Retina

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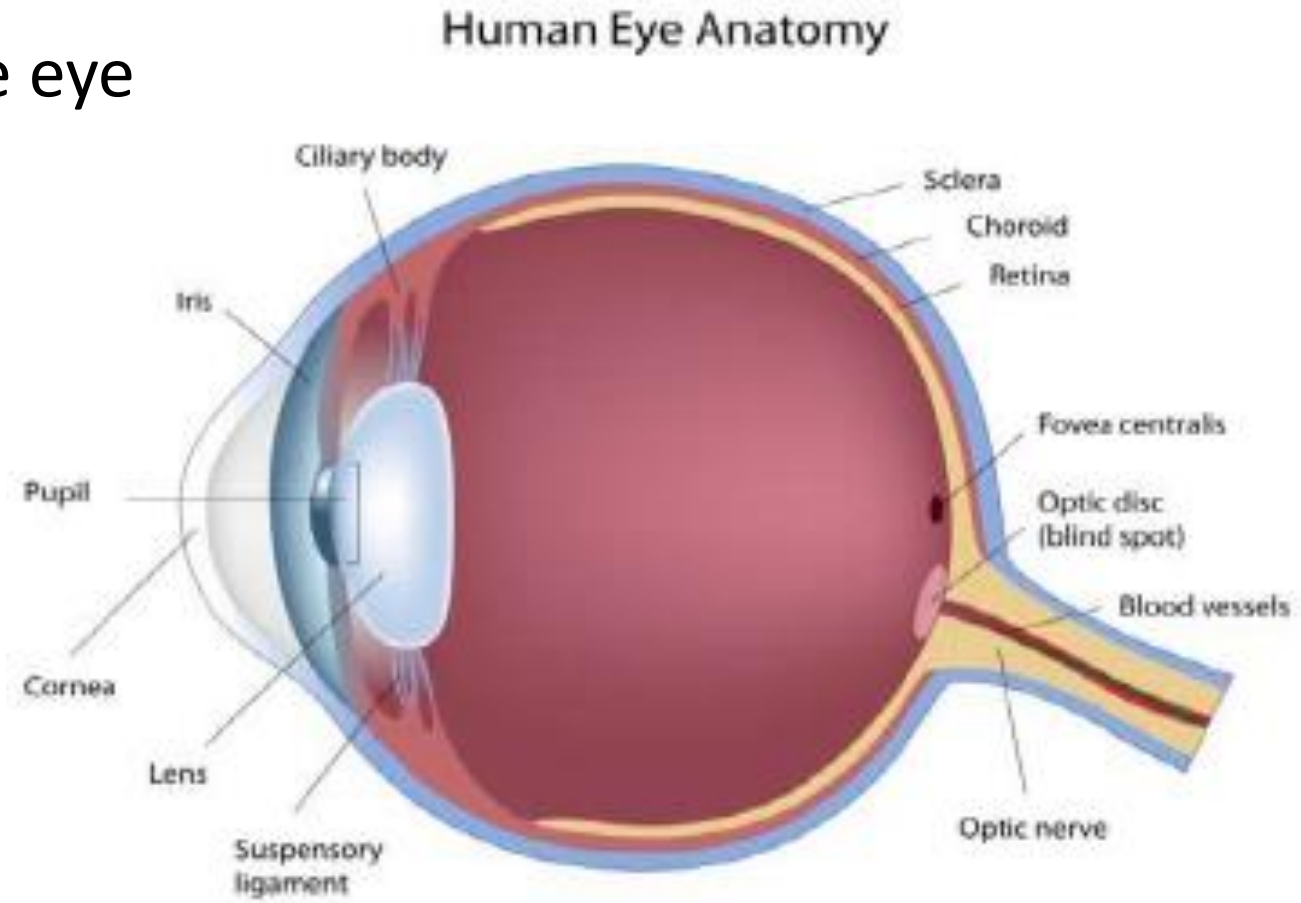
Retina

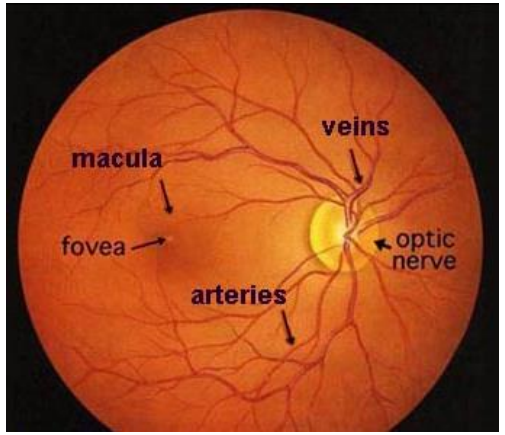
- Retina is the innermost tunic of the eyeball
- Thin, delicate, transparent membrane
- Highly developed tissue of the eye
- Appears purplish red

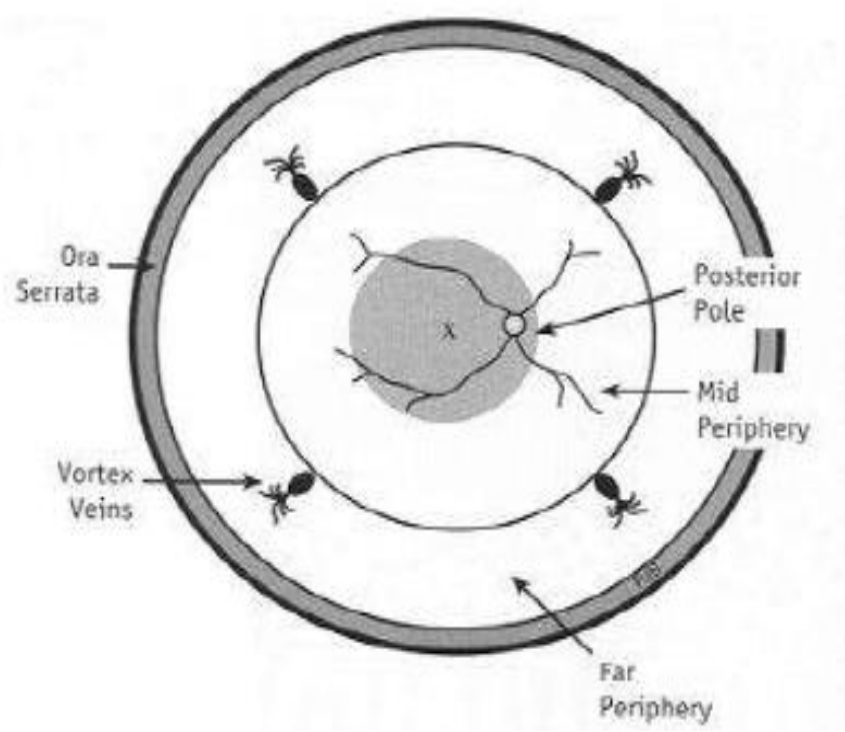


Gross Anatomy

Three distinct regions of retina:

