**Treatment and Management of Ocular Inflammation and Allergy**

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**Disclosures**

Paid consultant for:
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**Types of Allergic Eye Disease**

- **Acute allergic conditions**
  - Seasonal Allergic Conjunctivitis (Hay Fever) - SAC
  - Perennial Allergic Conjunctivitis - PAC

- **Chronic allergic conditions**
  - Vernal Conjunctivitis - VKC
  - Atopic Conjunctivitis - AKC
  - Giant Papillary Conjunctivitis - GPC

*SAC and PAC are most commonly encountered by ODs*

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**Allergic Conjunctivitis**

- **Seasonal Allergic Conjunctivitis (SAC)**
  - Occurs during peak allergy seasons: (spring & fall)
  - Primarily caused by outdoor allergens – pollen (ragweed, mountain cedar), grasses
  - Produces hallmark signs and symptoms such as:
    - itching,
    - redness,
    - chemosis,
    - tearing and
    - lid swelling

- **Perennial Allergic Conjunctivitis (PAC)**
  - Milder than SAC
  - Occurs year round
  - Primarily an indoor disease
    - Environmental controls can be effective
  - Can become more severe with higher pollen counts
Response to Histamine

- Vasodilation
- Erythema
- Increased vascular permeability
- Edema
- Neural stimulation
- Itching
- Reflex loop increasing vascular permeability

Hallmark Clinical Signs

- Hyperemia
- Chemosis
- Lid edema
- Tearing

Mast Cell Cascade

Treatment of Ocular Allergy

**Medications:**

- Topical OTC drops
- Oral antihistamines (prescription and OTC)
- Topical NSAID drops
- Topical antihistamines
- Topical mast cell stabilizers
- Topical steroid drops
- Topical dual-action drugs (antihistamine/mast cell stabilizers)

Vasoconstrictors

- Alpha-adrenergic agonists and are commonly used topically for the relief of conjunctival redness
  - E.g. Phenylephrine, Naphazoline, Tetrahydrozoline, Oxymetazoline
  - Well known and widely used
  - Limited duration (<2 hours) limits their value when compared with the newer anti-allergy drops.
  - Do not interfere with the allergic reaction and do not relieve itching
  - May also result in rebound hyperemia
    - E.g. Visine, Naphcon, AK-Con, Murine

Ocular Allergy Medication Options

<table>
<thead>
<tr>
<th>Vasoconstrictors</th>
<th>Medicated Vasoconstrictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrahydrozoline HCl</td>
<td>Levocabastine (EMODINE™ solution)</td>
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<tr>
<td>Naphazoline HCl</td>
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<td>Phenylephrine HCl</td>
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<td>Oxymetazoline HCl</td>
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<tr>
<td>Naphazoline/Pheniramine</td>
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<td>Ketotifen</td>
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<td>Suppositories</td>
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</tr>
<tr>
<td>Ketorolac</td>
<td>Levocabastine (EMODINE™ solution)</td>
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</table>

- Topical OTC drops
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- Topical NSAID drops
- Topical antihistamines
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- Topical steroid drops
- Topical dual-action drugs (antihistamine/mast cell stabilizers)
Antihistamines

- Have traditionally been first line in the treatment of ocular allergy.
- H1-receptor competitive antagonists
- First generation have good safety record
  - limited duration and potency (pheniramine and antazoline). Available in OTC drops.
- Newer H1 have longer duration (4-6 hrs) and are better tolerated than previous generation
  - Levocabastine (Livostin) bid-qid in patients ≥12
  - Emedastine (Emadine) bid-qid in patients ≥3
- FDA approved:
  - Bepotastine (Bepreve)
  - Twice day dosing for ocular itching in patients 2 or older
- Topical agents provide faster relief of ocular symptoms compared to oral agents
  - orals also have increased side-effects including dry mouth, dry eye, blurred vision, etc

