Marshall B.
KETCHUM UNIVERSITY
Southern California College of Optometry

Joint SCCO | USC | VA Symposium

Live Interactive CE Webinar | PM Session

Sunday | September 19, 2021 | 8:00 a.m. - 4:00 p.m.

Joint SCCO | VA | USC Symposium

Marshall B. KETCHUM UNIVERSITY
Southern California College of Optometry
Department of Continuing Education

Sunday, September 19

Pacific Time Zone | Live Webinar | Pending COPE-Approval

Morning Session

8:00 a.m. - 8:55 a.m.
Keratoconus in Youth: An Urgent Issue?
Gloria Chiu, OD

8:55 a.m. - 9:50 a.m.
Updates in Clinical Glaucoma Management
Brian Song, MD

10:00 a.m. - 11:50 a.m.
Refer or Relax? Macula
Steven Ferrucci, OD

11:50 a.m. - 12:10 p.m.
Break

Afternoon Session

12:10 p.m. - 1:05 p.m.
Optic Disc Edema
Jessica Chang, MD

1:05 p.m. - 2:00 p.m.
Herpetic Eye Disease
Brian Toy, MD

2:10 p.m. - 3:05 p.m.
The Calm in the Eye of the Storm: Re-Purposed Medications for COVID-19
Judy Tong, OD

3:05 p.m. - 4:00 p.m.
IPC: A Case for Collaboration
John Nishimoto, OD and Julie Tyler, OD

This activity is supported by an unrestricted educational grant from the following education partners. We sincerely thank them for their support!

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Instructor Biographies

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Gloria Chiu, OD

Associate Professor of Clinical Ophthalmology, USC Roski Eye Institute

Dr. Gloria Chiu completed her Bachelor of Arts from the University of California, Berkeley. She remained at the University of California, Berkeley, where she obtained her Doctor of Optometry degree in 2008. Following completion of her residency in Cornea and Contact Lenses at Southern California College of Optometry, Dr. Chiu pursued further fellowship training in Prosthetic Replacement of the Ocular Surface Ecosystem (PROSE) treatment at the Boston Foundation for Sight. Dr. Chiu developed and supervises the USC PROSE service and is actively conducting research in the areas of irregular corneas and ocular surface disease.

Brian Song, MD

Assistant Professor Of Clinical Ophthalmology & Director of Education, USC Department of Ophthalmology

Dr. Brian J. Song is Assistant Professor of Clinical Ophthalmology and Director of Education in the Department of Ophthalmology at the USC Keck School of Medicine. He received his undergraduate degree from Johns Hopkins University and his medical degree from the University of Texas Medical Branch. He then completed his ophthalmology residency at the Harkness Eye Institute of Columbia University Medical Center – New York Presbyterian Hospital followed by a glaucoma fellowship at the UCLA Stein Eye Institute. His current research interests include ophthalmic ultrasound and imaging methods to evaluate optic nerve biomechanics and blood flow abnormalities in glaucoma.

Steven Ferrucci, OD

Chief, Optometry Section at Sepulveda VA Ambulatory Care Center
Professor, MBKU | SCCO

Dr. Steven Ferrucci, a 1994 graduate of the New England College of Optometry, completed his Residency in Primary Care/Hospital Based/Geriatric Optometry at the Sepulveda VA Hospital in Sepulveda CA. He is currently Chief of Optometry at the Sepulveda VA Ambulatory Care Center and Nursing Home. He is also the Residency Director at his sight, and a Professor at the Southern California College of Optometry at Marshall B. Ketchum University. Dr. Ferrucci has lectured extensively, with a special interest in Diabetes, Diabetic Eye Disease, Age-Related Macular Degeneration, and Fluorescein Angiography. He has also published several articles in optometric journals, including The New England Journal of Optometry, Optometry and Vision Science, Optometry: Journal of The AOA and Review of Optometry. Currently, he serves on the Editorial Board for both Review of Optometry and Optometry Times. He is an active member in the American Optometric Association and the California Optometric Association, as well as a fellow in both the American Academy of Optometry and the Optometric Retinal Society.

Jessica Chang, MD

Clinical Assistant Professor of Ophthalmology, USC Roski Eye Institute

After undergraduate studies at Yale University, Dr. Jessica Chang spent a year doing volunteer work in China and then attended Duke University School of Medicine. As a medical student, she was selected as a Howard Hughes Medical Institute NIH Research Scholar and spent two years at the National Eye Institute doing basic and clinical research in ophthalmology. She then completed ophthalmology residency at the Wilmer Eye Institute, followed by American Society of Ophthalmic Plastic and Reconstructive Surgery fellowship training in Oculoplastics and Neuro-ophthalmology.

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Instructor Biographies

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Brian Toy, MD

Assistant Professor of Clinical Ophthalmology, Director of Clinical Informatics and Information Technology
Service Chief of the Uveitis and Ocular Inflammation Service, USC Roski Eye Institute

Dr. Brian Toy is a vitreoretinal fellow and clinical instructor at the USC Roski Eye Institute. He graduated magna cum laude from the University of California, Berkeley, with a degree in bioengineering, received an MD with distinction from the University of California, San Francisco, and completed a clinical research fellowship at the National Institutes of Health. He completed an internship at Santa Clara Valley Medical Center, a major county healthcare system in the Bay Area, and then completed an ophthalmology residency at Stanford University. Toy's professional interests include retinal imaging, telemedicine and safety net care, particularly as applied to diabetic retinopathy. Outside of work, he enjoys hiking, skiing, and spending time with friends and family.

Judy Tong, OD

Associate Professor & Assistant Dean of Residencies | MBKU | SCCO

Dr. Judy Tong is an Associate Professor of Optometry and Assistant Dean of Residencies at the Southern California College of Optometry of the Marshall B. Ketchum University. She received her BS degree in Genetics from the University of California, Berkeley and her OD degree from the Southern California College of Optometry. She completed a one-year residency in Primary Care Optometry at the Eye Institute of the Pennsylvania College of Optometry (Salus University). As the Assistant Dean of Residencies since November 2003, Dr. Tong serves to provide global administrative and educational direction to 24 residency programs across 6 different states. Her main academic responsibility is teaching anterior segment diseases, basic and advanced procedures including lasers, injection, and suturing. Dr. Tong is one of the core instructors of the glaucoma certification courses and grand rounds program in California. Dr. Tong's research activities include being the Principal Investigator and Co-Investigator on two phase III antibiotic drug trials and major allergy study.

John Nishimoto, OD, MBA

Professor & Senior Associate Dean for Professional Affairs, MBKU | SCCO

Dr. John Nishimoto received a Doctor of Optometry degree from the Southern California College of Optometry in 1987. In 1988, he completed a one-year residency in Hospital-Based Geriatric Optometry at the West Los Angeles VA Medical Center. Dr. Nishimoto is currently a Professor and the Senior Associate Dean for Professional Affairs. In 1997, he received a Health Care Executive Masters in Business Administration from the University of California, Irvine. Dr. Nishimoto has been a frequent contributor of articles and lectured on topics especially related to primary care and ocular disease. He is the co-author of the text "Differential Diagnosis in Primary Eye Care." Dr. Nishimoto is also currently a clinical faculty member in primary care and ocular disease at the University Eye Center at Ketchum Health. Dr. Nishimoto is a fellow of the American Academy of Optometry and served as Chair of the Section on Ocular Disease.

Julie Tyler, OD

Primary Care Department Chair & Associate Professor, MBKU | SCCO

Dr. Julie A. Tyler received her B.A. from Creighton University and her Doctor of Optometry Degree from Indiana University School of Optometry (IU). Following graduation, Dr. Tyler completed a Residency at Nova Southeastern University (NSU) and served as Chief Resident prior to joining the faculty at NSU full-time. More recently, Dr. Tyler joined the faculty at Southern California College of Optometry (SCCO) at MBKU. Dr. Tyler has served in a variety of clinical and academic roles including chief of service and instructor of record for various clinical and didactic coursework. She has been promoted to Associate Professor and received numerous teaching awards, as well as recognition as a faculty member of Gold Key Honor Society and in 2019 was inducted into Phi Kappa Phi honor society that recognizes individuals in all academic disciplines. Dr. Tyler has authored posters and published journal articles on a variety of topics in the areas of primary care and ocular disease and is a Fellow of the American Academy of Optometry and is also a member of the COA and AOA.

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Optic Disc Edema

Jessica Chang, MD

Optic Disc Edema

Jessica R. Chang, MD
Clinical Assistant Professor of Ophthalmology

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Disclosures

- Horizon Therapeutics Advisory Board
- Please do not share or copy patient images

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Outline

- Papilledema
- Pseudopapilledema
- AION—arteritic and non-arteritic
- Diabetic papillopathy
- Atypical Optic neuritis, Optic Peri-neuritis
- Neuroretinitis
- Other causes
- Cases
- Summary

Papilledema

- Optic disc edema from raised intracranial pressure (ICP)
- Edema tends to start nasally, wide range from mild to severe with hemorrhages and cotton wool spots
- May be asymmetric between the two eyes
- Visual symptoms:
  - Sometimes no visual symptoms, sometimes severe vision loss
  - Transient visual obscurations,
  - Enlarged blindspot on HVF
- Nonvisual symptoms:
  - whooshing pulsatile tinnitus, positional headaches

Papilledema

- Workup:
  - Emergent neuroimaging to rule out mass lesion
  - LP to measure ICP
  - Medication and/or surgery to reduce ICP (and address any mass lesion if present)

Pseudo-Papilledema

- With or without optic disc drusen
- May be asymptomatic or may cause VF deficits
- Drusen have been hypothesized to increase risk of NAION
- Buried drusen may become more apparent over lifetime
- Drusen diagnosed with Autofluorescence, FA, B-scan, EDI-OCT (and CT if calcified)

Hickam's Dictum vs. Occam's Razor

"A patient can have as many diseases as he d--n well pleases"

- Keep an open mind for multiple diagnoses
- Remember to rethink an initial diagnosis if something doesn't fit
- One can have disc drusen AND raised ICP, or disc drusen AND glaucoma, for example

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Anterior Ischemic Optic Neuropathy (AION)

- Arteritic (AAION): Giant cell arteritis, patient age >50yrs, F>M
  - Pallid disc edema, severe vision loss, may affect second eye shortly
  - ROS: headache, jaw claudication, weight loss, fever, cranial neuropathies
  - FA may show patchy choroidal filling; GCA may also present w/CRAO
  - Check CBC, ESR, CRP (not hs), consult rheumatology
  - Admit for IV methylprednisolone, then ~1 year of prednisone or steroid sparing alternatives such as tocilizumab
  - Temporal artery biopsy is gold standard for Dx but may be inconclusive still
  - Rarely other forms of arteritis/vasculitis may present similarly

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Anterior Ischemic Optic Neuropathy (AION)

- Non-arteritic (NAION)
  - Disc at risk morphology, PMH of OSA, HTN, HL, DM, hypotension and/or vasodilating medications, anemia, smoking, migraine, coagulopathies, age usually >50yrs
  - May have any VF defect but classically inferior altitudinal corresponding to superior segmental hyperemic optic disc edema
  - 40% of pts have spontaneous improvement
  - 15-20% risk of NAION in the fellow eye in the next 5 years
  - No treatment other than modifying risk factors

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Diabetic Papillopathy (formerly papillitis)

- Presents in patients with DM1 or 2, painless unilateral or bilateral disc edema, usually without severe vision loss
- Exact pathophysiology is unclear—some consider it a form of AION, but generally has less severe impact on final vision and different FA features
- No widely accepted treatment but anti-VEGF intravitreal injection has been published in case reports

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(Atypical) Optic Neuritis

- In pediatric patients, isolated optic neuritis (ON) tends to present with disc swelling more often than adults who classically have retrobulbar ON ("Typical ON")
- Adults with ON with disc edema should be worked up for infectious and inflammatory causes, based on PMH and risk factors
  - E.g. Lyme disease, syphilis, TB, Sarcoidosis, MOGAD, etc.

Neuroretinitis

- Optic disc edema and macular star/hemistar with lipid exudates
- Usually unilateral, most have RAPD and central VF defect
- Infectious:
  - Bartonella henselae, cat scratch fever—can be associated with encephalitis
  - Also syphilis, Lyme, RMSF, toxoplasma, toxocara, etc
- Idiopathic—still often viral prodrome/URI; may be recurrent
  - Final vision better than 20/40 in >90% of patients

Other assorted causes

- Toxic optic neuropathy (e.g. methanol)
- Optic perineuritis
- Hypertensive emergency
- Meningitis
- Infiltrative lesions (e.g. leukemia, sarcoid)
- CRVO

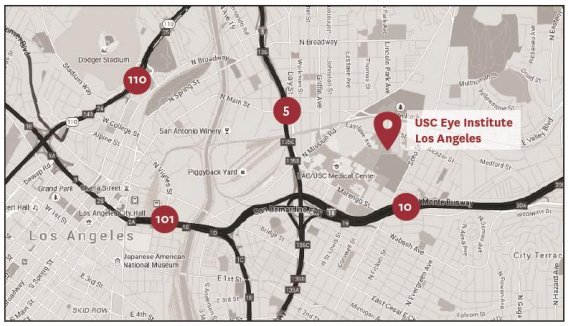
CASES

Summary

- Optic disc edema may result from a wide spectrum of disease, from anatomic anomaly to life-threatening emergency
- Thorough history and exam guide work up and management
- When in doubt please call/refer—if there is concern for raised ICP safest route is ER for emergent imaging

Thank you!

- Questions?



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- 323-442-6335 (office)
- My clinic locations:
  - USC HSC Campus east of downtown
  - USC Roski in Arcadia

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Herpetic Eye Disease

Brian Toy, MD

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Herpetic Uveitis Management

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No relevant financial disclosures

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Herpes family viruses account for a large proportion of infectious uveitis

Table 4. Causative organisms of infectious ocular inflammation by diagnosis and medication codes.

	Sample size, n
Specified by ICD-9 Diagnosis Code	
Parasite	
Histoplasma	5976
Toxoplasma	1104
Other	28
Viral	
VZV	1129
HSV	442
Other	577
Unspecified	
infectious endophthalmitis	1610
infectious iridocyclitis	733
Mycobacterial	36
Syphilis	36
Specified by NDC or J Medication Code	
Viral	3854
Bacterial	2943
Toxoplasma	786
Fungal	542
Mycobacterial	49
Parasite (excluding toxoplasma)	33

ICD = International Classification of Diseases; VZV = varicella zoster virus; HSV = herpes simplex virus; NDC = National Drug Code

https://doi.org/10.1371/journal.pone.0237995.t004

PLOS ONE

RESEARCH ARTICLE

Incidence, prevalence, and risk factors of infectious uveitis and scleritis in the United States: A claims-based analysis

Youning Zhang[1], Sarina Amin[1], Khristina I. Lung[2], Seth Seabury[2], Narsing Rao[1], Brian C. Toy[1]*

1 Department of Ophthalmology, Roski Eye Institute, Keck School of Medicine, University of Southern California, Los Angeles, California, United States of America, 2 Leonard D. Schaeffer Center for Health Policy & Economics, University of Southern California, Los Angeles, California, United States of America

(Zhang et al, PLOS One 2020)

Children's Hospital Los Angeles | LAC+USC

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Objectives

- Recognize the clinical presentation of herpetic uveitides
- Review updates in the medical and surgical management of herpetic uveitis

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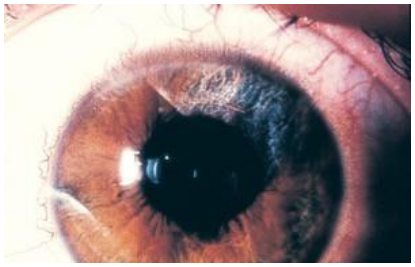
Case: 60M painful right facial vesicular rash for 1 week



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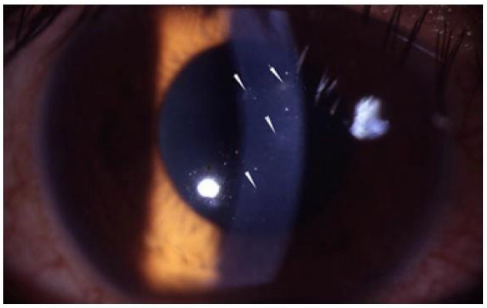
Herpetic keratouveitis can have multiple phenotypes

- unilateral, high IOP, iris atrophy
- stellate KP (diffuse, not in Arlt triangle)
- VZV > HSV-1 > HSV-2 >> CMV >> EBV

Other clinical manifestations include epithelial/stromal/endothelial keratitis with sequelae including immune ring (CMV), decreased corneal sensation and scarring (HSV and VZV), and corneal neovascularization



