

## The Good, The Bad and The Orals COPE# 92501-PH

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## Which Orals Do you Commonly Prescribe?

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## Prescribing Considerations

- Indications
- Brand vs. generics
- Does the insurance cover prescriptions?
- Costs of medications
- Compliance

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## Patient Assistance Programs

- [www.mylalcon.com](http://www.mylalcon.com)
- [www.abbvie.com](http://www.abbvie.com)
- [www.bausch.com](http://www.bausch.com)
- [www.tarsusrx.com](http://www.tarsusrx.com)
- [www.rxhope.com](http://www.rxhope.com)
- [www.RxOutreach.org](http://www.RxOutreach.org)
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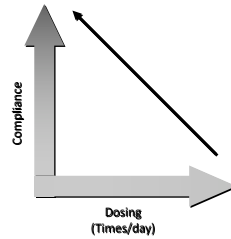
## Barriers to Compliance

- Cost
- Provider's role
- Forget
- Polypharmacy
- Dexterity
- Side effects

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## Patient Compliance and Dosing

- Literature review of 76 studies show
  - Compliance increases with decreased dosage regimen and complexity<sup>1</sup>
  - 79% compliance with QD regimen vs 51% for QID regimens ( $p=0.001$ )<sup>1</sup>
  - Simpler, less-frequent dosing results in better compliance in a variety of therapeutic classes<sup>1</sup>



1. Clinics of Clinical Therapeutics, 2001; 23:1296-1310

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## Prescription Considerations

- Review medical history
  - Renal function
  - Liver function
- Review current medications
- Side effect vs. true allergies
- Pregnant or nursing
- Rx for children



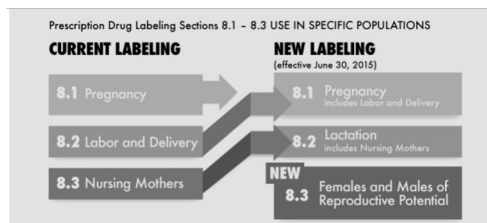
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## Prescribing for Women

- Certain medications are OK in pregnancy
- Breast feeding
- Consult OB-GYN if necessary

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## FDA Labeling



<http://www.fda.gov/Drugs/DevelopmentApprovalProcess/DevelopmentResources/Labeling/ucm093307.htm>

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## So What Can Be Used During Pregnancy?

- Antibiotics
  - Amoxicillin
  - Amoxicillin/clavulanate
  - Azithromycin
  - Erythromycin
- Antivirals
  - Acyclovir
  - Valacyclovir
- Anti-inflammatory
  - Prednisone
- Analgesics
  - Acetaminophen
  - Ibuprofen
  - Tylenol #3
  - Vicodin
- Allergy
  - Diphenhydramine
  - Loratadine

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## What About Topical Medications During Pregnancy?

- Category B
  - Antibiotics – tobramycin
  - Allergy – alcaftadine
  - Glaucoma – brimonidine
- Category C
  - Allergy - olopatadine
  - Anti-inflammatory – steroids, cyclosporine
  - Anti-viral – ganciclovir, trifluridine

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## Prescribing Considerations for Kids

1. Know the age
2. Know the weight >88lbs
3. Look up the dosage
  - mg/kg/day
4. Be good at math
  - Or call the pharmacist
5. Avoid
  - Tetracyclines
  - Fluoroquinolones



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## Math is Fun!

- Augmentin 20-40 mg/kg/day po in 3 doses
- Convert pounds to kg
  - 50 lbs / 2.2 lbs = 23kg
- Multiply kg by dosage to get DAILY dose mg
  - 23kg \* 20 mg/kg = 460 mg
- Daily dose divided by number of doses per day
  - 460 mg / 3 = 150 mg po tid



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## Clinical References/Apps



Epocrates



GoodRx

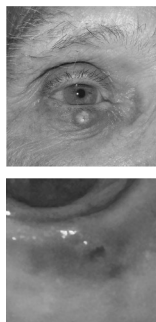


Eye Handbook

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## Annual Plaquenil Visit

- Rheumatologist wanted updated testing. Complains of dry eye and crusting. Constantly cleaning out OU. Bump on LLL which has been there for 3 weeks. Today it has come to a head. Uses erythromycin ung LLL BID and Ats BID.



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## Case #1

- 34 YOWF presents with pain and swelling OD lid and right side of face. Started about 4 days ago suddenly and not getting better. Started amoxicillin/clavulanate 1 PO BID 2 days prior. She is 20 wks pregnant and can only take Tylenol for pain. Had a similar episode a couple years prior which resolved.
- Oc Hx: Epiphora OD
- Med Hx: 20 weeks pregnant / unremarkable
- Allergies: NKMA

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### Examination

- BCVA:
  - OD 20/25
  - OS 20/20
- Neg APD
- CVF/EOMs – Full OU

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### What is Our Likely Diagnosis?

- 1) Chalazion
- 2) Dacryocystitis
- 3) Dacryoadenitis
- 4) Lid Abscess
- 5) External hordeolum

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### Which Antibiotic Would You Choose?

- 1) Change to ciprofloxacin 500mg BID PO
- 2) Erythromycin ointment BID OD
- 3) Continue amoxicillin/clavulanate 875 mg BID po
- 4) Change to azithromycin as directed
- 5) Does it really matter???

So what did we do???

We lanced it and kept on amoxicillin/clavulanate and Scheduled DCR

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### Which Antibiotic Would You Choose?

- 1) Cefalexin 875mg BID PO
- 2) Erythromycin ointment BID OD
- 3) Amoxicillin/clavulanate 875 mg BID po
- 4) Azithromycin as directed
- 5) Does it really matter???

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### Cephalexin

- First generation cephalosporin
- Caution in those with PCN allergy
- Disrupts the synthesis of peptidoglycan in bacterial cell walls
- Bactericidal but less susceptible to penicillinase
- Pregnancy Category B
- 500 mg BID for one week
- 5-10% cross-sensitivity with PCN
- Side Effects/Contraindications:
  - Renal dysfunction
  - GI disease

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### Abx Cross-sensitivity Reactions

- The overall cross-reactivity rate is approximately 1% when using first-generation cephalosporins or cephalosporins with similar R1 side chains
- For penicillin-allergic patients, the use of third- or fourth-generation cephalosporins or cephalosporins with dissimilar side chains than the offending penicillin carries a negligible risk of cross allergy

Campagna, J.D. et. Al. The use of cephalosporins in penicillin-allergic patients: a literature review. J Emerg Med. 2012 May;42(5):612-20

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## Fluconazole

- Effective against candidiasis, cryptococcal meningitis
- Interferes with fungal cytochrome P450 activity (lanosterol14- $\alpha$ -demethylase) decreasing ergosterol synthesis
- Pregnancy Category C
- 150 mg as a single oral dose
- Side effect
  - Headache

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## Painful, Swollen OS

- 77 yowm presents for red, painful swollen eye. 3 day prior, he recalls headache and pain OS. Woke up next am with red, crusty and discharge OS. He had a fall on left side after hematology appt but unsure if he hit OS. Went to Erdue to symptoms and was given erythromycin BID OS.
- Ocular Hx: Phaco OU, Blepharoplasty OU, Ectropion repair OU
- Med Hx: RA, NIDDM, HTN, High cholesterol, Gout
- Allergies: Metformin
- Meds: A LOT

