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### Disclosures

- Dr. Cunningham
  - Co-founder Sportsvisionpros.com
- Editor and Author
  - Review of Optometry
- Education Chair
  - American Society of Cataract and Refractive Surgery
- Consultant
  - Alcon, B+L, Aldeyra, Lumenis, BVI, J&J, Sightscience, Sun, RVL

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### Requirements for RX

- Can use any documented form of authorization

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### Key difference with Systemic Meds

- Higher blood concentrations
- Go through first pass metabolism

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### Special Consideration

- Young (usually by body weight)
  - BSA usually more accurate
- Old (reduced clearance)
  - Endless interactions
- Pregnant (A whole bunch of stuff)

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### Pregnancy Categories (OLD)

- Category A
- Category B
- Category C
- Category D
- Category X

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### New Risk Labeling

- Pregnancy
- Lactation
- Patients of Reproductive Potential

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### Missionary Pastor

- Local OD calls and asks if we will see her pastor for problematic red eye
- Patient reports history of using Vigamox occasionally and little relief from Patanol
- Has woken with significant eyelid swelling the last couple days and OD fears cellulitis
- Pt started on Augmentin PO<sub>o</sub>



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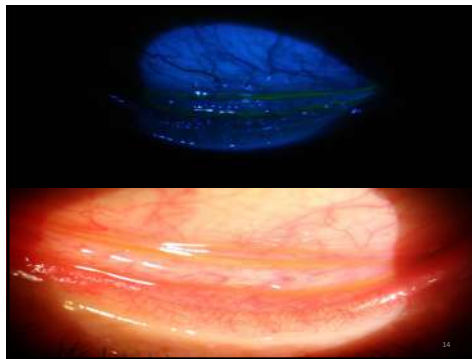


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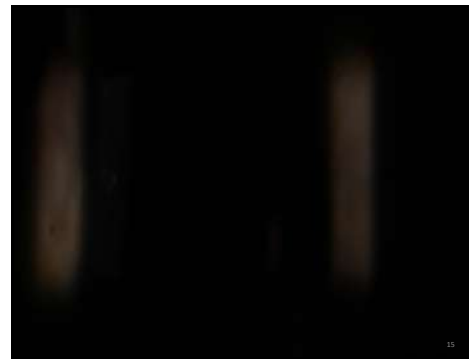
### The Pastor



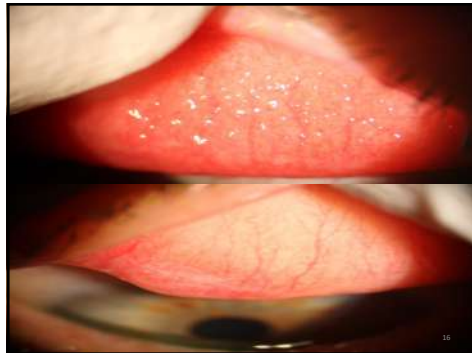
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**Treatment?**

A. Topical Antibiotic	B. Topical Combo
C. Oral Antibiotics	D. Artificial tears and monitor





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**Differential Diagnoses for chronic follicular conjunctivitis**

- Adenoviral keratoconjunctivitis
- Herpes simplex
- Staphylococci
- Rosacea
- Vernal or atopic
- Molluscum contagiosum

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**Chlam Conj**



<p><b>EPIDEMIOLOGY</b></p> <ul style="list-style-type: none"> <li>• Adult chlamydial conjunctivitis is a sexually transmitted disease (STD)</li> <li>• All ages but particularly young adults</li> <li>• More women than men affected</li> <li>• <i>C. trachomatis</i> serotypes D-K</li> </ul>	<p><b>Signs</b></p> <ul style="list-style-type: none"> <li>• Preauricular lymphadenopathy</li> <li>• Mucopurulent discharge</li> <li>• Conjunctival injection</li> <li>• Chemosis</li> <li>• Follicular reaction (especially bulbar or plica semilunaris follicles)</li> <li>• Superior micropannus</li> <li>• Fine or coarse epithelial or subepithelial corneal infiltrates</li> </ul>
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## Chlam Conj



