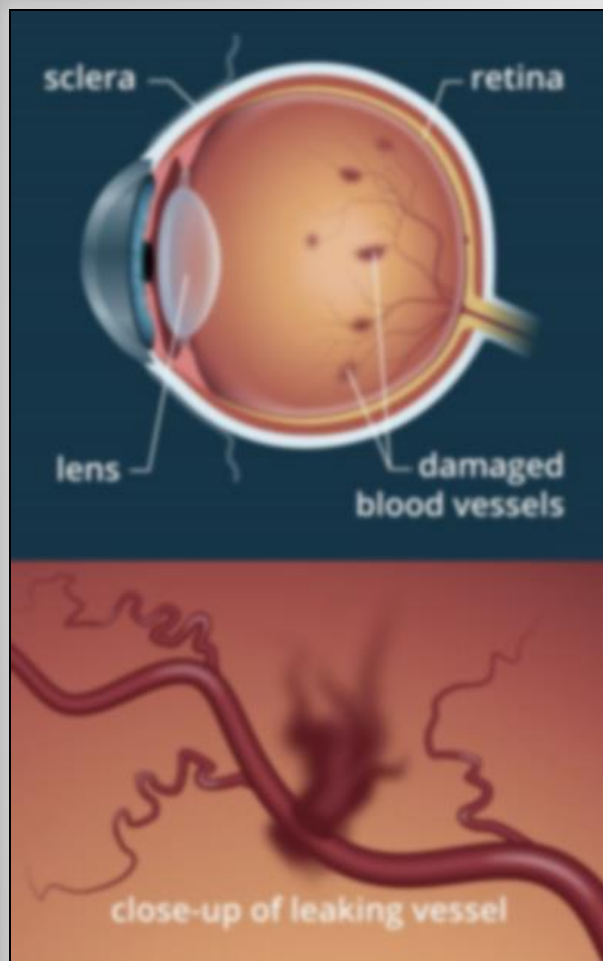


DIABETIC RETINOPATHY

PEARLS



https://images.ctfassets.net/u4vv676b8z52/1JP4UHSC3WLUNtO8JxBFJMQ/74b634444d04c7492c969a9af71114e0/diabetic-retinopathy-330x527_2x.jpg?fm=jpg&q=80

Susan Dini, OD

Aug 2021

Optometric Physician

Teaching associate, UW Dept of Ophthalmology

Pearls

1. *Diabetic retinopathy(DR)*
2. *Types of DR – NPDR/PDR*
3. *NPDR symptoms*
4. *NPDR clinical findings*
5. *PDR symptoms*
6. *PDR clinical findings*
7. *Retina evaluation & treatment*
8. *Complications of advanced/untreated DR*
9. *Blindness prevention*
10. *PCP role in treatment*

Pearl #1

Diabetic Retinopathy (DR)-

~4 million in US have DR

- In US, DR has become the leading cause of new cases of blindness
- DR generally affect both eyes and the longer a person has diabetes the more likely they are to develop retinopathy
- Only **half** of adults with diabetes recognize their risk for vision loss

Vision loss associated with DR is preventable!!!

***Optimizing** glycemic control, blood pressure, and serum lipid
CAN reduce risk and slow DR progression by 30-40%*

Natl Eye Institute recommends **annual dilated eye exams**
to help protect against diabetic related vision loss.

Diabetic related eye problems

DM can **affect all ocular structures...**

- Fluctuating vision, changes in refractive correction, near vision issues
 - Experienced with long periods of high blood sugar &/or deteriorated FBS control
 - Controlling hyperglycemia can improve accommodation and near vision issues noted in T1 diabetes
- Cataracts (5X more likely to develop cataract at a younger age)
 - increased intracellular sorbitol accumulation causes degeneration and liquification of lens fibers
 - Osmotic stress is also believed to form free radicals causing lens cloudiness
- Corneal changes
 - Corneal problems seen in over 50% diabetic patients. Associated with decreased tear film function, increased glucose/sorbitol in epithelium leading to superficial punctate keratopathy, trophic ulcers, persistent epithelial defects & RCE.
 - Autonomic control of the lacrimal gland function may also be compromised by neuropathy in diabetic patients

Diabetic related eye problems

Cont.

➤ Double vision or involuntary eye movements

diabetic neuropathy/nerve damage affects ocular muscles that control eye movements

➤ Eye floaters and spots (shadow in field of view)

- *due to retinal damage (swelling, deposits, bleeding or fluid leakage from the blood vessels into the retina and vitreous)*

➤ Glaucoma

- *more common in Prol DR where they can develop neovascular glaucoma*

WHEN TO REFER FOR EYE EXAM

Type 2 - retinal exam at diagnosis

Type 1- retinal exam at 3-5 years after diagnosis

Pregnant or planning on getting pregnant?

- ❖ counsel on risk of development &/or progression of DR.... Any abnormal spikes in blood sugar increases risk of diabetic retinopathy.
- ❖ eye exams should occur before pregnancy or in 1st trimester
- ❖ they should be monitored every trimester & for 1 year postpartum –

WHEN TO REFER FOR EYE EXAM

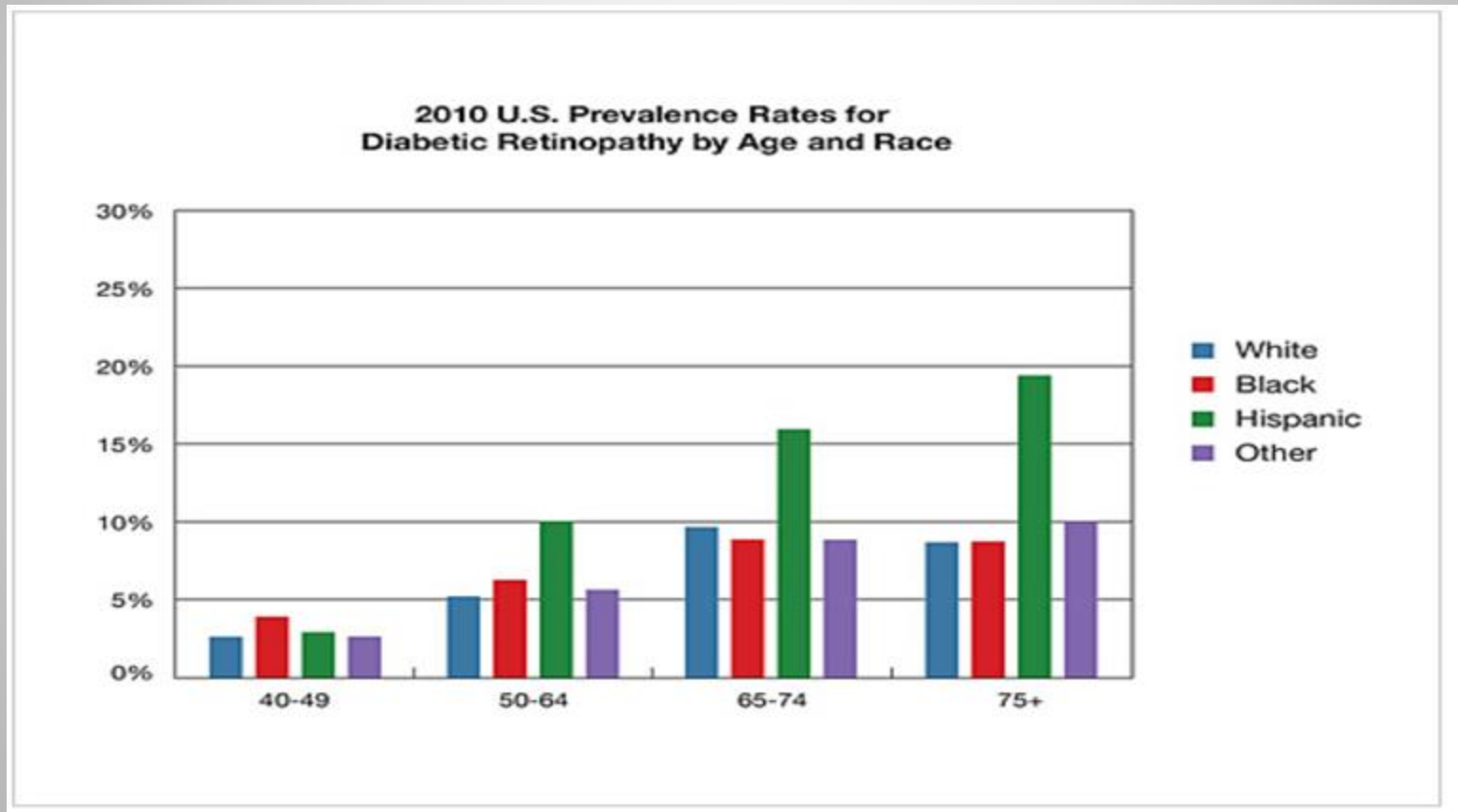
Gestational diabetes-

- ❖ if **no** previous diagnosis of DM, **no** retinal exam **unless** visual changes reported
- ❖ if previous diagnosis of DM, **well controlled without retinopathy, no retinal exam unless visual changes**
- ❖ if previous diagnosis of DM, **poorly controlled or documented retinopathy- retinal exam recommended**

