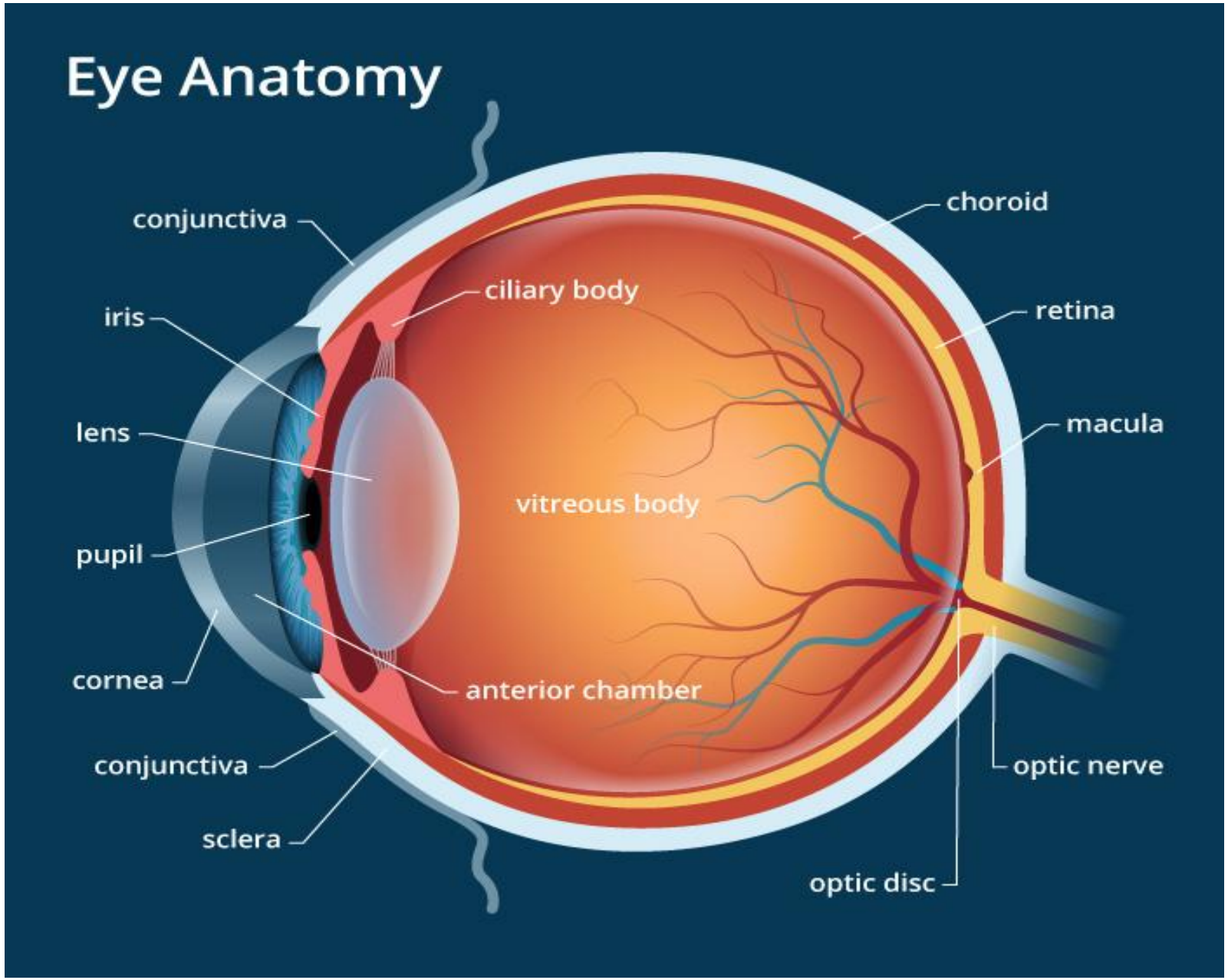

بسم الله الرحمن الرحيم
إنه من سليمان وإنه

DIABETIC RETINOPATHY

Learning Goals

- Definetion
- Diagnosis
- Treatment


Eye Anatomy
conjunctiva
iris
lens
pupil
cornea
conjunctiva
sclera
ciliary body
vitreous body
anterior chamber
choroid
retina
macula
optic nerve
optic disc

- **Diabetes mellitus (DM):**

  commonly referred to as diabetes, is a group of metabolic disorders in which there are high blood sugar levels over a prolonged period.

- *Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger.*

- Since the cells can't take in the glucose, it builds up in your blood. High levels of blood glucose can damage the tiny blood vessels in your kidneys, heart, eyes, or nervous system. That's why diabetes -- especially if left untreated -- can eventually cause heart disease, stroke, kidney disease, **blindness**, and nerve damage to nerves in the feet.

- **Type ١ diabetes** is an autoimmune condition.
  It's caused by the body attacking its own pancreas with antibodies.
  In people with type ١ diabetes, the damaged pancreas doesn't make insulin.
- This type of diabetes may be caused by a genetic predisposition.

- **Type ٢ DM** begins with **insulin resistance**, a condition in which cells fail to respond to insulin properly. As the disease progresses a lack of insulin may also develop. This is "adult-onset diabetes". **The most common cause** is excessive body weight and insufficient exercise.

- **Gestational diabetes** is the third main form, and occurs when pregnant women without a previous history of diabetes develop high **blood sugar** levels.

Prevention and treatment involve maintaining a healthy diet, regular physical exercise, a normal body weight, and avoiding use of tobacco.
Control of blood pressure and maintaining proper foot care are important for people with the disease.

