

PAIN MANAGEMENT AND ORAL PHARMACEUTICALS IN EYE CARE

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FINANCIAL DISCLOSURES

- No financial disclosures
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CATEGORIES


- I) ANTIBIOTICS
- II) ANTIVIRALS
- III) PAIN RELIEF
- IV) STEROIDS



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ORAL ANTIBIOTICS: OCULAR INDICATIONS

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



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Antibiotic basics

- **Bacteriostatic vs. bactericidal:** inhibits bacterial replication at standard doses vs. actively kills bacteria at standard doses
- **Spectrum:** broad (gram + and gram -), or narrow (one or the other)
- **Toxicity:** how hard the drug is on our cells
- **How they kill:** inhibit DNA or cell wall synthesis, alter protein synthesis, alter cell membranes, etc

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Gram “+” vs. gram “-”

- “+”: Staph, Strep, Clostridia, Corynebacterium
- “-”: Haemophilus, Pseudomonas, Neisseria, Moraxella, Serratia, Proteus, Enteric bacteria

- Gram positive bacteria have a thick cell wall, gram negative bacteria have a very thin cell wall.
- More antibiotic resistance in gram positive bacteria currently

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Which drug to choose?

- Consider.....
- Immunocompetent?
- Pregnant?
- Liver and kidneys normal?
- Young or old?
- Price!!!!!!!!!!!!!!



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ABCD's to consider

- Allergies
- Body weight
- Current medications
- Diseases



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Five "A" rule

- **Avoidance** (things to avoid)
- **Activity** (activities to avoid)
- **All** of it (complete the course)
- **Advise** (tell the patient why they need the drug)
- **Adverse** effects (warn of potential adverse effects)



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COST

- Low-cost generic plans at many pharmacies
- Indicated by an *



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CEPHALEXIN *

- 250 or 500 mg (QID or BID)
- Excellent broad-spectrum cephalosporin
- Bactericidal
- Cross sensitivity with penicillin regarding allergies but not with everyone. Only about 10%
- Keflex brand is very expensive!
- Up to 40% failure rate with facial cellulitis due to resistance

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DICLOXACILLIN

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

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AUGMENTIN

- Amoxicillin plus clavulanate: 250 ,500 mg TID or 875mg BID
- Works on bugs that are resistant to penicillin due to penicillinase
- Bactericidal, good coverage, allergies
- 500mg available generically, but more expensive than dicloxacillin

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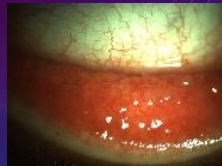
TETRACYCLINE*

- 250 or 500 mg QID
- Bacteriostatic with 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. Yeast infections.
- Photosensitivity, stomach upset, calcium inactivation (take on empty stomach)
- Great lipid / acid modulating effects

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DOXYCYCLINE

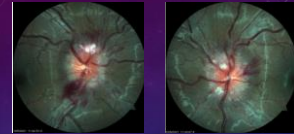
- 50 or 100 mg, often BID at first
- Periostat: 20mg (mostly dental use)
- In tetracycline family
- Can take with food
- Less problems with photosensitivity
- Still get stomach upset (don't lie flat for 30 minutes)
- As effective as tetracycline but fewer side effects, better dosing.
- Oracea (30 /10) \$\$\$\$\$\$\$\$\$\$\$\$ (very expensive)
- Can also use minocycline



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MINOCYCLINE

- 50 or 100 mg BID
- Similar side effect profile to others, but also blue / black discoloration of skin, nails, and sclera with long term use.
- Often used for acne
- Relatively high rate of increased ICP (intracranial pressure)



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AZITHROMYCIN

- Zithromax Z-pack: 6, 250 mg capsules. Is a macrolide. Moderate price but good for compliance
- Take 500 mg (2) the first day and one 250 mg tablet each of the next 4 days
- Can also take a single, 1000 mg dose. Powder pack
- May enhance the effect of oral anticoagulants
- 2 X risk of sudden cardiac death in heart patients

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AZITHROMYCIN

- Now has FDA warning for fatal arrhythmia
- Greater risk if prolonged QT interval, bradycardia, hypomagnesia
- Many experts calling for ban due to resistance concerns. Long half life and broad spectrum contribute majorly to overall resistance.
- Can be as effective in treating rosacea / MGD / chalazia as the tetracycline / doxycycline family of drugs