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## Amoxicillin / clavulanate

- Penicillinase-resistant penicillin
- Disrupts the synthesis of peptidoglycan in bacterial cell walls
- Bactericidal
- 500 mg TID or 875 mg, 1000mg BID for one week
- Can be used in kids and pregnancy category B
- Side Effects/Contraindications:
  - Cannot be taken if penicillin allergy
  - GI upset
  - Liver injury

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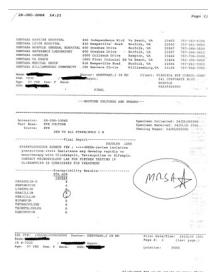
## Eyelid / Conjunctival Cultures

- Eyelid
  - Moisten swab, rub along the lid margins
- Conjunctiva
  - Inferior palpebral conjunctiva
- Inoculate solid media plates
- Culture
  - Calcium alginate swab
  - Cotton-tipped applicator
  - Transport medium

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## Example of Culture Report

- Hold for:
  - Bacteria 1 week
  - Viral 2 weeks
  - Fungal 1 month
- Test for all sensitivities



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## Treatments for MRSA

- 100% to vancomycin<sup>1</sup>
- 97.7% to sulfisoxazole<sup>1</sup>
- 95% to Polytrim<sup>2</sup>
- 93.2% were sensitive to tetracycline<sup>1</sup>
- 63.6% were sensitive to bacitracin<sup>1</sup>
- 14.8% of MRSA isolates were sensitive to ciprofloxacin and erythromycin<sup>1</sup>
- Besifloxacin has been reported to be effective

1. Fiedler J, Acharya N, Liskman TM, et al. Spectrum of eye disease caused by methicillin-resistant coagulase negative staphylococci. Am J Ophthalmol. 2007 Aug;144(2):313-5.

2. Abbott PA, Gully KA, Deng S, et al. Occlusal 'TRUST' nationwide antimicrobial susceptibility patterns in ocular isolates. Am J Ophthalmol. 2008 Jun;145(6):911-6.

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### Screening Tests for Syphilis

- Venereal Disease Research Lab (VDRL)
  - VDRL may become non-reactive in latent syphilis or after successful treatment
  - False positives may occur in:
    - Pregnancy
    - Infectious mononucleosis
    - Systemic lupus erythematosus
- Rapid Plasma Reagin (RPR)
  - Alternative to VDRL

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### Fluorescent Treponemal Antibody Absorption (FTA-ABS)

- Detects specific antibodies against *T pallidum*
- Confirms diagnosis of syphilis
  - More specific than VDRL
  - More sensitive in primary syphilis
- Test may remain positive for life
- Reactive:
  - Primary syphilis 95%
  - Secondary 100%
  - Late latent 100%
  - Tertiary 96%
  - False positives may occur in pregnancy and SLE

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### Syphilis

- STD caused by *T pallidum* / great imitator / any tissue and organ
- Sexually active / multiple partners
- Systemic Sx – Depends on stage – primary painless ulcer / secondary skin rash palms, soles, trunk / tertiary neurosyphilis
- All types of ocular inflammation
- Labs
  - VDRL / RPR
  - FTA – ABS
  - ESR elevated
- Tx – penicillin therapy
- Good prognosis if treated early

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### So He Has an Allergy to PCN?

- Augenbraun M, Workowski K. Ceftriaxone therapy for syphilis: report from the emerging infections network. Clin Infect Dis. 1999 Nov. 29(5):1337-8
  - Tetracycline, erythromycin, and ceftriaxone have shown antitreponemal activity in clinical trial

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### Doxycycline

- Inhibits bacterial protein synthesis
- Cannot be used for kids <8 and pregnancy/nursing
  - Category D
- Anti-infective dose: 100 mg BID for 10 days
- Anti-inflammatory dose: 50 mg BID for one month then qd 1-3 months
- Side effects/Contraindications:
  - GI upset: caution patient to take this with food
  - Photosensitivity
  - Pseudotumor cerebri

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## Azithromycin

- Inhibit bacterial protein synthesis
- Z pak:
  - Day 1 500 mg
  - Day 2-5 250 mg
- 1g dose
- Pregnancy Category B
- Side Effects/Contraindications:
  - GI upset
  - Headache
  - Rash
  - May worsen myasthenia gravis symptoms
  - Kidney or liver dysfunction
- Consider risk of fatal heart rhythms

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## MGD: Azithromycin vs. Doxy

- Purpose: To assess the efficacy and safety of oral azithromycin compared with oral doxycycline in patients with meibomian gland dysfunction (MGD) who had failed to respond to prior conservative management.
- Conclusion: Although both oral azithromycin and doxycycline improved the symptoms of MGD, 5-day oral azithromycin is recommended for its better effect on improving the signs, better overall clinical response and shorter duration of treatment

Kashkoush et al. Oral azithromycin versus doxycycline in meibomian gland dysfunction: a randomized double-masked open label clinical trial. Br J Ophthalmol. 2013 Feb;97(2):196-204.

44

## MGD: Azithromycin vs. Doxy

- Satitpitakul V, Ratanawongphaibul K, Kasetsuwan N, Reinprayoon U. Efficacy of azithromycin 1.5% eyedrops vs oral doxycycline in meibomian gland dysfunction: a randomized trial. Graefes Arch Clin Exp Ophthalmol. 2019 Jun;257(6):1289-1294.
- Upaphong P, Tangmonkongvoragul C, Phinyo P. Pulsed Oral Azithromycin vs 6-Week Oral Doxycycline for Moderate to Severe Meibomian Gland Dysfunction: A Randomized Clinical Trial. JAMA Ophthalmol. 2023 May 1;141(5):423-429.

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## Ocular Uses for Antibiotics

- Bacterial keratitis
- Canaliculitis
- Chalazion/Hordeolum
- Chlamydia
- Dacryocystitis
- Dacryoadenitis
- Lyme disease
- Eyelid lacerations
- Ocular surface disease
- Orbital blow-out fracture
- Preseptal cellulitis

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## Oral Antibiotics

- Is an oral antibiotic truly needed?
- Coverage
- Check allergy information
- Consider generics
- Take full course of therapy

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## Blowout Fracture

- Check VA
- Base and medial walls of orbit are very thin
- Does not need to be a major trauma
- Look for trapped EOMs
- Sunken eye
- Infraorbital hypoesthesia
- Diplopia
- Pain on eye movement
- Nausea

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### Repair?