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Herpesvirus serologies have limited utility in uveitis evaluation

- HSV-1 seroprevalence increases from 54% in adolescence to 90% after age 50
- Thus, positive IgG not helpful in confirming diagnosis, and positive IgM does not prove ocular infection
- Negative viral serology may be helpful in excluding viral etiology
- Aqueous PCR demonstrates over 90% sensitivity and specificity

(Pleyer and Chee, Clin Ophthalmol 2015)

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Landmark HEDS results guide clinical management

- Stromal keratitis:
  - Topical steroids speed resolution of stromal keratitis, with slow taper to minimize recurrence. They are contraindicated in the setting of epithelial keratitis. (Wilhemus et al, Ophthalmology 1994)
  - Oral acyclovir did not improve acute outcomes (Barron et al, Ophthalmology 1994) but did reduce rates of recurrence by 50% (Wilhemus et al, NEJM 1998)
- Anterior uveitis
  - Oral acyclovir may improve treatment success in conjunction with topical steroids (HEDS Study Group, Arch Ophthal 1996)

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Modern treatment considerations

- Oral antivirals preferred over topical treatment
- In patients unable to tolerate oral tx (renal dz), topical ganciclovir gel 0.15% less toxic than trifluridine used in HEDS study
- When topical steroids are indicated, consider starting no higher than QID to decrease risk of recurrence with tapering
- In chronic or recurrent inflammation, consider maintenance systemic antivirals + low-dose steroid drops

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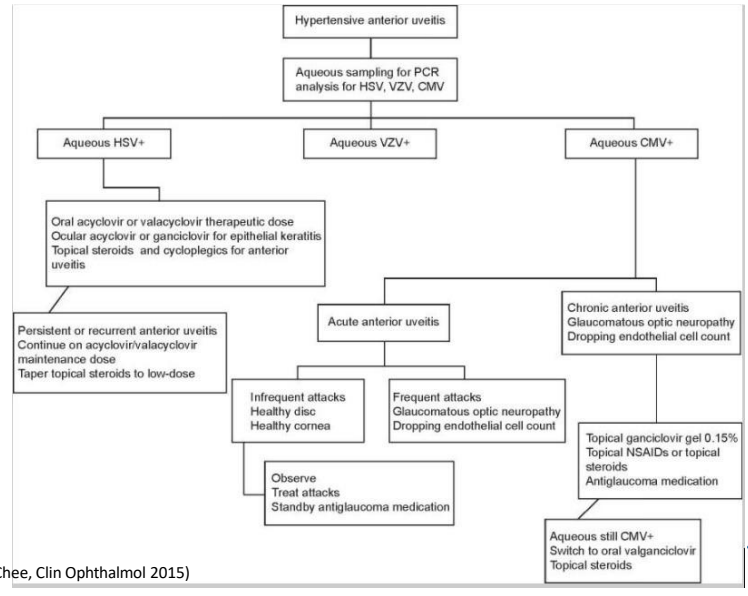
Herpetic Keratouveitis Management Summary



(Pleyer and Chee, Clin Ophthalmol 2015)

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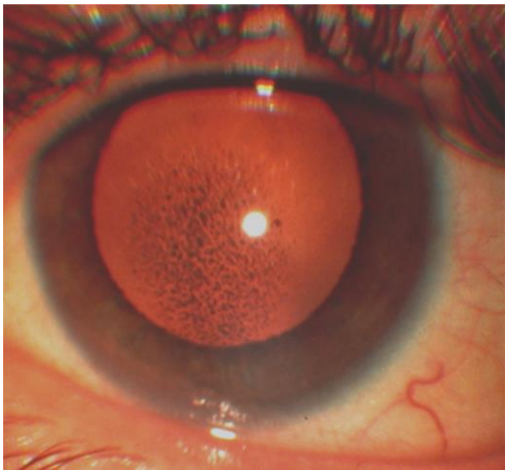
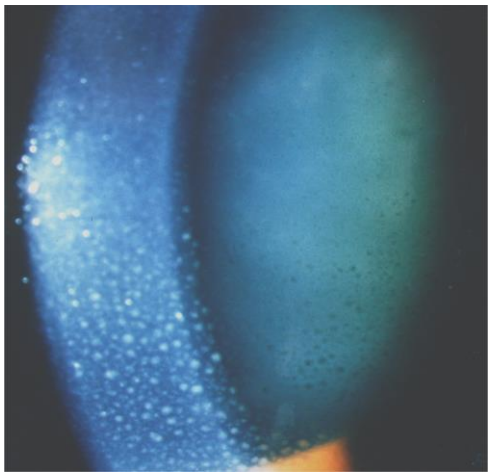
Case: 55M with ocular pain, photophobia and redness and decreased vision OS. VA was 20/20 and 20/50; IOP 10 and 31; Large KPs; 3+cells in AC **and 3+ cells in vitreous**





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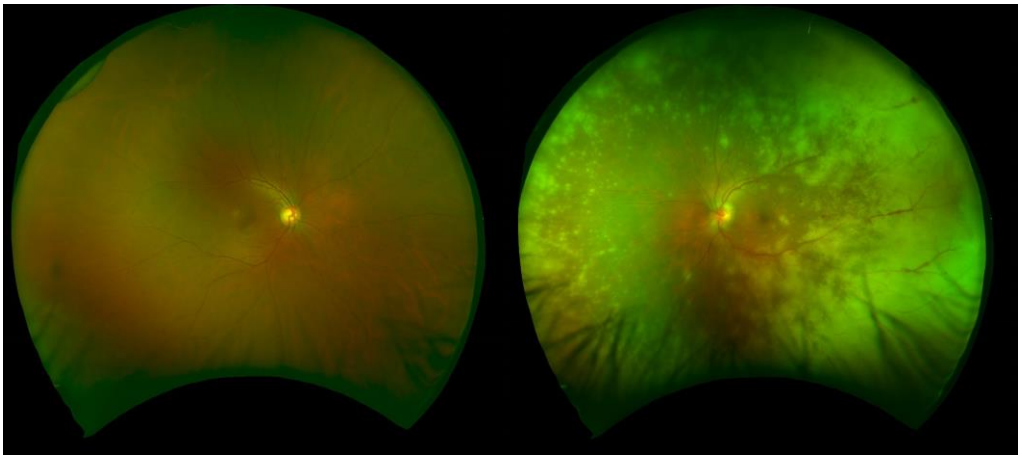
20/20 20/50



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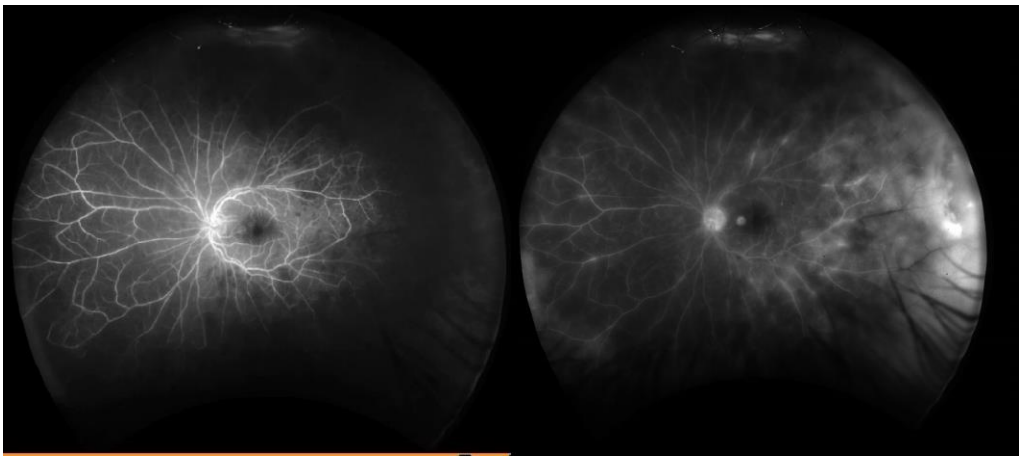

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ARN generally presents as an acute unilateral panuveitis in immunocompetent patients

- Sx: acute onset blurred vision, floaters, pain, photophobia
- Initially unilateral, but can become bilateral in 36% of patients within 6 weeks
- VZV > HSV-1 > HSV-2 >> CMV >> EBV
- DDx:
  - CMV retinitis
  - Syphilis
  - Atypical toxoplasmosis
  - Behçet

(Fisher et al, Ophthalmology 1992)

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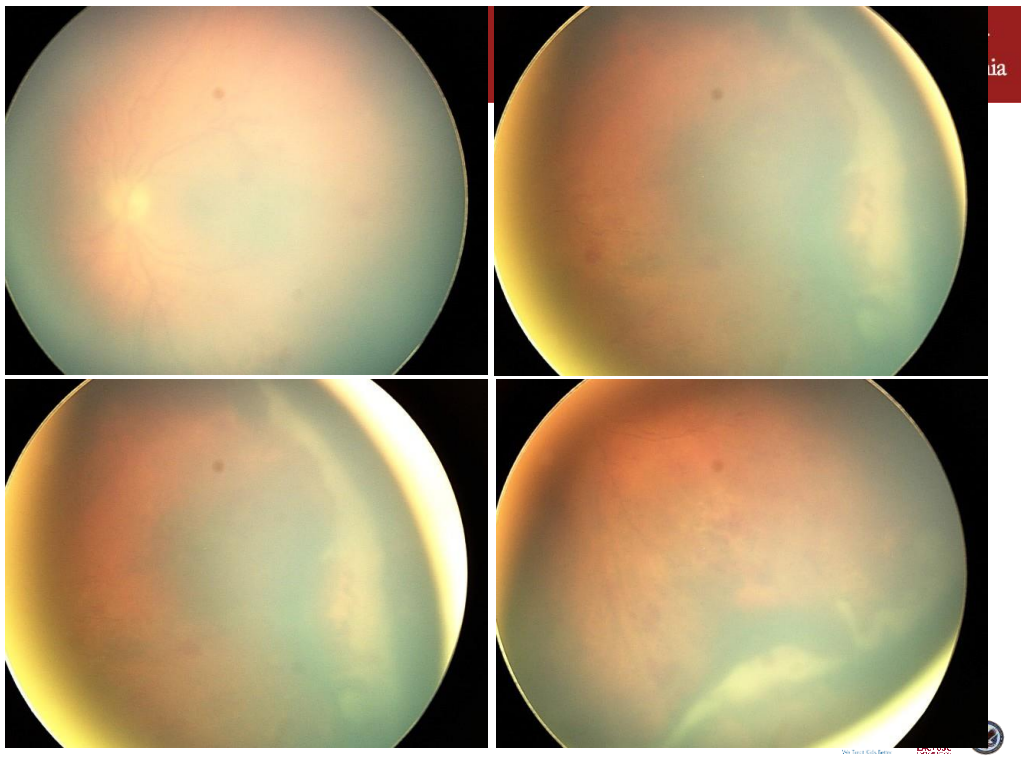

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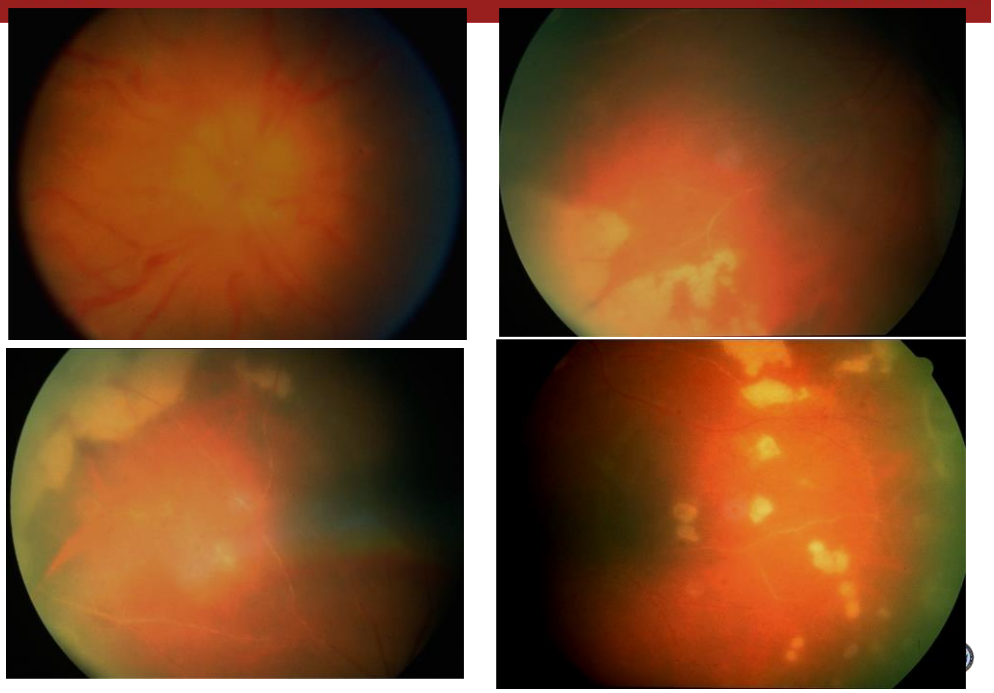

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ARN is primarily a clinical diagnosis

AUS diagnostic criteria

- Peripheral retinal necrosis with circumferential spread
- Rapid progression in absence of antiviral therapy
- Occlusive arteriolitis
- Prominent AC rxn, vitritis
- +/- scleritis, optic neuropathy

(Holland/AUS Executive Committee, AJO 1994)

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AC PCR can be a useful adjunctive diagnostic test

- AC PCR sensitivity and specificity > 95% for HSV/VZV/CMV viral retinitis
- Prognostication value: VZV>HSV ARN demonstrated greater loss of vision, higher risk of final VA worse than 20/200, and 2.5-fold increased risk of secondary RD
- Procedure:
  - Patient supine, aseptic technique
  - Indirect ophthalmoscope for illumination and magnification
  - 0.05-0.1ml collected using a 30g needle/1cc syringe via the limbus, over iris

(Takase et al, Jpn J Ophthalmol 2015; Blumenkranz et al, Retina 1989; Wong et al, Ophthalmology 2010)

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Systemic antivirals form the mainstay of ARN treatment

Induction (~10 days)
- Inpatient admission for acyclovir IV 10mg/kg q8h
- ValACV 2g PO TID
- Famciclovir 500mg PO TID

Treatment (~6 weeks)
- ACV 800mg PO 5x daily
- ValACV 1g PO TID
- Famciclovir 500mg PO BID

Maintenance/Secondary Prophylaxis (3-6 months)
- ACV 800mg PO TID
- ValACV 1g PO daily
- Famciclovir 250mg PO BID

Adjunctive treatments:
- Intravitreal ganciclovir 4mg or foscarnet 2.4mg
- Oral corticosteroids (prednisone 0.5mg/kg/day) starting 24-48 hours after initiating antivirals
- ASA 325

(Tibbetts et al, Ophthalmology 2010; Schoenberger et al, Ophthalmology 2017)

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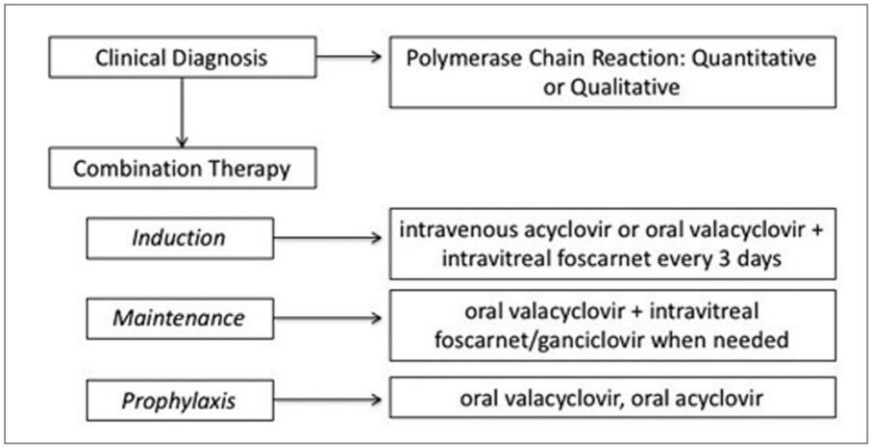
ARN Management Summary



(Li et al, OSLI Retina 2019)

