

## WHEN GLAUCOMA AND RETINA CONVERGE

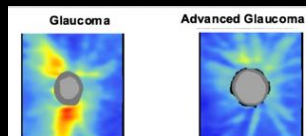
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## STATEMENT OF THE PROBLEM

Diagnosing and managing glaucoma isn't always straightforward, especially when retinal pathology is present.

## Course Goal

- To provide current, clinically relevant information about the management of glaucoma in patients with other posterior segment disease.
  - Case-based
  - Topical discussion



## GLAUCOMA AND RETINAL DISEASE FREQUENTLY PRESENT IN COMBINATION

Why?

## The Burden of Posterior Segment Diseases

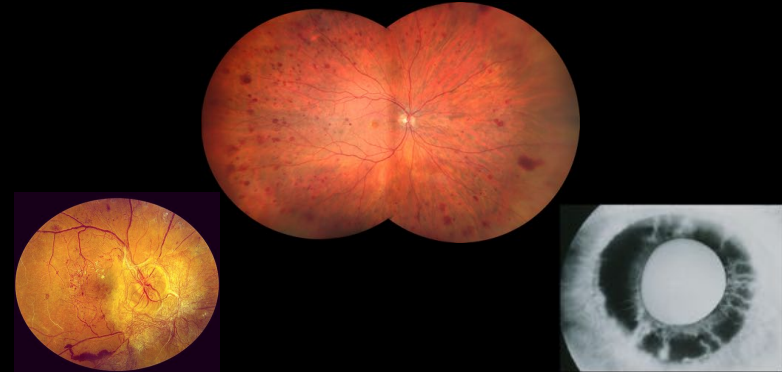
- Several retinal diseases that cause cell damage could eventually lead to glaucoma.<sup>1</sup>

- Diabetes/PDR
- RVO
- RAO



1. Griffith JF, Goldberg JL. Prevalence of comorbid retinal disease in patients with glaucoma at an academic medical center. Clin Ophthalmol. 2015;9:1275-1284. Published 2015 Jul 13. doi:10.2147/OPTH.S85851

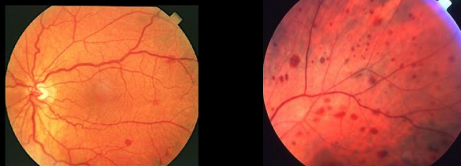
## Severe NPDR → PDR → Rubeosis



## The Burden of Posterior Segment Diseases

- Retinal diseases that cause cell damage could eventually lead to glaucoma.<sup>1</sup>

- Sickle Cell Retinopathy
- Hypoperfusion Retinopathy and Ocular Ischemic Syndrome (Carotid Occlusive Disease)
- Malignancy
- Uveitis



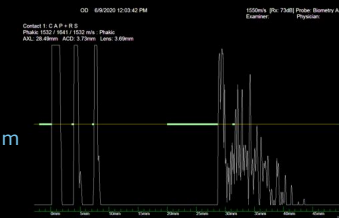
1. Griffith JF, Goldberg JL. Prevalence of comorbid retinal disease in patients with glaucoma at an academic medical center. Clin Ophthalmol. 2015;9:1275-1284. Published 2015 Jul 13. doi:10.2147/OPTH.S85851

## Posterior Segment Diseases

- Certain retinal diseases that are associated with higher risk for glaucoma.<sup>1</sup>

- High Myopia
- Retinal Detachment
- Retinitis Pigmentosa

Ax. Length = 28.49 mm



1. Griffith JF, Goldberg JL. Prevalence of comorbid retinal disease in patients with glaucoma at an academic medical center. Clin Ophthalmol. 2015;9:1275-1284. Published 2015 Jul 13. doi:10.2147/OPTH.S85851

## The Burden of Treatment

- Patients undergoing retinal Tx, procedures and surgeries are at **increased risk for elevated IOP and glaucoma**.
- The IOP rise may be temporary or sustained.
  - Intravitreal steroids, especially triamcinolone acetonide<sup>2</sup>
  - Intravitreal anti-vascular endothelial growth factor (anti-VEGF)
  - Topical or periorcular steroids (for post-op CME, etc.)
  - Panretinal photocoagulation (PRP)
  - Simple vitrectomy (eg, vitrectomy without gas, scleral buckle, or silicon oil)
  - Complex vitrectomy
- 2. Pizzimenti JJ, Nickerson MM, Pizzimenti CE, Kasten-Aker AG. Selective laser trabeculoplasty for intraocular pressure elevation after intravitreal triamcinolone acetonide injection. *Optom Vis Sci.* 2006; 83:421-425.