What to tell patients: ‘Although your vision may be good at present, it is important to have your eyes routinely dilated. If diabetes damages your eyes, you may need treatment. Timely treatment has been shown to reduce risk of blindness. If you wait too long your treatment may not improve your eyesight but may help preserve your vision.’

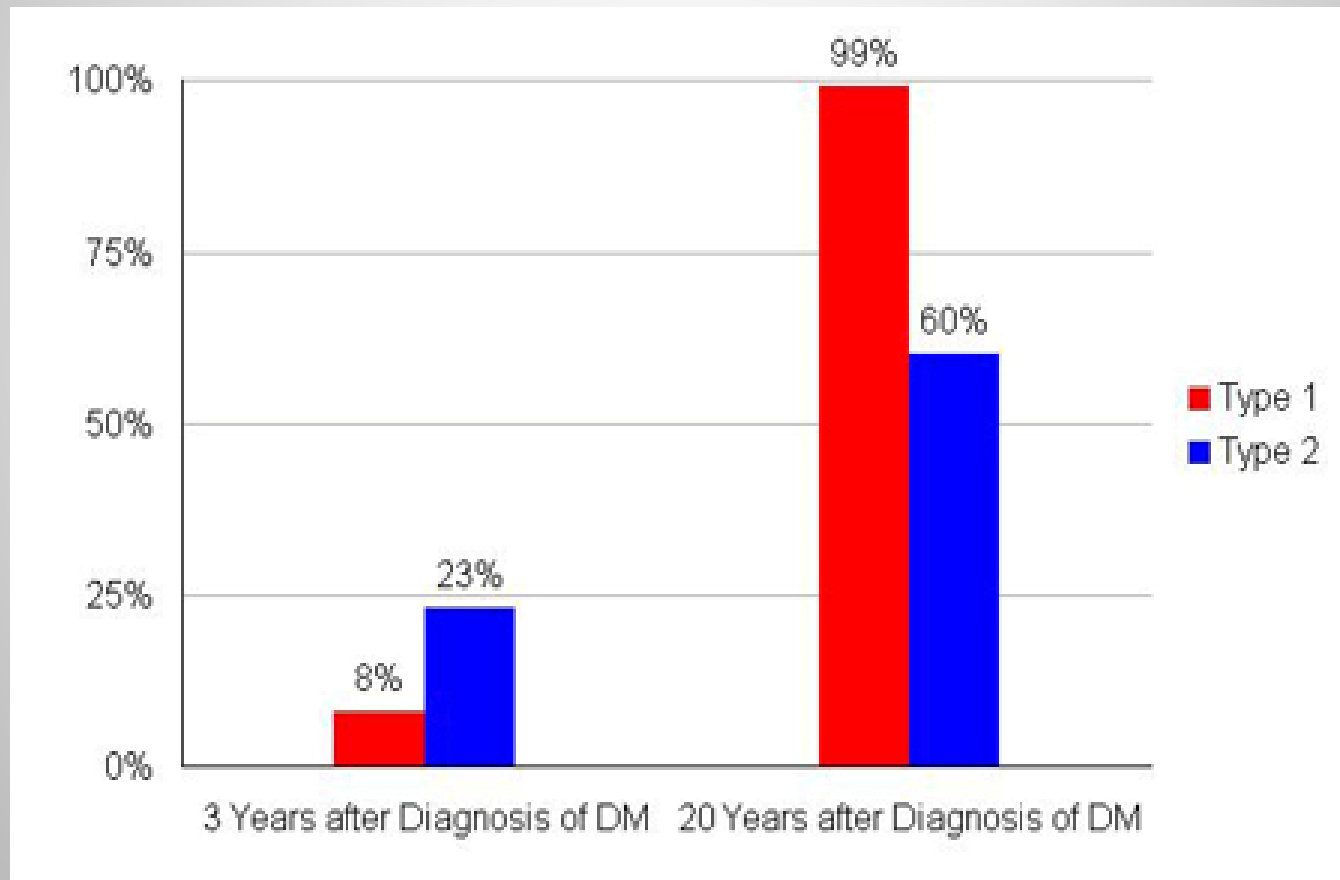
*Prevalence of DR

The American Academy of Ophthalmology (AAO) notes that **all diabetics who have the disease long enough** eventually will develop at least some degree of diabetic retinopathy. In the United States, **minorities** appear particularly vulnerable to vision loss caused by diabetic eye disease.



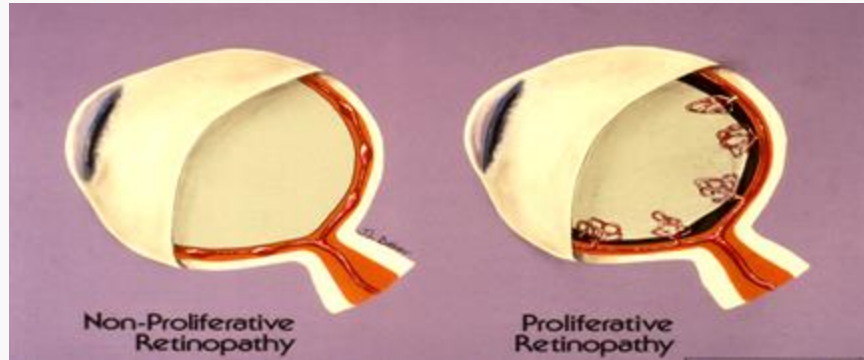
Risk factors for diabetic retinopathy include: duration; poor diab control, HTN, nephropathy, obesity, hyperlipidemia, smoking,& pregnancy

Prevalence of retinopathy in Type I and Type II Diabetes increases with duration of disease



Pearl #2

TWO TYPES of DR



Non-proliferative (NPDR)

NO new blood vessel growth

- *Early stages of diabetic retinopathy*
- *Have mild, moderate and severe classification*
- *Can cause significant visual disability when left untreated*

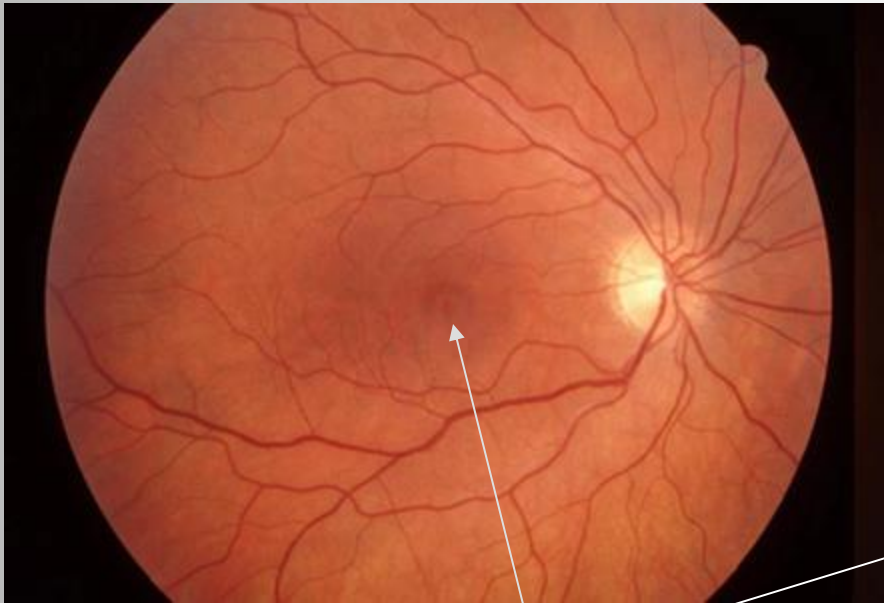
Proliferative (PDR)