Microvascular leakage

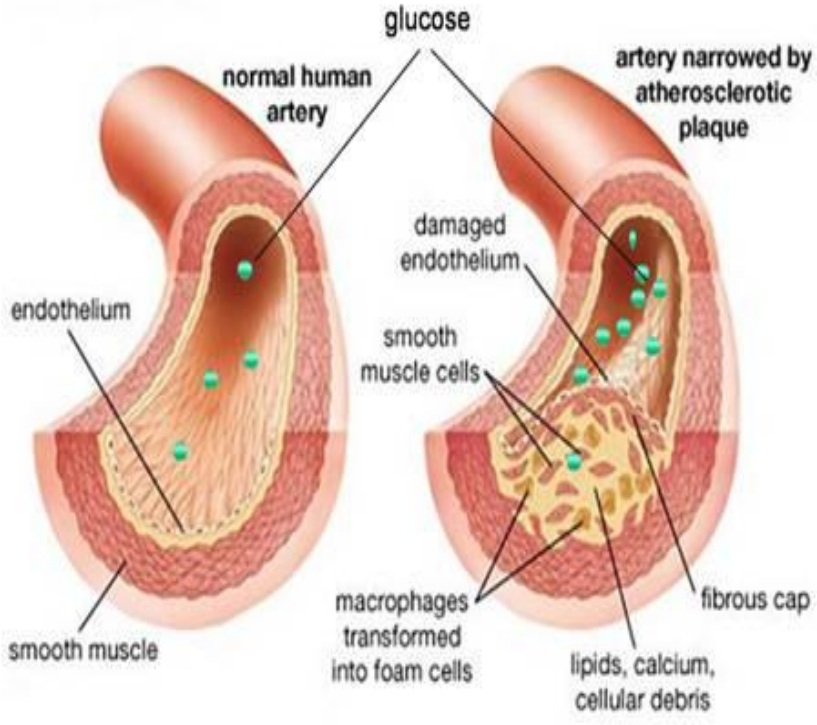
- Loss of pericytes results in distention of weak capillary wall producing ***microaneurysms*** which leak.
- Blood-retinal barrier breaks down causing plasma constituents to leak into the retina – ***retinal edema***, ***hard exudates***

Microvascular occlusion

- Basement membrane Thickening, endothelial cell damage, deformed RBCs, platelet stickiness and aggregation

- Vascular Endothelial Growth Factor (VEGF) is produced by **hypoxic retina**

- VEGF **stimulates** the **growth** of shunt and new **vessels**



RISK FACTORS:

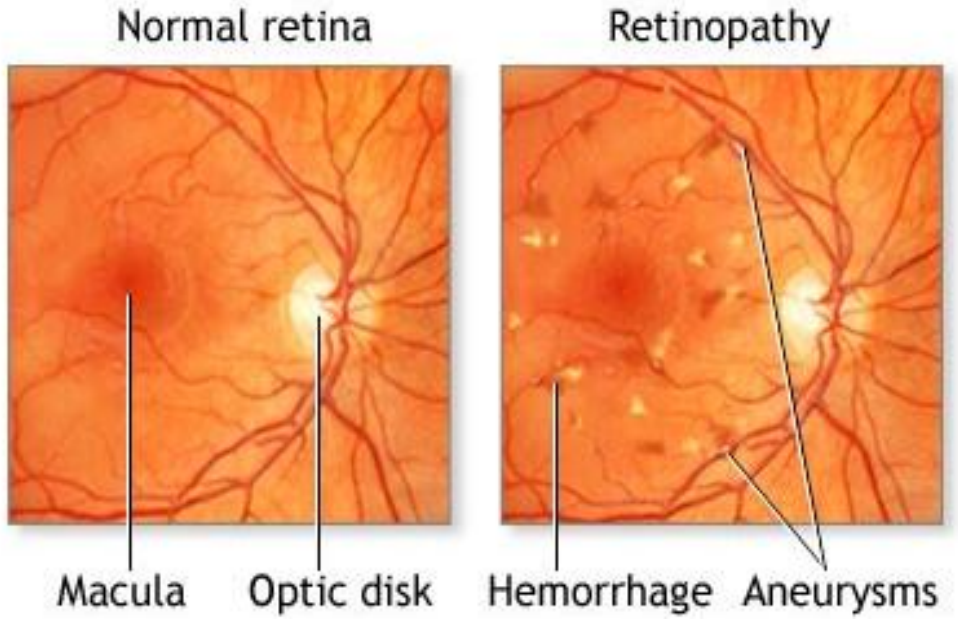
- Duration of diabetes
- Poor control of Diabetes
- Hypertension
- Obesity and hyperlipidemia
- Smoking
- pregnancy

Classification of DR

- **Non-proliferative DR (NPDR)**
- **Mild**
- **Moderate**
- **Severe**
- **Proliferative DR (PDR)**
- **Clinically significant macular edema (CSME)**

