Pharmaceutical Kitchen Part ONE
Out of the frying pan

Similarities between Chef and Optometrist?
• White coat
• Wash hands
• Infectious Disease

Foodborne illness in United States

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Estimated number of illnesses</th>
<th>%</th>
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<tbody>
<tr>
<td>Norovirus</td>
<td>5,461,731</td>
<td>58</td>
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<tr>
<td>Salmonella</td>
<td>1,027,562</td>
<td>11</td>
</tr>
<tr>
<td>Clostridium perfringens</td>
<td>985,958</td>
<td>10</td>
</tr>
<tr>
<td>Campylobacter spp</td>
<td>849,024</td>
<td>9</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>241,148</td>
<td>3</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>91</td>
</tr>
</tbody>
</table>

E. Coli burrito

Gram Positive
Staphylococcus Aureus (staphyle = bunch of grapes)

Gram Positive
Streptococcus Pneumoniae (strepto = twisted)
Hi Dr. Kenworthy,

I thought I’d update you on the sty. After a few nights of warm compress, along with using both prescriptions, the sty discharged and now you can barely tell it was ever there.

Just in time for a date Wednesday :)

“Excellent, thanks for the report. Just don’t tell that story over dinner on your date”

--

35 yo white male
red, swollen, painful eyelid x 2 days

What’s your diagnosis?

Case #1 Prescription
Prescribe an oral medication to treat patient’s problem

Gram Negative
*Haemophilus Influenzae* (blood-loving) - Does NOT cause the Flu

Thought #1 Eyelid Bumps
Agree? “Optometrists change lives”

Was Rx’d *Augmentin* 500mg bid x 1 week

One week later...
Chalazion: retained sebaceous secretion
Hordeolum: secondary infection of MG

What's the difference between chalazion and hordeolum?

Meibomian gland dysfunction

- Bacterial lipase
- Free Fatty Acids
- Increased melting point of meibum
- Tetracycline (Who can name one?)
- And what's the adult dose?
- Doxycycline 100mg bid

Kid's Menu
What are some lemon chickens?

- Tetracyclines:
  - permanent tooth staining and abnormal bone development
- The recommended oral dose for children ages eight and older is 2.1mg/kg/D BID
- It should never exceed the adult dose, which is 100mg BID
After Miboflow and Expression

25 yo pregnant female
Irritated red eyes x over a month
Looks overall pretty normal, until you ever lids

What should be on your radar?
And how would you treat it?

1 gram azithromycin (single dose)
May consider Z-pak

Improving at one week

Thought #2 Red Eyes

Adenovirus

- Shipyard Eye
  - This name became widely known in the summer of 1941, when an outbreak occurred in Pearl Harbor, and more than 10,000 people became infected with the malady

40 yo female, right eye red and irritated x 4 days
What else do you want to know?

Look at the seahorse eggs through hole in belly...

...And hope little Johnny before you didn’t have pink eye
45 yo male, bilateral red eye x 2 days
What department does he work in?

“Infection Control”

And the red eyes continue….Is it bacterial or viral?

20 yo Rice Univ. student with red, irritated eyes OU, but OD worse than OS
Problem started over a week ago

Subepithelial infiltrates??

Treated with Lotemax tid
Consider Zirgan?
Red already cleared by three days

In hindsight.....
Was it Thygeson’s superficial punctate keratitis??

“SPK” descriptor reserved for Thygeson’s

For dry eye, may consider using
• “PEE” punctate epithelial erosion
• “PEK” punctate epithelial keratitis
40 yo male developed "pink eye" OS only, while flying home to Houston from Manila, Philippines
(+/-) yellowish discharge
+ conj hyperemia and chemosis
(-) papillary

Possible diagnosis?
Case #2 Prescription
Prescribe topical pharmaceutical to treat condition
Rx’d Zylet tid OS x 7 days
1 week follow up

