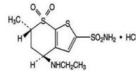


Update on Oral Medications



Carlo J. Pelino, OD, FAAO

Joseph J. Pizzimenti, OD, FAAO



What pharmacotherapy means to optometry

The ability to use pharmaceutical agents has enabled optometrists to become true primary health care providers.

Course Goal

To provide useful clinical information in the treatment of ocular conditions using systemic medications.



Routes of Drug Administration:

- Alimentary
 - Sublingual
 - Oral ←
 - Rectal
- Parenteral
 - Subcutaneous (SC)
 - Intramuscular (IM)
 - Intravenous (IV)
- Other
 - Inhalation
 - Topical



Principles of Pharmacology

- Pharmacokinetics: What the body does to a drug
- Pharmacodynamics: What the drug does to the body
- Always keep in mind contraindications, side effects and drug interactions before starting medication.
- Drug risks vs. benefits
- Keep in mind the age and weight of the patient
 - Consider starting with one half in the young or elderly (po)
 - Polypharmacy: elderly often on multiple meds – may lead to adverse reactions/interactions

Know Your Patient



Each patient is
unique.



Choosing the Proper Drug Therapy

- Patient considerations
 - Immune system viability
 - Kidney and liver function
 - Pregnant or nursing
 - Age
 - Allergy history
- Safety profile of the drug
- Cost considerations



General Principles:

- Drug Metabolism – Most drugs are metabolized by liver enzymes
- Drug Excretion – The kidney is the major route
- Some drugs are excreted after metabolism
- Some drugs are excreted unchanged
- Therefore, proper liver function is critical for metabolism of medications, and kidney function is integral to drug excretion.



Examples of Rx Writing

Oral Rx Augmentin 500 mg tablets
 Disp: 14 tablets
 Sig: 1 tablet BID PO X 1 week

Sol Rx Timoptic XE 0.5% Ophthalmic Solution
 Disp: 10 ml bottle
 Sig: 1 drop QD OU in the AM

Remember : Refills \emptyset and specific instructions – “shake well”

Practice-building Tip

- When Rx-ing for Peds:
- Place a courtesy call and send follow-up letter to pediatrician
- Especially with po meds



Prescribing for Children



Step 1: Convert pounds to kilograms by dividing # lbs by 2.2

Step 2: Multiply kilograms by dosage recommendation.

Step 3: Divide daily milligram total by number of doses per day.

Step 4: Choose from available manufactured doses.

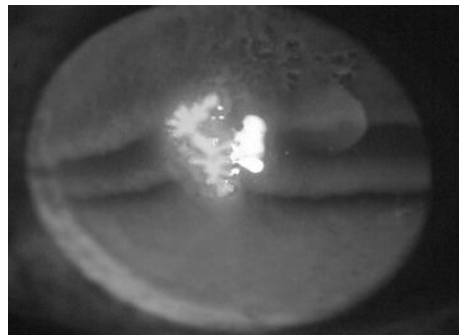
Step 5: Write prescription.

Special populations, special Rx.



25 year old female

10 weeks pregnant



Treatment?

HSVK

Pregnancy Category C



Pregnancy Category B

- Acyclovir (Zovirax®)
- Acute infection - 400 mg
PO 5x/day X 7 d
 - HSV Keratitis
 - Dendritic ulcer
 - HSV Blepharodermatitis
 - Lid involvement



Traditional FDA Use-in-Pregnancy Ratings

Category	Description
A	No risk in humans or animals
Absolutely safe	
B	No evidence of risk in humans, or adverse findings in animals.
Probably safe	or In the absence of adequate human studies, animal studies show no fetal risk. The chance of fetal harm is remote, but remains a possibility.

