Medications with Anterior Segment Implications: The Good, the Bad and the Ugly

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Thank you for allowing me to join you at this lovely event

- Clinical pearls
Objectives:

- Recognize the clinical benefits of various systemic medications – *with a focus on anterior segment conditions*

- Recognize the anterior segment complications of specific systemic medications

- Understand the various ocular findings & ocular presentations that are suggestive of medication complications
Why the Eye? – anterior segment

Small, lipid soluble molecules of medications can pass freely into aqueous humor

1. Lens
2. Cornea
3. Trabecular meshwork
Why the Eye? – posterior segment

Medications pass through the vasculature of the retinal or choroidal circulation

- Thin, fenestrated vessel walls
- Some drug molecules can pass

Talc retinopathy
Why the Eye?

Three major accumulation sites →

Anterior Segment

1. Lens – Especially,

   Bound drug particles → “photosensitizers”

   “Photosensitizers” = generic term for a drug/substance that can sensitize an organism, cell or tissue to light resulting in changes in the original tissue

2. Cornea

3. Vitreous
Why the Eye?

As an aside -- > In some cases medications are specifically “designed” for Penetration

- An example of ocular medications designed for penetration:
  - Loteprednol versus Prednisolone
Systemic Medications with Anterior Segment Implications

- The “Good”
  - Oral Antibiotics (mostly good, occasionally bad…)
  - Oral Antivirals
  - Carbonic Anhydrase Inhibitor/Diamox
  - Oral Anti-inflammatory medications
    - NSAIDS
    - Steroids → Prednisone
Systemic Medications with Anterior Segment Implications

- **The “Bad”**
  - Oral anti-inflammatory medications
    - Oral Steroids (not just good….also bad)
    - Non-steroidal anti-inflammatory drugs (NSAIDS)
  - Topiramate (Topamax)
  - Oral Contraceptives
  - Amiodarone $\rightarrow$ Anti-arrhythmic
Systemic Medications with Anterior Segment Implications

- **The “Ugly” (kind of like the bad….)**
  - Plaquenil/ hydroxyl-chloroquine
  - Tamulosin (Flomax)
  - Photosensitizers
    - Phenothiazine
    - Allopurinol

- **The “Others”**
  - Digitalis/Digoxin
  - Oral Beta-blockers
  - Tamoxifen
Systemic Medications with Anterior Segment Implications

- When an adverse affects → *May be mild to vision threatening*
  - Often monitor individuals on known medications to prevent or minimize serious consequences

**ICD 9 codes:**

- **V58.83** Encounter for therapeutic drug monitoring
  - Use additional code for any associated long-term (current) drug use (V58.61-V58.69)
- **V67.51** Following completed treatment with high-risk medication, not elsewhere classified
  - Excludes: long-term (current) drug use (V58.61-V58.69)
The “Good” → Oral Antibiotics

Doxycycline

- Mechanism of Action
  - Antibiotic by design
  - Anti-inflammatory component
  - Inhibitor of matrix metalloproteases → beneficial for recalcitrant recurrent corneal erosions

No kids < 8yo, Preg D
Example for “good”: Rosacea

- Chronic inflammatory condition of the facial skin and eyelids.

- Idiopathic disorder of the sebaceous glands
  - affects forehead, cheeks, chin and nose

- Exact etiology unknown
  - Evidence of genetic predilection
  - More common in:
    - Older patients
    - Women
    - Fair skin (i.e. Northern European)
Doxycycline

- Management:
  - Meibomian gland disease/blepharitis
  - Dry eye syndrome
  - Ocular rosacea

- Dosage and considerations
  - Ocular rosacea with corneal complications --
    - **Doxycycline 100mg po BID for 3 weeks**, followed by 100mg po qd for 3-4 weeks
    - LOWER Dose: Oracea: 40mg PO for patients without ocular involvement
  - Topical **metronidazole** as adjuvant to systemic therapy (Metrogel)
    - Finacea Gel (Azelaic Acid) = mild moderate
    - Mirvaso (Brimonidine Topical Gel) = redness only
Ocular Rosacea

- **TREATMENT CONSIDERATIONS:**
  - *Tetracycline is also effective but ...*
    - *More frequent dosing*
    - *More side effects*
  - Topical & systemic corticosteroids are contraindicated