“Neovascularization”

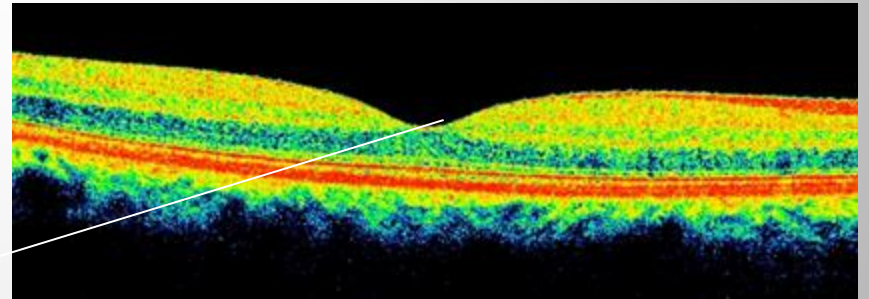
- *More advanced stage of diabetic retinopathy*
- *abnormal fibrovascular proliferations with subsequent bleeding and retinal detachment...*
- *Can cause irreversible blindness when left untreated*

Either form can occur in both Type 1 and Type 2 DM

Anatomy of the retina

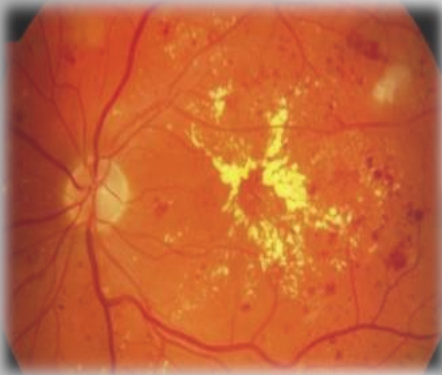


OCT-Optical Coherence Tomography
non-invasive imaging test

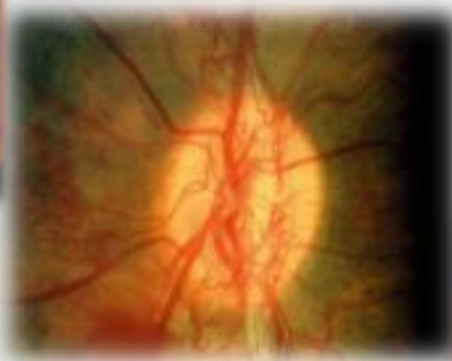


fovea-
the focal point of the vision

Diabetic Retinopathy Progression



Moderately-severe to severe NPDR

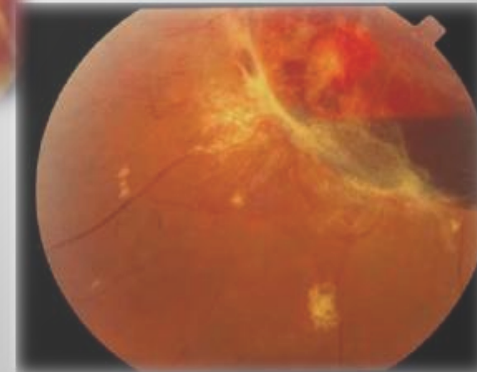


neovascularization

PDR



Ischemia & fibrosis



Vitreoretinal traction & RD

Risk of progression for mod'ly severe npdr is 26%@1yr, 66%@5yrs

For severe npdr risk of progression goes up to 52%@1yr, 80%@5yr,,,,,

& **Without tx** 50% of eyes with pdr are blind within 5 yrs

Pearl#3

Patient symptoms (NPDR)

Early stages — there's often **no visual symptoms**

Type 2: can be present even upon diagnosis

Type 1: rarely present earlier than three to four years after diagnosis

- Majority have 20/20 vision!

The patient can be completely asymptomatic

- Sometime report blurred vision (20/25-20/200)

If persistent can be due to swelling in the macula

“diabetic macular edema”; likelihood generally increases after 8 yrs

Pearl#4

NPDR Clinical findings

➤ *In NPDR tiny dot/blot hemorrhages: **microaneurysms***

damage to retinal bvs leads to....

*Leakage of clear fluid or serum protein into the retinal layers: **exudates***

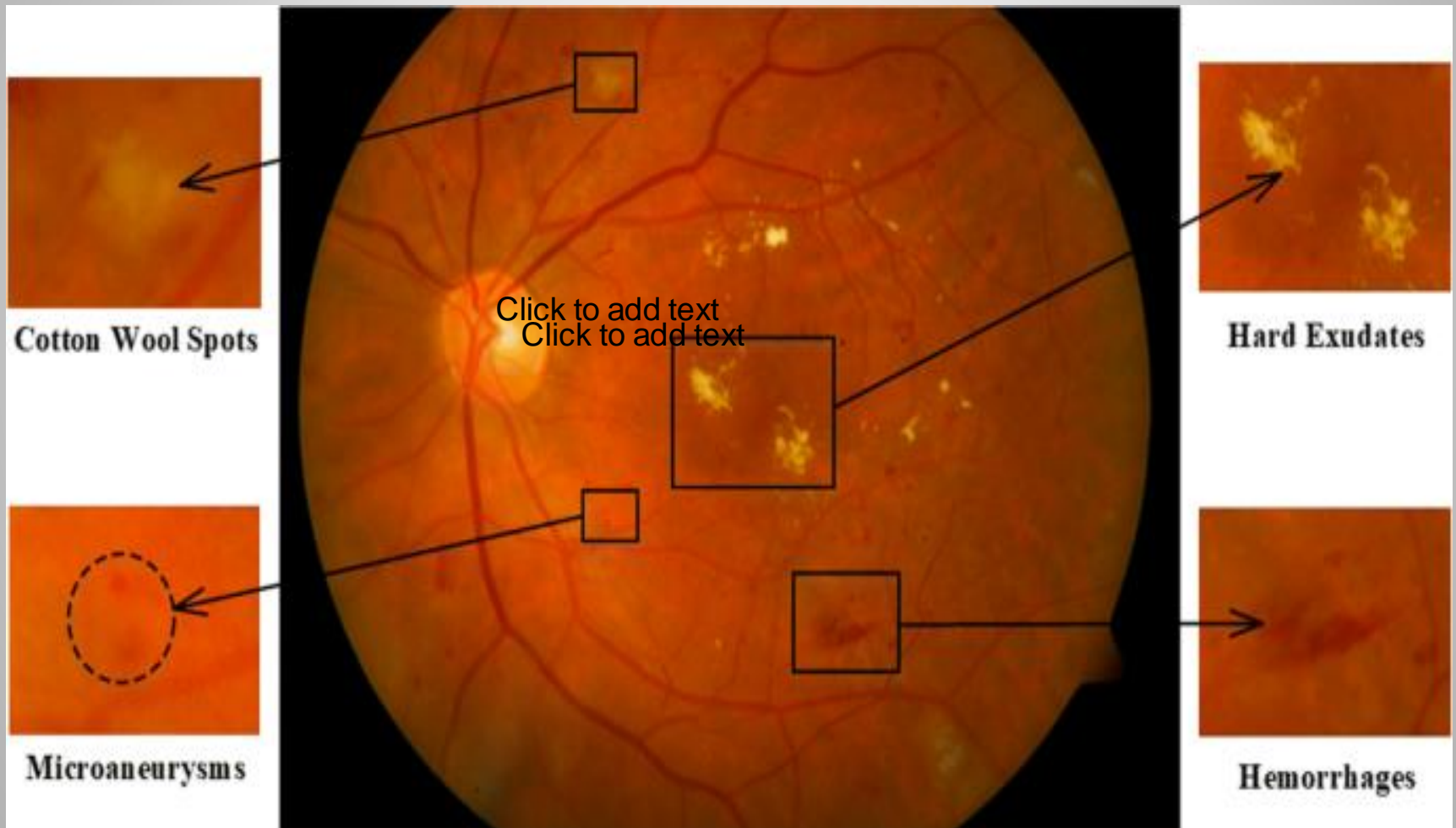
&

Capillary non-perfusion or axoplasmic stasis of the inner retinal layer:

cotton wool spot' (CWS)