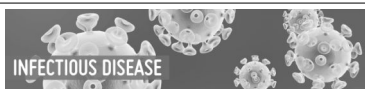
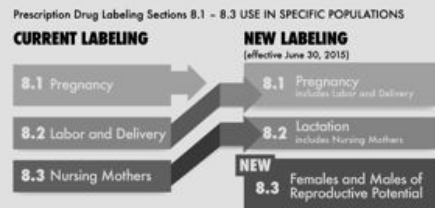
<http://www.fda.gov>

Use-in-Pregnancy Ratings

Category	Description
C	Risk can not be ruled out; but the potential benefits may outweigh the potential risk.
Questionably safe	
D	Positive evidence of Risk
X	Contraindicated in Pregnancy

<http://www.fda.gov>

[12/3/14] The FDA published the Content and Format of Labeling for Human Prescription Drug and Biological Products; Requirements for Pregnancy and Lactation Labeling, referred to as the "Pregnancy and Lactation Labeling Rule"



Bacterium



Virus



Fungus



Protozoan



Helminth

Infectious disease: 5 classes of micro-organisms

- 538 types of **bacteria**
- 208 types of **viruses**
- 317 types of **fungi**
- 57 types of **protozoa** (parasites)
- 287 types of **helminths** (worms)

These organisms differ from human eukaryotic cells.

Drugs target these differences.

Drugs affect the microbe without affecting the host.

Antibacterial Terminology:

- Bacteriostatic – stops the growth / replication of the bacteria
- Bactericidal – kills the bacteria

Questions and Comments?



What is your plan?

Treat or turf?



If you treat bacterial infection...

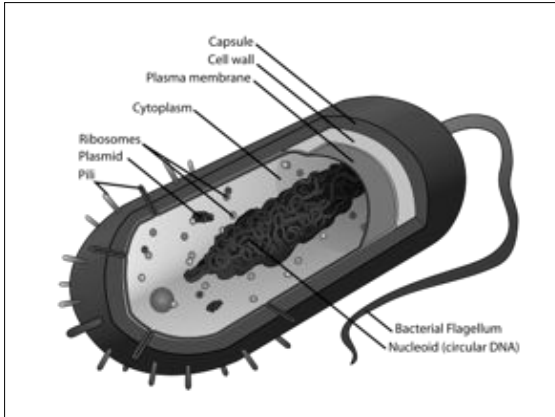
- Bacteriostatic – stops the growth / replication of the bacteria

versus

- Bactericidal – kills the bacteria

Choosing the Proper Drug Therapy

- Efficacy of Antibiosis
 - MIC = minimum inhibitory concentration
 - Lowest concentration that inhibits visible growth (growth-stopping)
 - Measures bacteriostatic activity of antimicrobials.
 - MBC = minimum bacteriocidal concentration
 - Lowest concentration that kills the microbe



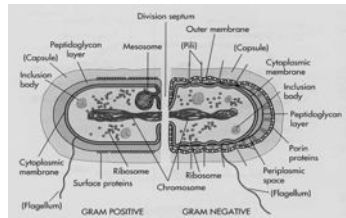
Part I

Oral Antibiotics: Five main classes

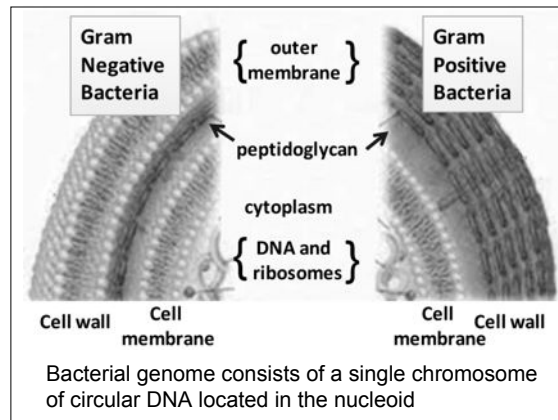
- Penicillins
- Cephalosporins
- Macrolides
- Tetracyclines
- Fluoroquinolones

The trend in oral antibiotic Rx-ing is to simplify dosing and administration QD or BID

Gram + vs Gram -



- Gram-positive cell walls contain a thick layer of peptidoglycan that encircles the cell.
- Gram-negative cell walls contain a thin layer of peptidoglycan between the cytoplasmic membrane and the outer membrane.