Mast Cell Stabilizers

- Inhibit mast cell degranulation by interrupting normal chain of intracellular signals resulting from the crosslinking and activation by allergen.
- Several available for use in the eye:
  - cromolyn sodium 4% (Crolom)
  - nedocromil sodium 2% (Alocril)
  - Lodoxamide (Alomide)
  - Pemirolast (Alamast)
- Cromolyn was first available
  - 1-2 drops and dosing is 4-6 times daily,
  - with a loading period of 7 days
  - has only partial inhibitory action and limited efficacy.
- Nedocromil is more potent
  - BID dosing.
- Lodoxamide
  - 2500 X more potent than cromolyn!!!
  - 1-2 drops tid-qid for up to 3 months in patients 3+ indicated for VKC and allergic conjunctivitis.
- Pemirolast
  - approved for QID dosing and proven to be effective in mast cell stabilization.

Dual-Action

- Trend is dual mechanism molecules
  - inhibit histamine release from mast cells
  - completely inhibits histamine binding to H1 receptors.
- Provides relief by immediate histamine receptor antagonism
  - also stabilizing future mast cell degranulation.
- Olopatadine:
  - [Patanol [0.1%], Pataday [0.2%], Pazeo [0.7%]]: Patanol and Pataday are now OTC
  - Bepotastine: Bepreve bid dosing
  - Alcaftadine: Lastacaft qd dosing

Tx: NSAID’s

- Mechanism of action via inhibition of the COX enzyme
  - blocks the synthesis of prostaglandins (in particular PGD2) which is known to incite significant and immediate allergic symptomatology.
- Ketorolac (Acular) proved to be effective and well tolerated at QID dosing for 2 weeks and then bid-tid as needed for itching.
  - Not as effective as olopatadine (qd or bid).
- Diclofenac sodium was also shown to have some effects in controlling S&S of seasonal and VKC.
Oral Antihistamines

- Oral medications may be indicated for ocular findings associated with additional systemic symptoms such as runny nose.
- Studies have shown poor efficacy in the relief of ocular findings in comparison to topical treatment.
- Options include both OTC and Rx.

Oral Allergy Medications

- Oral antihistamines (pills and liquids) ease symptoms such as:
  - swelling,
  - runny nose,
  - itchy or watery eyes, and
  - hives (urticaria).
- Some oral antihistamines may cause dry mouth and drowsiness.
- Older antihistamines such as diphenhydramine (Benadryl), chlorpheniramine (Chlor-Trimeton), and clemastine (Tavist) are more likely to cause drowsiness and slow reaction time.
  - these sedating antihistamines shouldn't be taken when driving or doing other potentially dangerous activities.

1st Gen Oral Antihistamines

- Classified According to Sedation Levels:
  - Mildly Sedating
    - Brompheniramine (Generic)
  - Moderately Sedating
    - Clemastine (Tavist)
  - Strongly Sedating
    - Diphenhydramine (Benadryl)
    - Promethazine (Phenergan)
- Most appropriate optometric use is for controlling allergic symptoms during sleep due to heavy powers of sedation.
- Use at night can result in "Drug Hangover" effect.

1st Generation Antihistamines - Benadryl

- Beneficial for temporary treatment of acute case of contact dermatitis.
- Topical formulas are available.
- Dosage: 50 mg TID – QID adults.
- 25 mg TID-QID kids.
- Onset: within minutes with peak at 1 hour and 6-12 hour duration of action.
- Pregnancy category B.

1st Generation Oral Antihistamines Contraindications

- Relatively contraindicated in patients with peptic ulcer disease, prostate hypertrophy, bladder obstructions, or narrow angles due to the anti-cholinergic properties.
- Avoid mixing with:
  - Anti-cholinergics and adrenergic agonists
  - CNS depressants (barbiturates, benzodiazepines such as Valium and Xanax)
- Elderly and those with liver dysfunction have higher risks for side effects.
- Nursing mothers?
  - Follow pregnancy categories closely and work with the patients OB/GYN.