- Within 2 weeks
  - Symptomatic diplopia within 30° of primary gaze
  - Muscle entrapment (prevent ischemia and necrosis)
  - Fracture greater than 50% of orbit floor
  - Displaced orbital rim fracture
  - > 2mm of enophthalmos
  - Significant hypo-ophthalmos
- Monitor
  - Diplopia outside central 30°
  - Modest isolated fractures
  - Improvement over first 2 weeks

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### Orbital Trauma in Children

- Trap door orbital floor fractures are very common
  - More elastic orbits
  - More common to get muscle entrapment
- Evaluation for repair typically in 5-7 days

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### Levofloxacin

- Broad spectrum antibiotic
- Can be used in patients with PCN allergy
- Not to be used in children, pregnancy, nursing
- Dosage: 500 mg qd for one week
- Warnings:
  - Tendinitis and tendon rupture
  - Increase risk of RD?
  - Peripheral neuropathy

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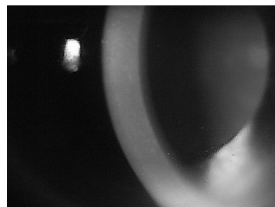
### Spider Bite

- 63YOWM Referred by PCP for sudden decrease VA OD and swelling of eyelids OD>OS for 1 week
  - Pressure from forehead to cheek
  - Worse in evenings
  - Mild seasonal allergies
  - Some tearing and redness OD
- Bitten 3 weeks ago on top of the head while working in the yard which become swollen that evening
- Went to PCP and given oral ABX which finished yesterday

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### Examination

- Non-healing scab on R forehead
- Conjunctiva: 2+ injection OD
- Cornea: 2+SPK, 2+ MCE, 1+ KPs, No dendrites OD
- AC: 2+ Cells OD
- Lens: 2+ NS OD / 1+NS OS
- IOP: 31/13



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### Diagnosis???

- Considerations
  - PCP told him he had an infection not shingles
  - Episode started 3 weeks prior
- Treatment
  - Valacyclovir 1000mg TID po
  - Difluprednate QID OD
  - Timolol 0.5% QAM OD
  - F/u 1 week

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## Herpes Varicella-Zoster Virus

- Primary infections: Chicken pox
  - Remains latent in dorsal root or other sensory ganglia after primary infection
  - May lie dormant for years to decades
- Later infections: Shingles
  - Virus specific cell-mediated immune responses decline
  - Localized cutaneous rash erupting in a single dermatome
  - HZO accounts for 10-25% of all cases of shingles

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## Herpes Zoster Ophthalmicus

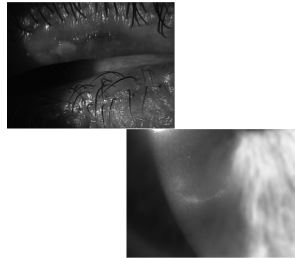
- 90% of U.S. population infected with VZV by adolescence
- 100% of U.S. population by 60 years of age
- 1.5-3.4 cases per 1,000 individuals

<http://emedicine.medicap.com/article/783223-overview?aw3a=0&id=0>

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## Herpes Zoster Ophthalmicus

- Conjunctivitis
- Scleritis
- Pseudodendrites
- Keratic precipitates
- Iritis
- Synechiae
- Neurotrophic keratitis
- Elevated IOP
- Potential vascular occlusion
- Nerve palsies
- Glaucoma (longer-term)



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## HZO: Signs and Symptoms

- Prodromal phase: fatigue, malaise, low-grade fever
- Unilateral rash over the forehead, upper eyelid, and nose
  - 60% of patient have dermatomal pain prior to rash
  - Erythematous macules to papules to vesicles to pustules to crusts
  - Other symptoms: eye pain, conjunctivitis, tearing, decrease VA, eyelid rash
  - Hutchinson's sign
- Post-herpetic neuralgia: >12 months for 50%

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## HZO: Treatment

- Local wound care
- Analgesia
- Antivirals
  - Valtrex 1g TID
- Antibiotics??
- Oral corticosteroids
- Post-herpetic neuralgia
  - Tricyclic antidepressants
  - Topical capsaicin ung
  - Gabapentin

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## Oral Antivirals

- Inhibit viral DNA polymerase without inhibiting normal cellular activity
- Works best if treatment initiated within 72 hours
- Pregnancy category B
- Caution in patients with renal disease

Antiviral Drug	HSV	HZO
Acyclovir	400 mg 5x/day for 1 week	800 mg 5x/day for 1 week
Valacyclovir	500 mg TID for 1 week	1000 mg TID for 1 week
Famciclovir	250 mg TID for 1 week	500 mg TID for 1 week

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## How long do you keep patients on oral antivirals for HZO?

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- TJJ and WOW
  - "I normally keep for full course of therapy and don't taper unless eye (cornea, uvea, retina) is involved and/or on steroids"
- JDS
  - "Average body weight and totally quiet. Start with the current 1000mg PO BID. Go to 500mg PO BID within 3 months quiet routine case, 6 months quiet bad case. Then good for 6 months cut to 500mg PO QD. Seems to work well, especially considering that traditional thinking precludes long term antivirals for Zoster, despite the efficacy with Simplex. All empirical but experiential"
- EY
  - "V1 zoster without ocular involvement can be a bugger bc I've seen post herpetic pain as well as recurrences that then do have intrapupillary involvement. I Rx 1gm daily of Valtrex or AcV 800 daily, at a minimum, for at least 6 months"

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### Zoster Eye Disease Study: Rationale and Design

Elizabeth J Cohen <sup>1</sup>, Judith S Hochman <sup>2</sup>, Andrea B Troxel <sup>3</sup>, Kathryn A Colby <sup>1</sup>,  
Bernie H Jeng <sup>4</sup>; ZEDS Trial Research Group

PMID: 35090164 DOI: 10.1097/JCO.0000000000002743

#### Abstract

**Purpose:** The purpose of this study was to describe the rationale and design of the Zoster Eye Disease Study (ZEDS).

**Methods:** ZEDS is a National Eye Institute-supported randomized clinical trial designed to determine whether 1 year of suppressive valacyclovir in patients with herpes zoster ophthalmicus (HZO) reduces complications because there is currently no high-quality evidence to support its use. Eligible patients are 18 years and older, immunocompetent, have a history of a typical rash at disease onset, and have had a record of active epithelial or stromal keratitis or iritis within 1 year before enrollment. Exclusion criteria include estimated glomerular filtration rate less than 45 or pregnancy. The primary endpoint is the time to first occurrence of new or worsening dendritic epithelial keratitis, stromal keratitis without or with ulceration, endothelial keratitis, or iritis due to HZO during 12 months of study treatment requiring prespecified treatment changes. The study has 80% power to detect a 30% difference between treatment groups, with a 30% rate of endpoints by 1 year assumed among controls. Secondary and exploratory questions include whether there is a persistent treatment benefit during the 6 months after treatment, whether development of postherpetic neuralgia varies by treatment group, and whether vaccinations against herpes zoster affect study outcomes and coronavirus disease 19 status.

**Results:** Over approximately 4 years, over 400 study participants have been enrolled.

**Conclusions:** ZEDS aims to provide scientific evidence on whether suppressive valacyclovir treatment improves outcomes in HZO and should become the standard of care.

**Trial registration:** ClinicalTrials.gov NCT03134198.

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## Vaccines for HZO – Shingrix (GSK)

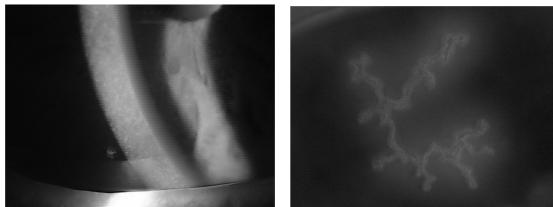
- Vaccine indicated for prevention of herpes zoster (shingles) in adults aged 50 years and older
- 2 IM doses (0.5 mL each) at 0 and 2 to 6 months
- Reduced risk of developing HZ from 85 – 97%
- Efficacy against PHN 85.5%

Data available from Shingrix PI

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## Orals for Simplex???



