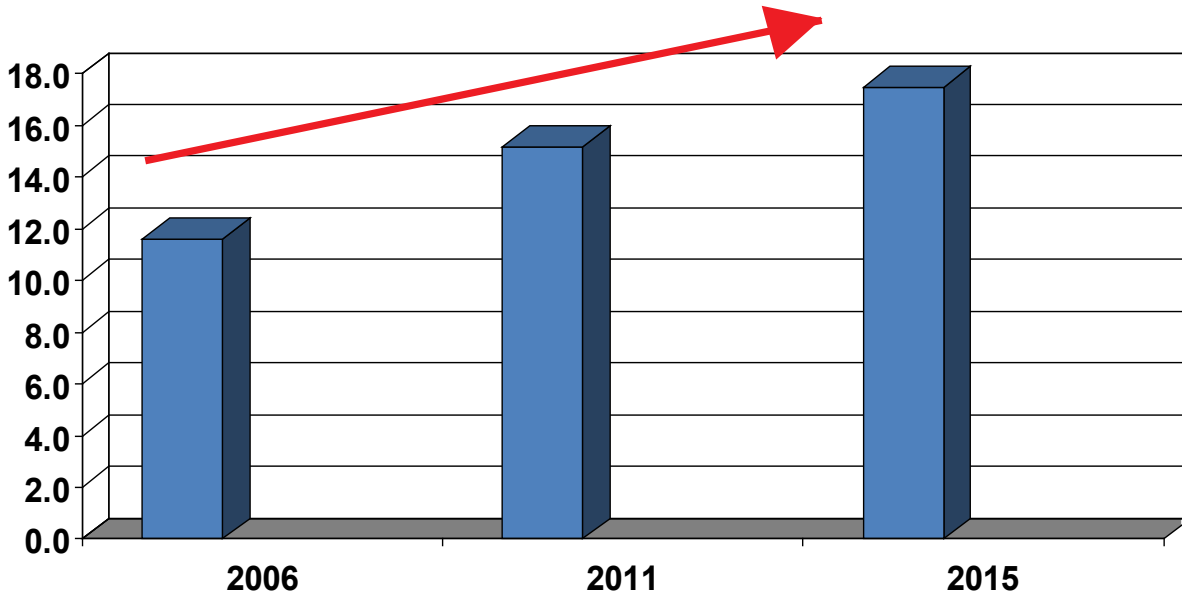
Prevalence is highest in Kedah (25.4%), followed by Perlis (20.6%) and Johor (19.8%). Lowest in Sabah & WP Labuan (14.2%) and Sarawak (14.8) (NHMS 2015)

Highest among Indians (22.1%), followed by Malay (14.6%) and Chinese (12.0%) (NHMS 2015).

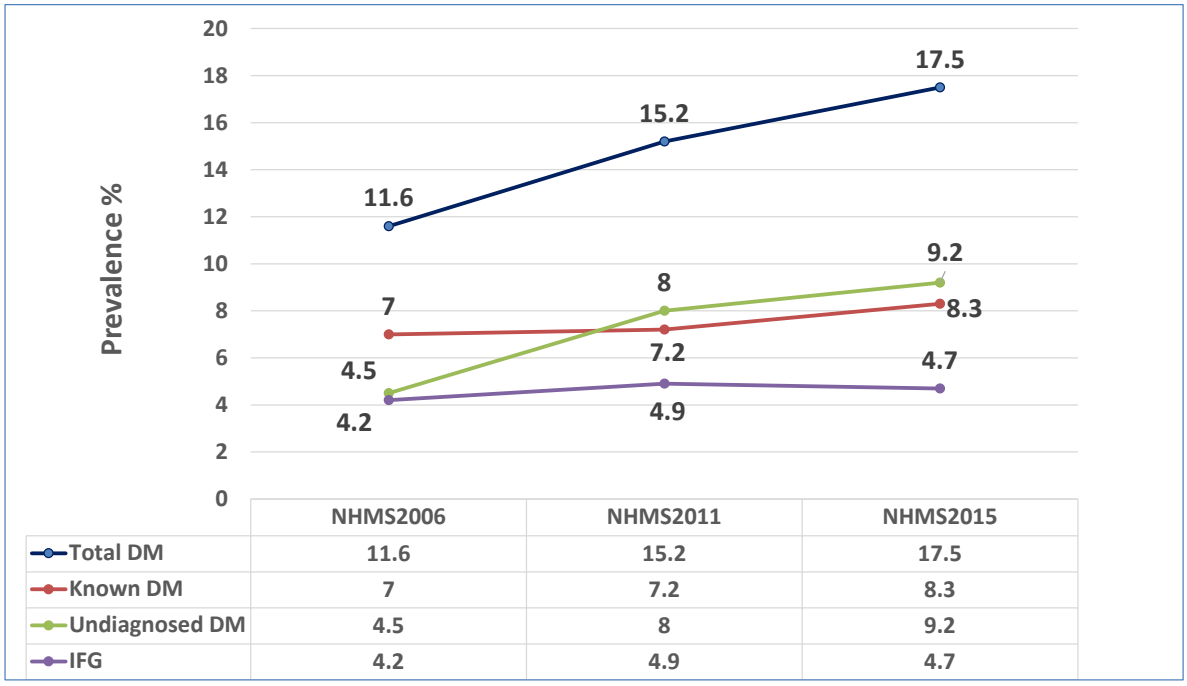
WHO estimates that in year 2030, Malaysia would have 2.48 million people with DM (NHMS 2006).

Prevalence of DM among Malaysian adults – National Health and Morbidity Survey (NHMS)

- 1986 - 6.3% (>35 yr)
- 1996 - 8.3 % (>30 yr)
- 2006 - 11.6% (>18 yr)
  - 14.9% (>30 yr)
- 2011 - 15.2% (>18 yr)
- 2015 - 17.5% (>18 yr)

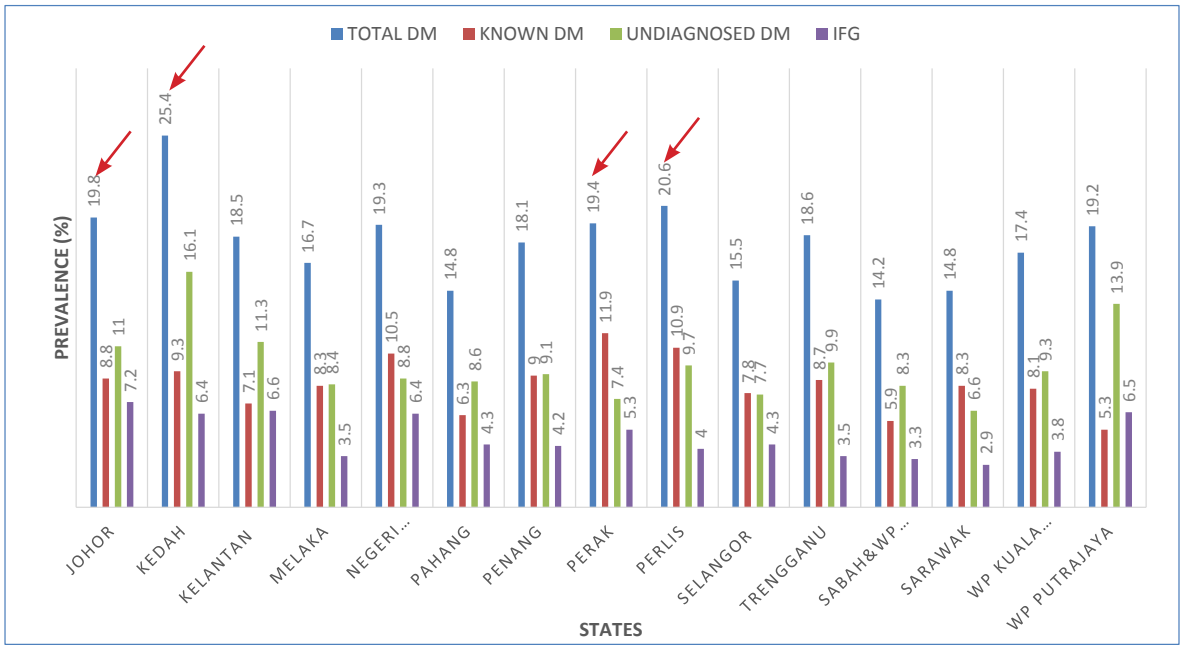


DIABETES PREVALENCE >18 years old: NHMS 2006, 2011, 2015

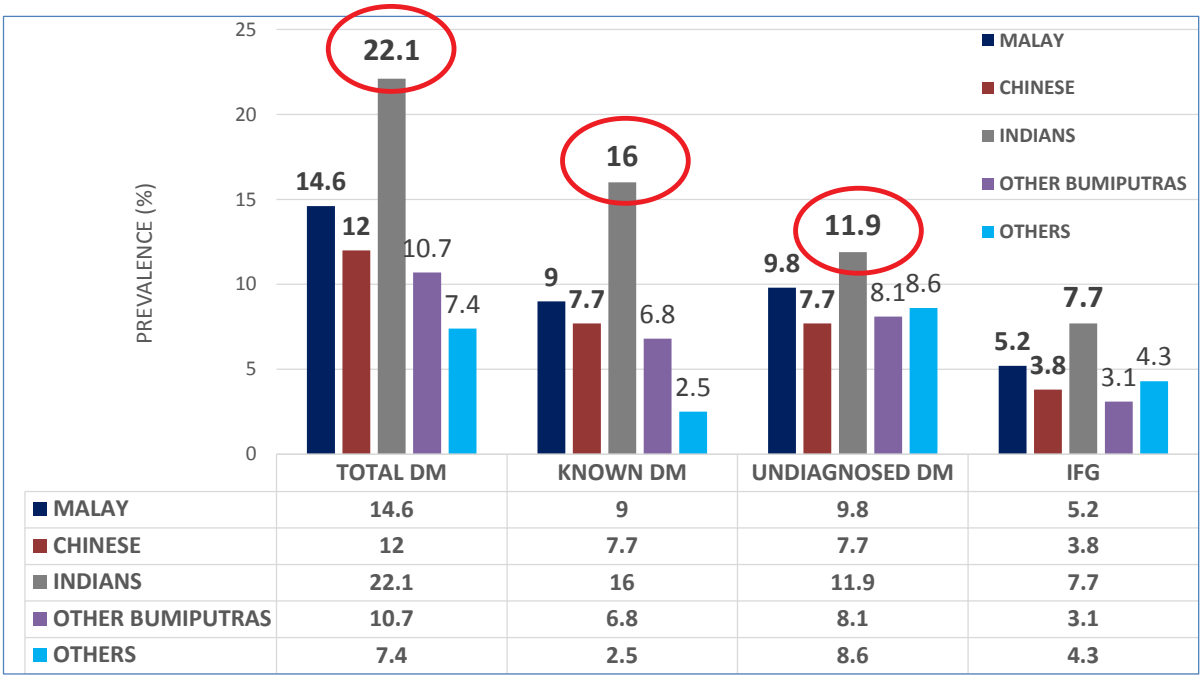


	NHMS2006	NHMS2011	NHMS2015
Total DM	11.6	15.2	17.5
Known DM	7	7.2	8.3
Undiagnosed DM	4.5	8	9.2
IFG	4.2	4.9	4.7

Prevalence of Diabetes, ≥18 years, by States (NHMS 2015)



Prevalence of Diabetes, ≥18 years, by Ethnicity (NHMS 2015)

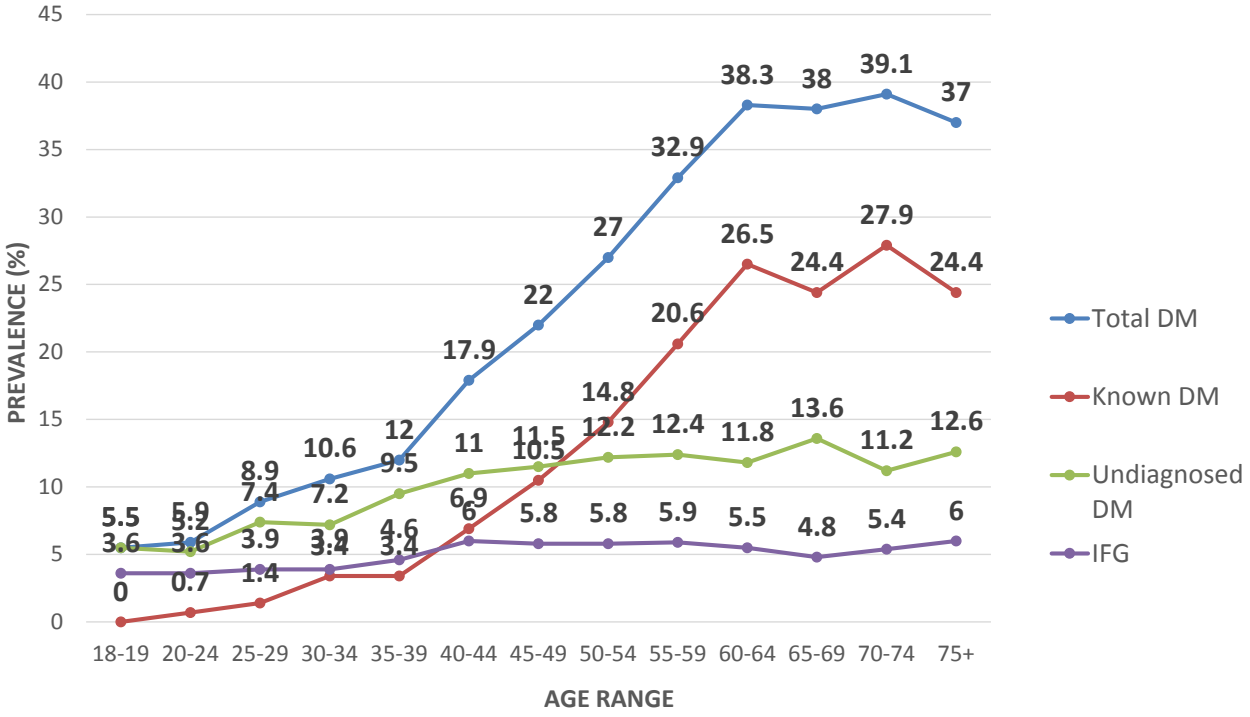


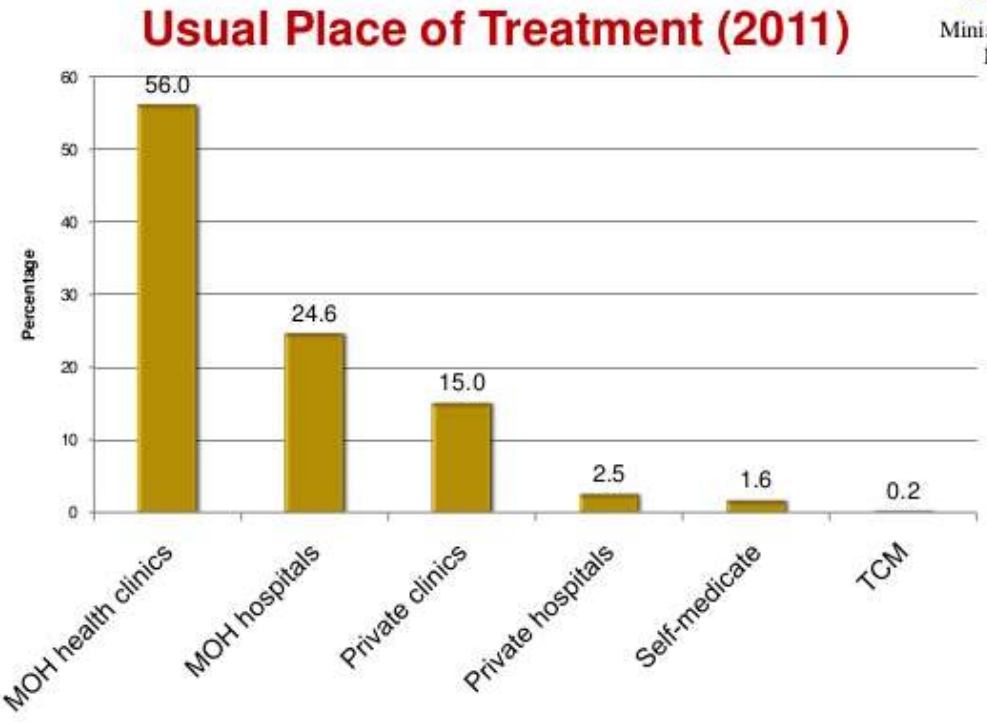
	TOTAL DM	KNOWN DM	UNDIAGNOSED DM	IFG
MALAY	14.6	9	9.8	5.2
CHINESE	12	7.7	7.7	3.8
INDIANS	22.1	16	11.9	7.7
OTHER BUMIPUTRAS	10.7	6.8	8.1	3.1
OTHERS	7.4	2.5	8.6	4.3

Prevalence of Diabetes, ≥18 years, by Gender (NHMS 2015)

	MALE	FEMALE
Total DM	16.7%	18.3%
Known DM	7.6%	9.1%
Undiagnosed DM	9.1%	9.2%
IFG	4.7%	4.7%

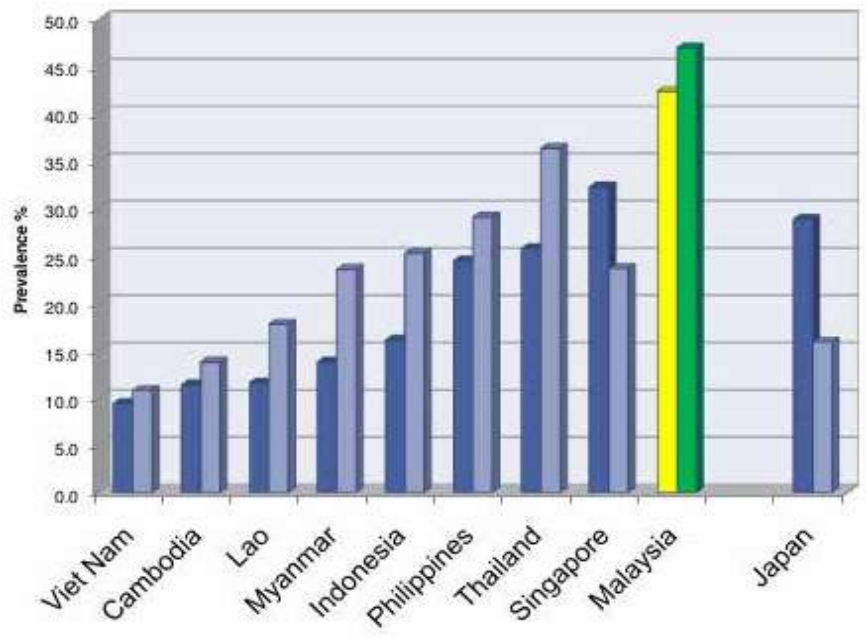
Prevalence of Diabetes, ≥18 years, by Age Groups (NHMS 2015)



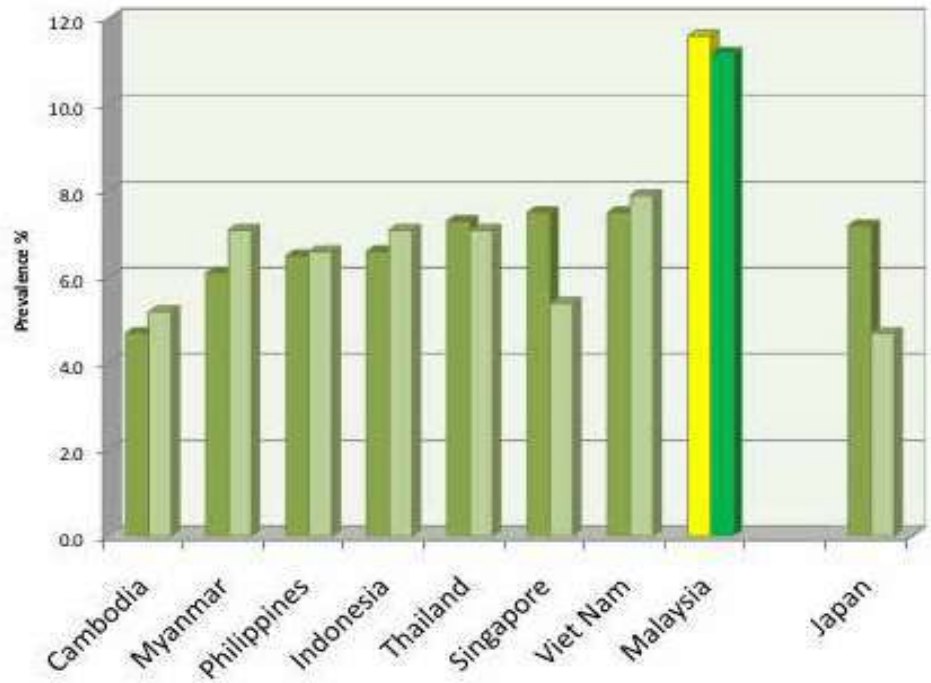


How do we compare to our neighbouring countries?