NPDR

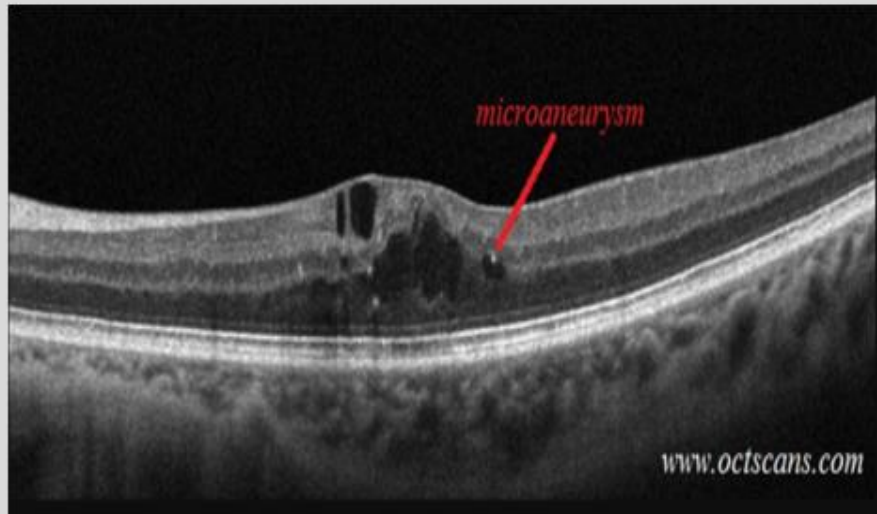
These changes are generally picked up at annual retinal-eye exams and as these changes are happening, the patient generally has no sign or symptoms of such.



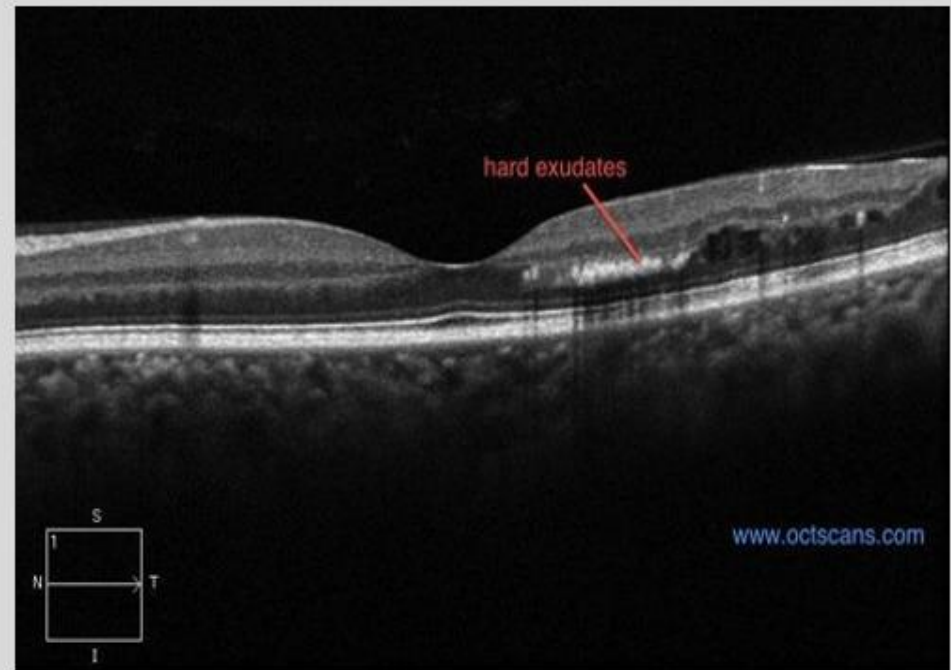
OCT:

optical coherence tomography

Microaneurysm



Hard exudates

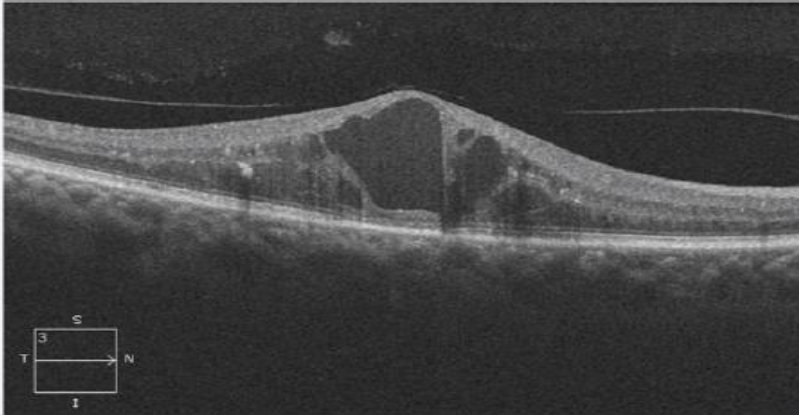
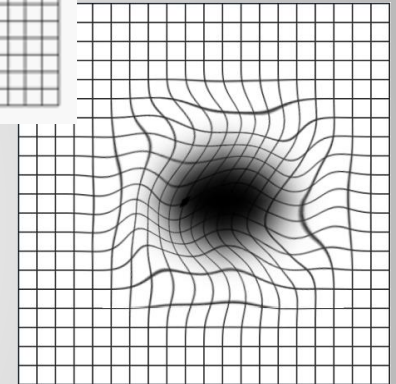
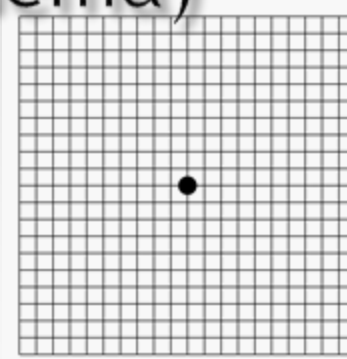


DME

(Diabetic Macular Edema)

Macular edema may occur separately from or in addition to NPDR or PDR

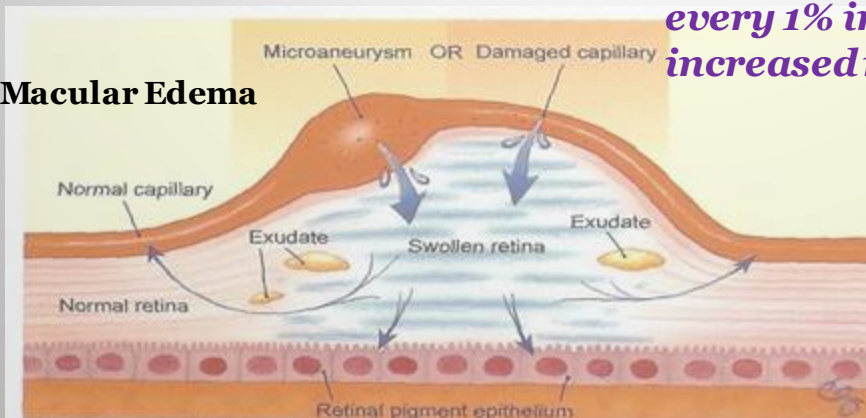
Generally, amsler grid monitoring is recommended and can be helpful for monitoring center vision at home.