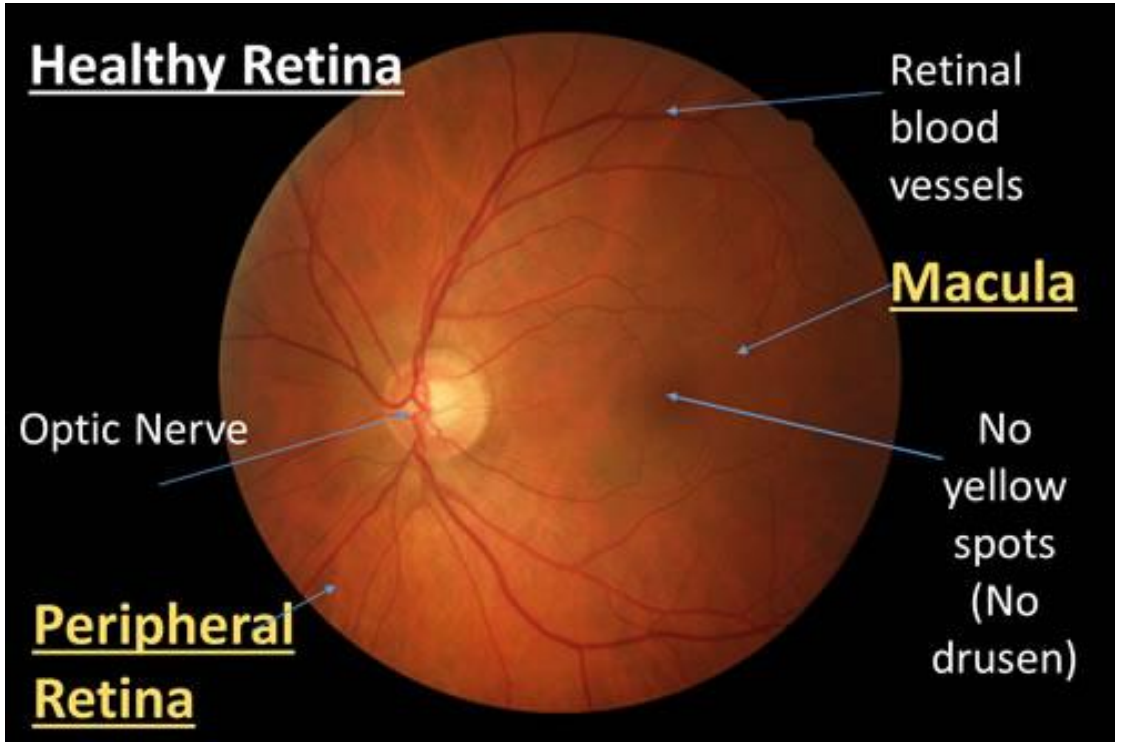
1. Optic Disc
2. Macula Lutea
3. Peripheral Retina





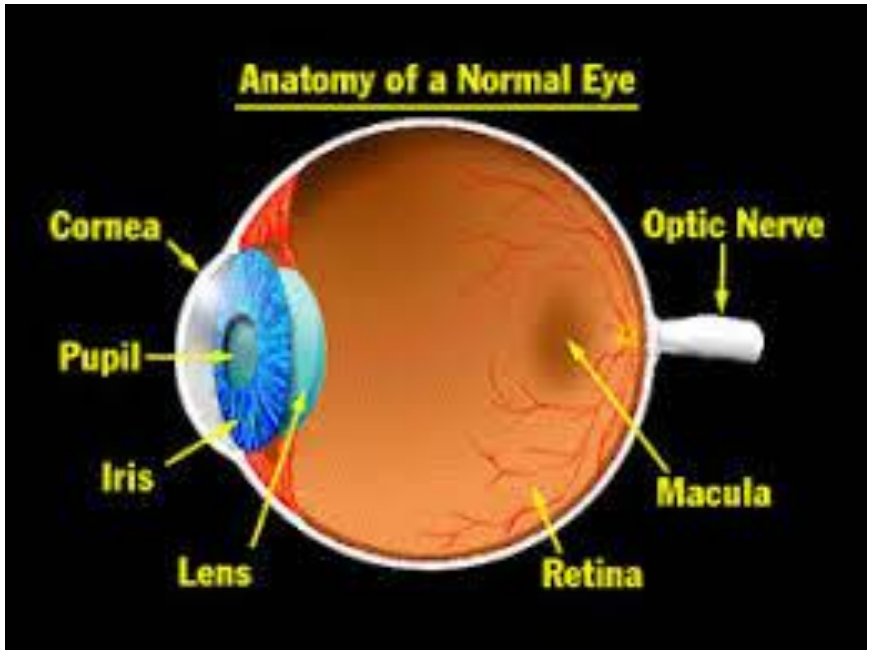
Macula lutea

- The macula lutea is comparatively dark area 5.5 mm in diameter , situated at the posterior pole of the eyeball , temporal to optic disc
- also called as yellow spot or area centralis
- Primary function : photoptic vision
- Fovea centralis is central depression in macula
- It is most sensitive part of retina



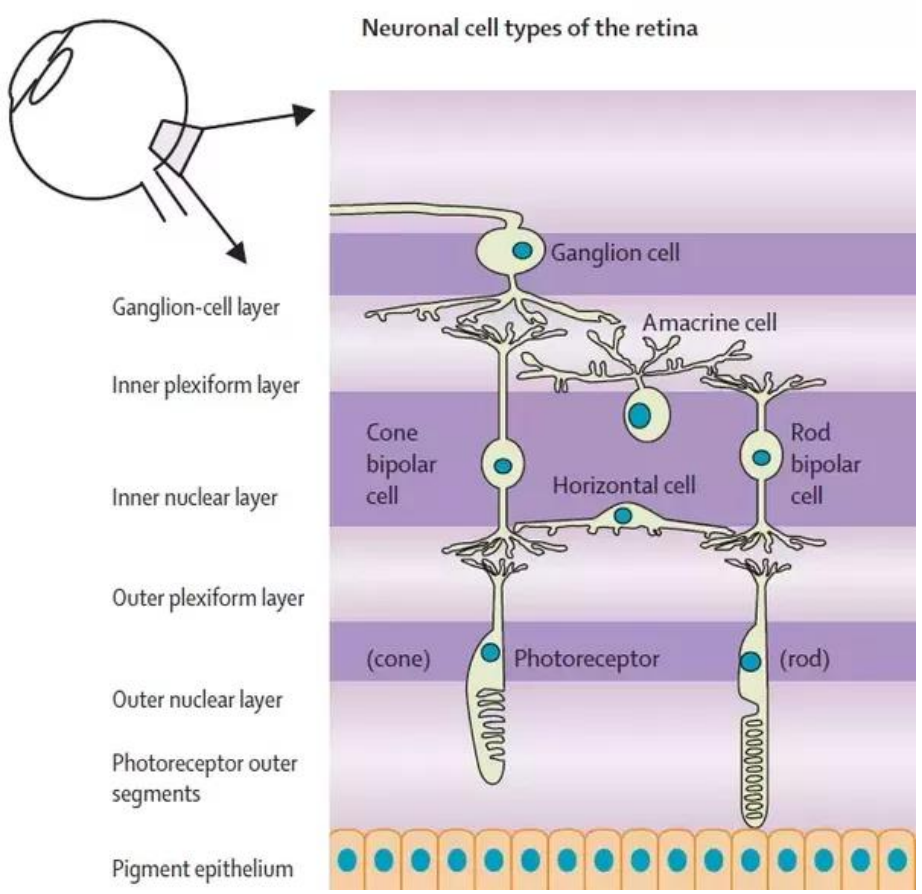
Optic disc

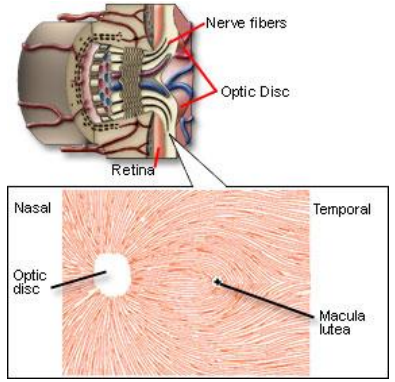
- ✓Pale pink in color, well defined circular area
- ✓Diameter: 1.5mm
- ✓All the retina layers terminate here, except the nerve fiber which pass through the lamina cribrosa



Micro-Anatomy

- Divided into 10 separate layers
- Between the ganglion cell **layer** and the rods and cones there are two **layers** of neuropils where synaptic contacts are made.
- The neuropil **layers** are the outer plexiform **layer** and the inner plexiform **layer**.
- Optic nerve carries the ganglion cell axons to the brain, and the blood vessels that supply the **retina**.
- Is responsible for converting light into electrical signals.
- Cones concentrated at the central retina , responsible for
  - ✓ Daylight vision.
  - ✓ Color Vision: (blue, green, red)
  - ✓ Detailed vision (reading fine print).
- Rods concentrated at the peripheral retina are responsible for
  - ✓ Night vision.
  - ✓ Sensitive to light and not sensitive to color perception.