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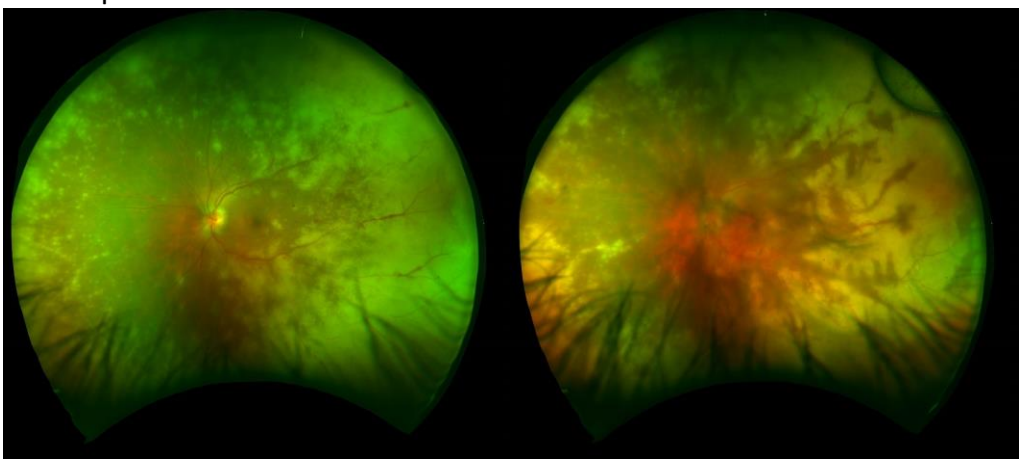
Back to our patient…

At presentation

1 week after treatment



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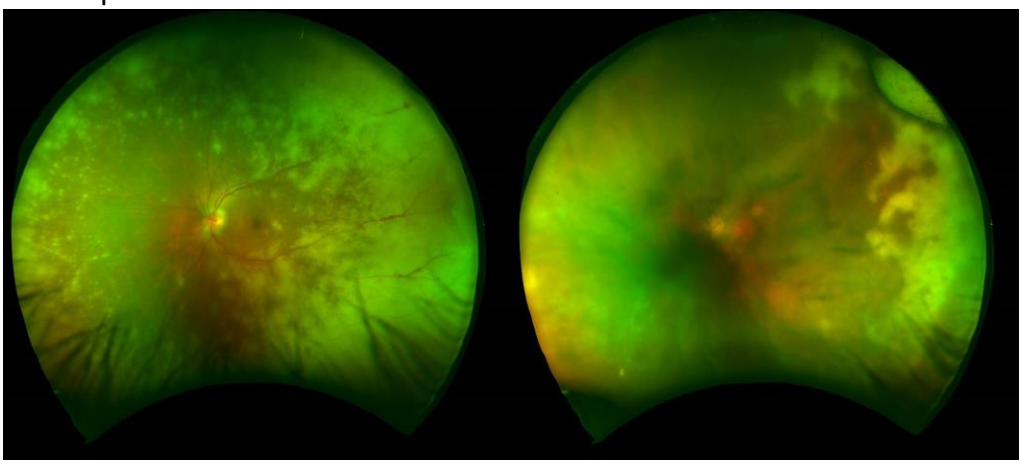
At presentation 1 month after treatment



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Sequelae of ARN cause significant visual morbidity

- RRD (24% in HSV, 62% in VZV), usually within 1-2 months
  - 40% risk reduction with IVI antivirals (VZV)
  - Prophylactic laser barricade or early vitrectomy have not demonstrated efficacy
  - Surgical management usually involves scleral buckling, vitrectomy, and silicone oil tamponade
- Optic atrophy
- Contralateral eye involvement is seen in up to 36% of cases and usually occurs within 6 weeks

(Hillenkamp et al, Ophthalmology 2009;
Lau et al, Ophthalmology 2007)

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Acute Retinal Necrosis

	HSV	VZV
Eyes	**33**	**48**
Age	**34**	**51**
1 year VA better than 20/60	**52%**	**35%**
1 year VA worse than 20/200	**35%**	**60%**
Retinal Detachment	**24%**	**62%**

Intravitreal Foscarnet 40% lower rate of RD in VZV group

(Wong et al, Ophthalmology 2010)

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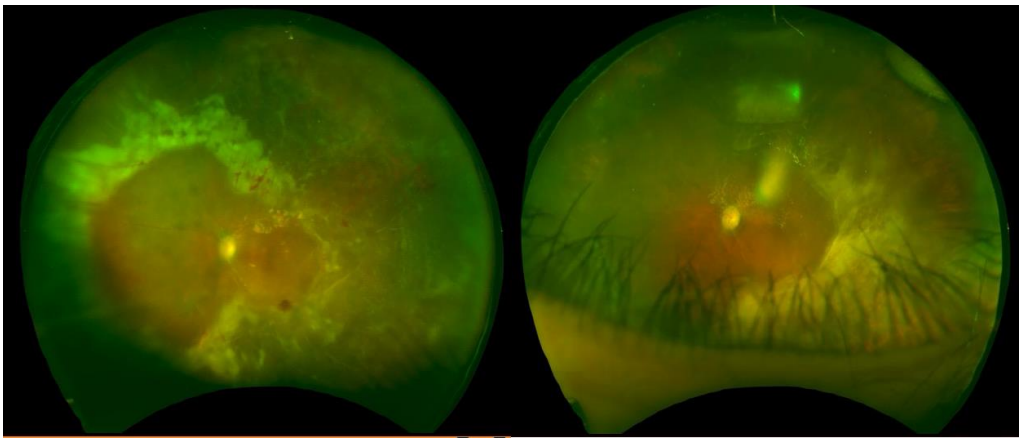
POW1 after SB/PPV/EL/SO POM3



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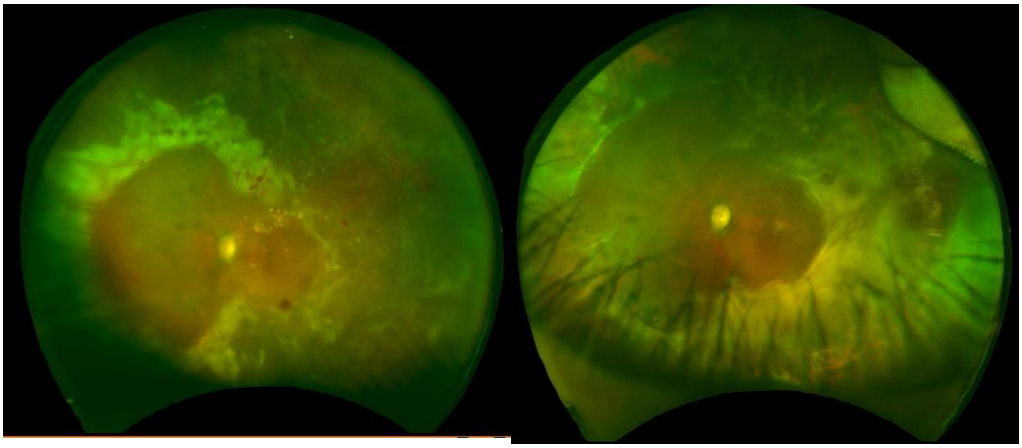
POW1 POM6



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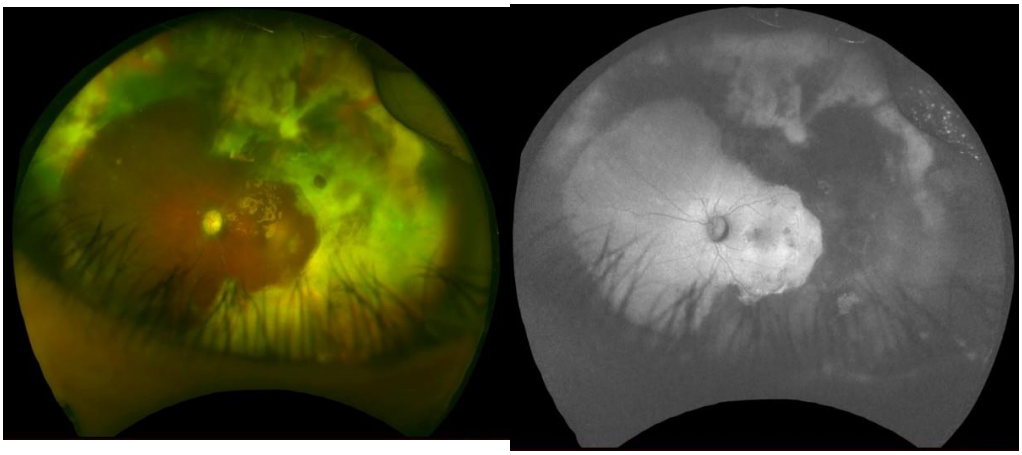
POM12 POM12



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ARN Management Summary

- AC PCR has an important diagnostic and prognostic role
- Treatment includes combination systemic antivirals with intravitreal therapy to decrease subsequent risk of RD
- Adjunctive PO steroids and aspirin may be beneficial to minimize sequelae of vitreous condensation and occlusive vasculitis
- Monitor disease activity with exam findings and changes in autofluorescence, secondary RD is common
- Surgical management of ARN-associated RD: SB/PPV/SO

(Li et al, OSLI Retina 2019)

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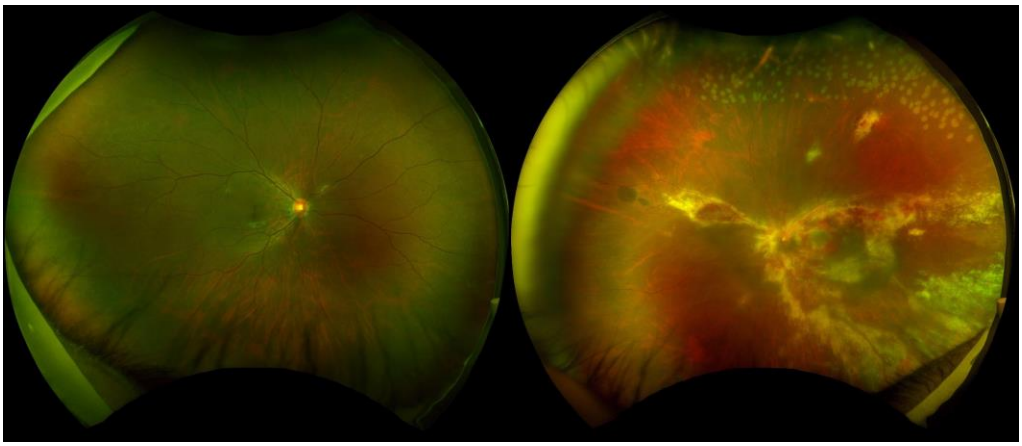
Case: 30 year old man newly diagnosed HIV, VL 300k, CD4 36

OD 20/20 **OS CF**



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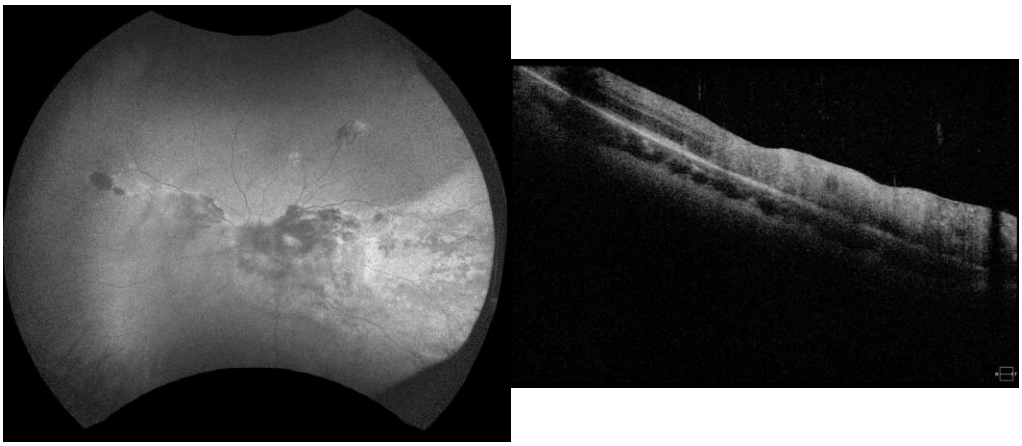
CMV Retinitis: OS



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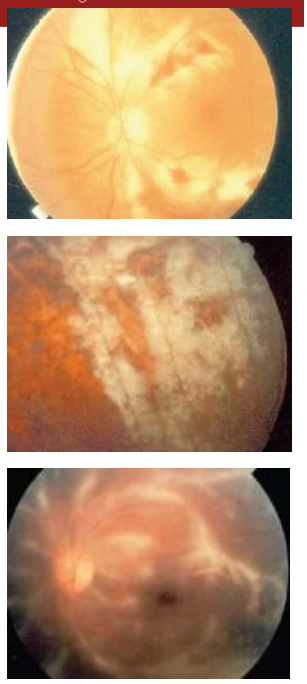
CMV Retinitis

- Immunocompromised host
  - AIDS, CD4<50
  - Immunosuppression post-transplant
- 3 patterns
  - classic / fulminant retinitis
    - posterior pole
    - hemorrhagic
  - granular / indolent retinitis
    - peripheral
    - minimal heme
  - frosted branch / perivascular



(Images courtesy of Dr. Damien Rodger)

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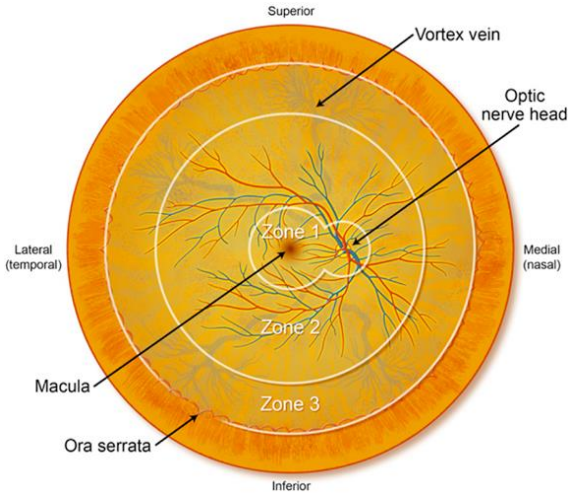
Staging disease

• Zone 1:
1500um (1 disc) diameter surrounding optic nerve and 3000um diameter around the fovea

• Zone 2:
Anterior to Zone 1 and posterior to vortex veins

• Zone 3:
Anterior to Zone 2 and posterior to ora



(Holland et al, Arch Ophthlamol 1989)

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Systemic antivirals form the mainstay of CMV retinitis treatment

- Diagnosis: clinical, AC PCR
- Treatment: induction and maintenance
  - IV ganciclovir / PO valganciclovir (myelosuppression)
  - IV foscarnet (renal toxicity)
  - IV cidofovir (anterior uveitis, hypotony)
  - PO letermovir (rescue therapy in transplant patients)
  - ~~intravitreal implant ganciclovir (sustained release 6-8 months)~~
  - Serial intravitreal injections ganciclovir or foscarnet
    - semiweekly injections x 3 weeks, then weekly
- ARV in HIV patients
  - Active retinitis recurs in 50% patients within 6-8 weeks of maintenance tx without ARV
  - Can consider d/cing maintenance tx once on ARV, CD4>100 q6months x 2, no active lesions

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Systemic antivirals form the mainstay of CMV retinitis treatment

- IV ganciclovir
  - Induction: 5mg/kg BID x 21d
  - Maintenance: 5mg/kg daily
- PO valganciclovir
  - Induction: 900mg BID x 21d
  - Maintenance: 900mg daily
- PO letermovir
  - Maintenance: 480mg PO daily
- IV foscarnet
  - Induction: 60mg/kg TID x 21d
  - Maintenance: 90-120mg/kg daily

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Intravitreal therapy is a useful adjunct for CMV retinitis treatment

- Ganciclovir
  - Nucleoside analogue that inhibits viral polymerases
  - 2-3 mg x 2 injections/week then maintenance of weekly injections
- Foscarnet
  - Pyrophosphate analog which inhibits viral polymerases
  - 1.2 - 2.4 mg x 2 injections/week then maintenance of weekly injections
- No comparison studies between foscarnet and ganciclovir have been reported, however there have been multiple case reports showing the use of foscarnet in ganciclovir resistant CMV cases.
- No differences in visual outcomes and CMV viral load in the aqueous between ganciclovir monotherapy or combined ganciclovir and foscarnet.