### Selective Laser Trabeculoplasty for Intraocular Pressure Elevation After Intravitreal Triamcinolone Acetonide Injection

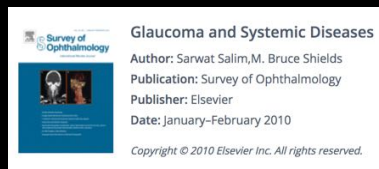
JOSEPH J. PIZZIMENTI, OD, FFAO, MARITZA M. NICKERSON, OD,  
CLAIRE E. PIZZIMENTI, OD, FFAO, and ANN G. KASTEN-AKER, MD  
*Nova Southeastern University, College of Optometry, Ft. Lauderdale, Florida (JJP, MMIN, CEP, AGK)*

*"Our case report illustrates the potential for laser trabeculoplasty to be implemented as a surgical option for steroid-induced glaucoma after intravitreal injection of triamcinolone acetonide." (2006)*

Source: PMID 16840867

## Systemic Disease and Glaucoma

- Certain systemic, vascular-related conditions have been **associated with glaucoma and/or retinal disease**.
  - Hypertension and hypotension
  - Diabetes mellitus
  - Migraine headache
  - Peripheral vascular disease
  - Raynaud's syndrome
  - Anemia
  - Obstructive Sleep Apnea

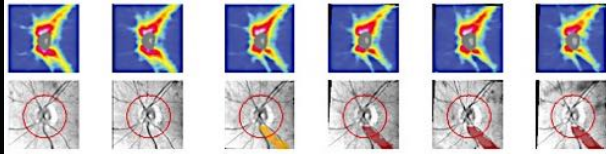


## Glaucoma + Retinal Disease = Blindness

- A longitudinal, retrospective study of 5,154 glaucoma patients found that 14.8% had a retinal comorbidity.
- Glaucoma patients with comorbid retinal disease had a much higher prevalence of blindness and low vision than those without comorbid retinal disease.

• Griffith JF, Goldberg JL. Prevalence of comorbid retinal diseases in patients with glaucoma at an academic medical center. *Clin Ophthalmol.* 2015;9:1275-1284. Published 2015 Jul 13. doi:10.2147/OPHT.S85851

## Questions and Answers



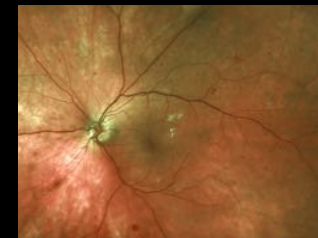
“OLD SCHOOL”

CASE 1 FROM 2004

OCT less widely used, mostly time domain  
 No OCTA  
 Wide field imaging still early

## Case History and Clinical Findings

- 48-year-old HM
- type 1 diabetes x 20 yrs
- + Hx of Oc HTN w/o glaucoma OD/OS
- Pinhole VA: 20/25 OD and 20/30 OS
- SLE: Grade 2 NS, Grade 2 CC OD/OS
- TAP: OD = 24 mmHg CCT = 595  
 OS = 22 mmHg CCT = 602

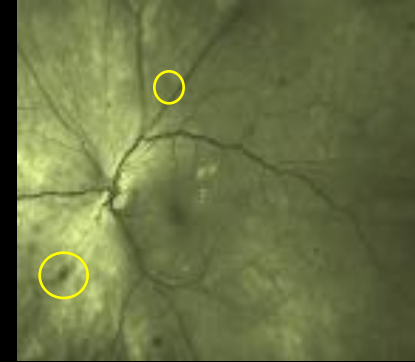




### Clinical Findings

- DFE (photophobic, poor fixation)
  - Several MAs, dot hemes and blot hemes centrally and extending into the mid-periphery OD/OS.
  - Hard exudates within both non-foveal maculae, w/o retinal thickening.