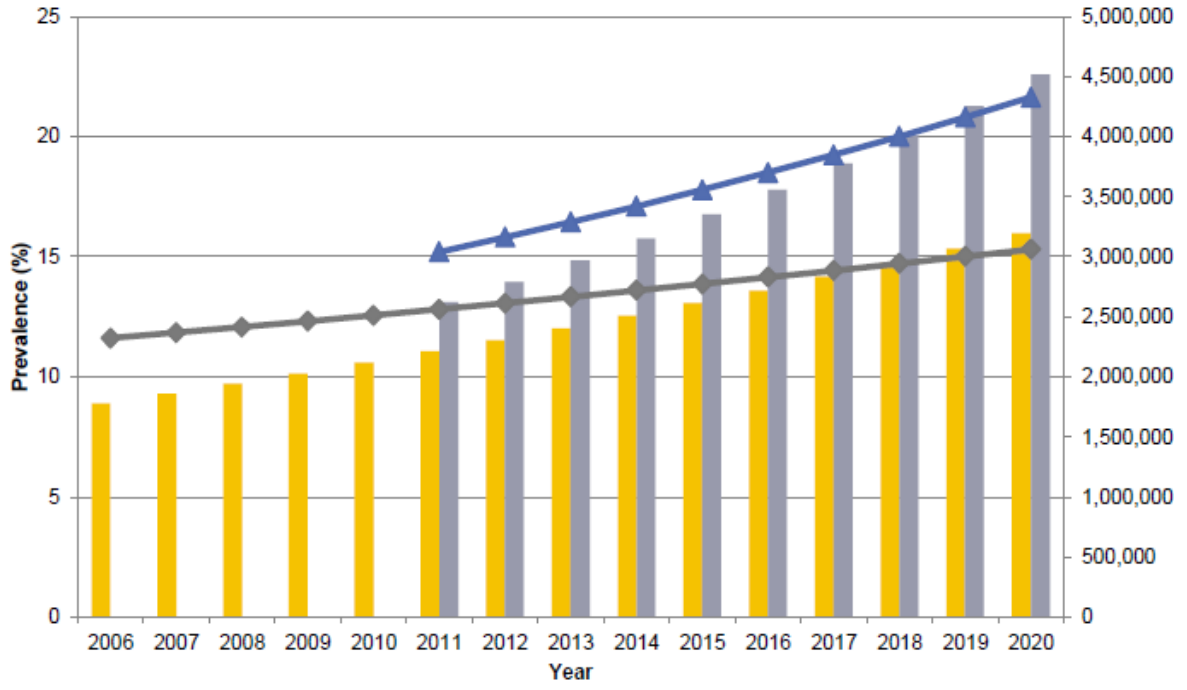
Overweight in Adults, ASEAN Region 2010



High Blood Sugar in Adults, ASEAN Region 2010

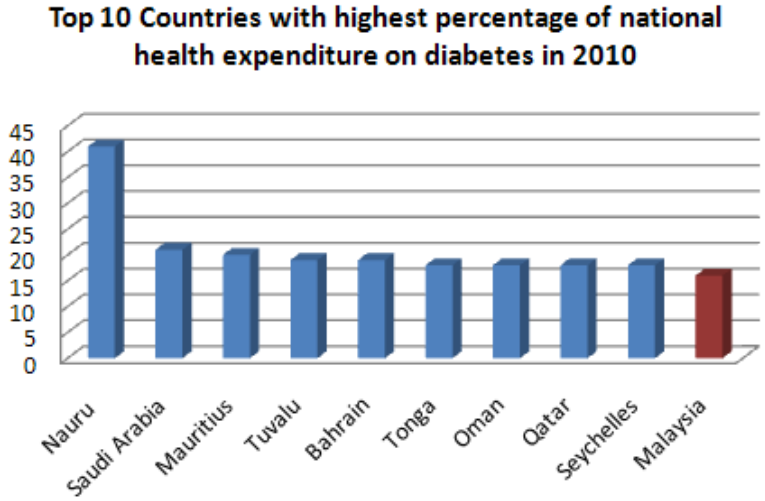


Burden of Diabetes in Malaysia :
Trends & Projection by 2020 (Adults age 18 years and above)



Diabetes Mellitus Costs

Diabetes costs are estimated to account for 16% of the national Malaysian healthcare budget, placing Malaysia among the top 10 countries in the world in term of percentage of healthcare budget spent on diabetes. In 2010, an estimated RM2.4 billion was spent on diabetes-related healthcare.



Zhang P. et al. Global healthcare expenditure on diabetes for 2010 and 2030 . Diabetes research and clinical practice. 2010; 87: 293-301

Diabetes Clinical Audit 2012

Variable	Targets	Total no. of tests	Meeting target (%)	Mean	95% CI
HbA1c	< 6.5 %	99,823	23.7	8.1	8.1 - 8.1
BP : Systolic	< 130 mmHg	121,751	47.6	135.5	135.4 - 135.6
BP: Diastolic	< 80 mmHg	121,726	67.2	78.4	78.3 - 78.4
Blood pressure	< 130 / 80 mmHg	121,698	40.9		
Total cholesterol	< 4.5 mmol/l	101,286	28.5	5.2	5.2 - 5.2
TG	≤ 1.7 mmol/l	101,008	60.6	1.8	1.8 - 1.8
HDL	≥ 1.1 mmol/l	76,214	65.5	1.3	1.3 - 1.3
LDL	≤ 2.6 mmol/l	75,734	37.8	3.1	3.1 - 3.1
BMI	< 23 kg/m2	108,559	16.6	27.4	27.3 - 27.4
Waist circumference	< 90 cm (Male)	35,520	33.6	94.0	93.9 - 94.1
	< 80 cm (Female)	55,493	14.4	90.7	90.6 - 90.8
Total: 130,340 Patients					

Diabetes Clinical Audit (2009 - 2012)

Anti-Diabetics	2009	2010	2011	2012
Metformin	81.7%	85.7%	82.3%	82.2%
Sulphonylureas	65.2%	62.9%	59.5%	56.6%
Alpha-glucosidase inhibitors	4.7%	5.9%	6.5%	4.8%
Insulin	**12.0%**	**11.9%**	**17.1%**	**21.3%**
Monotherapy (OHA)	33.6%	34.1%	27.8%	27.3%
>= 2 *OHA*	51.1%	51.7%	48.7%	45.5%
OHA + insulin	**8.8%**	**8.9%**	**13.2%**	**16.2%**
Diet only	3.4%	2.3%	6.4%	5.9%

Diabetic Retinopathy

Diabetic Retinopathy (DR) is a condition with progressive retinal damage that occurs due to microvascular complication of diabetes mellitus.

All diabetics are at risk of developing DR.

Within 20 years of diagnosis of DM, nearly ALL people with Type 1 DM and almost 2/3 of people with Type 2DM will have some degree of retinopathy.

About 15,000 to 39,000 people lose their sight because of diabetes (NHMS 2006).

The commonest cause of visual loss among working adults in Malaysia.

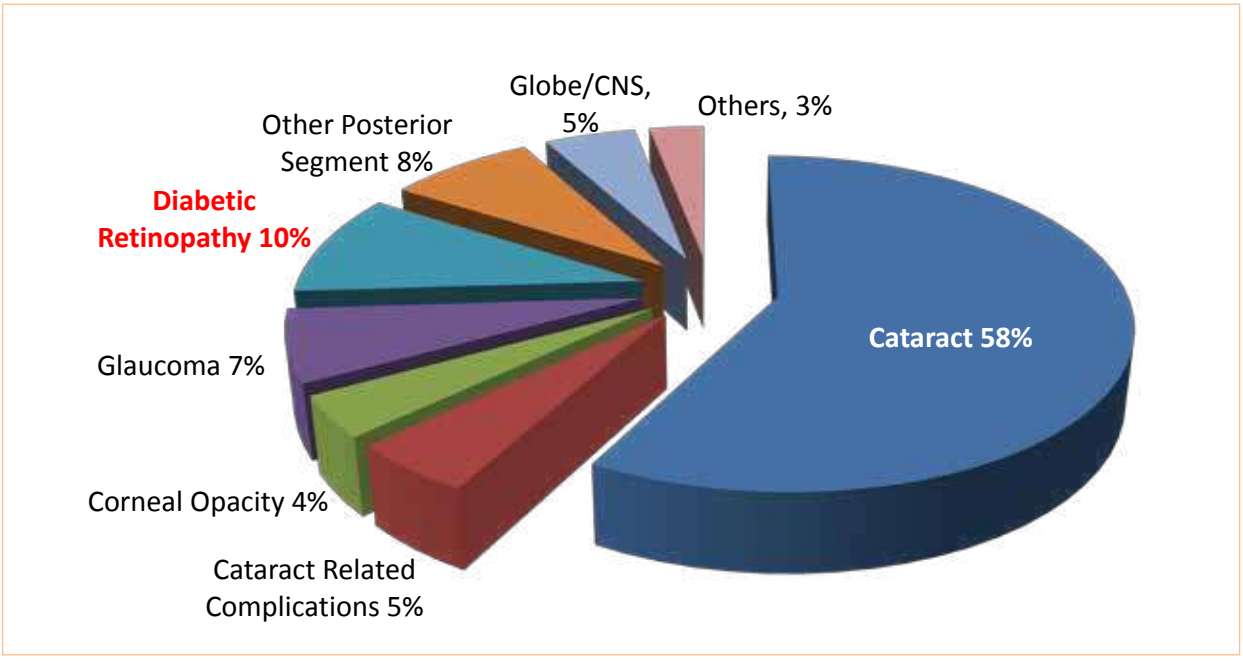
In early stage of DR – patient is asymptomatic.

Patients are unaware of their retinopathy changes.

Screening is necessary to identify the group at risk of visual loss.

National Eye Survey II 2014

Causes of Blindness



Diabetic Eye Registry (2007 & 2008)

- 22,870 new patients with DM seen for the first time
- Majority were **T2DM**
- **9% of eyes were blind** (VA worse than 3/60)
- 27% has low vision
- Diabetic Eye Registry Malaysia
    - 65.4% - No apparent DR
    - 34.6% has some form of DR :
        - 50.7% - mild NPDR
        - 26.1% - mod NPDR
        - **9.5% - severe NPDR**
        - **11.4% - PDR**
        - **4.8% - ADED**
        - **8% - maculopathy**

- Malaysian prevalence data:
    - National Diabetic Eye Registry 2007 : 36.8%
    - Primary healthcare data: 12.3% - 16.9%
- Singapore Malay Eye Study : Prevalence DR 35%
- World wide prevalence range from **4.4- 44.4%**

Diabetic Retinopathy

RISK FACTOR	FACTS

- Duration of DM – longer duration, higher risk
- Pre existing co-morbidities
  - HPT, CKD, CVA, CVD,
  - hyperlipidemia,
  - anaemia
- Poor control of DM
- Obesity / inactive lifestyle
- Smoking
- Pregnancy in diabetics
	- Good control of DM will delay the progression of DR
	- Good control of co-morbid illnesses will reduce the severity of DR
	- Pregnancy will cause progression of DR
	- Healthy lifestyle is highly recommended

Effects of DR on Patient's Quality of Life

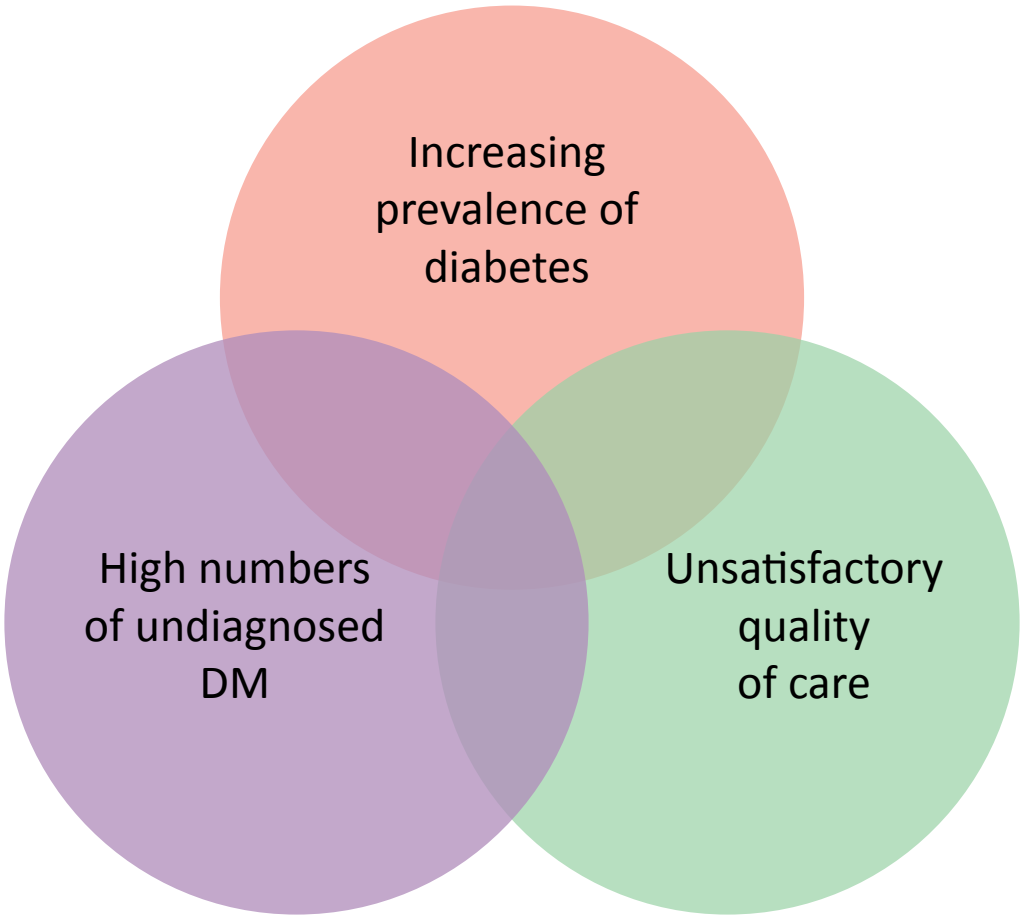
Visual impairment has a great impact on the patient's daily functions:

- Reduces vision-related function
- Reduces independence and productivity
  - limits social interactions
  - restricts ability to perform daily functions

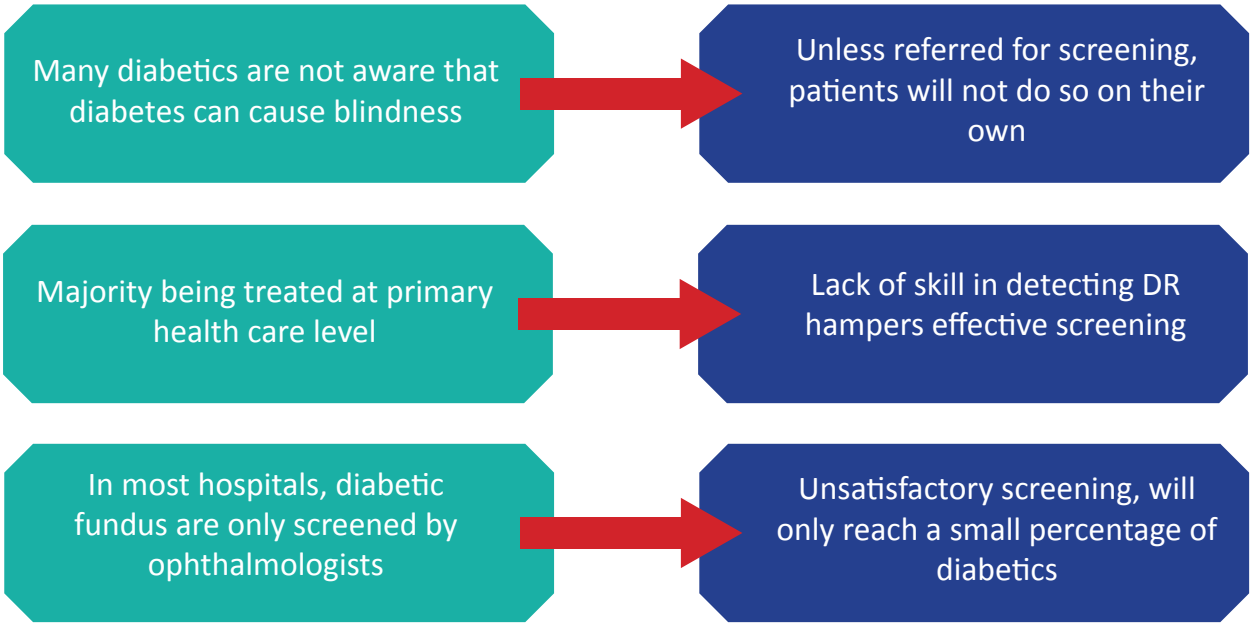
Patient's ability to manage their diabetes is also affected:

- Difficulty reading nutritional information on food
- Difficulty taking insulin and diabetes medication, and checking glucose levels
- Difficulty with foot care, such as cutting toenails
- Difficulty exercising

Main Issues In Malaysia



Problems in Management of DR



Diabetic Retinopathy: Screening Challenges

- Inadequate diabetic eye screening programme

- Inadequate resources to complete the task

- Poor patient information / awareness

Diabetic Retinopathy Screening Program

- Public health project
- Non-mydriatic fundus camera are available in MOH Health Clinics
- Majority are MOH sponsored
- Fundus photo - taken by AMO/SN/JM
- Grading by: Ophthalmologists / Optometrists / Family Medicine Specialists / Trained graders (paramedics)

Diabetic Retinopathy Screening Program

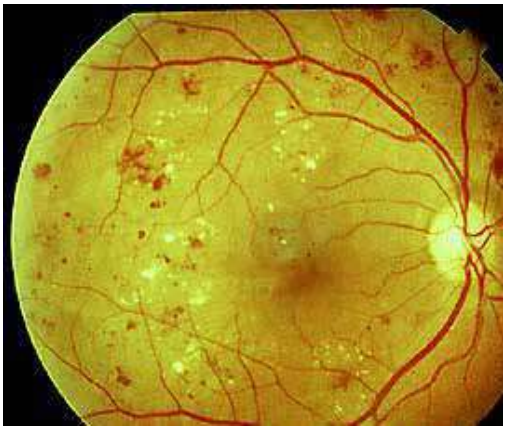
1. National screening program for prevention of blindness due to DR
2. Standard protocol for all states and hospitals
3. Needs co-operation from all stages of personnel
4. Echo training of staff
5. Continuous supervision of graders and photographers
6. Credentialing and privileging committee

Diabetic Retinopathy Screening

- Screening is a programme, not a test
- A programme to reduce the risk of disease

Why?

To reduce visual morbidity caused by diabetic retinopathy by facilitating early diagnosis & treatment of sight-threatening retinopathy through population screening

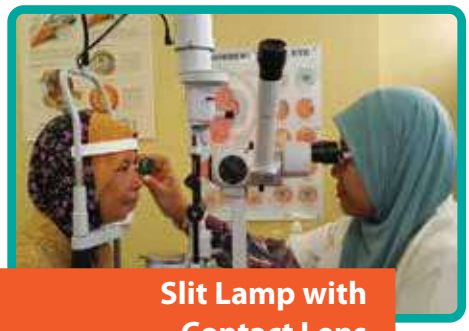


How?

Implementing a **cost effective** method in order to cater for a large number of population at risk without compromising the standard of care

Diabetic Retinopathy Screening Tools

Direct Ophthalmoscope



Slit Lamp with Contact Lens

Binocular Indirect Ophthalmoscope

Fundus Photography

Diabetic Retinopathy Screening Program

- **Non-mydriatic digital fundus camera** in diabetic eye examination is very useful.

- Fundus images captured can be graded :
  - at site (credentialed & privileged staff)
  - at selected centre via internet (Tele-DR)

Where?

1. Primary health care centre : selected Klinik Kesihatan with fundus camera.
2. Hospital/Clinics with eye care providers – ophthalmology and optometry clinics.
3. Mobile fundus camera.

Who?

- Family Medicine Specialist
- Medical Officers
- Optometrists
- Assistant Medical Officers / Staff nurses / JM

- **Fundus photography workshop**
- **Reading / grading of photographs classes**
- **Credentialing / privileging of staff – grader of fundus photographs**

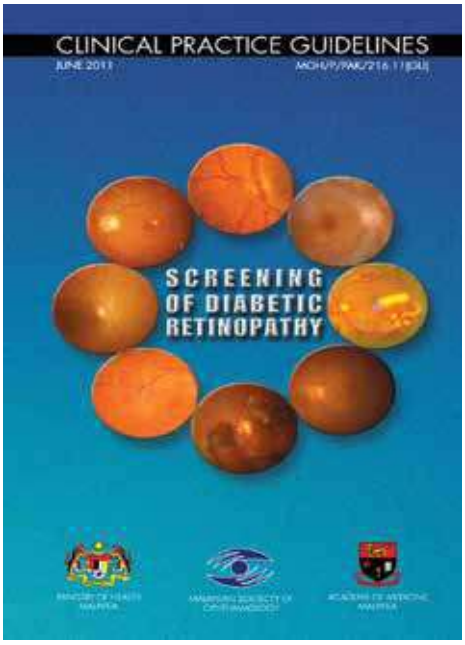
National Standard Program for Credentialing / Privileging of Screeners and Graders

- Screening protocol / Standard Operating Procedure (SOP)

- Training activities – fundus photography, grading of photos, referral criteria

- Good / acceptable referral system to Ophthalmologist

- Audit and Feedback mechanism



http://www.moh.gov.my/attachments/6601.pdf

CPG SCREENING OF DR

RECOMMENDATION

Screening for Diabetic Retinopathy should be done in all patients with diabetes mellitus. (Grade C).