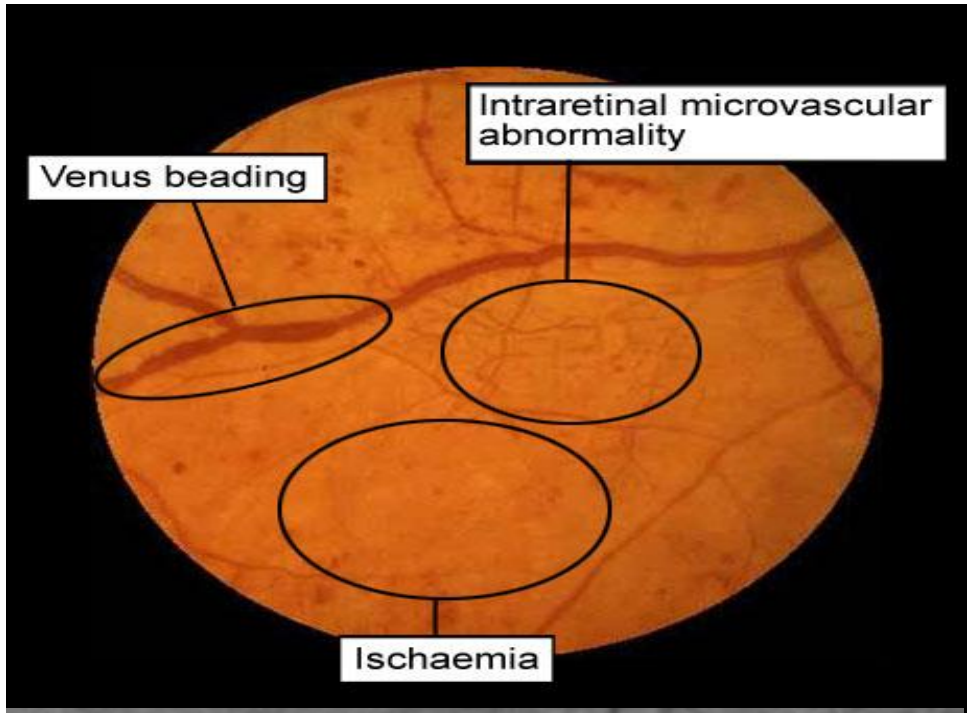
Mild NPDR

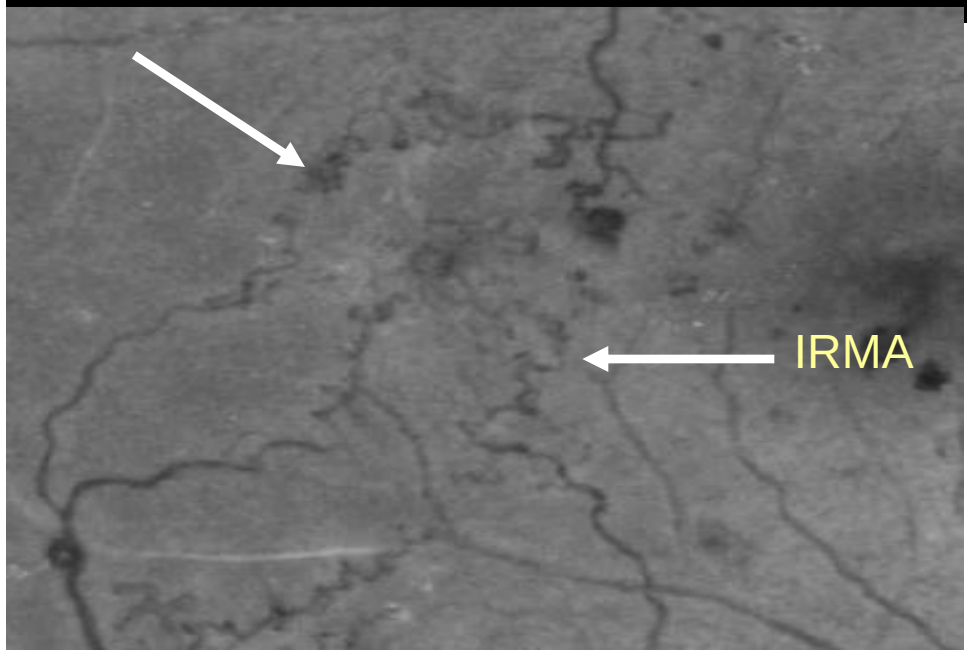
- **At least one microaneurysm - earliest clinically detectable lesion**
- **Retinal hemorrhages**
- **Hard or soft exudates**



Moderate NPDR

- **Microaneurysms** and/or dot and blot **hemorrhages** in at least ١ quadrant
- **Soft** exudates (Cotton wool spots)
- **Venous beading** or **IRMA** (intraretinal microvascular abnormalities)



