"FOCUS" on OPHTHALMOLOGY FOR PHARMACISTS

ACTIVITY DESCRIPTION
Although ophthalmologists and optometrists are the experts in treatment of eye diseases, pharmacists need a more thorough understanding of the topical and systemic effects of the drugs they dispense. Medications dispensed may cause hypersensitivity, elevations in intraocular pressure as well as bradycardia and exacerbations in bronchoconstriction. Also discussed will be treatment variations in closed and open angle glaucoma, prescription and over the counter treatment of conjunctivitis. Join Professor Pete Kreckel with a practicing pharmacist's view of common ophthalmologic conditions commonly treated in pharmacy. This program has been reviewed by both an ophthalmologist and an optometrist for content.

TARGET AUDIENCE
The target audience for this activity is pharmacists and pharmacy technicians in hospital, community, and retail pharmacy settings.

LEARNING OBJECTIVES
After completing this activity, the pharmacist will be able to:
• List principles of drug therapy for the eyes, and when to refer to a medical practitioner
• Identify the most common ophthalmological disease states and treatments, commonly available in a retail pharmacy
• Outline the role of drug therapy responsible for elevations in intraocular pressure, and the other ocular side effects
• Describe the role of pharmacist counseling with regard to the therapeutics geared toward management of common diseases of the eye

After completing this activity, the pharmacy technician will be able to:
• List common diseases of the eye
• List medications that can cause problems with the eye

ACCREDITATION

PHARMACY
PharmCon, Inc. is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

NURSING
PharmCon, Inc. is approved by the California Board of Registered Nursing (Provider Number CEP 13649) and the Florida Board of Nursing (Provider Number 50-3515). Activities approved by the CA BRN and the FL BN are accepted by most State Boards of Nursing.

CE hours provided by PharmCon, Inc. meet the ANCC criteria for formally approved continuing education hours. The ACPE is listed by the AANP as an acceptable, accredited continuing education organization for applicants seeking renewal through continuing education credit. For additional information, please visit http://www.nursecredentialing.org/RenewalRequirements.aspx

Universal Activity No. 0798-0000-13-179-L01-P&T
Credits: 1 contact hour (0.1 CEU)

Release Date: July 16, 2013
Expiration Date: July 16, 2016

ACTIVITY TYPE
Knowledge-Based Live Webinar
ABOUT THE AUTHOR
Professor Pete Kreckel is a practicing retail pharmacist who works in Altoona Pennsylvania. Both he and his wife, Denise are 1981 graduates of the University of Pittsburgh School of Pharmacy. He has worked independent retail pharmacy for over 30 years. He has been teaching Pharmacology in the Physician Assistant program at St. Francis University since 2005. He has been a regular PharmCon favorite since 2008 covering topics of primary interest to the retail pharmacist. He was inducted into Pi Alpha the Physician Assistant honorary fraternity, and was named as “Preceptor of the Year” by the Pennsylvania Pharmacists Association for his dedicated work to the education of pharmacy students from Duquesne University, and from his alma mater the University of Pittsburgh.

Pete Kreckel, RPh
Adjunct Assistant Professor, Saint Francis University

FACULTY DISCLOSURE
It is the policy of PharmCon, Inc. to require the disclosure of the existence of any significant financial interest or any other relationship a faculty member or a sponsor has with the manufacturer of any commercial product(s) and/or service(s) discussed in an educational activity. Pete Kreckel reports no actual or potential conflict of interest in relation to this activity.

Peer review of the material in this CE activity was conducted to assess and resolve potential conflict of interest. Reviewers unanimously found that the activity is fair balanced and lacks commercial bias.

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“Focus” on Ophthalmology for Pharmacists

Accreditation
Pharmacists: 05-2020-03115-10-P
Pharmacy Technicians: 05-2020-03115-10-T
Audience: A&B.

