Pharmacology Rounds

Brad Sutton, OD, FAAO
IU School of Optometry
Clinical Professor
#1) Topical Antibiotics
Fourth Generation Fluoroquinolones

• Gatifloxacin .5% (Zymaxid)
• Moxifloxacin .5% (Vigamox)
• Moxeza
• Besivance
• ? IQUIX
Fourth generations

- Second generation fluoroquinolones bind only to topoisomerase 4 or DNA gyrase, 4\textsuperscript{th} generations bind to both. Therefore not one but two genetic mutations are required for resistance.

- This has certainly helped, but as always, the bugs are figuring it out
ARMOR (antibiotic resistance monitoring in ocular microrg.) study

- Studied 592 ocular isolates
- 200 staph aureus, 144 coagulase negative staph, 75 strep pneumoniae, 73 haemophilus, and 100 pseudomonus
- All susceptibility studies were performed at the same lab
ARMOR study

• 39% of staph aureus was MRSA
• 80% of MRSA exhibited Fluoroquinolone resistance
• Besivance proved to show the least resistance across isolates
• Resistance was shown to be a significant problem with multiple drugs and multiple bugs
Gatifloxacin

- Zymaxid .5%
- Excellent, broad spectrum agent
- TID for bacterial conjunctivitis
- Zymar has been discontinued
Moxifloxacin

• Vigamox .5%
• Excellent broad spectrum agent
• Preservative free
• TID dosing for conjunctivitis
• Penetrates AC better than Zymar

• Moxeza .5%
• Different vehicle only
• Longer contact time, so BID conjunctivitis dosing
• Does not having BAK help or hurt?
Besivance

- Besifloxacin .6%
- Excellent, broad spectrum agent
- Suspension, so shake. Durasite vehicle
- No oral version, so less problems with resistance
**Iquix**

- 1.5% concentration of levofloxacin
- 4th generation
- Only topical antibiotic ever to come to the market initially with FDA approval for treating bacterial keratitis (ulcers)
Older Fluoroquinolones

- Ciloxan
- Ocuflox
Ciloxan

- .3% Ciprofloxacin (Alcon), generic available
- Second Generation
- Good gram-negative coverage, adequate pos.
- Weak against Strep, great against Pseudomonas
- White precipitate often seen in bed of ulcer with treatment. Occurs 15% of the time, increases dramatically with age (ph based)
- Has an available ointment
Ocuflox

- .3% Ofloxacin (Allergan) : generic
- Second generation
- Good gram-negative, better pos.
- Less effective against Pseudomonas
- Much better tissue penetration than Ciloxan........present in therapeutic levels in the AC
Aminoglycosides

• Tobramycin
• Gentamycin
• Neomycin
• All work by inhibiting bacterial protein synthesis. Are bactericidal
• Highly effective against gram-negative bacteria, especially Pseudomonas
• Effective against gram-positive bacteria but less so with ever increasing resistance
Aminoglycosides

- Side effects common to the entire class include PEK (epithelial toxicity), potential allergic reactions, and eyelid edema / erythema
- Cost effective due to generic availability (4$ plans)
Tobramycin .3%

- Available generically in drop and ointment form
- More effective and less toxic than Gentamycin
- Less allergic potential than Neomycin
- Tobradex (Tobramycin & Dexamethasone)
- Tobradex ST: lower concentration of dexamethasone (.05%)
- ZyLet (Tobramycin & Loteprednol)
Gentamycin .3 %

- Available generically in drop and ointment form
- Overall, slightly less effective and slightly more toxic than Tobramycin
- Less allergic potential than Neomycin
- With the arrival of generic Tobramycin, Gentamycin’s use has dropped off considerably
Neomycin

- Not available as a stand alone drug
- Ointment or drops in combination with other medications. Highest potential for allergy
- Neosporin drops (Neomycin, Polymyxin, Gramacidin)
- Neosporin Ointment (Neomycin, Polymyxin, Bacitracin)
- Maxitrol / Dexacidin (Neo / Poly/ Dexa)
Others

- Polytrim
- Erythromycin
- Bacitracin
- Sulfacetamide 10%
- Azasite
• Polymyxin-B and Trimethoprim
• Polymyxin great against gram negative, destroys cell membranes
• Trimethoprim inhibits folic acid synthesis and creates bacteriostasis. Effective against gram-positive and gram-negative except Pseudomonas
Polytrim