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## Herpetic Eye Disease Study I

- Herpes Stromal Keratitis, Not on Steroid Trial
  - Pred Phosphate faster resolution and fewer treatment failures
  - Delaying treatment did not affect outcome
- Herpes Stromal Keratitis, on Steroid Treatment
  - No apparent benefit in the addition of oral acyclovir to the treatment of topical corticosteroid and topical antiviral
- **HSV Iridocyclitis, Receiving Topical Steroids**
  - **Trend in the results suggests benefit in adding oral acyclovir**

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## Herpetic Eye Disease Study II

- HSV Epithelial Keratitis Trial
  - No benefit from oral ACV with topical trifluridine in preventing the development of stromal keratitis / iritis
- **Acyclovir Prevention Trial**
  - **Reduced by 41% the probability of recurrence**
  - **50% reduction in the rate of return of the more severe form**
- Ocular HSV Recurrence Factor Study
  - No results available

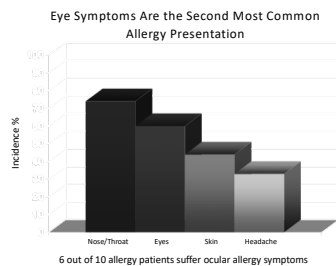
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## Herpes and Bell's Palsy

- HSV or HZV has been shown to cause Bell's Facial Nerve Palsy
- Main concern is dry eye secondary to poor lid function

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## Incidence of Allergic Symptoms



The 1999 Gallup Study of Allergies and Allergic Symptoms Affecting the Nose, Throat, Eyes, and Skin

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## Oral Antihistamines

- Central acting antihistamines
  - Benadryl (diphenhydramine)
  - Chlortrimeton
- Peripherally acting antihistamines
  - Selective peripheral histamine H1 receptor blockade
  - Less CNS and anticholinergic effects
  - Less sedating but also less effective
  - With / without a decongestant

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## Common OTC Allergy Meds

- Inhibits action of histamine by blocking H1 receptors preventing symptoms of allergy
  - Cetirizine (Zyrtec) 5 or 10mg qd
  - Desloratadine (Clarinex) 5mg qd
  - Fexofenadine (Allegra) 60mg bid; 180mg qd
  - Loratidine (Claritin) 10 mg qd
- Pregnancy category C
- Side Effects/Contraindications:
  - Hypersensitivity reactions
  - Dry mouth
  - Headache
  - Nervousness

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## Diphenhydramine

- Temporarily relieves these symptoms due to hay fever or other upper respiratory allergies
  - Runny nose
  - Sneezing
  - Itchy, watery eyes
  - Itching of the nose or throat
- Pregnancy Category B
  - 25-50 mg q6-8 hours
- Side effects
  - Blurred VA, Diplopia
  - CNS depression / somnolence

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### Effect of Oral Re-Esterified Omega-3 Nutritional Supplementation on Dry-Eye Disease: Double-Masked Randomized Placebo-Controlled Study

- 105 patients with dry eye disease
  - Four capsules (2 gm) once a day containing 1680mg EPA and 560mg DHA (PRN Dry Eye Omega Benefits) for 3 months or four capsules of placebo.
  - All patients underwent a screening, baseline, 6 week and 12 weeks visit.
  - On each visit patients were tested for tear osmolarity, MMP-9, fluorescein corneal staining, Schirmer's testing, and OSDI. On the screening exam and week 12 evaluation patients had their omega index tested.
- This study demonstrated that oral consumption of re-esterified omega-3 fatty acids (1680 mg EPA and 560 mg DHA once daily for 12 weeks) is an effective treatment of dry eye disease and results in a statistically significant improvement in tear osmolarity, OSDI, tear break up time and omega index levels.

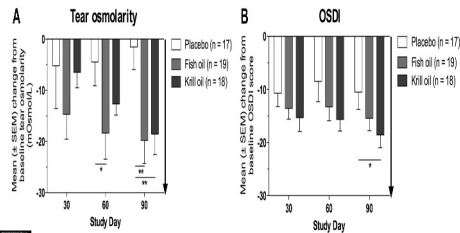
Donnenfeld ED, Holland EJ, Bucci PA, et al. 2015

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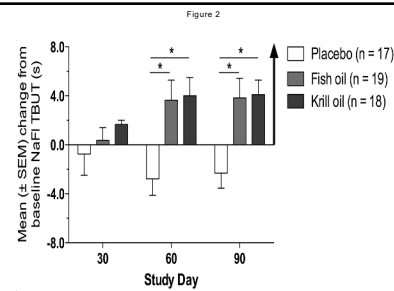
### A Randomized, Double-Masked, Placebo-Controlled Clinical Trial of Two Forms of Omega-3 Supplements for Treating Dry Eye Disease



Ophthalmology 2017; 124: 43-52 DOI: 10.1016/j.ophtha.2016.09.022

DeVries LA, Algh, JV, Chinn, YW. Ophthalmology Volume 124, Issue 1, Pages 43-52 (January 2017)

81



Ophthalmology 2017; 124: 43-52 DOI: 10.1016/j.ophtha.2016.09.022

82

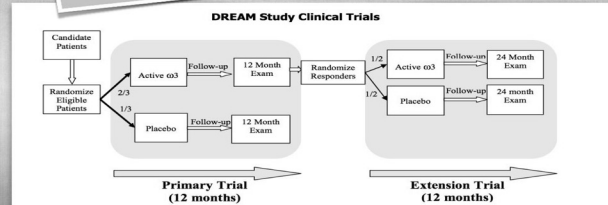
### Dream Study

Multi-site  
 579 patients  
 2 years  
 ω3 2000mg EPA, 1000mg DHA/  
 day  
 Placebo

Slides Courtesy of Milton Horn, MD, FAAG

83

### Dream Study



Slide Courtesy of Milton Horn, MD, FAAG

84

### Results

- No significant difference between fish / olive oil groups
- However, **both groups** improved significantly in primary endpoint of symptoms (plus secondary endpoints of corneal / conj staining, TBUT)
- Olive oil may not have been best choice for study
- There's been much confusion over findings

85

### What does this mean to clinicians?

- We should all make effort to educate ourselves on research – headlines often get it wrong
- Fish oil may be beneficial, but may not be the only option we should consider
- Other omegas (e.g. GLA), and nutrients have clinical evidence in OSD, weren't examined in DREAM

86

Can daily supplementation with marine  $\omega$ -3 fatty acids prevent the development of dry eye disease (DED)?

- **Findings** In this randomized clinical trial of 23,523 US adults who at study entry were free of a previous diagnosis of DED and were not experiencing severe dry eye symptoms, daily supplementation with 1 g of marine  $\omega$ -3 fatty acids for a median (range) 5.3 (3.8-6.1) years had no significant effect on the incidence of diagnosed DED or reported DED symptoms.
- **Meaning** The results do not support recommending marine  $\omega$ -3 fatty acid supplementation to reduce the incidence of DED.