Raised, “bullous” type corneal lesions
Rx’d

What’s a fork?
Offensa
New combo drug = Ocuflox + Prolensa
Combination therapy

Some REAL combination eye drops

<table>
<thead>
<tr>
<th>Polytrim</th>
<th>polymyxin B / trimethoprim</th>
<th>sol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxitrol</td>
<td>neomycin 0.35% polymyxin B desamethasone 0.1%</td>
<td>sol &amp; ung</td>
</tr>
<tr>
<td>Tobradex</td>
<td>tobramycin 0.3% desamethasone 0.1%</td>
<td>sol &amp; ung</td>
</tr>
<tr>
<td>Zylet</td>
<td>tobramycin 0.3% tobramycin 0.3%</td>
<td>sol</td>
</tr>
<tr>
<td>Combigan</td>
<td>brimonidine/brinzolamide</td>
<td>0.2%/0.5%</td>
</tr>
<tr>
<td>Cosopt</td>
<td>dorzolamide/brimonidine</td>
<td>2%/0.5%</td>
</tr>
<tr>
<td>Simbrinz</td>
<td>brinzolamide/tobramycin</td>
<td>1%/0.2%</td>
</tr>
</tbody>
</table>

Thought #3 Cornea’s Dating Profile

“Hi, I’m Cornea”
• I have no blood until you take my breath away
• I’m transparent, always telling the truth
• I’m a sensitive guy, thanks to the ciliary nerves and lots of tears

“Hi, I’m Cornea”
• Nutrients supplied via aqueous humor and tears
• Regularly spaced collagen fibrils, no regeneration of stroma
• Most densely innervated tissue in body, 1st division of trigeminal

Neovascularization secondary to K hypoxia
Contacts can be problematic

32 yo female, eye pain x 1 day because she “scratched her eye”
Do you sleep in contacts? No, but I did two nights ago.
"Empiric" therapy

- Broad spectrum fluoroquinolone q1hr
  - Gatifloxacin (Zymaxid)
  - Moxifloxacin (which two?)
- Loading dose?
- How about Besivance?
  - Duratek vehicle prolongs the drug's contact time on the ocular surface
  - Currently, no plans for systemic

How about a steroid?

SCUT (The Steroids for Corneal Ulcers Trial)

- Basic Question: Will visual prognosis after a corneal ulcer be better if you use steroids during treatment?
- Five hundred patients
  - 485 (97%) were enrolled in India
  - The majority of patients were agricultural manual laborers (220 of 500, 44%).
  - The most common object of injury was vegetative matter.
  - Eight patients were contact lens wearers
- The most common organisms isolated were
  - Streptococcus pneumoniae (250 of 506; 49%)
  - Pseudomonas aeruginosa (111 of 506; 22%)
  - Nocardia species (56 of 506, 11%)
- The most common organism in the United States was P. aeruginosa (5 of 16, 31%)
- Contact lens wear is a common risk factor for ulcers in the United States, in contrast to agricultural work in India.
- Basic Answer: No, steroids did not help in SCUT, but what about timing?!!

Early Addition of Topical Steroids (2014)

- In a recently published sub-analysis, patients who were given steroids within two to three days of starting antibiotic therapy showed a statistically significant gain in visual acuity (1 line) at three months, particularly those with severe or moderately severe ulcers.
- In patients who had 4 or more days of antibiotic therapy before corticosteroid treatment, the effect was not significant
  - patients given corticosteroids had 1-line worse visual acuity at 3 months compared with those in the placebo group

Is an ulcer normal in a grafted eye?

- Loose suture replaced one week later; THIS pops up

Magical cure for everyone

What does the patient want prescribed?