(Fan et al, Int J Ophthalmol 2018; Morlet et al, BJO 1996)

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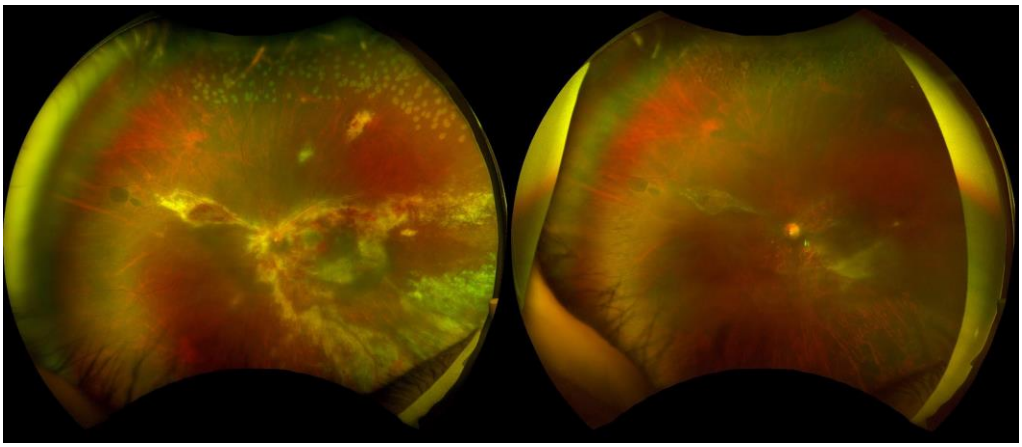
CMV Retinitis: OS

At presentation | 3 months after treatment



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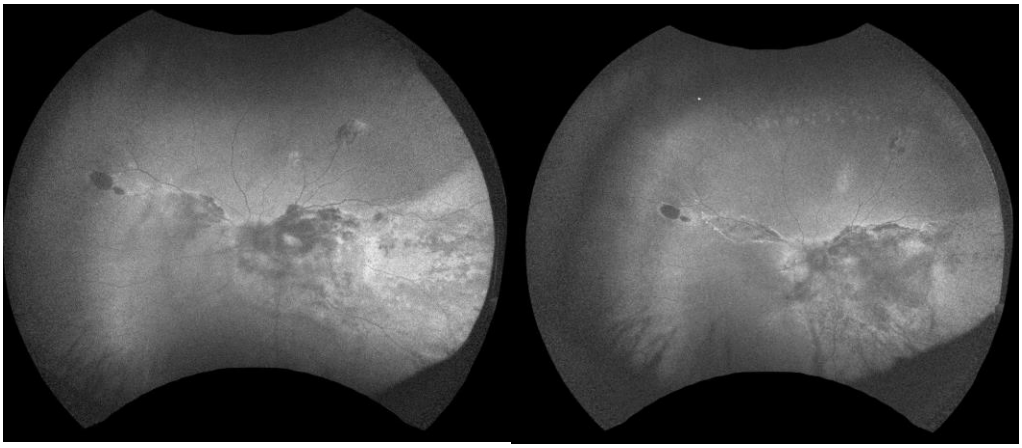
CMV Retinitis: OS

At presentation | 3 months after treatment



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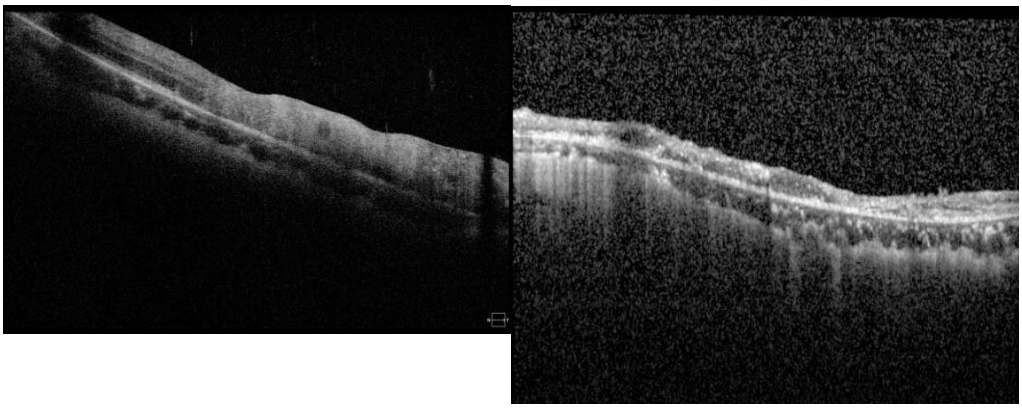
CMV Retinitis: OS

At presentation

3 months after treatment



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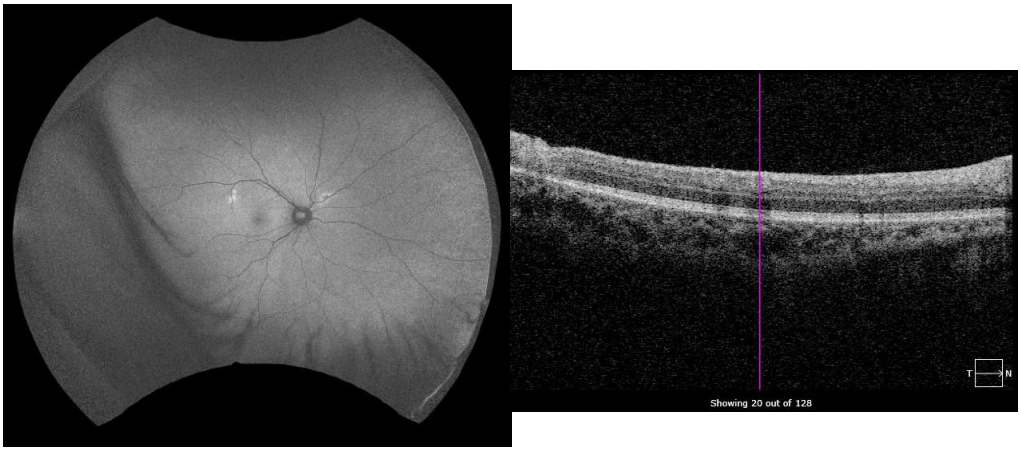
CMV Retinitis: OD



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CMV Retinitis: OD

At presentation | 3 months after treatment

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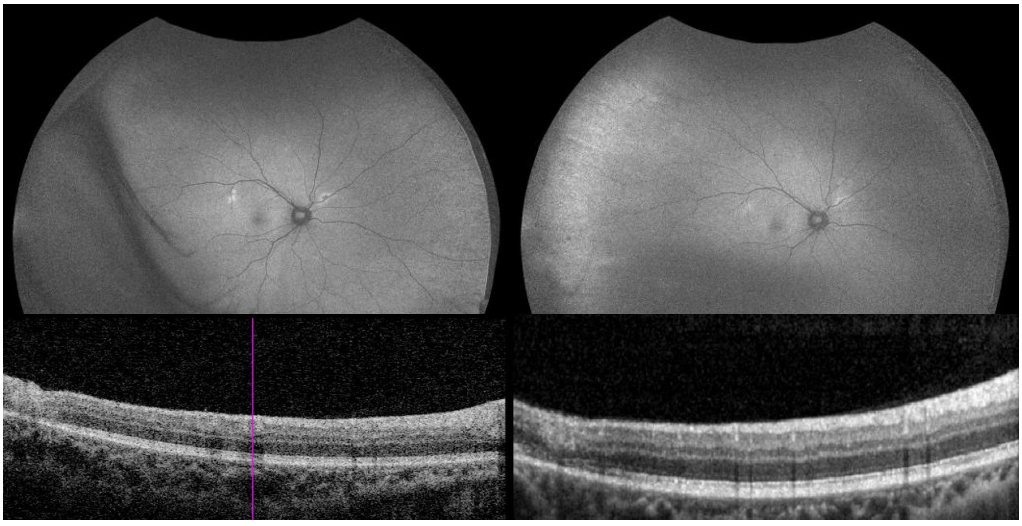
CMV Retinitis: OD

At presentation | 3 months after treatment



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Immune recovery uveitis is common among patients starting HIV therapy

- As the CD4 counts rise with ARV, cell-mediated response to CMV antigens cause anterior or intermediate uveitis
- Risk can be reduced by starting ARV after completion of CMV induction
- Manage IRU with topical steroids

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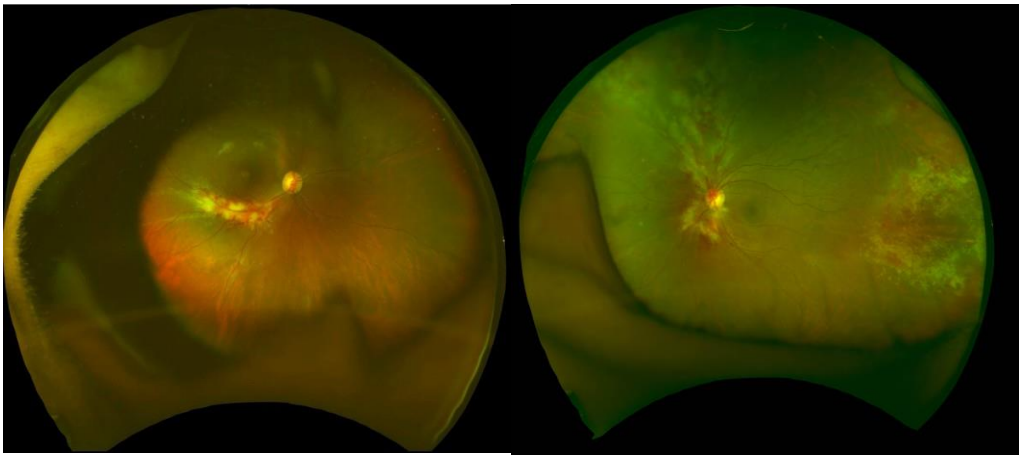
CMV retinitis: another case

OD OS



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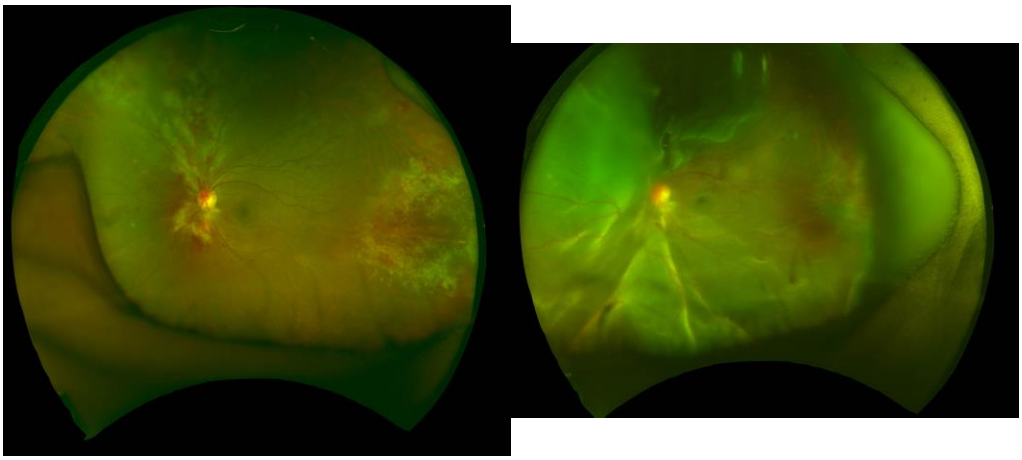
CMV retinitis: another case

1 month after initiating treatment



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Retinal detachment can occur in 40% of patients with CMV retinitis

- Breaks occur near thin, necrotic retina
- Risk factors for RRD include
  - Larger lesion size
  - Zone 3 involvement
  - Bilateral disease
- PPV ± SB ± SO / Gas tamponade ± clear lens extraction

(Yen et al, AJO 2015)

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Results of Rhegmatogenous Retinal Detachment Repair in Cytomegalovirus Retinitis with and without Scleral Buckling

Roberto F. García, MD, Marisa Flores-Aguilar, MD, Jose I. Quiceno, MD, Edmund V. Capparelli, PharmD, David Munguia, Baruch D. Kuppermann, MD, PhD, Fernando Arevalo, MD, William R. Freeman, MD

- 22 eyes with PPV/no buckle
  - 86% total reattachment rate
  - 91% macular reattachment rate
- 56 eyes with PPV/buckle
  - 84% total reattachment rate
  - 91% macular reattachment rate
- Unbuckled eyes had 1 D more of hyperopia
- No difference in visual outcome
- *in this study, the SB eyes had a larger percentage of macular involving RDs (59% vs 45%)

(Garcia et al, Ophthalmology 1995)

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Surgical repair of cytomegalovirus-related retinal detachment without silicone oil in patients with AIDS.

Canzano JC[1], Morse LS, Wendel RT.

- 6 eyes in 5 patients with CMV related RDs without SO
- RDs were repaired with SB/PPV/EL/Gas
- 83% of patients had total reattachment; macular reattachment in all eyes.
- Preoperative vision ranged from 20/40 to HM
- Mean postoperative visual acuity was 20/40
- Mean postoperative follow-up was 12 months; one patient detached 7 months after initial repair and was reattached without SO.

(Canzano et al, Retina 1999)

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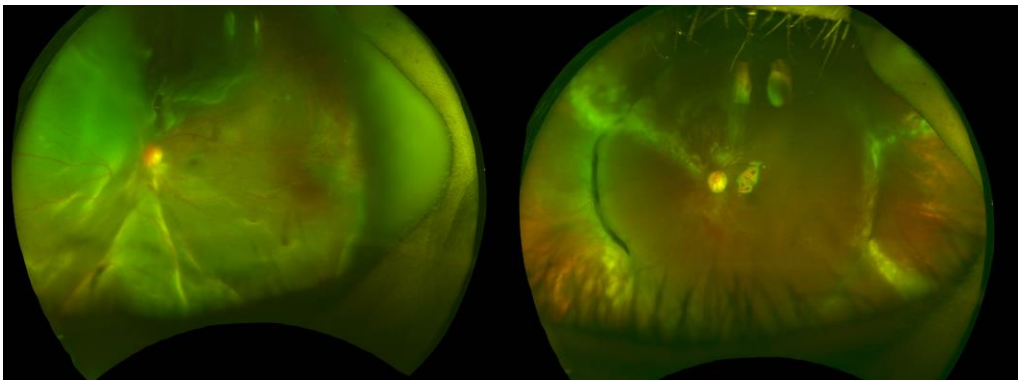
The patient underwent SB/PPV/EL/SO

Pre-op POW1



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POM6

- Doing well, retina attached under oil
- 20/50 | CF ft (3+ PSC OS)
- Combined CEIOL/SOR associated with high risk of redetachment

TABLE 3. Summary of Additional Procedures Performed on Patients With Cytomegalovirus Retinitis Related Retinal Detachments who Underwent Surgical Repair Consisting of Trans Pars Plana Vitrectomy and Oil, and Then Later Underwent Additional Surgery Consisting of Trans Pars Plana Vitrectomy and Oil Removal

	All Eyes (n = 15)	Detached (n = 8)	Attached (n = 7)	*P* Value*
Additional Procedures at Time of Initial				
RD Repair				
Scleral buckle	4 (27%)	1 (13%)	3 (43%)	.28
Additional Procedures at Time of Oil				
Removal				
Scleral buckle	7 (47%)	5 (63%)	2 (29%)	.31
ERM peel (total # of pts)	3 (20%)	1 (13%)	2 (29%)	.57
Cataract extraction	8 (53%)	7 (88%)	1 (14%)	.01
Pars plana lensectomy	5	5	0	
Phacoemulsification	3	2	1	
Gas tamoponade	13 (87%)	7 (88%)	6 (86%)	>.99
C3F8 gas	9	5	4	
SF6 gas	4	2	2	
No gas	2	1	1	

ERM = epiretinal membrane; RD = retinal detachment.
*Fisher's exact test.