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****for those with known diabetes of 8+ yrs...
every 1% increase in A1C corresponds to 50%
increased risk of DME***

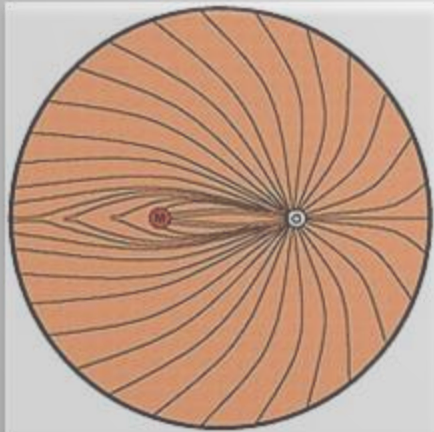
Mechanism of Macular Edema



Sign of **increasing** retinal non-perfusion

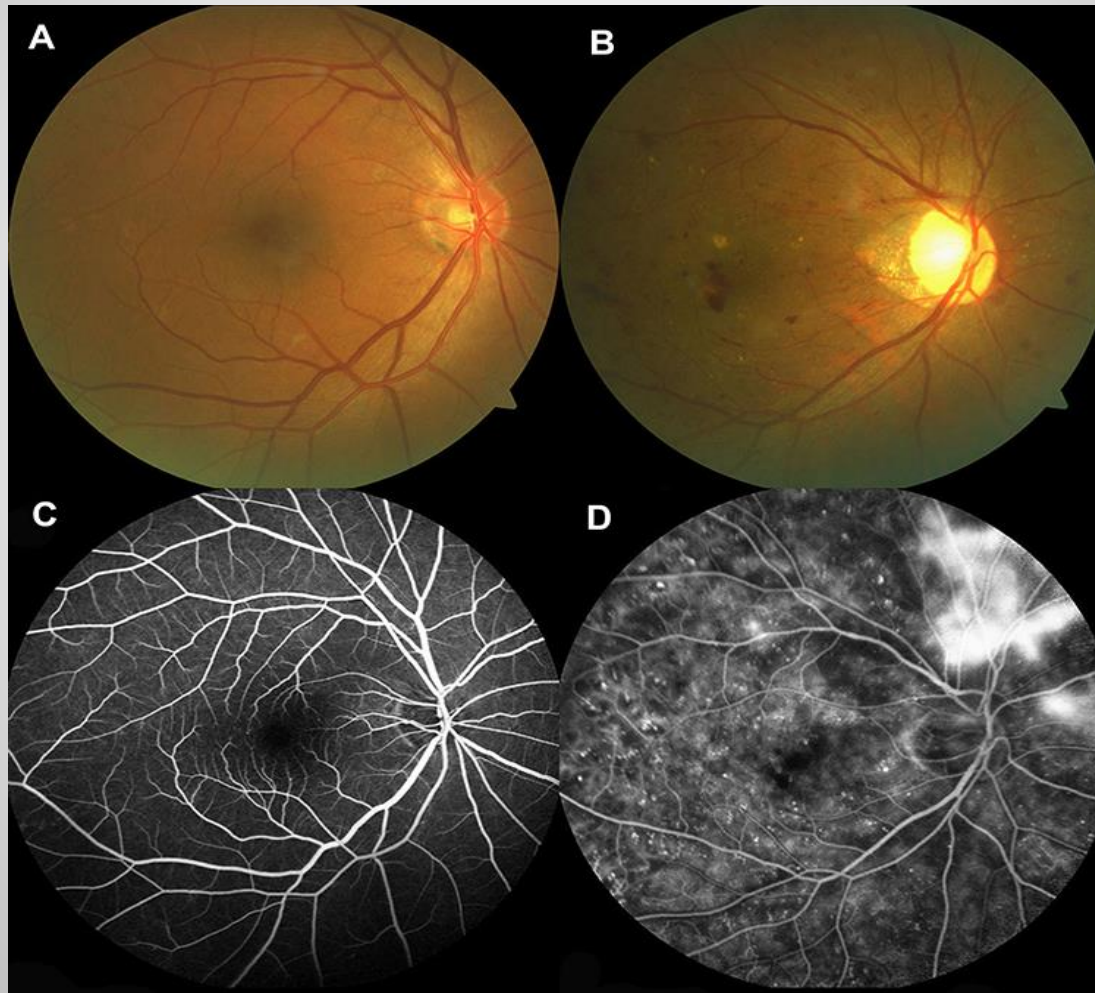
Cotton wool spots

*Nerve fiber layer ischemia
causing stasis of axoplasmic
flow in ganglion cell layers*



Fluorescein Angiography

Gold standard for evaluating retinal vasculature



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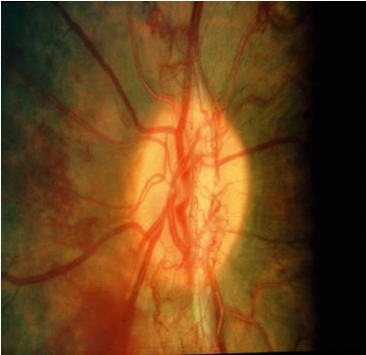
Pearl #5

PDR Patient symptoms

- 20/20!
May be asymptomatic
- Floaters
new onset, few or many
- Vision impairment
Partial or Total loss of vision
- Pain (RARE)
Only in neovascular glaucoma

Pearl #6

PDR Clinical Findings



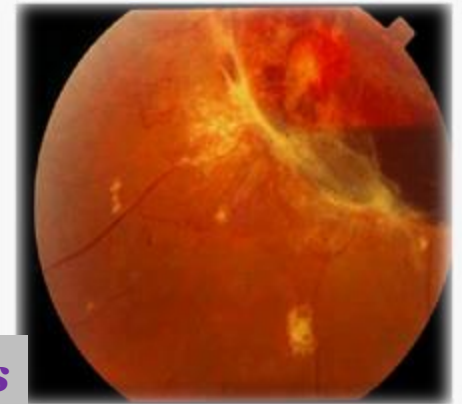
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*Advanced complication of diabetes
the greatest risk of visual loss*

- **Neovascularization**
New abnormal blood vessel growth
- **Fibrous proliferation**
scar tissue formation
- **bleeding &/or traction**
pulling of the retina...Retinal detachment



PDR

Vitreous hemorrhage Symptoms



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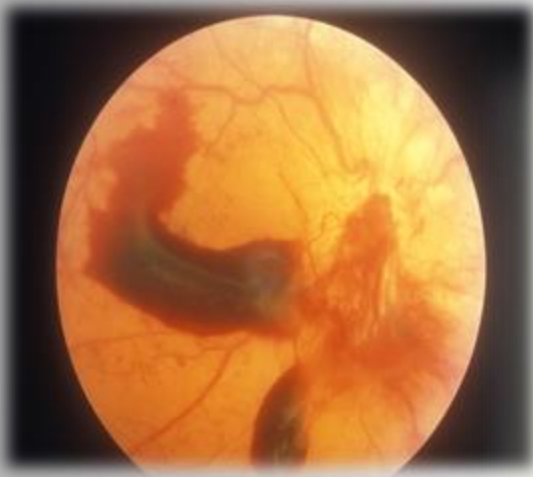
Affects approx. 7/100,000 people each yr

Showers of dots or floaters

Possible decreased light perception

Not painful

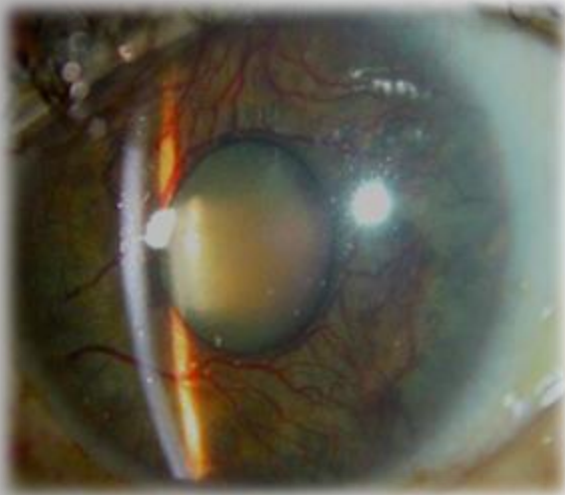
Urgent evaluation by ophthalmologist



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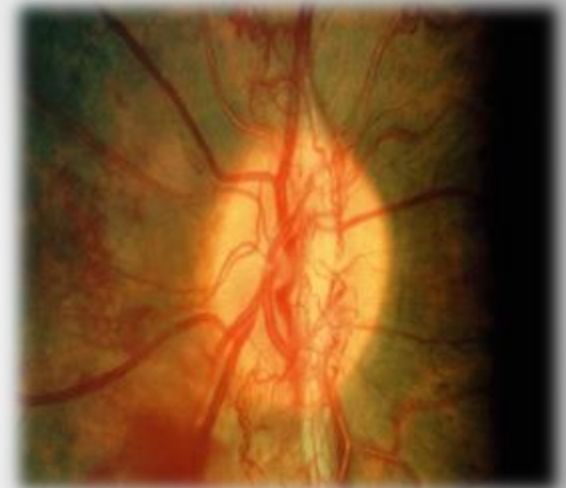
PDR