87

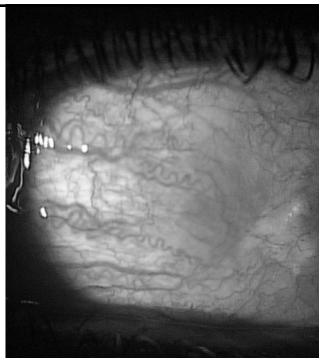
### It's Red Again

- 38 year old, African American, Female presents with red, painful, and photophobic OS
- Started 3 weeks ago / similar episode 10 years ago
- Tried dexamethasone 0.1% but no relief
- BCVA OD 20/25    OS 20/20
- IOP: 17 mmHg

88

### Differentials

- Conjunctivitis
- Episcleritis
- Scleritis
- Uveitis



89

### When Should Lab Tests Be Ordered?

- Bilateral cases
- Atypical age group
- Recurrent uveitis
- Scleritis
- Recalcitrant cases
- Hyperacute cases
- Worsens with tapering
- VA worsens
- Immunosuppressed

90

### Treatment for Scleritis

- NSAIDS
- Systemic steroids
- Immunosuppressive therapy
- Topical steroids???

91

### Ibuprofen

- Analgesic, antipyretic, anti-inflammatory properties
- Suppresses inflammatory cascade by inhibiting COX pathway
- Pregnancy Category
  - C – Prior to 30 weeks gestation
  - D – After 30 weeks gestation
- OTC 200 mg tablets/capsules
- Analgesic dosage - 1,200 mg / day
- Anti-inflammatory dosage – 3,200 mg / day
- Generics available

92

### Oral Anti-inflammatory Indications

- Allergic reaction
- Uveitis
- Scleritis
- AION
- Optic neuritis
- Orbital pseudotumor
- Herpes zoster
- Contact dermatitis
- Episcleritis

93

### 82 yowf Sudden Loss of VA OD

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• VAcc:               <ul style="list-style-type: none"> <li>• OD: LP</li> <li>• OS: 20/50 +2</li> </ul> </li> <li>• Pupils               <ul style="list-style-type: none"> <li>• OD: 1+ APD</li> <li>• OS: round and reactive</li> </ul> </li> <li>• EOM               <ul style="list-style-type: none"> <li>• Full OU</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• CVF               <ul style="list-style-type: none"> <li>• OD: constricted inferior 180</li> <li>• OS: Full to finger counting</li> </ul> </li> <li>• IOP: 18mmHg/18mmHg by Goldmann</li> </ul> |
|---|--|

94

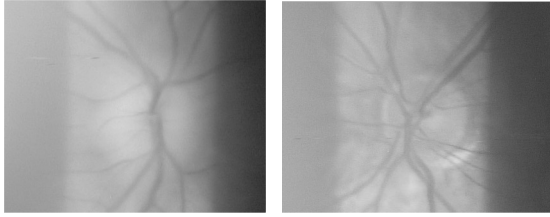
- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Ocular history:               <ul style="list-style-type: none"> <li>• Primary open angle glaucoma OU</li> <li>• Epithelial basement membrane dystrophy OU</li> <li>• Pseudophakia OU</li> <li>• Early Dry ARMD OU</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Medical history:               <ul style="list-style-type: none"> <li>• Arthritis</li> <li>• Hypertension</li> <li>• High Cholesterol</li> <li>• Peripheral Neuropathy</li> <li>• Restless leg Syndrome</li> <li>• GERD</li> </ul> </li> </ul> |
|--|---|

95

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Ocular Medication               <ul style="list-style-type: none"> <li>• Brimonidine/timolol BID OS</li> <li>• Travaprost QHS OU</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Systemic Medication               <ul style="list-style-type: none"> <li>• Crestor 5mg</li> <li>• Amlodipine-Benazepril 5/10mg</li> <li>• Pramipexole 0.125mg</li> <li>• Tramadol HCL</li> <li>• Nexium 40mg</li> <li>• Lidoderm patch</li> <li>• Gabapentin 300mg</li> <li>• Celebrex 200mg</li> <li>• Iron supplement</li> <li>• Krill oil supplement</li> </ul> </li> </ul> |
|--|---|

96





97

### PW-GCA

- Assessment
  - Ischemic Optic Neuropathy OD
    - Pt denied any jaw pain, headaches, shoulder or hip pain, change in weight and malaise
- Plan
  - Labs ordered: ESR, CRP, CBC w/diff
  - Medication: Prednisone 20mg 3 PO
  - Meds are not to be started before having blood drawn
  - Follow up in 1 week pending lab results

98

### PW - GCA

- Lab Results:
  - ESR: 95 (High)
  - CRP: 7.09 (High)
  - Platelet: 465 (High)
- Temporal artery biopsy scheduled in 2 weeks

99

### PW -GCA

- Temporal Artery Biopsy Result
  - Active arteritis with rare giant cells, consistent with temporal arteritis
  - Mild arteriosclerosis
  - Disruption and focal loss of internal elastic lamina
- Informed the patient that her PCP will monitor her labs from now on and adjust her oral prednisone dose accordingly. She is to continue on the 60mg/day dosing for right now until he instructs her otherwise
- Follow up in 1 month

100

### Prednisone

- Suppresses inflammatory cascade and immune response
- Optic neuritis
  - Methylprednisolone 1g/day i.v. for 3 days
  - 60-100mg qd p.o. for 11 days
  - Only after initial IV steroid treatment per ONTT to decrease risk of recurrence
- AION: 60-100mg qd
- Scleritis/Uveitis
  - Not responding to topical treatment
  - 40-80 mg as an initial dose with taper

101

### Prednisone

- Side Effects/Contraindications:
  - Increased IOP
  - Cataract formation
  - Fluid retention (moon face, buffalo hump)
  - Increase blood sugar levels in diabetics
  - Gastric ulcers
  - Not to be used if pregnant
  - Mood changes
- Advantages:
  - Widely available
  - Inexpensive

102

### Oral Corticosteroid Considerations

- Accurate diagnosis is essential
- Indicated for acute inflammatory eye, orbital and eyelid conditions
- Pregnancy category C
- Dosepaks available
  - 24 mg, 30 mg, 60 mg with taper
- Best taken with meals
- Short term rarely has ocular side effects

103

### Oral Analgesics

- Hydrocodone/acetaminophen is the most frequently prescribed oral medication in the U.S.
- Indicated for:
  - Corneal abrasions
  - Recurrent corneal erosions
  - Severe keratitis
  - Severe iritis
  - Refractive surgery

104

### Aspirin

- Pain, inflammation, fever, anti-platelet
- Pregnancy Category D
- OTC 325-650mg every 4-6 hours
- Avoid aspirin 1-2 weeks prior to surgery
- Consider in patients with CRVO, retinal emboli
- Side effects
  - Hypersensitivity
  - Rhinitis
  - Bleeding disorders
  - Reye's syndrome
  - Pregnancy