- Excellent choice in pediatric infections
- Very effective against *Haemophilus* (50% of pediatric conjunctivitis) and *Streptococcus pneumonia* which are the most common causes of childhood eye infections. *Haemophilus* infection is becoming increasingly less common
- Drop form only-generic available
- Good against MRSA
Erythromycin

- .5% ointment only (Ilotycin)
- FERA pharmaceuticals
- Bacteriostatic - inhibits protein synthesis
- Good gram-positive, marginal gram-negative
- Not good for active therapy, supportive only
- Prophylaxis for ophthalmia noenatorum
Bacitracin

• Ointment only. FERA pharmaceuticals
• Degrades cell walls......works on gram positive only
• Great against Staph so good choice for blepharitis treatment
• Polysporin ointment (Bacitracin and Polymixin). Good gram pos. and good gram negative from polymyxin
Sulacetamide 10%

• What’s old is new again....
• Many of today’s bacterial strains have never been exposed
• Resistance is currently actually low
• High allergy rate
AzaSite

- 1% Azithromycin in Durasite vehicle
- Approved for bacterial conjunctivitis: Used for MGD
- Bacteriostatic, not bactericidal
- Conjunctivitis dosing is BID for two days, QD for five days so nine drops total for treatment course
- Very expensive, especially considering the fact that only nine drops are used
- May already be facing considerable resistance due to long time systemic use
#2) Topical Steroids
Quick review of topical steroids

• Several topical steroids available for ocular use
• Long track records for many of them with proven efficacy
• Differing levels of activity with differing side effect profiles
• Various clinical niches for different drugs
• Side effects well known......PSC’s (< orals), increased IOP (> orals), etc.
Prednisolone Acetate

- Most commonly used topical steroid
- Potent “gold standard” with good mix of effectivity and side effect profile
- .12% suspension (Pred mild)
- 1% suspension (Pred Forte, Omnipred). Econopred no longer exists: replaced by generic Omnipred with smaller molecule.
Prednisolone phosphate

- No longer available as a stand alone product
- Only on market still as Vasocidin drops in combo with Sulfacetamide
Durezol

- .05% Ophthalmic emulsion
- Sirion (Alcon) pharmaceuticals
- Has Durasite vehicle so increased retention
- ½ dosing schedule

- Expensive!
- Very effective against iritis
- High propensity to elevate IOP
Loteprednol Etabonate

• Site-specific steroids often referred to as “soft steroids”
• Two strengths, .5% (Lotemax) and .2% (Alrex)
• Both made by B & L
Lotemax

- Very unique agent! .5% Loteprednol
- Almost as potent as Pred Forte but very little propensity to elevate IOP or cause PSC’s
- In the eye, it binds to the target site and achieves therapeutic effect but then is quickly broken down
- Intrinsic esterases turn the drug into cortienic acid which is an inactive metabolite
- Available in ointment form which is preservative free and as a “gel” forming drop
Lotemax

• This allows for excellent therapeutic effect with a substantially reduced propensity to cause problems
• Penetrates very well
• Potent enough to be used for almost everything except acute iritis / iridocyclitis
• FDA approved for post-op use
• “The” choice for chronic intraocular inflammation
• No reported PSC’s, 2% incidence of IOP rise in trials
Alrex

- .2% Loteprednol
- Similar to Lotemax but not potent enough to treat intraocular inflammation
- Excellent for chronic treatment of allergies and dry eye
- Cost?
Dexamethasone

- Dexamethasone sodium phosphate or alcohol suspension
- .1% suspension (Maxidex)
- Potent, but tremendous ability to increase IOP
- Frequently used in combination with antibiotics (Tobradex, Maxitrol, Dexacidin)
- Tobradex ST: only .05% dexamethasone
Fluoromethalone

- Relatively weak, little risk of elevating IOP but limited clinical uses
- .1% ointment (FML)
- .1% suspension (FML and Eflone)
- .25% suspension (FML Forte)
- .1% acetate suspension (Flarex)
Rimexolone

• 1% suspension (Vexol)
• Claims to have less propensity to increase IOP, which is true but it still does
• Limited clinical niche
• One of only two steroids with specific FDA approval for post-op use
Combinations