(Morrison et al, AJO 2015)

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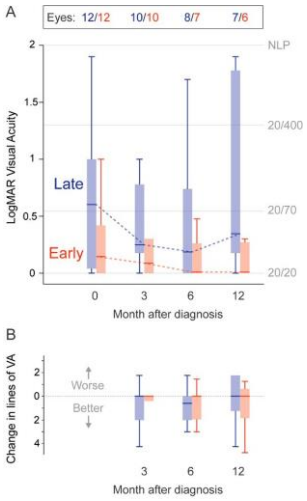
Early detection is key to reducing morbidity from CMV retinitis

Active CMV retinitis is often asymptomatic

- Patients with CD4 <50 cells/mm^3 should be seen at least every 3 months to screen for CMV retinitis (AAO Preferred Practice Pattern)
- Earlier detection of CMV retinitis within 4 months after CD4<100 resulted in better visual outcomes
- Role for widefield tele-ophthalmology screening



(Ausayakhun et al, BJO 2018)

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CMV Retinitis Management Summary

- Evaluate for etiology of immunosuppression in patients with CMV retinitis
- Screen for other opportunistic infections
- Systemic antivirals form the mainstay of CMV retinitis treatment, with adjunctive intravitreal therapy
- Antivirals are virostatic, so longstanding control of CMV will depend on reconstitution of cellular immunity, which may be accompanied by immune reconstitution uveitis
- Monitor disease activity with exam findings and changes in autofluorescence
- Surgical management of CMV retinitis-associated RRD is patient-dependent and options include:
  - Laser barricade
  - PPV ± SB ± SO / Gas tamponade ± clear lens extraction

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THANKS!

brian.toy@med.usc.edu

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KETCHUM UNIVERSITY
Southern California College of Optometry

The Calm in the Eye of the Storm: Re-Purposed Medications for COVID-19

Judy Tong, OD

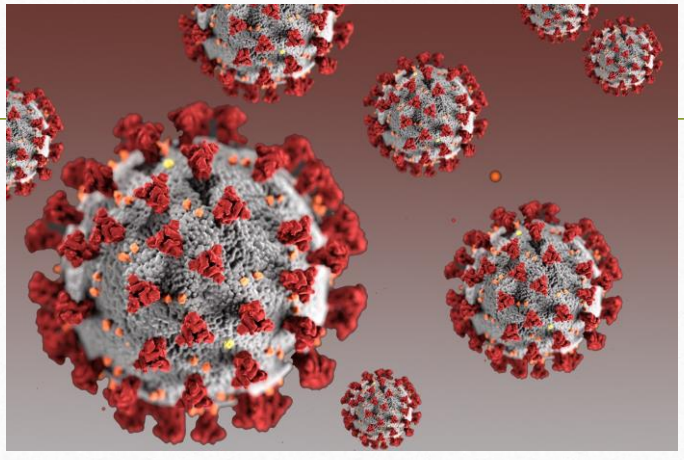
The Calm in the Eye of the Storm: Re-Purposed Medications for COVID-19

Judy Tong, OD, FAAO

Associate Professor

Assistant Dean of Residencies

1



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Financial Disclosures

- I have no financial interest in any drug companies, medical or ophthalmic products that are discussed in this presentation.

3

Lecture Objectives

- Timeline
- Epidemiology – Incidence
- COVID-19 Infection – Symptoms
- Eye Involvement
- Cytokine Storm
- Vaccinations
- Re-Purposed Medications

4

Timeline

- January 19, 2020 - First case confirmed in Washington State
- January 31st - WHO issues global health emergency
- February 3rd - US declares public health emergency
- March 6th - 21 passengers test positive on cruise ship off of the SF bay
- March 11th - WHO declares COVID-19 pandemic
- March 13th – Former president declares COVID-19 a national emergency and travel ban
- March 19th – California issues statewide stay at home order

https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020

5

Epidemiology – Incidence

(worldometer.info)

6

California Stats

Now | Yesterday | Search:

#	USA State	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Tot Cases/ 1M pop	Deaths/ 1M pop	Total Tests	Tests/ 1M pop	Population
	USA Total	31,918,591	+47,864	575,829	+276	24,480,522	6,862,240	96,430	1,740	419,387,284	1,267,021	
1	California	3,700,774	+3,512	60,444	+63	1,960,395	1,679,935	93,661	1,530	56,363,675	1,426,487	39,512,223
2	Texas	2,830,578	+1,413	49,437	+26	2,693,355	87,786	97,620	1,705	26,650,395	919,110	28,995,881
3	Florida	2,124,233	+5,520	34,021		1,638,610	451,602	98,904	1,584	26,192,642	1,219,525	21,477,737
4	New York	2,000,173	+6,849	51,391	+75	1,284,382	664,400	102,818	2,642	47,470,275	2,440,184	19,453,561

7

7 Types of Coronavirus

- SARS-CoV-2
- Middle East Respiratory Syndrome (MERS)
  - 858 deaths. Started in Saudi Arabia in 2014. Seen in Indiana and Florida.
- Sudden Acute Respiratory Syndrome (SARS)
  - 774 deaths. Started in Guangdong, China in 2003. No cases reported since 2015.
- Others – common colds and flus

8

Symptoms

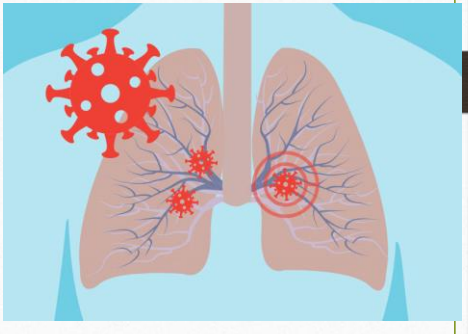
- Fever
- Coughing
- Shortness of Breath (SOB)
- Difficulty Breathing

- Fatigue
- Chills (with or without shaking)
- Body Aches
- Headache
- Sore Throat
- Congestion/Runny Nose
- *Loss of Smell*
- Nausea/Vomiting
- Diarrhea

9

COVID-19 Infection

- Can affect the upper respiratory tract
  - Nose, sinuses, and throat
- Can affect the lower respiratory tract
  - Trachea and lungs

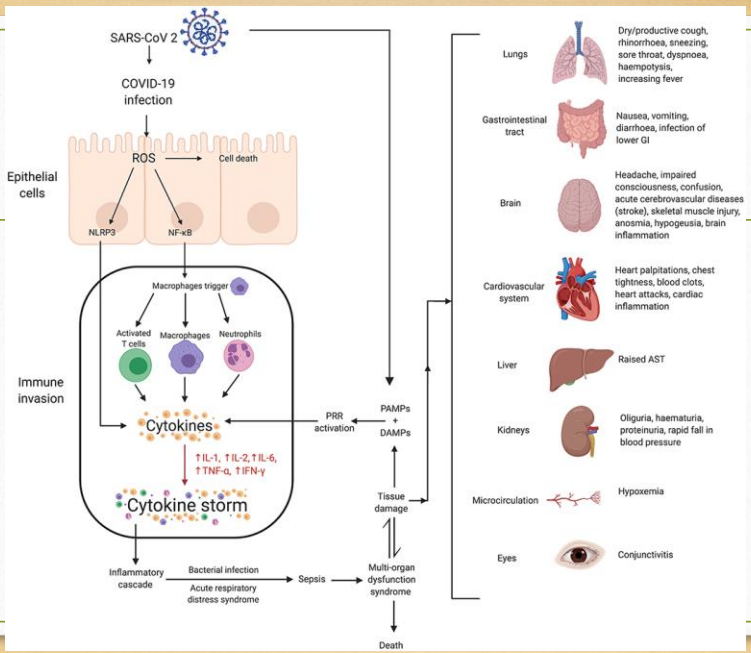


10

Cytokine Storm

- COVID-19 infection triggers innate immune system
- Floods bloodstream with inflammatory proteins called cytokines
- Causes acute respiratory distress syndrome (ARDS).
- Dysregulated hyper-inflammation in response to viral infection (not the virus or the infection) leads to tissue damage and death
- Exaggerated, rapid stimulation of the innate immune response that triggers activation of the Nod-like receptor family, pyrin domain-containing 3 (NLRP3) inflammasome pathway and release of its products including the proinflammatory cytokines IL-6 and IL-1β.

11



12

COVID-19 Can Be Transmitted Through the Eye

- Ophthalmologist and whistleblower Li Wen Liang MD contracts COVID -19 from his glaucoma patient. Dies in Feb. 2020.
- JAMA Ophthalmology publishes finding that one can catch the COVID – 19 virus through the eye even though prevalence in tears is low.
- JAMA Ophthalmology (Sept. 2020) reports that habitual glasses wearer less likely to be infected by COVID-19. 276 patients hospitalized. 5.8% were myopes while China's population is 80% myopic. Greater than 8 hours wearing time.

13

Conjunctivitis

- Affects anywhere from 1-3% to 10% of Covid – 19 cases
- Accompanies fever, cough, and shortness of breath
- Appears early on in the course of the disease

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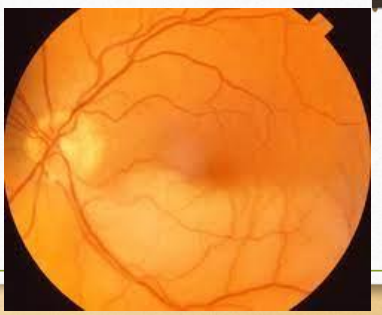
Other Possible Eye Complications

- **Optic Neuritis**
  - Khalid Sawalha MD, etal. COVID-19 Induced Acute Bilateral Optic Neuritis. Journal of Investigative Medicine High Impact Case Report. October 31, 2020
- **BRAO**
  - Judy Tong OD and Brandon Grove MD.
  - 27 year old Asian Female – 4th year Pharm Student – seen on 6/22/2020



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Connect Blood Type and COVID-19 Risk

- Blood Advance (March 2021) – SARS-CoV-2 attracted to blood group A antigen on respiratory cells
- No preference of SARS-CoV-2 for blood group A red blood cells, or other blood groups found on respiratory or red cells
- Some reports suggest a 50% greater risk of infection if blood type is A and 50% less risk if blood type is O
- Researchers caution that the results do not point to any blood type being completely protective or vulnerable to the virus

16

Emergency Use Authorization (EUA)

- Emergency mechanism employed to make available the use of "medical countermeasures" in the midst of a public health crisis
- FDA evaluates an EUA request but not through the normal approval channels
- "FDA may allow the use of UNAPPROVED medical products, or unapproved uses of APPROVED medical products in an emergency to diagnose, treat, or prevent serious or life-threatening diseases or conditions when certain statutory criteria have been met, including that there are no adequate, approved, and available alternatives."

17

COVID-19 Vaccines

- Moderna = Modified + RNA (Nov. 16th)
  - Reduces risk of COVID-19 infection by 94.5%
  - Works by using mRNA
  - Authorized for people 18 years or older and is given in two (0.5 ml) doses, 28 days apart
- Pfizer-BioNTech = Biopharmaceutical New Technologies (Nov. 18th)
  - 44,000-person trial demonstrate that the COVID-19 vaccine is 95% effective
  - As effective as vaccines for shingles and measles
  - Authorized for people 16 years or older and is given in two (0.3 ml) doses, 21 days apart
- Johnson & Johnson (Feb. 2021)
  - Authorized for people 18 years or older and is given in a single dose

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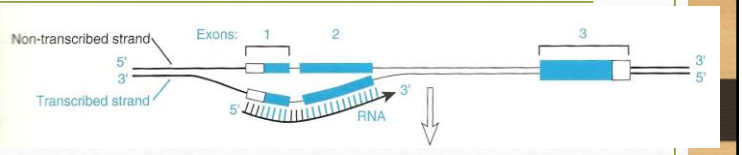
Steps to Immunity

- For Pfizer and Moderna vaccines
  - Is a messenger RNA (mRNA)
  - Not a part of the virus
  - Will not cause disease
  - It is a molecule that contains instructions for making coronavirus's infamous "spike protein."
  - Expectation is that the cells in the recipient's body are instructed to make copies of the fake spike protein
  - This reaction triggers an immune system response that acts as a "fire drill"
  - When subsequent exposure to the real coronavirus in the future, cells in the body are already well-equipped and trained to defend itself



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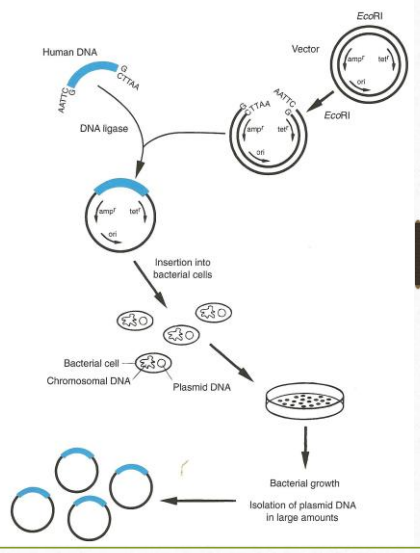
Vaccine Differences

- The Pfizer and Moderna vaccines
  - Messenger RNA, or mRNA
  - A segment of genetic code to cells to make the surface protein (known as spike) on the SARS-2 virus
  - Activation of the immune system to recognize the spike protein as foreign
  - Subsequent development of antibodies and other immunity weapons to defend itself

20

- **The J&J vaccine**
  - **Uses a viral vector – a harmless adenovirus**
  - **Vector carries genetic code for SARS-2 spike protein**
  - **Instructs human cells to make the SARS-2 spike protein which then triggers an immune response**
  - **Same technology used for the development of the Ebola vaccine**



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	Johnson & Johnson	Pfizer	Moderna
Type of vaccine	Viral vector	RNA	RNA
How it works	Teaches the immune system to attack the protein the virus uses to infect other cells. The instructions are carried by a non-dangerous virus.	Uses RNA to teach the immune system to target the virus's surface, preventing infection.	Uses RNA to teach the immune system to target the virus's surface, preventing infection.
Effectiveness*	**66%**	**95%**	**94.5%**
Storage conditions	At least three months at refrigerator temperatures	Two weeks at freezer temperatures (**-4°F**), five days in the refrigerator (**36°** to **46°F**)	One month at refrigerator temperatures
Doses needed per person	One shot	2 shots, three weeks apart	2 shots, four weeks apart
Status of availablity	FDA authorized	FDA authorized	FDA authorized

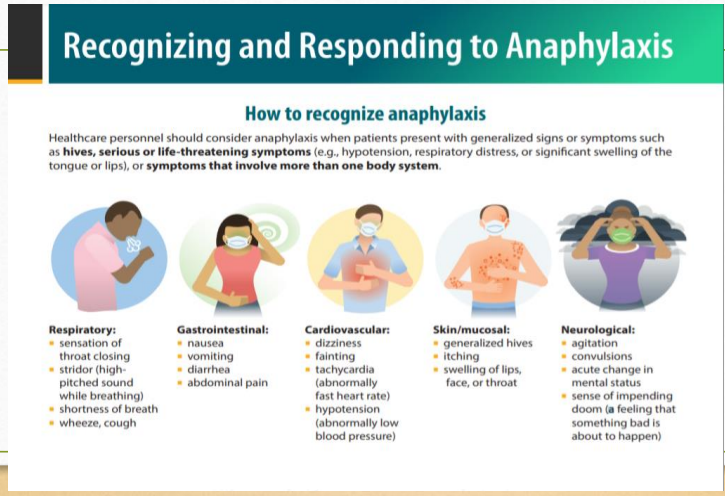
**Note: The Johnson & Johnson vaccine was tested at a time when faster-spreading viral variants were common and in countries where these strains are known to exist.*

Sources: Pfizer; Moderna; Johnson & Johnson; U.S. Food and Drug Administration; World Health Organization

U-T

22

Signs of Anaphylaxis



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How do you know that you have immunity after an asymptomatic series of COVID vaccination?

- **SARS CoV-2 Spike Protein Antibody Test**
  - **Should be (+) POSITIVE**
  - **Neutralizing antibodies that target the spike protein of SARS-CoV-2**
  - **Blocks the binding of the virus to the ACE2 receptor site**
- **IgG Nucleocapsid Protein Antibody Test**
  - **Should be (-) NEGATIVE**
  - **Indicates past infection by detecting IgG antibodies**

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Re-Purposed Drugs

- Oleandrin
  - Plant found in Africa
  - Digoxin like properties
  - Anti-cancer?
  - Toxic

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Chloroquine or Hydroxychloroquine

- Chloroquine or Hydroxychloroquine with or without Azithromycin
  - Immunosuppressive agent and anti-parasite
  - Disease modifying antirheumatic drugs (DMARDs)
  - Better known as Plaquenil
  - Prescribed for rheumatoid arthritis and lupus skin problems
  - NOT RECOMMENDED. EUA rescinded June 15th due to heart arrhythmias

26

Remdesivir (Veklury)

- The only FDA drug to be APPROVED for treatment of COVID-19
- Broad spectrum anti-viral
- Shorter time to recovery
- IV injection only

- John H. Beigel, M.D., etal. Remdesivir for the Treatment of Covid-19 — Final Report . NEJM. Oct 9, 2020

27

Tocilizumab (Actmera)

- A recombinant humanized anti-interleukin (IL)-6 receptor monoclonal antibody
- FDA approved treatment for
  - moderate to severe rheumatoid arthritis
  - polyarticular juvenile idiopathic arthritis (PJIA) and systemic juvenile idiopathic arthritis (SJIA)
  - cytokine release syndrome
- Controls level of pro-inflammatory (IL)-6 thus reducing effects, duration, and severity of COVID-19 infection.