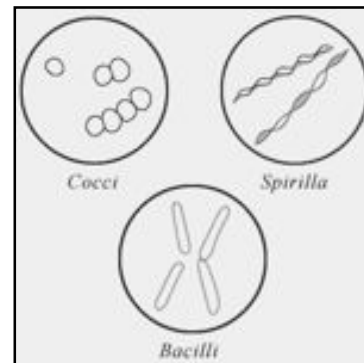


Bacterial genome consists of a single chromosome of circular DNA located in the nucleoid

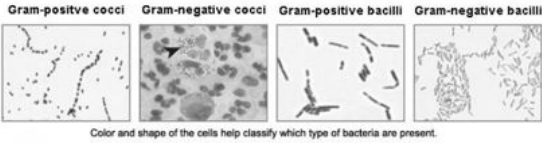
Gram-positive bacteria are those that stain dark blue or violet in the presence of a lipid solvent (acetone - alcohol).

Gram-negative bacteria are those that do not retain crystal violet dye - stain pink when exposed to a red dye, safranin.

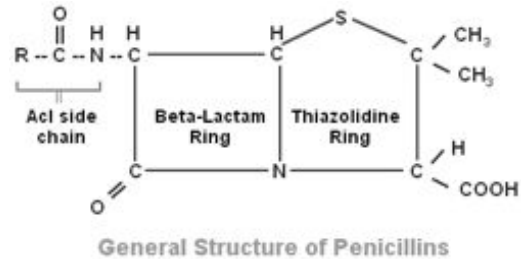
Note: Many species of Gram-negative bacteria are pathogenic in a host organism.



Most infections of the eye and adnexa are caused by gram + organisms staph and some strep



Most staphylococcal bacteria produce an enzyme called Penicillinase which inactivates penicillins and some cephalosporins



Levels of Immunity

Innate Immunity:

First line of defense = external barriers (skin, mucous membranes, lashes)

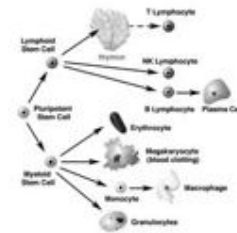
Second line of defense = phagocytic cells, proteins, inflammation, fever, complement system, interferon

Adaptive Immunity:

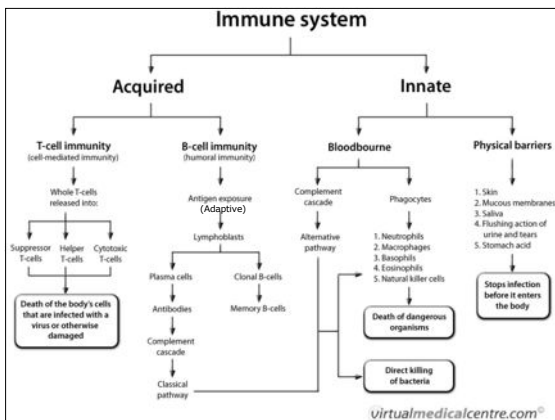
Third line of defense = Antigen-specific, protects only against a certain type of pathogen

Elements of the Immune System

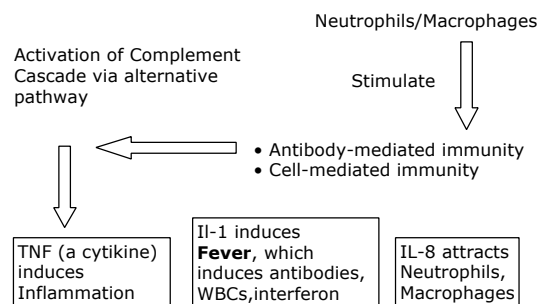
- Lymphocytes (T cells and B cells)
- Macrophages / Monocytes
- Basophils
- Eosinophils
- Neutrophils – first cell present
- Dendritic cell and Langerhans cells



- Cytokines: Interferon, TGF, IL, TNF
- Mast cells
- Complement system



When bacteria enter the skin...



