Systemic Steroids, NSAIDs and Antihistamines

Corticosteroids

- Hypothalamus releases corticotropin releasing hormone (CRH)
- This stimulates the pituitary gland to release ACTH (adrenocorticotropic hormone/corticotropin)
- This results in the stimulation of the adrenal system to produce corticosteroids from cholesterol
- Negative feedback mechanism for the production of more corticosteroids

Adrenal Corticosteroids

- The adrenal corticosteroids include:
  - Glucocorticoids such as cortisol to maintain the body's metabolism and resistance to stress
  - Mineralocorticoids such as aldosterone control the body's water volume and sodium/potassium
  - Androgens (anabolic steroids) such as testosterone and the precursor dehydroepiandrosterone (DHEA)
- The body usually produces about 10-20 mg of cortisol per day but can increase or decrease this amount – negative feedback loop
Corticosteroids

• We use corticosteroids for the glucocorticoid effect

• And would like minimal changes to mineralocorticoid levels

• Nearly every tissue in the body has a receptor for glucocorticoids which almost guarantees side effects

• Corticosteroids:
  • Anti-inflammatory but also gives increased blood glucose levels among many other effects

Corticosteroids and Inflammation

• Corticosteroids are anti-inflammatory agents that inhibit all aspects of the inflammatory response...

• Regardless of what the cause of the inflammation is – allergic, bacterial, viral, injury, etc

• Stopping the inflammation is great short term but doesn’t do anything to fix the underlying problem

How do steroids work?

• Inhibit the arachadonic pathway
  • Inhibit phospholipase A₂ to block the production of arachadonic acid
  • Which inhibits Leukotrienes and prostaglandins
How do steroids work?

- Inhibit the activity of almost all inflammatory cells by down-regulating their mRNA (and subsequent cytokines, oxygen radicals, etc)
  - Inhibit macrophages and peripheral lymphocytes (T/B Cells)
  - Decrease the activity of eosinophils, basophils, and mast cells
  - Decrease fibroblast proliferation
  - Reduce collagen deposition, thus reduce scarring

Anti-inflammatory Efficacy

- Cortisol (hydrocortisone) is the standard of comparison for glucocorticoid potency and is given an anti-inflammatory score of 1
- All of the other medications are given relative scores that allow direct comparison
  - 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.

<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>
<td>5.0</td>
<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>
<td>0.0</td>
</tr>
</tbody>
</table>
Bioavailability of Systemic Steroids

- Corticosteroids are readily absorbed from the intestinal tract which makes oral dosages very effective
- They are metabolized by the liver (must consider function before prescribing) and excreted via the kidneys
- Long term steroid treatment must be tapered to avoid side effects
  - Even at doses as low as 15 mg of prednisone if the patient has been dosed for several weeks

Systemic Corticosteroids

- Prednisone
  - Available as Oral: 1, 2.5, 5, 10, 20, 50 mg tablets (1 and 5 mg/mL solution and syrup, if needed)
- Ocular Treatment Guidelines
  - Mild to Moderate: Initial dose of 20-40 mg
  - Moderate to Severe: 40 – 60 mg
  - Severe: 60-100 mg
- IV Methylprednisolone 250 mg IV q6hhours for 12 doses for arteritic ischemic optic neuropathy (giant cell arteritis)
- Similar dose given for active optic neuritis 2nd to MS

Steroid Treatment Pearls

- Specific type and location of inflammation determine route of administration
  - i.e. treat the problem!
    - Topical, Systemic, Periocular, Intravitreal, etc.
- Must institute treatment immediately and at a high enough dose and frequency to suppress the inflammation
Indications for oral and IV steroids

- Inflammation of the posterior segment, optic nerve, or orbital tissues
  - Stubborn anterior uveitis
  - Posterior uveitis and/or chorioretinitis
  - Scleritis
  - Arteritic Ischemic Optic Neuropathy – temporal arteritis
  - Optic neuritis
  - 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 adrenal cortex

- Most common oral steroid used by optometrists: Prednisone

- Most common IV steroid used by optometrists: Methylprednisolone

Why Taper?

- To prevent rebound inflammation
  - Corticosteroids reduce the quantity and activity of leukocytes
  - Stopping cold turkey causes these white cells will proliferate and increase the production of inflammatory cytokines
  - This means more steroids for a longer period of time which increases the risk of side effects
Why Taper?

- Allows the adrenal cortex to resume natural steroid production
- Synthetic steroids in the body result in less production of adrenocorticotropic hormone (ACTH) from the pituitary gland and fewer natural steroids
- Tapering allows the adrenals to begin producing steroids again without a period of abnormally low levels
- If low levels occur, weakness, hypotension and lack of inflammation control can result

What is the “right way” to taper oral prednisone?