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ERYTHROMYCIN*

- Ery-tab sustained release tablets 250, 333, or 500 mg. Dose is 1000 mg (1 gram) per day so dose according to tablet
- Can use safely when tetracycline family can not be used (children, etc.)
- Bacteriostatic and terrible stomach upset
- Does not have the lipid / acid modulating properties of the tetracyclines
- Very rarely a first choice

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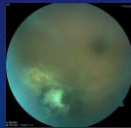
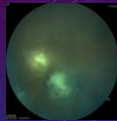
ERYTHROMYCIN

- Increased risk of sudden cardiac death
- Two-fold increase of very low risk when taken alone
- Five-fold increase when taken with the following drugs.....
Diltiazim, Fluconazole, Itraconazole, Ketaconazole, Verapamil
- These drugs slow the breakdown of E-mycin resulting in increased concentration which in turn increases cellular sodium levels in resting heart muscle cells triggering an arrhythmia

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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
- Good against MRSA and toxoplasmosis (DS)



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CIPROFLOXACIN*

- Fluoroquinolone: 750 / 500 / 250 BID
- 5mg/100ml suspension
- Effective but overused so resistance an issue.
- Should not use in patients under 18 due to joint / tendon problems
- Possible increased risk of RD has been refuted for the most part
- FDA now says oral Fluoroquinolones should never be first line choice due to potential SE's

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ORAL FLUOROQUINOLONES

- Significant side effects.....
- Peripheral neuropathy
- Tendon rupture
- Heart arrhythmia
- Dysglycemia in diabetics
- Possibly GI perforation

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ORAL ANTIVIRALS

- Used to manage Herpes Simplex and Herpes Zoster



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Oral agents-Simplex dosing

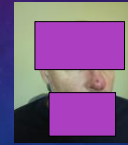
- **Acyclovir** (200,400,800) : 800mg TID or 400 mg 5 x day
- Also available in a pediatric suspension
- **Famvir** (125,250,500) : 500mg TID
- **Valtrex** (500,1000) : 500 mg TID. (It is a pro-drug of Acyclovir, so more bioavailability)



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ORAL ANTIVIRALS-DOSING ZOSTER

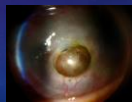
- **Acyclovir**: 800mg 5X day for 10 days
- **Famvir**: 500mg TID x 1week (may be antiviral of choice with zoster: can kill latent virus particles)
- **Valtrex**: 1000 mg TID X 1 week



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SIDE EFFECTS OF ANTIVIRALS

- Very safe
- Significant caution with renal impairment: only true contraindication other than allergy
- Headache
- GI upset / abdominal pain
- Hallucinations in elderly patients



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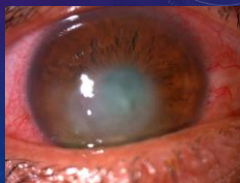
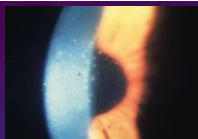
H.E.D.S. (HERPETIC EYE DISEASE STUDY) - FINDINGS

- Prophylactic 400 mg of oral Acyclovir (Famvir / Valtrex not studied) twice per day for one year resulted in a 45% decrease in the rate of recurrence for all forms of ocular complications
- Over the six months after discontinuation, there was no rebound increase but no continued benefit, so have to keep taking it
- Interestingly, the benefit mostly applied to those with previous stromal disease, not previous dendrites alone in this study

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ADDITIONAL STUDY

- Olmstead County, Minnesota (394 patients)
- Those NOT taking prophylactic antivirals were.....
- 9.4 X more likely to have epithelial recurrence
- 8.4 X more likely to have stromal rec.
- 34.5 X more likely to have lid / conj. rec.



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PROPHYLAXIS

- So.....
- At least discuss prophylaxis for all patients with stromal disease and patients with multiple attacks of epithelial disease
- Acyclovir 400mg PO BID
- Very safe, caution in severe kidney disease, monitor creatine and BUN
- Resistance issues?