### Symptoms

- **Unilateral or bilateral** involvement
- Purulent discharge, crusting of lashes, swollen lids, or lids "glued together"
- Patient may also complain of:
  - red eyes
  - irritation
  - tearing
  - photophobia
  - blurred vision

### Treatment (pick one)

- Azithromycin 1000mg single dose
- Doxycycline 100mg BID for 7 days
- Tetracycline 100mg QID x 7 days (avoid in pregnant women and in children)
- Erythromycin 500 mg QID x 7 days

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## Oral Antibiotics

- **Category B**
  - Augmentin, Azithromycin, Cephalexin

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## Soft Tissue Infections

1. **Augmentin** – 500 mg TID po
- - amoxicillin and clavulanate potassium (penicillin)
  - Cross sensitivity with Keflex
2. **Keflex** – 500mg BID po
  - Cephalosporin
3. **Zithromax** – Day 1 – 500mg qd po then Day 2-5 250mg qd po
  - Azithromycin – possible heart rhythm interactions
4. **Levaquin** – LEVA-pak 750 mg x 5
  - Swelling or tearing of tendons
  - Watch with NSAIDs, Diabetes or heart rhythm disorders
5. **Doxycycline** -50-100mg bid po

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## They all can cause

Diarrhea

Nausea, vomiting, stomach pain

headache

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## Bactrim DS

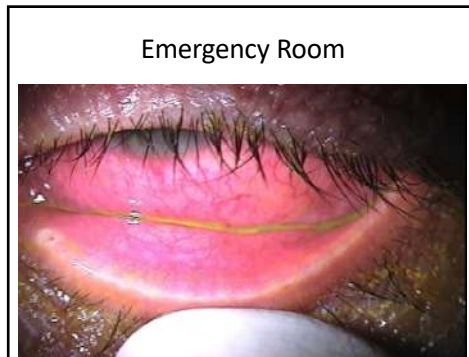
- Sulfamethoxazole and trimethoprim
- Contraindicated in liver/kidney disease, anemia, history of low platelet counts
- Pregnancy category C/D (do not use during breast feeding)
- Easy on the Booze

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## Don't Forget

- Diflucan – fluconazole
  - One pill (150mg oral dose)
  - Can cause heart rhythm issues
  - Do not take multiple doses when pregnant (one is OK)
  - Makes birth control less effective
  - Do not use during breast feeding.

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**45 year old Hispanic Female**

- Presents to emergency room with both eyes swollen shut.
- Claims she was at home looking at wallpaper when they involuntarily shut on her and she has not been able to open them since

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**45 year old Hispanic Female**

- Very poor historian
- ER physicians unable to get eyes open to look at globe
- ER orders eye consult

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**Next Step?**

- A. Blood work
- B. CT scan
- C. Cultures
- D. IV steroids

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**Stable?**

**What now????**

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### Blepharitis – Not Easy

- Chronic
- Uncertain etiology
- Coexisting ocular disease



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### Blepharitis

- Constantly releases inflammatory factors into the tear film
- Tear film then provides vehicle to bath all tissues in these inflammatory factors
- Lack of proper tear film allows extended contact time between factor and tissue

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### Culprits

- *Staphylococcus epidermidis*
- *S. aureus*
- Toxin production
- Cell mediated immunity – Staph antigens cause inflammation

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### Bleph Treatments?

- Are warm compresses and lid scrubs necessary?
- Artificial tears
- Antibiotics – Oral or topical?
- What about the inflammation?



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### Ocular Rosacea

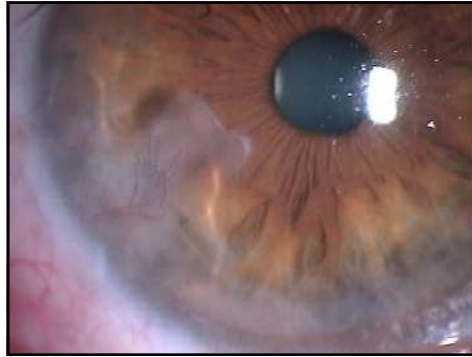
- Eye lid margin telangiectasia
- Inflammation of MG leading to solidification of meibum
- Allows for colonization of *Staph*
- Release of lipases and other inflammatory factors

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### Marginal Keratitis



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## Antibiotics

- Topical
  - Bacitracin
    - Great for the bacteria, not so much for the inflammation
- Combos
  - Zylet and Tobradex
    - Tobramycin

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## Antibiotics ?