**Aldox convenience kit (2 mo $110)**
**Nutridox convenience kit (Doxy+Thera)**
The “Good” ➔ Oral Antibiotics

Doxycycline ➔ Spoiler alert

- But can also be “bad”…..
- PTC, diplopia, photosensitivity, color vision defects
The “Good” → Oral Antibiotics

Other “Good” for ocular findings →

Cephalosporins

Cephalexin (Keflex) →
- 1-4g/day PO divided
- 10-15% cross rxn pcn allergy

Cefaclor [2\textsuperscript{nd} generation] →
- 250-500mg TID, 500mg (SR=slow release) BID
- 10-15% cross rxn for pcn
The “Good” → Oral AntiVirals

Acute
- HSV
  - Topical vs. Orals
- HZV
  - Orals!!
The “Good” → Oral AntiVirals

**HEDS:** Determine if oral acyclovir is beneficial for tx of oc herpetic infection & reoccurrence

- Beneficial for reoccurrences of HSV epithelial keratitis?
- Beneficial for reoccurrences of HSV stromal keratitis?
- Beneficial to prevent stromal reaction or iritis if HSV?

**Considerations:**

- Due to **recurrent nature**, long-term suppressive therapy may be beneficial with **acyclovir 400mg PO bid**
  - *Reduces rate of reoccurrence of HSV epithelial and stromal (esp previous stromal keratitis)*

- No benefit of 3 week course of oral Acyclovir to prevent HSV stromal keratitis/iritis in patients w/epi changes
The “Good” → Oral AntiVirals

Prevention of recurrence from HEDS I

- Determined that use of oral acyclovir after an outbreak of Ocular HSV decreases the risk of recurrence of stromal keratitis
And now…

Herpes Eye Disease Study II (HEDS II)

- Evaluate the primary treatment of HSV with oral Acyclovir
The “Good” → Oral AntiVirals

Acute presentation of HSV keratitis
Acyclovir

- Highly selective anti-viral
  - activity against HSV-1, HSV-2, VZV, and some CMV
- Available: Orally and intravenously
- Oral bioavailability is poor
  - Variable & incomplete absorption from GI tract
- Relatively short half life in plasma

- Treatment of HSV keratitis w/oral acyclovir
  - Wasn’t studied by Herpetic Eye Disease Study I (HEDS I)
  - Evidence suggests it may be as effective as topical
Acyclovir

  - “Antiviral Treatment Thwarts Recurring Eye Problems From Herpes Simplex”
    - Oral antiviral prophylaxis after infection with HSV is associated with a reduced risk for recurring eye problems

- HEDS treatments – continue to be in progress
Valcyclovir/Valtrex

- Pro-drug of Acyclovir
- Available only in oral formulation
- Hydrolyzed by esterases in the GI tract & liver
  - Converting more than 95% to acyclovir
  - Provides significantly greater bioavailability

- Small randomized trial
  - May be an effective treatment for HSV keratitis
  - No large clinical trials have been done to study efficacy & safety of Valtrex in HSV keratitis

- May ALSO be effective in resolving or lessening post-herpetic neuralgia & has a more convenient dosing schedule than traditional acyclovir
Famvir

- Pro-drug of penciclovir
- Active against HSV-1, HSV-2, and VZV (no CMV)
- Well absorbed orally and rapidly converted

- Spectrum of activity and potency similar to acyclovir
- Very long plasma half-life → permits infrequent dosing

- No randomized controlled trials have evaluated the efficacy of Famvir for recurrent HSV keratitis
# Dosing for acute HSV keratitis

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage Options</th>
<th>Duration</th>
<th>Prophylaxis Dosing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valtrex</strong></td>
<td>1 gram BID x 7 -10 dys</td>
<td>1 gram QD for prophylaxis</td>
<td><strong>Within first 72 hours for HZO:</strong> Valtrex 1g <strong>TID</strong></td>
</tr>
<tr>
<td><strong>Acyclovir</strong></td>
<td>400 mg 5x dy for 7-10 dys</td>
<td>400 mg BID for prophylaxis</td>
<td><strong>Within first 72 hours for HZO:</strong> Acyclovir <strong>800mg</strong> 5x/day</td>
</tr>
<tr>
<td><strong>Famvir</strong></td>
<td>500 mg BID for 7-10 days</td>
<td>250 BID for prophylaxis</td>
<td><strong>Within first 72 hours for HZO:</strong> Famvir 500mg <strong>TID</strong></td>
</tr>
</tbody>
</table>
Cidovir