28

Collective Treatment Guidelines for COVID-19 from the REMAP-CAP and RECOVERY Trials

- Trials
  - Randomized, Embedded, Multifactorial Adaptive Platform Trial for Community-Acquired Pneumonia (REMAP-CAP)
  - Randomized Evaluation of COVID-19 Therapy (RECOVERY)
- Recommendations
  - Hospitalized patient with rapid respiratory decompensation (invasive or non-invasive mechanical ventilation or high flow nasal canula) – tocilizumab (single dose) with dexamethasone
  - Hospitalized patient with hypoxemia on conventional O2 supplementation – remdesivir, dexamethasone with remdesivir, dexamethasone alone

29

Regen-Cov (Casirivimab with imdevimab)

- Regeneron in Phase III drug cocktail
- Monoclonal antibodies
- Subcutaneous Injection
- Reduced risk of symptomatic infection by 81%
- Speed up recovery to 1 week vs 3 weeks

30

Other "Re-Purposed" Medications

- Convalescent plasma – plasma containing antibodies to COVID virus from previously infected person
- Lopinavir/Ritonavir and other HIV Protease Inhibitors - HIV anti-viral. NOT RECOMMENDED.
- Ivermectin – Anti-parasite. NO RECOMMENDATION FOR OR AGAINST.

31

Fluvoxamine (Luvox)

- Selective Serotnine Uptake Inhibitor
- Endoplasmic reticulum chaperone protein involved in the regulation of cytokine production
- Decreases inflammation of the brain
- 2 randomized studies

32

Montelukast, Zafirlukast and Pranlukast (Singulair, Accolate, and Onon)

- Cysteinyl leukotriene receptor antagonists
- Likely to inhibit SARS-CoV-2 main protease (Huynh et al. 2020)

33

Properties of Montelukast (MK)

- Endotheliitis Induced by SARS-CoV-2 Infection
  - Antagonizes the inflammatory cascade induced by angiotensin II in vascular smooth muscle cells decreasing inflammation.
- Neurological Disorders Induced by SARS-CoV-2 Infection
  - Shown to reduce damage induced on the blood-brain barrier, observable anti-convulsant properties, reduced neuro-inflammation
- Atherogenic Vascular Inflammation
  - Exhibit anti-atheromatous properties reducing COVID-19 mortality in atheromatous patients
- Ischemia/Reperfusion
  - May alleviates the ischemia/reperfusion phenomenon reducing risk of arterial and venous thromboembolism
- Asthma, Hyper-Reactivity Bronchitis, and Post-Infectious Cough

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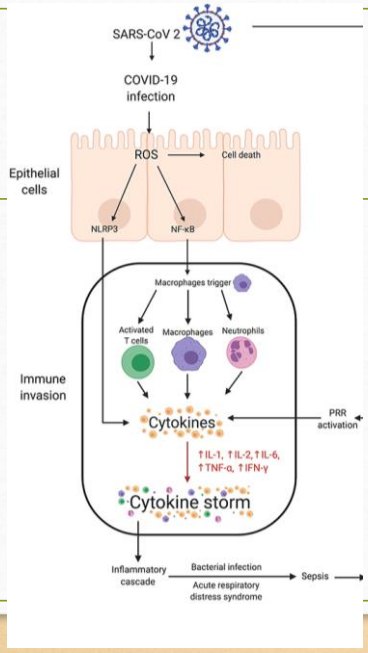

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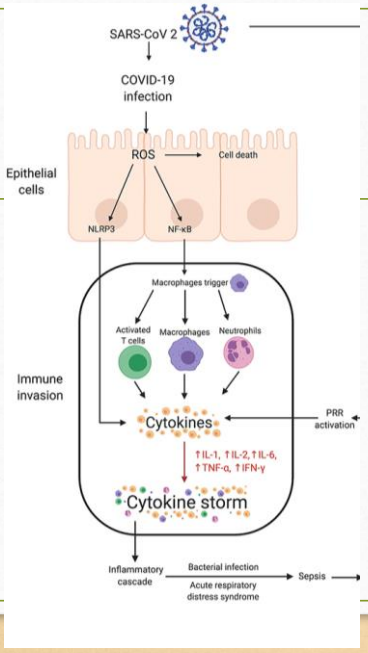
- Cytokine Storm
  - Antagonist action of ZK on CystLT1 receptor protects the endothelium from inflammatory lesions induced by TNF-α (Zhou, etal 2019)
- Acute Respiratory Distress Syndrome
  - Decrease in the intensity of the induced cytokine cascade and a lesser activation of neutrophils in the bronchoalveolar fluid
- Antioxidant Properties
  - Demonstrable upregulation of mitochondrial genes and genes responding to oxidative stress (Shao, etal. 2006)
- Anti-Fibrosis Properties
  - May limit the residual extent of COVID-19 sequelae of pulmonary damage (Peng, etal. 2017)
  - May regulate the extracellular remodeling matrix and inhibits the formation of fibrosis (Debelleix, etal. 2018)

36



37

Vitamin D

- Provides a certain degree of protection against respiratory infections, unsure about COVID-19
- Augments host barrier epithelial integrity by reinforcing intracellular junctions
- Triggers antimicrobial peptide production
- Receptors expressed on surface of immune cells types (B cells, T cells, and antigen presenting cells)
- Influences the expression and secretion of pro-inflammatory chemokines and cytokines
  - Lancet Diabetes & Endocrinology

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- Low levels of 1,25-dihydroxyvitamin D3 seen in COVID-19 patients
- Involved in pulmonary angiotensin-converting enzyme 2 expression which in turn reduces lung surface tension in COVID-19
- Exerts inhibitory effects on inflammation namely cytokine IL-6
- African American, Obese, and Seniors are prone to low levels
- Africans American with low levels of Vitamin D more at risk - <40 ng/ml
- Low vitamin D levels with higher COVID-19-related mortality

- Derbyshire EJ, Calder PC. "Respiratory Tract Infections and Antibiotic Resistance: A protective role for Vitamin D". Frontiers in Nutrition

39

Trivia but not so Trivial

- Vaccination may provide 6 months or greater protection
- Pfizer vaccination likely will require a 1 year booster
- COVID – 19 infection may confer 3-4 months of protection. Rare to get 2nd time – but there have been reports of re-occurrences
- Is it safe to go back to eat out, church, fly, or stay in a hotel?
- How long will we likely have to wear a mask?
- More symptoms upon second vaccination and more symptoms for those that had COVID.

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KETCHUM UNIVERSITY
Southern California College of Optometry

IPC: A Case for Collaboration

John Nishimoto, OD and Julie Tyler, OD

Marshall B.
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Southern California College of Optometry

IPC: A Case for Collaboration

John Nishimoto, OD, FAAO
Julie Tyler, OD, FAAO

1

1

Disclosures

Dr. John Nishimoto
•*None*

Dr. Julie Tyler
•*None*

"Alone we can do so little; together we can do so much." – Helen Keller

2

Learning objectives

1. **To emphasize the value of Optometry's role within interprofessional collaborative practice**
2. **To provide resources for optometrists that will build greater relationships with other health professionals**
3. **To recognize several common clinical conditions that most benefit from collaboration and management within health professionals**

3

Our roles at SCCO/MBKU

- Clinical Education of SCCO students
- Developing Interprofessional Collaborative Practice (ICP) programs
- Collaborating with faculty & students from the School of PA Studies and College of Pharmacy
- Provide students with skills – *including team building*- needed to develop relationships with other health providers

4

Ketchum Health Clinic

To provide co-management services for patients

- *Family Medicine*
  - *Includes rotations/consultations with PA and Pharm*
- *Pediatrics and Vision Therapy*
- *Low Vision Rehabilitation*
- *Cornea and Contact Lenses*
- *Ocular Disease and Ophthalmology*
- *Telehealth*

5

IPC-

World Health Organization (WHO) KEY messages

- Collaborative practice happens when **multiple health workers from different professional backgrounds work together** with patients, families, carers, and communities to deliver the **highest quality of care.**

- The goal is to prepare all health professions students **for *deliberatively* working together with the common goal of building a safer and better patient-centered and community/ population-oriented** U.S. health care system.

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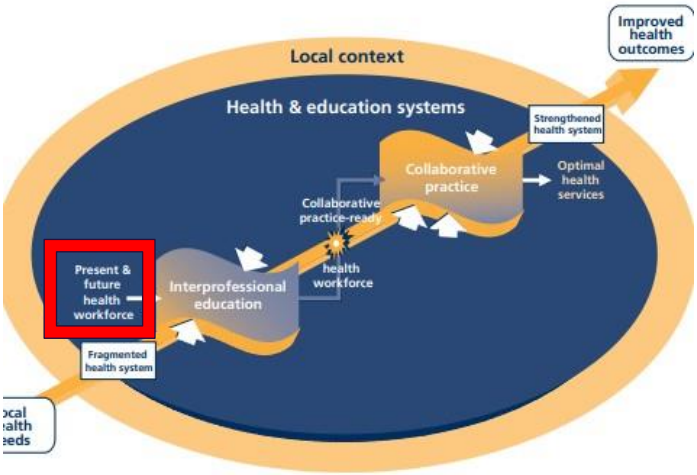
FIGURE 2: Framework for Action on Interprofessional Education & Collaborative Practice



Reprinted with permission from: *World Health Organization (WHO). (2010). Framework for Action on Interprofessional Education & Collaborative Practice. Geneva: World Health Organization.*

7

Who do you collaborate with?

8

Providers that we can collaborate with:

- Family Medicine/Practice
- Pediatricians
- Emergency Department (ED)
- PAs
- Nurse Practitioners
- Pharmacists
- Rheumatologists
- Endocrinologists
- Dermatologists
- Allergists
- Nutritionists
- Audiologists
- Speech-Language Pathologists
- Occupational Therapists
- Physical Therapists
- Neurologists
- Psychologists
- Social Workers
- Schools (Nurses, Teachers, Psychologists)

9

How to enhance relationships with providers – *examples from Daniel May, MD*

- **Making introductions & discussing your role**
  - *As an optometrist, we can assist with anything related to the eye and vision, and can refer as a point of contact for any suspected health problem*
    - *Visual fields*
    - *Headaches*
    - *Allergies ….and many more*
- **Communication on a relatable level with other professionals**
- **Minimize optometry (or eye specific) jargon**
- **Keep short and concise**

10

Give to health care associates – SIMPLE request letter courtesy of Dr. Alissa Nagel-Esposito. Also, SIMPLE consult response

Diabetic Eye Exam Request

Patient's Name: _____ Date: _____
Patient's Phone: _____
Insurance Company: _____
Type: IDDM or NIDDM Last HbA1c and date: _____
Referring Doctor: _____ MD OD DO
Address: _____
Phone: _____ Fax: _____
Please send results via: ❑Fax or ❑E-mail to:_____

8937 W. Sahara Ave. Ste A
Las Vegas, NV 89117
phone: 702-254-3558 fax: 702-254-4012

We will gladly see your patient within 48 hours of receiving your referral.

University Eye Center at Ketchum Heath
5460 E. La Palma Ave
Anaheim, CA 92807
714-449-7409

March 23, 2021

RE: Patient Name, Diabetic Eye Exam

To Whom It May Concern:

Thank you for referring Patient Name to our office. She is a pleasant 53 year old female that entered our office on March 23, 2021 for a diabetic eye exam. She did not have any vision complaints.

Best Corrected Visual Acuities at 6 Meters (Distance)
Right Eye: 20/20
Left Eye: 20/20

Our findings on Dilated Eye Examination revealed that she has proliferative diabetic retinopathy, right and left eye. Our recommendation would be to reassess the control or her Type II diabetes. She is also referred to a retinal specialist for consideration of laser treatment.

If you have any questions feel free to contact me. Thank you very much for your time in this matter and allowing us to examine your patient.

Sincerely,

John Nishimoto, O.D.

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CHALLENGES to Interprofessional Collaboration

- **INSURANCE**
- **Availability of services**

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Case Example

IPE Clinic at SCCO/Ketchum Health

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"Diabetic Day": March 16, 2021

* 53 YO Hispanic Female - Pt entering with "no ocular or visual complaints" with (+) history of Diabetes Mellitus, Type II

Ocular Hx: Does not wear any glasses (although prescribed)

Med Hx: Type II DM (dx 2018), hyperlipidemia, HTN

Medications: Invokana (DM with kidney issues), Lipitor (Cholesterol), Humalog (Insulin)

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Diabetics

Specific additional history --
Blood Sugar: 112
HgA1c: unknown

OPPORTUNITIES: *Additional Testing In Office*
Random Blood Sugar (RBS) Glucometry
Hemoglobin A1c Testing

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Data – Diabetic Eye Exam

Refraction and Best Corrected Distance VAs:
OD: -0.75-0.50x90 (20/20)
OS: -1.00-0.75x92 (20/20)

Preliminary Test: Normal results for pupils, CF, motility
Blood Pressure: 130/80mmHg seated

Anterior Seg & Tonometry:

- **IOP:** 10mmHg/12mmHg OD/OS @16:34
- **Lids/Lashes, Conj, Cornea**: Without pathology OU
- **Iris:** (-) Neovascularization of iris, normal iris appearance
- **Lens:** Trace NS

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Posterior Seg:
Optos and Dilated Fundus OD

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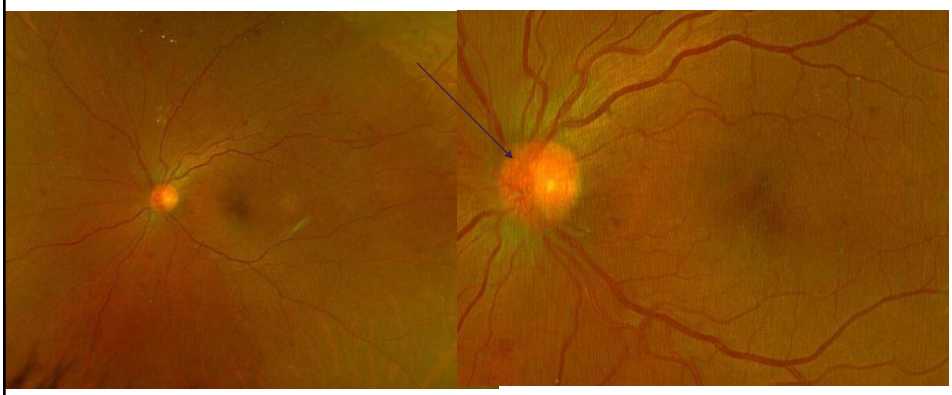
Posterior Seg:
Optos and Dilated Fundus OD



18

Management – That Day

PA – Completed **Diabetic foot exam** and counseling of pt regarding shoes and nutrition

Pharmacist – Reviewed medications with patient, proper dosing and timing of medications; discussed considerations of other options for pt based on findings

Team – Consulted with patient; With permission also consulted with family member to educate on visual risks and need for FU

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Who can we collaborate with?

- OMD --> Vision
- Primary Care Physician (/whoever managing DM)
- PA
- Nutritionist
- Endocrinologist

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Management next steps

Consult PCP- Update status of DM/BS control

- Recommend update of medications to help with protection of kidneys
- If Blood Sugar/HgbA1c not consistent with findings of diabetic ret --> Recommend r/o blood dyscrasias and other causes of neovascularization of retina

Retina Consult – FA & Treatment considerations

- Anti-VEGF injection vs PRP

Note – PCP follow up visit added Lisinopril (HTN)

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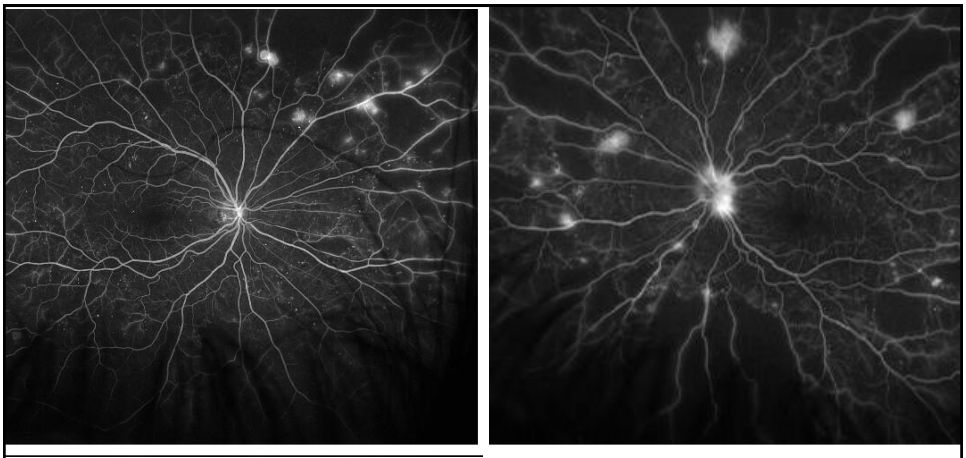

22

NVD & NVE: Large areas of drop-out

23

PRP
OS 7-1-21

24

Diabetes Care - HEDIS Measures – NCQA

Comprehensive Diabetes Care (CDC)

Assesses adults 18–75 years of age with diabetes (type 1 and type 2) who had each of the following:

- Hemoglobin A1c (HbA1c) testing.
- HbA1c poor control (>9.0%).
- HbA1c control (<8.0%).
- HbA1c control (<7.0%) for a selected population. *
- Eye exam (retinal) performed.
- Medical attention for nephropathy.
- BP control (<140/90 mm Hg).