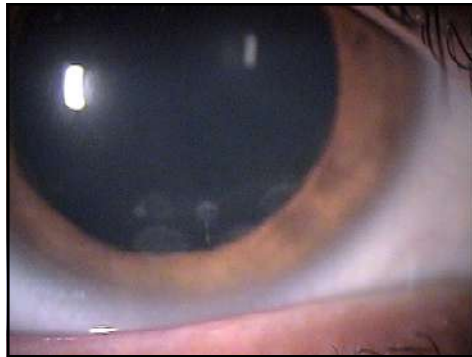
- **Tetracycline** analogues have been shown to decrease bacterial lipases, and demonstrate anti-inflammatory properties in the cornea
- Should be used with moderate bleph or MGD, and when corneal involvement is significant
- **Doxy** 50-200mg/day x 30 days (may need a maintenance dose of 100mg x up to 6 months)
- Use **Minocycline** if tolerability is an issue, or increased sun exposure

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## Doxy

- **Doxycycline--a role in ocular surface repair**  
Br. J. Ophthalmol., May 1, 2004; 88(5): 619 - 625.
- Doxycycline irreversibly inhibits corneal MMP-2 activity by chelating the metal ions that are catalytically and structurally essential.

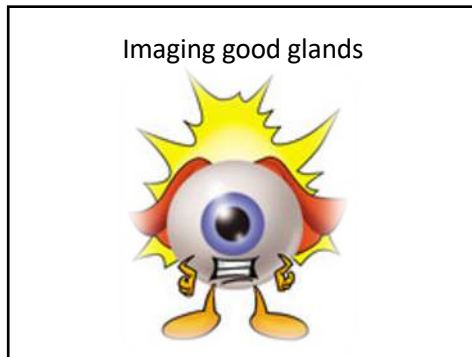
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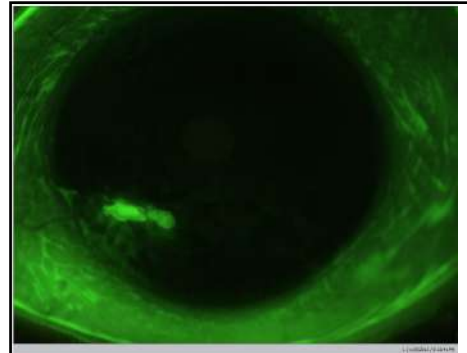
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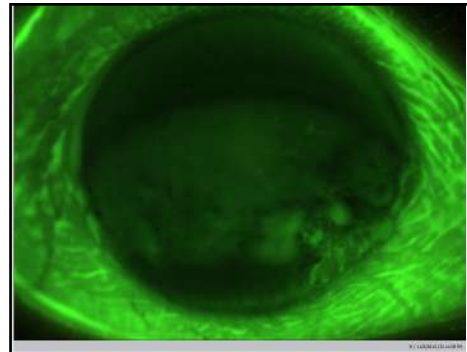
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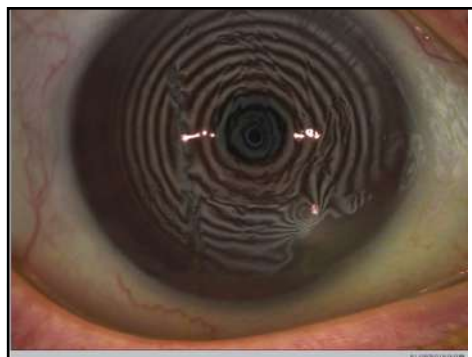
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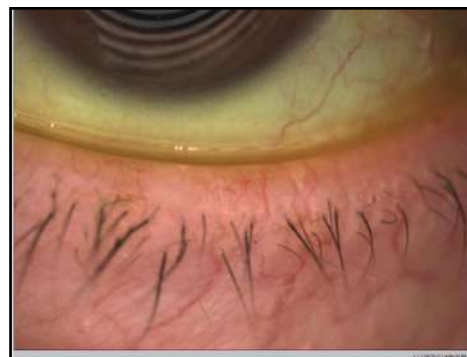
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### Doxycycline disease interactions