- **INJECTABLE ANTI-VIRAL:**
  - Active against CMV retinitis

- **BUT....Results in:**
  - **Acute anterior uveitis**
  - Vitritis
  - Hypotony

- When complications arise treat as is typical for uveitis:
  - Topical Steroids
  - Mydriatics
The “Good” ➔
Carbonic Anhydrase Inhibitors (CAI)
Diamox

- Acute: Angle closure management

May reduce IOP by 40-60%
The “Good” →
Carbonic Anhydrase Inhibitors (CAI)

Diamox

- Chronic: Pseudotumor cerebri
The “Good” \(\rightarrow\) Carbonic Anhydrase Inhibitors (CAI)

Diamox \(\rightarrow\) Chronic use of CAI:
- In addition to Pseudotumor cerebri…
- Chronic open-angle glaucoma

**Mechanism of Action:**
- Reduces rate of aqueous humor formation by direct inhibition of enzyme carbonic anhydrase on secretory ciliary epithelium \(\rightarrow\) reduction in IOP
  - > 90% of CA must be inhibited before IOP lowering occur

**Sequel formulation:**
- Reduces side effects vs. regular formulation (\\$\\$\\$)
The “Good” → Carbonic Anhydrase Inhibitors (CAI)

Diamox

- Effects are seen in about 1 hr
  - Peak in 4 hours
  - Trough in about 12 hours

- Dosing for Diamox
  - Angle closure: 500 mg PO/IV, followed by 125-250 mg PO q4hr
  - Sustained-release: 500 mg PO q12hr

- Also, a class of medications available for both TOPICAL and SYSTEMIC management of Glaucoma
Oral NSAIDS (OTC & Rx)
  - Uveitis
  - Scleritis
  - Post seg: CME

Steroids → Prednisone
  - Uveitis
  - Scleritis
  - Posterior seg: Optic nerve inflammation

Variable and diverse conditions and treatment regimens based on underlying ocular condition
The “Good” can also be “Bad” ➔ Oral Anti-inflammatory medications

Steroids ➔ Prednisone
- Treat inflammatory & allergic conditions
- Acute & chronic
- Topical, systemic and inhalers (nasal/oral)

Other considerations for steroids …
1) Cataracts
2) Increased IOP
3) Delayed wound healing/secondary infection
4) Other considerations….
Steroids → Prednisone

“Cataractogenic”

- From any type of route: topical or systemic including inhalers → Worse if systemic route
- Mechanism:
  - Drugs may be reacting with amino groups of the crystalline lens fibers
  - Irreversible changes
- Initially tend to be posterior subcapsular (PSC)
  - later, anterior subcapsular region begins
- Children are more susceptible
The “Bad” →
Oral Anti-inflammatory medications

Common ocular complications of steroids

...continued:

- Increased IOP
  - Incidence greater with topical vs systemic
  - Increased aqueous humor formation & reduced outflow
- Consider changing steroid type or dose
- Typically occurs within a few weeks

→ DUREZOL = within a few days
The “Bad” →
Oral Anti-inflammatory medications

Most common ocular complications of steroids...continued:
• Decreased wound healing/exacerbation of herpetic keratitis

Previous example shown of HSV keratitis and blepharitis for pt placed on oral prednisone
The “Bad” ➔
Oral Anti-inflammatory medications

Non-steroidal anti-inflammatory drugs ➔
Indomethacin (Indocin)

- Anterior segment
  - Whorl-like stromal opacities (11-16%)
  - Pts may complain of light sensitivity

- Posterior segment
  - RPE or retinal changes can occur
  - Pseudotumor cerebri with any NSAID
The “Bad” →
Topamax (topiramate)

• Uses: Epilepsy and Migraine Headache
  • Secondary treatment = Headache

• “Angle closure” secondary to choroidal infusion

• Symptoms:
  • Large quick MYOPIC shift
  • Significant increase in IOP
  • Sudden symptoms
    • Within 2 weeks
  • Time frame/management
The “Bad” → Topamax (topiramate)

- Sulfa-based med that induces choroidal infusion, “rotating” structures forward

- “Antero-lateral rotation of the ciliary body”
  - Ant. displacement of the lens-iris diaphragm
  - Leads to myopic shift (“lengthening” focal pt)

- Anterior chamber shallowing
  - Secondary appositional angle closure
Notice the “Parallel” corneal and iris orientation.