Penicillins

Bactericidal with relatively low toxicity

Mechanism of Action:

- Inhibits the formation of bacterial cell wall, thus exposing the cell membrane

Natural Penicillins:

- Penicillin G or V
- Gram + except for Staphylococcal
- Penicillin G is IV only drug of choice for sypphilis
- Penicillin V is oral use for Strep. infections

GROUP I: Ample Spectrum Penicillins

<u>Generic Name</u>	<u>Trade Name</u>
Amoxicillin	Amoxil®
Ampicillin	Omnipen®
Bacampicillin	Spectrobid®
Carbenicillin Indanyl	Pyopen®, Geogen®, Geocillin®
Mezlocillin	Mezlin®
Piperacillin*	Pipracil®
Ticarcillin	Ticar

Amoxicillin

- Dosage
 - Adults: 125-875 mg BID-TID x 7-10 d
 - Eg. Preseptal cellulitis: 500 mg TID x 10 days
 - Children: 20-40 mg/kg TID x 7-10 d



Prescribing for Children



Example; 50 lb child Amoxicillin 20 mg/kg TID

Step 1: Convert pounds to kilograms by dividing by 2.2
 $50/2.2 = 23$ kg

Step 2: Multiply kilograms by dosage recommendation.
 $23 \text{ kg} \times 20 \text{ mg/kg} = 460$ mg

Step 3: Divide daily milligram total by number of doses per day.
 $460/3 = 153$ mg

Step 4: Choose from available manufactured doses.
 Closest is 125 mg/5 ml.
 So, we can write our prescription for amoxicillin 125mg/5ml.
 We need 5ml TID, so every eight hours (15 ml per day) for 10 days.
 So, 15ml/day x 10 days = 150ml bottle.

Final Prescription

Dr. Jane Smith
 2020 Main Street
 Miami, FL 12345
 (305) 123-4567

Name: Laura Fernandez Age: 7
 Address: 4000 Avenue A Date: 10-15-2016

Rx: Amoxicillin 125/5 #150ml
 1 tsp (5 ml) q8h x 10 days

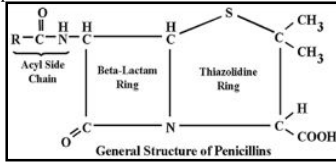
Refills—ZERO Jane Smith, O.D.

GROUP II: Penicillins and Beta Lactamase Inhibitors

<u>Generic Name</u>	<u>Trade Name</u>
Amoxicillin-Clavulanic Acid	Augmentin®
Ampicillin-Sulbactam*	Unasyn®
Benzylpenicillin	Benpen®
Cloxacillin	Tegopen®, Coxapen®
Dicloxacillin	Dycil®, Dynapen® , Pathocil®
Methicillin	Staphcillin®
Oxacillin	Prostaphilin®, Bactocil®
Penicillin G	Wycellin®
Penicillin V	Pen-Veeek®, Beepen-VK®
Piperacillin+Tazobactam*	Zozyn®
Ticarcillin+Clavulanic Acid	Timentin®
Nafcillin	Unipen®, Nafcil®

Penicillinase Resistant Penicillins

- AKA Staphylococcal Penicillins
- Very large R group- C and H attached to molecule
- Methacillin
- Naphicillin
- Cloxacillin
- **Dicloxacillin**

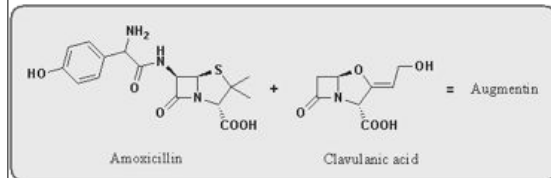


- **Dicloxacillin (Dynapen)** – excellent choice for treatment of internal hordeolum, preseptal cellulitis, dacryocystitis, orbital blow out fractures