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26

Posterior Segment Considerations

Conditions	Collaborators
Diabetes Mellitus/ Diabetic Retinopathy	
Hypertension/ Hypertensive Retinopathy	**Who do you generally think of "first" in this area?**
Ocular Ischemic Syndrome (OIS)	
Central Retinal Artery Occlusion (CRAO)	

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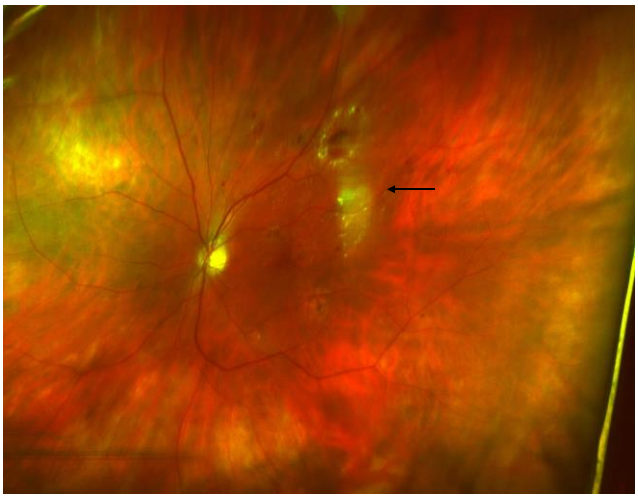
Hypertensive Retinopathy



This image shows an artery macroaneurysm with associated exudates in hypertensive retinopathy (arrow)

Communication:
PCP, PA

OMD if needed

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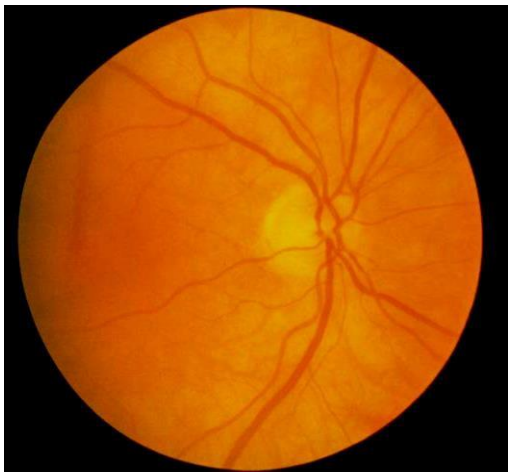
Hypertensive Retinopathy



This image shows changes in the A/V ratio

Communication:
PCP, PA

Are you checking BP in office?

29

Hypertensive Retinopathy – What is significant here?

30

BRVO Early Stages

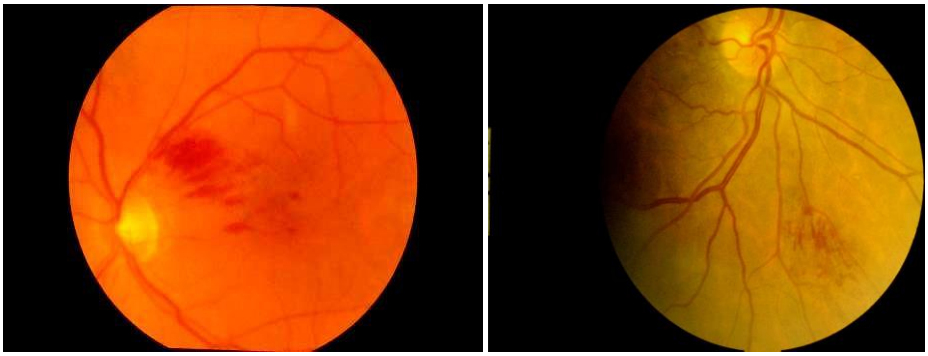


Image examples of small Branch Retinal Vein Occlusions (BRVO)

Testing in office: OCT to assess for mac edema based on area

Communication: PCP, PA, OMD if needed

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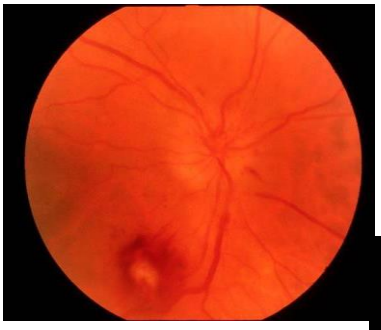
BRVO with concurrent AION



This image shows an OD with inf BRVO (ischemic/CWS) and OS with ON pallor due to past AION

Communication:

PCP, PA

Endocrinologist (DM too!)

OMD if needed

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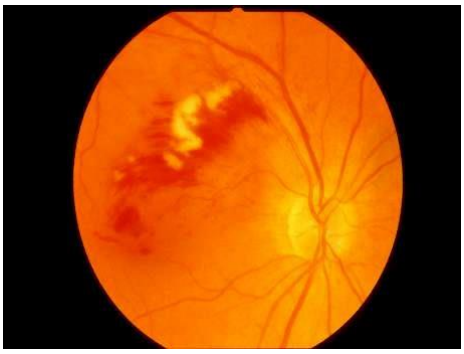
BRVO "Longstanding" with increased risk for vision



These image shows eyes with increased risk for additional complications --> Ocular and otherwise

**** Neovascular concerns**

33

Hollenhorst Plaque

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Who can you collaborate with?

35

Carotid Artery Disease (CAD)

Visual concerns with CAD *beyond* Hollenhorst plaques:

- Blackouts to vision (TVO)
- Peripheral signs of Ocular Ischemic Syndrome (OIS), include blot hemes in the "mid-periphery"
- Other non-retinal findings
  - *Visual Field Defects*
  - *Decreased persistent VA*
  - *Corneal folds*

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Carotid Occlusive Disease - Ocular Ischemic Syndrome (OIS)

Major obstruction of Carotid artery --> Look at retina as well as other signs and symptoms

CC/Oc Hx/ROS:

•Pts may complain of decreased and/or "darkened" vision

•**May also have complaints related to:**

- *Achy, soreness of eye*
- *Ringing in the ears or heartbeat sounds in the ear*

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Retina in OIS

•Generally, mid-perpiheral retina involved

•Dot-blot hemes

•Dilated non-tortuous veins

Outside of the eye:

- Bruits

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Diabetic Retinopathy/
Ocular Ischemic Syntrome
Mild - peripheral

39


Retinal Telangiectasia
Sometimes the harbinger of Carotid Artery disease

40

What else to consider with plaques AND ….?

Differentials and finally, considerations for collaboration?

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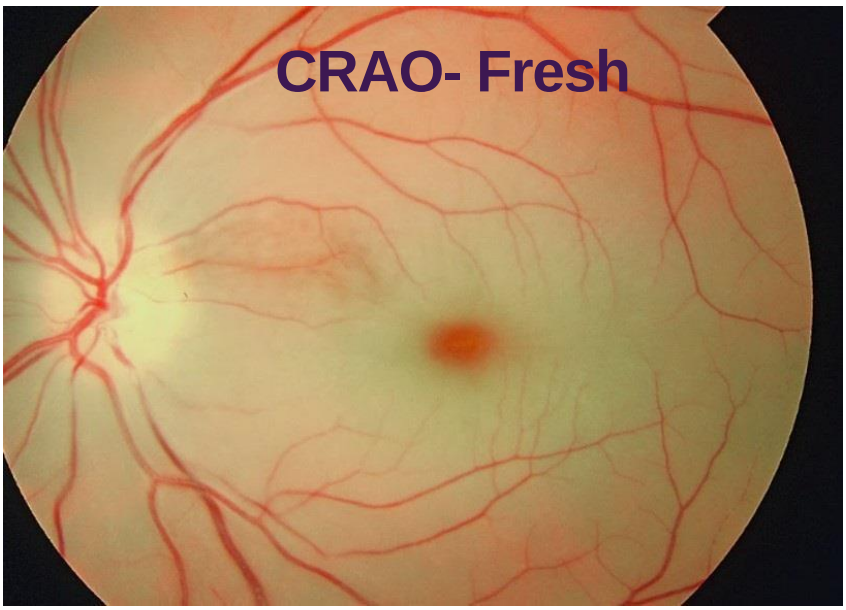
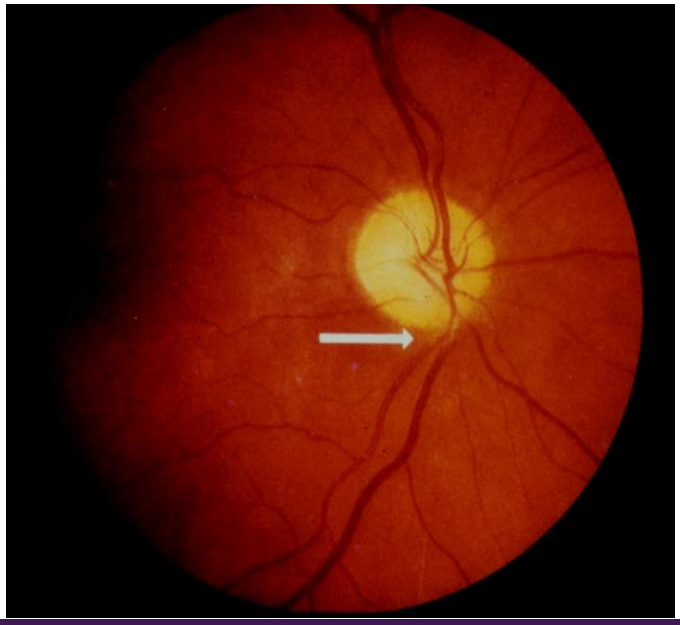
CRAO- Fresh



By sidthedoc - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=84360138d text

42

CRAO - Old



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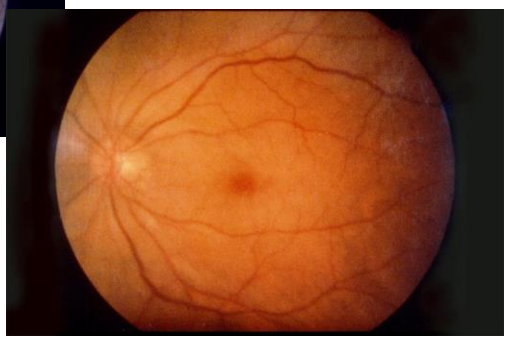
CRAO – Incomplete *(compare each picture)*



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CRAO – Current Management Strategies

45

CRAO – Collaboration/Considerations

Standards for management in 2021

STROKE centers: Primary vs. Comprehensive

- Primary: Stabilize pts and **are able to provide** victims of ischemic stroke by using a **clot busting drug**
- Secondary: Stabilize pts and **able to perform catheter-based procedures to remove blood clots**, as well as provide neurosurgical services

Availability based on location may be restricted

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Neovascular Glaucoma

Depends on:

- **Amount of retinal ischemia and "opportunity" to release VEGF**

  Vascular endothelial growth factor (VEGF) plays central role in angiogenesis

- **Also needs, viable tissue support**

Found in:

- Up to 60% of Hemorrhagic CRVO's
- Ocular ischemic syndrome

- Leads to angle closure
- Pupillary margin development

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Neovascular Glaucoma

Starts as OPEN ANGLE type of glaucoma, but

- Leads to angle closure
- Pupillary margin development often first with most pts who develop, but not all (depends on systemic/ocular etiology)

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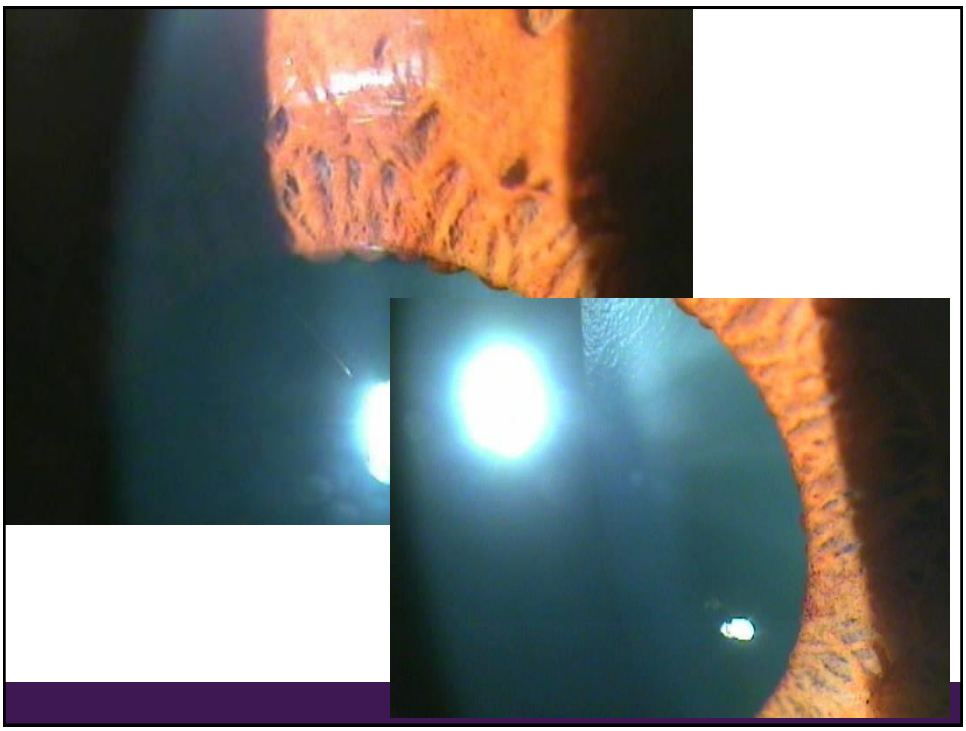

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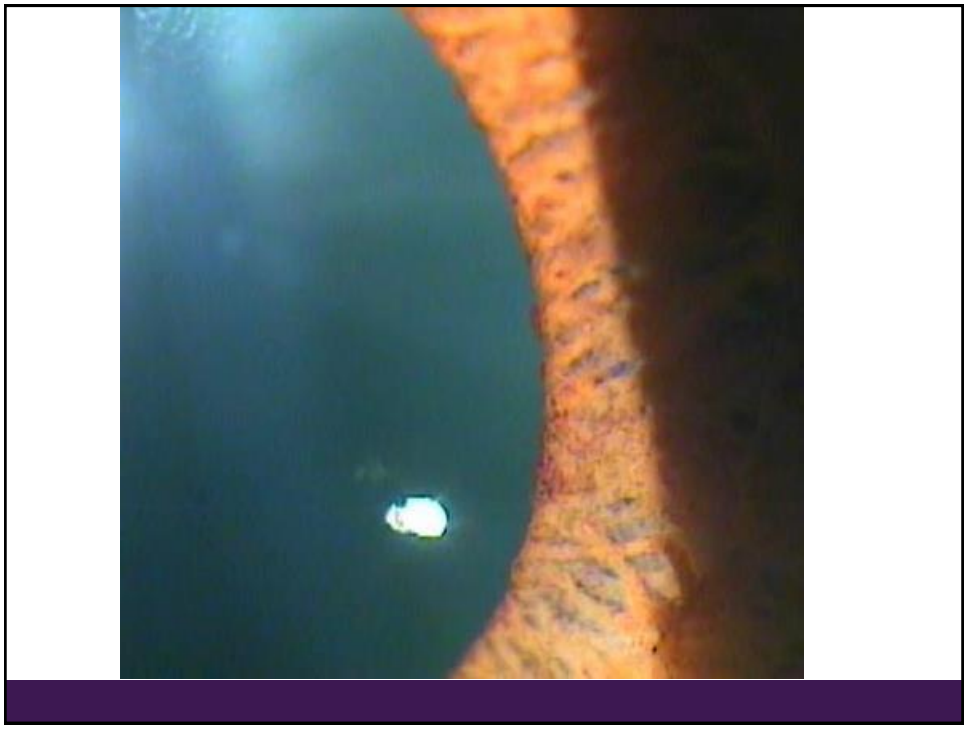