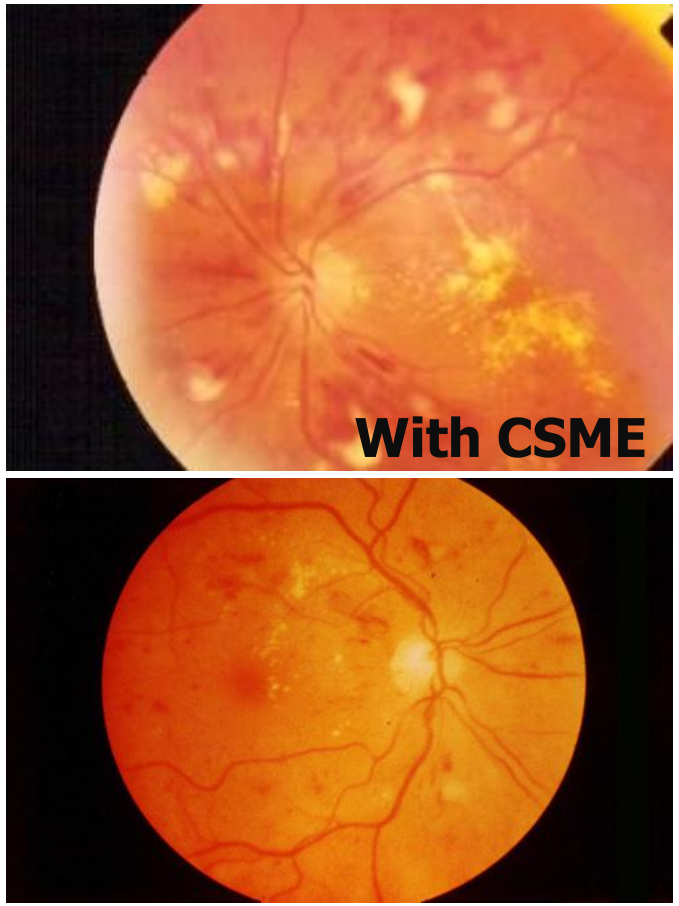


Severe NPDR

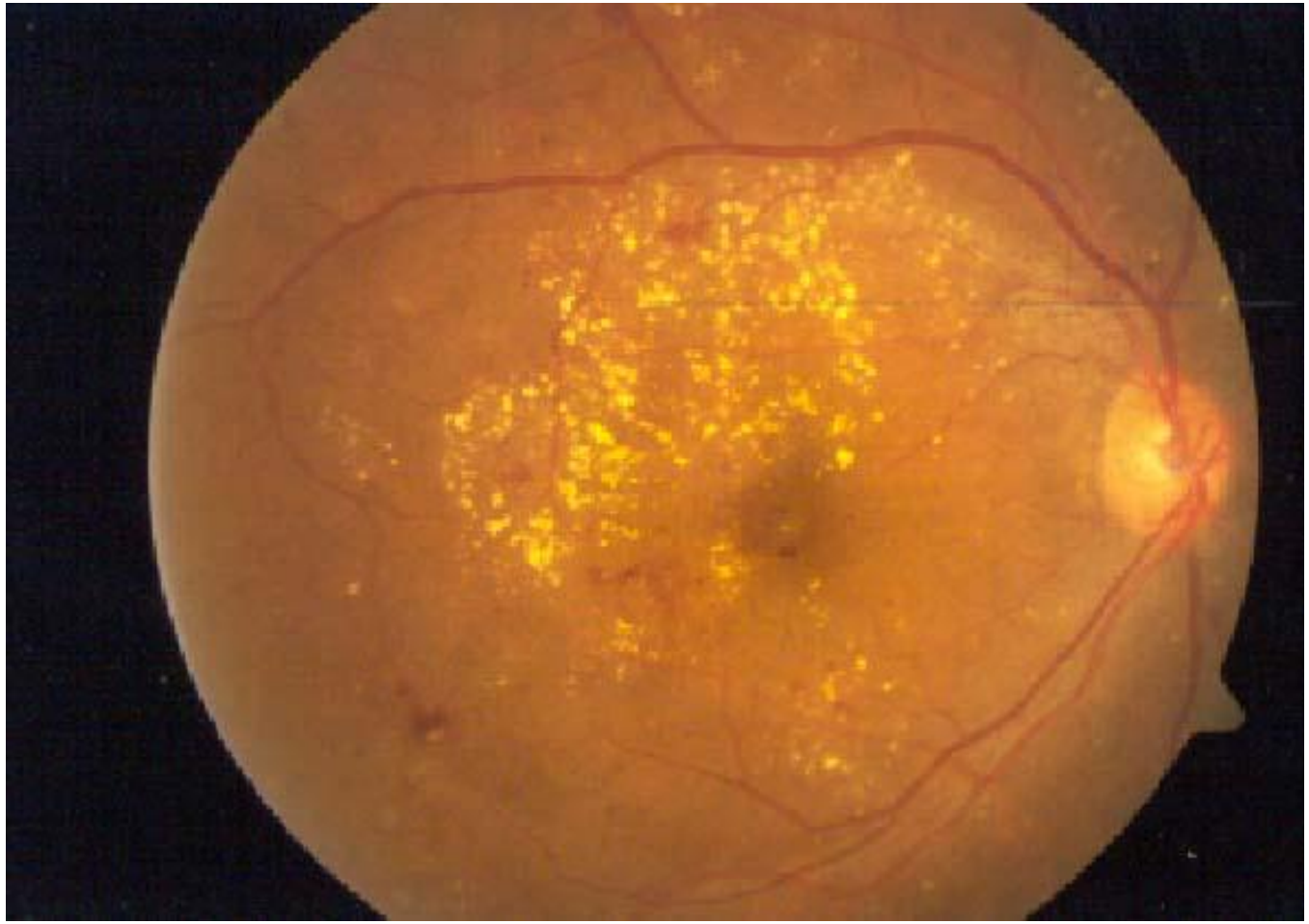
- Any <u>one</u> of the following ٣ features is present
- Microaneurysms and intraretinal hemorrhages in all ٤ quadrants
- Venous beading in ٢ or more quadrants
- Moderate IRMA in at least ١ quadrant
- Known as the ٤-٢-١ rule

Severe NPDR

- Cotton wool patches
- Hemorrhages - ۴ quadrants



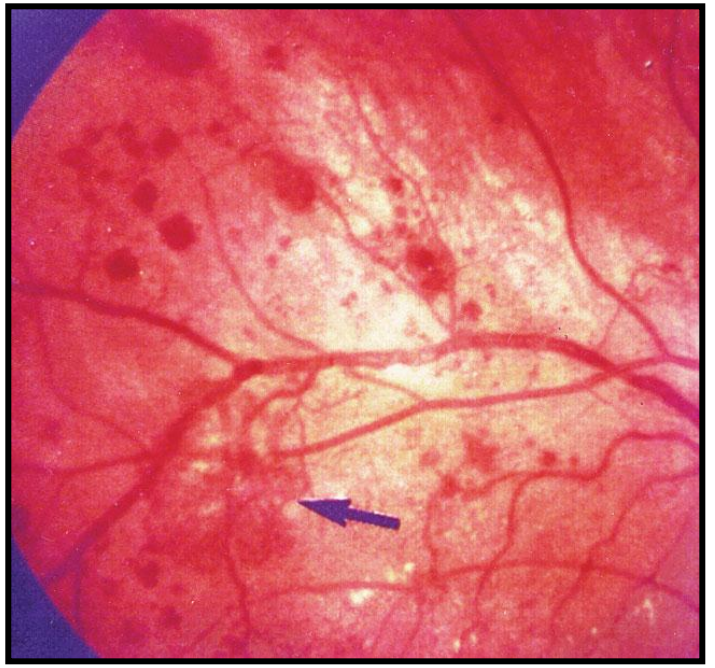
CSME – Hard exudates close to fovea and associated retinal thickening