CE Credits(s)
contact free CE

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Exclusions to Self Care
- Blunt trauma
- Foreign particles trapped or embedded in the eye
- Ocular abrasions
- Infections of the eyelid/eye surface
- Eye exposure to chemical splash, solid chemical, or chemical fumes. “Super glue” damage
- Thermal injury to eye
- Bacterial conjunctivitis
- Chlamydial conjunctivitis

Legal Disclaimer
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**Principles of Drug Therapy**

- Drugs must cross cornea to act within the eye.
- Must be lipophilic or uncharged
- Adjust pH so weak bases or acids can produce larger portion of uncharged molecules.
- Most eye drops are sterile products.
- Action of some drugs is related to eye color.
- Black & brown irises contain more pigment than green, gray or blue. The more pigment, the more drug that can bind to it resulting in a slower onset and longer duration of action.

**Counseling Points**

- There no FDA approved anti-infective products available OTC
- Avoid “homemade” products – boric acid solution, chamomile tea compresses, etc.
- Replace cap immediately and tighten.
- Remind patient to throw out any unused eye drops at end of treatment course.
- Best not to write refills for antibiotic eye drops

**Allergic Conjunctivitis**

- **Treatment Goals:** Remove or avoid allergen
  - Provide symptomatic relief-limit allergy reaction
  - Protect the ocular surface
- **Pharmacologic Therapy**
  - 1st line: Artificial tears
  - If symptoms persist: Ophthalmic antihistamine/mast cell stabilizer. If no resolution in 72 hours, Contact eye care practitioner.
- **Nonpharmacologic Therapy**
  - Do not wear contact lenses until resolved
  - Apply cold compresses 3-4 times a day
- **Causes:** Pollen, Animal dander, topical eye preps
- **Symptoms:** Red eye with watery discharge, itching

**Allergic Conjunctivitis-Decongestants**

- **Ophthalmic Decongestants**
  - Constrict conjunctival vessels reducing redness-Works on alpha-adrenergic receptors of ophthalmic vasculature
    - Phenylephrine
    - Oxymetazoline
    - Naphazoline
    - Tetrahydrozoline
- **Ocular decongestant side effects**
  - Generally do not have ocular or systemic side effect
  - Long-term use leads to potential for:
    - Rebound conjunctival hyperemia
    - Allergic blepharitis
    - Abnormal dryness
**ALLERGIC CONJUNCTIVITIS - DECONGESTANTS - PRECAUTIONS**

- Ocular Decongestants
  - Do NOT use in patients with
    - Systemic hypertension
    - Arteriosclerosis
    - Narrow angle glaucoma
    - Diabetes
    - Hyperthyroidism
    - Use sparingly if at all in pregnancy
  - Typical dose: Decongestants are usually applied 1 or 2 drops up to 4 times a day. Oxymetazoline is a longer acting agent that is generally administered twice daily.

**ALLERGIC CONJUNCTIVITIS - ANTIHISTAMINES**

- Ophthalmic Antihistamines
  - MOA: histamine₂-receptor antagonists
    - Pheniramine maleate
    - Antazoline Phosphate
  - Available in combination with decongestants
    - Pheniramine/naphazoline
    - Antazoline/naphazoline
  - More effective than using either agent alone

**ALLERGIC CONJUNCTIVITIS - ANTIHISTAMINE/MAST CELL STABILIZER**

Zaditor® (ketotifen fumarate) OTC
- Potent H₁-receptor antagonist
- Mast cell degranulation inhibited, release of inflammatory mediators inhibited
- Relief in minutes
- Lasts for 12 hours
- Can use in children 3 years of age and older
- Patanol® (olopatadine) 0.1% soln Rx only
  - Indication: prevention of itching due to allergic conjunctivitis
  - Dosage: 1 drop each eye BID (separate by 6-8 hours)
  - Pataday® (olopatadine) 0.2% soln Rx only
  - Dosage: 1 drop in each eye every 24 hours
  - Bepreve® (bepotastine besilate ophthalmic solution) Rx
  - Dosage: (1) drop in the affected eye twice a day.