- Tapering is VERY case specific – no cookie-cutter method
- If the inflammation is mild and a low dose oral steroid is prescribed for less than a week, tapering is usually not needed
- Do NOT start tapering until the inflammation is resolved
- Begin tapering by 20 mg with each next step no less a length of time than the original dose…for example…
  - It took 80 mg of oral prednisone x 4 days to quell your patient’s scleritis
  - Taper to 60 mg x 4 days; then to 40 mg x 4 days; 20 mg x 4 days; 10 mg x 4 days
  - Can consider 5 mg x 4 days

Medrol Dose Pack (Methylprednisolone)

- 4 mg pills
- Dosed for 6 days of treatment with built-in taper
Another example...

- Contact dermatitis
- Prescribe 60 mg oral prednisone (20 mg tab tid) x 3 days
- Then drop to 40 mg (20 mg tab bid) x 3 days
- Then 20 mg tab x 3 days
- Then 10 mg tab x 3 days

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
Medication Interactions

• Increased metabolism of steroids occurs with:
  • Phenytoin (Seizure Medication)
  • Barbiturates (CNS Depressants such as Phenobarbital)

• May reduce the effect of anticoagulants

Therapy Considerations

• Diabetics
  • Educate all Type 2 Diabetics that their blood sugar will likely become elevated
  • Educate all Type 1 Diabetics they made need to alter their insulin levels

• Peptic Ulcers
  • Consider prescribing an H2 Blocker or a Proton Pump Inhibitor if prednisone dose ≥60 mg or ≥30 mg over 2 weeks
    • PPIs: Omeprazole (Prilosec), Esomeprazole (Nexium), and Lansoprazole (Prevacid)
    • H2 Blockers: Cimetidine (Tagamet), Famotidine (Pepcid), and Ranitidine (Zantac)

Steroid Considerations

• Also use caution in patients with:
  • Any Infectious disease
  • Pregnancy (Orals are Category C)
  • Chronic renal failure
  • Congestive Heart Failure
  • Systemic Hypertension
  • Osteoporosis
  • Psychoses
• Unlike steroids, NSAID's have only one mechanism for decreasing inflammation.
  • Inhibit the enzyme cyclooxygenase which produces prostaglandins, prostacyclins, and thromboxanes from Arachadonic Acid.

Cyclooxygenase Enzymes

COX 1
  • Stimulated continuously by normal body physiology
    • Major player involved in secretion of mucus in the stomach and controlling blood flow to the kidneys.

COX 2
  • Induced as the result of an immune response to cause higher levels of prostaglandins.

NSAIDs as analgesics

• Pain occurs when specialized nerve endings in peripheral tissues (nociceptors) are stimulated.
  • Nociceptors exist in high levels in the eye and orbit.

• Nociceptors are activated in response to mechanical stimulation (trauma) and chemical compounds such as serotonin, bradykinin, and histamine.
  • Prostaglandins and leukotrienes further sensitize the nerve endings to these mediators.
Systemic NSAID’s

• NSAID’s are the drug of choice for treating mild to moderate ocular pain.
  • Very beneficial for treating systemic inflammation as well.

• All NSAID’s are rapidly absorbed from the GI tract, highly bound in the plasma, and capable of crossing the blood brain barrier.

• Exhibit a “ceiling effect” – there is a dosage beyond which no further analgesia occurs.
  • Produce no tolerance or dependence, increasing their safety profile.

• Variability exists in patient responses to NSAID’s
  • No definitive recommendation on treatment can be given.
  • If one NSAID does not work – TRY ANOTHER.

Major Classes of NSAID’s

• Commonly Used:
  • Aspirin (ASA) and Other Salicylates
  • Propionic Acids
  • Indoleacetic Acids
  • COX-2 inhibitors

• Rarely Used NSAIDs in Optometry Include:
  • Oxicam Derivatives
    • Piroxicam (Feldane) and Meloxicam (Mobic)
  • Fenamates
    • Meclofenamate (Meclomen)
  • Acetic Acids
    • Ketorolac (Toradol) and Etodolac (Ludne)

NSAID’s

• NSAID selection depends on multiple factors:
  • Clinical experience
  • Patient convenience or preference
  • History of favorable analgesic effect
  • Side effects
  • Cost

• The medications with the most effective analgesia are generally those with rapid onset of action.
NSAID Contraindications

- Children/Teenagers following a viral infection - aspirin
  - Associated with Reye's syndrome (post-infectious encephalopathy).
- Adult asthma (aspirin)
- History of upper GI disease
- Avoid in patients with bleeding disorders
- Avoid in patients who have had recent intraocular surgeries
- Should not be used during pregnancy.
- Chronic renal or hepatic disease.