Neovascularization



Iris neovascularization/
neovascular glaucoma

Retina neovascularization



Neovascularization of disc

Pearl #7

Retina evaluation & treatment

- Clinical exam

Slit lamp bio-microscopy

Indirect ophthalmoscopy

- Imaging

OCT (optical coherence tomography)

Fluorescein Angiogram

ULTRA SOUND- “Bscan”

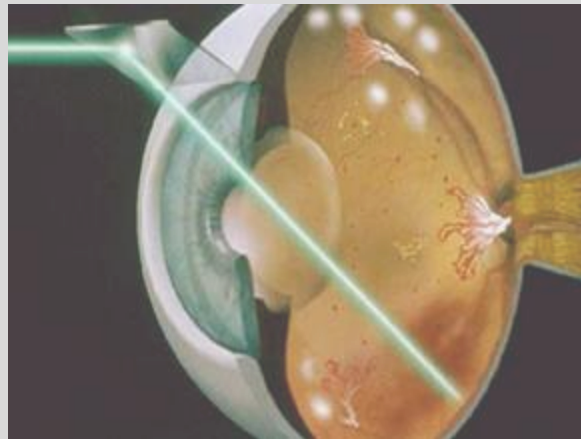
Treatment of Proliferative DR

- **Panretinal photocoagulation (PRP)**- burn ischemic retina
- Causes regression of existing neovascular tissue and prevents progressive neovascularization in the future



PRP

Tx Side Effects

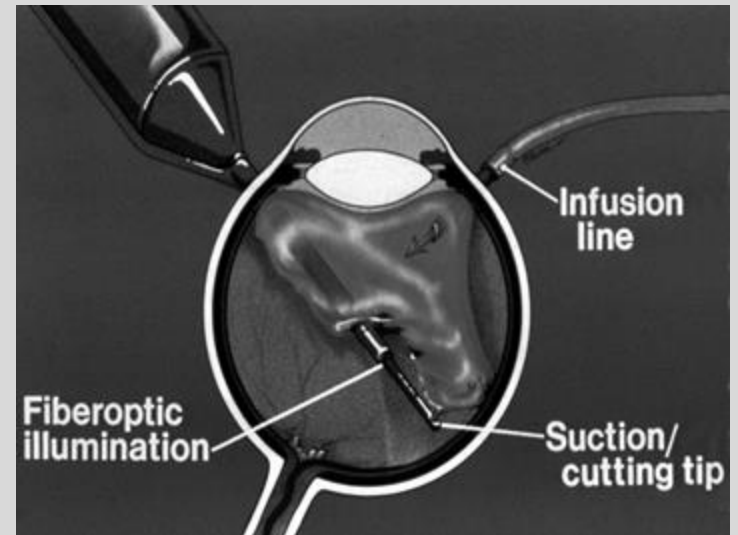


- ❖ *Decreased night vision*
- ❖ *Decreased color vision*
- ❖ *Decreased peripheral vision*
- ❖ *Possibly loss of 1-2 lines of va*