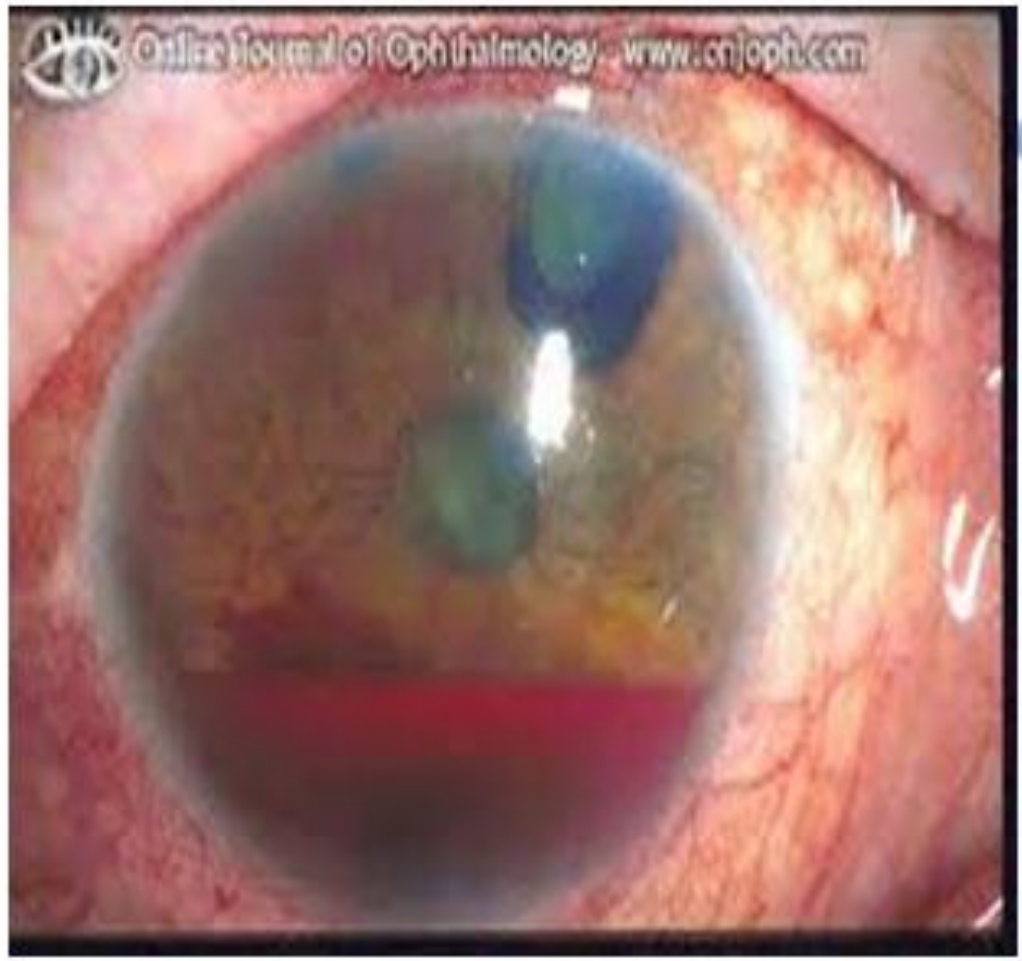


Proliferative DR (PDR)

Characterized by Proliferation of new vessels from retinal veins

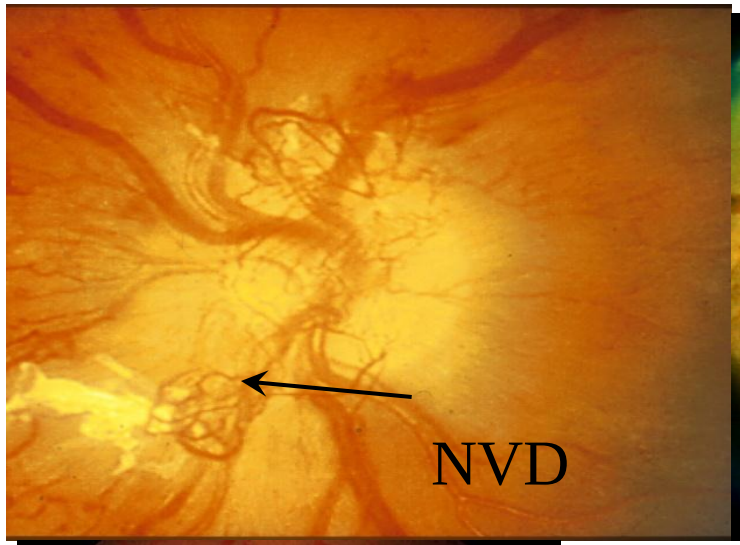
- New vessels on the optic disc
- New vessels elsewhere on the retina

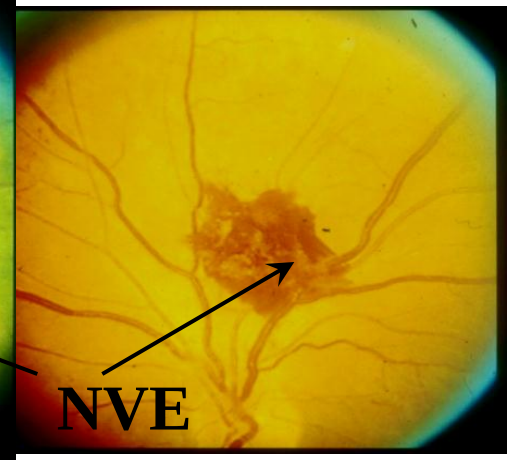




RUBEOSIS IRIDIS

Proliferative retinopathy





Pre-retinal haemorrhage

Laser burn scars

Laboratory Diagnosis

Fasting Glucose Level	Indication
From ٧٠ to ٩٩ mg/dL	Normal fasting glucose
From ١٠٠ to ١٢٥ mg/dL	Prediabetes (impaired fasting glucose)
١٢٦ mg/dL and above on more than one testing occasion	Diabete