**VIRAL CONJUNCTIVITIS - “PINK EYE”**

- Most common form of conjunctivitis. In adults 80% of pink eye is of viral etiology. In Children 50% of pink eye cases are viral.
- Highly contagious - for one week
- Precursors -
  - Recent cold
  - Sore throat
  - Exposure to someone with “pink eye”
**Viral Conjunctivitis—“Pink Eye”**

- Goal of therapy: relieve symptoms while infection runs its course. Symptoms
  - Watery discharge, conjunctival redness and swelling
  - Ocular discomfort, with mild-to-moderate sensation of foreign object in eye
  - Blurred vision
- Self-limiting: symptoms resolve in 1-3 weeks
- For symptomatic relief: use artificial tear preparations or ocular decongestants

**Conjunctivitis—Clinical Pearls**

- Worsening symptoms during topical treatment with any antibiotic (particularly Neosporin® or a Sulfonamide (Sulamyl, Bleph-10®) may represent a contact allergic reaction.
- Conjunctivitis due to N. gonorrhoeae must be considered in the sexually active adult, with a thick, prominent, and copious discharge of the eye. Neisseria species are capable of invading an intact corneal epithelium
- In early or mild cases of bacterial conjunctivitis, symptoms may be limited to mild conjunctival injection without frank purulent drainage that is evident to the clinician. Thus, empiric antibiotic therapy is warranted in MOST cases of conjunctivitis

**Differentiating Bacterial, Viral, and Allergic Conjunctivitis**

<table>
<thead>
<tr>
<th>Type of conjunctivitis</th>
<th>Bacterial</th>
<th>Viral</th>
<th>Allergic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redness</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Swelling</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Clear, watery discharge</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Stringy, white mucus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>discharge</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Purulent discharge</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burning</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Lash matting</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Grittiness</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Itching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Photophobia</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
**Infectious conjunctivitis**

- **Infectious conjunctivitis**: Bacterial conjunctivitis may start in one eye and spread to the other. Signs are redness, swelling, itchy painful eye, with thick discharge often yellow or green. Discharge is crusty and dried upon wakening in the morning, causing eye to stick shut.
- **Most common pathogens**: *Streptococcus pneumoniae*, *Haemophilus influenza*, and *Staphylococcus aureus*
- **Treatment**: consists of antibiotic eye drops or ointment given several times per day. Warm wet compresses are soothing for patients, and helps to soften up the morning crust around the eye. Don’t wear contact lens until all signs of infection are gone.

**Drug therapy for Infectious Conjunctivitis**

- **Azithromycin (AzaSite®) Dosage**: 1 drop every 12 hours for two days; then just once daily for the next 5 days.
- **Erythromycin ophthalmic ointment**: For the treatment of superficial ocular infections involving the conjunctiva and/or cornea caused by susceptible organisms. For prophylaxis of ophthalmia neonatorum due to N. gonorrhoeae or C. trachomatis.
- **Trimethoprim/Polyoxin-B (Polymyxin®)**: mild to moderate infections, instill 1 drop q3h (maximum of 6 doses per day) x 7 to 10 days.

**Fluoroquinolone therapy**

<table>
<thead>
<tr>
<th>Ciloxan® drops &amp; ointment</th>
<th>Ciprofloxacin (generic available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocuflox® drops</td>
<td>Ofloxacin (generic available)</td>
</tr>
<tr>
<td>Quixin® drops</td>
<td>Levofloxacin</td>
</tr>
<tr>
<td>Vigamox® drops &amp; Moxeza®</td>
<td>Moxifloxacin (TID) (BID)</td>
</tr>
<tr>
<td>Zymar® drops</td>
<td>Gatifloxacin 0.3% (TID)</td>
</tr>
<tr>
<td>Zymaxid drops</td>
<td>Gatifloxacin 0.5% (may dose TID)</td>
</tr>
<tr>
<td>Besivance® drops</td>
<td>Besifloxacin (may dose TID)</td>
</tr>
</tbody>
</table>