- Colitis – will flare up pseudomembranous colitis
- Hepatotoxicity – Doxy is metabolized in the liver and should not be use in liver disease patients
- Esophageal Irritation

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### Taking Doxy

- Do not take with Dairy – reduced effect
- Do not take with multivitamins, or antacids – Iron can bind Doxy
- Do not take before bed – acid reflux

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### Doxy common instructions

- Avoid sun exposure – will burn easier
- Will make birth control less effective

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### DOXY

- Pregnancy Category D
- Lactation – fears of staining infants' dental enamel or bone deposition (highly unlikely with short term use)

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### DOXY

- Will cause permanent teeth color changes if taken before the age of 8

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### Doxy Contraindications

- Liver disease
- Kidney disease
- Asthma, sulfite allergy
- History of increased intracranial pressure
- Use of isotretinoin (pseudotumor Cerebri)
- Use of seizure meds or blood thinners

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### Doxy Common side effects

- Nausea, vomiting, upset stomach
- Diarrhea
- Skin rash
- Vaginal itching or discharge

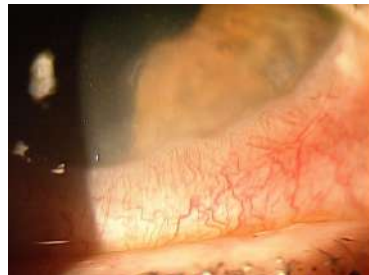
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### Doxy possible dangerous side effects

- changes in your vision;
- severe stomach pain, diarrhea that is watery or bloody;
- fever, swollen glands, body aches, flu symptoms, weakness;
- skin rash, pale skin, easy bruising or bleeding, severe tingling, numbness, pain, muscle weakness;
- upper stomach pain (may spread to your back), loss of appetite, dark urine, jaundice (yellowing of the skin or eyes);
- chest pain, irregular heart rhythm, feeling short of breath;
- confusion, nausea and vomiting, swelling, rapid weight gain, little or no urinating;
- new or worsening cough with fever, trouble breathing;
- increased pressure inside the skull--severe headaches, ringing in your ears, dizziness, nausea, vision problems, pain behind your eyes; or
- severe skin reaction--fever, sore throat, swelling in your face or tongue, burning in your eyes, skin pain, followed by a red or purple skin rash that spreads (especially in the face or upper body) and causes blistering and peeling.

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### RED EYE?



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### Case #1

- Two week f/u – Finished Zylet with No Improvement
- Dx: marginal keratitis
- K – Microcysts in affected area, (-) stain
- IOP – 40 mmHg
- Referred for second opinion



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### Next Step?

- |                        |                              |
|------------------------|------------------------------|
| • A. Stop steroids     | • C. Add aqueous suppressant |
| • B. add prostaglandin | • D. Add antivirals          |

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### Case #1

- No change in SLE
- IOP improved to 32 mm Hg
- Dx: HSV Iridocyclitis OD
- Tx:
  - Valtrex 500 mg tid
  - Lotemax qid
  - Betimol bid



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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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## 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**

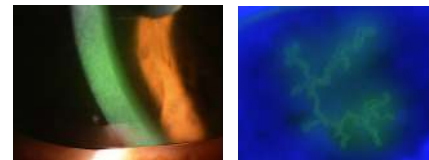
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## Herpetic Eye Disease Study II

- 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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## Orals for Simplex



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## Treatment: Epithelial Involvement

- Topical Antivirals
  - Zirgan 5 x per day until dendrite resolves and then TID x 1 week
  - Viroptic q2h
- PF artificial tears
- Oral antivirals (Valacyclovir 500mg TID)?
- Follow-up next day, day 3-4, day 7-10

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## Treatment: Stromal & Endothelial

- No epithelial involvement
- Corticosteroids
- Prophylaxis with P.O. Valacyclovir (1000mg qd) or Acyclovir (800mg bid) or topical antivirals
- Cycloplege

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## When to use Oral Antivirals?