Laboratory Diagnosis

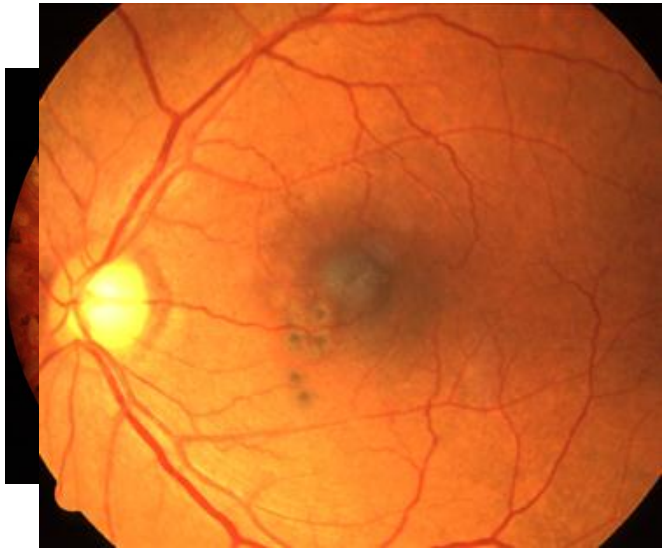
A١c Level	Indication
Less than ٥,٧%	Normal
٥,٧% to ٦,٤%	Prediabetes
٦,٥% or higher	Diabetes

Laboratory Diagnosis

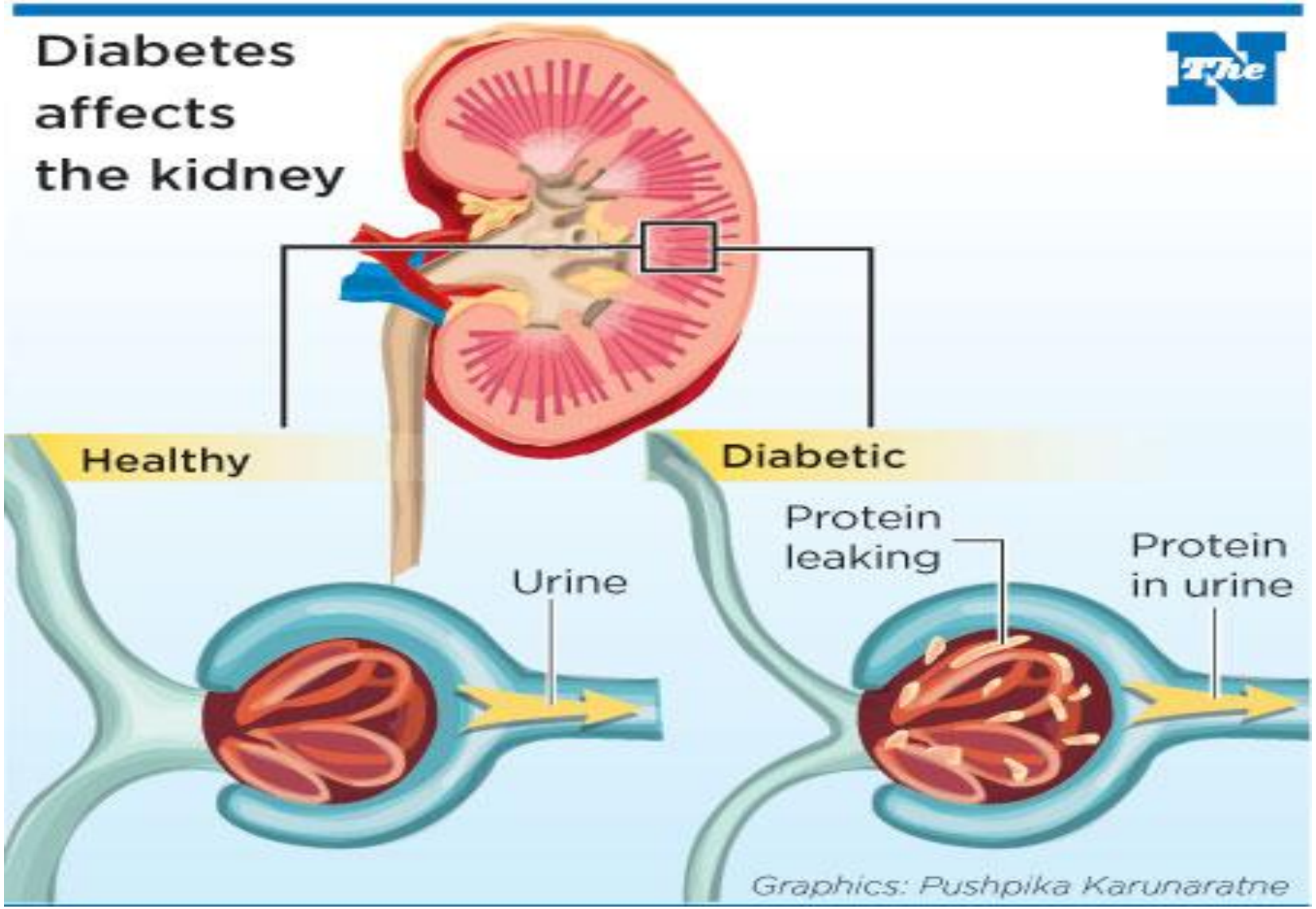
Glucose Level ٢ Hours After ٧٥-gram Drink	Indication
Less than ١٤٠ mg/dL	Normal glucose tolerance
From ١٤٠ to ١٩٩ mg/dL	Prediabetes
Equal to or greater than ٢٠٠ mg/dL on more than one testing occasion	Diabetes

TREATMENT

- **LASER:** Light Amplification by the Stimulated Emission of Radiation
  - Focal
  - grid
  - Pan retinal photocoagulation
- **ANTI-VEGF**:
  - Avastin