**Drug therapy for Infectious Conjunctivitis**

- **AVOID**: Sodium sulfacetamide: is a potent sensitizer. Many allergic reactions are confused with therapeutic failures. Not an ideal choice for conjunctivitis. *(Only should be used for trachoma)*
- **Gentamycin ophthalmic soln and ophthalmic ointment**
- **Tobramycin ophthalmic soln and ophthalmic ointment**
  - **Indications**: excellent coverage for both Gram negative & gram positive organisms.
  - **Dose**: every 4 hours, more frequently if severe
- **Tobradex®** (tobramycin plus dexamethasone) in drops and ointment.
  - *(Non-specialists should avoid this combo, due to chance of herpes infection)*
- **Bacitracin ophthalmic ointment**: good gram positive coverage, minimal gram negative. Named 2003 Allergen of the year!
**Blepharitis**

**Blepharitis**

- Can be detected by redness of the lids, burning, itching, and scaly skin. The underlying problem such as seborrheic dermatitis, or staph aureus should be treated. Staph infection often requires antibiotic therapy. Bacitracin ophth oint may be beneficial. For seborrheic blepharitis washing with baby shampoo, warm compresses, artificial tears if eyes are dry.

**Stye (hordeolum)**: infection of the sebaceous gland of the eyelid. Can not be treated with OTC therapy. Hot compressed QID can help. Some patients may require an antibiotic.

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**Glaucoma-defined**

- Causes damage to your eye’s optic nerve, associated with a buildup of pressure inside the eye. Glaucoma tends to be inherited and may not show up until later in life.

- Intracocular pressure, can damage the optic nerve, which transmits images to the brain. If damage to the optic nerve from high eye pressure continues, glaucoma will cause permanent loss of vision. Without treatment, glaucoma can cause total permanent blindness within a few years.

- **NORMAL RANGE:** pressure is 12-22 mm Hg

- **Most glaucoma cases are diagnosed with pressure exceeding 20mm Hg.**

- **However, some people can have glaucoma at pressures between 12-22mm Hg. Eye pressure is unique to each person.**

---

**Glaucoma Testing**

**EXAMINING**

<table>
<thead>
<tr>
<th>EXAMINING</th>
<th>NAME OF TEST</th>
</tr>
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<tbody>
<tr>
<td>The inner eye pressure</td>
<td>Tonometry</td>
</tr>
<tr>
<td>The shape and color of the optic nerve</td>
<td>Ophthalmoscopy (dilated eye exam)</td>
</tr>
<tr>
<td>The complete field of vision</td>
<td>Perimetry (visual field test)</td>
</tr>
<tr>
<td>The angle in the eye where the iris meets the cornea</td>
<td>Gonioscopy</td>
</tr>
<tr>
<td>Thickness of the cornea</td>
<td>Pachymetry</td>
</tr>
</tbody>
</table>

**Age of Patient** | **Recommended testing**
--- | ---
Before age 40 | Every 2-4 years
Age 40-54 | Every 1 to 3 years
Age 55-64 | Every 1-2 years
Age 65 and above | Every 6-12 months

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**Closed angle glaucoma**

Accounts for 5% or less of primary glaucomas. In chronic closed angle glaucoma flow of aqueous into the anterior chamber angle is obstructed. When CAG occurs it MUST be treated as an ophthalmologic emergency to avoid visual loss.

**Symptoms include:**

- Rapid onset in older age groups, particularly hyperopes and Asians.

- Severe pain and profound visual loss with “halos around lights”.


- May see nausea, vomiting, abdominal pain and diaphoresis.