- Maxitrol, Dexacidin
- Pred-G
- Tobradex (has a generic) & Tobradex ST, Zylet
- Blephamide, Vasocidin
- FML-S
#3) Topical NSAIDS
Ketoralac

• Acular LS 0.4% (what does LS stand for?). QID
• Acuvail preservative free, unit dose vials. BID
• Original Acular was .5% and it had substantial issues with stinging

• Uses for topical NSAIDS include surface pain, post-operative pain / inflammation, CME, and occasionally allergic conjunctivitis
Voltaren

- Diclofenac .1%
- Generically available (earlier generic forms linked to corneal melting)
- QID dosing
Nevanac

- Nepafanac .1%
- Prodrug
- TID dosing
- Excellent for CME
- Expensive
Bromday

- Bromfenac .09%
- Has a generic
- QD dosing
- Replaces BID Xibrom
- Now Prolensa .07%. Decreased PH to increase corneal penetration (1.6 ml and 3ml)

- Remura: a different formulation and lower concentration of Bromfenac
- In clinical trials for dry eye therapy
Not an NSAID, but........

- Restasis
- Topical cyclosporin A: Inhibits T-cells
- Emulsion
- Dose as “two trays”
- Takes a few months for maximum effect
- BID dosing, can sometimes decrease to QD after chronic use
#4) Topical Anti-Allergy Medications
The OTC players......

- Ketotofin based mast cell / antihistamine combination products
- Old antihistamine / vasoconstrictor combos
  - Vasocon-A, Naphcon-A
- Alaway (most cost effective due to 10ml bottle) CVS has a generic
  - Zaditor
  - Caritin Eye
  - Refresh Allergy
  - All BID for a couple of weeks, then possibly QD chronically
Mast Cell Stabilizing / Antihistamine Combination Products

- QD dosing
  - Pataday
  - Lastacaft
- BID dosing
  - Bepreve (10 ml, may have positive effect on allergic rhinitis)
  - Elestat (generic available)
  - Optivar
  - Patanol
Other agents

- Pure antihistamine
- Emadine
- QID dosing

- Pure mast cell stabilizers
- Alamast
- Alocril (BID)
- Alomide
- Crolom
- Opticrom
- Most are QID dosing
#5) Topical Antiviral Agents
Viroptic

- HSK Epithelial lesions respond extremely well to topical antiviral therapy. Historical mainstay of treatment is Viroptic (triflurorodine).
- Extremely effective against HSV but very toxic to the cornea. Also, very expensive.......7.5 ml around $140.00 generic! (drugstore.com price)
Viroptic

- Viroptic is utilized Q 2-3h with an ideal maximum of around nine drops per day (toxicity). Once epithelium heals, decrease to QID for about 1 more week
- Medicamentosa is very common with secondary keratitis but the drug is almost universally effective in treating the infection
Zirgan

• Another topical option is Zirgan, a gel forming drop. May also be effective against adenovirus.
• Prolonged contact time, so dosing is less: 5 times per day until the epithelium is intact, then TID for several more days
• Unfortunately, it is also very expensive. $160 per tube (drugstore.com price)
Topical antivirals

• Zirgan has been used for a decade in Europe under the name Virgan
• Possibly effective against adenovirus as well
• Older agents that are no longer readily available include IDU (Idoxuridine) and Vira-A (vidaribine) ointment
Treatment alternative

• A viable alternative to topical therapy is the use of oral antiviral agents
• Can be very effective, but may take a while longer to work
• Very, very cost effective if using Acyclovir. Dosing is 800mg TID. Cost of around $30
• Also available in 200mg pills on most $4 / $10 plans. Can run into issues with supply (need 12 pills per day)
#6) Topical Glaucoma Medications
Drance and the wedge
Drance and the wedge
Prostaglandins

- Four drugs
  - Xalatan
  - Travatan-Z
  - Lumigan
  - Zioptan
Prostaglandins

- Work by increasing uveoscleral outflow

- Under normal circumstances uveoscleral outflow in humans accounts for only 10-20% of drainage
Prostaglandins

• Very effective
• Can lower IOP 30% and more
• Can get remarkable effects with very high pressures
• First choice for most practitioners
• QD dosing: does not have to be QHS

• Synergistic with other topical meds
• Most synergistic with CAI’s and Alpha 2 agonists, seem to be least so with Beta blockers
• Relatively slow onset of action
Prostaglandin side effects

- Contraindicated to some degree in........