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ORAL PAIN MEDICATIONS

- Manage underlying condition appropriately first from an ocular standpoint
- Topical/ocular pain control.....
- Cycloplegia
- NSAIDs
- Steroids
- Bandage CL
- Topical anesthetic in office only

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PAIN MEDICATIONS

- If topical management is not enough, then consider oral pain relief
- Laws vary for OD's regarding use of controlled substances
- Two broad categories...
 - OTC pain relief, mostly NSAID's
 - Narcotic pain relief

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COMPARISON OF ANALGESICS

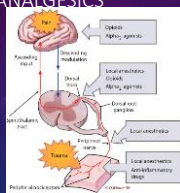


Image from cvm.msu.edu/_Pain%20Management%20PDA.htm

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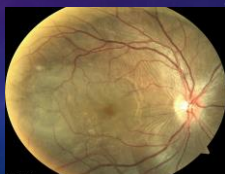
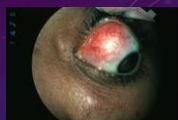
NSAIDS

- OTC NSAID's are often enough to mitigate ocular pain
- Aspirin 81mg, 325-500mg
- Advil 200mg
- Tylenol 325-500mg
- Aleve 220mg
- Aspirin, Ibuprofen, APAP, naproxen
- Common Trade names aspirin, Advil, Tylenol, Aleve

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RX NSAIDS

- Indomethacin (Indocin) 25, 50 mg
- Naproxen (Anaprox) 275, 550 mg
- Ibuprofen (Motrin) 200-800 mg
- Indomethacin very good for scleritis. TID dosing



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COMMON NSAID CONCERNS

- GI upset (take with food or drink, don't lie down for 30 minutes)
- Bleeding
- Ulcers
- Caution also with renal disease, heart disease, liver disease (mostly APAP)
- Rx strength particularly problematic with heart disease

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TRAMADOL (ULTRAM): USED TO BE NON-NARCOTIC, BUT NOW A CONTROLLED SUBSTANCE

- Immediate release (50-100 mg) and extended release (100-300 mg) versions
- Maximum dose 300mg /day
- Dose q 6-8 h
- Schedule IV, so limited (but possible) abuse potential



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NARCOTIC PAIN RELIEF

- As an OD, may or may not have authority to use (only Tramadol in Indiana for example)
- Standard warnings.....no alcohol, don't operate machinery



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NARCOTIC SIDE EFFECTS

- Constipation very common, and can be severe
- Nausea and vomiting often ceases after first few doses
- Sedation
- Lack of mental clarity
- Respiratory depression (most severe)

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NARCOTIC PAIN RELIEF

- DEA Scheduled substances
- I-V
- Schedule one has high abuse potential, schedule 5 very limited abuse potential
- Two types of dependence....
- Psychological and physical
- Physical usually requires 2 weeks of use or more

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OXYCODONE

- Schedule II :high abuse potential with severe dependence risk
- **Percocet**: 5mg with 325 mg of APAP
- **Percodan**:4.5mg with 325 of APAP
- **Tylox**: 5mg with 500mg of APAP

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HYDROCODONE

- Schedule II
- **Lortab**: 2.5,5,7.5 mg with 500mg APAP
- **Vicodin**: 5mg with 500mg APAP
- **Vicodin ES**: 7.5MG with 500mg APAP
- **Norco**: 5,7.5,10 with 325 APAP
- **Zohydro ER**: 10,15,20,30,40,50

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CODEINE

- Schedule III
- Tylenol with Codeine, all have 300mg of APAP
- Tylenol #2 : 15mg
- Tylenol #3 : 30mg
- Tylenol # 4 : 60 mg

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ORAL STEROIDS

- When oral steroids are used appropriately for a relatively short time they are very, very safe
- After all, they are basically a natural substance already found in the body
- Be aware of body weight when dosing

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WHO DOESN'T GET ORALS, OR GETS THEM VERY, VERY CAREFULLY

- Diabetics
- Patients with stomach problems / ulcers
- Patients with active infection
- Pregnant women

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WHAT CAN THEY DO THAT'S BAD?

- Almost nothing in the short term! Most issues require long term use
- Increase Na⁺, decreased K⁺ leading to fluid retention
- Hypertension
- Elevate blood glucose levels
- Stomach pain and ulcers (stomach upset with short term use)
- Insomnia, euphoria, psychosis (possible with short term use)
- Thin skin / bruising
- Osteoporosis
- Increased ICP
- PSC's (far more commonly than topicals)
- Increased IOP (far less commonly than topicals)

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WHAT CAN THEY INTERACT WITH?

- Screw up glucose control
- ASA, Coumadin
- Digoxin
- Some antibiotics, anti-seizure meds, anti-TB meds (TB itself is a strong relative contraindication)



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WHAT DO THEY DO THAT'S GOOD?

- Duh!.....they decrease inflammation and therefore inflammatory sequelae

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WHAT CAN WE USE ORAL STEROIDS FOR IN EYE CARE?