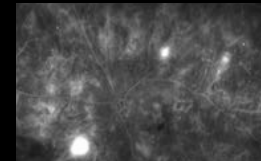
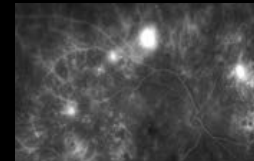




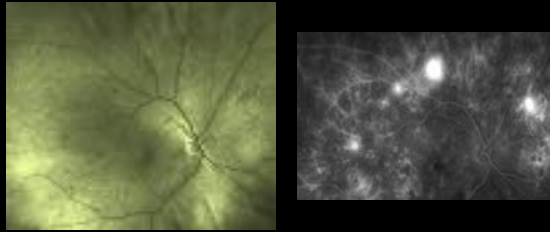
### Post Red-Free Imaging Diagnosis

- Early (Low Risk) PDR w/o CSDME OD and OS
  - Is any PDR truly low risk?
- Plan: Retinal Consultation within 1 week for FA, consideration of treatment.
- 2004 management = PRP
- 2022 management: Anti-VEGF vs laser?

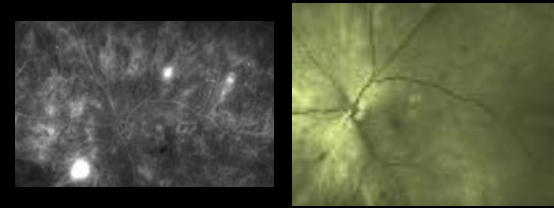
### Retinal Consult: IVFA c/w NVE OU



OD



OS



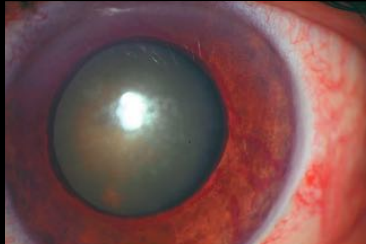
### Case 1: Conclusions

- **Red-free** clearly shows MAs, hemes, IRMA, NVD/E better than standard color
- Modern technology enables clinical image manipulation and digital enhancement.
- Magnify the images on your screen and look **along the vascular arcades** for **neovascularization**.\*

### Rest of the story...Patient misses retina Tx. visit x 3

- Presents 10 months later with “cloudy vision” and moderate pain OS
- Pinhole VA: 20/25 OD and **20/50 OS** (down from 20/30)
- TAP: OD = 24 mmHg      OS = 52 mmHg
- Grade 2 **K-edema OS**
- OS: see image

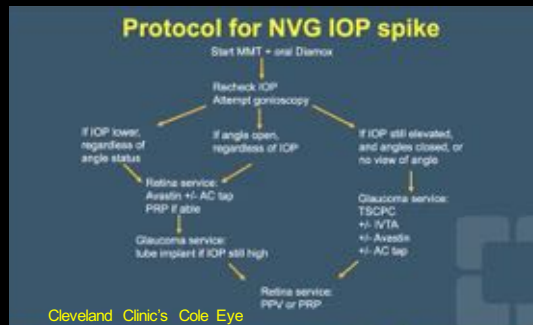
NVG is a common and severe type of secondary angle closure glaucoma that develops in the setting of retinal ischemia resulting in aqueous VEGF and NVI/A.