- In prolonged attacks vision loss may occur if IOP is high enough. Tonometry reveals IOP as high as 40-90 mmHg.

- **Treatment:** goal is rapid reduction of IOP to preserve vision loss.
TREATMENT OF CLOSED ANGLE GLAUCOMA

- Treatment: goal is rapid reduction of IOP to preserve vision loss.
- A single dose of Acetazolamide 500 mg IV followed by 250 mg PO QID OR
- Treatments consist of mannitol, urea or glycerol. Once the IOP has started to fall topical Pilocarpine 4% one drop every 15 minutes for 1 hour, then QID
- Definitive treatment is laser peripheral iridotomy. This procedure should be prophylactically on the other eye.

DRUGS THAT CAN ELEVATE IOP

Open Angle Glaucoma
- Ophthalmic corticosteroids (highest risk) affect the drainage through trabecular network
- Systemic corticosteroids and topical steroids
- Nasal or inhaled corticosteroids

Closed Angle Glaucoma
- Anticholinergics: topical or systemic
- Sympathomimetics: topical or systemic
- Low potency phenothiazines
- Antihistamines (1st-gen)
- Ipratropium

Open angle glaucoma = CHRONIC

- Open Angle Glaucoma:
  - Chronic disease primarily treated with topical drugs. Primary defect is reduced drainage of the aqueous humor into the canal of Schlemm.
  - Cause is not clearly understood, although genetic mutations have been identified in a small number of the cases.
  - Is physiologically determined by the relative production and elimination of the aqueous humor, the clear liquid that fills the anterior and chamber of the eye. The relatively constant flow (2 to 3 microlitres/minute) maintains the physiological IOP.

Options for topical corticosteroid therapy

Prednisolone acetate 1% versus loteprednol etabonate (Lotemax) ophthalmic suspension

- 72% of patients treated with loteprednol experienced resolution of anterior chamber cells, compared to 87% of patients treated with prednisolone acetate 1%
- The incidence of patients with clinically significant increases in IOP (≥10 mm Hg) was 1% with loteprednol and 6% with prednisolone acetate 1%. Loteprednol should not be used in patients who require a more potent corticosteroid for this indication.
- Loprednol is available as drops, gel and ointment.
Overview of Drug Therapy

**Drugs that Decrease production of Aqueous Humor:**
- Beta blockers (topical): (timolol, betaxolol, carteolol, levobunolol)
- Alpha agonists (topical): Epinephrine, dipivefrin, apraclonidine, brimonidine
- Carbonic anhydrase inhibitors: acetazolamide (po), brinzolamide, dorzolamide, methazolamide (po)

**Drugs that Increase the drainage of Aqueous humor:**
- Miotics: carbachol, pilocarpine
- Prostaglandins: Latanoprost, Travoprost, Bimatoprost
- Alpha agonists (topical): Epinephrine, dipivefrin, brimonidine

**Alpha agonists**
- Mechanism: The alpha agonists: Brimonidine, Dipivefrin, & Epinephrine BOTH decrease formation of aqueous humor, and increase outflow of aqueous humor. Apraclonidine (l-tipidine): decreases aqueous production, and no effect on outflow.
- Alphagan-P (Brimonidine 0.15%) new additional strength 0.1% -- caution!! 1 drop in the affected eye TID q8h
- Propine (dipivefrin) 0.1% one drop Q12H (is a pro-drug of epinephrine)
- Epinephrine 0.1%, 0.5%, 1% 2%:-not available in USA
- Iopidine (apraclonidine 0.5%): used for acute IOP lowering, not for maintenance.