- Contact dermatitis / allergic response of the eye lids
- Reaction to insect bite or sting on the eye lids
- Recalcitrant CME
- Recalcitrant uveitis, especially bilateral or vitritis
- Choroiditis / retinitis
- Scleritis



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USES OF ORALS IN EYE CARE

- Myasthenia Gravis
- Inflammatory orbital pseudotumor
- Thyroid eye disease / Grave's ophthalmopathy
- Optic neuritis (but not by themselves!)
- GCA

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OCULAR SIDE EFFECTS OF ORAL STEROIDS

- These are well known.....PSC's and increased IOP
- IOP increases are rare, but can occur with very long-term use
- PSC's are not rare!
- 10 mg per day or less for one year or less has almost no chance of PSC formation
- 16 mg per day or more over several years has a 75% chance of PSC formation
- Overall, general population has a .5% chance of PSC development while those on long term oral steroids have a 30% prevalence (across doses)

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ORAL STEROIDS



- Oral steroids are generally prescribed in one of two ways.....
- 1) Medrol dose pack (methylprednisolone)
- 2) Prednisone 10mg tablets

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COMPARISONS

- When it comes to suppressing the HPA (hypothalamic-pituitary-adrenal) axis.....
- 25mg **Cortisone** = 20mg **Hydrocortisone** = 5mg **Prednisone** = 4mg **Triamcinolone** = 4mg **Methylprednisone** = .75mg **Dexamethasone**
- Potency essentially follows this order but in reverse
- Body produces an amount of cortisone that equals 5mg of prednisone per day

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MEDROL DOSE PACK

- Available in different strengths
- Most commonly used is a package of 21, 4 mg tablets(2 mg is available)
- Six are taken the first day, then one less each day thereafter (6-5-4-3-2-1 = 21 tablets)
- Self tapering and little to no suppression of the HPA axis
- In eye care, really only strong enough and long lasting enough for treatment of lid reactions

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PREDNISONE*

- Most common dosing is to give the desired amount in 10 mg tablets (need 40 mg, take 4 pills)
- Is available in 1, 2.5, 5, 10, 20, and 50 mg tablets
- Best choice for most of our desired uses in eye care
- Potent and flexible

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DOSING

- Up to 60 mg, take entire dose in the morning
- Over this amount take ½ in morning, ½ in evening
- As previously mentioned, Medrol dose pack self tapers
- With prednisone, after relatively short course at full desired strength, taper by ten milligrams every other day

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DOSING

- An alternative approach is to give twice the desired dose every other day then don't taper. Only for short term use, not long term
- Theory is that anti-inflammatory properties remain high but suppression of HPA axis is much, much less
- For long term use taper must be very slow
- As OD's we rarely would be involved in the long-term prescription of oral steroids

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Ocular side effects of oral medications

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Plaquenil

Hydroxychloroquine (Plaquenil)

One of the most common reasons for routine ocular screening for adverse reaction

Used mostly for treatment of RA and Lupus, other emerging uses
About 150,000 people in the 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

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Plaquenil

Dose is 200mg or 400mg daily.
400mg common

Prescribed in 200 mg tablets

Occasionally see 300 mg per day used (cut pills in half)

Increased risks of ocular damage include....

daily dose over 5.0 mg/kg/day using strictly actual weight (old standard for many years was 6.5 mg/kg/day using ideal body weight: may still be best for short, obese patients)

Renal dysfunction (50% decrease in GFR = 2X toxicity risk)

Other maculopathy

Tamoxifen use concurrently (5 X risk)

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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, but still small
 Ocular damage and symptoms can progress after meds have been D/C
 Damage can be irreversible

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Plaquenil

Affects the photoreceptors and then the RPE
 Stores in Melanotic tissue, the liver, and the kidney
 Excreted mostly by the kidney
 Damage begins in a ring around the center of the fovea: often begins inferior-temporally first thus affecting the VF superior nasal to fixation first

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Chance for retinal toxicity

At doses below the 5.0 mg / kg / day threshold.....
 < 1% risk at 5 years
 < 2% risk at 10 years
 20% risk at 20 years

Marmor and Melles 2014: study of 2361 patients with use over 5 years: 177 with toxicity (7.5%); all doses included

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Chance for retinal toxicity

But what about higher doses by body weight? After 15 years of use.....
 Over 6 mg/kg/day : 21.6% chance
 5-6 mg/kg/day: 11.4% chance
 < or = 5 mg/kg/day: 2.7% chance
 For specifically moderate to severe toxicity: 5.9% over 6, 2.4% between 5-6, and 1.1% @ 5 and under

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Ocular side effects of Plaquenil

Bullseye pigmentary maculopathy: late!
 Visual field loss
 Decreased vision and contrast sensitivity
 Color vision changes
 Vortex keratopathy (rare.....more common with chloroquine)



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Plaquenil management

Testing should include.....
 Baseline exam with fundus evaluation within one year of beginning medications
 Most current management guidelines are from June 2016
 Looking for pre-existing pathology
 Supplementary diagnostic tests not needed at baseline visit

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Plaqueuil management

Then after five years of use.....