2nd Generation Oral Antihistamines

- Minimal cholinergic blocking and minimal sedation effects.
- 2nd generation antihistamines are less lipid soluble and cannot penetrate the blood brain barrier as effectively.
- Same side effects are still possible but usually much less than 1st gen drugs.
- Include:
  - Fexofenadine (Allegra)
  - Loratadine (Claritin)
  - Desloratadine (Clarinex)
  - Cetirizine (Zyrtec)
  - Levocetirizine (Xyzal).
2nd Generation Antihistamines

- No major contraindications besides hypersensitivity
- Antacids may block absorption and erythromycin may increase bioavailability
- If taken in doses exceeding the recommended values, CNS side effects will likely occur
  - All may potentiate psychotropic medications to some degree
- Always use caution and consider dose adjustment in patients with kidney or renal failure
- If symptoms are not controlled with one 2nd generation antihistamine, often success can be found with another

Additional Use of Antihistamines

- Essential Myokymia (Eyelid Twitching)
  - Relatively mild contractions of the orbicularis muscle
  - Usually unilateral
  - Idiopathic; linked to:
    - Fatigue, stress, anxiety and caffeine
  - Findings are benign and not progressive
    - Frequently resolve in a few hours to weeks
  - Antihistamines have been clinically shown to cause relief of mild symptoms
    - Occurs by prolonging the refractory time of the orbicularis

Intranasal Medications

- Studies do confirm that ocular symptoms are relieved somewhat by nasal medications (corticosteroids)
- These studies show that nasal medications do give better relief of ocular symptoms than oral medications but not as beneficial as topical ophthalmic drugs
- Intra-nasal sprays plus ophthalmic drops give the more benefit and the fewer side effects than oral antihistamines

Steroids

- Indications for Ocular Steroids
  - Eyelid edema, chalazia, dermatitis, burns
  - Conjunctiva, conjunctivitis (various types), mucocutaneous lesions, burns
  - Cornea: edema, graft rejection, rosacea keratitis, herpes simplex (stromal) keratitis, herpes zoster keratitis, postherpetic neuralgia, infiltrates, marginal ulcers, burns
  - Uvea: iridocyclitis, uveitis, traumatic hyphema, sympathetic ophthalmia
  - Sclera: episcleritis, scleritis
  - Retina: vasculitis, choroiditis
  - Optic Nerve: neuritis, temporal arteritis
  - Pupil: exophthalmia, pseudotumor cerebri, Grave’s ophthalmopathy

Contraindications of Steroid Use

- Three instances in which we would NOT consider using steroids by themselves, although it may be appropriate to use a steroid-antibiotic combination:
  - 1. Avoid steroids when treating an acute bacterial or fungal infection, mainly because steroids do not possess antimicrobial properties.
  - 2. Steroids are contraindicated when there is a significant corneal-epithelial defect.
  - 3. Steroids are contraindicated when you’re unsure of the diagnosis.
Corticosteroids and Inflammation

- Anti-inflammatory agents that inhibit all aspects of the inflammatory response!
- Does not matter what the cause of the inflammation is – allergic, bacterial, viral, injury – always acts in a non-specific nature!
- Stop the inflammation but doesn't do anything to “fix” the underlying problem.

Specific Actions on Inflammation

- Inhibit the actions of other cells that modulate inflammation
- Inhibit the release of histamine from the basophils and mast cells
- Inhibit phospholipase A<sub>2</sub> to block the production of arachidonic acid (NO PROSTAGLANDINS OR LEUKOTRIENES)

Specific Actions on Inflammation

- Influence tissue regeneration and repair
  - Reduce collagen deposition, thus reduce scarring
  - Decrease fibroblast proliferation
  - Decrease vascular permeability

Ophthalmic Topical Steroids

Case

- 30 BF presents with eye pain in both eyes for the past several days
  - Severe pain (8/10)
  - Never had eye exam before
- PMHx:
  - Has chronic bronchitis
  - Rash on legs
  - Has recently lost weight and has a fever
  - Taking aspirin for pain