- Uveitic and Neovascular glaucoma
- History of uveitis
- History of HSK
- During cataract post-op

- Aphakia
- History of CME
- Mixed colored irises?
- Unilateral Treatment
- Not very helpful with acute angle closure (take too long to work)
Prostaglandin side effects

- Can darken mixed colored irises
- Hyperpigmentation of eyelid skin
- Hypertrichosis
- Hyperemia
- “Orbitopathy”
- Almost entirely free of significant systemic side effects
Xalatan

- Latanaprost .005%
- Generic is available
- Longest track record
- Seems to have the most propensity to change iris color
- Since generic, no samples for new starts
Travatan-Z

- Travaprost .004%
- Preserved with Sofzia, so less toxicity

- Any blood testing indicated for the patient pictured here?
Lumigan

- Bimataprost .03% (old) and .01% (new)
- May be slightly more potent than Xalatan and Travatan-Z
- Most prominent side effect profile, but .01% has helped
- If one does not work, try another?
Zioptan

- .0015% Tafluprost
- Preservative free
- FDA approval for OAG and ocular hypertension
- Merck

- Also, Rescula is back
- Similar to Prostaglandins, but less effective
- BID dosing
Beta Blockers

- Many available
- Both .5% and .25%
- Many can be used QD: Can try .25% QAM in mild cases and work up from there
- Decrease aqueous production
- Not very effective when used with prostaglandins (why?)
- Very, very inexpensive in generic form
- Expect IOP drop of around 25%
- Dose in AM when using QD
Beta Blockers

- Timolol / Timoptic .25% and .5% ($4 / $10 plans)
- Betagan .25% and .5%
- Betimol .25% and .5%
- Istalol .5%
- Timoptic XE and Timoptic XE PF .25% and .5%
- Most available as generics
Beta Blocker contraindications / SE’s

- Well known with very long track record.....
- Asthma
- COPD / bradychardia
- Some COPD patients or patients with mild asthma can take Beta Blockers
- Depression
- Impotence
- Effects on cholesterol levels
- Topical drops less effective when on oral beta blockers
- Very safe over all
Alpha -2 agonists

• Alphagan and Alphagan-P
• Confusing! Alphagan .2%, Alphagan-P .15%, and Alphagan-P .10%
• .2% available generically, but rarely stocked in pharmacies. Alphagan-P .15% also generically available
• What does the “P” stand for? Purite (preservative in place of BAK)
• Combigan (.2% A and .5% T)
Alphagan (P)

- Dosed BID; rarely TID
- Expect IOP drop of around 20%

- Work by decreasing inflow and increasing TM outflow
Alphagan SE’s

- Dry mouth
- Hyperemia
- Follicular toxic conjunctivitis
- Fatigue!!!!!!
- Can’t use with MAOI’s........but who takes those?
Topical CAI’s

- Two: Trusopt and Azopt
- Relatively safe but not very potent as monotherapy
- Expect IOP drop around 15-20%
- More synergistic with prostaglandins however
- Dosed BID, TID occasionally

- Cosopt is combo drop with Truspot and Timolol 0.5%
- Trusopt and Cosopt have generics
- New Simbrinza: Trusopt and 0.2% Alphagan combination. Dosed BID-TID

- Work by decreasing inflow
Topical CAI SE’s

- Burning and stinging (especially Trusopt)
- Sulfa allergies (but not a problem for some with systemic allergy)
- Can be hard on corneal endothelium: watch with Fuch’s
- Metallic taste
Glaucoma treatment during pregnancy and / or nursing

• Many things to consider
• Most important during first trimester due to organogenesis, then again during nursing
• IOP drops naturally during pregnancy
Pregnancy / nursing

- Consider no treatment if glaucoma is mild
- Consider SLT
- With drops......