Yearly exams with 10-2 VF (white on white) and SD-OCT

Also, can consider FAF and multifocal ERG as extra testing

See more frequently and before five years if extensive risk factors present or dose above threshold

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VF defects with Plaqueuil

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

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Plaqueuil management

Multifocal ERG (very sensitive, but extremely variable: should not be used alone),

SD-OCT (Flying Saucer sign), FAF.

Report to rheumatologist

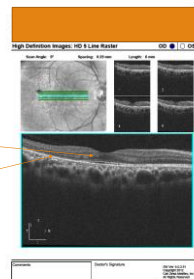
Assess for dose toxicity at every visit

We have the ability to detect toxicity before vision loss occurs and before fundus changes are visible

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Flying saucer sign

Drop out of ellipsoid line / PIL



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Plaqueuil management

Study in Ophthalmology (January 2014 on-line) showed.....

Out of 150 individuals showing clear toxicity after cumulative dose of over 1000g (almost 7 years at 400 mg daily).....

90% showed defects on both 10-2 VF and OCT

10% showed VF defect, but no OCT defect. Zero with OCT but no VF

2018 Study: *Br J Ophthalmol* 2019; 0: 1-5

Showed that the opposite can occur: 17 eyes found that had early OCT defects (attenuated PIL line or loss of parafoveal interdigitation zone) but no VF loss

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Late progression

Marmor and Hu JAMA online June 2014

11 patients with toxicity

Followed for three years after D/C Plaqueuil

Categorized as mild / moderate / severe toxicity

Mild / moderate showed no progression after D/C

Severe progressed for up to three years

A second, 2018 study of 13 patients (some the same as above, some different) showed that some severe patients with RPE damage progressed for over 20 years!

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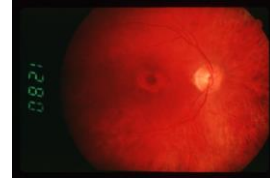
Late progression

Basically no progression of VA or VF loss
Significant progression in severe cases of SD-OCT and FAF damage

May be related to eventual death of already critically damaged RPE cells and foveal cones
Plaque found in blood in low amounts one year after D/C

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Bullseye Maculopathy



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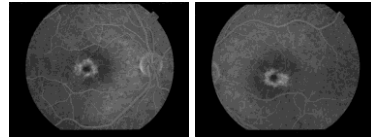
Bullseye Maculopathy

5 cases of Bull's Eye Maculopathy reported with Sertraline (Zoloft)
An SSI used for depression
Very rare, but very significant

One case involved a 14 year old whose vision dropped to 20/200 in each eye after one year of use. Did not recover or improve after three years off of the drug

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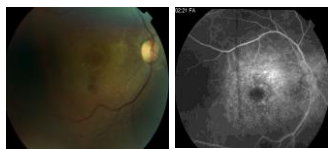
Bullseye IVFA



Very good at detecting Plaquenil macular toxicity, but invasive

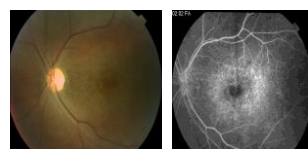
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Chloroquine maculopathy



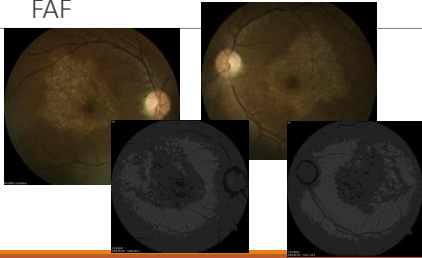
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Chloroquine maculopathy



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Chloroquine maculopathy & FAF



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Chloroquine OCT



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Critical caveat

In Asian patients, damage tends to be paramacular and can extend out to the arcades

