Lower Cost Therapies Available for Many Ocular Conditions

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Disclosures
Last 12 months (alphabetical order):
Allergan
AMO
Bausch
Ciba
Essilor
Inspire

Ocular Drugs
- Antibiotics
- Glaucoma
- Dry eye
- Steroids
- NSAIDs
- Allergy

A look at the past:
- Bacteria
  - 3.5 billion years old and still kicking
  - They love us: the big buffet
  - Reproduction

Private lives of bacteria

Bacteria have an "unembarrassed penchant for reproduction."
Francis Mah, MD

The antibiotic era
- Began 1928
- Alexander Fleming discovered penicillin
- Used for World War II
- General use late 1940s

Antibiotics
- Some bugs create a whole new generation every twenty minutes
- Adaptability
"We can close the books on infectious disease". US Surgeon General, 1969

Is this the beginning of the end of the antibiotic era?
Adaptability and resistance

50 million pounds of antibiotics are taken annually
30 percent for respiratory tract infections
More than one half probably viral

The bugs are getting stronger—and they’re getting stronger faster”
Barry Kreiswirth, New York City’s Public Health Research Institute

Ten years ago: Nearly all strains of Streptococcus pneumoniae were susceptible to penicillin.
Today: 45% of all strains are resistant. (Shnayerson and Plotkin, The Killers Within, Little Brown, 2002)

Between 1980 and 1992, resistance contributed to 58% rise in infectious disease deaths in Americans
Each year about 13,000 Americans die from antibiotic resistant strains

Five times as many domestic food animals as people in the United States
Daily animal fecal excretion can be 5-400 times greater than humans
Amount of feces excreted by a cow per day is 100 times more than a human

Flies - genetically exact antibiotic-resistant organisms from nearby animals.
Ground water and streams contaminated with antibiotic-resistant bacteria
Used to treat fruit trees, honeybees hives, and catfish and salmon farms.

“We may be confronted with once-treatable diseases that have become as dangerous as they were in the days before antibiotics were discovered.”
http://www.infectionspotlight.com/resistance/BacterialResistanceTheFacts.jsp
A view of the present:
- The arms race
- Defenses
- Antibacterial soaps

The arms race
“The war between humans and bacteria seems like a hopeless one because of the sheer numbers of bacteria, [and] their incredible ability to adapt.”
Francis Mah, MD

Defenses
- Made cell walls impermeable
- Created tiny efflux pumps that vomited antibiotics out of the cell
- Developed enzymes to attack the antibiotic and slice chemical rings

Antibacterial soaps
- Changed or replaced Ab attachment enzymes
- Gene swapping—shared resistance
  “entire bacterial world ... one huge multicellular organism... interchange their genes with ease”  Stuart Levy

Antibacterial soaps
- Antibacterial soaps
- No more effective than plain soaps

Antibacterial soaps
- Contains triclosan (TCS)
- Triclosan-adapted bacteria
- Cross resistance to antibiotics

Antibacterial soaps
- Limit your use of antibacterial products

Antibacterial soaps
- Clearasil Daily Face Wash
- Dawn
- Colgate Total
- Crest Cavity Protection
- Softsoap

Antibacterial soaps
- Dial
- Right Guard deodorant
- Sensodyne
- Total Care
- Old Spice
- Mentadent

Antibacterial soaps

“...low-level exposure...to TCS does not affect antimicrobial susceptibility and...is degradable by common domestic biofilms.”


4G Binds to Both Topo IV and DNA Gyrase in Gram-positive Bacteria

Gatifloxacin (Zymar)

- 8-methoxy group
  - Improved in vitro activity against Gram-positives
  - Very low UV-induced toxicity
- FDA approval for oral, systemic use since 1999: Zymar
  - 5ml 0.3% $70.38

Moxifloxacin (Vigamox)

- 0.3% unpreserved
- Bulky side chain in C-7 position
- Approved 1999 oral: Avelox
  - 3ml 0.5% $73.38

Summary of In Vitro Susceptibility: Zymar vs Vigamox

- Nearly identical against Gram-positives
- Zymar 2- to 4-fold better against gram negative ocular isolates tested
- Substituent at 7 position of moxifloxacin decreases activity