105

### Acetaminophen

- Analgesics and antipyretic
- Indications:
  - Pain relief associated with corneal abrasions, chemical burns, headaches associated with eye pain, scleritis
- Pregnancy Category B
- Side Effects/Contraindications:
  - Rash, Hives
  - Itching
  - Difficulty swallowing/breathing
  - Overdose may damage liver
  - Do not take with alcohol

106

### Oral Narcotic Analgesics

- Centrally acting opioid receptor blockers
- Safe and effective for acute, short-term pain
- Clinically used in combination with acetaminophen
- Generally prescribed as one tablet po q4-6hours prn
- Onset 20 minutes, peak 1 hour, duration 4-6 hours

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### Hydrocodone/acetaminophen

- Dosage:
  - Vicodin contains 5mg hydrocodone with **300 mg** APAP
  - Vicodin ES contains 7.5mg hydrocodone with **300 mg** APAP
  - Vicoprofen contains 7.5mg hydrocodone with **200 mg** ibuprofen
- Pregnancy Category C
- 1 tablet po q4-6 hours
- Indicate how many in writing
- Generics available

108

## Controlled Drug Act

- **Schedule I - drugs with a high abuse risk.** These drugs have NO safe, accepted medical use in the United States. Some examples are heroin, marijuana, LSD, PCP, and crack cocaine.
- **Schedule II - drugs with a high abuse risk, but also have safe and accepted medical uses in the United States.** These drugs can cause severe psychological or physical dependence. Schedule II drugs include certain narcotic, stimulant, and depressant drugs.
- **Schedule III, IV, V - drugs with an abuse risk less than Schedule II. These drugs also have safe and accepted medical uses in the United States.** Schedule III, IV, or V drugs include those containing smaller amounts of certain narcotic and non-narcotic drugs, anti-anxiety drugs, tranquilizers, sedatives, stimulants, and non-narcotic analgesics.

Accessed from <http://www.deadiversion.usdoj.gov/schedules/index.html> on 8/20/11

109

## Tramadol hydrochloride

- Moderate to severe pain
- Non-narcotic opioid receptor agonist
- Pregnancy Category C
- 50-100mg q4-6 hours
- Side effects
  - Hallucinations
  - Fever
  - Nausea and vomiting
  - Seizure
  - Skin rash
  - Shallow breathing, weak pulse

110

## Side Effects of Pain Meds

- Constipation
- Nausea and vomiting
- Sedation
- Dizziness
- Itching
- Respiratory depression
- Addiction

111

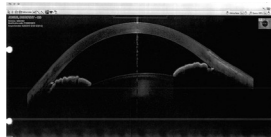
## Promethazine

- Used to treat allergy symptoms
- Prevents motion sickness
- Treats nausea and vomiting or pain after surgery
- Sedative or sleep aid
- 25 mg QID po

112

## Angle Closure Glaucoma

- Fewer than 10% of US glaucoma cases
- Anatomically narrow angle
- Sex
  - 3 X higher in caucasian women
  - In blacks, men + women equally affected
- Incidence increases with age



113

## ACG Treatment Options

- Surgical Care
  - Laser iridotomy
  - Laser goniotomy
- Medication
  - Alpha-adrenergic agonist
  - Beta-blockers
  - Miotic agents
  - Prostaglandins
  - Carbonic anhydrase inhibitors

114

Randomized Controlled Trial > Lancet. 2019 Apr 20;393(10181):1609-1618.  
doi: 10.1016/S0140-6736(18)32607-2. Epub 2019 Mar 14.

### Laser peripheral iridotomy for the prevention of angle closure: a single-centre, randomised controlled trial

Mingguang He <sup>1</sup>, Yuzhen Jiang <sup>2</sup>, Shengsong Huang <sup>3</sup>, Dolly S Chang <sup>4</sup>, Beatriz Munoz <sup>4</sup>, Tin Aung <sup>5</sup>, Paul J Foster <sup>6</sup>, David S Friedman <sup>4</sup>

**Interpretation:** Incidence of angle-closure disease was very low among individuals classified as primary angle closure suspects identified through community-based screening. Laser peripheral iridotomy had a modest, albeit significant, prophylactic effect. In view of the low incidence rate of outcomes that have no immediate threat to vision, the benefit of prophylactic laser peripheral iridotomy is limited; therefore, widespread prophylactic laser peripheral iridotomy for primary angle-closure suspects is not recommended.

115

## Acetazolamide

- Carbonic Anhydrase Inhibitor
- Diuretic, interfering with conversion of bicarbonate and reducing aqueous formation
- Contraindicated in renal, hepatic, and respiratory disease
- Pregnancy Category C
- Decreases IOP by 40-60%
- 125 mg, 250 mg, 500 mg sequels

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## Acetazolamide

- Angle closure
  - 250mg X 2 plus topical glaucoma meds
  - Urgent LPI
- Chronic open angle glaucoma
  - Diamox sequels 500mg BID
- Pseudotumor cerebri
  - Must have labs performed prior to treatment
  - MRI
  - Spinal tap
  - Diamox Sequels 500 mg BID

117

## Acetazolamide

- Side Effects/Contraindications:
  - Not for those with sulfa allergy
  - Kidney dysfunction
  - Metallic taste
  - Tingling and burning in hands/feet
  - Aplastic anemia
  - Diabetics susceptible to ketoacidosis

118

## Ocular Side Effects of Systemic Medications

119

## 10 Most Commonly Prescribed Drugs

- 1) **Hydrocodone (combined with acetaminophen)**
- 2) Generic Zocor (simvastatin), a cholesterol-lowering statin drug
- 3) Lisinopril (brand names include Prinivil and Zestril), a blood pressure drug
- 4) Generic Synthroid (levothyroxine sodium), synthetic thyroid hormone
- 5) Generic Norvasc (amlodipine besylate), an angina/blood pressure drug
- 6) Generic Prilosec (omeprazole), an antacid drug
- 7) **Azithromycin (brand names include Z-Pak and Zithromax), an antibiotic**
- 8) **Amoxicillin (various brand names), an antibiotic**
- 9) Generic Glucophage (metformin), a diabetes drug
- 10) Hydrochlorothiazide (various brand names), a water pill used to lower blood pressure

<http://www.webmd.com/news/20110420/the-10-most-prescribed-drugs>

120

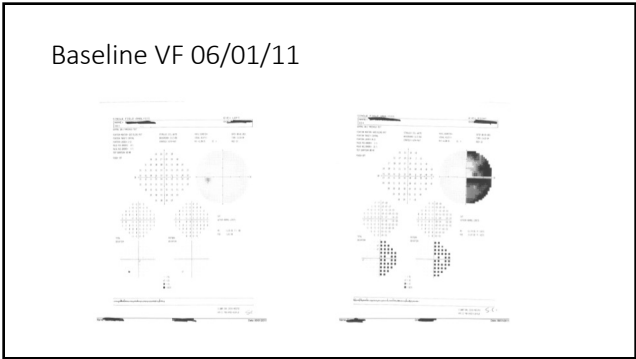
Drug	Use	Ocular Effect
Alendronate	Osteoporosis	Episcleritis/scleritis/uveitis
Amiodorone	Ventricular arrhythmia	Optic Neuropahty
Antihistamines	Allergies	Decreased tear secretion
Chloroquine	Arthritis / Lupus	Bull's Eye Maculopathy
Contraceptives	You know	Decrease lacrimation
Corticosteroids	Anti-inflammatory	Increased IOP / PSC
Coumadin	Anticoagulant	Retinal Heme / SCH
Digoxin	Congestive Heart Failure	Yellow vision
Isotretinoin	Recalcitrant acne	Dry eye / MGD
Gold Salts	Arthritis	Deposits on K / Lens
Sildenafil citrate	ED	NAION
Tamoxifen	Anti-cancer	Crystalline retinopathy
Tamsulosin	BPH	IFIS
Tetracycline	Antibacterial	Pseudotumor
Thioridazine	Anti-psychotic	Pigmentary retinopathy
Thorazine	Anti-psychotic	Stellate ASC
Topiramate	Migraines	Acute myopia / ACG