More diffuse maculopathy instead of a bullseye pattern

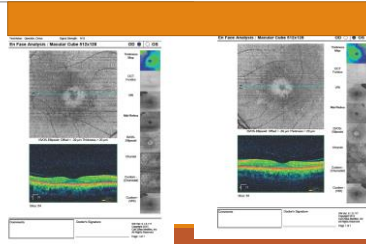
Must perform 24-2 or 30-2 VF instead of a 10-2 because damage tends to be further out

SD-OCT scans need to be performed outside of the fovea too

FAF a good choice

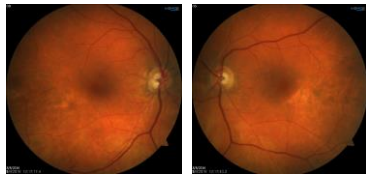
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Chloroquine OCT En-face



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Plaquenil toxicity



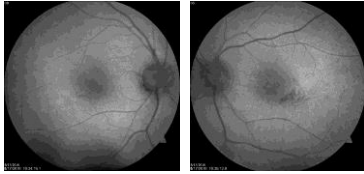
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Plaquenil toxicity OCT



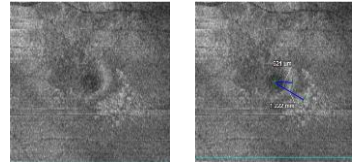
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Plaquenil Toxicity FAF



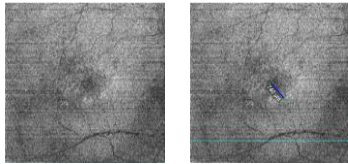
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Plaquenil toxicity En Face OS



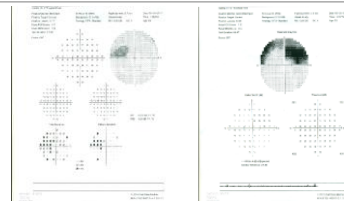
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Plaquenil toxicity En Face OD



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Plaquenil VF OU



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Elmiron (pentosan polysulfate sodium) : PPS

Newly discovered in 2019

Known as PPS

Treatment for bladder pain due to interstitial cystitis (85% female)

After years of use, causes a maculopathy that mimics AMD or pattern dystrophy

Most risk after 1000 grams or more cumulative dose, particularly after 1500 grams. About 10 years of use

Mild vision loss

Night vision difficulties

Mild changes seen on exam and fundus photos

Substantial RPE damage seen on FAF, best way to detect

Tends to progress significantly after discontinuation, even up to 10 years

Can mimic non-exudative AMD

89

Other drugs causing pigmentary maculopathy

Clofazimine (Lamprene): also causes crystalline deposits in the cornea and conjunctiva. Used to treat leprosy and some skin conditions

Indomethacin: NSAID. Can also cause vortex keratopathy

Deferoxamine (Desferal): also causes cataracts and optic neuropathy. A chelating agent used to treat hemochromatosis

90

Viagra / Levitra / Cialis

Phosphodiesterase 5 inhibitors
Prescribed for ED



91

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)

92

Viagra / Cialis / Levitra and NAION

? Under reported

These medications also occasionally used for pulmonary HTN

Visual loss most often noted upon awakening the morning after use

Is the association real or coincidence?

Likely the "straw that broke the camel's back" in those with risk factors. But.....

93

ED drugs and NAION

Very interestingly, has been reported in a 7-month-old infant, 28-year-old, and 33-year-old, presumably all taking them for pulmonary HTN

At those young ages, not as likely to have other NAION risk factors

2 reported cases of PION, one in a female with use for pulmonary HTN

94

Viagra / Cialis

What is the proposed mechanism? Nitrous oxide release actually dilates vessels.....but drops blood pressure.

Do ION patients have faulty autoregulation?

Ask all males with NAION about ED drug use. D/C if using to protect fellow eye.



95

Voriconazole (Vfend)

Affects PDE 6 in the retina so has many of the same ocular side effects as Viagra etc. Antifungal drug

Color vision changes / photophobia / blurred vision 30 minutes after dose

No link to NAION

96

Methotrexate

Chemotherapy / immune suppression for auto-immune disease

Not common to cause ocular side effects but can.....