Case report: 4G resistance

Trey Sullins, OD., Athens, TN
- 48 year old male
- Nursing home
- Wheelchair patient
- Car accident traumatic brain injury
Hist of respiratory tract infections
- Recurrent bronchitis 3 months
- Treated by physician with levo po
- Conjunctivitis
- Prescribed Quixin for 2 to 3 wks

Case report: 4G resistance

Trey Sullins, OD., Tennessee

Hyperacute conjunctivitis
Filaments

Lab cultures
- Staphylococcus aureus
- Resistant to all fluoroquinlones tested (3G 4G).
- MRSA

MRSA
- Known as the “Superbug”
- Multiresistant properties
- Staph aureus found in Egyptian mummies

MRSA
- First discovered in 1961 UK
- Higher fatalities than methacillin susceptible SA
Definitions

CA-MRSA
- Community-acquired Methicillin-Resistant Staphylococcus Aureus

HA-MRSA
- Hospital-acquired Methicillin-Resistant Staphylococcus Aureus

First line: Oral vancomycin

 MRSA

18.3% in 2000
29.1% in 2005
Most increase CA-MRSA


“MRSA and MRSE are the No. 1 infectious disease concerns for ophthalmology for the foreseeable future, and the problem will only get worse…”
- Eric Donnenfeld, MD.

Loughery J Methicillin-resistant ocular infections of increasing concern. OSN June 25, 2008.

“Of the Staph aureus found in nosocomial infections, approx two-thirds are methicillin-resistant”
- Francis Mah, MD.

Loughery J Methicillin-resistant ocular infections of increasing concern. OSN June 25, 2008.

“These ulcers appear no different than the average infectious keratitis, but they can be more aggressive, and there is no way to differentiate them without performing cultures.”
- Eric Donnenfeld, MD.

Shovlin JP, What to do about MRSA. Review of Optometry 2007;144(11)

197 Staphylococcus aureus isolates
33 MRSA isolates
15.2% were susceptible to FQs

Ta CN, Sahm DF. Ocular TRUST Antimicrobial Susceptibility Patterns in MRSA vs MSSA Eye Infection: Results from Ocular TRUST. ARVO 2007 #2682/B772

“MRSA is a multidrug-resistant pathogen in ocular infections”
“[Over] 64% of MRSA isolates were resistant to all antimicrobials tested except trimethoprim.”

Ta CN, Sahm DF. Ocular TRUST Antimicrobial Susceptibility Patterns in MRSA vs MSSA Eye Infection: Results from Ocular TRUST. ARVO 2007 #2682/B772
100% of the isolates were sensitive to vancomycin
93.2% sensitive to tetracycline and 63.6% were sensitive to bacitracin
Ciprofloxacin and erythromycin were essentially ineffective with sensitivities of 14.8%

The Ocular TRUST network:
104 institutions (10 eye centers)
350+ staph and strep ocular isolates

Ocular TRUST AJO March 2008

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Status</th>
<th>MIC</th>
<th>Susceptible</th>
<th>Intermediate</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin</td>
<td>MSSA &gt; 16</td>
<td>&gt; 16</td>
<td>0.0</td>
<td>0.0</td>
<td>75</td>
</tr>
<tr>
<td>Rosa</td>
<td>MRSA &gt; 16</td>
<td>2</td>
<td>0.0</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Penicillin</td>
<td>MSSA &gt; 1</td>
<td>16</td>
<td>0.0</td>
<td>0.0</td>
<td>148</td>
</tr>
<tr>
<td>Rosa</td>
<td>MRSA &gt; 1</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
<td>33</td>
</tr>
<tr>
<td>Polymyxin B</td>
<td>MSSA &gt; 8</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>164</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>MRSA &gt; 8</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>MRSA</td>
<td>MSSA &gt; 32</td>
<td>12</td>
<td>1.2</td>
<td>10</td>
<td>6.1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>MSSA &gt; 2</td>
<td>160</td>
<td>9.7</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>MRSA</td>
<td>3</td>
<td>93.9</td>
<td>2</td>
<td>6.1</td>
<td></td>
</tr>
</tbody>
</table>

"If there’s going to be an Achilles’ heel for FQ, it’s going to be MRSA"
Francis Mah, MD.