- Category B: Alphagan
- Category C: Prostaglandins, Topical CAI’s, Beta Blockers
Pregnancy Nursing

- Alaphagan the “safest” based upon category but can cause severe CNS depression and apnea in infants, so D/C shortly before birth
- Many practitioners feel the most safe using beta-blockers, even though category C, because systemic B-blockers are used for HTN in pregnancy
Pregnancy / Nursing

- Avoid prostaglandins (used systemically to induce labor)
- Use NLDO or punctal plugs to minimize systemic absorption in all cases

- Summary: Alphagan or Beta Blocker during pregnancy
- Prostaglandins or Beta Blockers during lactation
#7) Oral Antibiotics and Oral Antivirals

- Pills that we prescribe to our patients
Oral Antibiotics: Ocular Indications

- Beat the bugs!
- Rosacea / Ocular Rosacea
- Dacryoadenitis
- Dacryocystitis
- Preseptal Cellulitis
- Hordeola / Chalazia
- Blowout Fractures
Cost

- $4 (30 day) and $10 (90 day) lists for generics at Kroger, Walmart, Target etc.
- Indicated by an * during talk
- Meijer has some generic antibiotics for free
Cephalexin *

- 250 or 500 mg (QID or BID)
- Excellent broad spectrum cephalosporin
- Bactericidal
- Cross sensitivity with penicillin regarding allergies but not with everyone
- Keflex brand = $104 for 30, 500 mg. tabs!
- Up to 60% resistance in facial cellulitis
Dicloxacillin

- Penicillinase resistant penicillin
- Great for soft tissue infections
- Bactericidal
- Nausea, allergies, diarrhea
- 250 mg QID or 500 mg BID
Augmentin

- Amoxicillin plus clavulanate: 250,500mg TID or 875mg BID
- Works on bugs that are resistant to penicillin due to penicillinase
- Bactericidal, good coverage
- Allergies
- 500mg now available generically
Tetracycline*

- 250 or 500 mg QID
- Bacteriostatic but much resistance
- Poor for soft tissue disease
- Can not be used in pregnant women or children due to effect on bone and enamel formation (discoloration of teeth)
- Makes BC Pill less effective
- Photosensitivity, stomach upset, calcium inactivation (take on empty stomach)
- Great lipid / acid modulating effects
Doxycycline

- 50 or 100 mg BID
- Periostat: 20mg
- In tetracycline family
- Can take with food
- Less problems with photosensitivity
- Still get stomach upset
- As effective as tetracycline but fewer side effects, better dosing. Breast cancer risk vs. protection?
- Oracea (30 /10 ) $$$$$$$$$$$$$$$
- Useful in RCE management
Azithromycin

- Zithromax Z-pack: 6, 250 mg capsules
- Take 500 mg (2) the first day and one 250 mg tablet each of the next 4 days
- May enhance the effect of oral anticoagulants
- Expensive but great for compliance
- Macrolide
- FDA warning for fatal cardiac arrhythmia. Worse with prolonged QT, bradycardia, hypomagnesia
Bactrim

- Trimethoprim and Sulfamethoxazole: one tablet contains 80 mg T and 400 mg S (also available in double strength). One double-strength tablet Q12h
- Can not use if patient has sulfa allergy
- Rarely used in eye care outside of Toxoplasmosis treatment, but effective against MRSA, so becoming more common
Ciprofloxacin*

- Fluoroquinolone
- 5mg/100ml suspension
- 750 mg, 500, 250 used BID
- Effective but overused so resistance an issue
- Can not use in patients under 18 due to joint problems
Oral Antivirals

- Used to manage Herpes Simplex and Herpes Zoster
Oral Antivirals-Dosing Simplex

- Acyclovir (200,400,800) :
  200mg QID/ 400BID; up to 800mg TID
- Also available in a pediatric suspension
- Only 200mg on $4 / $10 plans

- Famvir (125,250,500)
  - 500mg TID
  - 500mg

- Valtrex 500mg
  - 500 mg TID
Oral Antivirals-Dosing Zoster

- Acyclovir: 800mg 5X day for 10 days
- Famvir: 500mg TID x 1 week
- Valtrex: 1000 mg TID x 1 week
Side Effects of Antivirals

• Very safe
• Caution with renal impairment
• Headache
• GI upset / abdominal pain
Ocular Side Effects of Oral Medications

- Pills that other doctors prescribe that affect the eye
Pegulated Interferons

- Treatment used mainly for hepatitis.
- Very long treatment course
- Can cause retinal CWS and other vascular retinopathy / macular edema
- Can be sight threatening but rarely are
- Most common is CWS near the optic nerve
Interferons

• Inform prescribing physician
• Endogenous interferon levels rise with cancer
so..................