CWS

Blurred vision, conjunctivitis

4 case reports of toxic optic neuropathy

Can decrease risk of toxic neuropathy with folic acid supplementation

97

Topamax (Topiramate)

Anticonvulsant used for migraines, epilepsy, depression, bipolar disease and weight loss

Carries FDA warning for ocular side effects

Multiple cases of **bilateral, acute angle closure**

Rare instances of uveitis with hypopyon

Five-fold risk of oral clefts in baby if taken in high doses while pregnant

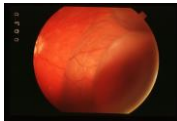
98

Topamax

Severe edema of the ciliary body leads to uveal effusion causing angle closure, excessive myopic shift

Occurs most often within 2 weeks

Can also cause VF defects without IOP increase



99

Topamax

Can happen with other sulfonamides but very rare.

Hydrochlorothiazide

Diamox

Sulfasalazine

One reported case with Wellbutrin, Tamiflu, Zonisamide, Duloxetine (Cymbalta)

3 cases of uveal effusion reported with immune checkpoint inhibitors for metastatic cancer treatment: Keytruda, Opdivo, Tecentrig, others

LPI typically not effective

Steroids and cycloplegics; discontinue medication

100

Topamax

Also causes a 10-micron increase in RNFL thickness on average with OCT

Can lead to myopic shifts as well, about -.50 on average. Up to -8.75 has been reported!



101

Fosamax

Biphosphonate

Used to treat osteoporosis, rarely Paget's disease and bone metastases



102

Fosamax

Ocular side effects include..... **Scleritis**

Rarely.....

- iritis
- Conjunctivitis
- Ptosis
- Yellow color disturbance
- Diplopia

103

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!

Happens after about 2 weeks of use, then does not really get much worse after that and effect is essentially permanent

104

Flomax

Stopping the medicine before surgery does not appear to be effective

Occurs to a much lesser degree with Hytrin, Cardura, and Uroxatrol.

105

Comparison

Ophthalmology October 2013 E-pub

IFIS in Uroxatrol vs. Flomax

226 eyes: 70 Flomax, 43 Uroxatrol, 113 controls

Severe IFIS in...

34% of Flomax

16% of Uroxatrol

4% of control eyes (?)

Can rarely be seen with antipsychotic medications too

106

Flomax

Evidence indicates that the effect can be significantly reduced during surgery with intracameral 10% phenylephrine



107

Rapaflo

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

Same risk for IFIS as Flomax

108

Pegylated Interferons

Treatment used mainly for hepatitis.
 Very long treatment course
 Can cause retinal CWS and vascular retinopathy / macular edema
 Can be sight threatening but rarely is
 Most common is CWS near the optic nerve
 Plegridy: MS treatment every two weeks

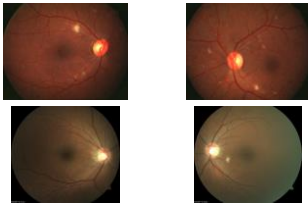
109

Interferons

Inform prescribing physician
 Endogenous interferon levels rise with cancer so.....
 Watch for isolated CWS with no explanation.....think undiagnosed cancer, HIV, GCA, anemia, sarcoid, lupus

110

CWS secondary to interferons



111

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

Can also cause downbeat vertical nystagmus

112

Amiodarone

Resolves months after discontinued
 Can also rarely affect color vision
 Fabry's Disease (X-linked; lipid storage disorder caused by enzyme deficiency)
 Limbal stem cell deficiency

What glaucoma drop can do this?



Rhopressa!

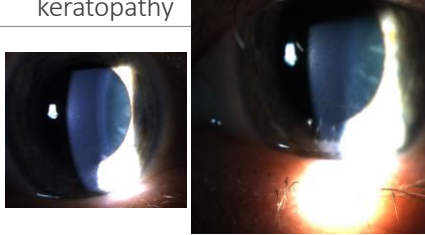
113

Amiodarone

Also causes bilateral optic neuropathy 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

114

Amiodarone vortex keratopathy



115

Tamoxifen (Nalvodex)

Anti-estrogen therapy for the management of breast cancer
 Similar in chemical structure to chloroquine: enhances chance of Plaquenil retinopathy
 1-6% get ocular side effects
 Causes a **crystalline retinopathy**
 Pathognomonic foveal cystic spaces on OCT

116

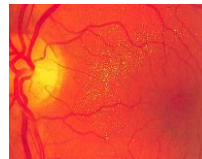
Tamoxifen

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

117

Tamoxifen retinopathy

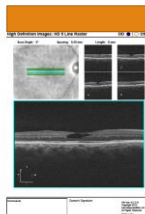


Can also get from Methoxyflurane use
 An inhaled anesthetic

118

OCT changes look like Mac Tel II

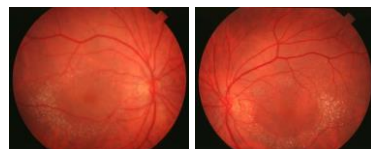
ILM Drapes



119

Canthaxanthine

TANNING AGENT



120

Balversa (Erdafitinib)