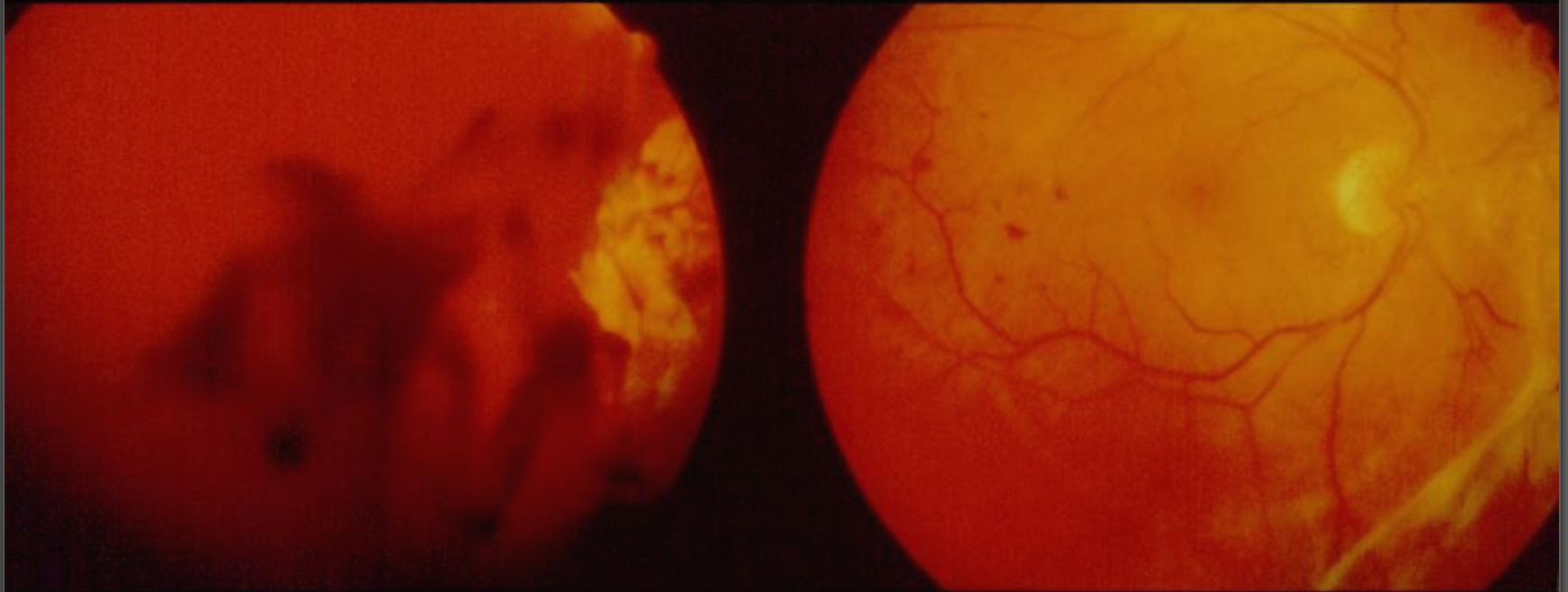
Vitrectomy Surgery



- To remove vitreous hemorrhage
- To treat or prevent retinal detachment



Vitrectomy

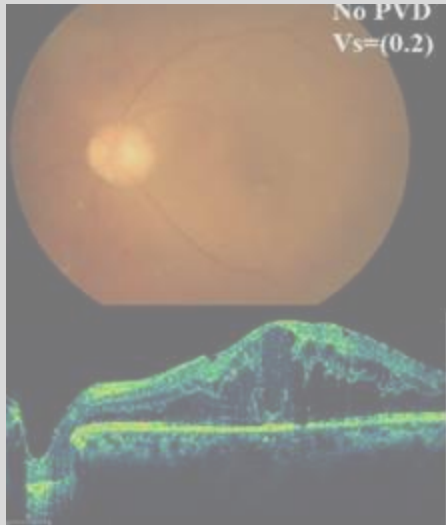


Before

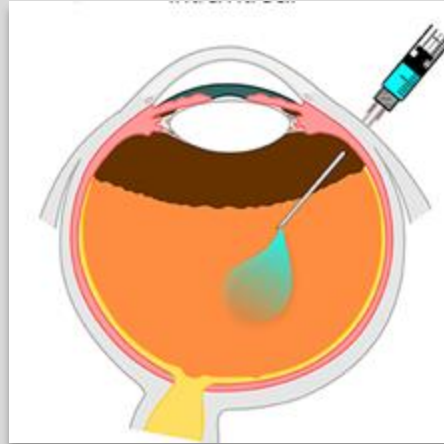
After

INTRA-VITREAL INJECTIONS

DIABETIC MACULAR EDEMA

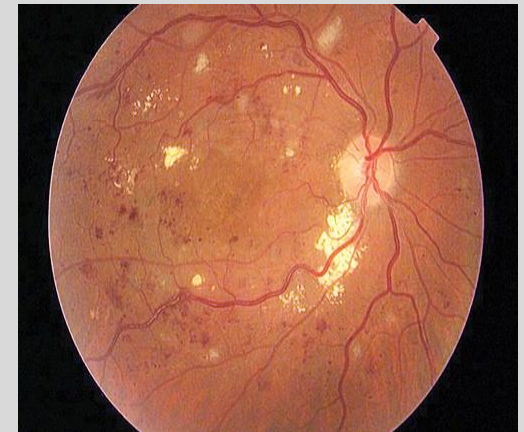


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Moderate-severe NPDR



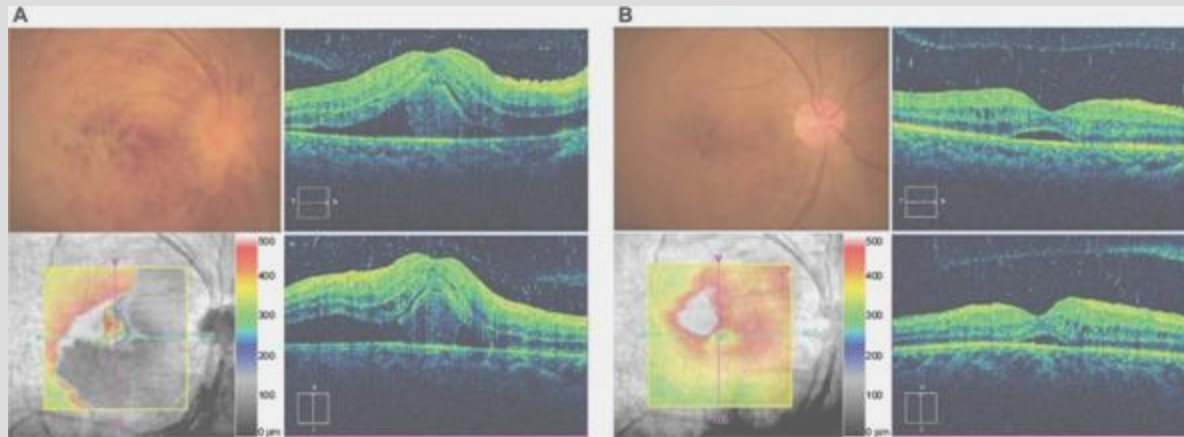
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- Anti- VEGF (first line of treatment usually)
- Steroid (short acting/long acting-depot)
- Addition of Focal laser- only if specific leaking microaneurysms are identified and safely away from the foveal center.

ANTIVEGF

(antivascular endothelial growth factor therapy)

Group of medications injected into the vitreous to reduce new BV growth



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Although historically **Panretinal photocoagulation (PRP)** had been gold standard for proliferative DR (50+ %**Reduction in Visual Loss**), **ANTIVEGF injections** have proved effective in reducing progression, fewer DME seen, fewer vitrectomy, less visual field loss

Injections are generally administered monthly and may be over a two-year period
DR scores show significant improvement and retinopathy regression

- *aflibercept/Eylea (75.9%)*
- *bevacizumab/Ranivizumab (34.4%)*
- *ranibizumab/Lucentis (55.2%)*

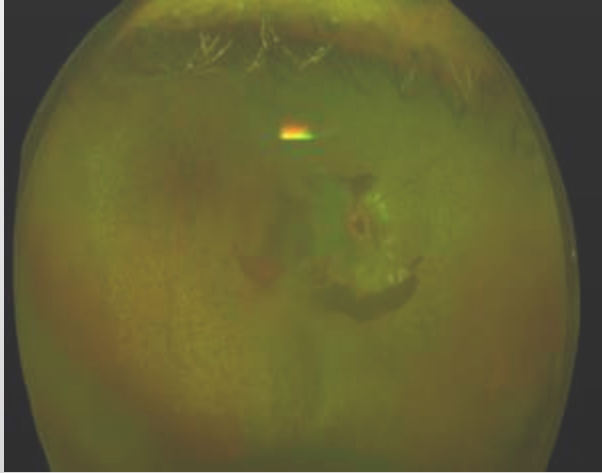
ANTIVEGF is being use to treat **DME** as well as **moderately-severe NPDR**₃₀

Pearl #8

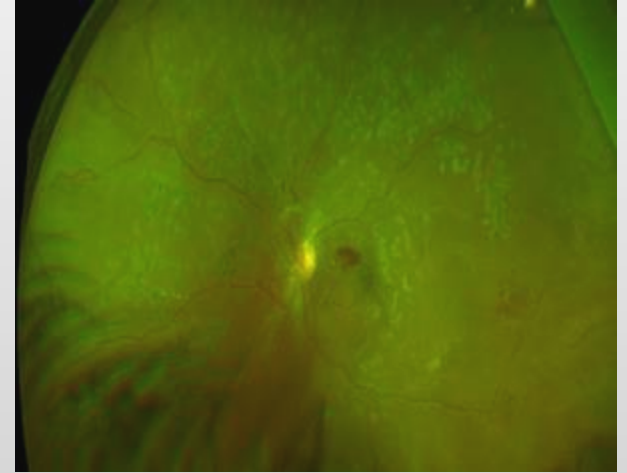
Complications of advanced /untreated DR *(usually irreversible)*

- *Macular ischemia= Blindness*
- *Neo-vascular glaucoma= Blindness*
- *None clearing vitreous hemorrhage=Blindness*
- *Retinal detachment=Blindness*
- *Painful blind eye*
- *Phthisis bulbi (atrophy/shrinkage of the globe)*