- The optic nerve carries the ganglion cell axons to the brain, and the blood vessels that supply the **retina**. ...
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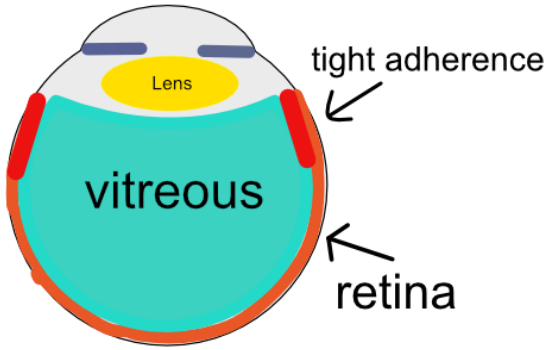
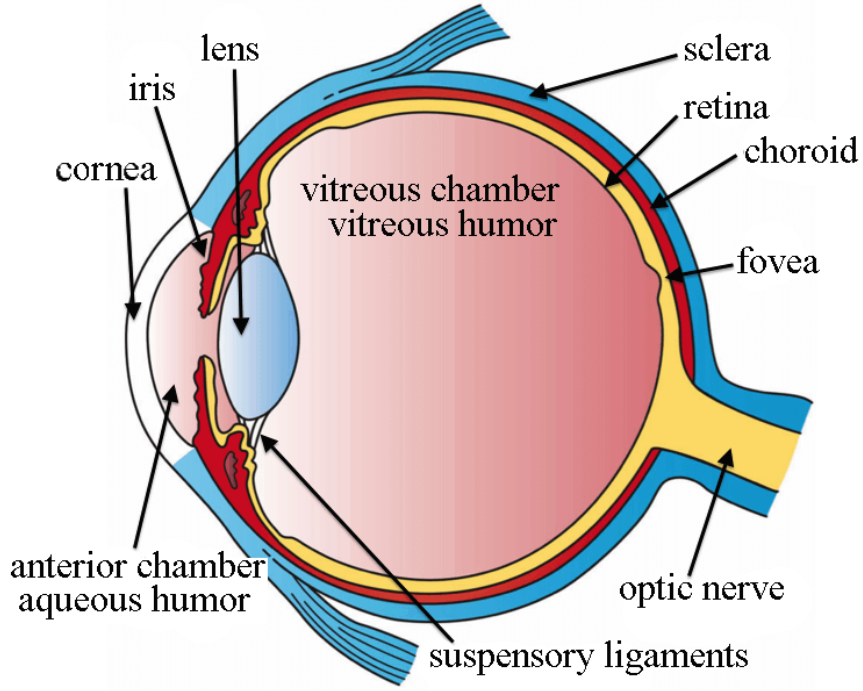
The vitreous

- Is a clear gel occupying two-thirds of the globe.
- 98% water + hyaluronic acid + collagen fibers + few cells.
- firmly attached anteriorly to peripheral retina, and around the optic disc, and less firmly to the macula and retinal vessels.
- Has a nutritive and supportive role.





SYMPTOMS OF RETINAL DISEASES

Macular Dysfunction (Central Retina)

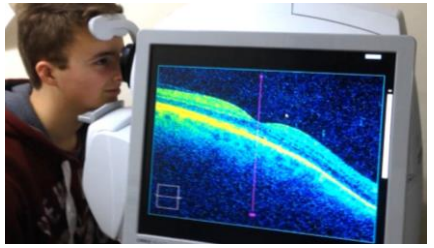
1. Blurred central vision
2. Distorted vision (METAMORPHOPSIA)
   A. Derangement Of The Photoreceptors
   B. Reduction of object size (MICROPSIA) = photoreceptors stretched apart (e.g. Macular Edema)
   C. Enlargement of object size (MACROPSIA) = photoreceptors compressed together.
3. Loss of the central visual field (scotomata) = photoreceptor layer covered, e.g. by blood, or destroyed.

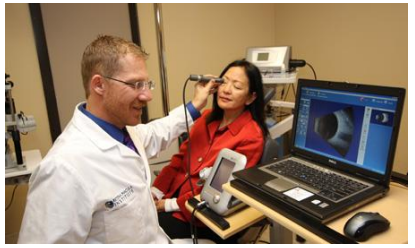
Peripheral retinal Dysfunction:

1. Loss of Peripheral visual field
2. night vision is reduced (night blindness).

Diagnostics Tests of Retinal Diseases

- **Color Fundus** Retinal **Photography**
  - uses a **fundus** camera to record **color images** of the condition of the Retina, in order to document the presence of disorders and monitor their change over time.
- Optical coherence tomography (**OCT**)
  - is a non-invasive imaging test. **OCT** uses light waves to take cross-section pictures of your retina
- Fundus Fluorescein Angiography (FFA):
  - is a technique for examining the circulation of the **retina** and choroid (parts of the fundus) using a fluorescent dye and a specialized camera
- Ultrasound
- Visual Field
- ERG

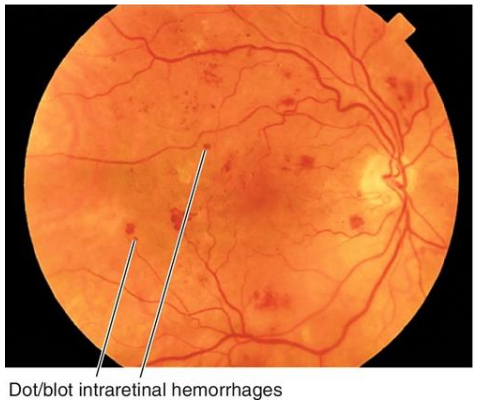




Signs of Retina Disorders

Hemorrhages

Flamed-Shaped= Nerve Fiber layer,

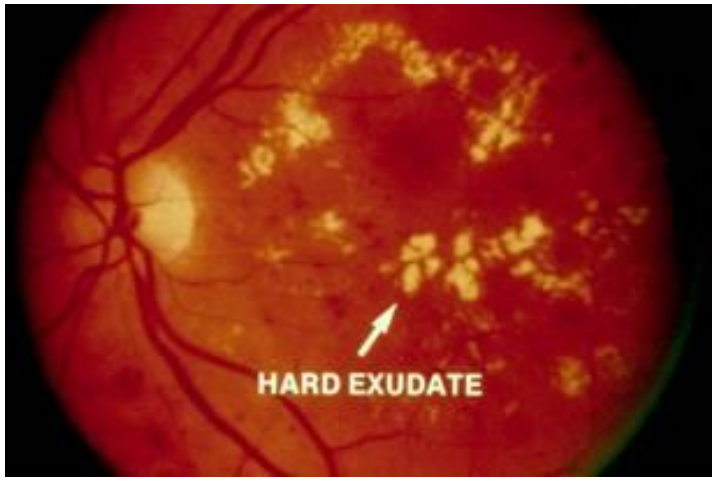


Blot and Dot= inner Plexiform layer)

Exudates

Hard exudates (lipid) **Hard exudates**

- Yellowish white deposits with sharp margins.
- Located in the outer layers of the retina, deep to the retinal vessels.