### NVG Management

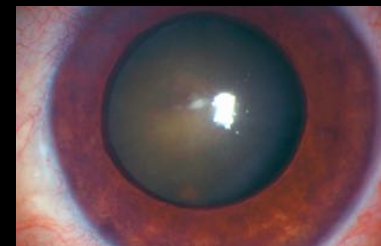
- Atropine 1% in office, then BID
- Topical steroid 1 gt in office, then QID
- Topical aqueous suppressants
  - B-blocker, alpha-agonist, CAI
  - Avoid PGs
- PO Diamox
  
- Anti-VEGF adjuvant treatment
- PRP standard treatment

MMT = Max topical medical therapy (OD)  
 IVTA = intravitreal triamcinolone acetonide (Glaucoma)  
 TSCPC = transscleral cydophotocoagulation (Glaucoma)



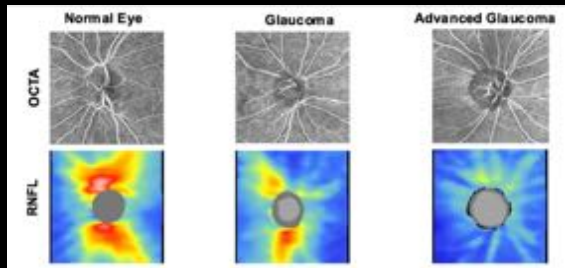
Acknowledgement: Rishi P. Singh, MD

### After PRP





## Questions and Answers



## “LUSCIOUS LASHES”

### CASE 2



Acknowledgment Richard Trevino, OD

## Case History and Clinical Findings

69 yo WF presents for annual exam

- POH & MH: Unremarkable, LEE 1yr

- VA: 20/25+2 OD, 20/20 OS

- PERRL, (-)APD

- TAP: 27/28 @ 12pm ← ↑10 mmHg from 1yr ago

- SLE: White & Quiet

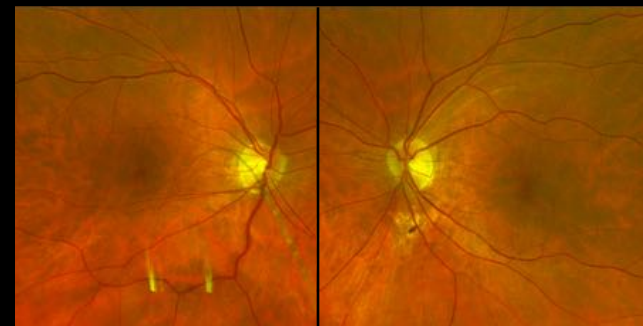
- C/D: 0.6 OD, 0.5 OS

Gonio: Open to SS/CB w/ GR 4 Approach

CCT: 572 OD, 576 OS

IMP: Glaucoma suspect

PLAN: Schedule OCT & VF





DIFFERENTIAL DIAGNOSIS OF CLINICALLY SIGNIFICANT INCREASE IN IOP

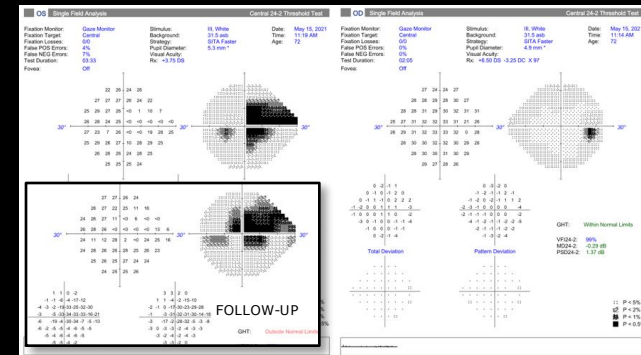
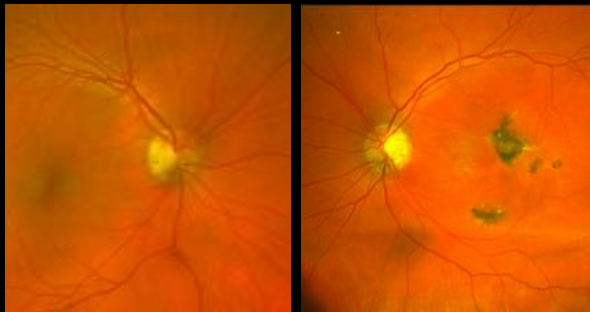