Valtrex 500mg TID for Tx or 1000mg qd for prophylaxis:

- Toxicity of Viroptic required lower dosing and introduction of oral antivirals
- Patients with Hx stromal keratitis- Children - primary HSV (acyclovir preferred)- Prior to surgery prophylaxis
- Epithelial cases?

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## Antivirals – HSV, HZV

- 1. **Valtrex** – 1000mg TID x 7 days
- 2. **Acyclovir** – 400mg po 5x/day

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## Acyclovir

- Start as soon as possible - just lessens the effect of the virus
- Pregnancy Category B, but do not use when breast feeding if possible
- Do not use if patient has kidney disease or is immunosuppressed

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## Acyclovir common side effects

- Nausea, vomiting
- Diarrhea
- General ill feeling
- Headache

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## Possible severe reactions to Acyclovir

- easy bruising or bleeding, purple or red pinpoint spots under your skin; or
- signs of a kidney problem--little or no urinating; painful or difficult urination; swelling in your feet or ankles; feeling tired or short of breath.

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## Anti-infectives

- **Acyclovir (B) has not had any reports of adverse effects during pregnancy**  
– Zirgan?
- **Pyrimethamine used in the treatment of toxoplasmosis, is potentially teratogenic. Use spiramycin instead**

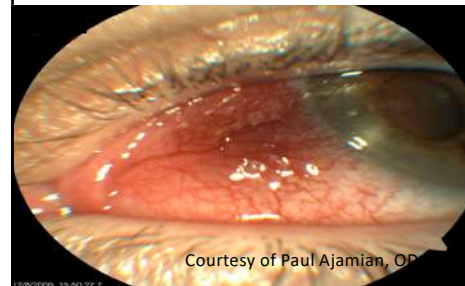
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### Valtrex (valacyclovir)

- Just about same concerns and side effects as acyclovir. (slightly more likely to cause depression-like symptoms)
- Maintenance dose for herpetic prophylaxis is usually 500mg/day

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Pt presents with extremely painful eye – no HX of trauma



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### Scleritis

- Chronic, painful, and potentially blinding
- Associated with systemic autoimmune disease
  - e.g. RA, SLE, Wegener's, ankylosing spondylitis, polyarteritis nodosa and GCA
- Anterior or Posterior scleritis
- Diffuse, nodular & necrotizing
- Posterior scleritis is characterized by thickening of the posterior sclera and retrobulbar edema
- Clinician cannot see but patient also cannot see

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### Scleritis: Symptoms

- Pain Tender to touch and decreased VA
- Significant pain
- Wakes patient at night
- Radiating to sinus, forehead or jaw
- Usually not resolved with analgesics such as Ibuprofen or Tylenol

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### Scleritis: Signs

- Purple hue or deep red
- Does not blanch with the application of neosynephrine

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### Scleritis: Treatment

- Discover associated systemic disease if applicable
- Co-manage with specialist
- Topical meds show minimal help although will still use a strong topical steroid (Durezol QID or Q2H)
- Systemic medications are the key
  - Medrol dose pack (methylprednisolone oral)
  - Decadron (Dexamethasone oral) 2.5 grams
- Monitor closely

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### Scleritis: Lab Testing

CBC with Diff (also check lymph nodes) ESR  
(and CRP if suspicious for GCA)

HLA-B27 antibody ANA (antinuclear antibody) FTA-ABS (RPR)