Secondary glaucoma from Topamax.
B-Scan Ultrasound of choroidal effusion associated with Topamax leading to secondary glaucoma
The “Bad” ➔
Oral Contraceptives

Anterior segment
- Steepening of the corneal curvature
- Reduced tear secretion
  - Dry eye
  - Contact lens intolerance
The “Bad” →
Oral Contraceptives

Posterior segment/ Microvascular complications
- Retina/ vascular occlusions
- Clotting factors/ Transient Ischemic Attacks (TIA)

Other side effects:
- Migraines
- Pseudotumor cerebri
- Macular edema
A condition with multiple potential “bad guys” → PTC

- Pseudotumor cerebri has been associated with a variety of medications:
  - Antibiotics →
    - Tetracycline
    - Doxycycline
    - Minocycline
  - Steroids
    - Oral Birth Control (OBC)
    - Amiodarone
    - Tamoxifen
  - High dose vitamin therapy → Vitamin A
The “Bad” →
Anti-arrhythmic/ Amiodarone

Treatment for:
- Arrhythmia
  - Atrial fibrillation
  - Ventricular tachycardia

Mechanism of Action:
- Potassium (K+) channel blocker
- Half life may last up to 100 days!

****Cardarone or Pacerone
The “Bad” →
Anti-arrhythmic/ Amiodarone

Characteristics of the medication:
- Photosensitizer w/ a tendency towards lipid storage in lens & cornea
  - Typically does not have an affect on VA
- Almost ALL patients develop keratopathy after 6 months or more….
- Dose and duration dependent drug
- Side effects usually dissipate months after amiodarone is discontinued
  - → GREEN HALOES
The “Bad” → Anti-arrhythmic/ Amiodarone

Anterior Segment Complications

- Crystalline lens
  - Anterior subcapsular changes
  - Posterior subcapsular changes

- Cornea – whorl-like corneal deposits
  - Occurrence
    - As early as six days
    - Most likely in one to three months
The “Bad” →
Anti-arrhythmic/ Amiodarone

Also known as

- Corneal verticlata (Vortex keratopathy)
  - Bilateral, fine, gray or “golden-brown” opacities
  - Create a “whorl-like” pattern
    - Subepithelium
    - Originates BELOW the pupil and swirls outward
  - Central → Spares the limbus
The “Bad” →
Anti-arrhythmic/ Amiodarone

- Cornea – whorl-like corneal deposits
- Main Systemic Differential = Fabry’s disease
The “Bad” →
Other meds causing Vortex Keratopathy

- NSAIDS: Indomethacin, Meperidine
- Phenothiazines
- Tamoxifen

- Chloroquine and Hydroxychloroquine
  - UNLIKE RETINOPATHY, keratopathy bears no relationship to dosage or duration
The “Bad” →
Anti-arrhythmic/ Amiodarone

- Less common but possible are Posterior segment complications:
  - **Optic neuropathy** (1-2% of pts) →
    - Mimics NAION but bilateral
  - Pseudotumor cerebri
The “Bad” → Anti-arrhythmic/ Amiodarone

Management considerations:
- DFE
- Amsler grid and central visual-field screening
- UV blocker (photosensitizer)

Education of Ocular Symptoms
- Possible mild decreased VA (20/25-20/30)
- Glare, halos, foggy vision and color vision changes
- VA may improve if medication D/C but VF defects may not…
Some of “the bad” & “the ugly” → Photosensitizers

A consistent ocular complication of the many medications that have this photosensitizing quality:

✓ Anterior subcapsular lens changes

Some of these medications include:

- Amiodarone
- Chloroquine (and Hydroxychloroquine, aka Plaquenil)
- Phenothiazines
- Allopurinol
The “Ugly” → Anti-malarial/Anti-rheumatic: Plaquenil

- Chloroquine (Arlen)
  - Tends to be more toxic than Hydroxychloroquine
  - Not as commonly used in the US, but...