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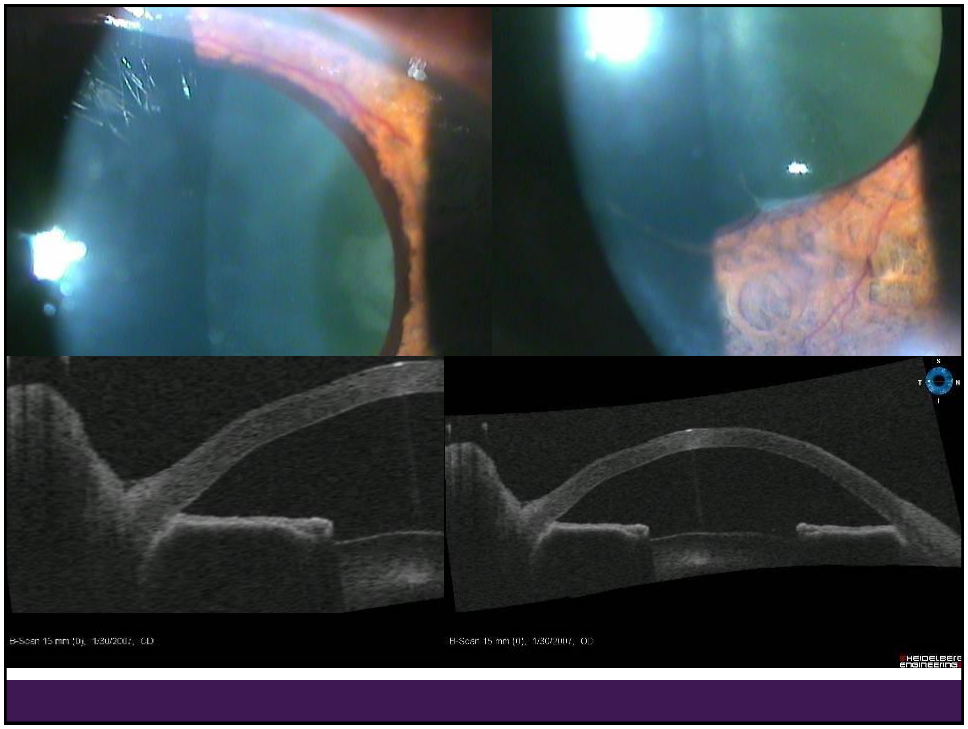

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More "typical" anterior segment collaboration opportunities

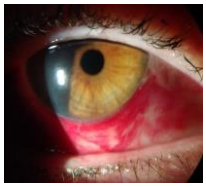
Conditions

- *Uveitis*
- *Adult inclusion Conjunctivitis (AIC)*
- *Allergic Conjunctivitis*
- *Dry Eye*
- *Thyroid Eye Disease*

Collaborators

- *Primary care*
- *Rheumatology*
- *Infectious disease*
- *Allergist*
- *Endocrinology*





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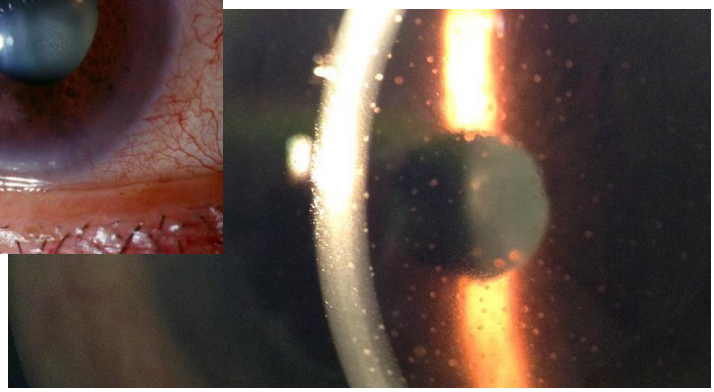
Uveitis -

Communication:
PCP, PA
OMD if needed (*based on surgical hx, seriousness)*
Rheumatologist

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Uveitis: Collaboration opportunities

When do we want to consider a work-up for patients?

- SEVERE presentations without other known etiology
- BILATERAL uveitis → OR evidence/suggestion that condition was previous in other eye
- Granulomatous uveitis
- Significant ocular/med hx or ROS findings/co-morbidity
  - *New rashes, swelling, aches/pains or malaise*; ALSO, (+) Family hx, contagious disease exposure, risky social habits, travel hx, etc…

Or if additional risk findings noted during exam with careful health evaluation, tonometry and DFE

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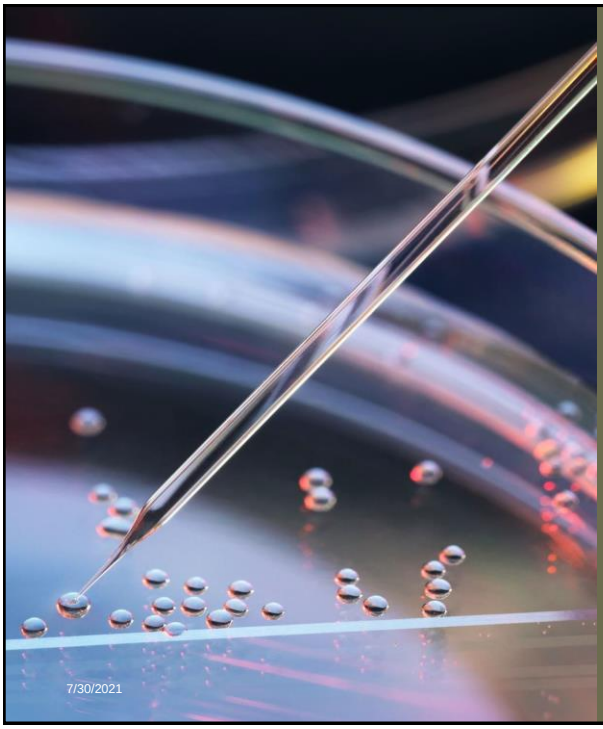

Tools of the Trade: Testing

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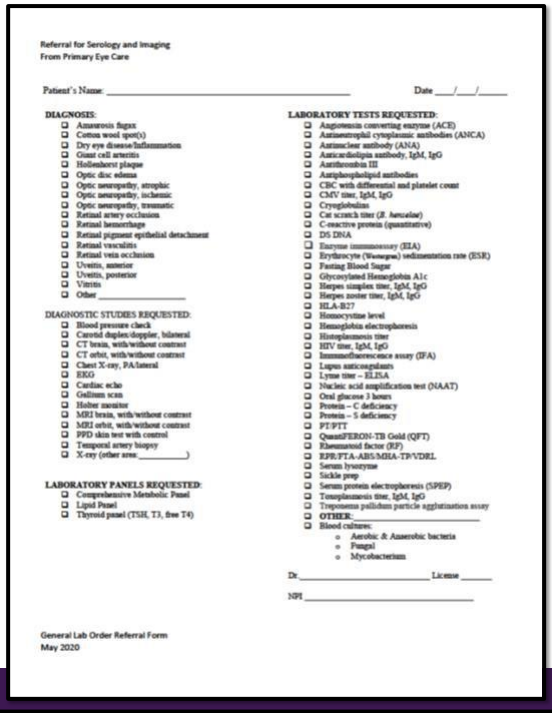
Lab Guide



Referral for Serology and Imaging
From Primary Eye Care

Patient's Name: _____ Date ___/___/_____

DIAGNOSES:
- ☐ Amaurosis fugax
- ☐ Cotton wool spot(s)
- ☐ Dry eye disease/Inflammation
- ☐ Giant cell arteritis
- ☐ Hollenhorst plaque
- ☐ Optic disc edema
- ☐ Optic neuropathy, atrophic
- ☐ Optic neuropathy, ischemic
- ☐ Optic neuropathy, traumatic
- ☐ Retinal artery occlusion
- ☐ Retinal hemorrhage
- ☐ Retinal pigment epithelial detachment
- ☐ Retinal vasculitis
- ☐ Retinal vein occlusion
- ☐ Uveitis, anterior
- ☐ Uveitis, posterior
- ☐ Vitritis
- ☐ Other _____

DIAGNOSTIC STUDIES REQUESTED:
- ☐ Blood pressure check
- ☐ Carotid duplex/doppler, bilateral
- ☐ CT brain, with/without contrast
- ☐ CT orbit, with/without contrast
- ☐ Chest X-ray, PA/lateral
- ☐ EKG
- ☐ Cardiac echo
- ☐ Gallium scan
- ☐ Holter monitor
- ☐ MRI brain, with/without contrast
- ☐ MRI orbit, with/without contrast
- ☐ PPD skin test with control
- ☐ Temporal artery biopsy
- ☐ X-ray (other area:_____)

LABORATORY PANELS REQUESTED:
- ☐ Comprehensive Metabolic Panel
- ☐ Lipid Panel
- ☐ Thyroid panel (TSH, T3, free T4)

LABORATORY TESTS REQUESTED:
- ☐ Angiotensin converting enzyme (ACE)
- ☐ Antineutrophil cytoplasmic antibodies (ANCA)
- ☐ Antinuclear antibody (ANA)
- ☐ Anticardiolipin antibody, IgM, IgG
- ☐ Antithrombin III
- ☐ Antiphospholipid antibodies
- ☐ CBC with differential and platelet count
- ☐ CMV titer, IgM, IgG
- ☐ Cryoglobulins
- ☐ Cat scratch titer (*B. henselae*)
- ☐ C-reactive protein (quantitative)
- ☐ DS DNA
- ☐ Enzyme immunoassay (EIA)
- ☐ Erythrocyte (Westergren) sedimentation rate (ESR)
- ☐ Fasting Blood Sugar
- ☐ Glycosylated Hemoglobin A1c
- ☐ Herpes simplex titer, IgM, IgG
- ☐ Herpes zoster titer, IgM, IgG
- ☐ HLA-B27
- ☐ Homocystine level
- ☐ Hemoglobin electrophoresis
- ☐ Histoplasmosis titer
- ☐ HIV titer, IgM, IgG
- ☐ Immunofluorescence assay (IFA)
- ☐ Lupus anticoagulants
- ☐ Lyme titer – ELISA
- ☐ Nucleic acid amplification test (NAAT)
- ☐ Oral glucose 3 hours
- ☐ Protein – C deficiency
- ☐ Protein – S deficiency
- ☐ PT/PTT
- ☐ QuantiFERON-TB Gold (QFT)
- ☐ Rheumatoid factor (RF)
- ☐ RPR/FTA-ABS/MHA-TP/VDRL
- ☐ Serum lysozyme
- ☐ Sickle prep
- ☐ Serum protein electrophoresis (SPEP)
- ☐ Toxoplasmosis titer, IgM, IgG
- ☐ Treponema pallidum particle agglutination assay
- ☐ OTHER: _____
- ☐ Blood cultures:
  - Aerobic & Anaerobic bacteria
  - Fungal
  - Mycobacterium

Dr._____ License _____

NPI _____

General Lab Order Referral Form
May 2020

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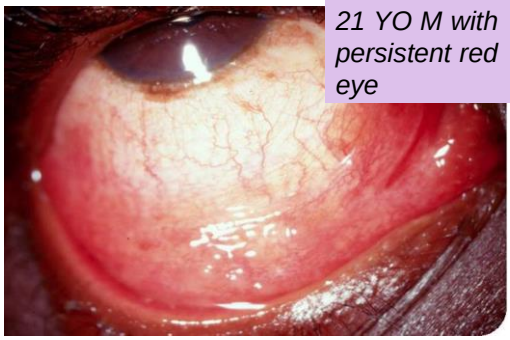
Adult Inclusion Conjunctivitis

History:
- Recent "new"sex partner, ~4-8 weeks
- Incubation ~5 to12 dys
- Females often asymptomatic

Often diagnosed because pt Non-responsive, persistent red eye with traditional antibiotic and supportive treatment



21 YO M with persistent red eye

Communication:
PCP, PA
Infectious disease/Community health centers

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Allergic conjunctivitis

24 YO F with itchy red eye

History:
•Chronic or acute symptoms of redness, itching, irritation

ROS:
- Rashes, chronic rhinitis

Communication:
PCP, PA
Allergist (*even if in office testing for therapy*)

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Scleritis

History:
•First time but especially if recurrent

ROS:
- Skin, joints, muscles

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Scleritis

CHECK to see if recent systemic medication changes

Communication:
PCP, PA
Rheumatologist

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Thyroid Eye Disease (TED)/ Thyroid Associated Orbitopathy

75% of pts with thyroid *hyperactivity* develop ocular signs

* *Of pts with thyroid hyperactivity, 15% of those pts will develop serious functional impairment*

Communication:
PCP, PA
*** IMAGING!**
Endocrinologist

Smoking is the most important risk factor for complications associated with TED

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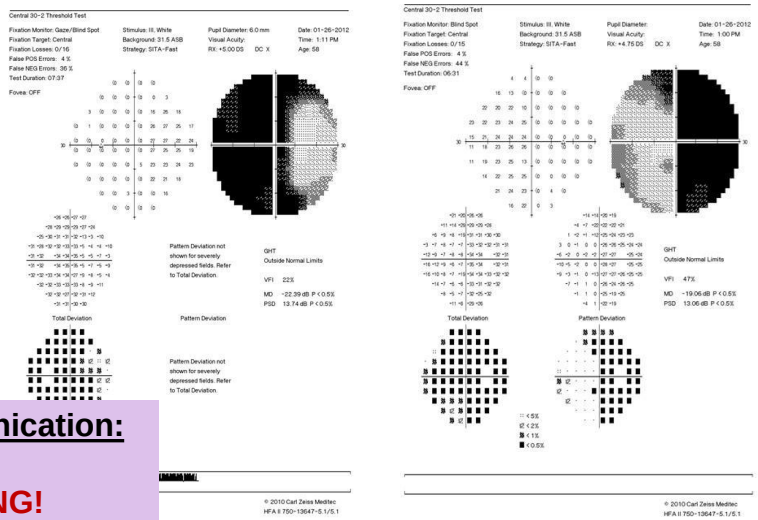
Thyroid Associated issues may also be associated with ….



Communication:
PCP, PA
*** IMAGING!**
Endocrinologist

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Who can you collaborate with?

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Neurological Disorders

- *Those that symptomatically affect vision,* usually located in Occipital lobe --> but can be Temporal or Parietal
- **Fundus generally appears Normal**
- Pupils Normal --> if "symmetric" impact on vision
- Visual Field defects often "respect" vertical midline
  - ➢ *ALTHOUGH other neurologic related conditions may result in **altitudinal defects** (eg, MS), **diffuse loss**, or bitemporal defect (eg, pituitary or sellar mass)*
- Symptoms vary from increasing headaches, sudden onset of diplopia, disorientation

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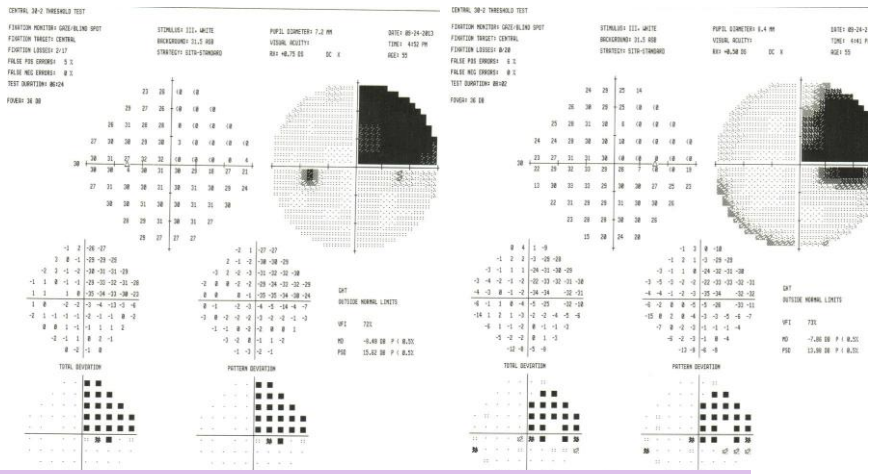
Occipital Lobe Infarct



<u>Communication – Mx varies if acute vs. chronic:</u>
Acute: STROKE center, Neurologist/Neurosurgeon
*** IMAGING**
Chronic: PCP, PA, Neurologist, VT/OT/PT

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More Neurologic Conditions & Collaborations

Conditions

- New onset double vision/ motility issues
- Migraines
- Stroke
- Mulitiple sclerosis (MS)/ Parkinsons disease
- Progressive supranuclear palsy

Collaborators

- Neuro-ophthalmologist/ Neurologist/Neuro-surgeon
- Therapists – VT, PT, OT
- Psychologist

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Who can you collaborate with?

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1904
Marshall B.
KETCHUM UNIVERSITY
Southern California College of Optometry
THANK YOU!!
None of us is as smart as ALL of us!
- Ken Blanchard
Marshall B. Ketchum University | Southern California College of Optometry
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