**Beta blockers**
- Mechanism: decrease production of aqueous humor by the ciliary body, presumably by decreasing action of circulating epinephrine, without producing substantial effects on aqueous humor outflow. NO EFFECT on pupil size or accommodation. Minimal therapeutic effect during night.
- CAUTION: If using other topical BB in cardio & pulmo patients. May cause bronchosspasm, or bradycardia. Only betaxolol is selective.
  - Betoptic® 0.25% (betaxolol) ophthalmic suspension has minimal effects on cardiovascular and pulmonary parameters. Is Beta-1 selective. Dose: one drop in the affected eye (s) twice daily.
  - Timoptic-XE (gel forming solution) (timolol) 0.25% & 0.5% dosed once daily
  - Timoptic 0.25% and 0.5% (timolol) solution dosed BID. Both available generically.
  - Betagan 0.25% and 0.5% (levobunolol): 1 drop BID
  - Ocushield 1% (carbateol) 1 drop BID

**Carbonic Anhydrase inhibitors**
- Mechanism: Inhibits carbonic anhydrase (CA) in the ciliary process of the eye, decreases the aqueous humor secretion.
- Are sulfonamides, and are administered topically and are absorbed systemically. Watch for signs of hypersensitivity.
- Horrible taste. Pinch bridge of nose for 30 seconds after administration.
- Dorzolamide (Trusopt®) 2% Dosage: 1 drop TID
- Brinzolamide (Azopt®) 1% susp Dosage: 1 drop TID
- Oral carbonic anhydrase inhibitors: Acetazolamide (Diamox®)
- Dose: 250mg 1-4 times a day. SR Caps: 500mg BID. Very useful as add on. Watch for hypokalemia—always supplement with K
**MIOTICS**

- Mechanism: It is a parasympathomimetic drug which duplicates the mydriatic effects of acetylcholine. Produces pupillary constriction, stimulates ciliary muscles, increases aqueous humor outflow. It causes increased tension on the scleral spur and opening of the trabecular meshwork spaces to facilitate outflow of aqueous humor.
- Decreased visual acuity & night vision. Lens opacity may occur. Headache. Individuals with very pigmented irides may require higher strengths. (Currently used for laser peripheral iridotomy)
- Pilocarpine 0.125%, 0.5%, 1%, 2%, 3%, 4%, 5%, 6%, 8%, 10% ophth soln
- Dosage: 1-2 drops 3-4 times daily.
- Pilopine HS 4% gel: apply ½ inch ribbon in conjunctival sac once HS
- Ocushert Pilo: system placed in eye. Changed weekly. Releases 20mcg/hr for 1 week.
- Carbachol: 0.75%, 1.5%, 2.25%, 3%. Dosage: 2 drops TID

**PROSTANOIDS**

Mechanism: lower IOP by increasing outflow of aqueous humor.

**Patient Education**

- Color changes to iris - will change blue to brown may be permanent
- Eyelash and eye lid changes - causes thickening
- All products are dosed once at bedtime in the affected eye.

**AVAILABLE PRODUCTS**

- Xalatan® (latanoprost) 0.005% (room temp for up to 6 weeks)
- Travatan-Z® (travoprost) 0.004%
- Lumigan® (bimatoprost) 0.03%
- Zioptan® (tafluprost) preservative free. Available in single use containers
- Latisse® (bimatoprost) the first drug approved for increasing eyelash growth. Takes about 8 weeks to work. Eyelashes return to “normal” a few weeks or months after stopping treatment. Darkens the iris and skin around the eyes. Wait 15 minutes before re-inserting contact lens.

**NSAIDS FOR THE EYE**

- Acular® ophth soln (ketorolac 0.5%). Rx only
  - Acular 15.0.4%: for ocular pain (stinging/burning) after corneal refractive surgery
  - Indication: Relief of ocular itching caused by seasonal allergic conjunctivitis.
  - Dosage: one drop QID
- Voltaren® ophth soln (diclofenac 0.1%) Rx only
  - Indication: post op inflammation after corneal extraction. Photophobia and pain after corneal refractive surgery. Worst for corneal melting
  - Adult dose: 1 drop QID beginning 24 hours post-op., for 2 weeks.
- Nevanac® ophth soln (Naproxen 0.1%) Rx Only
  - Indication: Post op pain and inflammation following cataract surgery
  - Adults: 1 drop TID 1 day before surgery and for 2 weeks post-op
- Bromday® ophth soln (bromfenac 0.09%) Rx only
  - Indicated for the treatment of postoperative inflammation and reduction of ocular pain in patients who have undergone cataract extraction
  - Adults: Instill one drop once daily beginning 1 day prior to surgery, 14 days post-op