Thanks El Salvador

1) AC response of 3+ or more (>10 cells/1mm beam)
2) infiltrate is greater than 3mm in size or extends into deep stroma
3) infiltrate is less than 3mm from the visual axis
4) The condition is worse after 24 hours of empiric therapy
5) Just hope it's before 5:00 o'clock pm and not in a graft

1 gram positive cocci in chains and pairs

Gram Stain Result: 3+ WBCs
Thought #4: Be Patient (‘Cause Herpes Is)

Beginning of long journey

“In a hole in the ground there lived a hobbit”

“You have herpes”

Herpes Simplex and Zoster

<table>
<thead>
<tr>
<th>Type</th>
<th>Synonym</th>
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<tr>
<td>HHV-1</td>
<td>Herpes simplex virus-1 (HSV-1)</td>
</tr>
<tr>
<td>HHV-2</td>
<td>Herpes simplex virus-2 (HSV-2)</td>
</tr>
<tr>
<td>HHV-3</td>
<td>Varicella zoster virus (VZV)</td>
</tr>
<tr>
<td>HHV-4</td>
<td>Epstein-Barr virus (EBV), lymphocryptovirus</td>
</tr>
<tr>
<td>HHV-5</td>
<td>Cytomegalovirus (CMV)</td>
</tr>
<tr>
<td>HHV-6</td>
<td>Herpes lymphotropic</td>
</tr>
<tr>
<td>HHV-7</td>
<td>Roseolovirus</td>
</tr>
<tr>
<td>HHV-8</td>
<td>Kaposi’s sarcoma-associated herpesvirus</td>
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Different manifestations of HSV-1

- Dermatitis
- Blepharitis
- Conjunctivitis
- Epithelial Disease (dendritic)
- Stromal keratitis (necrotizing, disciform)
- Endothelitis
- Trabeculitis
- Iridocyclitis
- Retinitis

32 yo male patient was diagnosed with “conjunctivitis” a few days ago.
Given Maxitrol (which has dexamethasone-steroid)
Returns with worsening symptoms, pain, redness and tearing

What’s your diagnosis? Case #4 Prescription
Prescribe topical pharmaceutical to treat condition
Presumed Herpes simplex – epithelial keratitis

Day 1: Zirgan 5x’s / day
Day 4: Zirgan tid, AT’s
Day 7: AT’s & steroid

Corneal toxicity

- Zirgan 5x’s / day until the corneal ulcer has healed
- Then additional seven days of administration 5x’s / day
- Zirgan 5x’s / day until the corneal ulcer heals
- Then TID Additional seven days

- 41 year old Middle Eastern male
- Earlier that year: spectacles from Walmart
- Also Rx’d FML 0.1% for “eye redness”
- Blur and redness OS
- BCVA OD 20/20, OS 20/50
- IOP OD 14 mmHg, OS 20 mmHg
- Suspected reactivation of herpes infection
- Hx of herpes 7 YEARS AGO!!
- (patiently waiting in trigeminal ganglion)

Pigmented Iron deposit

(-) Fluorescein stain
Why check??

Corneal Scars
Active Corneal Swelling

What's your diagnosis? Does that change your prescribing?

Acyclovir bid 400mg po
FML q2hr x 2 days, then FML q4hr x 5 days

Two week follow up
• BCVA OD 20/20, OS 20/30
• IOP OD 16mmHg, OS 15mmHg

Initial Visit

Two Weeks Later

How about Acyclovir?

• HEDS (Herpetic Eye Disease Study)
  • Oral Acyclovir (400mg bid x 1 year)
    reduced risk of stromal keratitis recurrence by 50%
    • 14% recurrence Acyclovir vs 28% recurrence placebo

To steroid or not...

Epithelial HSV keratitis
  Promote replication of virus (that’s a bad thing)

Stromal/Endothelial HSV keratitis
  Suppress inflammation (that’s a good thing)

Skin lesions Herpes?

Oral Antivirals 7-10 days
Acyclovir 800 mg 5x's
Valtrex 1000 mg tid
Famvir 500 mg tid

Valacyclovir prodrug (becomes acyclovir) but has longer duration of action (dosed less)

What's the difference between acyclovir and valacyclovir??

30 yo male hospital consult for “white bumps on upper eyelid x 2 days

Valacyclovir 500 mg x 7 days
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**Zoster (Chickenpox → Shingles)**

- Greek “half belt”
- Dormant in dorsal root ganglion

20 year old student
Given Rx of Valtrex 1,000mg tid for “shingles” earlier that a.m.

Lesson beyond lid margins
Consider adding topical antiviral? (like Zirgan)