RECOMMENDATION FOR SCREENING

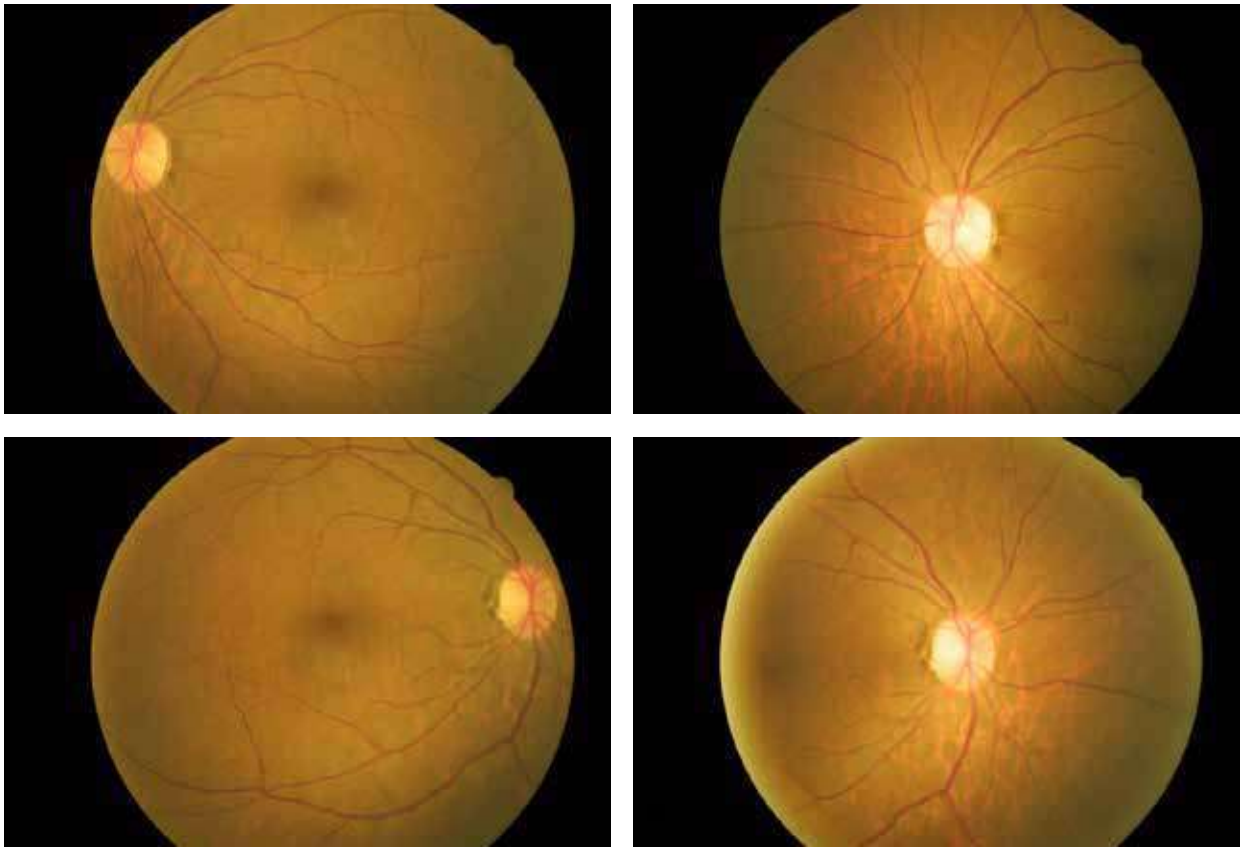
Recommendation

- Non-mydriatic fundus camera should be used as a screening tool for diabetic retinopathy (DR) when possible. (Grade A)
- Two fields fundus photo assessment should be done. (Grade C)

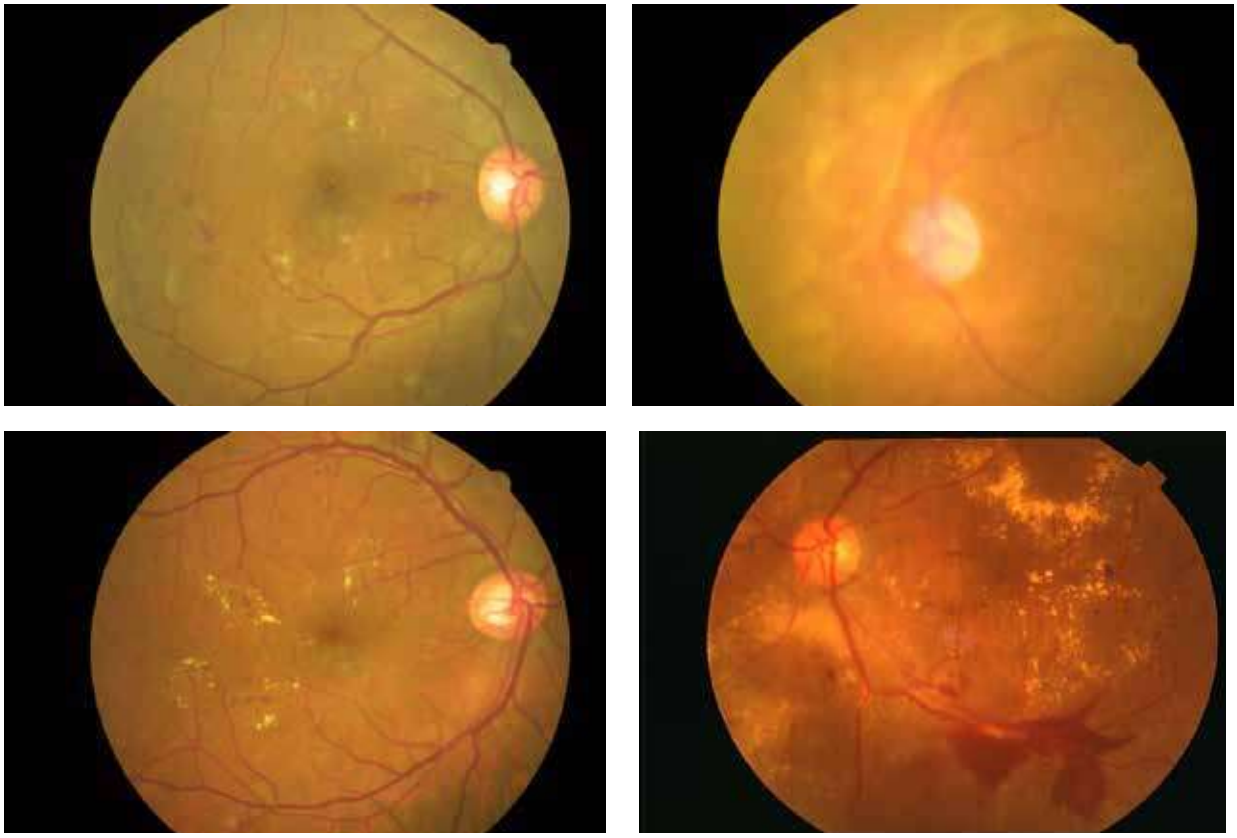
- When there is no access to fundus camera, ophthalmoscope should be used for screening of DR. (Grade C)

Example of Digital Screening Photos

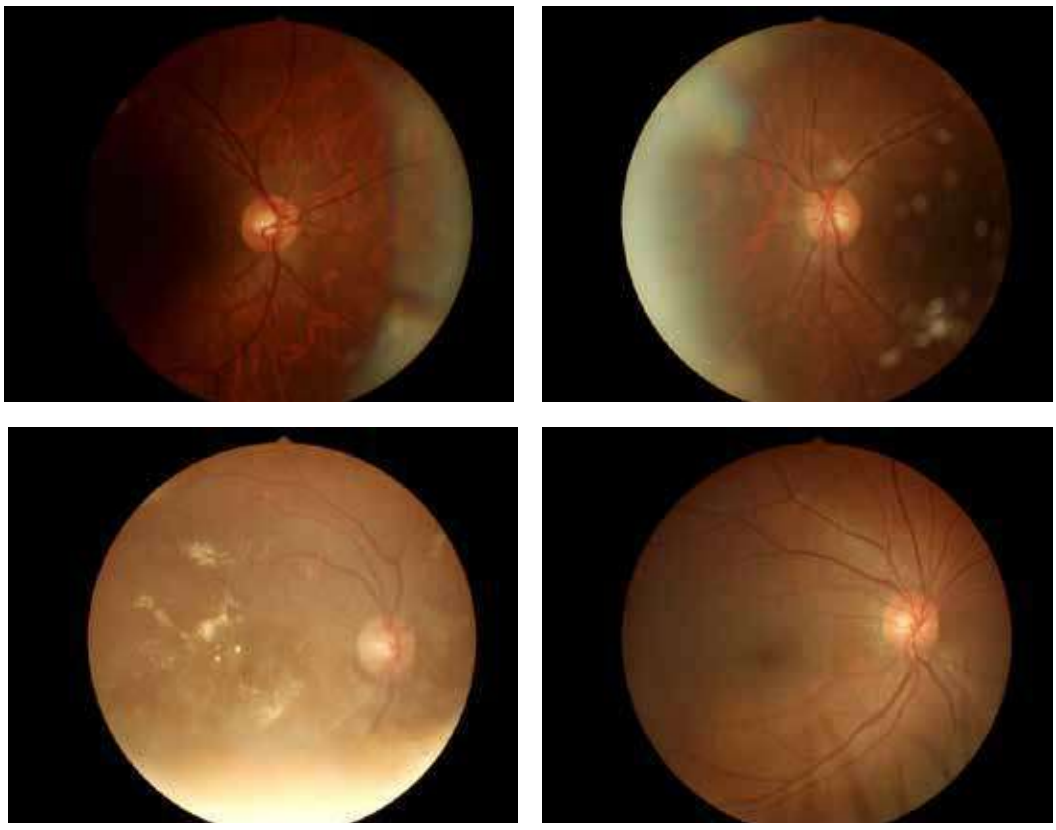
Normal Fundus



Abnormal Fundus



Poor Photos – Inadequate for Grading



CONCLUSION

- Diabetes mellitus is a major contributor to health morbidities and mortalities.
- **Diabetic retinopathy (DR)** is one of the major complications of diabetes mellitus which causes **irreversible blindness**
- Majority patients with diabetes are **unaware** of their DR condition – mostly are asymptomatic in early stage and presented late with sight threatening DR
- Screening for DR is essential for early detection and early treatment
- Implementation of user / patient friendly and cost effective screening tool – **non-mydriatic fundus camera.**
- Commitment from all health care providers is important to ensure sustainability of the program, thus preventing diabetic related blindness

MODULE 2

Diabetes Mellitus & Complications

MOH Diabetic Retinopathy Screening Team

Diabetes Mellitus & Complications

Introduction

Diabetes mellitus is a metabolic disease characterized by high blood sugar level over a prolonged period. If untreated, diabetes can cause many complications.

Types of DM

Type 1 Diabetes

- Ages 10-20 years
- Lean
- Lack of insulin
- Pancreas fails to produce enough insulin
- Require insulin

Type 2 Diabetes

- Ages 30 and above
- Obese
- Insulin resistance .
- Cells fail to respond to insulin
- Oral hypoglycemia with / out insulin

DM : Diagnosis

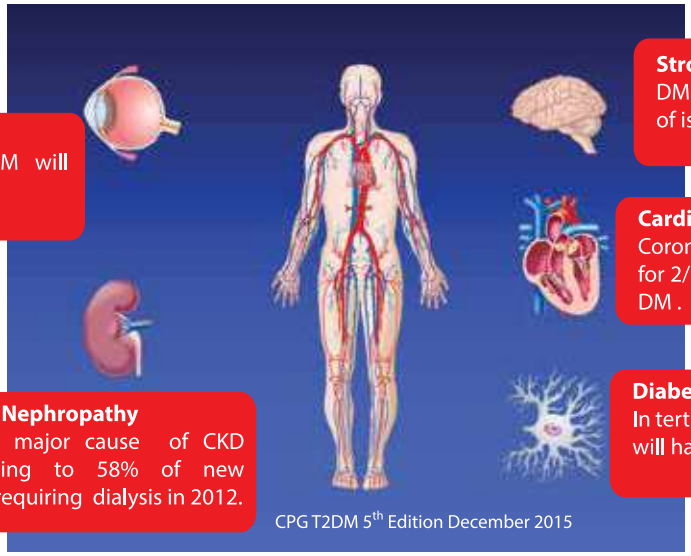
Diagnostic value for DM based on venous plasma glucose		
	Fasting	Random
Normal	< 6.1 mmol/L	
DM	≥ 7.0mmol/L	≥ 11.1 mmol/L

If the fasting venous plasma glucose is between 6.1 to 6.9, we need to do MGTT		
	0 Hour	2 Hour
Normal	**< 6.1 mmol/L**	**<7.8**
IFD	**6.1 - 6.9**	
IGD	**-**	**7.8 - 11.0**
DM	**≥ 7.0**	**≥ 11.1**

	Normal	Pre-Diabetes	Diabetes
A1c	<5.6% (<38 mmol/mol)	5.6 - 6.2% (38 - 44 mmol/mol)	≥ 6.3% (≥ 45mmol/mol)

COMPLICATIONS OF DIABETES MELLITUS

DM : Systemic Complications



Diabetic Retinopathy
60% patients with T2DM will have some degree of retinopathy after 20 years

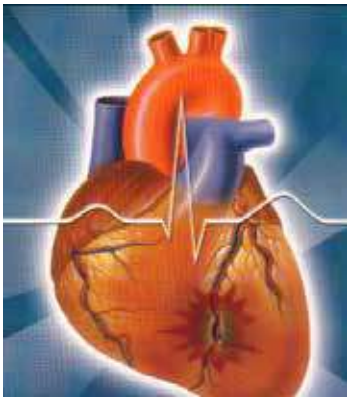
Stroke
DM patients have twice the risk of ischemic stroke.

Cardiovascular Disease
Coronary heart disease accounts for 2/3 of deaths associated with DM .

Diabetic Nephropathy
DM is a major cause of CKD contributing to 58% of new patients requiring dialysis in 2012.

Diabetic Neuropathy
In tertiary centre, 50 – 80% of DM will have neuropathy.

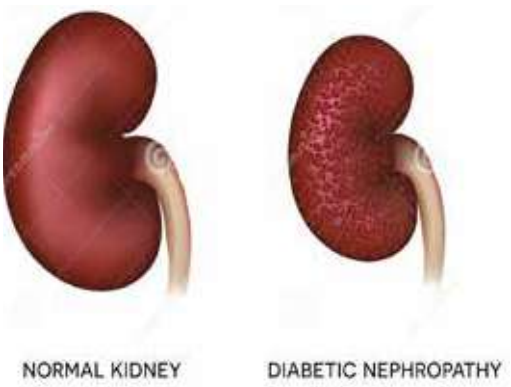
Coronary Heart Disease



- T2DM increase risk for CHD (2-4x)
- Thrombosis of the vessels
- Manifest as:
  - Angina
  - Myocardial infarct
  - Sudden death
- Silent MI – present with heart failure

Diabetic Nephropathy

- Microalbuminuria is the earliest sign of diabetic nephropathy.
- Blood pressure & glycaemic control are crucial in preventing and retarding progression to CKD
- Referral to nephrologist should be made if Se Creatinine>200umol/l



Stroke

- Diabetes patients have a high risk of death from stroke, particularly woman.

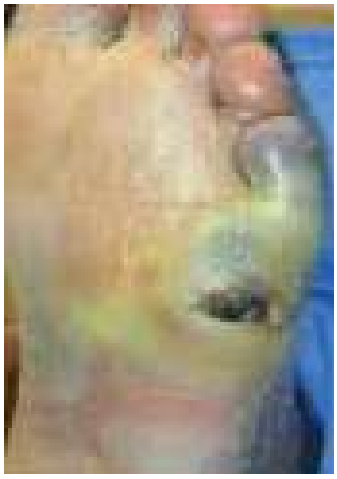
- Duration of diabetes is an important contributing risk factor of stroke.

Diabetic Neuropathy

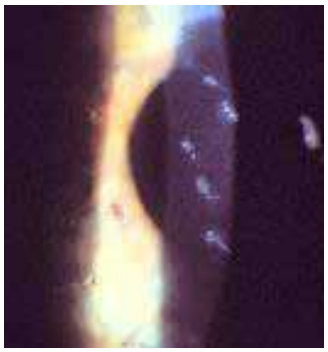
- Maybe asymptomatic
- Neuropathies in diabetes:
    1. Distal symmetrical polyneuropathy or peripheral neuropathy.
    2. Autonomic neuropathy
    3. Proximal asymmetrical neuropathy.
    4. Focal neuropathy

Diabetic Foot

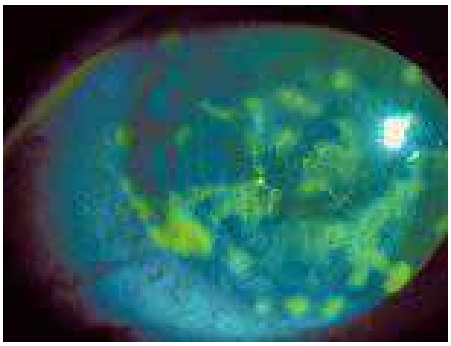
- Loss of peripheral sensation
- Peripheral vascular disease - Gangrene
- Minor injury - major effects
- Leading to foot ulceration and amputation.



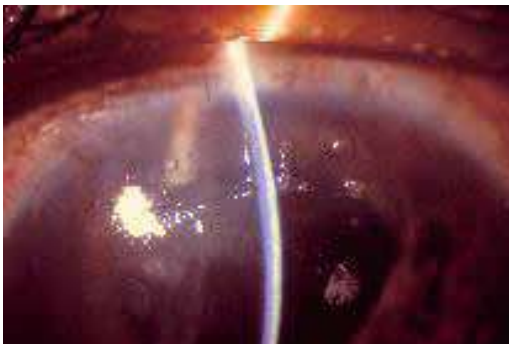
Diabetic Eye Complication



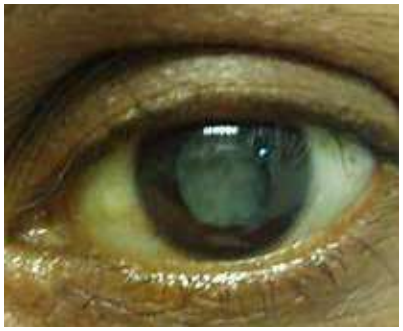
Dry Eyes

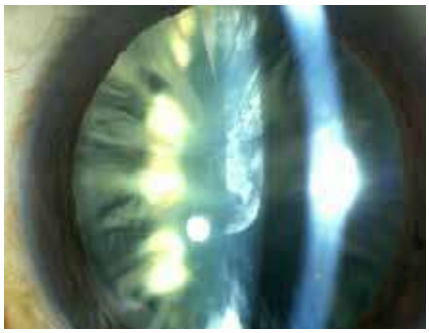


Recurrent Erosions

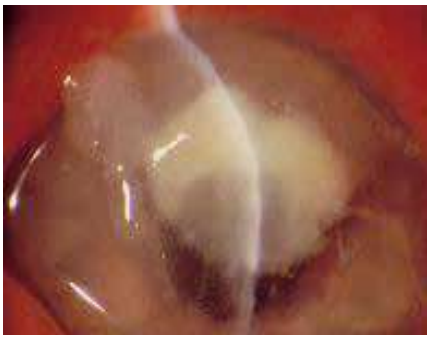


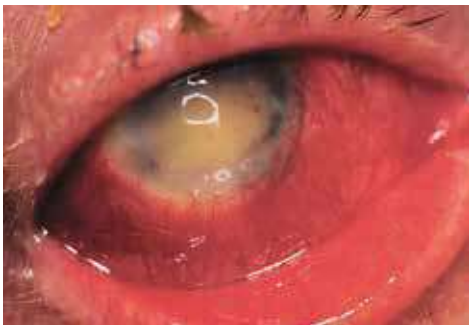
Filamentary Keratitis



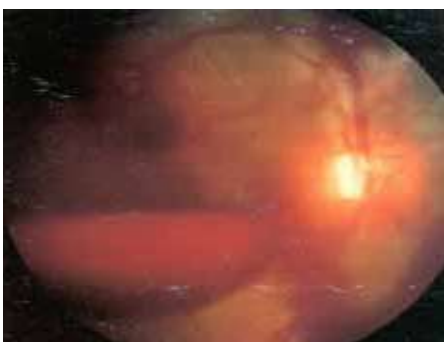


Cataract





Infective Keratitis / Corneal Ulcer



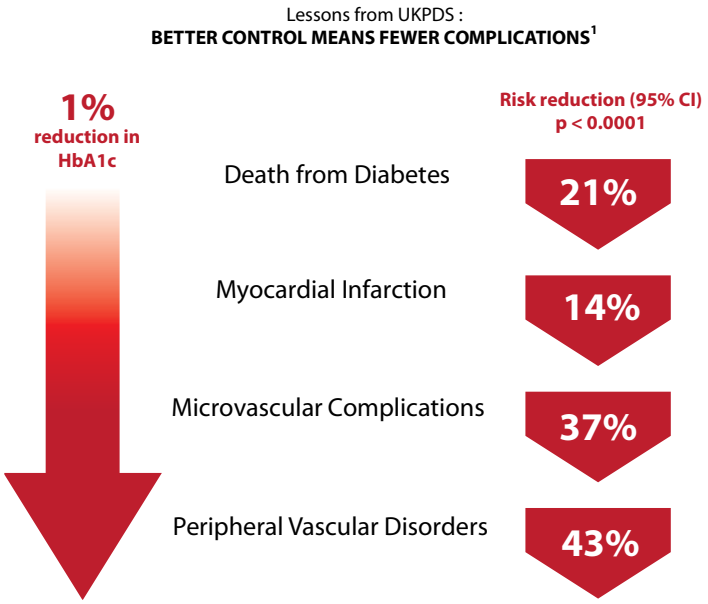
Diabetic Retinopathy

Prevention of Diabetic Complications

1. CONTROL GLUCOSE LEVEL

Glycaemic Measure	Target
Fasting Blood Glucose	4.4-6.1 mmol/L
Non-fasting Blood Glucose	4.4-8.0 mmol/L
HbA1c	< 6.5%

Importance of Good Glucose Control



2. CONTROL BLOOD PRESSURE

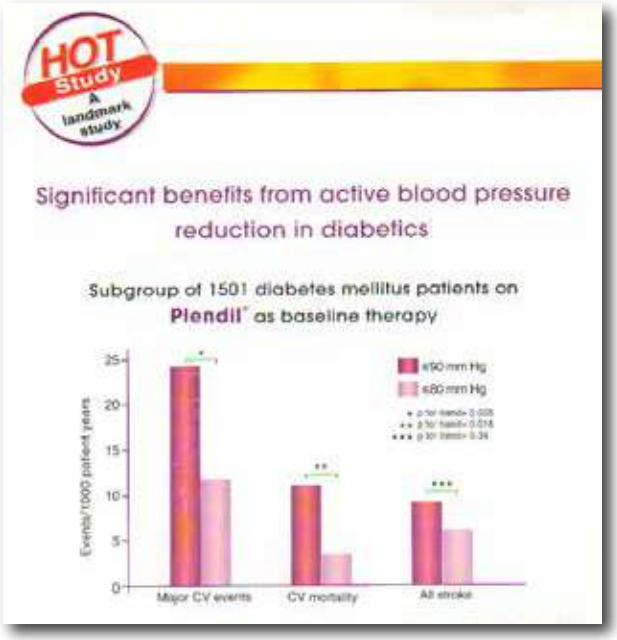
To start antihypertensive drugs if BP:
Systolic >140 mmHg and /or diastolic > 90 mmHg.