Loughery J Methicillin-resistant ocular infections of increasing concern. OSN June 25, 2008.

"hourly doses of 4G FQ...[and] any...history of exposure to MRSA, such as healthcare worker...prescribe polytrim six times per day"
Stephen S. Lane, MD.


"Some wipes that claimed to kill bacteria were found to transfer live [MRSA] bacteria from one surface to another"
G. J. Williams1, S. P. Denyer1, I. K. Hosei, Determining the Ability of Surface Wipes to Remove, Kill and Prevent the Transfer of Staphylococcus aureus from Contaminated Surfaces. American Society for Microbiology. 2008 #Q-280

"one swipe per wipe on a single surface"
G. J. Williams1, S. P. Denyer1, I. K. Hosei, Determining the Ability of Surface Wipes to Remove, Kill and Prevent the Transfer of Staphylococcus aureus from Contaminated Surfaces. American Society for Microbiology. 2008 #Q-280
**Bioavailability**

- Two isolates S. aureus resistant to gatifloxacin 0.3% tested in animal model of keratitis
- MICs of 12 and 64 mg/mL
- In vivo gatifloxacin 0.3% significantly lower clinical corneal infiltrate score
- For both isolates, gatifloxacin 0.3% significantly lower colony counts compared with levofloxacin 0.5% and ciprofloxacin 0.3%

**3G 4G fluorquinolones**

- 0.5% Levofloxacin (Quixin)
  - 5ml $38.42
  - Described in the same class as moxi and gati: American Family Physician 2000;61(9):2744.

**Iquix**

- New formulation: Iquix 1.5% levofloxacin; legacy 0.5%
- Preservative free
- 5x concentration of ciprofloxacin and ofloxacin

**AzaSite (Azithromycin)**

- InSite Vision Inc, Alameda, CA
- Feb 2007 Inspire
- Oral forms: Zithromax
- Chlamydial infections
- 1 g single dose

**Colony Count Data**

**Median Colony Counts per Cornea**

- Gatifloxacin
- Levofloxacin
- Ciprofloxacin
- Control

**3G 4G fluorquinolones**

- 0.5% Levofloxacin (Quixin)
  - 5ml $38.42
- Described in the same class as moxi and gati: American Family Physician 2000;61(9):2744.

**Iquix**

- More bioavailability
- Greater penetration
- 5ml $73.17

**AzaSite (Azithromycin)**

- InSite Vision Inc, Alameda, CA
- Feb 2007 Inspire
- Oral forms: Zithromax
- Chlamydial infections
- 1 g single dose

**Pharmacokinetic measures of 0.5% and 1% AzaSite**

- Remained in the conjunctiva 24 hours
- Long half life; low dosing frequency
AzaSite (Azithromycin)

- 2.5 ml $69.99
- Walgreen’s

*NEW AzaSITE™ (azithromycin ophthalmic solution) 1%*

**Comparative Dosing**

<table>
<thead>
<tr>
<th>Day</th>
<th>AzaSite</th>
<th>Vigamox</th>
<th>Zymar</th>
<th>Polytrim</th>
<th>Ciloxan</th>
<th>Gentamicin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Day 2</td>
<td>21</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Day 3</td>
<td>28</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Day 4</td>
<td>42</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

- A full therapeutic course of AzaSite™ requires 65% fewer drops


**Relative cost**

- Coverage to Cost relationship
- 1161 isolates
- Bacterial conjunctivitis 1993-2005
- Tested against 11 antibiotics


- Vigamox 86%
- Ocuflox 86%
- Ciloxan 84%
- Zymar 84%
- Sulfacetamide 84%
- Polytrim 80%
- Gentamicin 74%
- Bacitracin 70%
- Tobramycin 68%
- Erythromycin 62%


"Sulfacetamide...with 84%...coverage...and an average cost of $13.11 appeared to be the most cost-effective antibiotic for...bacterial conjunctivitis"


"Although more expensive, the fluoroquinolones...appeared to provide similar coverage."


"Sulfa drugs (i.e., sulfacetamide) are the classic medications for treating Staphylococcal infection."

Sulfaacetamide

“These work by competitive inhibition of para-amino benzoic acid (PABA), which inhibits cellular processes of the bacteria.”