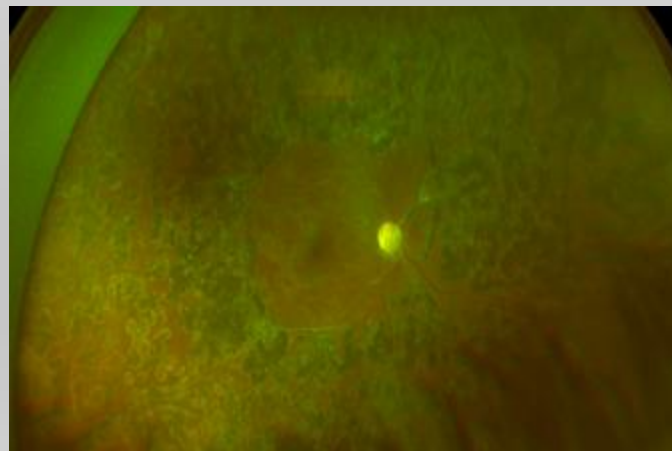
CASE OF PDR in 21 year old*



*Hemorrhaging, fibrosis
& retinal traction*

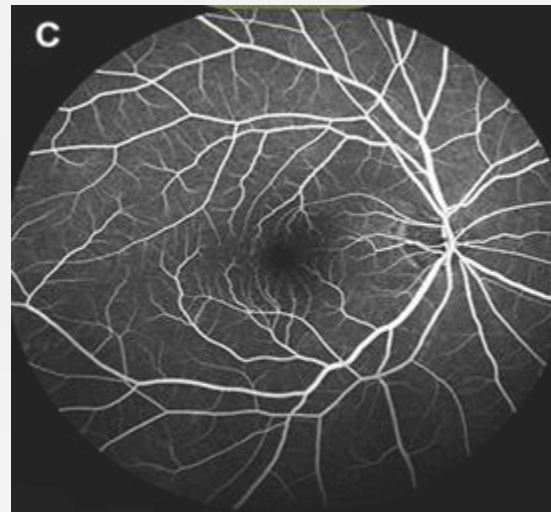
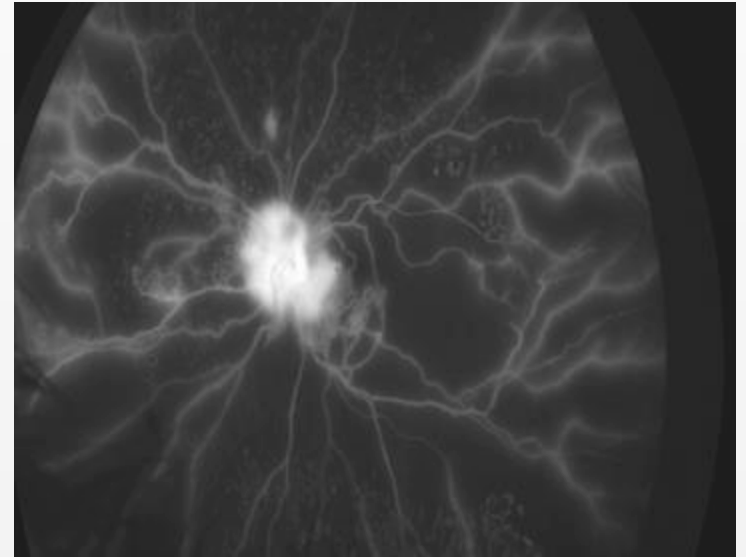
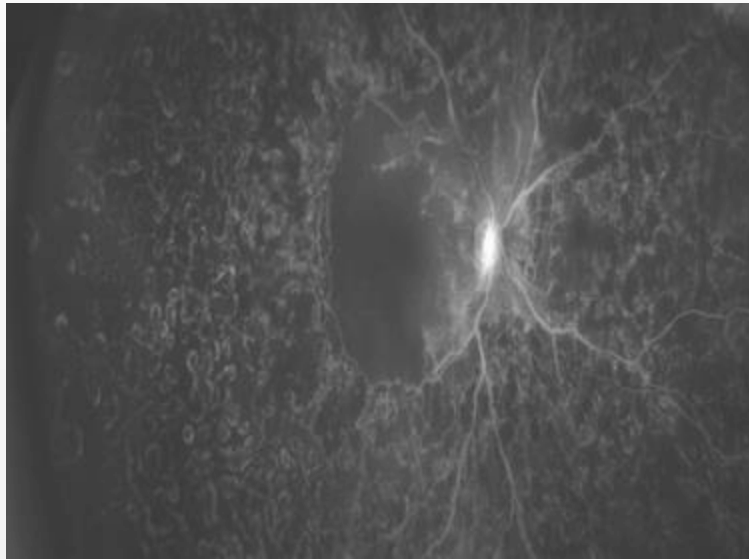


*Ischemia & vitreal
hemorrhage*



Post tx: PRP & vitrectomy

Successfully “treated” with vitrectomy & laser



Pearl #9

Prevent Blindness

- **Know the risk factors:** *blood glucose, blood pressure, blood lipids, body mass index, smoking, anemia, untreated sleep apnea*
- **Blood sugar control** (*HbA1C-7.0 or better*)
 - 40% reduction in risk of developing DR for every 1% reduction in A1C which equates to 25% reduction in need for laser tx & 15% reduction in blindness
- Treatment of diabetic retinopathy may be **90% effective in preventing severe vision loss** (visual acuity less than 5/200) using current treatment strategies

Pearl #10

PCP role in Treatment

Early detection is very important

- *Patient education increases compliance*
- *Frequent dilated exams*
 - ❑ **Type I DM 3-5 years after diagnosis, then annually**
 - ❑ **Type II DM @ time of diagnosis, then annually unless otherwise advised by eyecare provider**

Tight glycemic control and modification of risk factors that increase severity of retinopathy

- *Treat HTN, Hyperlipidemia, Anemia, sleep apnea*
 - ❑ **controlled/tight glycemic range (A1C below 7)**
 - ❑ **BP at/below 130/80 for those 60+, 125/75 if younger**

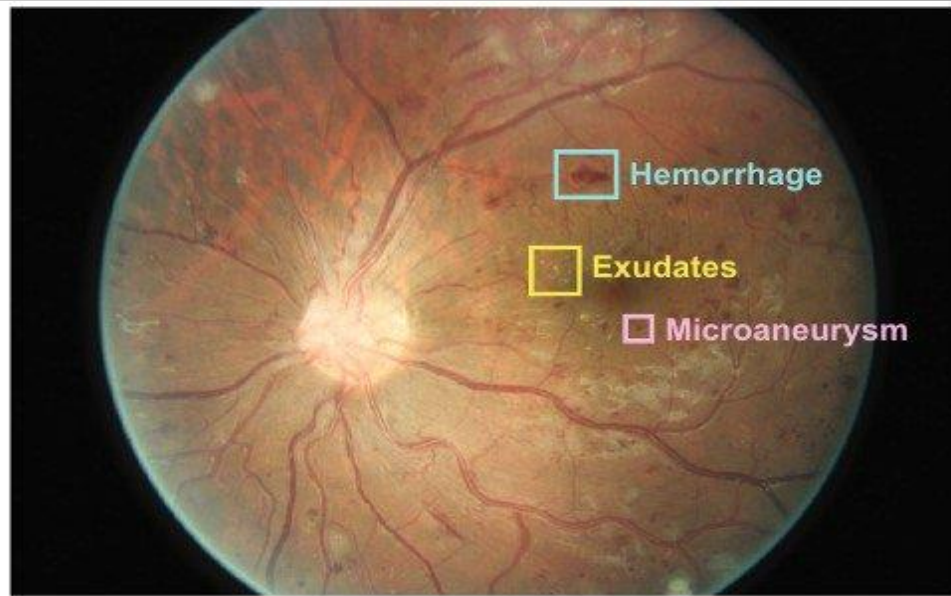
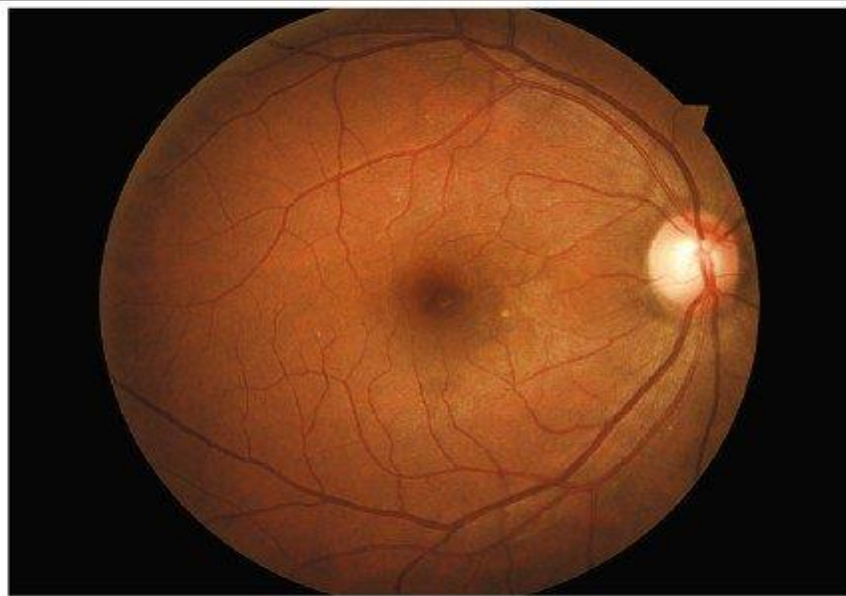
CONCLUSION

- *Early treatment may prevent blindness*
- *Improved screening can ensure early treatment*

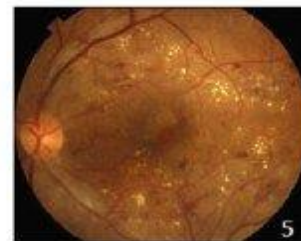
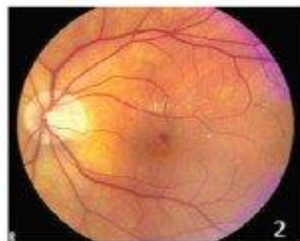
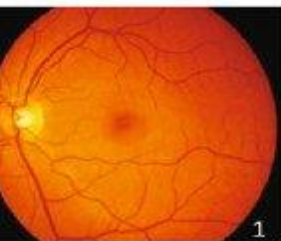
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10, 12 DR Absent	14, 15, 20 DR Questionable	35 Mild NPDR	43 Moderate NPDR	47 Moderately Severe NPDR	53 Severe NPDR
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60, 61 Mild PDR	65 Moderate PDR	71 High-risk PDR	75 High-risk PDR	81 Advanced PDR	85 Advanced PDR
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