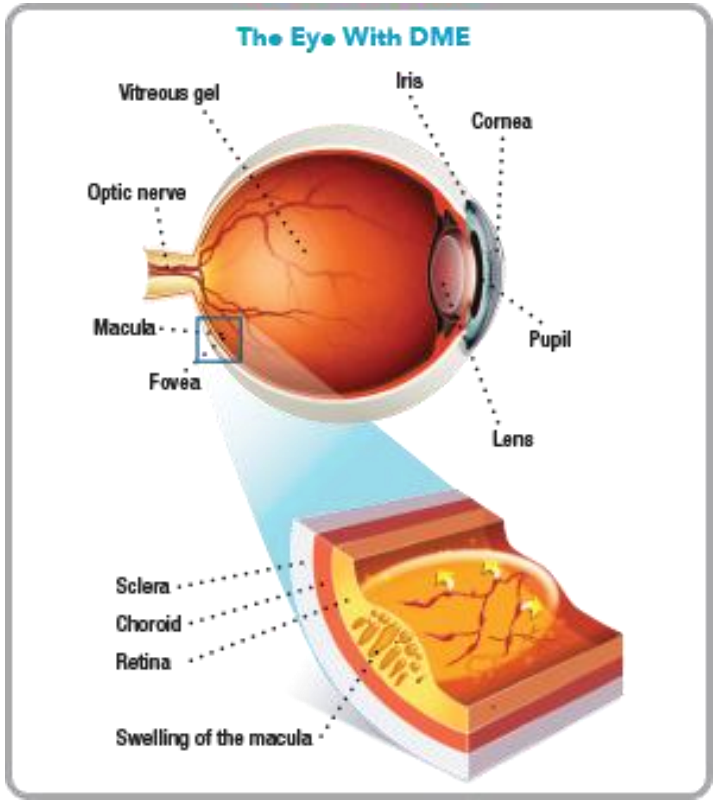
Cotton-wool spots (CWS), also sometimes referred to as '**soft exudates**',

- Nerve fiber layer infarcts, or pre-capillary arterial occlusions.
- They are an ischemic event of a very small amount of tissue.

Macular edema

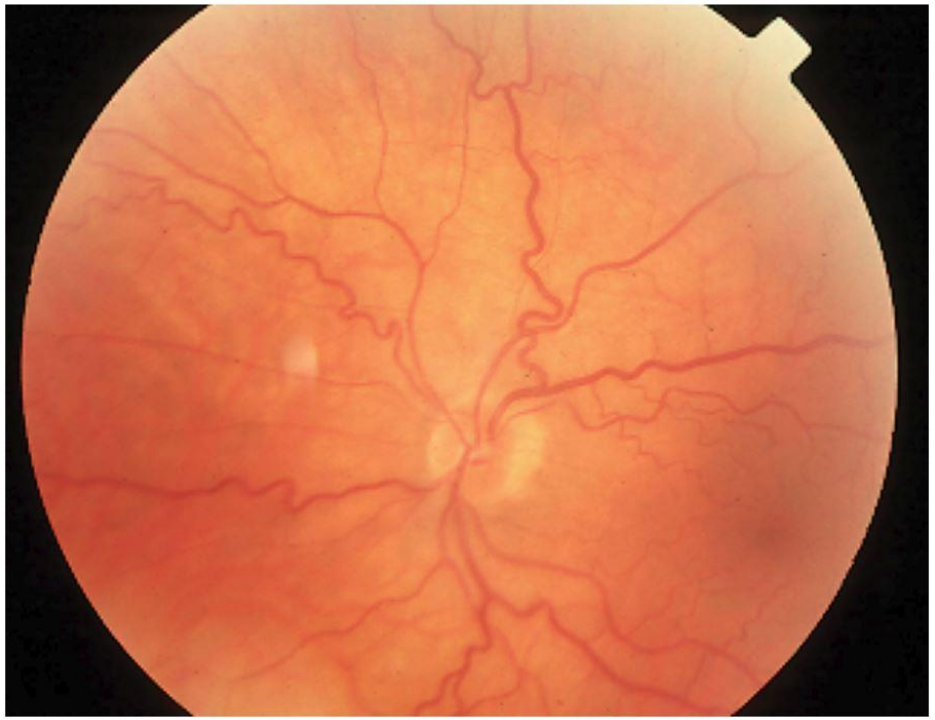
- ✓ Fluid in the **macula**,
- ✓ Center of the retina.
- ✓ Causes the **macula** to swell and thicken, and distorts vision.

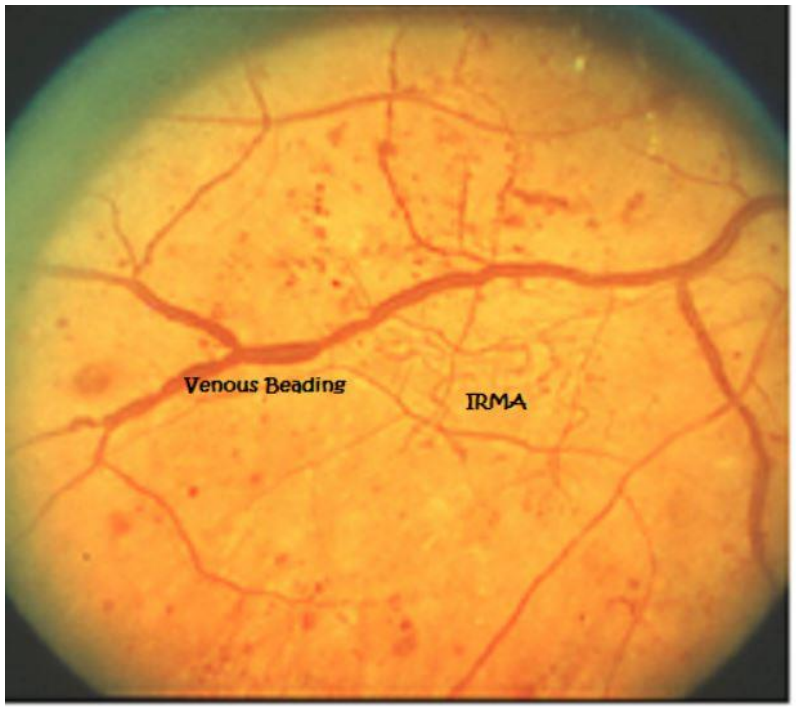
- Causes of macular Edema:
  - Intra-ocular Surgery
  - Uveitis
  - Retinal Vascular Disorders
  - Retinitis Pigmentosa