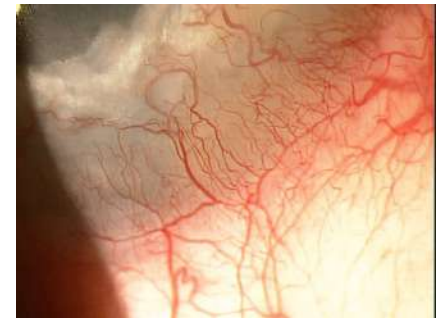
RA (Rheumatoid factor) ACE (angiotensin converting enzyme)

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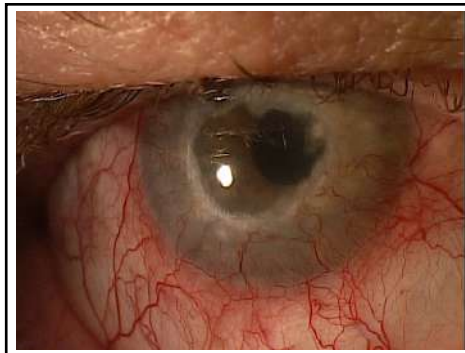
### Scleritis: Associated inflammatory co-morbidities

- Uveitis
- Peripheral ulcerative keratitis
- Glaucoma
- Cataracts
- Limbal stem cell deficiency

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### Corticosteroids – Inflammatory orbital disease, uveitis, DLK

1. **Prednisone** – 60 mg po qd with taper
2. **Medrol dose pack** – 4mg tablets; start 24mg/day and taper

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### Prednisone side effects

- Most common
  - Confusion
  - Excitement
  - Restlessness
  - Headache
  - Nausea
  - Vomiting
  - Thinning skin
  - Trouble sleeping
  - Weight gain

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### Prednisone – potential life threatening side effects

- Allergy – skin rash, swelling of face/tongue
- Vision changes
- Eye pain
- Infection
- Increased blood sugar
- Swelling of feet/ankles

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### Which of the following is not true regarding episcleritis?

- |   |  |
|---|--|
| A. It will blanch with the application of phenylephrine   | B. Recurrences can be associated with systemic diseases such as RA |
| C. Patients most commonly present with sectoral injection | D. It has a purplish hue   |

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### Corticosteroids

- Often required in vision threatening conditions (uveitis)
- Teratogenic in animal studies
- Systemic corticosteroids have been associated with non-syndromic orofacial clefts
- Ophthalmic steroids are probably safe due to the low dosage and small amount used



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### Accutane (isotretinoin) – acne

- Ocular side effects - dry eye, conjunctivitis, pseudotumor cerebri, cataracts, corneal opacities, decreased night vision

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### Lipitor (atorvastatin) – hypercholesterolemia, hypertriglyceridemia

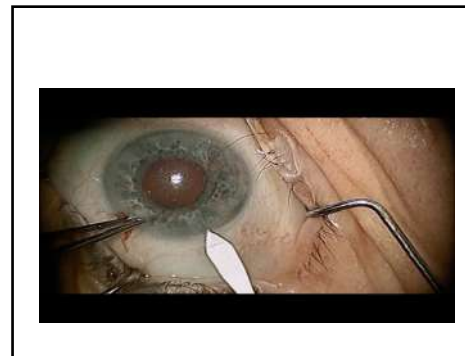
- Ocular side effects - dry eyes, blurred vision, photosensitivity, headache

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**Flomax (tamsulosin) – benign prostatic hyperplasia**

- Ocular side effects - floppy iris syndrome, blurred vision

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**Viagra (sildenafil) – erectile dysfunction**

- Ocular side effects – non-arteritic ischemic optic neuropathy, retinal hemorrhage, vision loss, increased IOP, photosensitivity





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**Plaquenil (hydroxychloroquine) – rheumatoid arthritis, SLE**

- Ocular side effects - toxic maculopathy, Steven-Johnsons Syndrome, visual changes, retinopathy, headache

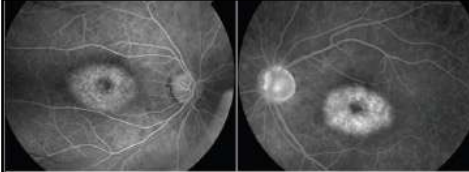
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**Chloroquine / Hydroxychloroquine**  
**Discontinuation of Drug:**  
 Early stages: May regress      Late stages: Progression years later