Target of treatment:
Systolic < 135 mmHg and diastolic < 75 mmHg.

Reduction of diastolic pressure :

< 90 vs < 80mmHg

51% reduction in heart / vascular disease



3. LOWER CHOLESTEROL LEVEL

Target	
LDL	≤ 2.6 mmol/L
TG	≤ 1.7 mmol/L
HDL	≥ 1.1 mmol/L

4. STOP SMOKING

Important factor in reducing risk of macrovascular and microvascular diseases.

5. EXERCISE

- Exercise 30 min 5 times a week
- Reduce weight (10% weight reduction in 6 months)
- Normal BMI : 18.5 -22.9 kg/ m²

6. HEALTHY DIET

7. EDUCATION

Educator	**- Doctor** **- Nurse** **- AMO** **- Health education officer** **- Dietitian** **- Pharmacist** **- Occupational therapist / Physiotherapist**
Objective	**- Understand the disease, its management and complication** **- Promote compliance and self care** **- Reassure and alleviate anxiety**
Education Plan	**1. What is diabetes** **2. Managing blood sugar level** **3. Hba1c measurements** **4. Self monitor blood glucose target level** **5. Drugs (dose and side effect)** **6. Managing hypo and hyperglycemia** **7. Monitoring and managing complications** **8. Foot care** **9. Diet and exercise** **10. Stop smoking**

Clinical Monitoring Schedule

Test	Initial Visit	3-monthly visit	Annual visit
Weight	√	√	√
Waist circumference	√	√	√
BMI	√	-	√
Blood Pressure	√	√	√
Eye: Visual acuity	√	-	√
Fundoscopy	√	-	√
Feet: Pulses	√	√	√
Neuropathy	√	√	√
Dental Check-up	√	√ (6-monthly)	√
Blood Glucose	√	√	√
A1c	√	√	√
Cholesterol/HDL cholesterol	√	+	√
Triglycerides	√	+	√
Creatinine/BUSE	√	+	√
Liver function test	√	-	√
Urine microscopy	√	-	√
Albuminuria*	√	+	√
ECG**	√	+	√

* Microalbuminuria if resources are available; ** At initial visit and if symptomatic.

• Modified from Asian-Pacific Type 2 Diabetes Policy Group and International Diabetes Federation (IDF) Western Pacific Region: Type 2 Diabetes Practical Targets and Treatments, 2005. [178 (Level III)]

√	Conduct test
+	Conduct test if abnormal on 1st visit or symptomatic
-	No test required

CONCLUSIONS

Early detection and effective risk factor management would avoid diabetic complications and reduce morbidity & mortality impact.

MODULE 3

Diabetic Retinopathy

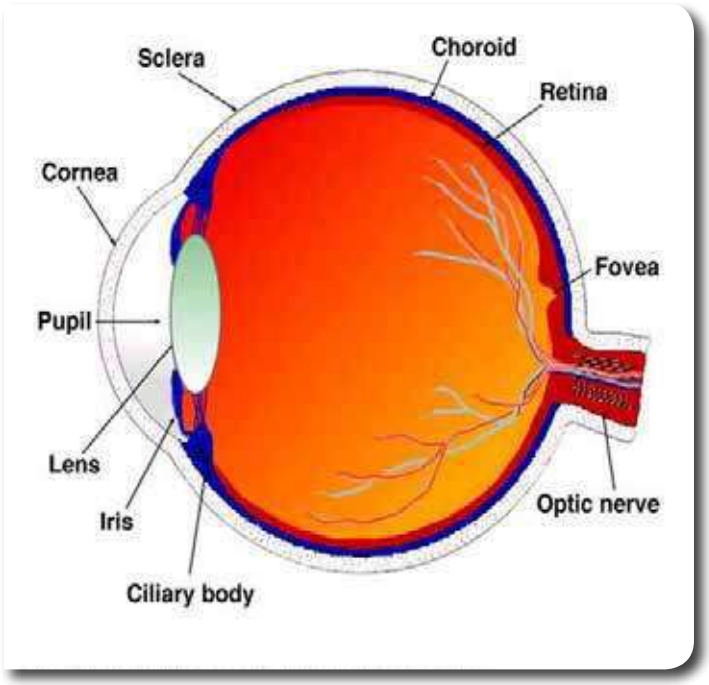
MOH Diabetic Retinopathy Screening Team

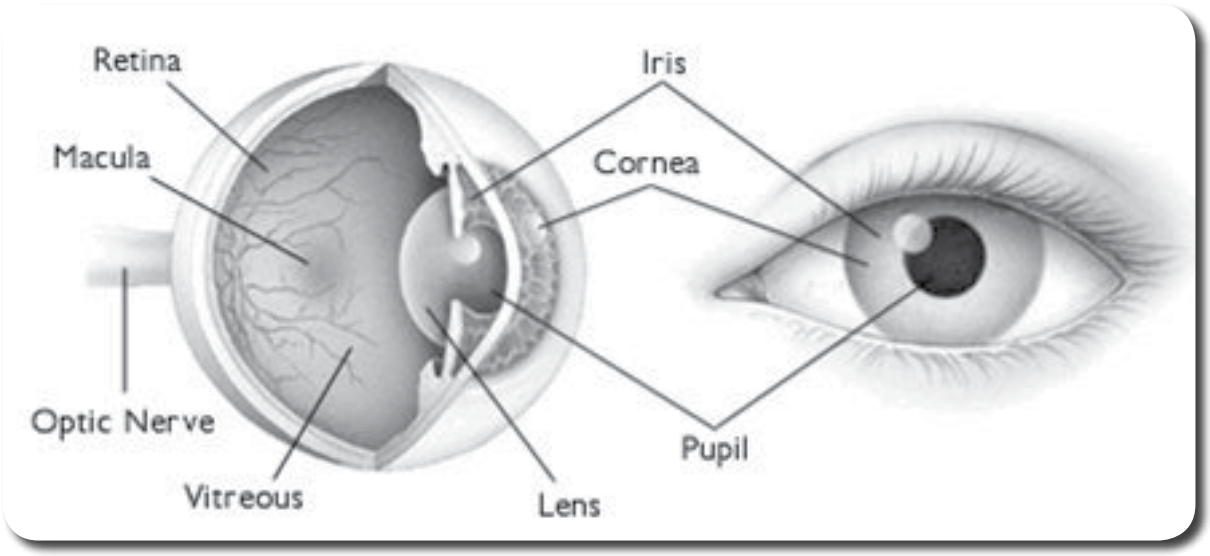
Diabetic Retinopathy

Scope of Presentation

- Anatomy of the eye
- Pathogenesis of Diabetic Retinopathy
- Symptoms and Risk Factors
- Grading of Diabetic Retinopathy and Maculopathy
- Examination Schedule and Treatment

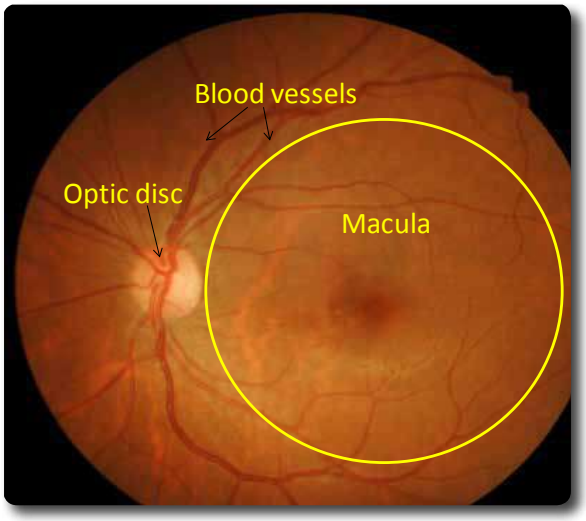
Anatomy of the Eye





Normal Fundus

Left Eye

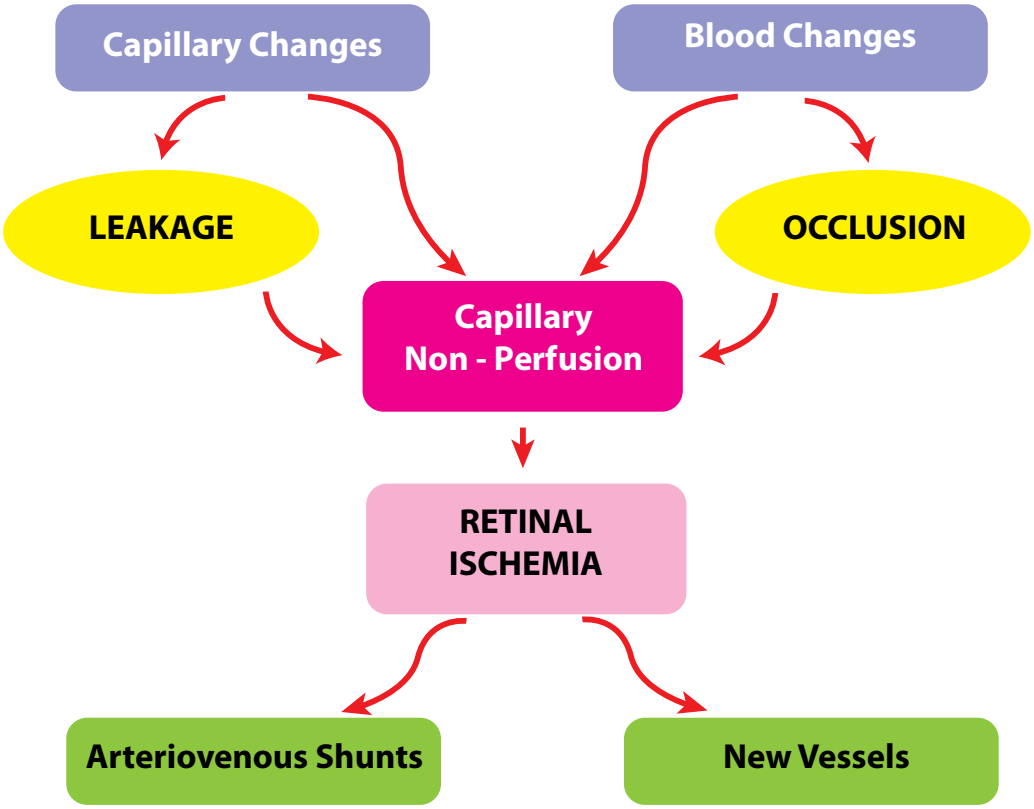


Pathogenesis of Diabetic Retinopathy

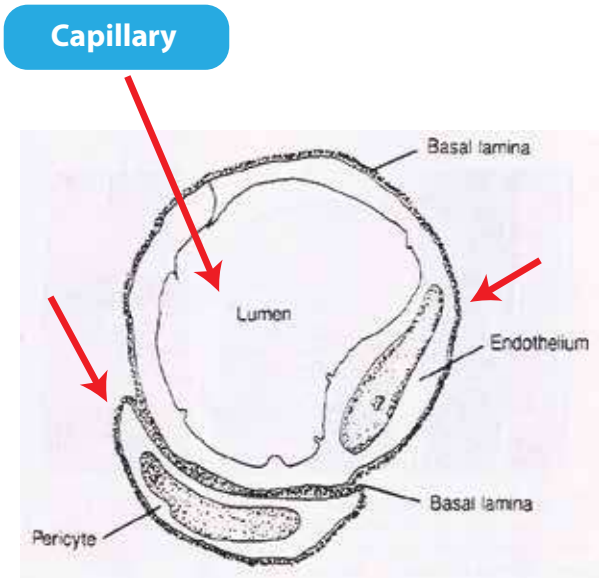
What is Diabetic Retinopathy (DR)?

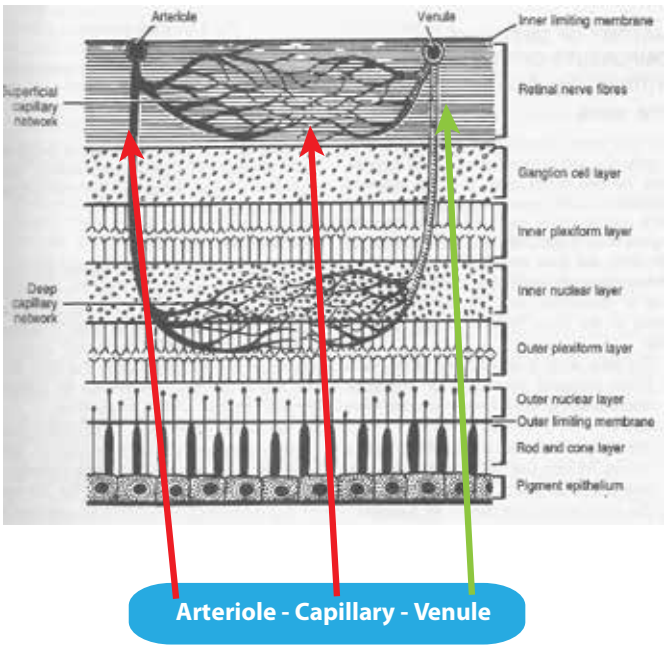
Disease of the retina caused by diabetes that involves damage to the blood vessels in the back of the eye.

Pathogenesis of DR



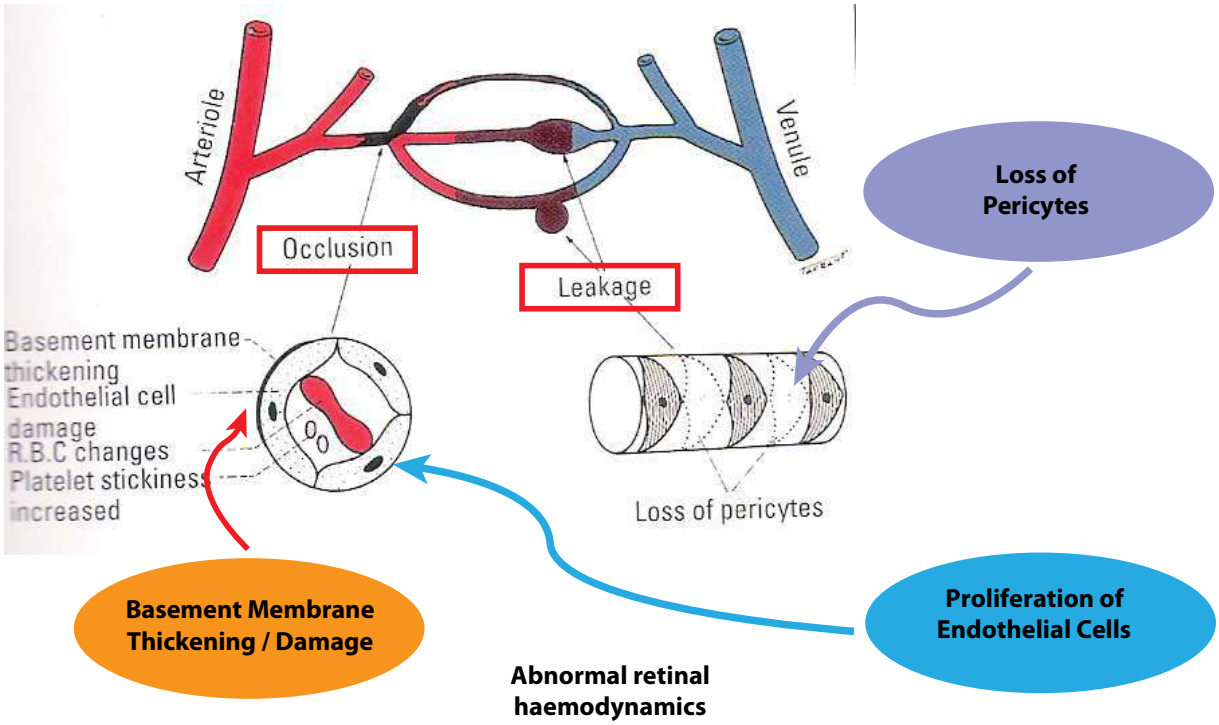
Normal Retinal Blood Vessel





Pathogenesis

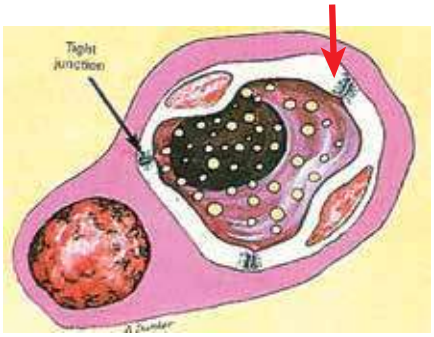
Capillary Changes



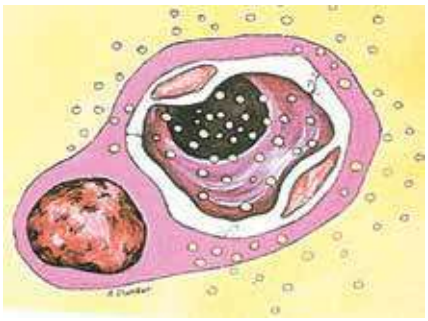
Pathogenesis

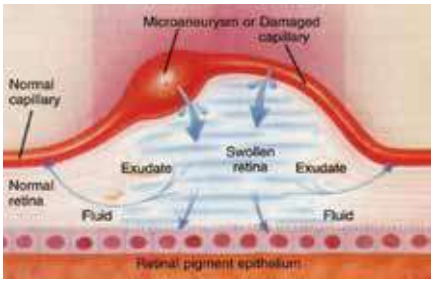
Capillary Changes

Loss of tight junction



LEAKAGE

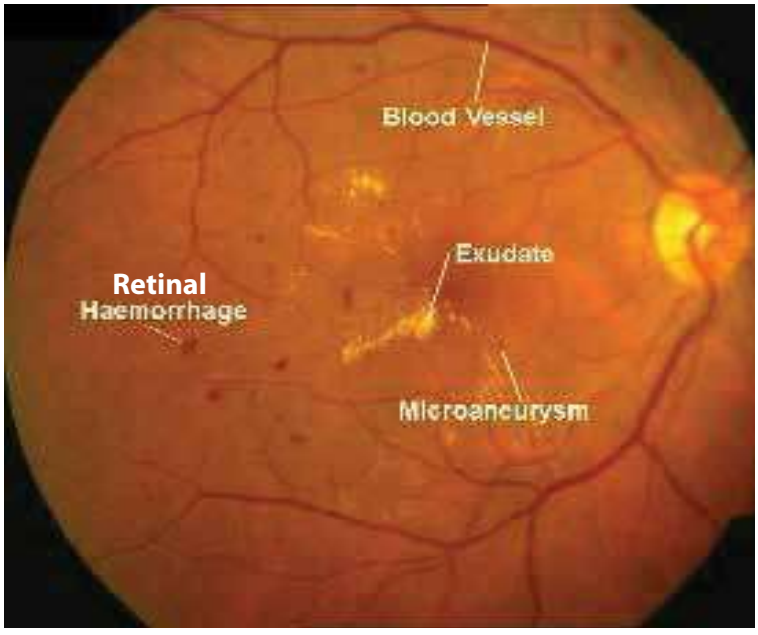




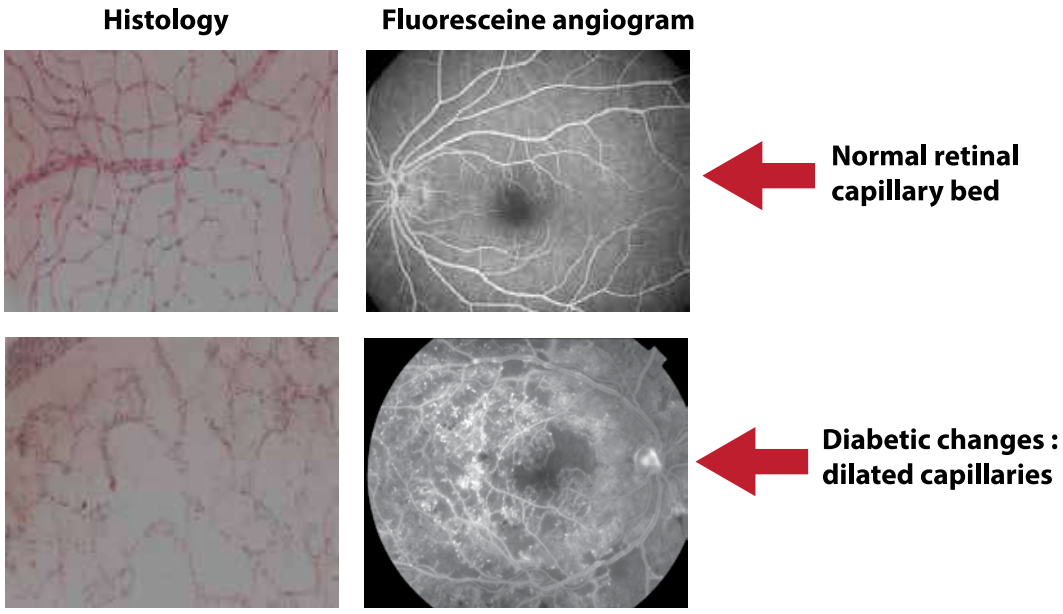
Intraretinal fluid
Hard exudates
Retinal haemorrhage