**RX TREATMENT OF DRY EYES**

- Restasis® (cyclosporin 0.05% emulsion) available in boxes of 32 vials.
- Dosage: 1 drop in each eye BID
- Mechanism: Immunomodulator. Decreases inflammation in patients with keratoconjunctivitis, which causes a decrease in tear production.
- Indications for use: to increase tear production.
- Warnings/precautions/adverse effects: Caution with herpes keratitis. May see ocular burning 17%
- Single dose vials. Discard immediately after each use.
- Contact lens may be inserted 15 minutes after eye drops (patients with dry eyes are not ideal candidates for contact lens)
Oral meds causing ophthalmological conditions

Drugs causing corneal and conjunctival disturbances:
- Chlorpromazine
- Theophylline
- Chloroquine
- Hydroxychloroquine
- Lovastatin (progression of cataracts)
- Indomethacin
- Amiodarone

Drugs causing retinopathy
- Disease states: diabetes mellitus
- Methanol (moonshine)
- Chloroquine
- Indomethacin
- Tamoxifen
- Phenothiazines

Drugs causing optic neuropathy
- Ethambutol
- Chloroquine
- Quinine
- Quinidine

Drugs causing color visual disturbances
- Digoxin
- Oral contraceptives
- Viagra® (sildenafil)
- Ethambutol

Drugs causing eye disorders - IFIS

Intraoperative Floppy Iris Syndrome: The iris becomes flaccid and billows in response to intraoperative irrigation currents, causing the potential prolapse of the iris toward phacoemulsification incisions.
- Caused by: ALL Alpha-1 Blockers: examples: Flomax (tamsulosin), Cardura (doxazosin), Hytrin (terazosin)
- Ophthalmologists can modify their surgical techniques including using iris hooks, iris dilation rings, viscoelastic devices.
- Ophthalmologists MUST know before surgery that patient has been on alpha blocker therapy. Usual protocol is to stop the medication 7-10 days pre-op

Pharmacists Role in Eye Specific Meds

- knowing when to consult eye care practitioners based on symptomatology
- Knowing when not to delay therapy by contacting provider to switch medications that should not be switched:
  - Betaxolol versus timolol
  - Loteprednol versus Prednisolone acetate
  - Gatifloxacin versus ciprofloxacin

Med Error Alert
The #1 dosage form error is dispensing an ear drop for use in the eye.
(Oftoxacin otic for ophthalmic)
**Pharmacists role: Administration techniques for eye drops**

- If suspension, shake well. Wash hands before using!
- Do not touch tip to the eye
- Pull down on lower eyelid to expose conjunctival sac. **Preferable to drop in the middle of the conjunctival sac and not inner canthus**
- Multiple drops: the eye can only handle 1 drop at a time. Wait 5 minutes between drops. *(Note script should read 2 drops TID (1 drop will wash out the other)*
- May be beneficial to **hold lower lid for a minute after instillation and then** press finger against inner corner of eye for 1 minute to prevent rapid drainage into tear duct. *(Punctal occlusion)*
- Use tissue only to remove excess liquid form the eyelid.

**On the horizon**

- Rho kinase inhibitors

**Benefits**

- The inhibition of Rho kinase lowers the intraocular pressure by increasing the outflow through the trabecular meshwork.
- Increased blood flow to the optic nerve and a possible delay of optic nerve cell death has also been reported
- Notable side effect: transient hyperemia

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**Questions??**

- Type any questions in the chat box