Morphological Retinal Vascular Changes

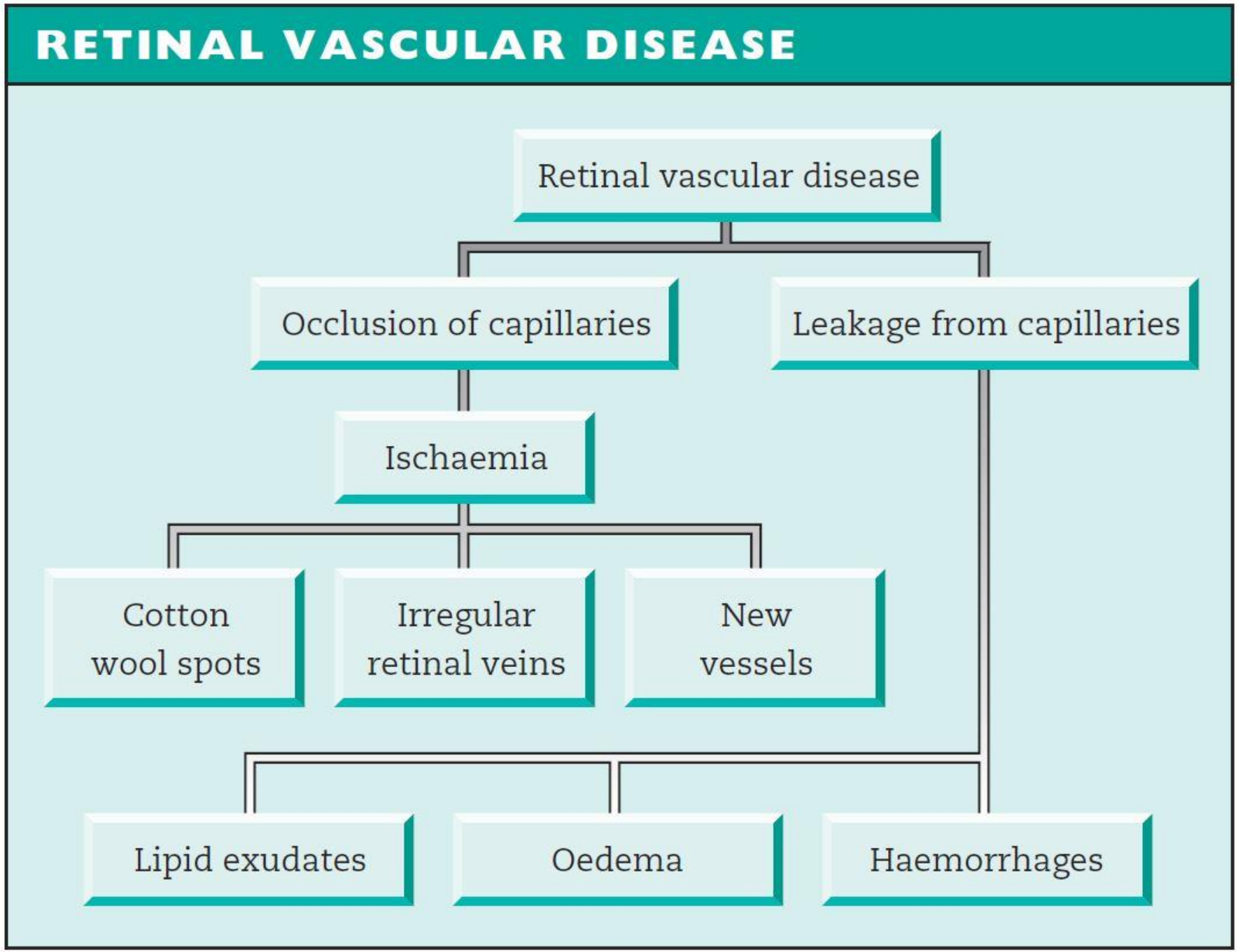
Dilated, tortuous retinal veins in an impending vein occlusion.





Neovascularization

- formation of new blood vessels (neo + vascular + ization)
- in the form of functional microvascular networks,
- capable of perfusion by red blood cells,
- serve as collateral circulation
- in response to local poor perfusion or ischemia.


RETINAL VASCULAR DISEASE
Retinal vascular disease
Occlusion of capillaries
Leakage from capillaries
Ischaemia
Cotton wool spots
Irregular retinal veins
New vessels
Lipid exudates
Oedema
Haemorrhages

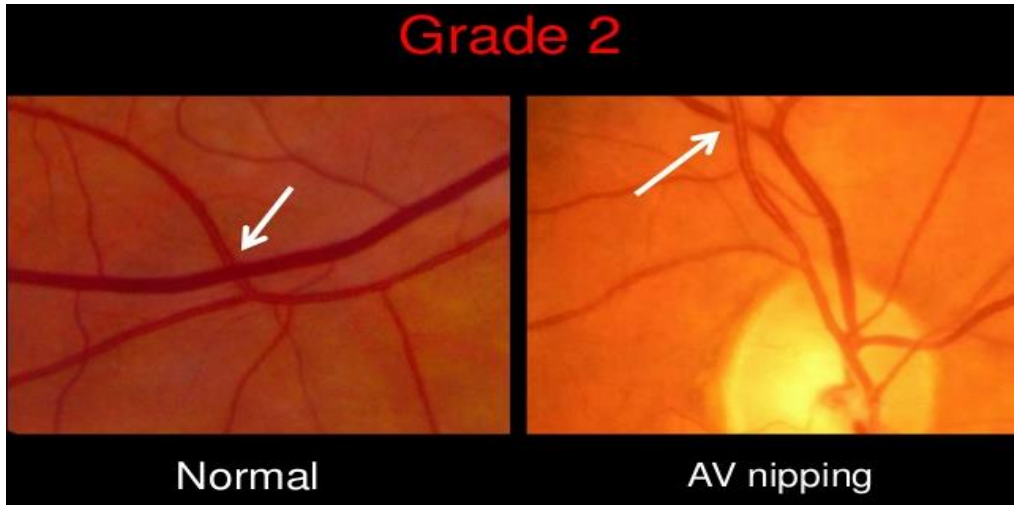
Hypertensive Retinopathy

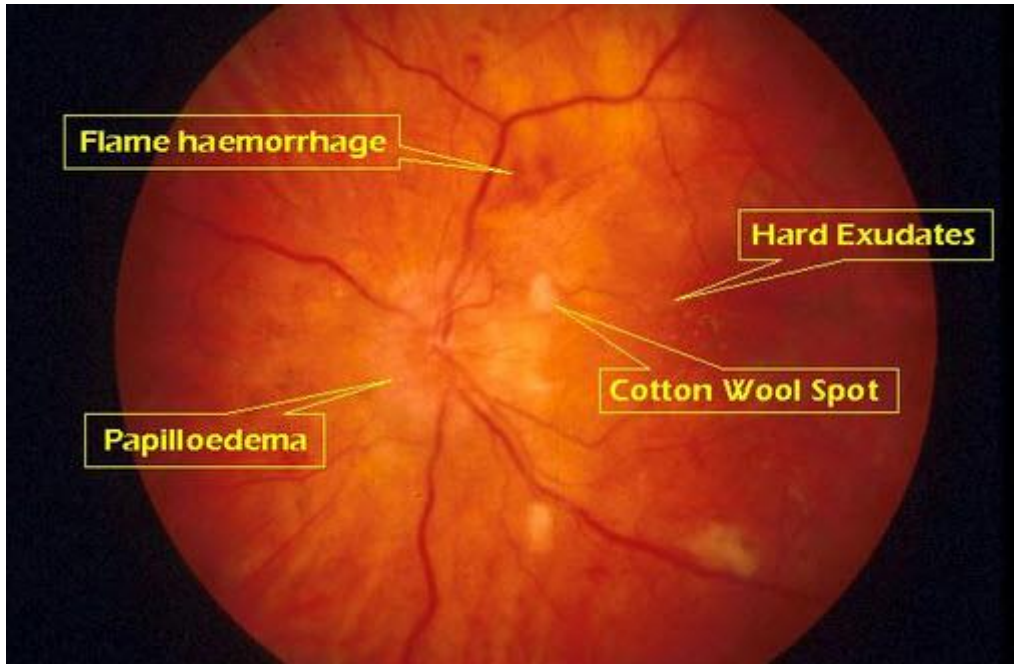
I. .Arteriolar thickening , tortuosity and increased reflectiveness (Sliver Wiring)