- Hydroxychloroquine (Plaquenil)
  - Tx for rheumatoid arthritis & lupus
  - Anti-malarial medication
  - Characteristics = Photosensitizer
The “Ugly” → Anti-malarial/Anti-rheumatic: Plaquenil

Anterior segment:

- Cornea = whorl-like “pigment” deposits within corneal epithelium
- Lens = anterior subcapsular lens changes
- Transient & reversible corneal changes → typically when pt receives > 250 mg daily
The “Ugly” →
Anti-malarial/Anti-rheumatic: Plaquenil

Posterior Segment: Retinopathy

- Bull’s-eye maculopathy CLINICALLY starts as fine pigmentary mottling
  - Loss of foveal reflex
  - Differentials include RP and ARMD
The “Ugly” →
Anti-malarial/Anti-rheumatic: Plaquenil

Posterior segment complications….

- **Mechanism:**
  - Inhibition of critical enzymes & interference with the metabolic functions of RPE and photoreceptors
  - *Drugs with an affinity for melanin*

- **Retinopathy:** Management Considerations
  - Risk of irreversible retinal damage: *dose-dependent*
Plaquenil Toxicity

Bulls Eye Maculopathy →
Risks

• > 6.5mg/kg
• > 5 years
• > 60 years
• High fat level
• Renal disease
Posterior segment complications….

- **Retinopathy**: Management Considerations
  - Risk of irreversible retinal damage is **dose-dependent**
  - Risk increases when total cumulative **dose exceeds 300g**; Increased if **daily dose is 6.5mg/kg for longer than 5 years with Plaquinil** (less if chloroquine)
The “Ugly” → Anti-malarial/Anti-rheumatic: Plaquenil

PLAQUENIL SCREENING…..

- **Protocol:**
  - **First five years** – routine exams depending on pt age
    - Annually if the patient is > 60 years of age, is obese, has renal or hepatic dysfunction, history of concurrent macular disease
  - **After five years** – examinations more than once/year

- **Testing (American Academy of Ophthalmal screening):**
  - Baseline exams with color vision & dilated fundus exam
  - Central 10-2 VF (white-on-white) and Amsler grid
  - Fundus photography
  - Spectral Domain OCT/ Fundus autofluorescence

  “Flying saucer” sign on SC- OCT
The “Ugly” → Tamsulosin (Flomax)

Treatment for Benign Prostatic Hypertrophy (BPH)

- **Intraoperative Floppy Iris Syndrome (IFIS)**
  
  Defined by Chang & Campbell for study purposes, *Journal of Cataract and Refractive Surgery* with the following criteria:
  
  1. *Intraoperative fluttering and billowing of the flaccid iris stroma caused by normal intraocular currents*
  2. *Propensity for iris prolapse to the phaco and/or side-port incisions*
  3. *Progressive constriction of the pupil during surgery*
The “Ugly” → Tamsulosin

- Intraoperative Floppy Iris Syndrome (IFIS)
  - Also noted by Chang & Campbell pre-operatively:
    - Poor pre-operative pupil dilation
    - Elasticity of the pupil margin
    - We Need To Identify prior to surgery…….
The “Ugly” → Tamsulosin

- Need to:
  - Discontinue medication prior to surgery
  - IFIS can also be seen with other systemic alpha-agonists including:
    - Hytrin
    - Cardura
The “Ugly” ➔ Phenothiazines

Tx for schizophrenia & other emotional disorders

- Original medications in class:
  - Chlorpromazine (Thorazine)
  - Thioridazine (Mellaril)

- Mechanism of complications - multiple:
  1) Photosensitizer
     Anterior subcapsular lens changes
     Corneal pigmentary “deposits”
The “Ugly” → Phenothiazine

2) Ocular symptoms → “anticholinergic” properties

- Blurred vision
  - Decreased accommodation & mydriasis
  - (and possibly, Anterior subcapsular cataracts)
- Other possible issues:
  - Dry eye
  - Macular pigmentary changes

- Transient and dose dependent

- Newer meds: Prozac & Zoloft = dry eye & accommodative issues but less overall
The “Ugly” → Phenothiazine

Anterior segment

- Endothelial and lenticular pigment deposits
- Doses greater than 500mg/day for prolonged periods have higher incidence of irreversible cornea and lens changes
The “Ugly” → Phenothiazine