Ocular Health Assessment

- VA: 6/9 (20/30) OD, OS
- PERBL
- PTTF
- EOM with eye pain in all quadrants
- 3+ injection
  - 3+ cells and trace flare
  - deposits on endo (see photo)
- IOP: 18, 18 mmHg
- DFE:
  - see attached fundus image and fluorescein angiography
Helpful Mnemonic

- Mnemonic for acute forms of non-granulomatous uveitis: **BLAIR G**
  - B: Behcet’s disease
  - L: Lyme disease
  - A: Ankylosing spondilitis
  - I: Irritable bowel syndrome (Crohn’s)
  - R: Reactive arthritis
  - G: Glaucomatocyclitic crisis

Uveitis

- Clinical findings of:
  - circumlimbal hyperemia,
  - cells and flare in the aqueous and anterior vitreous, and
  - keratic and trabecular precipitates

Bioavailability of Topical Steroids

- Ophthalmic steroids have vast differences in their ability to penetrate the cornea and in the distribution/metabolism they undergo once in the structures.
- Very important factor for topical therapy is the derivative the active medication is formulated in.

Topical Derivatives

- The derivative can significantly alter the solubility, ocular penetration, formulation, and efficacy of the active medication.
- Bioavailability will also depend on the status of the corneal epithelium.
- Commonly used derivatives include:
  - Acetate: Increased Lipophilic Nature (Acetate > Alcohol)
    - Should penetrate intact cornea better
  - Alcohol: Increased Hydrophilic Nature
    - Should penetrate an absent epithelium cornea better
  - Salts such as sodium phosphate or hydrochloride
    - Ex) Prednisolone phosphate vs. prednisolone acetate.

Types of Topical Steroids

- Ketone Based
  - Ex) Prednisolone and Dexamethasone
  - Long half-life in tissues (body cannot break down ketones as easily)
  - Higher risk for side effects

- Ester Based
  - Ex) Loteprednol
  - Enzymatically degraded quickly in the body (due to high amounts of esterases)
  - Less risk for side effects

Prednisolone

- Synthetic analogue of cortisol.
- Formulated in acetate and sodium phosphate derivatives.
  - Acetate has greater efficacy due to increased affinity for the steroid to its receptor caused by the substitution on the 21\(^{st}\) position.
- Available in 0.125% and 1% concentrations.
  - Increasing the concentration to higher levels than 1% does not enhance the anti-inflammatory effect.
  - Minimal use for 0.125% in clinical cases.
**Prednisolone Acetate**
- Drug of Choice for the Treatment of Uveitis.
- Available as a suspension only (must shake).
- Available generically and brand name.
  - Brand Names 1%: Pred Forte (Allergan)
  - Brand Names for 0.125%: Pred Mild (Allergan)
- Available in 1, 5, 10, and 15 mL bottles.
- Use in Kids has not been established.

**Prednisolone Phosphate**
- Not used as commonly as Prednisolone Acetate due to decreased efficacy.
- Solution, unlike prednisolone acetate.
  - Available in 1% and 0.125%
- Primarily used to treat ocular surface conditions:
  - E.g. allergic conjunctivitis, episcleritis, punctate epithelial keratopathy

**Dexamethasone**
- Drug of second choice due to greater risk of side effects and less efficacy at available dosages.
  - Most commonly used in combination with antibiotics.
- Available in a 0.1% concentration in a drop and ointment.
  - Dexamethasone alcohol is a suspension
- Also available as implant (Ozurdex™)
- Management of steroid-responsive inflammatory conditions such as allergic conjunctivitis, iritis, or cyclitis, symptomatic treatment of corneal injury from chemical, radiation, or thermal burns, or penetration of foreign bodies. The ophthalmic solution is also indicated for otic use to treat steroid-responsive inflammatory conditions of the external auditory meatus.