- Angle closure
- Non-adherence with glaucoma therapy
- Use of steroid medication
- Previously undetected large diurnal variation
- Discontinuation of systemic beta-blocker
- Influence of other drugs or medications (e.g. caffeine)

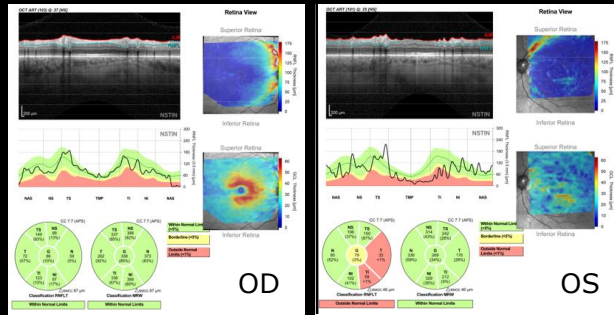
LATISSE: Rx by Derm PA, using for 2 yrs, ran out a few mon ago.

- Latisse == Generic Lumigan == **bimatoprost 0.03%**
- Latisse has all the same clinical effects as Lumigan
- **Adverse effects with Latisse:** conj hyperemia and irritation, increase iris pigmentation, periocular skin pigmentation, and periorbital fat atrophy
- Direct application of Latisse to the upper lid margin with a brush minimizes ocular exposure
- **Lumigan (bimatoprost 0.01%)** is effective in IOP reduction and has fewer side effects.

72 yo HF  
 + Oc HTN being Tx w/bimatoprost 0.01%  
 s/p ERM Sx w/complications OS



### Hood report reveals effect of ERM OS



Ophthalmology Retina

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### Epiretinal Membrane Surgery in Eyes with Glaucoma: Visual Outcomes and Clinical Significance of Inner Microcystoid Changes

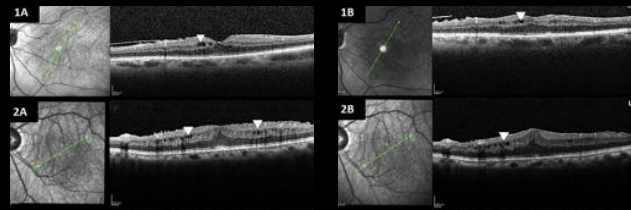
Travis Peck, MD • Miratafiah Salabat, MD • Raziye Mahmoudzadeh, MD • ... Jason Hsu, MD • Sunir J. Garg, MD • M. Ali Khan, MD

Published: March 18, 2022 • DOI: <https://doi.org/10.1016/j.oret.2022.02.016>

**Purpose**

To assess surgical outcomes of PPV with membrane peel (MP) surgery in eyes with idiopathic ERM and concurrent glaucoma, and to identify potential imaging-based biomarkers of vision outcomes.

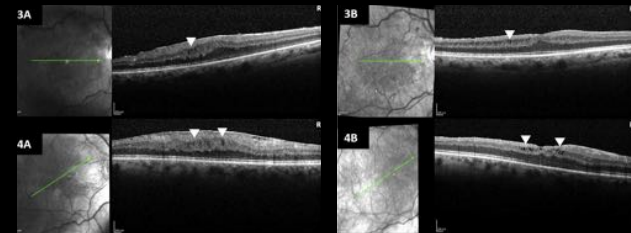
### Inner Microcystoid Changes



Pre-op

Post-op

### Inner Microcystoid Changes



Pre-op

Post-op

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Epiretinal Membrane Surgery in Eyes with Glaucoma: Visual Outcomes and Clinical Significance of Inner Microcystoid Changes

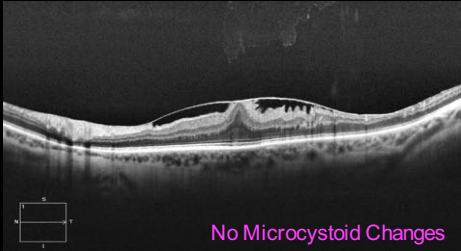
Travis Peck, MD · Mirzaollah Salabat, MD · Raafiyah Mahmoudradah, MD · Jason Hsu, MD · Sunir J. Gang, MD · M. Ali Khan, MD · Show all authors