II. + Focal Arteriolar Spam and Venous Constriction @ A-V crossing (Arterio-Venous Nipping)

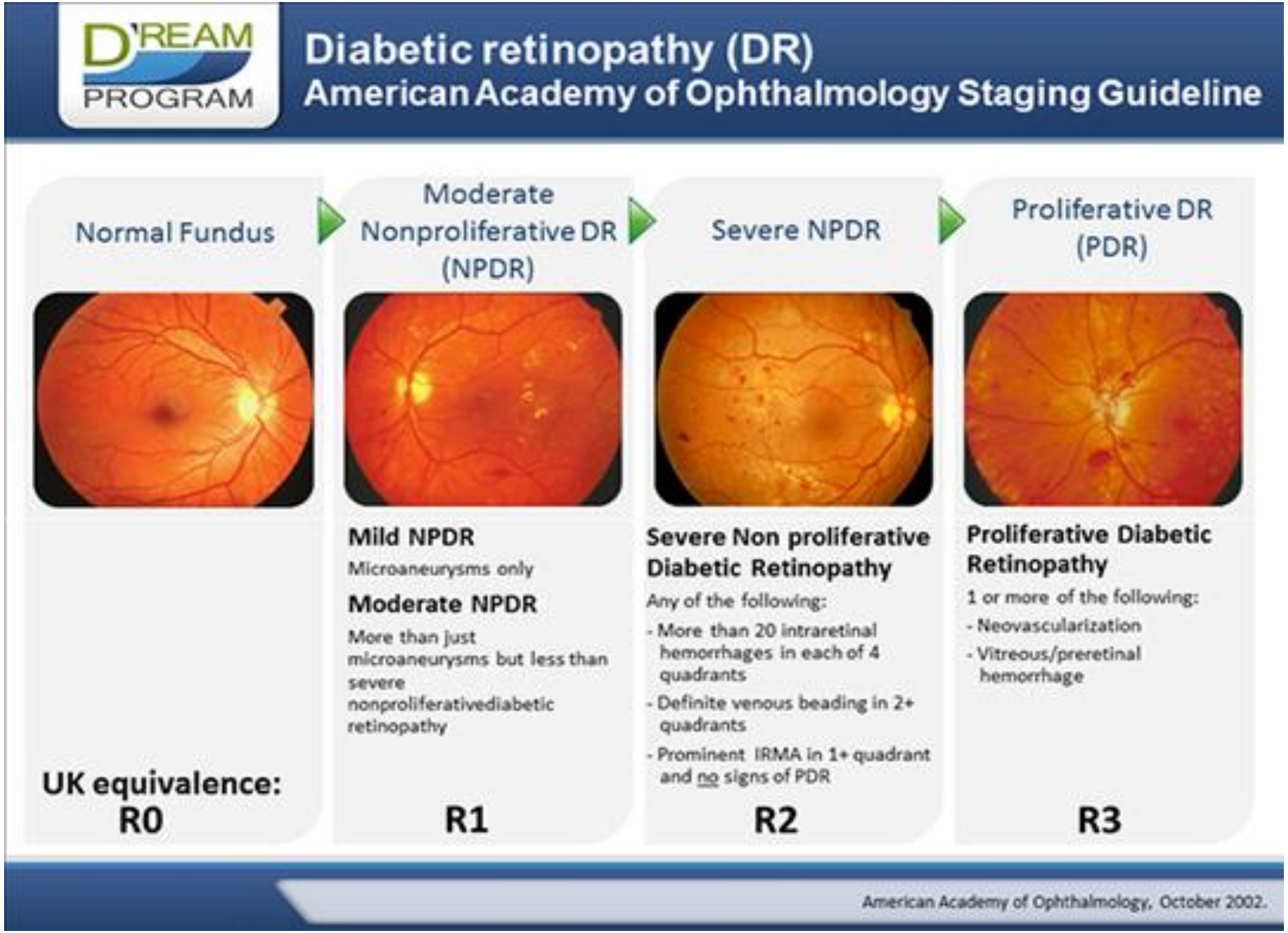
III. + Evidence of Retinal ischemia (Flamed-Shaped Hemorrhages, Cotton Wool Spots, edema)

IV. + Papilledema





DR


D'REAM PROGRAM
Diabetic retinopathy (DR)
American Academy of Ophthalmology Staging Guideline
Normal Fundus
Moderate Nonproliferative DR (NPDR)
Severe NPDR
Proliferative DR (PDR)
Mild NPDR
Microaneurysms only
Moderate NPDR
More than just microaneurysms but less than severe nonproliferativediabetic retinopathy
Severe Non proliferative Diabetic Retinopathy
Any of the following:
- More than 20 intraretinal hemorrhages in each of 4 quadrants
- Definite venous beading in 2+ quadrants
- Prominent IRMA in 1+ quadrant and no signs of PDR
Proliferative Diabetic Retinopathy
1 or more of the following:
- Neovascularization
- Vitreous/preretinal hemorrhage
UK equivalence:
R0
R1
R2
R3
American Academy of Ophthalmology, October 2002.

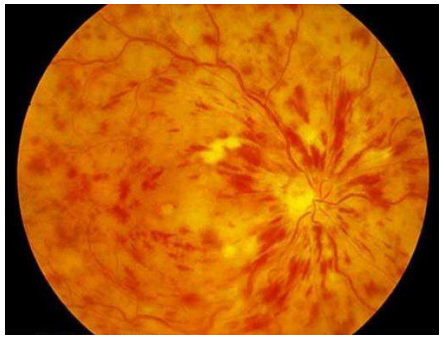
Retinal Venous Occlusion

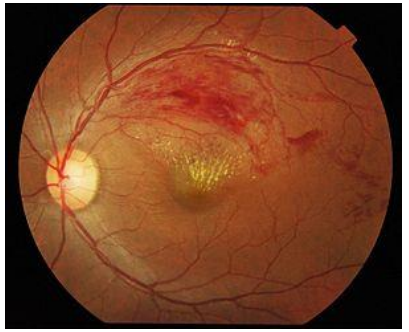
- Pathologenesis:
  1. Abnormality Of The Blood (Hyperviscosity Syndromes)
  2. Abnormality Of Venous Wall (Inflammation)
  3. Increased Ocular Pressure

- Causes:
  1. Raised Ocular Pressure,
  2. Diabetes
  3. Hypertension

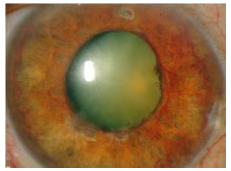
- Symptoms : sudden partial or complete loss of vision

- Signs:
  1. Retinal Hemorrhages
  2. Tortuosity Of Retinal Veins.
  3. Engorgement Of Retinal Veins.
  4. Optic Disc Appears Swollen





if the retina become ischemic (ischemic retinal vein occlusion)…..
Abnormal new vessels may grow on the retina and optic disc,….
IRIS…. Neovascular Glaucoma

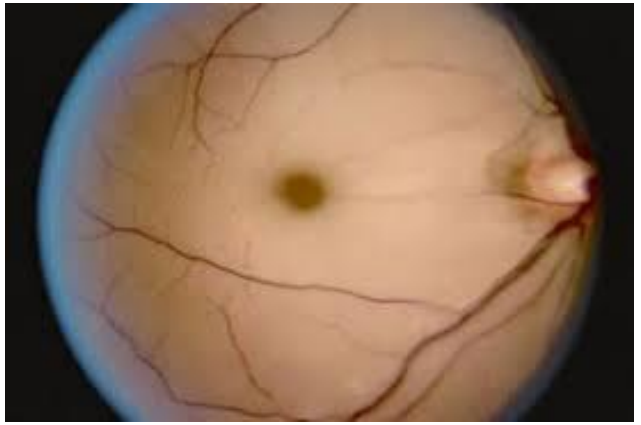


Treatment:

1. Retinal laser treatment is given if the retina is ischemic to prevent the development of retinal and iris new vessels
2. Intravitreal Injection (Steroids, Anti-Vascular Endothelial factors)

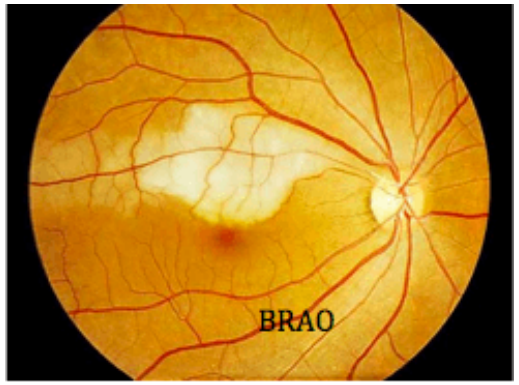
Retinal Artery Occlusion

- PATHOGENESIS
  - Central and branch retinal artery occlusions are usually embolic in origin.
  - Three types of emboli:
    1. Fibrin-Platelet Emboli commonly from diseased carotid arteries;
    2. Cholesterol Emboli commonly from diseased carotid arteries
    3. Calcific Emboli from diseased heart valves.