121

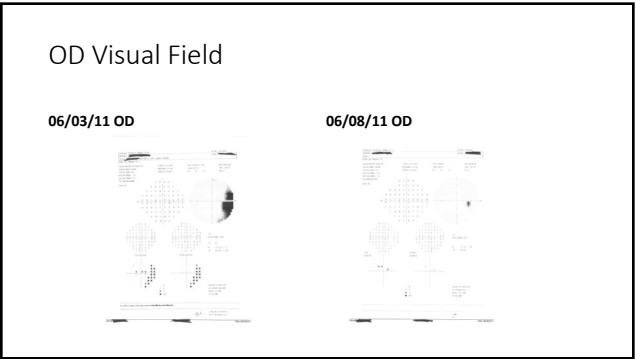
Sudden Decrease in VA

- 24 YOWF, decrease VA 5 minutes ago, OD temp VF
- Bitten by a spider 3 days prior
- Ohx: LASIK 3 months prior
- Mhx: Unremarkable
- Shx: PT smoker
- VA ODsc: 20/25 OSc: 20/20
- (-) APD
- GAT: 7/10

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Oral Contraceptives

- You know what it's for
- Ocular Side Effects
  - Optic neuritis
  - Pseudotumor
  - Dry eye
- Increase risk with smoking
  - Heart attack
  - Blood clots
  - Stroke
  - HTN
  - Migraines

125

Case Report

Am J Ophthalmol. 2001 May;131(5):671-3.

doi: 10.1016/S0002-9394(00)00873-4.

Reversal of nonarteritic anterior ischemic optic neuropathy associated with coexisting primary antiphospholipid syndrome and Factor V Leiden mutation

Srinivasan T, A Fern, W H Watson, M D McCall

Affiliations expand

PMID: 11556954 DOI: 10.1016/S0002-9394(00)00873-4

Abstract

Purpose:

To report nonarteritic anterior ischemic optic neuropathy (NAION) as an ocular manifestation in a woman with combined primary antiphospholipid syndrome and Factor V Leiden (FVL) mutation.

Methods:

Case report of a middle-aged woman with hematological investigations confirming the diagnosis of both primary antiphospholipid syndrome and Factor V Leiden mutation, who presented with visual disturbance in her left eye.

Results:

NAION was noted in her left eye. The patient was promptly treated with low molecular weight heparin, followed by warfarin, which resulted in the reversal of the ischemic optic neuropathy.

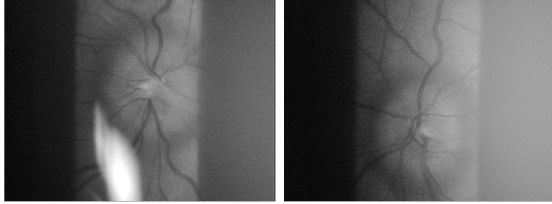
Conclusions:

Primary antiphospholipid syndrome and coexisting Factor V Leiden mutation should be considered in the differential diagnosis of NAION. Prompt treatment with anticoagulants can result in the reversal of the ischemic process.

PubMed Disclaimer

126

## Pseudotumor Cerebri



127

## What Medications Exacerbate Dry Eyes?

- Anti-hypertensive agents
- Antihistamine / Decongestants
- Hormonal Replacement Therapy
- Antidepressants
- Pain Relievers
- GI medications
- Chemotherapy
- Antipsychotics

128

## Hydroxychloroquine sulfate

- Indicated for the treatment of discoid and systemic lupus erythematosus, rheumatoid arthritis, and malaria
- Dosage: 200mg to 400mg per day
- Primary risk factors
  - Duration > 5 years
  - Cumulative dose >1000g
  - Age
  - Systemic – High BMI, liver, kidney dysfunction
  - Ocular – retina or macular changes

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American Academy of Ophthalmology Statement

### Recommendations on Screening for Chloroquine and Hydroxychloroquine Retinopathy (2016 Revision)

Michael F. Marmor, MD,<sup>1</sup> Usha Kishor, MD,<sup>2</sup> Timothy Y.Y. Lai, MD,<sup>3</sup> FRCS(oph),<sup>4</sup> Ronald B. Miller, MD,<sup>5</sup> William F. Maller, MD,<sup>6</sup> for the American Academy of Ophthalmology

**Background:** The American Academy of Ophthalmology recommendations on screening for chloroquine (CQ) and hydroxychloroquine (HCQ) retinopathy are revised in light of new information about the prevalence of toxicity, risk factors, fundus distribution, and effectiveness of screening tools.

**Purpose of Recommendation:** Although the focus of toxic damage is performed in many eyes, Asian patients often show an extramacular pattern of damage.

**Dose:** We recommend a maximum daily HCQ use of <5.0 mg/kg real weight, which correlates better with risk than ideal weight. There are no similar demographic data for CQ, but dose comparisons in older literature suggest using 2.2 mg/kg real weight.

**Risk of Toxicity:** The risk of toxicity is dependent on daily dose and duration of use. As recommended doses, the risk of toxicity up to 5 years is under 1% and up to 10 years is under 2%, but it rises to almost 20% after 20 years. Patients with older than 20 years a patient's current toxicity rate only a 4% risk of converting in the subsequent years.

**Major Risk Factors:** High dose and long duration of use are the most significant risks. Other major factors are concomitant renal disease, or use of tamoxifen.

**Screening Schedule:** A baseline fundus examination should be performed to rule out preexisting maculopathy. Begin annual screening after 5 years for patients on acceptable doses and without major risk factors.

**Screening Tests:** The primary screening tests are automated visual fields plus spectral-domain optical coherence tomography (SD-OCT). These should look beyond the central macula in Asian patients. The multifocal electroretinogram (mfERG) can provide objective confirmation for visual fields, and fundus autofluorescence (FAF) can show damage topographically. Modern screening should detect retinopathy before it is visible in the fundus.

**Testing:** Retinopathy is not reversible, and there is no proven therapy. Recognition at an early stage before any HFE loss is important to prevent central visual loss. However, questionable test results should be repeated or validated with additional procedures to avoid unnecessary cessation of valuable medication.

**Counseling:** Patients (and prescribing physicians) should be informed about risks of toxicity, proper dose levels, and the importance of regular annual screening. Ophthalmology 2016;144:1-10 © 2016 by the American Academy of Ophthalmology.