**Fluorometholone**
- Fluorinated structural analogue of progesterone.
  - Moderate strength steroid in comparison with minimal risk of IOP spike, thus good for chronic therapy.
- Formulated as alcohol and acetate derivative in 0.1% and as alcohol derivative in 0.25% concentration.
  - FML Forte is fluorometholone alcohol 0.25% but it offers no clinical advantage over lower concentration and is rarely used.

**Fluorometholone**
- Fluoromethalone alcohol 0.1%
  - Suspension is Brand Name: FML
  - Ointment also available.
  - Okay for use in 2 years and up.
- Fluoromethalone acetate 0.1%
  - Suspension is Brand Name: Flarex (Alcon)
  - Clinically fluorometholone acetate is about at the ½ way point in efficacy compared to fluorometholone alcohol and prednisolone acetate.
**Rimexolone (Vexol®)**
- Treatment of postoperative inflammation following ocular surgery; treatment of anterior uveitis
- Not as great of efficacy as Prednisolone acetate despite same concentration of 1%.
- Less IOP response seen.
- Instill 1 to 2 drops in conjunctival sac of affected eye every hour during waking hours for the first week, then 1 drop every 2 hours during waking hours of the second week, and then taper until uveitis is resolved

**Loteprednol Etabonate**
- "Soft Drug" analogue of prednisolone.
- Only ester based topical steroid available.
- Acts quickly at site of inflammation, then quickly metabolized to its inactive form.
- Decreased risk of side effects, although they do occur.
- Pregnancy Category C medications.
- Available in two concentrations: 0.2% and 0.5%

**Loteprednol Etabonate 0.2%**
- Brand Name: Alrex (Bausch and Lomb)
- No Generic Available.
- Very Mild Steroid.
- FDA Approved:
  - Seasonal Allergic Conjunctivitis
  - Instill 1 drop into affected eye(s) 4 times daily.
  - Available in 5 and 10 mL bottle.

**Loteprednol Etabonate 0.5% Suspension**
- Brand Name: Lotemax (Bausch and Lomb)
- No Generics Available.
- FDA Indications:
  - Post Operative Inflammation
  - Any Eye Inflammation Responsive to Steroids
  - Suspension available in 2.5, 5, 10, and 15 mL bottles.

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### Relative Efficacy Comparison
*According to Melton and Thomas: Clinical Guide to Ophthalmic Drugs*

<table>
<thead>
<tr>
<th>Medication</th>
<th>Clinical Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone 1%</td>
<td>1</td>
</tr>
<tr>
<td>Prednisolone 0.125%</td>
<td>2</td>
</tr>
<tr>
<td>Loteprednol 0.2% (Alrex)</td>
<td>2.5</td>
</tr>
<tr>
<td>Fluorometholone alcohol 0.1% (FML)</td>
<td>3</td>
</tr>
<tr>
<td>Dexamethasone 0.1%</td>
<td>4</td>
</tr>
<tr>
<td>Fluorometholone acetate 0.1% (Flarex)</td>
<td>4</td>
</tr>
<tr>
<td>Rimexolone 1%</td>
<td>4.5</td>
</tr>
<tr>
<td>Loteprednol 0.5% (Lotemax)</td>
<td>4.5</td>
</tr>
<tr>
<td>Prednisolone Acetate 1% (Pred Forte)</td>
<td>5</td>
</tr>
</tbody>
</table>

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**Durezol**
- Difluprednate ophthalmic emulsion 0.05%
  - Ketone based derivative of Prednisolone
- FDA Approved for Post Op Inflammation and Pain (first steroid with pain approval).
  - Dosage: QID X 2 weeks, BID X 1 week, Taper
- FDA approved for treating Uveitis
  - Dosage: One drop QID
  - "Double the Strength of Pred Forte"
- Available in 5 mL bottle only
Durezol