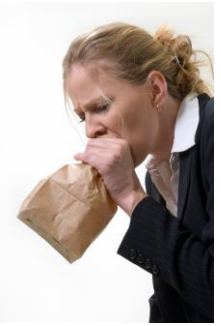
- Symptoms:
  - sudden painless loss of all or part of the vision

- Signs:
  - Retina Is Swollen And White (Edematous), While The Fovea Is Red (Cherry Red Spot)
  - After Several Weeks :Optic Disc Becomes Pale (Atrophic) And The Arterioles attenuated



- Investigations:
  - vascular work-up since disease in the eye may reflect systemic vascular disease.

- Treatment:
  - AN EMRGENCY within 24 hours of onset of the obstruction lowering the intraocular pressure with
    1. intravenous acetazolamide
    2. ocular massage;
    3. paracentesis (a needle is inserted into the anterior chamber to release aqueous and lower the intraocular pressure rapidly)
    4. getting the patient to rebreathe into a paper bag firmly applied around the mouth and nose to use the vasodilatory effect of raised carbon dioxide levels.



POSTERIOR VITREOUS DETACHMENT

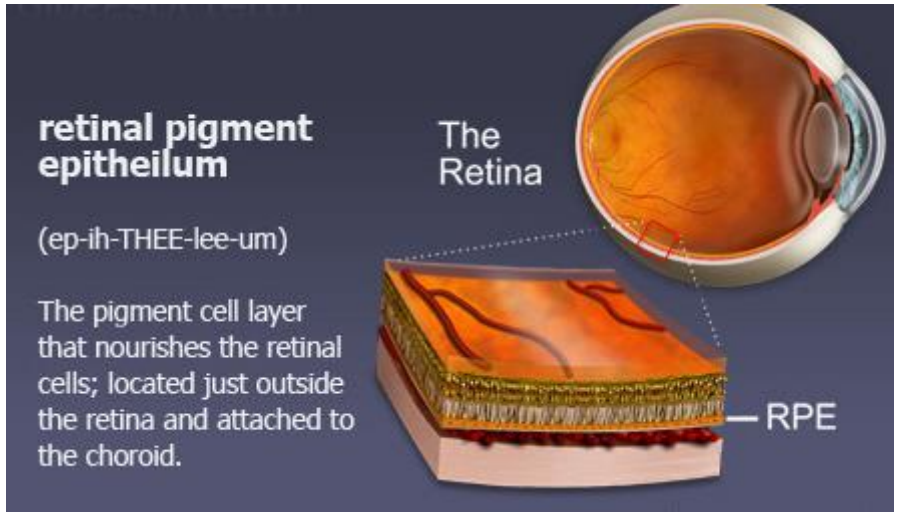
- the vitreous, which is relatively loosely attached to most of the retina, detaches, a condition termed a posterior vitreous detachment
- The vitreous gel undergoes degenerative changes in patients in their 50s and 60s (earlier in myopes)
    1. Floaters
    2. Photopsia (Flashing Lights)

Retinal Detachment

The potential space between the neuroretina and its pigment epithelium corresponds to the cavity of the embryonic optic vesicle.

The two tissues are loosely attached in the mature eye and may become separated

3 Types of RD:
1. Rhegmatogenous RD
2. Tractional RD
3. Exudative RD



Rhegmatogenous Retinal Detachment (RRD)

- Risk Factors
  - High Myopes
  - Cataract Surgery
  - Eye Trauma

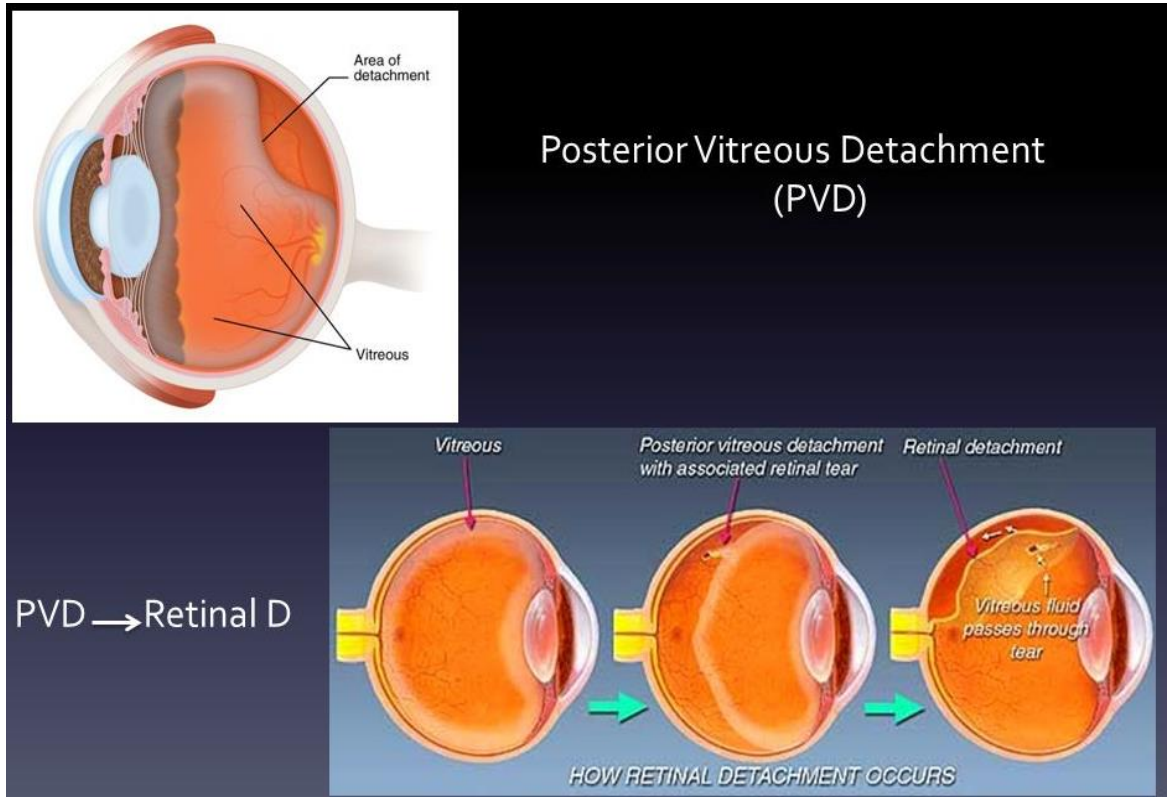
- Symptoms:
  1. Preceded by symptoms of a posterior vitreous detachment, including floaters and flashing lights.
  2. field defect, often described as a ‘shadow’ or ‘curtain

- Signs:

  Detached retina is visible on ophthalmoscopy

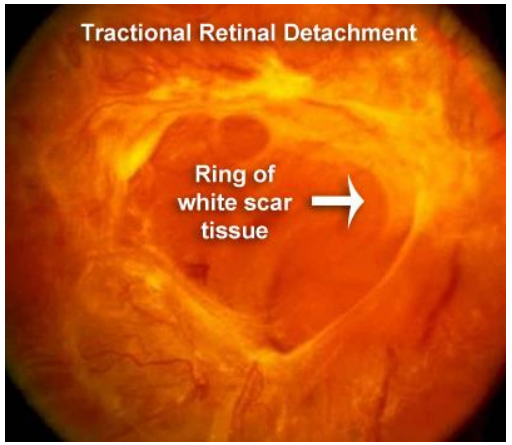
- Management :