Pathogenesis

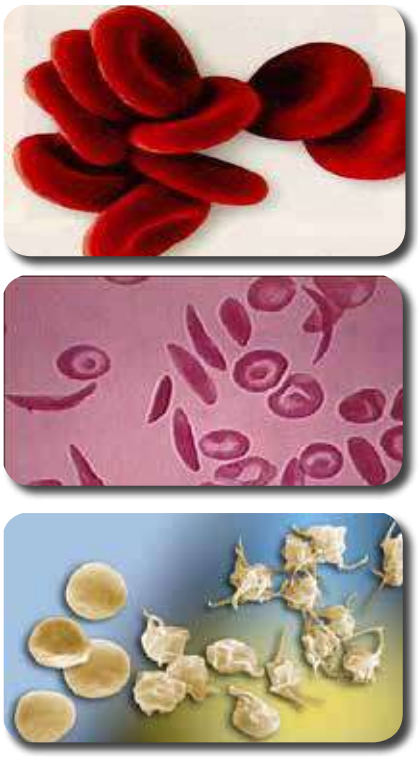
Capillary Changes



Capillary Changes



Haematological Changes



Increased rouleaux formation of RBC

↓

Deformation of RBC

↓

Leukostasis & Increased platelet stickiness & aggregation

↓

Sluggish blood flow & decreased oxygen transport

PATHOGENESIS

Pathogenesis

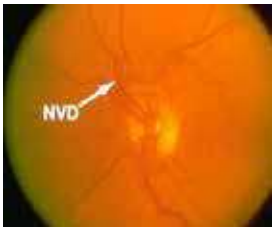
Hypoxic Retina

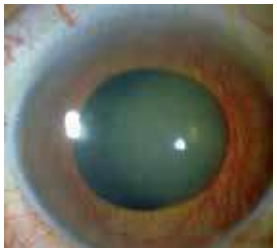
↓

Release of vascular endothelial growth factor (VEGF)

↓

New vessels at retina, optic nerve head & iris (arise from veins)





Symptoms & Risk Factors for DR

Symptoms

Early stage - asymptomatic

Gradual or sudden blurring of vision

'Floaters' - black spots / web-like spots in the visual field

Metamorphopsia - distortion of straight lines

Normal Vision

Diabetic maculopathy vision

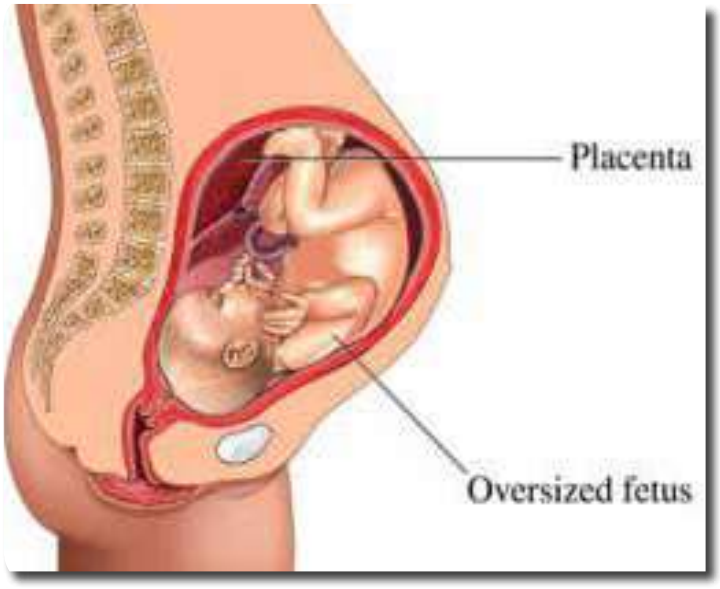
Risks

- Duration of diabetes
- Poor glucose control
- Hypertension
- Renal disease
- Hyperlipidaemia
- Smoking
- Overweight/ Obese
- Pregnancy




DM in Pregnancy

- Ocular examination before, during and after pregnancy
- DR progress rapidly during pregnancy
- Severe NPDR- higher risk
- PDR can bleed during delivery
- Macular edema worsened
- Gestational DM has no risk of DR except if diagnosed in first trimester

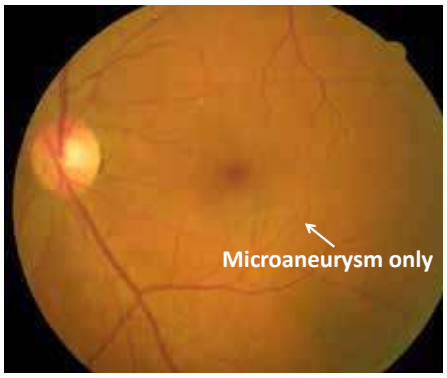


Diabetic Retinopathy Grading

International Clinical Diabetic Retinopathy and Diabetic Mocula Oedema Disease Severity Scale

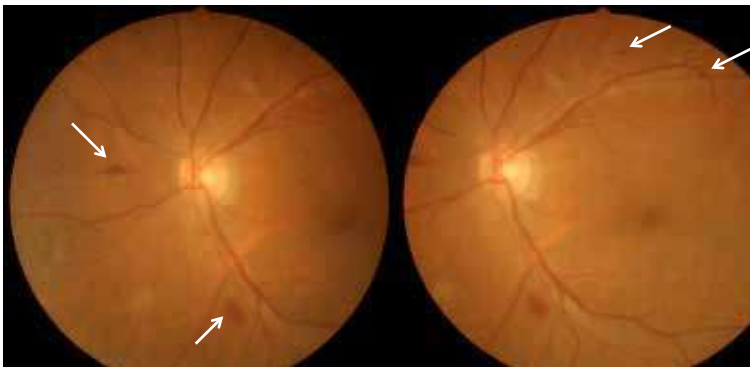
RETINOPATHY STAGE	FINDINGS ON OPHTHALMOSCOPY
No apparent retinopathy	No abnormalities
Mild non-proliferative DR (NPDR)	Microaneurysms only
Moderate NPDR	More than just microaneurysms but less than severe NPDR
Severe NPDR 4-2-1 rule 52-75% progress to PDR	Any of the following : 1. More than 20 intraretinal haemorrhages in each of 4 quadrants. 2. Definate venous beading in 2 or more quadrants. 3. Prominent intraretinal microvascular abnormalities in 1 or more quadrants AND no sign of proliferative retinopathy.

Mild NPDR

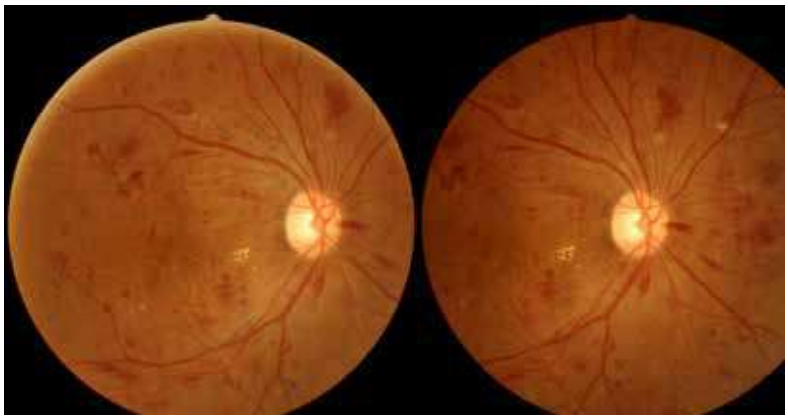


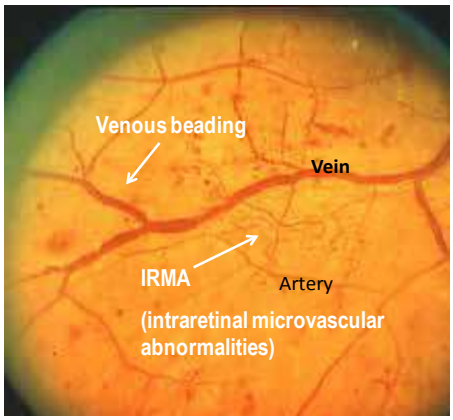
Moderate NPDR

More than just microaneursyms but less than severe NPDR



Severe NPDR

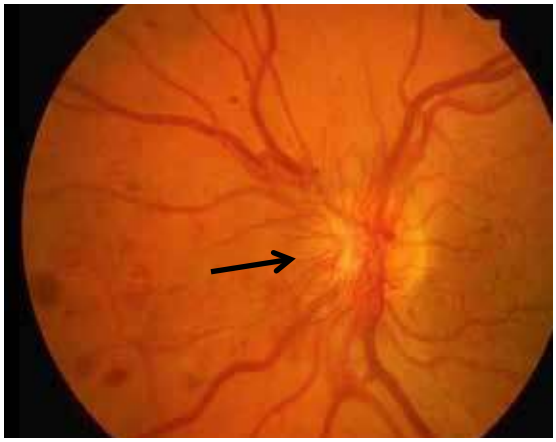




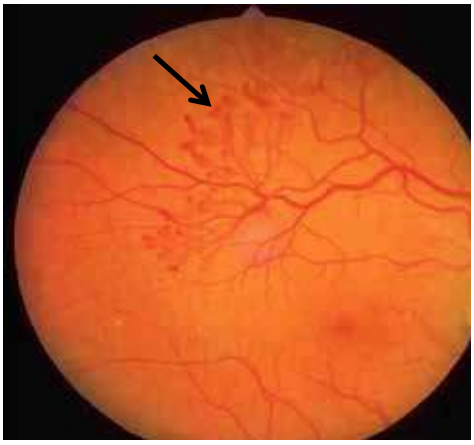
International Clinical Diabetic Retinopathy and Diabetic Mocula Oedema Disease Severity Scale

RETINOPATHY STAGE	FINDINGS ON OPHTHALMOSCOPY
Proliferative DR (PDR)	One of the following : 1. Neovascuarisation 2. Vitreous / preretinal haemorrhage
Advanced Diabetic Eye Disease (ADED)	One of the following : 1. Formation of tibrovascular tissue proliteration 2. Traction retinal detachment due to formation of posterior vitreuos detachment. 3. Dragging of retinal / distortion. 4. Rhegmatogenous retinal detachment.

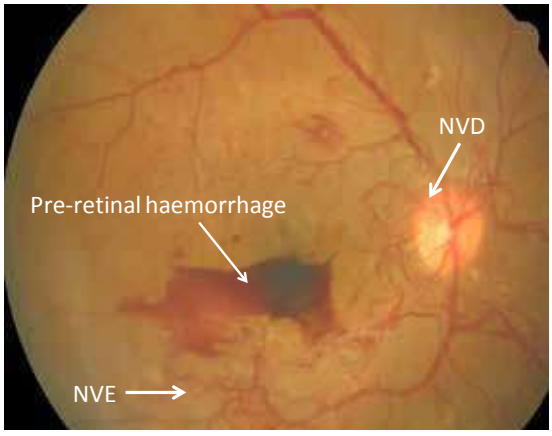
PDR: Neovascularisation at disc (NVD)



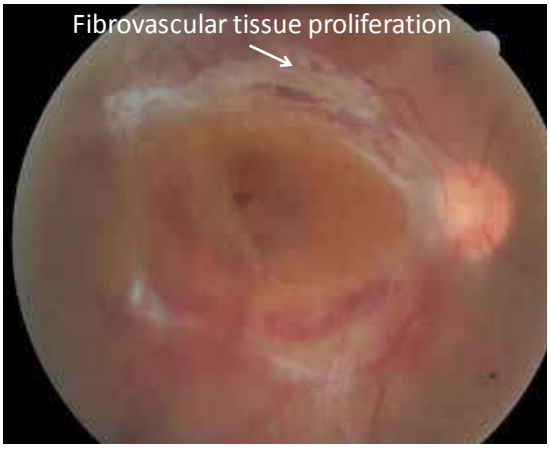
PDR: Neovascularisation Elsewhere (NVE)



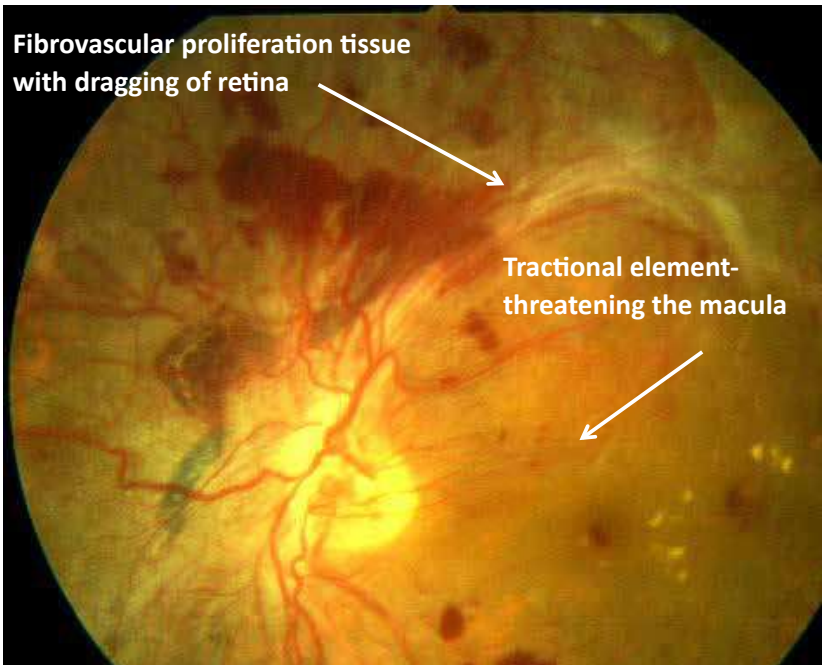
PDR: NVD & NVE with pre-retinal haemorrhage



Advanced Diabetic Eye Disease (ADED)



Advanced Diabetic Eye Disease (ADED)

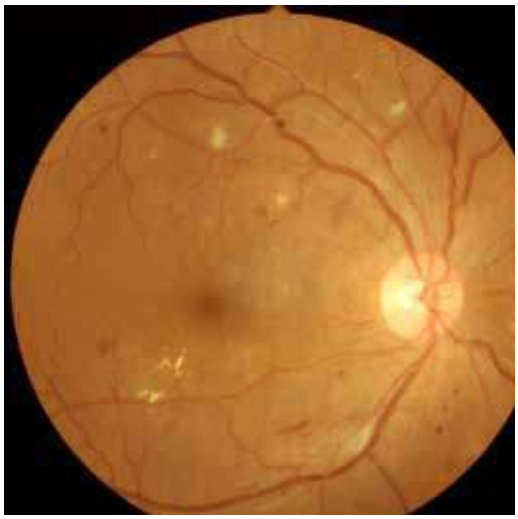


Classification of Diabetic Macula Edema (DME)

MACULA OEDEMA	FINDINGS ON OPHTHALMOSCOPY
Absent	No retinal thickening or hard exudates in posterior pole
Present	• Mild – some retinal thickening or hard exudates in posterior pole but distant from the macula • Moderate – retinal thickening or hard exudates approaching the centre of the macula but not involving the centre • Severe – retinal thickening or hard exudates involving the centre of the macula

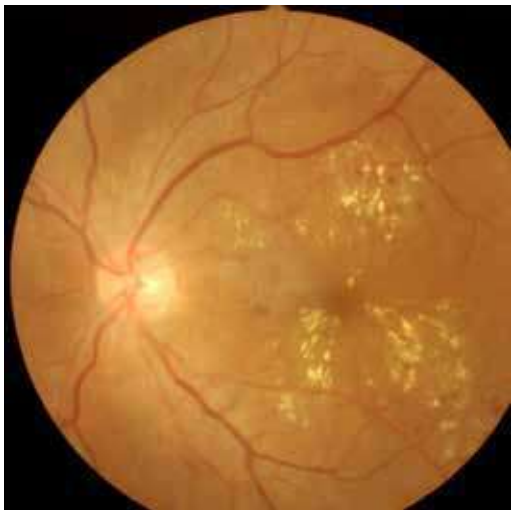
Source: Wilkinson CP, Ferris FL III, Klein RE, et al. Proposed international clinical diabetic retinopathy and diabetic macular edema disease severity scales. Ophthalmology 2003; 110:1679-80

DME: Mild Maculopathy



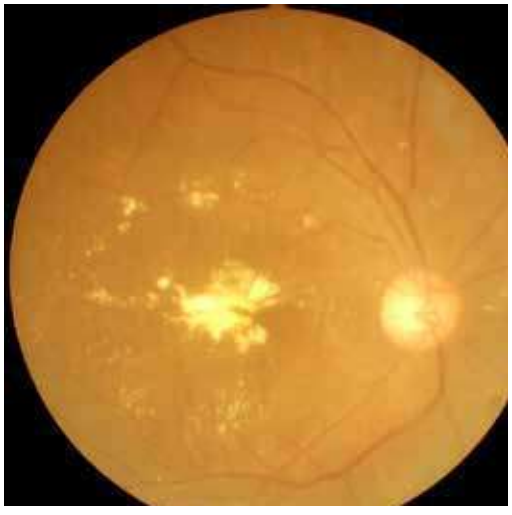
Retinal thickening or hard exudates in macula but distant from fovea

DME: Moderate Maculopathy



Retinal thickening or hard exudates approaching the fovea

DME: Severe Maculopathy



Retinal thickening or hard exudates involving the fovea

Examination Schedule

First screening for diabetic retinopathy (DR) should be done at:

- Adults type 1 DM- up to 3 years after diagnosis

- Adults type 2 DM- at time of diagnosis

- Pregnant women with:
  i. Pre-existing DM- prior to planned pregnancy
  ii. Gestational DM (GDM) diagnosed in the first trimester at the time of diagnosis. Otherwise not required.

- Children T1DM
  i. At age 10 or at onset of puberty if this is earlier, after 2- 5 years of diabetes duration
  ii. Annually thereafter (CPG T1DM 2017)

- Children T2DM- at time of diagnosis

Recommended Follow-up Schedule

STAGE OF RETINOPATHY	FOLLOW-UP
No DR	12 - 24 months
Mild NPDR without maculopathy	9 - 12 months
Moderate NPDR without maculopathy	6 months
Mild/Moderate NPDR with maculopathy	Refer to Ophthalmologist
Severe NPDR without maculopathy	
Any maculopathy	
Proliferative DR	Refer urgently to Ophthalmologist
Advanced Diabetic Eye Disease (ADED)	
No DR to Mild NPDR In Pregnant Women	Every 3 months
Moderate NPDR or Worse In Pregnant Women	Refer to Ophthalmologist

Examination schedule and urgency of referral to an ophthalmologist should be based on grade and severity of DR and consideration of the risk factors

Referral Criteria to Ophthalmologist

Ultimate aim of screening:

- To detect sight threatening DR

Criteria for referral are:

- Any level of Diabetic Maculopathy
- Severe NPDR
- Any PDR
- Unexplained visual loss
- If screening examination cannot be performed including ungradable fundus photo

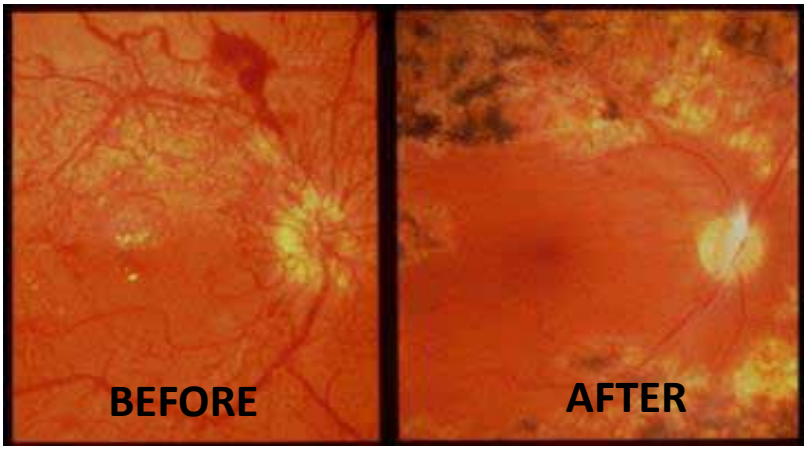
CRITERIA FOR URGENT REFERRAL

URGENCY OF REFERRAL	OCULAR FEATURES
Emergency (same day referral)	• Sudden severe visual loss • Symptoms or signs of acute retinal detachment
Within 1 week	• Presence of retinal new vessels • Preretinal haemorrhages • Vitreous haemorrhage • Rubeosis iridis } PDR
Within 4 weeks	• Unexplained drop in visual acuity • Any form of maculopathy • Severe NPDR • Worsening retinopathy

Treatment for Diabetic Retinopathy

Severe NPDR	• Laser - scattered pan-retinal photocoagulation (PRP)
PDR	• Laser - PRP

Laser treatment- PDR



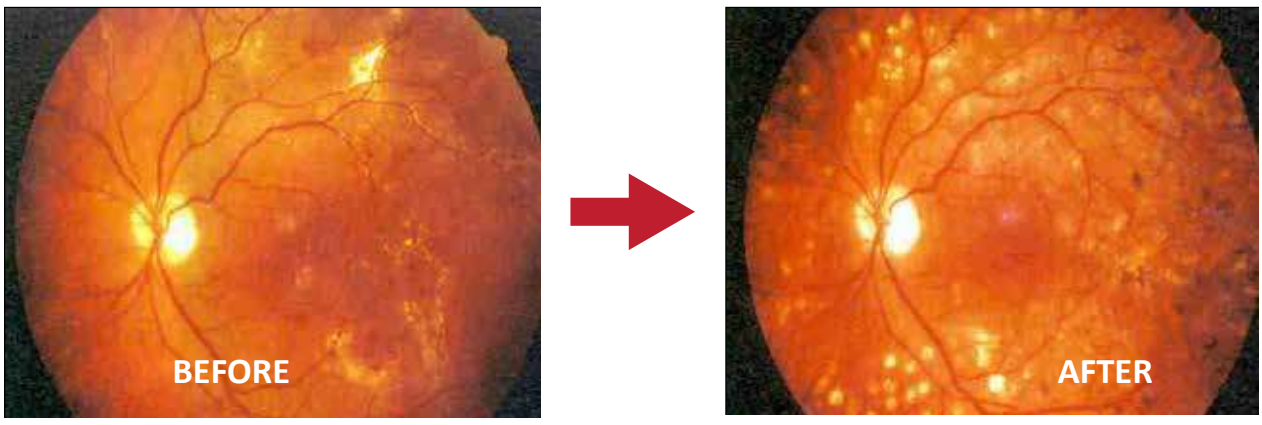
Mechanism of Action:

- Photocoagulation of retina- reduce metabolic & oxygen demand

↓

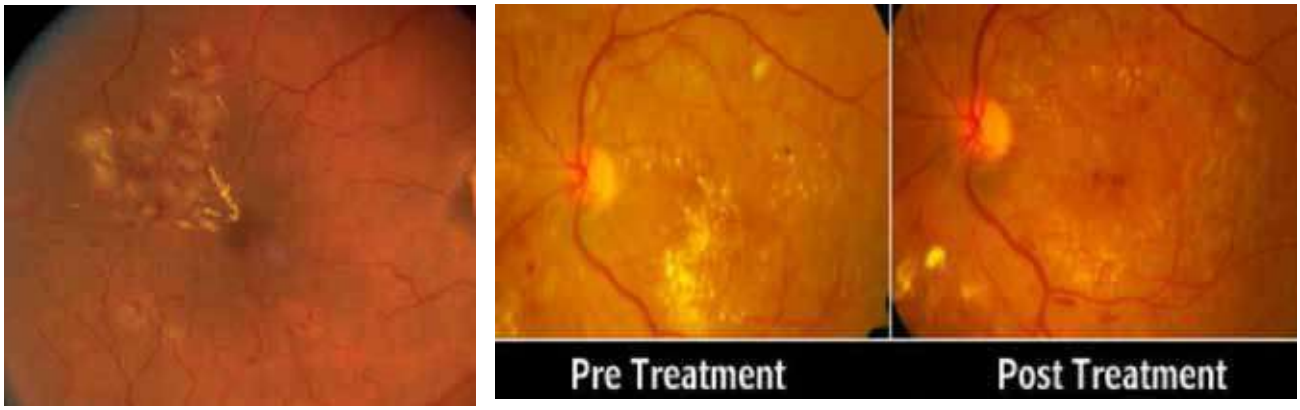
- Regression of new vessel

PDR: Laser PRP

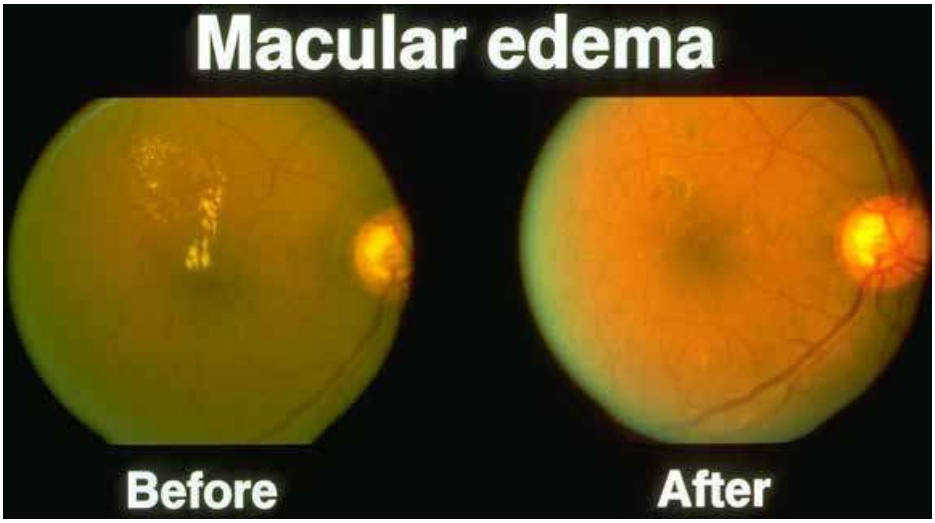


Treatment of DME

STAGE OF DR	MODE OF TREATMENT
DME	• Laser - focal/ grid • Intraocular steroids* • Intraocular anti-vascular endothelial growth factor (anti-VEGF)*



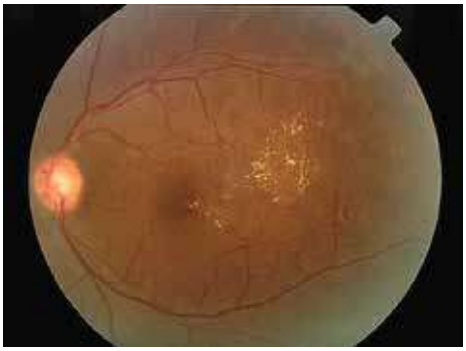
DME: Laser Treatment

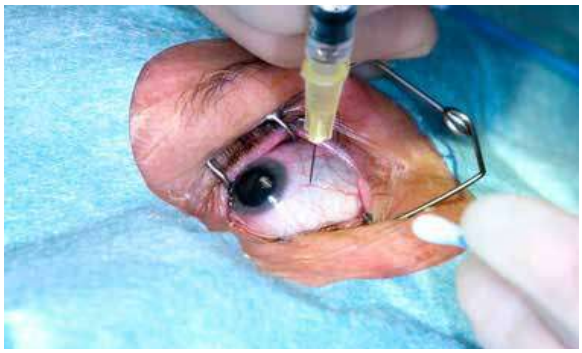


Aim
- To stimulate fluid absorption & to ablate microaneurysm
- Reduce risk of moderate visual loss

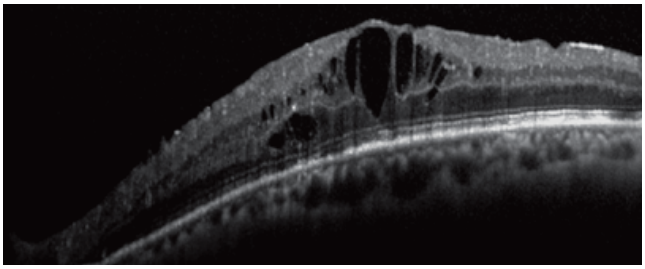
DME: Intravitreal anti-VEGF

Diabetic macula edema

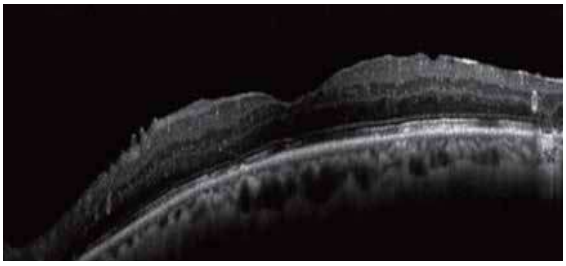




Pretreatment



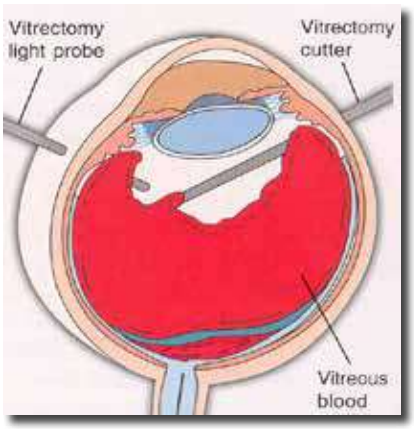
Post - Treatment

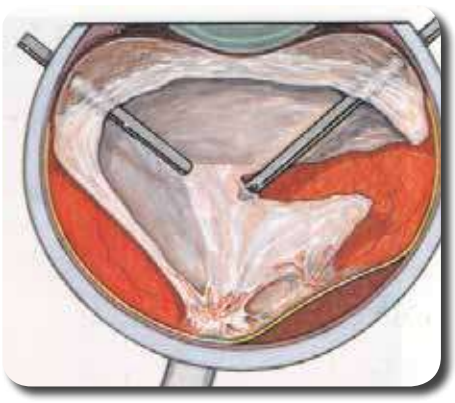


Treatment of DR- ADED

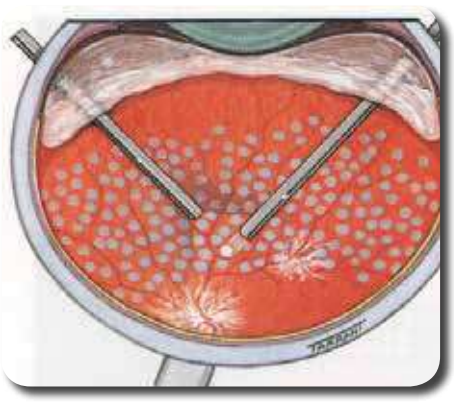
ADED

- Pars plana vitrectomy & endolaser
  - i. To clear vitreous haemorrhage
  - ii. To release fibrous traction & flatten retina





Vitrectomy & membrane peeling



Endolaser

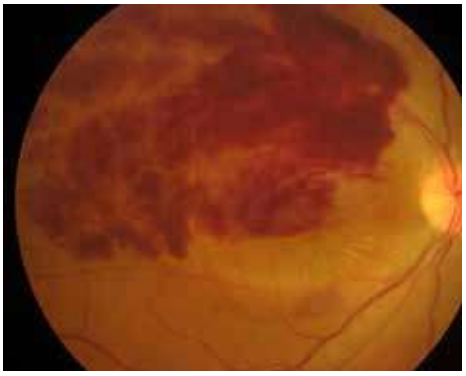
Fenofibrate

Lipid-modifying agent

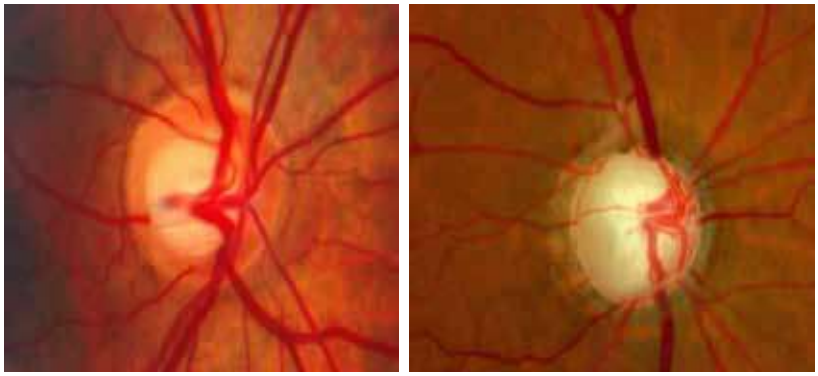
- Systemic treatment option that delays DR progression in patients with mild and moderate DR changes.
- Reduced the progression of diabetic retinopathy by 40%[1]
- Significantly reduced the need for a first laser treatment for DR by 31%[2]

1.. ACCORD Study Group and ACCORD Eye Study Group. N Engl J Med 2010;363:233-44
2. FIELD Study Investigators. Lancet 2005;366:1849-61

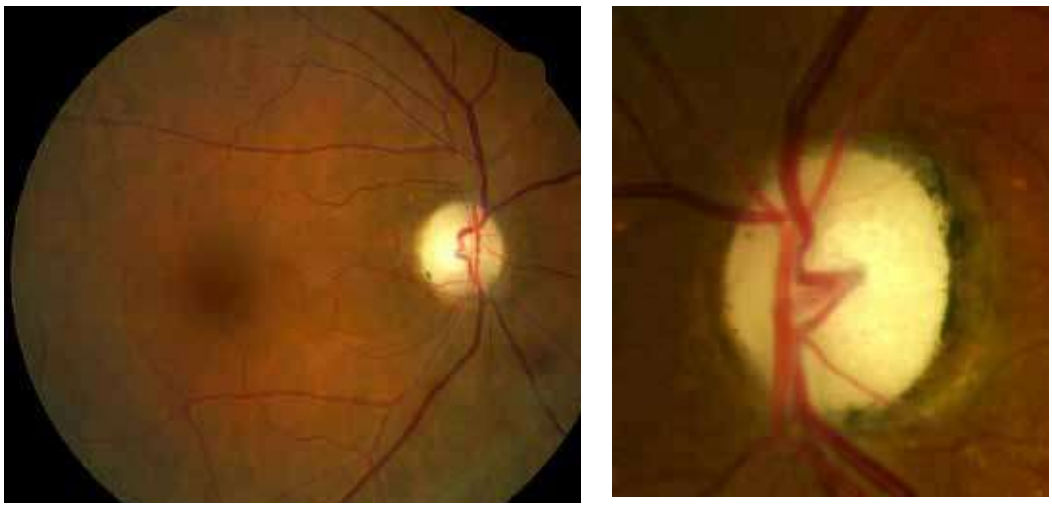
Other Retinal Abnormalities



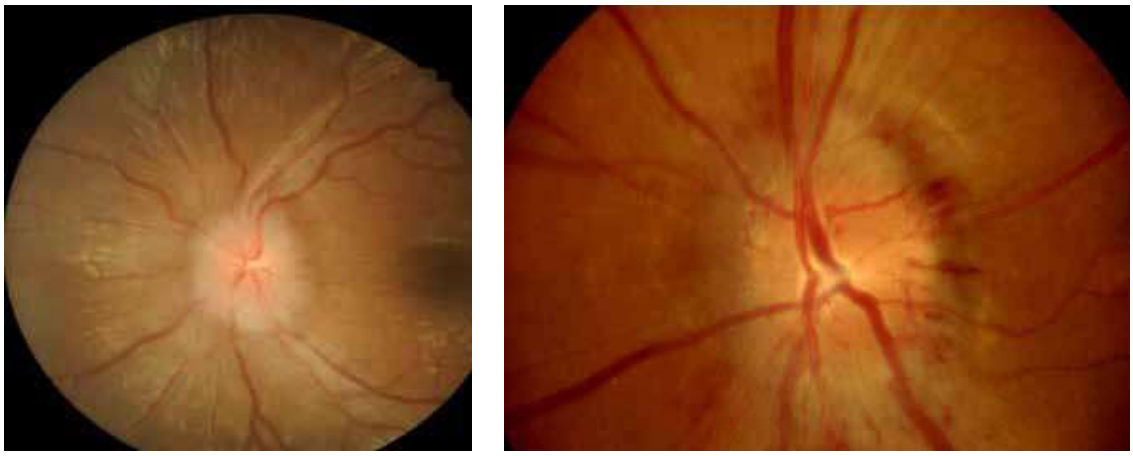
Retinal Vein Occlusion



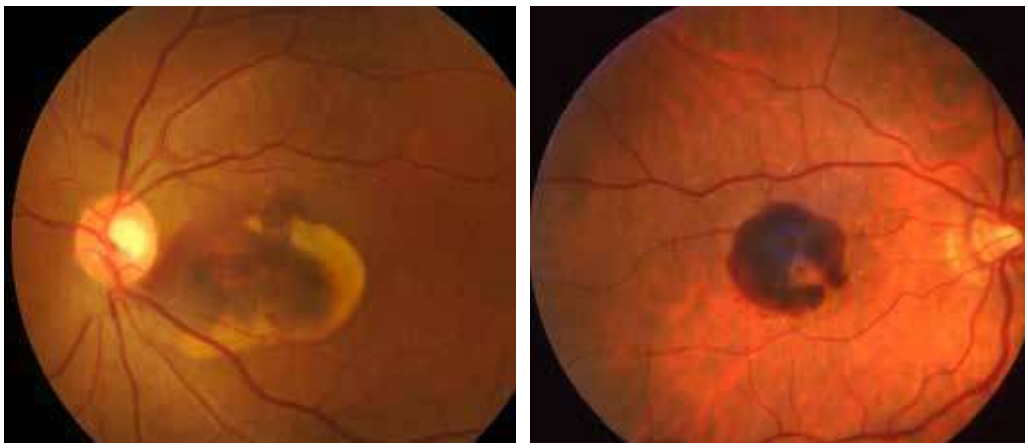
Glaucoma



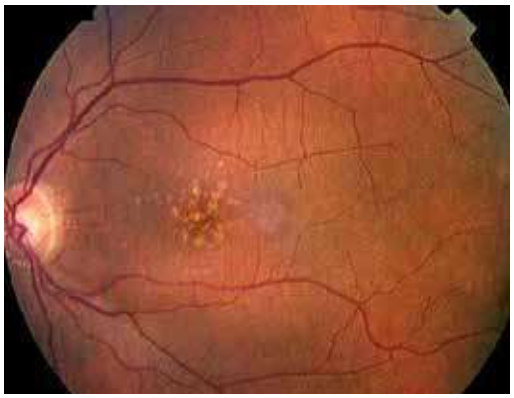
Optic Disc Atrophy



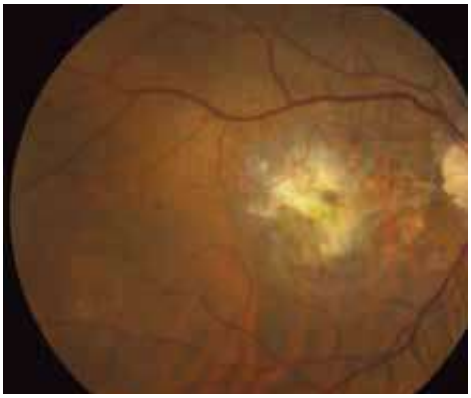
Optic disc swelling



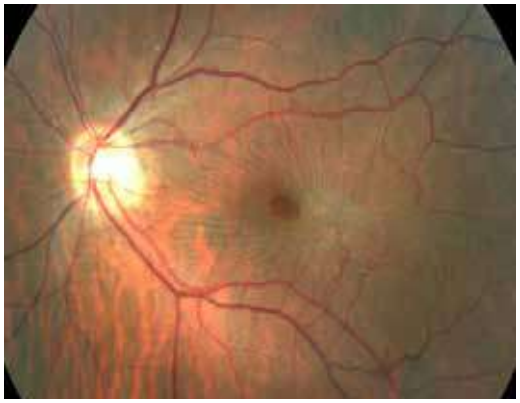
Wet Age Related Macula Degeneration (AMD



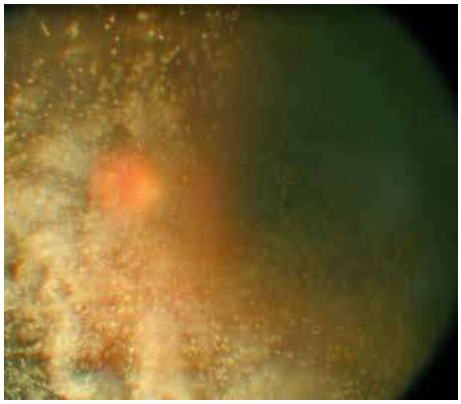
Dry AMD



Macula Scar



Macula Hole



Asteroid Hyalosis

MODULE 4

Introduction to Fundus Camera & Visual Assessment

MOH Diabetic Retinopathy Screening Team

Kamera Fundus

Pengenalan

Terdapat pelbagai alatan untuk Saringan Diabetik Retinopati. Contohnya :

- *Direct Ophthalmoscope*
- *PAN-ophthalmoscope*
- *Binocular Indirect ophthalmoscope (BIO)*
- *Slit lamp*
- Kamera fundus
    - i. *mydriatic* (anak mata perlu dibesarkan)
    - ii. *non-mydriatic*

Kebanyakan alat-alat pemeriksaan memerlukan kemahiran dan pengetahuan dalam pengendalian. Kamera fundus *non-Mydriatic* mudah digunakan oleh semua lapisan anggota kesihatan dan penggunaannya disarankan oleh CPG untuk saringan Diabetik Retinopati.

Kamera Fundus *(Non - Mydriatic)*

- Mudah digunakan
- Mesra pesakit
- Mesra pengguna
- Jimat masa & kos
- Dilatasi anak mata jika perlu

Komponen Kamera Fundus – *Non Mydriatic*

- Kamera digital
- Komputer
- Sistem Perisian *(software)*

Kamera Digital

- Gambar digital berkualiti tinggi.

- Gambar fundus dapat dilihat serta-merta dan ditunjuk kepada pesakit.

- Pesakit lebih memahami keadaan mata mereka.

- Mudah dikendalikan.
- Sistem Digital.
- Memudahkan penyuntingan *(edit/ delete)* gambar.
- Membolehkan gambar dianalisis dan direkodkan dalam komputer serta boleh dilihat semula bila perlu.

Fotografi Digital

Dua imej digital diambil menggunakan kamera fundus :

- *Macula* di tengah gambar (central)
- *Optic dis*c di tengah gambar (disc)

Anak mata tidak dibesarkan kecuali jika perlu.