Aspirin (ASA)

- Weak organic acid.
- Oldest non-opioid analgesic available today.
  - Reduces pain by inhibiting synthesis of the prostaglandin E2 by irreversible acetylation and inactivation.
  - Has some CNS effect on pain by acting on the hypothalamus.
- Very good anti-inflammatory and antipyretic properties.

Aspirin

- Largely replaced as treatment for pain associated with inflammation by the other classes of NSAID's due to the frequent side effects.
  - GI Distress: Inhibit prostaglandin synthesis and the production of a mucous lining on the stomach leading to increased gastric acid secretion.
- Symptoms include:
  - Dyspepsia
  - Nausea
  - Vomiting
  - Abdominal Cramping
  - Ulcerations/Bleeding/Perforation
Propionic Acids

- Most commonly used and largest class of NSAIDs.
- Mechanism of action is similar to ASA.
  - Metabolized in the liver and excreted in the urine.
- Superior analgesic efficacy over ASA with less incidence of side effects.
- Includes: Ibuprofen, Naproxen, Ketoprofen, Oxaprozin, and Fenoprofen.

Ibuprofen

- Adult analgesic dose: 200-400mg q4hours
  - Maximum Dosage: 2400 mg/day for pain (approved for 3200 mg/day in arthritis treatment)
- OTC: 200 mg tabs
- Rx: 300, 400, 600, 800mg tabs
- Peak levels 1-2 hours
- Most renal toxic of all the NSAID's
- Brand Names: Motrin, Advil, and Nuprin

Naproxen and Naproxen Sodium

- Sodium speeds up the absorption over Naproxen (Naprosyn) alone causing it to be used more frequently.
- Adult Dose: 550 initial dose, followed by 220 - 275mg q6-8h or 550mg q12hours.
  - Maximum Dose: 1375mg/day
- OTC: 220mg tablets (Aleve)
- Rx: 275 and 550 mg tablets (Anaprox)
Ketoprofen

• Adult dose:
  • 25-50mg q6-8 hours for pain
  • Maximum Dose: 75 mg/day
  • 50 – 100 mg TID for inflammation
  • Maximum Dose: 300 mg/day – limited to 7-14 days

• OTC: 12.5mg not available
• Rx: 25, 50, 75, 100mg
• Brand Name: Orudis
• Shown to have a higher risk of GI side effects than other NSAID’s such as ibuprofen.

Indoleacetic Acids: Indomethacin

• Adult Dosage: 25-50 mg TID

• Rx Only: 10mg - 75mg capsules

• Mainly used as a short term anti-inflammatory especially for conditions that do not respond to less toxic NSAIDS.
  • Indomethacin has a very high level of intolerance compared to other NSAID’s.

• Oral NSAID most widely used in Tx of ocular inflammation.

Systemic NSAID
Uses: Scleritis

• NSAID’s are Treatment of Choice per many sources
  • Ibuprofen 400-600 mg QID
  • Naproxen 250-500 mg BID
  • Indomethacin 25 mg TID
Side Effects of Oral NSAID's

• Very similar to the side effect profile of ASA.
  • GI Effects
    • Profile is dependent on COX selectivity.
    • Consider using PPI’s while treating with NSAID or ASA.
  • CNS problems such as headache, confusion in the elderly, and loss of short-term memory.
  • Inhibit platelet function
    • Only while a high concentration exists in the body.
  • Risk of triggering asthma attacks is less with NSAID’s than what is found with ASA.

• NSAID’s are excreted from the body via urine. Must monitor kidney function.
  • NSAID’s block prostaglandins to the kidney which causes renal blood flow to decrease and increases the retention of sodium and fluid.
    • Risk factors for damage include:
      • Dehydration
      • Hypertension
      • Congestive Heart Failure
      • Use of ACE Inhibitors
      • Advanced Age
    • This will effect Cardiovascular homeostasis – can exacerbate heart failure.

NSAID Drug Interactions

• NSAID’s are well known to displace medications from sites on plasma proteins and alter their metabolism/excretion.

• NSAID’s inhibit platelet aggregation and can significantly increase the risk of bleeding if used along with anticoagulants such as warfarin.

• Antihypertensive agents such as ACE inhibitors, diuretics, and beta blockers may have decreased effectiveness.
  • Interaction is highly variable and difficult to predict.
Cox-2 Inhibitors

• Selective agents for only COX-2 designed to protect the GI system from the side effects seen with NSAID's.