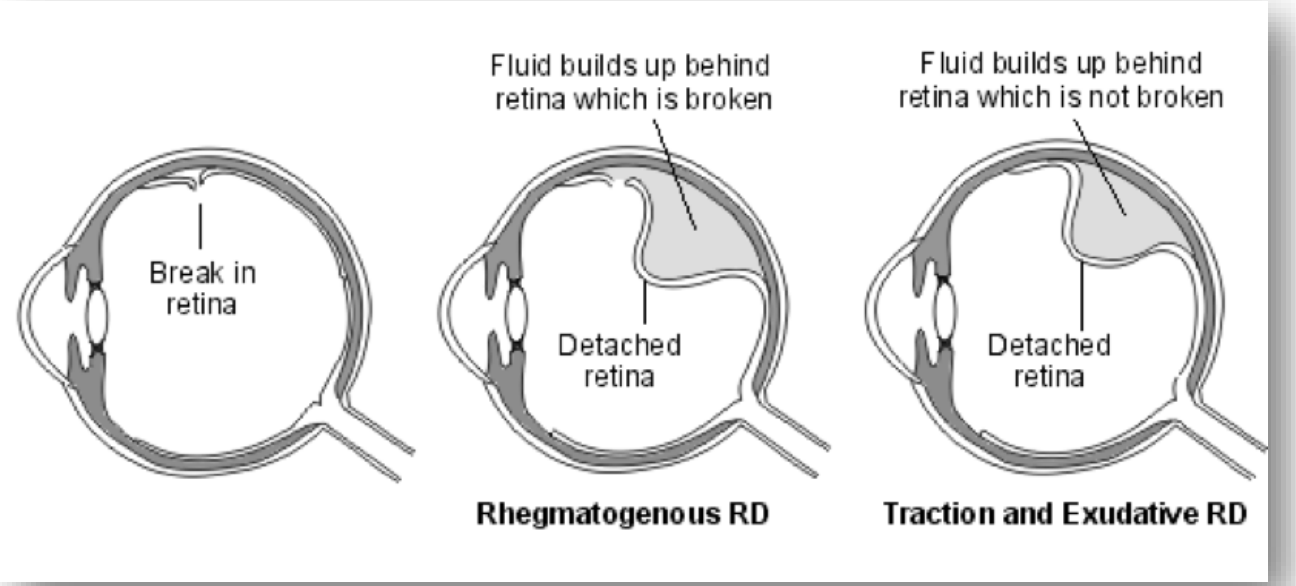
  two major surgical techniques for repairing RRD
  1. External (conventional approach)
  2. Internal (vitreoretinal surgery).



Tractional Retinal Detachment

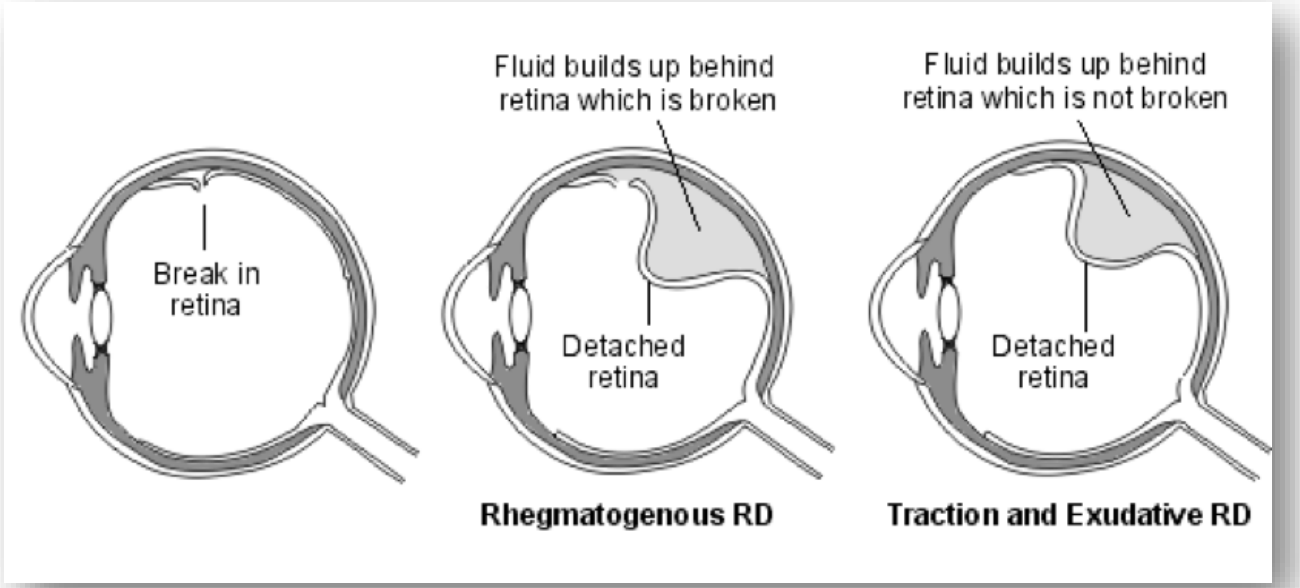
- The retina is pulled away from the pigment epithelium by contracting fibrous tissue which has grown on the retinal surface.
- seen in Proliferative Diabetic Retinopathy
- Vitreoretinal surgery is required to repair these detachments.





Exudative Retinal Detachment

Fluid accumulates in the subretinal space as a result of an exudative process, which may occur during toxemia of pregnancy



Drugs causing retinal Toxicity

- Digitalis : Abnormal Color Vision (Yellow Vision)
- Chloroquine: Bulls Eye Maculopathy, Retinal Degeneration
- Phenothiazine (**Chlorpromazine)**: Pigmentary Retinopathy and retinal Edema
- Tamoxifen : Pigmentary Retinopathy

Retinitis Pigmentosa

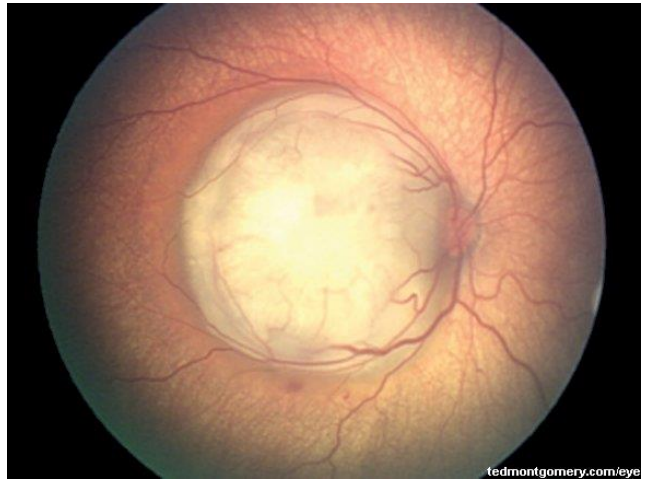
- an inherited disorder of the photoreceptors (RODS)
- It may occur in isolation or in association with a number of other systemic diseases.
- Symptoms:
  - Poor Night Vision
- Signs:
  1. Peripheral Clumps Of Retinal Pigmentation (‘Bone-spicule’ Pigmentation)
  2. Attenuation Of The Retinal Arterioles
  3. Disc Pallor
- Complications:
  1. Cataracts
  2. Macular Oedema
  3. Glaucoma

Ocular albinism

- is a genetic condition that primarily affects the eyes.
- This condition reduces the coloring (pigmentation)
  - Iris which is the colored part of the eye
  - Retina which is the light-sensitive tissue at the back of the eye.
- Pigmentation in the eye is essential for normal vision.

Retinoblastoma

- It is the most common primary malignant intraocular cancer in children.
- A white pupillary reflex (leukocoria)
- whitish pink mass protruding from the retina into the vitreous cavity.
- Tx: Removal (enucleation) of the eye



Thank You