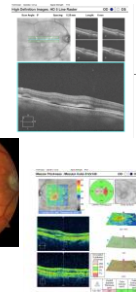
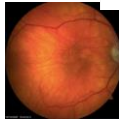
Oral chemotherapy agent for the treatment of urothelial cancer

Substantial risk of RPE detachments and neurosensory serous retinal detachments

Can affect vision if macula is involved

D/E every month for the first 4 months, then every 3 months thereafter

D/C med if substantial impact on vision



121

Mitogen-activated Protein Kinase Inhibitors (MEK)

Used to treat metastatic melanoma

Carmustine and Cisplatin are chemotherapeutic agents that interfere with DNA replication. Can cause cone dysfunction, dysphotopsia, hemorrhages, exudates, vasculitis, and pigmentary retinopathy

Cause a CSR like retinopathy with neurosensory detachments, and generally no PED's

Immune checkpoint inhibitors and BRAF inhibitors. Treat cancer, cause uveitis

122

Phenothiazines

Phenothiazines –Chlorpromazine (Thorazine), Thioridazine (Mellaril)

Decreased accommodation

Dry eye

Older antipsychotic agents

ASC cataracts

Corneal endothelial pigment deposits

Macular pigment changes (mostly chlorpromazine)

123

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.



124

Digoxin

Cardiac agent used for atrial fibrillation / flutter and CHF

If doses exceed standard therapeutic levels, 95% of patients develop ocular complications



125

Digoxin

The most common ocular side effect is color disturbance.....often taking the form of a gold or yellow tinge to images

Haloed and other color changes are possible



126

Digoxin

Rare ocular side effects include.....

Optic neuritis
Loss of central vision
Decreased acuity

127

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

128

Sabril (Vigabatrin)

Epilepsy medication

Not first line monotherapy except in infants

VF constriction (diffuse) with predilection for nasal field

Optic atrophy

Takes months to years

Occurs in roughly 1/3 of individuals

Males to Females 2:1

Not fully understood

129

Ethambutol

TB treatment

Can cause **optic neuropathy** with severe and lasting vision loss

1% chance

In use since 1960

Isoniazid 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

Another TB / mycobacterium treatment, **Rifabutin**, causes **deposits** on the corneal endothelium, in the angle, and on the lens surface

130

Isoretinoine (Accutane)

Used to treat Acne

Ocular side effects include.....

Dry eyes / meibomian gland dysfunction: By far the most common.

Conjunctivitis

Decreased night vision

131

Accutane

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



132

Dupilixent (Dupilumab)

Biologic for the treatment of atopic dermatitis / eczema

Significant MGD, conjunctivitis, dry eye, keratitis

Subcutaneous injection

Targets Interleukin-4, blocking cytokines that are needed to support T-cell function

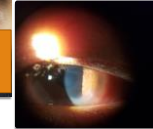
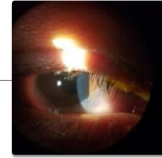
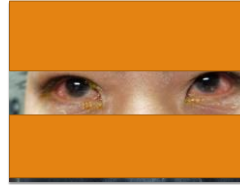
Severely decreases the function of mucous producing goblet cells

Case reports of corneal perforation



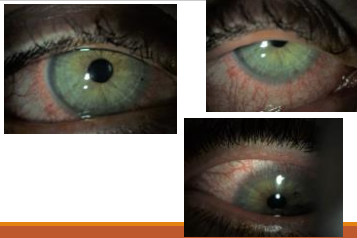
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Dupilixent



134

Another Dupilixent patient



135

Edema causing meds

Amantadine (Parkinson's / flu) : Corneal edema due to endothelial damage

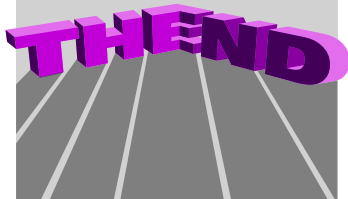
Can start weeks to years after beginning

Can look much like Fuch's

Fingolimod (MS): Macular edema (13 of 2564 in trials, only 2 at proper dose). May also be linked to vein occlusions

Paclitaxel (cancer TX): macular edema and corneal LSCD changes

136



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