• Watch for isolated CWS with no explanation......think undiagnosed cancer! Also remember HIV and GCA
CWS secondary to interferons
Flomax

• Prostate therapy (Alpha 1 blocker)
• Also affects iris dilator muscle
• IFIS (Intraoperative Floppy Iris Syndrome)
• Leads to progressive miosis with floppy iris during intraocular surgery. Makes cataract surgery quite challenging!
Flomax

- Stopping the medicine before surgery does not appear to be effective.
- Occurs to a much lesser degree with Hytrin, Cardura, and Uroxatrol.
Rapaflo

• New medication (silodosin) for BPH that is also highly selective for Alpha 1A receptors

• Same risk for IFIS as Flomax
Phenothiazines

Phenothiazines – Chlorpromazine (Thorazine), Thioridazine (Mellaril)

Older antipsychotic agents

• Decreased accommodation
• Dry eye
• ASC cataracts
• Corneal endothelial pigment deposits
• Macular pigment changes (mostly chlorpromazine)
Phenothiazines

- Macular pigment changes are sight threatening, cornea and lens changes have little impact on vision
- Other more common meds like Prozac and Zoloft affect accom.
Amiodarone

• Antiarrhythmic agent (K+ channel blocker)
• Cardarone or Pacerone
• Half life of up to 100 days!

• Vortex keratopathy
• Almost universal after six months or more of therapy
• Does not typically have a major impact on vision but can
Amiodarone

- Resolves months after therapy is discontinued
- Can also rarely affect color vision
- Fabry’s Disease (X-linked; lipid storage disorder caused by enzyme deficiency)
Amiodarone

• Also causes bilateral optic nerve head edema in 2% of patients
• Mimics NAION but occurs in both eyes
• VA changes slowly recover and often return to baseline norms after discontinuing the drug but VF changes may not
• Is this real...........or just NAION?
Amiodarone

- Nerve swelling
Digoxin

• Cardiac agent used for atrial fibulation / flutter and CHF
• If doses exceed standard therapeutic levels, 95% of patients develop ocular complications
Digoxin

- The most common ocular side effect is color disturbance......often taking the form of a gold or yellow tinge to images
- Haloes and other color changes are possible
Digoxin

- Rare ocular side effects include........
- Optic neuritis
- Loss of central vision
- Decreased acuity
Plaquenil

- Hydroxychloroquine
- One of the most common reasons for routine ocular screening for adverse reaction
- Used for treatment of RA and Lupus
- About 150,000 people in US

- Chloroquine (Aralen)
- Used as an antimalarial drug; very rarely for RA / Lupus
- Much greater chance of ocular damage
- Rare to be on long term therapy
Plaquenil

- Dose is 200mg or 400mg daily. 400mg becoming very common
- Usually prescribed in 200 mg tablets
- Very occasionally see 100 or 300 mg per day use (cut pills in half)

- Risks for ocular damage include……..
- daily dose over 6.5 mg/kg/day using lower of ideal body weight for height or actual body weight
- Renal / hepatic dysfunction or maculopathy
- Lifetime dose over 1000g
Plaquenil

• If patients are on 200mg / day ocular problems are very rare
• At 400mg / day for extended periods of time the risk is much greater
• Ocular damage and symptoms can progress after meds have been discontinued
• Damage can be irreversible
Ocular side effects of Plaquenil

- Bulls eye pigmentary maculopathy
- Visual field loss
- Decreased vision and contrast sensitivity
- Color vision changes
- Vortex keratopathy rarely with chloroquine
Plaquenil management

• Testing should include........