Sulfaacetamide

“Today, despite a reputation for broad spectrum activity, sulfa-based medications are often ineffective because many organisms have developed resistance to sulfa drugs.”


Bacterial keratitis

<table>
<thead>
<tr>
<th>First Class</th>
<th>Economy generic/OTC</th>
<th>Low to no cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>4G Fluoroquinolones</td>
<td>Periostat, Oracea, Alodox (doxycycline)</td>
<td>Warm soaks, Irrigation</td>
</tr>
<tr>
<td>3G Fluoroquinolones</td>
<td>Tobramycin, Doxycycline generic</td>
<td></td>
</tr>
</tbody>
</table>

Bacterial conjunctivitis

<table>
<thead>
<tr>
<th>First Class</th>
<th>Economy generic/OTC</th>
<th>Low to no cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>4G Fluoroquinolones</td>
<td>AzaSite (azithromycin)</td>
<td></td>
</tr>
<tr>
<td>Sulfaacetamide Polytrim (polymixin B sulfate/trimethoprim sulfate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warm soaks, Irrigation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Xalatan

- 0.005% Latanoprost
- Prostaglandin analog
- $68.29

Lumigan

- 0.03% Bimatoprost
- Prostaglandin analog
- 5ml $72.72

Travatan

- 0.004% travoprost
- Prostaglandin analog
- Travatan Z 5ml $90.23

Combigan

- 0.2%/0.5% brimonidine/timolol
- 5ml $67.63
Calculated yearly cost:

- $150.81/$203.47 for generic/branded timolol
- $352.89/$529.34 BID/TID generic
- $559.08/$873.98 for Alphagan P BID/TID
- $427.69 Travatan
- $577.62 Lumigan


“Nonselective beta-blockers remain the most inexpensive class of glaucoma medications.”


“Existing studies suggest that bimatoprost may be more cost effective than other agents.”


Glaucoma

**First Class**

<table>
<thead>
<tr>
<th>Prostaglandins analogs</th>
<th>Economy generic/OTC</th>
<th>Low to no cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betoptic (betaxolol)</td>
<td>Brimonidine</td>
<td>Non-selective beta blockers (generic)</td>
</tr>
<tr>
<td>Alphagan P (brimonidine)</td>
<td></td>
<td>(timolol)</td>
</tr>
<tr>
<td>Cosopt (dorzolamide/ timolol)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combigan (brimonidine/timolol)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Glaucoma**

Allergan

www.rxhope.com

Alcon Cares


800-222-8103

Patient assistance

Alcon Cares yearly household income:

- One person: $21,660
- Two persons: $29,140

If no documentation, Dr can sign form

Alcon Cares, Inc. (“AC”) is a Foundation offering a voluntary public service program which provides medication to qualified individuals at no charge. Each request is subject to approval and determines based upon current available resources. The Foundation reserves the right to modify or discontinue this program. These products are not to be sold, traded or used for any other purposes.

Dose: Mondays, Wednesdays, Fridays


**Glaucoma**
- Timolol generic 0.5%
  - $8.99 15ml
  - qD

**Dry eye**

**Artificial tears**
- Systane Ultra and Classic (Alcon)
- Optive & Refresh (Allergan)
- Blink tears (AMO)
- Soothe XP (Bausch)
- Refresh Dry Eye Therapy (Allergan)
- FreshKote (Focus)

**Artificial tears**

<table>
<thead>
<tr>
<th>Product</th>
<th>Mechanism of action</th>
<th>Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systane Ultra/Classic</td>
<td>pH</td>
<td>HP guar</td>
</tr>
<tr>
<td>Optive</td>
<td>compatible solutes</td>
<td>l-carnitine, erythritol, cmc</td>
</tr>
<tr>
<td>Refresh</td>
<td>muco-adhesive</td>
<td>cmc</td>
</tr>
<tr>
<td>Blink tears</td>
<td>high shear thinning</td>
<td>sodium hyaluronate</td>
</tr>
<tr>
<td>Soothe XP</td>
<td>emulsion</td>
<td>mineral oil</td>
</tr>
<tr>
<td>Refresh Dry Eye</td>
<td>emulsion</td>
<td>castor oil</td>
</tr>
<tr>
<td>FreshKote</td>
<td>oncotic, “water-logged” lipid</td>
<td>Amisol</td>
</tr>
</tbody>
</table>