Posterior segment

- Bulls eye maculopathy with moth-eaten appearance
- Potential permanent VA & visual field loss
- **Doses which exceed 800mg/day** for a few weeks is enough to reduce VA and impair dark adaption

  - Salt & pepper pigmentary changes of the mid-periphery and post pole
  - RPE Pigment clumping
  - Diffuse loss of RPE & choriocapillaris
The “Ugly” →
Thiazide/diuretics

Treatment:

*hypertension & congestive heart failure*

- Ocular complications
  - Common: Dry eye and changes in tear film
  - Rare: Myopic shifts and band keratopathy
The “Ugly” →
Allopurinol

Treatment for gout

- **Photosensitizer** = anterior subcapsular changes
- Increases the risk of cataract formation if:
  - CUMULATIVE dose exceeds 400g
  - Duration exceeds 3 years

- Cataracts: Cortical and subcapsular changes
The “Others” →
Digitalis/Digoxin

Digitalis (Digoxin)/ Lanoxin

- Ocular symptoms
  - 11-25% of patients experience ocular symptoms
  - Up to 95% develop a type of ocular complication
  - Changes in color vision, visual sensations, flickering vision, blurry vision, photophobia
- Side effect: Reduction in IOP

- Mechanism of action of medications: Cardiac glycoside
  - Congestive heart failure
  - Arrhythmias
The “Others” ➔
Digitalis/Digoxin

Digitalis (Digoxin)/ Lanoxin ➔

- **Mechanism for pathology:** Posterior segment etiology presumed due to High concentrations of medication in the retina and choroid
The “Others” →
Anti-Tuberculosis Medications

- **Rifabutin**
  - Used to treat TB
  - Complications:
    - May present with a unilateral acute uveitis
    - Often with hypopyon
  - Treatment:
    - Stopping medications

- **Isoniazid**
  - Treatment for TB
  - Complications:
    - Optic nerve atrophy
The “Others” →
Anti-Tuberculosis Medications

- Ethambutol:
  - Used in combination with isoniazid and rifampin
  - Toxicity typically occurs between 3 and 6 months
  - Prognosis good if cessation of the medication occurs quickly
    - Minority of patients will suffer permanent vision loss
  - VF defects usually consist of central or centrocecal scotomatas
The “Others” → Oral Beta-blockers

Some considerations for optometry:

- Dry eyes
- “MISDIAGNOSED” normal tension glaucoma
- Masked diabetic symptoms
Topical Medications with Secondary Implications....

Topical Beta-blockers

- Anterior segment
  - The Good ➔
    - Reduction of aqueous formation
    - Reduced IOP
  - The Bad ➔ Reduction of tear secretion
    - Dry eye symptoms
    - Consideration of refit CL
  - The Other ➔ Corneal hypoesthesia
Topical Medications with Secondary Implications....

Topical Beta-blockers

- Systemic complications
  - Breathing problems
  - Bradycardia/Heart palpitations
  - Depression
  - Other systemic considerations
Topical Medications with Secondary Implications....

Prostaglandin analogues

- Anterior segment findings
  - Conjunctival hyperemia
    - Bimatoprost 0.01% developed primarily to reduce the risk of this
  - Possible darkening of the iris
  - Decreased IOP
Topical Medications with Secondary Implications....

Prostaglandin analogues

- Dermatologic/Facial concerns
  - Hair in and around eyes
  - Hypertrichosis
  - Darkening around the eyes

- Posterior segment findings
  - Patients at risk: cystoid macular edema
Fluoroquinolones

Medication: Antibiotics
- Synthetic, broad-spectrum: inhibits DNA gyrase & topoisomerase IV

Anterior segment $\rightarrow$ Toxic to cornea

Systemic considerations
- Achilles Tendonitis
- Also, shoulder and hand
Topical Medications with Secondary Implications....