• Visual acuity
• Central visual field analysis with 10-2
• Dilated evaluation of macula
• Baseline fundus photo before treatment may be useful
Plaquenil management

• Multifocal ERG (very sensitive!), SD-OCT (Flying Saucer sign), FAF when VF defects occur. Take any VF defect very seriously, and repeat the test
• Report to rheumatologist
• Discontinue or decrease dose when possible at earliest sign of trouble (remember can progress after d/c)
VF defects with Plaquenil

- HVF 10-2 white on white
- Use pattern deviation plot
- Look for paracentral ring scotoma or partial ring scotoma in area 2-6 degrees from center
- Take any defect, even modest defects of 4-8 DB, seriously
- If HVF 24-2 or 30-2, defect is central (scaling)
Sup ➔ inferior

Courtesy Dr. Diana Shechtman
Chen et al. Clinical Ophthalmology 2010:4 p. 1151
Plaquenil follow-up

- Baseline exam, then again after five years, then yearly after that.
- See more often if especially high risk. Many patients will be getting yearly eye exams any way.
- Always assess for dose toxicity
- Communication is the key!
Bull’s Eye Maculopathy
Bull’s Eye
Bull’s Eye IVFA
Chloroquine maculopathy
Chloroquine maculopathy
Chloroquine maculopathy
Chloroquine OCT
Dilantin (Phenytoin)

• Anticonvulsant
• Used to treat seizures / epilepsy
• Ocular side effects include blue-yellow color disturbance, nystagmus, diplopia, and rarely ophthalmoplegia
• Nystagmus and color disturbances are relatively common and are dose related
Dilantin

- Standard eye exam with addition of blue / yellow color testing
- Report problems to the patient’s neurologist
Topamax (Topirimate)

• Anticonvulsant used for migraines, epilepsy, depression, bipolar disease and weight loss
• Carries FDA warning for ocular side effects
• Nearly 100 cases of acute, bilateral angle closure
Topamax

- Severe edema of the ciliary body leads to angle closure, excessive myopic shift and even uveal effusion
- Occurs most often within 2 weeks
Topamax

• Can also happen with other sulfonamides but very rare.
• Hydrochlorothiazide
• Diamox
• Sulfasalazine
• One case reported with Wellbutrin, Tamiflu

• LPI typically not effective
• Steroids and cycloplegics; discontinue medication
• Can also cause VF defects without angle closure / increased IOP
Fosamax

• Biphosphonate
• Used to treat osteoporosis, rarely Paget’s disease and bone metastases
Fosamax

• Ocular side effects include......

• Rarely......

• Scleritis!
• Iritis
• Conjunctivitis
• Ptosis
• Yellow color disturbance
• Diplopia
Tamoxifen (Nalvodex)

- Antiestrogen therapy for the management of breast cancer
- Similar in chemical structure to chloroquine
- 6% get ocular side effects
- Causes a crystalline retinopathy
Tamoxifen

- Can cause......
- Vortex keratopathy
- Macular edema with decreased vision
- Leads to decreased optic cup volume secondary to astrocyte swelling
- Report to oncologist / physician
- Monitor yearly
Tamoxifen retinopathy
Talc retinopathy
Canthaxanthine

Tanning agent
Ethambutol

- TB treatment
- Can cause optic neuropathy with severe and lasting vision loss
- 1% chance
- In use since 1960
- Isononiazid now favored for treatment, but also linked to optic neuropathy
- Central or ceco-central VF loss but......
- Also has the ability to damage the chiasm and lead to bi-temporal VF loss
Isoretinoine (Accutane)

- Used to treat Acne
- Ocular side effects include......

- Dry eyes / meibomian gland dysfunction
- Conjunctivitis
- Decreased night vision
Accutane

• Rare ocular side effects include corneal deposits, color vision disturbances, acute myopic shifts, and increased ICP leading to papilledema
Viagra / Levitra / Cialis

- Phosphodiesterase 5 inhibitors
- Prescribed for ED
Viagra etc.

- Works on PDE 5, but PDE 6 is found in the retina and the drugs have some effect on it (10 X more effect on PDE 5)
- Changes in color perception are common, many colors possible
- Increased light sensitivity, photopsia
- Dose dependent: those taking 200mg of Viagra have 50% chance of ocular side effects; 50 mg <5 % (normal dose)
Viagra etc.

- Many reports of NAION within 24-36 hours of taking these drugs (around 50 cases)
- All individuals involved had a “disc at risk” and vascular risk factors for NAION
- Common to have these vascular problems in those suffering from ED
- 10 X risk with history of myocardial infarction; 7X risk with hypertension
Viagra etc.

- What is the mechanism? Stimulates nitrous oxide leading to hypotension
- Should potential recipients of the drug be screened by eye doctors first? Not practical
The end!