• Major agent available on the market is Celecoxib (Celebrex).
  • Other agents Valdecoxib (Bextra) and Rofecoxib (Vioxx) were removed from the market due to increased risk of heart attacks and strokes.

• It is approved for the treatment of osteoarthritis and rheumatoid arthritis.
  • Dosage: 100 mg BID or 200 mg daily

COX-2 Selective Agents

• Must avoid use in patients with cardiovascular risk factors.
  • Studies have shown that the greater the Cox-2 selectivity the greater the risk for hypertension from NSAID's.

• Celebrex has still been shown to cause GI bleeding in patients at risk and should not be consider "safe".

Allergic Eye Disease

• Hallmark Symptom: ITCHING!!!

• 20-30% of Americans are symptomatic with allergies although almost 3 in 5 will test positive for allergies
  • 20% have ocular symptoms

• Allergic conjunctivitis is the most common condition but the eyelids and even the cornea can be involved
Type I Hypersensitivity Reactions

- A mast cell – histamine reaction to allergens in the upper respiratory tract and eyes
  - Allergens include pollen, mold, pet dander, etc
- Food and drug allergies (e.g. nuts, penicillin) are the same type I reaction
  - Since ingested, these give more systemic findings such as urticaria (hives) and anaphylaxis
- Type I reactions require prior sensitization but can occur within minutes of exposure to an allergen in sensitized individuals
- Late-phase reaction can develop 4 to 8 hours after the initial encounter and can last for up to 2 days
  - This is often more inflammatory in nature

Type I Hypersensitivity Reactions

- Initial Exposure: Allergen → T helper → B lymphocyte → Immunoglobulin Epsilon (IgE) → binding to mast cells
  - Approximately 50 million Mast Cells in the conjunctiva
- Repeat Exposures: More allergen binds and cross-links IgE on mast cells
  - This binding opens calcium channels and activates cyclic AMP
- The result is a degranulation of the mast cells’ preformed mediators

Type I Hypersensitivity Reactions

- Activation of the Mast Cell leads to:
  - Early Phase: Degranulation of the mast cells and the release of preformed inflammatory mediators.
    - Major Mediator: Histamine
    - Others Include: Heparin, preformed inflammatory prostaglandins, chymase, tryptase, etc
  - Late Phase: more prostaglandins including PGE₂ and PGD₂ and leukotrienes such as LTD₄ and LTE₄
    - Other inflammatory mediators such as tumor necrosis factor alpha (TNF-α) and Macrophage Inflammatory Protein
    - This phase is especially triggered during times of very high pollen counts
Type I Hypersensitivity

- Histamine is the main mediator of Type I reactions
- We have mast cells (and histamine) all over the body, with the highest amounts in the mucous membranes and the skin
- Histamine has four receptors: H1, H2, H3, and H4
  - H1 and H2 are the types involved in the allergic response and both exist in the eye

Histamine

- H1 receptors exist in blood vessels, smooth muscle of bronchi, mucous membranes, and the intestine
  - Histamine release causes itching, vasodilation, increased vascular permeability, and contraction of smooth muscle in the GI tract and bronchi
  - Release also stimulates sensory nerve endings
- H2 receptors exist in gastric parietal cells, the heart, cells of the immune system, and pulmonary blood vessels
  - Histamine release causes itching, vasodilation, mucous discharge, and gastric secretion

Histamine and the Eye

- Ocular Symptoms:
  - Itching and Tearing
  - Chemosis
  - Lid Edema
  - Dilation of conjunctival vessels
  - Papillary Reaction
Type IV Hypersensitivity

- Also known as: T Cell-mediated immune or delayed hypersensitivity
- Delayed reaction takes 24 hours, with a peak at 48 – 72
- Mediated by $T_h$ and/or $T$ cytotoxic lymphocytes
  - Sensitization takes 1 – 2 weeks following initial exposure
    - Repertoire leads to cytokines being released and the activation of macrophages
      - Chronic inflammation leads to tissue damage
- Ocular Type IV reactions include vernal keratoconjunctivitis (VKC), atopic KC (AKC) and contact dermatitis

Vernal Keratoconjunctivitis

- Severe allergic (Type 1 and 4) conjunctivitis commonly seen in young males 2:1
  - Onset peaks between ages 11 – 13, and rare above 30
  - More common in warm, dry climates
  - Often concurrent with other atopic conditions such as asthma
- Symptoms: Intense itching, irritation, photophobia
  - Corneal involvement common
- Two Forms Exist with Varying Signs:
  - Tarsal: Non-uniform cobblestone papillae
  - Limbal: Yellow-gray limbal infiltrates (Trantas Dots)