**Systane**
- Systane Ultra
  - 10 ml $11.99
- Systane Classic
  - 15 ml $12.99
  - HP guar

**Optive**
- Optive
  - 30 ml $15.99
  - l-carnitine
  - erythritol
  - glycerin
  - cmc

**Refresh**
- Refresh tears
  - CMC
  - 30 ml $12.99
Soothe XP
- Soothe XP
- 15 ml $11.99
- Mineral oil

Blink tears
- Sodium hyaluronate
- 30 ml $13.99
- 0.15% HA

Visco-Adaptive Mechanism of Action

Vismed
- Alcon
- Lantibio
- UK/Germany
- 0.18% HA

Sodium hyaluronate

Cyclosporin (Restasis)
- Cyclosporin
- Emulsion vehicle

Loteprednol
- Site specific steroids
- Pregnancy Category C
- $43.26 5 ml (Alrex)
- $36.38 5 ml (Lotemax)
- Systemic steroids appear in milk
Nutritional support

- Omega-3 and 6 fatty acids
- Higher dietary intake of Omega-3 fatty acids decreased incidence of dry eye in women.

HydroEye

- Omega 6
- Gamma linoleic acid (GLA)
- www.sciencebasedhealth.com

Tears Again Hydrate

- Omega-3 fatty acid
- Flaxseed oil
- Evening Primrose oil (EPO) (GLA)
- Bilberry extract (BBE)
- Recommended dosage: 4 soft-gels daily.
- www.ocusoft.com

Flaxseed oil

- Thins the meibomian oils
- Unstable; rancid easily
- Dependable omega 3s:
  - Cold water fish
  - Cod liver oil

8 x 8 rule

- 8 x 8 rule:
  - 8 x 8 oz. glasses of water/day

Vitamin A

- Pregnancy Category X
- Excess of 5000 units fetal harm

Other ingredients: Glycerin, Water, Vegetable Glycerin, Glycerol, Lecithin, Titanium Dioxide and Calcium Citrate.

Nutritional support

- 71 patients mild to moderate dry eye
- Supplements or or placebo capsules, BID 6 months.
- Schirmer test, TBUT, fluorescein and lissamine green staining improved
- Not statistically significant.
“No scientific studies were found in support of 8 x 8”


“Surveys of food and fluid intake...strongly suggest that such large amounts are not needed”


**Aqueous Deficient**

<table>
<thead>
<tr>
<th>First Class</th>
<th>Economy (generic/OTC)</th>
<th>Low to no cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restasis (cyclosporin)</td>
<td>BID</td>
<td></td>
</tr>
<tr>
<td>Aloe/Lutemax (loteprednol)</td>
<td>Pred Forte (prednisolone)</td>
<td></td>
</tr>
<tr>
<td>Punctal plugs</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>OTC artificial tears:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systane Classic</td>
<td>Ultra, Refresh</td>
<td></td>
</tr>
<tr>
<td>Optive, Blistar tears, Thera tears, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artificial tears (generic)</td>
<td>Goggles/sunglasses</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td>Humidifier</td>
<td></td>
</tr>
<tr>
<td>(glasses, waterfall)</td>
<td>Nutritional support</td>
<td></td>
</tr>
</tbody>
</table>

**Evaporative dry eye**

- **Rice and sock**
- **One cup uncooked rice**
- **Pour into sock**
- **Sock: long enough to leave about 6 sq in of surface area with a tied knot**
- **Microwave about 30 seconds**

**Lid hygiene sheet**

- **Warm washcloth**
- **Potato (microwave)**
- **Boiled egg**
- **Uncooked rice**
- **Spa mask**

Nichols K CLS February 2006

**Dehydration**

**Dry eyes**

- **Irrigation**
- **Artificial tears (generic)**
- **Goggles/sunglasses**
- **Humidifier**
- **(glasses, waterfall) Nutritional support**

**Lid hygiene sheet**

- **Massage with sock for 30 sec**
- **Express lids**
- **Lower lid = upward**
- **Upper lid = downward**
- **BID**
- **Apply moist heat**
AzaSite (Azithromycin)