- Use for uveitis has shown great clinical success with less dosing frequency than PA1%.
- Comparison of Durezol QID to Pred Forte q2hours showed equivalent resolution of anterior chamber cells.
- Also showed increased resolution of pain and photophobia at this lower dosage.
- Side Effects are similar to other steroids, BUT increased likelihood of Acute IOP Spike.
  - Also included: Corneal Edema, Hyperemia, Reduced VA, and Ocular Discomfort

Patient Case

- 35 WM presents to clinic because his right eye doesn’t feel right
  - Currently being treated by another clinic for an “undiagnosed” corneal problem and they couldn’t work him into their schedule that day
  - Patient is taking Durezol QID OD and has been for past month
  - VA: 6/6 OU
  - SLE: unremarkable
  - IOP: 28 OD, 11 OS

Pearls to Prescribing Topicals

- Topical Tapering
  - Taper by about 50% once the inflammation is controlled.
  - Example:
    - if taking q1hour for 3 days
    - Begin q2hours for 3 days
    - QID for 3 days
    - TID for 3 days
    - BID for 3 days
    - Daily for 3 days
  - Any rebound inflammation means you must return to the previous level where inflammation was under control.

Ocular Side Effects

Posterior Subcapsular Cataracts

- Frequency is directly related to dosage and duration of therapy, as well as the age/demographics of the patient.
- Therapy for 1 - 4 years and incidence of cataracts:
  - Dosage of < 10 mg/day = 12%
  - Dosage of 10-15 mg/day = 30%
  - Dosage of > 15 mg/day = 80%
- Cataracts occur faster and at lower doses in children receiving steroids and more frequently in Hispanics than other races.
- Diabetes patients are also more at risk.

Ocular Hypertension or Glaucoma

- Increase in IOP occurs in both normal and glaucomatous eyes.
- Greatest frequency is in eyes with PDAG or in children of glaucoma patients.
- Degree of Response seems to have Genetic Link
  - ~70% of first degree offspring will have an IOP elevation of at least 5 mmHg
- Other Risk Factors Include:
  - Patient Age
  - Myopia of 5D or more
  - Krukenberg’s Spindle
IOP Steroid Response
- Occurs much more frequently with topical therapy than systemic therapy.
- Topical Steroids should be used with extreme caution in Glaucoma Patients (Must monitor IOP more closely).
- Usually within 2 – 8 weeks of initiating therapy.
- Generally reversible – return to original levels within 1-3 weeks after administration is terminated.
- Different Medications show different Results:
  - Factors Include: Bioavailability, Half-Life, Susceptibility to Metabolism, Concentration, Frequency of dosing, and Length of Administration.

Ocular Side Effects
- Infection
  - Prolongs Healing Time
  - Masks Signs that the Condition is Worsening
  - Enhanced risk of superinfections from bacteria, fungal, or viral causes.
  - Contraindicated for Use In:
    - Herpes Epithelial Keratitis
    - Avoid in Significant Epithelial Compromise
    - Avoid in Acute Onset Bacterial Infections

Anti-Inflammatory Efficacy
- Cortisol (Hydrocortisone) is the standard of comparison for glucocorticoid potency and is always given a relative anti-inflammatory activity of 1.
- All of the other medications are given rankings that allow direct comparison.
  - Ex) Prednisone has a relative anti-inflammatory efficacy of 4.
- Much easier to compare for systemic medications than topical because of the vast differences in tear films, drop delivery, etc.