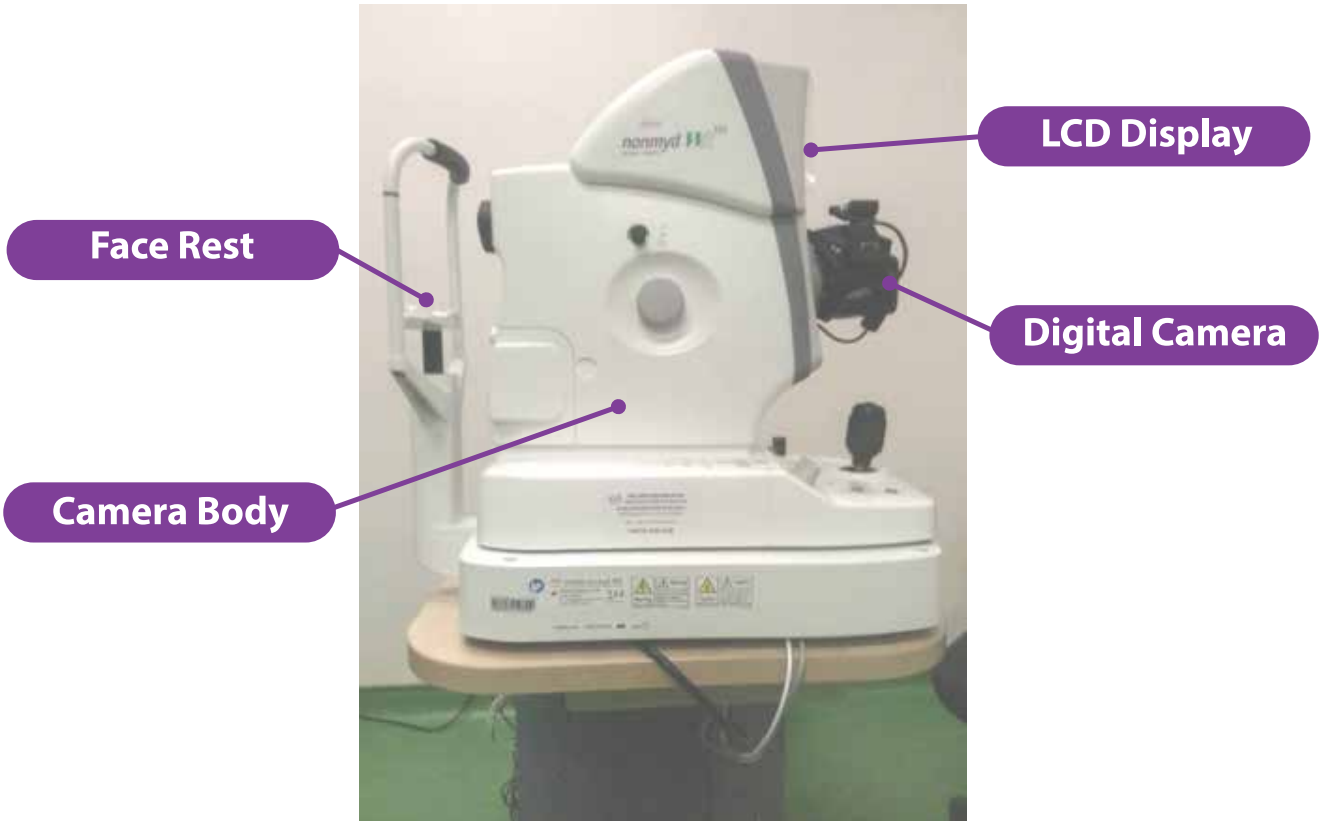
Gambar berkualiti - memerlukan teknik dan pengetahuan tentang fotografi dan perisian.

Kamera Fundus - *Non - Mydriatic*

Terdapat banyak model di pasaran.

Ciri-ciri yang penting untuk diambil kira semasa pembelian kamera fundus :

- Pakej termasuk perisian (software) khusus untuk fotografi fundus.
- Mesra pengguna dan mudah digunakan oleh semua lapisan.
- Bermutu tinggi dan kos efektif.
- Servis yang baik selepas pembelian.
- Menyediakan program latihan dalam pengendalian kamera.



Teknik Fotografi Fundus Yang Baik

- Periksa kamera
- Periksa komputer dan perisian
- Bersihkan lensa
- Penerangan diberikan kepada pesakit
- Dudukkan pesakit dengan selesa
    - Pastikan posisi dagu dan dahi adalah betul

Tidak mendongak

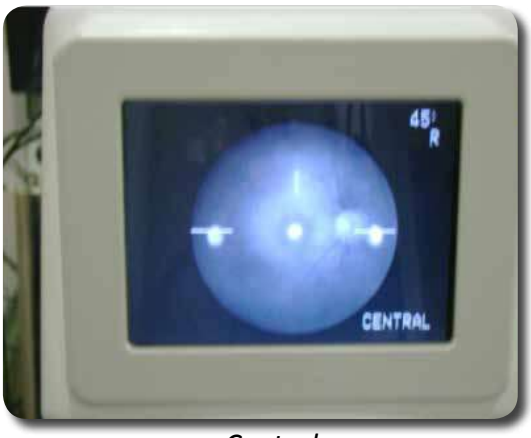
Tidak membongkok

- Dudukkan pesakit dengan selesa
    - Pastikan sudut mata searas dengan tanda

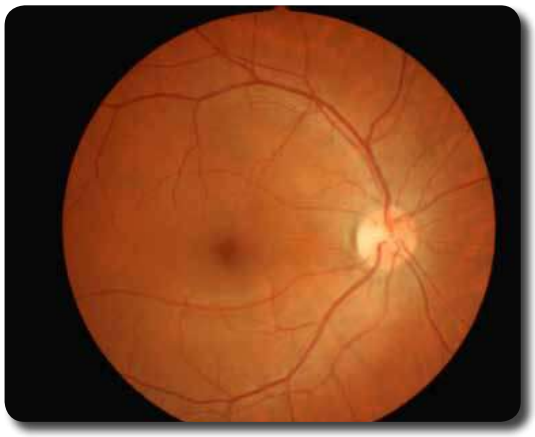
Paras Mata

Teknik Pemfokusan

Allignment

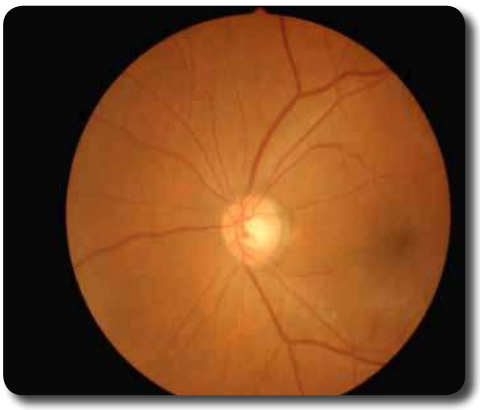


Central



Imej *Macula* di Tengah

Disc (Nasal)



Imej *Optic Disc* di Tengah

Penjagaan Kamera

Tanggungjawab pengguna :
- Pastikan kamera dan suis utama ditutup selepas selesai
- Kunci kamera

- Tutup lensa dengan penutup yang disediakan

- Tutup badan kamera dengan penutup

Sebab-sebab Gambar Tidak Boleh Digredkan

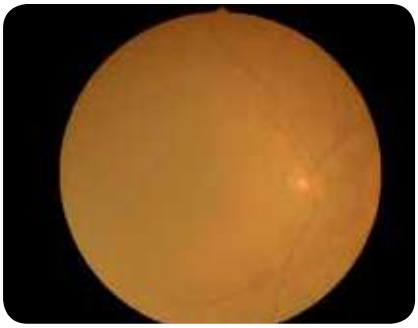
Faktor Pesakit
- Posisi pesakit yang tidak betul
- Pesakit yang tidak memberikan kerjasama
- Anak mata terlalu kecil
- Gangguan media
    - Masalah kornea
    - Katarak

Faktor Kamera / Pengguna
- Pengguna yang tidak sabar
- Gangguan daripada persekitaran
    - Bilik terlalu terang
- Lensa yang kotor
    - permukaan luar dan dalam
- Skrin komputer kotor.

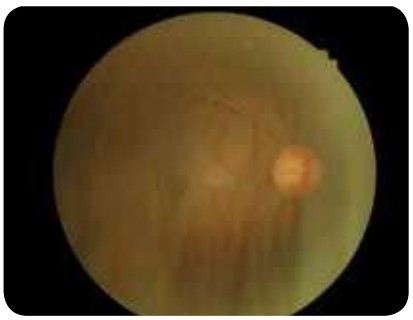
Contoh Gambar Yang Tidak Boleh Digredkan

Lensa Kotor

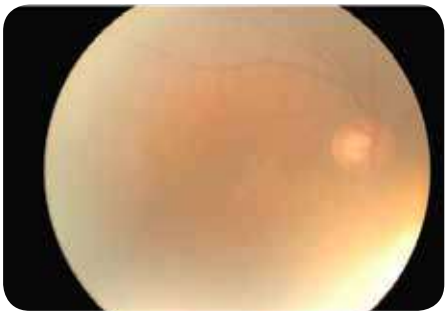
Posisi pesakit tidak betul



Katarak



Gangguan bulu mata



Anak mata kecil

Trouble Shooting in Fundus Photography

1. Dark Rim around the photo / shadow on photo

Reason : Small pupil

Solution : Dim room, Pad other eye, Dilate with Gutt Tropicamide

2. Artifacts on photo

Reason : Dry Cornea surface, Dirty camera lens

Solution : Patient to blink, Clean lens surface

3. Poor Red Reflex

Reason : Cataract

Solution : Refer Ophthalmologist

4. Out of focus point

Reason : Tilted head position

Solution : Position patient properly

Visual Assessment

Visual Acuity (VA)

Definition : Ability to resolve fine detail

3 principal measures of V/A
- unaided VA : vision
- habitual VA : with patient`s own (presenting) spectacles
- optimal VA : with best refraction (BCVA) correction

Should be done on all patients as the first procedure

Equipment for VA testing

- Snellen Chart
- Occluder
- Pin hole
- Pointer
- Mirror if testing distance is at 3 meters

Distance VA

Tested @ 6 meters/ 20 feet

Snellen chart :
- widely available & used
- can be used as direct (6m) or indirect (3m with mirror)
- consist of alphabets, numbers, letter E, pictures
- each row is denoted by a number : 60, 36, 24, 18,12, 9, 6 and 5

Recording of VA

Snellen fraction: example 6/24

6 : testing distance that is 6 meters

24: the smallest snellen row that can be read by patient or

24: the distance at which a normal person can see

6/24 -1 : patient cannot read one alphabet from row 24

6/24 +1 : patient can read all alphabets from row 24 and one alphabet from row 6/18

If patient cannot read 6/60

Ask patient to walk towards the chart in 1 meter step /until he can see the largest letter
If he can see the largest letter @

5m : VA is recorded as 5/60
4m : 4/60,
3m : 3/60,
2 m: 2/60,
1m : 1/60 ~ 3 feet

If patient cannot read the biggest letter at 1 meter

Counting fingers (CF) :
Hold your hand @ 3 feet from the patient`s eye, ask if he can count the numbers of fingers that you display

- if patient is unable to count the fingers @ 3 feet, recheck @ 2 feet , than @ 1 foot
- VA denoted as :

CF 3 ft , OR
CF @ 2 ft, OR
CF @ 1 ft

If patient is unable to see counting fingers

Hand movements (HM):

- Use moving hand as the target
- Ask if patient can see the hand moving (@ distance of 1 foot)
- If patient is able to see the hand moving,
- VA is recorded as HM

If patient is unable to see HM

Perception of lights (PL):

- Shine a penlight in front of the patient`s eye (~ 20 inches from patient)
- Position the light in different areas of the patient`s visual field
- If the patient is able to point at the light/ or can tell the presence & absence of light, VA is recorded as PL
- If he cannot, VA is NPL (No perception of lights)

Pinhole (PH) Visual Acuity

- Taken when VA is worse than 6/9
- Purpose : to determine whether reduced VA is due to refractive error OR pathological/ neurological disease
- If VA improves, indicates a refractive error
- If no improvement in VA, indicates amblyopia (lazy eye) or pathological/neurological cause

Testing Method with Pinhole

One eye is occluded

- Place PH before the other eye
- Test the VA
  - recording method ; example:

VA RE : 6/36 unaided 6/18 with PH
VA LE : 6/12 with glasses : 6/9 with glasses & PH

Pearls

Always observe the patient, not the chart, the chart should be memorised by the examiner

Most common errors :

- Allowing patient to decide their acuity i.e not 'pushing' them to guess
- Permitting patients to peep through occluder
- Wrong testing distance
- Not recording results immediately after test

Smart Chart & Projection Chart

Testing Distance :

- As recommended by the manufacturer
- Need to refer to the manual provided

Testing Method :

- Testing principle is the same as Snellen Chart

Smart Chart & Projection Chart

- Most Charts are placed at a distance of 3 meters, hence if patient is unable to read 6/60, vision of 4/60 and 5/60 cannot be assessed.

- However, vision of 3/60 is available from the chart i.e stated as 6/120 which is equivalent to 3/60, hence vision of 2/60 and 1/60 can be assessed.

MODULE 5

Handbook : Guide to Diabetic Retinopathy Screening

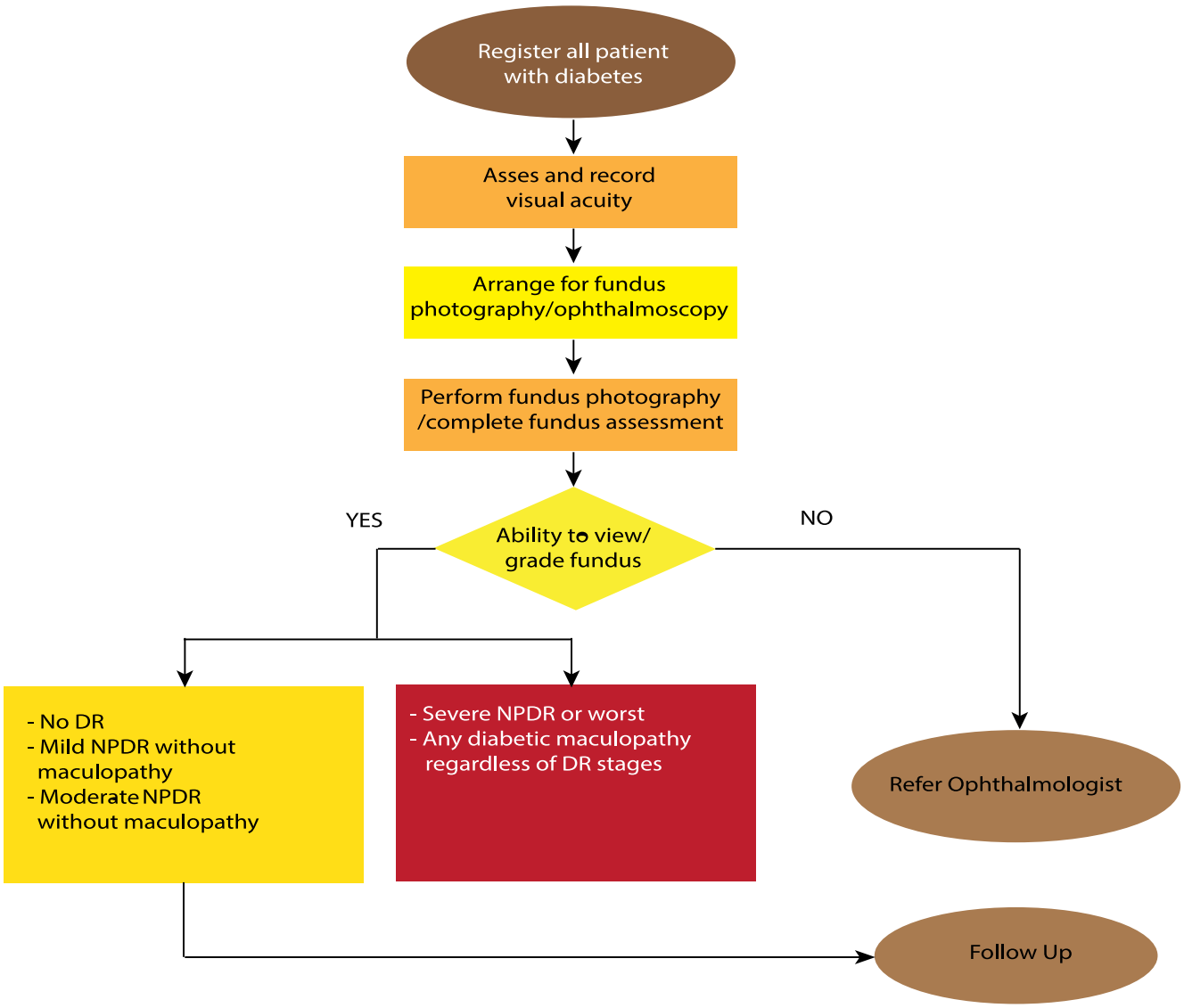
MOH Diabetic Retinopathy Screening Team

HANDBOOK :
GUIDE TO DIABETIC RETINOPATHY SCREENING

Overview

- Work Flow Diabetic Retinopathy screening.
- Examination Schedule
- Assessment Of Diabetic Retinopathy
- Diabetic Retinopathy Grading
- Follow Up Schedule
- Referral
- Credentialing & Privileging(Fundus Photo Grader)

ALGORITHM FOR SCREENING OF DIABETIC RETINOPATHY TO PREVENT BLINDNESS



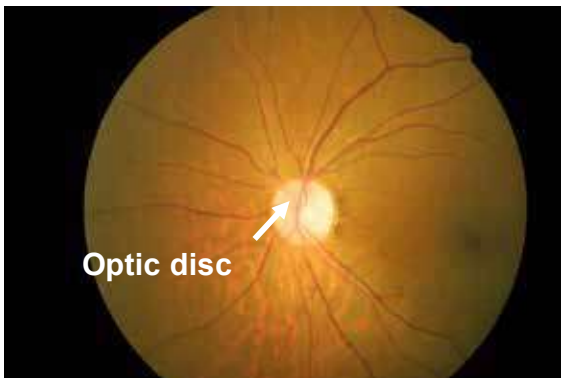
TIMING OF FIRST SCREENING

Type Of DM	Recommended time of 1st screening
Adult Type 1 DM	Up to 3 years after diagnosis
Adult Type 2 DM	At time of diagnosis
Pre-existing DM planning to get pregnant	Prior to conception
Gestational DM diagnosed in the first trimester	At the time diagnosed of GDM
Children T1DM	Start at age 10 or at onset of puberty if this earlier, or after 2 – 5 years diabetes (T1DM CPG 2017)
Children T2DM	At time of diagnosis

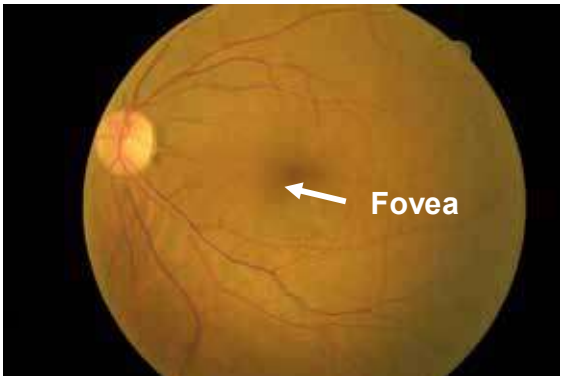
TECHNIQUE OF PHOTOGRAPHY

2 photographs (views) should be taken for each eye:

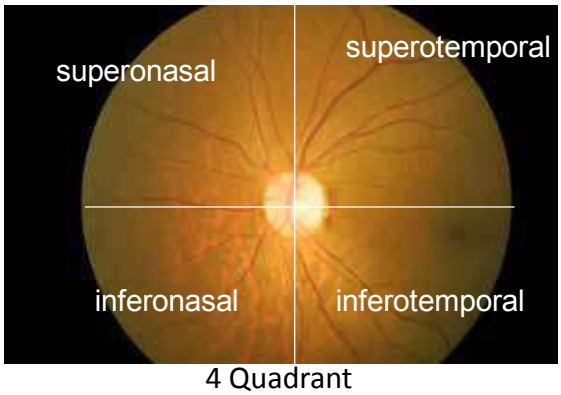
1. Optic disc as the center



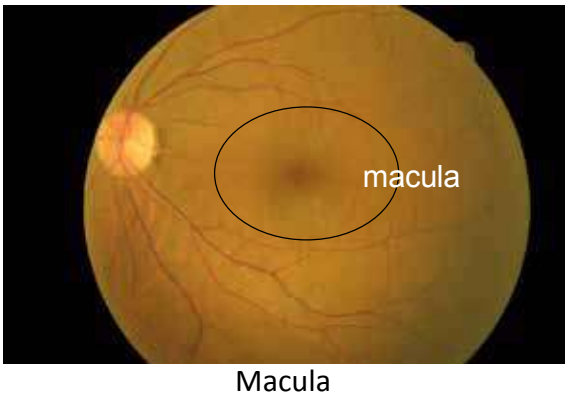
2. Fovea as the center



Normal Fundus

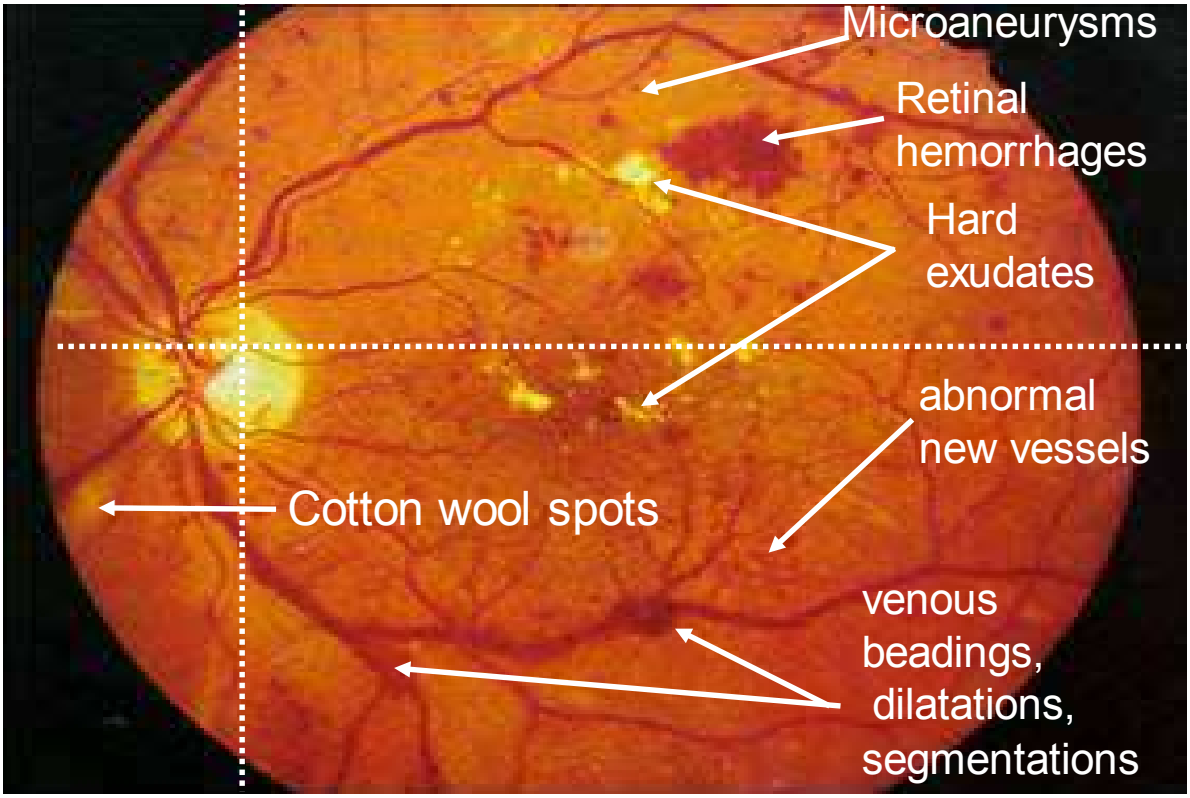


4 Quadrant



Macula

FEATURES OF DIABETIC RETINOPATHY



INTERNATIONAL CLINICAL DIABETIC RETINOPATHY AND DIABETIC MACULA OEDEMA DISEASE SEVERITY SCALE (AMERICAN ACADEMY OF OPHTHALMOLOGY)