- 2.5 ml $69.99
- Walgreen’s

Erythromycin

- 3.5g $12.99
- drugstore.com

AzaSite vs. erythromycin ung

- Week 4: Complete resolution
  - 98.5% AzaSite
  - 37.5% erythromycin
- Week 8: Complete resolution
  - 98.5% AzaSite
  - 50% erythromycin


Medication may cause photosensitivity and accommodative problems

- Antihistamines
- Decongestants
- Tetracyclines for blepharitis

photosensitize lid tissue

Solution: Sunglasses, AR, UV400

- Anti-fatigue lens
- Progressive lens

Spectacle Solutions

- AR - decreases reflections, glare and increases transmission of light
- Polarized - reduces disabling glare
- UV 400 - reduces scattering, protects eye
- Appropriate tint - decreases scatter, improves contrast by blocking out short wavelengths of light. (Brown for sun lenses, amber or pink indoors)
- Aberration reducing lenses - minimizes higher order aberrations; single vision 360, Physio 360, izon lenses
- Wrap around goggles for severe ocular surface disease (Gunnar type)
- Photochromic for kids to protect eyes because they won’t have separate pair of sunglasses

Evaporative

<table>
<thead>
<tr>
<th>First Class</th>
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<th>Low to no cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>AzaSite (azithromycin)</td>
<td>generic/OTC</td>
<td>OTC artificial tears, Sooth XP, Refresh Dry Eye Therapy</td>
</tr>
<tr>
<td>Erythromycin ung</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periocort, Ziacare, Doxycycline (doxycycline)</td>
<td></td>
<td>Nutritional support</td>
</tr>
</tbody>
</table>

Steroids

- ILD therapy
- OTC emulsions: Sooth XP, Refresh Dry Eye Therapy
- OTC artificial tears
- Nutritional support

Inflammation
**Inflammation vs infection**

Infection: caused by an exogenous pathogen

Inflammation: response to the pathogen.

“In the absence of inflammation, wounds and infections would never heal and… can compromise the survival of the organism.

Inflammation...unchecked can...lead to a host of diseases…”

Inflammation entry from Wikipedia.org

**Corticosteroids**

- Prednisolone
- Rimexolone
- Dexamethasone
- Fluorometholone
- Triamcinolone
- Hydrocortisone
- Loteprednol

**Loteprednol**

- Site specific steroids
- Pregnancy Category C
- $43.26 5 ml (Alrex)
- $36.38 5 ml (Lotemax)
- Systemic steroids appear in milk

**Antibiotic steroid combos**

- Tobradex
- Zylet
- Maxitrol

**Tobradex**

- Tobramycin
- Dexamethasone
- 5ml $65.38

**Zylet**

- Tobramycin
- Loteprednol
- 5ml $63.46

**Case Report**

- 36 year old female
- Discomfort
- Dryness
- Wearing silicone hydrogels

**Case**

- 36 year old female
- Discomfort
- Dryness
- Wearing silicone hydrogels
Sterile
Infected
Small
Large
Multiple or arcuate
Individual lesions
No discharge
Pain
Epithelial staining
inactive=no stain
active=stains
early=mild SPK/stains
later=stains
Elevated
AC quiet
Flat or excavated
AC reaction

Differential Dx Summary
Steroids and corneal ulcers

“Adding steroids to an active infection is similar to using jet fuel to extinguish a fire!”


“Some corneal specialists advocate... corticosteroids...with antibiotics...to reduce...tissue damage and scarring."
“Others fear...steroids...reduce the cornea’s immune response [and] will prolong or even exacerbate infection.”

SCUT study

Handbook of Ocular Disease Management
http://www.revoptom.com/handbook/sect5d.htm

Residual ulcer size at 10 weeks compared to baseline
Photographic documentation
Two groups:
Antibiotic
Antibiotic plus steroid


Steroids and ulcers

Average time to heal (p=.36), ulcer size (p=.47) and VA (p=.14) better for antibiotic plus steroid
No statistical significance


Steroids and ulcers

40 patients with bacterial corneal ulcers
Two groups:
Antibiotic only
Antibiotic plus steroid


Steroids and ulcers

No delay in healing rate with topical steroid.
No significant difference in visual outcome between the two groups.