Fluoroquinolones →

“New”: Zymaxid and Moxeza
versus the “Old”.....
Ocular Summary: Vortex Keratopathy

- Amiodarone
- Chloroquine & Hydroxychloroquine
- Indomethacin, Meperidine
- Tamoxifen
- Phenothiazines
- Fabry disease
Ocular Summary: Dry Eye

- Anti-histamines
  - Claritin, Zyrtec
- Beta blocker agents
- Anti-psychotic agents
- Oral Contraceptives
- Accutaine
Ocular Summary: Subconjunctival Hemorrhages

- Ginkgo Biloba
- Aspirin therapy
- NSAIDS
  - Advil - ibuprofen
  - Indocin - indomethacin
  - Orudis - ketoprofen
  - Aleve – naproxen
- Primary Blood thinners
  - Coumadin
  - Heparin
  - Warfarin

RARE but also possible → Spontaneous anterior chamber hyphema
Ocular Summary: Cataracts

- Amiodarone
- Steroids
- Anti-psychotic agents
- “Statins” for cholesterol
  - Lovastatin
  - Simvastatin
Ocular Summary: Uveitis

- **Rifabutin**
  - Used to treat TB

- **Cidovir**
  - Used to treat CMV retinitis
Ocular Summary: Increased IOP

- Steroids
  - Orals
  - Topical/nasal inhalers
- Topamax
Ocular Summary: PTC

- Oral Birth Control
- Steroids
- Tamoxifen
- Antibiotics →
  - Tetracycline
  - Doxycycline
  - Minocycline
- Vitamin therapy → Vitamin A
Ocular Summary: Optic neuritis

- Viagra/Cialis
- Digoxin/Digitalis
- Amiodarone
Ocular Summary: Retinopathy/Maculopathy

- Hydroxychloroquine (Plaquenil)
- Phenothiazides (Mellaril)
- Tamoxifen
- Canthaxanthin
- Interferon
** A few others...Posterior segment: Maculopathy

- **Tamoxifen**
  - Anti-cancer medication → Breast cancer
  - Selective estrogen receptor modulator
    - Thus, not used for all types of breast cancer
    - Produces a maculopathy....

- Occurs in 6% of pts within 6 months of low dose therapy (~20mg/D)
  - Reversible EARLY, not reversible later
  - **White crystalline macular deposits** → VA decreases secondary to foveal cyst
** A few others...Posterior segment: Maculopathy

- **Canthaxanthin**
  - Oral tanning agent
  - Maculopathy reverses once drug is stopped
**A few others...Posterior segment:**

**Retinopathy**

- **Interferon**
  - Used for a variety of diseases including:
    - Multiple sclerosis
    - Hepatitis
    - Other viral diseases
  - Common ocular side effects
    - Cotton wool spots (CWS) near the optic nerve
    - Retinal hemorrhages
    - Macular edema
** A few others...Posterior segment: Retinopathy

Viagra (sildenafil) / Cialis

- Ocular side effects → Dose dependent
  - 50 mg (normal dose) less than 5% chance
  - 200mg have a 50% chance of oc. side effects

- Avoid in RP patients

- General ocular symptoms:
  - Color perception changes
  - “Bluish” tinge (things appear blue)
  - Light sensitivity/ photopsia
** A few others...Posterior segment: Retinopathy

Viagra (sildenafil) / Cialis

- Anterior Ischemic Optic Neuropathy (AION)
  - Non-arteritic
  - Within 24-36 hours
  - A “disc at risk”
** A few others...Posterior segment: Retinopathy

Viagra (sildenafil) / Cialis

- “Viagra-associated” Serous Maculopathy
**A few others....eye movements**

Dilantin/Phenytoin
- Anticonvulsant
  - Treatment of seizures

- Ocular side effects:
  - Nystagmus & Diplopia
  - Ataxia

- Zyrtec
  - Oculogyric crisis (eyes and lids tonically elevated, neck hyperextended)
** A few others....VF defects

Vigabatrin (Sabril)
  - Anti-epileptic

  - Ocular side effects:
    - Binasal visual field defects

  - Defects persist once treatment is stopped
    → Do not progress
Recognizing “When to Look”

Thorough medical history

- Specific medications
  - Focus in this presentation on anterior and systemic considerations but there are some medications -- some mentioned and others not included (eg, canthaxanthine) that can retinal complications

- Dosage

- Duration of treatment
Recognizing “When to Look”

Toxicity variability

- Dosage versus length of time
- Type of medications
Recognizing “When to Look”

Detecting and Reporting

- Complete evaluation including specialty testing
- Collaborating with other doctors