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## Fingolimod

- FDA-approved oral disease-modifying therapy for the treatment of multiple sclerosis (MS). It acts by modulating the sphingosine-1-phosphate (S1P) receptor, preventing the release of lymphocytes into the systemic circulation and therefore reducing autoimmune demyelination in the central nervous system<sup>14</sup>. Macular edema (ME) has been reported as a significant ocular adverse event associated with the use of fingolimod for the treatment of MS and is termed fingolimod-associated macular edema (FAME).

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## Fluoxetine

- Antidepressant
- Ocular side effects
  - Dry eye
  - Blurred VA
  - Mydriasis
  - Photophobia
  - Diplopia
  - Conjunctivitis
  - Ptosis

132

## Phenothiazines

- Indicated for depression and anxiety
- Ocular side effects
  - Night blindness
  - Anterior subcapsular cataracts
  - Salt and pepper fundus

Accessed from <https://studydriveapp.com/medicines/ophthalmology/phenothiazines/>

133

## Levothyroxine

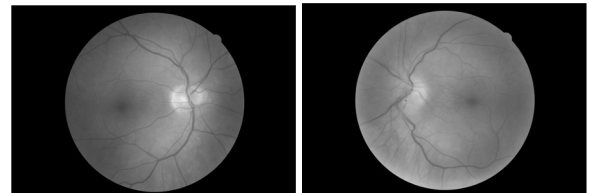
- Indicated for hypothyroidism
- Ocular side effects
  - Diplopia
  - Ptosis
  - EOM paralysis
- Graves Diseases
  - 5X W>M
- NOSPECS

134

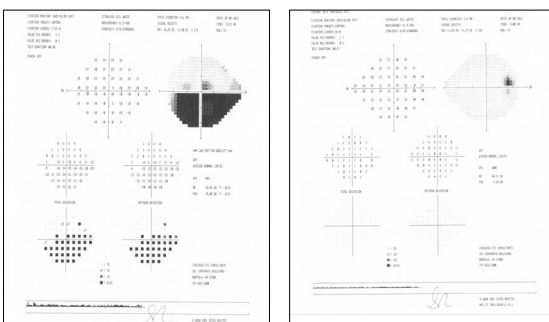
## Ethambutol

- Indicated for tuberculosis
- Used in combination:
  - Rifampin
  - Isoniazid
  - Pyrazinamide
- Ocular side effects
  - Optic neuropathy
  - SE dose dependent

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## Sildenafil citrate

- Selective inhibitor of phosphodiesterase type 5
- Impairment of color discrimination (B/G)
- Non-arteritic ischemic optic neuropathy

Accessed from [www.thisisthebest.net/cartoons/images/viagra.jpg](https://www.thisisthebest.net/cartoons/images/viagra.jpg) on 4/6/11

138

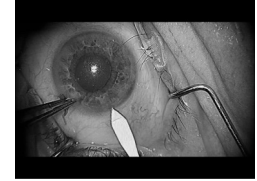
### Can Anything be Done?

- Hayreh SS, Zimmerman MB. Non-arteritic anterior ischemic optic neuropathy: Role of systemic corticosteroid therapy. Graefes Archives of Clinical Exp Ophthalmology 2008; 246:1029-1046.
- Initial VA 20/70 or worse, treated within 2 weeks of onset of symptoms
  - Visual outcome at 6 mo
    - Treated eyes 70% improved
    - Untreated eyes 41%.
  - Visual Fields
    - Treated – 40.1% improvement
    - Untreated – 24.5% improvement

139

### Tamsulosin

- Indication for the treatment of benign prostatic hyperplasia
- Alpha-1 blocker
- Intraoperative floppy iris syndrome
- Importance to communicate prior to cataract surgery



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### Amiodorone

- Indicated for the treatment of life-threatening recurrent ventricular arrhythmia
- Side Effects
  - Halos
  - Photosensitivity
  - Optic neuropathy
  - Optic neuritis
  - Disc swelling



141

### Differentials for Vortex Keratopathy

- Drug induced
  - Amiodorone
  - Chloroquine
  - Tamoxifen
  - Ibuprofen
  - Indomethacin
- Stem cell deficiency
- Fabry's disease

142

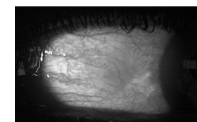
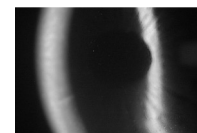
### Fabry Disease

- X-linked disorder due to a deficiency of alpha-galactosidase resulting in the buildup of globotriaosylceramide
- Signs and symptoms include:
  - Severe pain in the extremities
  - Exercise intolerance
  - Renal involvement
  - Skin lesions – angiokeratoma corporis discusum consists of clusters of superficial cutaneous dark-red angiokeratomas
  - Tortuosity of conjunctival and retinal vessels

143

### Alendronate

- Osteoporosis in post-menopausal women, Paget's disease
- Inhibitor of osteoclastic-mediated bone resorption
- Side Effects
  - Episcleritis
  - Scleritis
  - Uveitis

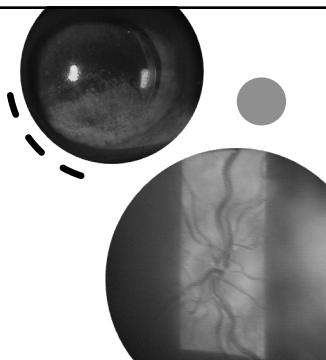


144



## Isotrentinoïn

- Used in the treatment of recalcitrant nodular acne
- Dry eyes
- Keratitis
- Conjunctivitis
- Decreased night VA
- Cataracts
- Optic Neuritis
- Pseudotumor cerebri



145

## Topiramate

- Indicated for the prophylaxis of migraine headaches
- Choroidal effusions
- Acute myopia
- Acute angle closure
- Treatment cessation of drug, cycloplegics, and topical hypotensives

146

## Phentermine and Topiramate

- FDA approved for weight loss in overweight adults who are also diagnosed with hypertension, type 2 diabetes mellitus, or hyperlipidemia
- Ocular Side Effects
  - Acute myopia
  - Bilateral Angle closure glaucoma
  - Choroidal effusion

147

## Tamoxifen

- Anti-estrogen used as adjunctive therapy for the treatment or prophylactics of breast cancer
- Maculopathy with crystalline deposits and macula edema

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## My Top 10 Oral Meds

- Preseptal Cellulitis – Keflex 500mg BID
- MGD – Azithromycin as directed
- HSV/HZO – Valacyclovir 500/1000mg TID
- Allergies – Singulair 50mg QD
- DED – Hydroeye
- Pain – Ibuprofen 400mg TID
- Pain – Vicodin 5mg hydrocodone/ 300 mg APAP q4-6hrs
- Glaucoma – Diamox 500mg BID
- AMD – Macula Protect Complete / AREDS 2
- Inflammation – Prednisone / Dosage varies

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## Conclusions

- Many prescription options available to treat a variety of ocular condition
- Consider patient age, history, drug interactions, compliance, cost
- Important to treat and monitor
- Practice to the fullest extent of our education!

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