Published: March 18, 2022 · DOI: <https://doi.org/10.1016/j.oret.2022.02.018>

**Conclusions**

Pre-operative inner microcystoid changes on OCT were present in over half of eyes with ERM and concurrent glaucoma, and may be a poor prognostic OCT biomarker. Eyes with ERM and concurrent glaucoma experienced worse vision outcomes compared to eyes with ERM alone, particularly those with advanced disc cupping.

## Questions and Answers



No Microcystoid Changes

“NEVUS FLAMMEUS”

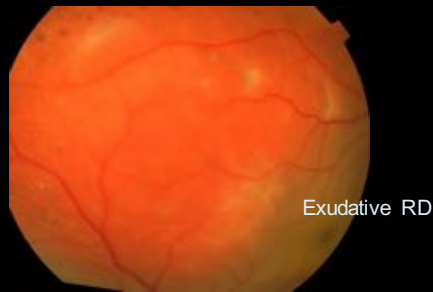
CASE 3



### History and Clinical Findings

- A 24 year old Hispanic male with history of Sturge-Weber syndrome (SWS) reported unilateral “dim” vision OD since his teens.
- VA: OD = LP OS = 20/20
- He reported corresponding ocular pain over few years.
- He presented with chronic unilateral glaucoma, high IOP (38 mmHg w/iCare), and ipsilateral diffuse choroidal hemangioma (DCH).
- We referred the patient to a glaucoma specialist for surgical management of IOP (trabeculectomy) and to a retina specialist for treatment of the tumor.

## Diffuse Choroidal Hemangioma



## DCH

- A non-malignant neoplasm
- DCH can result in vision loss secondary to refractive error, foveal distortion, or exudative RD.
- Management
  - Treatment may include laser, photodynamic therapy, and radiotherapy.
  - Neurologic consultation indicated

## Sturge-Weber Syndrome

### • Clinical Ocular Signs

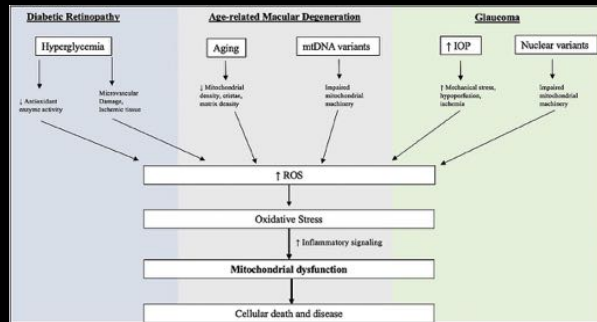
- Ipsilateral glaucoma
- Episcleral hemangioma
- Cavernous choroidal hemangioma
  - Usually DCH (not Circumscribed CH)
- Iris heterochromia (less common)

## When Glaucoma and Retina Converge: Summary

- The high prevalence of comorbid retinal disease in glaucoma patients demonstrates the need for optometrists to be vigilant for both.
- The higher prevalence of retinal diseases in glaucoma patients—especially POAG pts-- may reflect **common pathophysiological processes** that warrant further investigation.

• Ellis JT. Mitochondrial dysfunction in the aging retina. *Biology (Basel)*. 2019;8(2):31. doi:10.3390/biology8020031

Complex cellular mechanisms contribute to ROS production. Oxidative stress is a shared feature of these conditions and leads to mitochondrial dysfunction and subsequent cell death.



• Eells JT. Mitochondrial dysfunction in the aging retina. *Biology* (Basel), 2019;8(2):31. doi:10.3390/biology8020031

## Conclusions

- Diseases of the posterior segment are among the leading causes of vision loss worldwide.
- The new frontier:
  - Today's optometrists are well positioned to fully embrace both glaucoma and vitreoretinal care.

Thank you for spending your precious time with me!

*Joe*