RETINOPATHY STAGE	FINDINGS ON OPHTHALMOSCOPY
No apparent retinopathy	No abnormalities
Mild non-proliferative DR (NPDR)	Microaneurysms only
Moderate NPDR	More than just microaneurysms but less than severe NPDR
Severe NPDR	Any of the following : 1. More than 20 intraretinal haemorrhages in each of 4 quadrants 2. Definite venous beading in 2 or more quadrants. 3. Prominent intraretinal microvascular abnormalities in 1 or more quadrants AND no signs of proliferative retinopathy

INTERNATIONAL CLINICAL DIABETIC RETINOPATHY AND DIABETIC MACULA OEDEMA DISEASE SEVERITY SCALE (AMERICAN ACADEMY OF OPHTHALMOLOGY)

RETINOPATHY STAGE	FINDINGS ON OPHTHALMOSCOPY
Proliferative DR (PDR)	One of the following : 1. Neovascularization 2. Vitreous/preretinal haemorrhage
Advanced Diabetic Eye Disease (ADED)	One of the following : 1. Formation of fibrovascular tissue proliferation 2. Traction retinal detachment due to formation of posterior vitreous detachment 3. Dragging of retinal/distortion 4. Rhegmatogenous retinal detachment

MACULA EDEMA	FINDINGS ON OPHTHALMOSCOPY
Absent	No retinal thickening or hard exudates in posterior pole
Present	• Mild – some retinal thickening or hard exudates in posterior pole but distant from the macula • Moderate – retinal thickening or hard exudates approaching the centre of the macula but not involving the centre • Severe – retinal thickening or hard exudates involving the centre of the macula

RECOMMENDED FOLLOW UP SCHEDULE

STAGE OF RETINOPATHY	FOLLOW-UP
No DR	12 – 24 months
Mild NPDR without maculopathy	9 - 12 months
Moderate NPDR without maculopathy	6 months
Mild/moderate NPDR with maculopathy	Refer to Ophthalmologist
Severe NPDR without maculopathy	
Any maculopathy	
Proliferative DR	
Advanced Diabetic Eye Disease (ADED)	
No DR to Mild NPDR In pregnant Women	Every 3 months
Moderate NPDR or worse in pregnant women	Refer to Ophthalmologist

CRITERIA FOR URGENT REFERAL

URGENCY OF REFERRAL	OCULAR FEATURES
Emergency (Same day referral)	• Sudden severe visual loss • Symptoms or signs of acute retinal detachment
Within 1 week	• Presence of retinal new vessels • Preretinal haemorrhage • Vitreous haemorrhage • Rubeosis iridis
Within 4 week	• Unexplained drop in visual acuity • Any form of maculopathy • Severe NPDR • Worsening retinopathy

CREDENTIALING & PRIVILEGING (FUNDUS PHOTO GRADING)

1. Candidates : FMS, MO at KK, PPP / SN who are involved in Diabetic Programme

2. Attending Diabetic Retinopathy Screening workshop with 5 modules.

3. Sit for Photo Grading Exam, answer 50 question and must pass 80%.

4. C&P will be given by C&P committee at National Level.

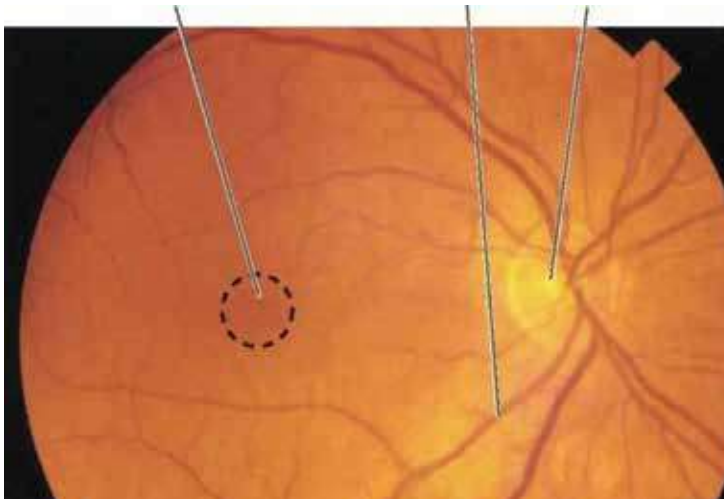
PRE & POST TEST

MOH Diabetic Retinopathy Screening Team

Pre & Post Test

1. Anatomy of retina.

A._____ B._____ C._____



2. What are diabetic retinopathy screening tools?

a. _____

b. _____

c. _____

3. State 3 risk factors of diabetic retinopathy

a. _____

b. _____

c. _____

4. Answer true or false :-

a. Patient with good control of DM will stop the progression of DR. T/F

b. Pregnancy will cause progression of DR . T/F

c. If patient is asymptomatic, DR screening is not essential. T/F

d. Patient with GDM diagnosed at 28 weeks needs to undergo screening. T/F

5. When to screen for complication of DR in adult. :-

a. Type 2 DM : _____

b. Type 1 DM: _____

6. What is the age recommendation for screening of DR in children type 1 diabetes?

a. _____

b. _____

7. List three systemic complication of DM other than DR. ?

a. _____

b. _____

c. _____

8. List three eye complication secondary to Diabetes Mellitus.

a. _____

b. _____

c. _____

9. A 32 year old malay lady, known case of DM on oral anti diabetic agent. She planned to get pregnant. What is the recommended time for fundus examination for her.

_____

_____

_____

10. A 39 year old indian lady, currently pregnant at 10 weeks of gestation (1st Trimester). She is not known to have diabetes before pregnancy. But her MGTT and BSP showed that she had gestational diabetes. When is the recommended time for fundus examination for her?

_____

_____

_____

11. List 4 symptoms of Diabetic Retinopathy.

a. _____

b. _____

c. _____

d. _____

12. What are the 2 main pathogenesis of Diabetic Retinopathy.

a. _____

b. _____

13. List stages of Diabetic Retinopathy.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

14. Below are the findings in severe NPDR.

A. More than 20 intraretinal haemorrhage in each of four quadrant. T/F

B. Definite venous beading one quadrant only. T/F

C. Prominent IRMA in one or more quadrants. T/F

D. Neovascularization. T/F

15. Below are the findings in Proliferative Diabetic Retinopathy.

A. Vitreous or preretinal haemorhage. T/F

B. Hard exudate at peripheral retina.T/F

C. Cotton wool spot. T/F

D. Neovascularization (new vessel) T/F

16. List 2 findings in Advanced Diabetic Eye Disease.

a. _____

b. _____

17. List 2 findings in diabetic macula edema.

a. _____

b. _____

18. Fill in the recommendation follow up schedule.

No DR	
Mild NPDR without maculopathy	
Moderate NPDR without maculopathy	
No DR to mild NPDR in pregnant women	

19. List cases that require referral :-

a. Within same day

_____

b. Within 1 week

_____

C. Within 1 month

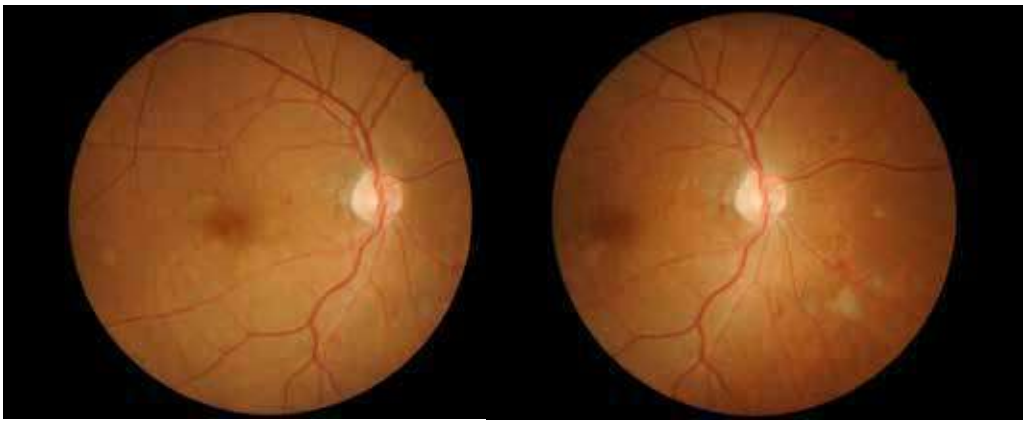
_____

20. How many images required for Diabetic Retinopathy screening using fundus camera.

_____

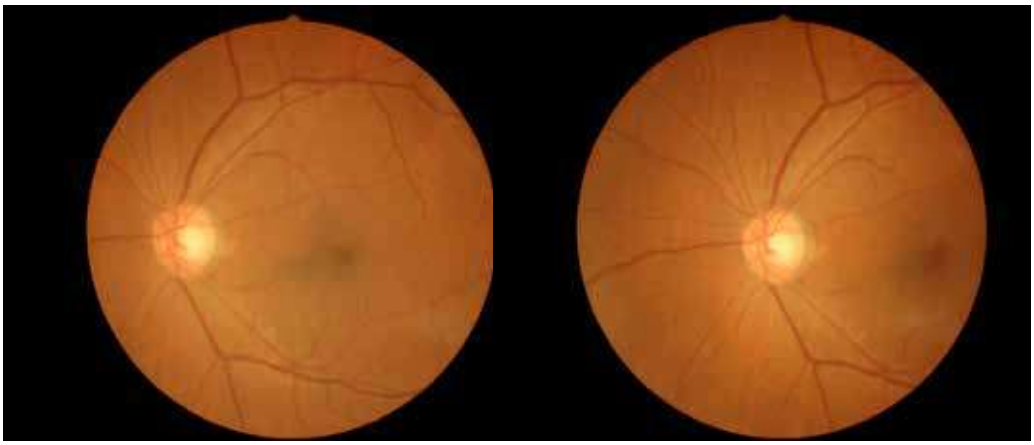
_____

FUNDUS PHOTO - Pre / Post Test Assessment



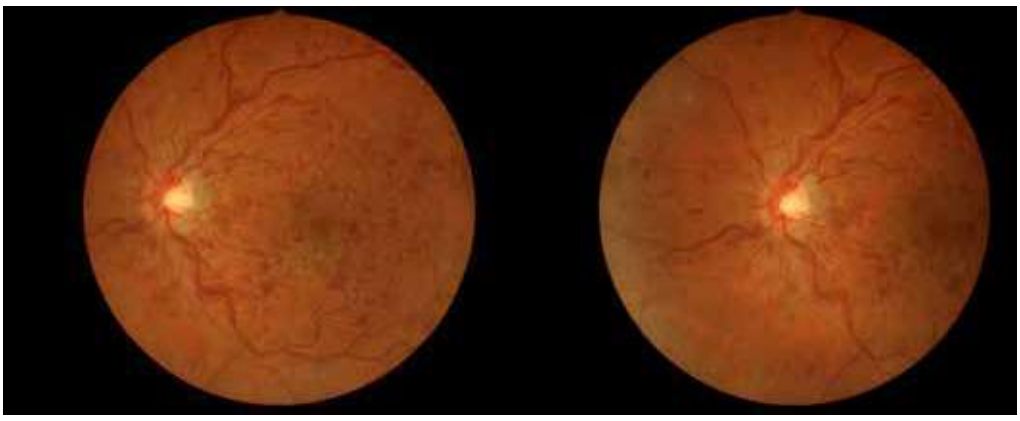
Diagnosis :_____

Management / Follow-up : _____



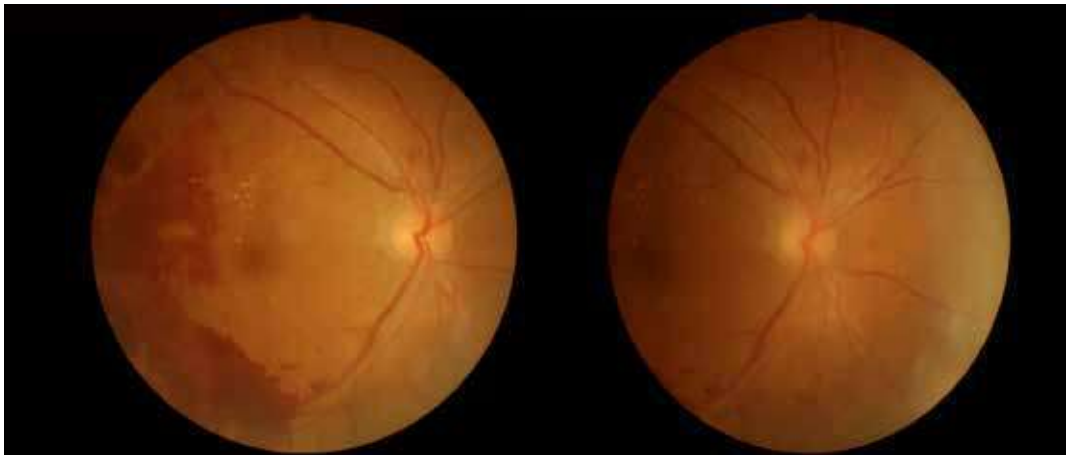
Diagnosis :_____

Management / Follow-up : _____



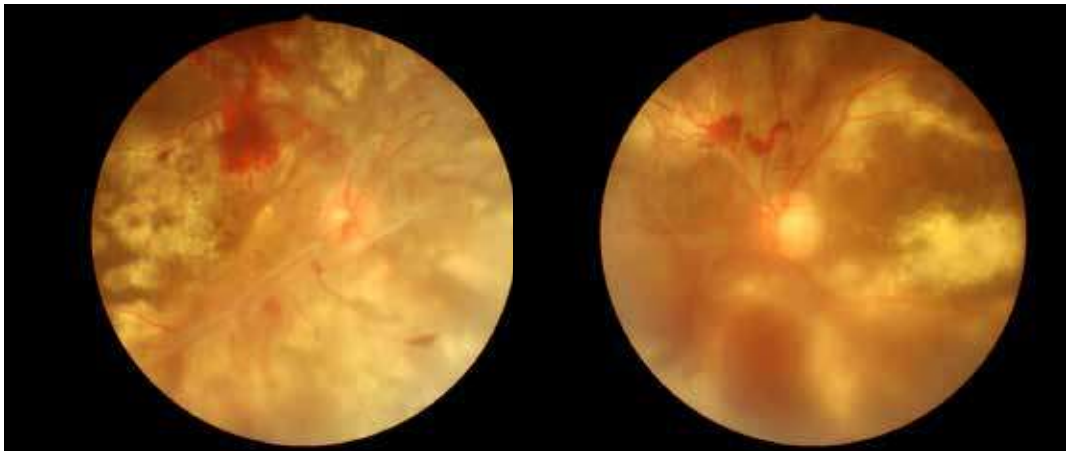
Diagnosis :_____

Management / Follow-up : _____



Diagnosis :_____

Management / Follow-up : _____



Diagnosis :_____

Management / Follow-up : _____

ANSWER PRETEST & POST TEST

1. Anatomy of retina
a. macula
b. retinal vessel
c. optic disc /3

2. What are diabetic retinopathy screening tools?
a. direct ophthalmoscope
b. fundus photography
c. slit lamp biomicroscopy with contact lens
d. binocular indirect ophthalmoscope /3

3. State 3 risk factors of diabetic retinopathy
a. duration of DM, the longer, higher risk
b. poor control of DM
c. obesity/inactive lifestyle
d. other illnesses- hpt, ckd, cva, cvd, hyperlipidaemia, anemia
e. smoking
f. pregnancy in diabetics /3

4. Answer true or false.
a. patient with good control of DM will stop the progression of DR. F
b. pregnancy will cause progression of DR . T
c. if patient is asymptomatic, DR screening is not essential. F
d. Patient with GDM diagnosed at 28 weeks needs to undergo screening. F /4

5. When to screen for complication of DR in adult.
a. type 2 diabetes: when first diagnosed
b. type 1 diabetes: up to 3 years after diagnosis /2

6. What is the age recommendation for screenng of DR in children type 1 diabetes.
a. start at age 10 or at onset of puberty if this earlier
b. after 2-5 years diabetes (T1DM) /4

7. List three systemic complications of DM other than DR.
a. stroke
b. cardiovascular disease
c. diabetic neuropathy
d. foot complication
e. diabetic nephropathy /3

8. List three eye complications secondary to DM
a. dry eyes
b. recurrent corneal erosion
c. filamentary keratitis
d. cataract
e. infective/ corneal ulcer
f. diabetic retinopathy
g. oculomotor muscle paresis: squint/ diplopia
h. ischaemic optic neuropathy /3

9. A 32 year old malay lady, known case of Diabetes Mellitus planned to get pregnant.
What is the recommendation time for fundus examination for her.
a. before pregnant /1

10. A 39 year old indian lady, currently pregnant at 10 weeks of gestation. She is not known of DM before pregnancy.
But her MGTT and BSP showed that she had gestational diabetes.
What is the recommendation time for fundus examination for her?
a. during first trimester /1

11. List 4 symptoms of DR
a. asymptomatic
b. gradual or sudden blurring f vision
c. floaters
d. problem in reading books or signage
e. diplopia
f. pain
g. red eyes
h. increased in eye pressure metamorphopsia /4

12.What are the 2 main pathogenesis of microangiopathy in DR.
a. microvascular occlusion
b. microvascular leakage /2

13. List the stages of DR
a. no DR
b. mild NPDR
c. mod NPDR
d. evere NPDR
e. PDR
f. ADED /6

14. Below are the findings in severe NPDR. True or false
a. more than 20 intraretinal haemorhage in each of four quadrant. T
b. definite venous beading one quadrant only. F
c. prominent IRMA in one or more quadrants. T
d. Neovascularization. F /4

15. Below are the findings in PDR. True or false.
a. vitreous or preretinal haemorhage. T
b. hard exudate at peripheral retina F
c. cotton wool spot. F
d. neovascularization.T /4

16. List 2 findings in advanced diabetic eye disease
a. formation of fibrovascular tissue proliferation
b. tractional retinal detachment due to formation of posterior vitreous detachment.
c. dragging of the retinal/ distortion
d. rhegmatogenous retinal detachment /2

17. List 2 findings in diabetic macula edema
a. some retinal thickening in post pole centre or not centre involving
b. hard exudate in post pole centre or non centre involving /2

18. Fill in the recommendation follow up schedule.

No DR	12-24 months
Mild NPDR without maculopathy	9-12 months
Moderate NPDR without maculopathy	6 months
No DR to mild NPDR in pregnant women	Every 3 months

/4

19. What criteria that need to refer to Oftalmology clinic within the below duration.
(able to give 1 answer get 1 mark for each duration)

a. On the same day
    a. Sudden severe visual loss
    b. Symptom and sign of acute retinal detachment
b. Within 1 week
    a. PDR
    b. ADED
c. Within 1 month
    a. Severe NPDR
    b. Any form of maculopathy
    c. Unexplained drop in visual acuity
    d. Worsening retinopathy /3

20. How many image required for DR screening using fundus camera.
2 images;
    a. optic disc at centre
    b. macula at centre /3

Fundus Photo

1. Diagnosis: RE moderate NPDR with mild maculopathy
Management/ Follow-up: Refer Ophthalmologist within 1 month /2

2. Diagnosis: LE normal eye – no DR
Management/ Follow-up: See 1 year /2

3. Diagnosis : LE severe NPDR with maculopathy
Management/Followup : Refer Ophthalmologist within 1/12 /2

4. Diagnosis: RE PDR
Management/Follow-up: Refer 1/52 /2

5. Diagnosis: LE ADED
Management/Follow-up: Refer within 1/52 /2

Total mark: _____/71

Tentative Programme

MOH Diabetic Retinopathy Screening Team

Programme Tentative

DAY 1	PROGRAMME
0730-0800	Registration
0800-0815	Doa Recital / Opening Speech
0815-0845	Pre Test
0845-0915	Tea
0915-1015	Module 1
1015-1115	Module 2
1115-1215	Module 3
1215-1300	Module 4
1300-1400	Lunch
1400-1700	Practical Session 1

DAY 2	PROGRAMME
0800-0815	Registration
0815-0845	Module 5
0845-0915	Post Test
0915-0945	Tea
0945-1300	Practical Session 2
1300-1400	Lunch
1400-1500	Fundus Photo Reading / Grading – Slide show
1500-1600	Closing & Certificate Giving Ceremony

References

1. National Health Morbidity Survey (NHMS) 2015

2. Zhang P et all. Global healthcare expenditure on diabetes for 2010 and 2030. Diabetes research and clinical practice. 2010; 87: 293-301

3. National Diabetes Registry 2011

4. National Eye Survey II 2014

5. Diabetic Eye Registry 2007 & 2008

6. CPG Screening of Diabetic Retinopathy June 2011

7. CPG T2DM 5th Edition December 2015

MINISTRY OF HEALTH MALAYSIA

DIABETIC RETINOPATHY SCREENING

TRAINING MODULE FOR HEALTHCARE PROVIDERS
SECOND EDITION 2017

MOH Diabetic Retinopathy Screening Team

Graphic : Khairi Anuar, HEU Hospital Ampang