Courtesy: Retinal Physician

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**Bull's Eye Maculopathy**

<b>Toxic</b>	<b>Others</b>
Chloroquine toxicity	Cone dystrophy
Hydroxychloroquine toxicity	Stargardt's disease
Clofazamine toxicity	ARM, Sorsby's, etc

Courtesy: Retinal Physician

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### Fosamax (alendronate) - osteoporosis treatment, prevention

- Side effects – uveitis, scleritis

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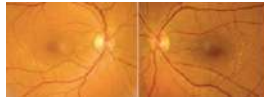
### Topamax (topiramate) – migraine prophylaxis, seizures

- Ocular side effects - acute myopia, secondary acute angle closure glaucoma, maculopathy, abnormal vision
- 

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### Tamoxifen (generic) – breast cancer

- Ocular side effects - retinopathy – crystalline retinal deposits, cataract formation, headache, vision changes
- Increased risk with greater than 100mg per day or over a year of use



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### Tamoxifen Retinopathy

#### Severe case:



Refractile deposits: Products of axonal degeneration

#### Role of OCT:

Evolving Role for Early detection  
Microcystoid changes with no ↑ CRT  
Can PRECEED VISUAL changes!  
Indication to discontinue drug

#### Discontinuation Drug:

Refractile deposits do NOT disappear  
RPE changes do NOT disappear  
CME may disappear  
(If Not consider AntiVEGF)  
Courtesy: Retinal Physician

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### DUPILUMAB

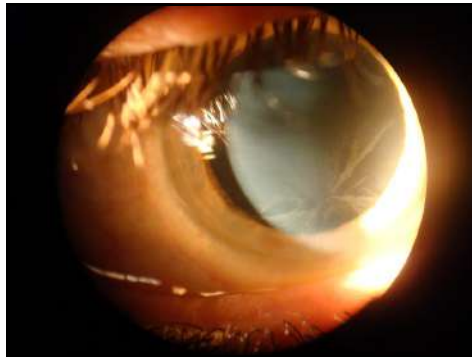
- Dupilumab (dupixent) – Human Monoclonal antibody used to treat atopic dermatitis.
  - a. Common to get conjunctivitis shortly after injection.
  - b. Conjunctivitis can range from mild to severe
  - c. Common symptom is red/painful eyes
  - d. Treatment goal is to decrease inflammation
    - - topical steroids and possible immunomodulators have been shown to be successful.

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### Amiodarone (generic) – ventricular arrhythmia, atrial fibrillation, hypertrophic cardiomyopathy

- Ocular side effects - vortex keratopathy, photophobia, photosensitivity, optic neuropathy, visual disturbance

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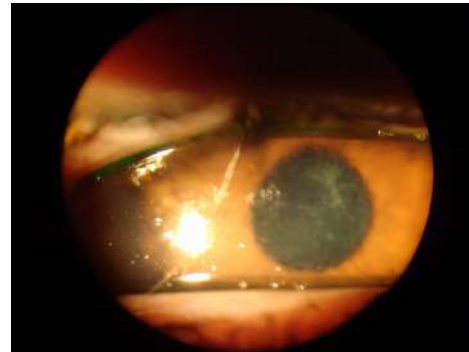
**Beta Blockers** – hypertension and endless other uses

- Ocular side effects – Lower IOP, decreases efficacy of topical beta blockers, red eyes

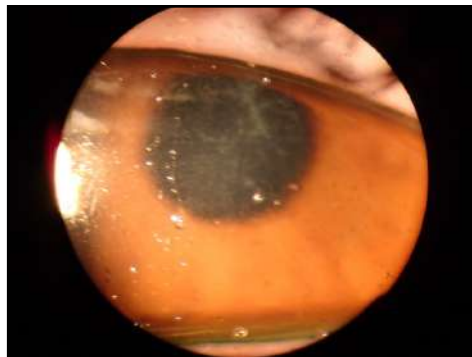
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Chemotherapy?

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Thank You

Derek.n.cunningham@gmail.com

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