Steroids for Corneal Ulcers Trial (SCUT)

500 bacterial corneal ulcers
2 groups:
Vigamox plus Pred
Vigamox plus saline (control)
Completion November 2010
Steroids for Corneal Ulcers Trial (SCUT)

SCUT Pilot study
42 patients
Steroid group:
- Better VA and smaller infiltrate/scar size
- But longer re-epithelialization time
No statistical significance (small sample size)

“Evidence from animal and human reports is mixed.” SCUT study

Steroids and ulcers

Evidence from animal and human reports is mixed.

SCUT study

Steroids for Corneal Ulcers Trial (SCUT)

Infiltrate treatment protocol

Day 1:
- 4G FQ 1-2 drops q15 to 60 min
- q2H overnight or Ab ointment
- Atropine, homatropine, scopolamine
- Doxy or minocycline 20 mg to 100mg BID
- Vitamin C 3-5 g/day

Day 2:
- When do we add the steroid?

Day 2: Approach A:
- Add if same size or smaller
- Lotemax or Pred Forte qH
- Lotemax 1pm, FQ 2pm, Lotemax 3pm, etc

NSAIDs

Day 2: Approach A:
- Dose steroid half as much as FQ
- Ex. Steroid 4x/day; FQ 8x/day

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes

Factors to consider when to adding steroid or combo:
- Add when edema is present
- CL is patient risk factor
- Avoid steroid in first 24 hours

Infiltrate treatment protocol

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes

Infiltrate treatment protocol

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes

Infiltrate treatment protocol

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes

Infiltrate treatment protocol

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes

Infiltrate treatment protocol

Approach B:
- Add steroid when epithelium improves

Approach C:
- Add steroid when epithelium closes
**Acular**
- 0.5% Ketorolac tromethamine
- 5ml $58.00

**Nevanac**
- 0.1% Nepafenac
- $82.52

**Xibrom**
- .09% Bromfenac Ophthalmic
- 5ml $194.44 drugstore.com

**NSAID**
- Post cataract
- CME management
- Pain
- Abrasion
- Chemical keratitis

**Prevalence**
- 54.3% of the population had positive test responses to one or more allergens.

**Understanding allergy**
- "Ocular allergy is underdiagnosed and has a significant impact on the life of the patient."

**Ragweed**
- #1 cause of fall hay fever
- Ambrosia artemisiifolia

**Global warming**
- Ragweed pollen growth
- Increases 61% in double CO2
- 350 ppm CO2 (current)
- 700 ppm CO2 (predicted in 2050)


“There may be significant increases in... allergenic pollen under the present scenarios of global warming.”


Ragweed
- Single ragweed = 1 billion pollen grains
- Each grain travel 100 miles
- Number 1 cause of seasonal allergy
- Can account for 75 to 90% of all pollen
- Released at daybreak
- Highest level 10 am to 12 noon
- 20% children with allergies have asthma symptoms

Butterbur
- Petasites plant with large soft leaves
- Used to wrap butter
- Allergic rhinitis and conjunctivitis
- 50 mg BID or TID
- Effective as Zyrtec
- Without drowsiness


Allergy treatments
- Avoidance
- Pharmacotherapy
  - Oral
  - Topical

Pharmacotherapy
- Non-sedating antihistamines
  - Claritin
  - Zyrtec
  - Allegra
- Oral antihistamines
  - Adverse reactions
  - Altered lacrimation
  - Reported as side effect in less than 5% of patients

Pataday
- Olopatadine
- qD dosing
- $84.43
Elestat
- Epinastine
- $83.87

Optivar
- Azelastine
- $89.29

Zaditor
- Ketotifen
- OTC
- $14.99

Alaway
- Ketotifen
- OTC
- $12.99

Refresh Eye Itch Relief
- Ketotifen
- OTC
- $12.99

Ocular Allergy

First Class
- PataDay qD
- Elestat BID

Economy
generic/OTC
- Zaditor
- Alaway
- Refresh Eye Itch Relief

Low to no cost
- Avoidance
- Cool soaks
- Artificial tears
- Butterbur

Thank you!
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