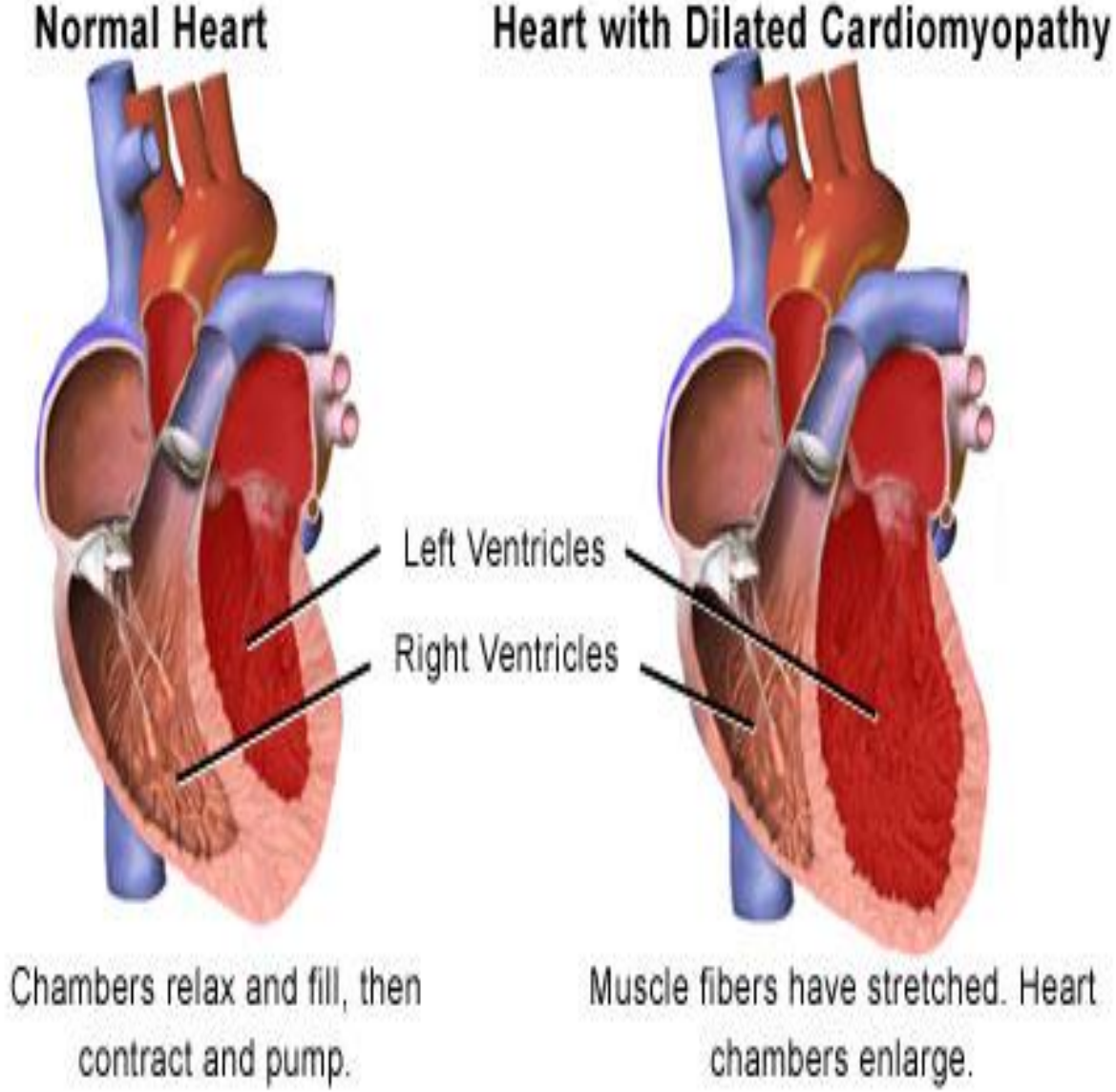


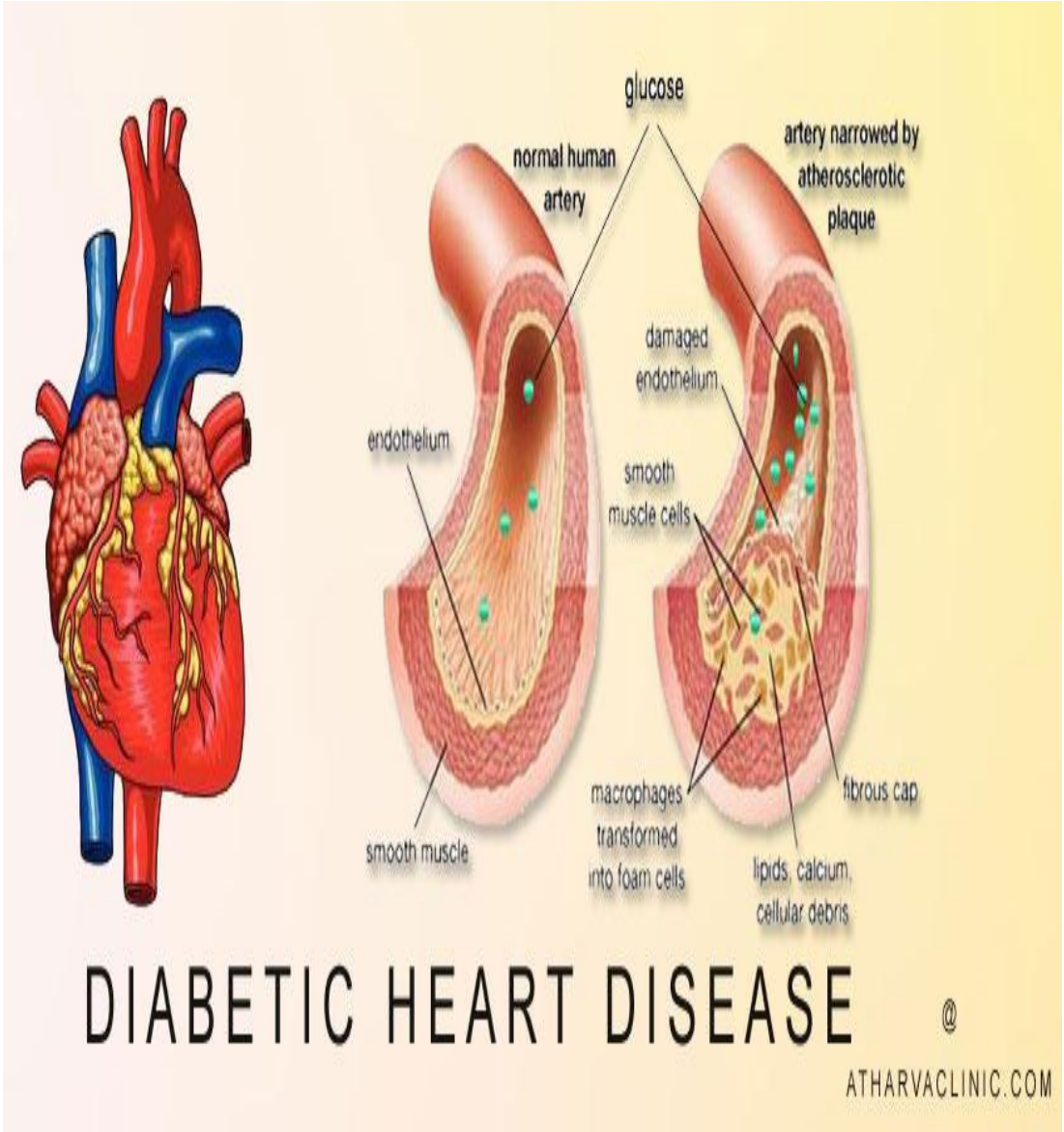
- چو عضوی به درد آورد روزگار دگر عضوها را نماند قرار