Systemic Steroids

<table>
<thead>
<tr>
<th>Generic Name of Medication</th>
<th>Anti-Inflammatory Activity</th>
<th>Equivalent Dose (mg)</th>
<th>Relative Sodium Retaining Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>1.0</td>
<td>20 mg</td>
<td>1.0</td>
</tr>
<tr>
<td>Prednisone</td>
<td>4.0</td>
<td>5 mg</td>
<td>0.8</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>4.0</td>
<td>5 mg</td>
<td>0.8</td>
</tr>
<tr>
<td>Triamcinolone</td>
<td>5.0</td>
<td>4 mg</td>
<td>0.0</td>
</tr>
<tr>
<td>Methylprednisolone</td>
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<td>4 mg</td>
<td>0.0</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>25.0</td>
<td>0.75 mg</td>
<td>0.0</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>25.0</td>
<td>0.75 mg</td>
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</table>
Bioavailability of Systemic Steroids

- Corticosteroids are readily absorbed from the intestinal tract, which is why oral dosages are commonly used.
- Nearly every tissue in the body has a receptor for glucocorticoids.

Why Do We Taper Steroids?

- Prevent Rebound Inflammation
- Synthetic steroids result in less production of natural steroids.
- Tapering allows the body to slowly begin producing again, without risking abnormally low levels in the body from occurring.
- If any antigen is left a massive reaction will occur and lead to severe inflammatory responses.
- Some patients will never be able to be fully tapered from their steroid medications.

Systemic Tapering

- If a reduction in dosage is followed by an increase in inflammation at any stage, dosage should be increased to the initial level & tapered more slowly.
- Reduction in dose in graduated decrements at intervals of 3 to 4 days.
  - 10 mg steps for larger doses
  - 2.5 mg steps for smaller doses
- When 15-20 mg is reached should maintain dose for 1-2 weeks to prevent flare ups of the inflammation and continue with smaller decrements.
- When 5 mg/day of prednisone level is reached, steroid can be switched to hydrocortisone 10 mg/day with subsequent dosage reductions of 2.5 mg/week of hydrocortisone (available in 5, 10, 20 mg tablets).

Tapering Systemic Medications

- Medrol Dose Pack (Methylprednisolone) – 4 mg pills
  - Provided with dosage for 6 days of treatment.

Indications for oral and IV steroids

- Inflammation of the posterior segment, optic nerve, or orbital tissues
  - Stubborn anterior uveits
  - Posterior uveits and/or chorioretinitis
  - Scleritis
  - Artirctic Ihecemic Optic Neuropathy – temporal arteritis
  - Optic neurits
  - Orbital inflammatory pseudotumor
- Also recommended for hypersensitivity reactions
  - Contact dermatitis, etc

Systemic Corticosteroids

- Often grouped based on duration of action:
  - Short acting: Hydrocortisone and Cortisone
  - Intermediate acting: Prednisone, Prednisolone, Methylprednisolone, and Triamcinolone
  - Long acting: Dexamethasone
- The shorter-acting medications have less effect on the HPA axis.
- Most commonly used oral steroid by Optometrists:
  - Prednisone
- Most commonly used IV steroid by Optometrists:
  - Methylprednisolone
Systemic Corticosteroids

- Prednisone
  - Available as Oral: 1, 2.5, 5, 10, 20, 50 mg tablets and 1 and 5 mg/mL solution and syrup

- Ocular Treatment Guidelines:
  - Mild to Moderate: Initial dose of 20-40 mg
  - Moderate to Severe: Begin with 60 mg and increase if necessary
  - Specific Conditions: Giant Cell Arteritis
    - 80-100 mg Prednisone
    - Consider IV Methylprednisolone 250 mg IV q6hours for 12 doses

Side Effects of Systemic Corticosteroids

- Incidence increases with long-term high-dose therapy.
- Length of use has greater link to developing side effects than dosage amount.

Side Effects of Systemic Steroids

- Metabolic Effects:
  - Hyperglycemia can occur
  - Increased appetite, Weight Gain, and Redistribution of fat
  - Decreased calcium absorption – leads to Osteoporosis
  - Hyperlipidemia

- Mineralocorticoid Effects:
  - Fluid Retention (Increased Sodium Retention)
  - Hypertension
  - Edema (if liver/kidneys can’t keep up)

- CNS Symptoms: Euphoria, Insomnia, Psychoses, Depression, and Restlessness

Thank You!
blonsberry@pacificu.edu