Atopic Keratoconjunctivitis

- Similar clinical appearance as VKC
- Also more prevalent is children and young adults
- Patient will often have atopic dermatitis as well
- ~10% of children have some form of dermatitis (1% of adults)
  - ~20-40% of atopic dermatitis patients will have ocular involvement
- AKC patients have high rates of eczema and/or asthma
**Antihistamines**

- Act on the H1 receptors to inhibit the effects of histamine:
  - Decreased capillary dilation and vascular permeability
  - Decreased constriction of bronchial smooth muscle
  - Decreased itching and pain
  - Decreased mucous secretion

- Help relieve: itching, sneezing, congestion, watery and red eyes

- Antihistamines only blocked new histamine receptors – not ones that are already bound by histamine

**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

**1st Generation Antihistamines**

- These medications have excellent penetration over the blood brain barrier resulting in significant CNS side effects
  - Sedation, decreased cognitive function, etc
  - Act on muscarinic receptors for anticholinergic effects
  - Dry mouth, dry eyes, urinary retention, etc
  - Possibly some alpha adrenergic receptor actions (likely related to anticholinergic)
  - Hypotension with overdose, dizziness, etc
  - Alteration of cardiac ion channels
  - Prolonged QT intervals, ventricular arrhythmias, etc

- 1st generation antihistamines also dull the inner ear's ability to sense motion
  - Helpful for preventing nausea and vomiting associated with movement
  - Dramamine is an antihistamine used for motion sickness
1st Gen Oral Antihistamines

• Classified According to Sedation Levels:
  • Mildly Sedating
    ▪ Brompheniramine (Generic)
    ▪ Chlorpheniramine (ChlorTrimeton)
  • 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)
  • Due to additive effects

• 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)

Fexofenadine (Allegra)

- Metabolite of terfenadine (Seldane: 1st non-sedating antihistamine)
  - Available OTC – adult dosage (12+ YO): 60 mg BID or 180 mg daily
  - Children over two or older: 30 mg syrup BID
    - Onset: 1-2 hours
    - Duration: 24 hours
- Pregnancy Category C
- Older Seldane associated with heart arrhythmia but not Allegra
- Erythromycin can potentiate effects and grapefruit juice and antacids can block absorption

Loratadine (Claritin, Alavert, Generics)

- First OTC 2nd generation antihistamine available
  - Loratadine is available in 5 and 10 mg tablets, dissolving tablets and liquid formulation
- Well absorbed with peak levels after about 90 minutes
- Pregnancy Category B
- Approved for ages 2+
- Dosage 6+ years: 10 mg Daily
  - 5 mg/day for ages 2 – 6
Desloratadine (Clarinex)

- Chemical cousin of loratadine
  - Rx only
- 5 mg per day for 12 years of age and up
- Available in regular tablets, dissolving tablets and oral suspension
- Approved for children over 6 months of age
  - Dosage: 1 mg daily under six years of age
  - 2.5 mg in 6-11 year olds
- Pregnancy Category C

Cetirizine (Zyrtec)

- Available OTC in multiple formulations for adults and children
  - 5 and 10 mg tablets, gel capsules, dissolving tablets, syrup
- Dosage for ages 6+: 5 - 10 mg daily
  - Children 2-6 years: 2.5 – 5 ml
- Pregnancy Category B
  - Approved for 2+ years of age
- Reaches peak serum levels more rapidly than other 2nd gen oral antihistamines and has slightly higher levels of potency
- 3 ½ times more likely to cause sedation than other 2nd generation antihistamines

Levocetirazine (Xyzal)

- Newest 2nd generation antihistamine
  - Available as 5 mg tablet or oral suspension
  - Rx only
- Chemical isomer of Zyrtec
- Pregnancy Category B
- Approved for children 6 months of age and older
- Dosage:
  - 1.25 mg daily for ages 6 months – 5
  - 2.5 mg daily for ages 6 – 11
  - 5 mg daily in individual 12 and up
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
Intranasal Corticosteroids

• Agents Include:
  • Fluticasone furoate
  • Mometasone
  • Budesonide
  • Triamcinolone
  • All the above are dosed:
    • 1-2 sprays in each nostril per day

• Fluticasone propionate
• Beclomethasone
• Both are dosed: 1-2 spray’s in each nostril q12h

Intranasal Corticosteroids

• Risks?
  • IOP Spike?
  • Glaucoma?
  • Cataracts
  • Central Serous
  • Chorioretinopathy?
  • Nasal ulcers and infections!