Diabetes affects the kidney
The N
Healthy
Diabetic
Urine
Protein leaking
Protein in urine
Graphics: Pushpika Karunaratne


(a)
(b)

Figure 1. (A-E) Case 1. Diabetic neuropathic ulcer with 3 weeks time to healing.


Normal Heart
Heart with Dilated Cardiomyopathy
Left Ventricles
Right Ventricles
Chambers relax and fill, then contract and pump.
Muscle fibers have stretched. Heart chambers enlarge.


glucose
normal human artery
artery narrowed by atherosclerotic plaque
damaged endothelium
endothelium
smooth muscle cells
smooth muscle
macrophages transformed into foam cells
fibrous cap
lipids, calcium, cellular debris
DIABETIC HEART DISEASE
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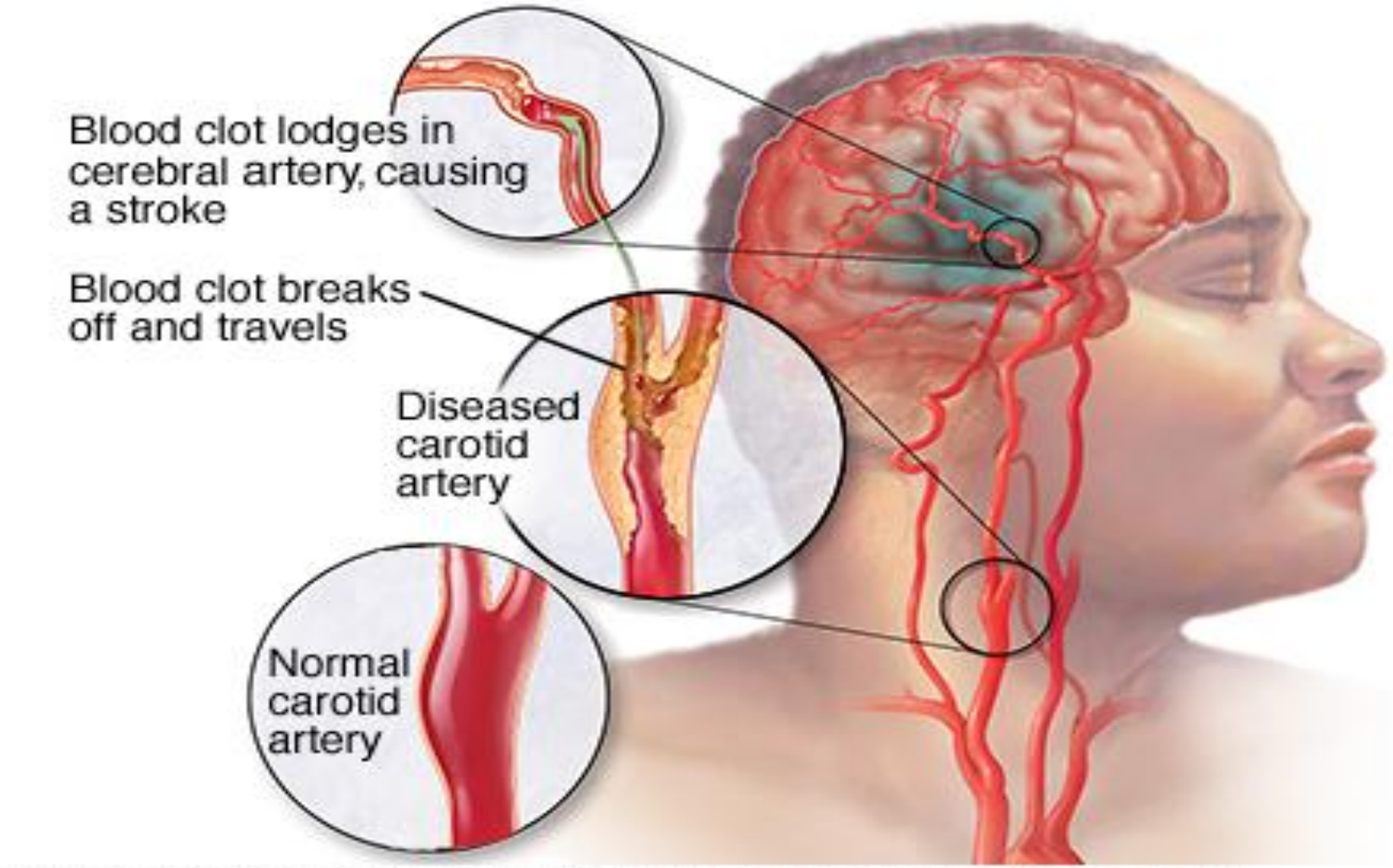

Gestational diabetes

Gestational Diabetes Mellitus, GDM) is a condition in which women without previously diagnosed diabetes exhibit high blood glucose levels during pregnancy.


Thanks for your attention