Typical Adult Dose: 250-500 mg QID X 7-10 d
For children: 12.5-25 mg/kg QID X 7-10 d

Augmentin: Amoxicillin + Clavulanic Acid

- Clavulanic Acid
– A beta-lactamase inhibitor with some AB activity



GROUP II: Penicillins and Beta Lactamase Inhibitors

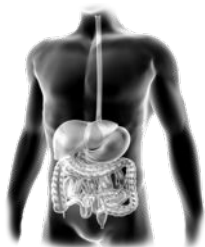
- **Augmentin** = Amoxicillin/clavulanic acid (inhibits beta lactamase)

Amoxicillin is a pro-drug of Ampicillin

Typical Dose: 500 mg BID or TID X 1 week to 10 days

Augmentin

- Dosage
 - Adults: 125-875 mg BID-TID x 7-10 d
 - Eg. Preseptal cellulitis: 500 mg TID x 10 days
 - Children: 20-40 mg/kg TID x 7-10 d



- Diarrhea may occur from increased GI motility
- May occur from a disruption of the GI flora that is a barrier to infection/aids in carbohydrate digestion

Penicillins: Side Effects

- Diarrhea is the most common SE
 - = 35% get Antibiotic Associated Diarrhea (AAD), Pseudomembranous Colitis; 17% of cases = fatal
 - Take probiotics for prevention and treatment
- Also common are nausea, vomiting, upset stomach
- Allergy 5%** - from degraded beta lactams. Rash, swelling, itching.
- Anaphylaxis**- within min - hours, throat. Epinephrine Tx.

• The Penicillins are Category B

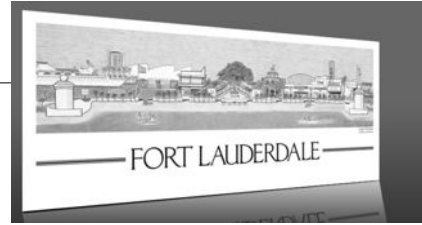
Penicillins: Contraindications

- Penicillins are contraindicated in patients who have had serious allergic reactions to them.
 - True penicillin allergy prevalence is actually no greater than 5%.



QUESTIONS

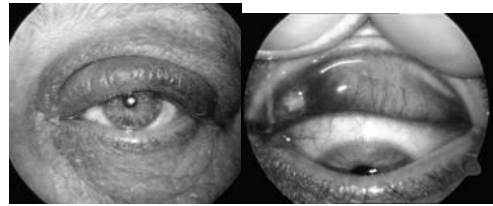
AND COMMENTS?



Case

- 55 / W / M
- CC: LUL red, tender, irritated x 3 days
- Oc Hx: + choroidal nevus, DM w/no DR
- Med Hx: DM x 6yrs, HTN, heart disease, cholesterol
- BVA: 20/20-1, 20/20-1
- FROM, FTFC OD OS, No APD
- SLE: see photo

Internal Hordeolum w/Preseptal Cellulitis



What are you going to do?

- Make sure it is not **orbital** cellulitis!
- Warning signs: absence of lid crease, red, pain, blurred vision, headache, double vision, warmth, proptosis, pain on eye movement, restricted motility, fever, decreased periorbital sensation



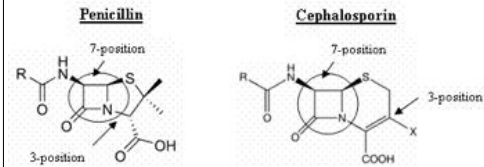
Orbital Cellulitis

Cephalexin

- Brand names
 - Keflex, Biocef, Keftab, Zartan
 - Generic
- Mechanism
 - Inhibits bacteria cell wall synthesis
 - Bactericidal against gram + and gram -
- Uses
 - Hordeola
 - Preseptal cellulitis
 - *S. Aureus*, streptococci, *haemophilus influenzae*



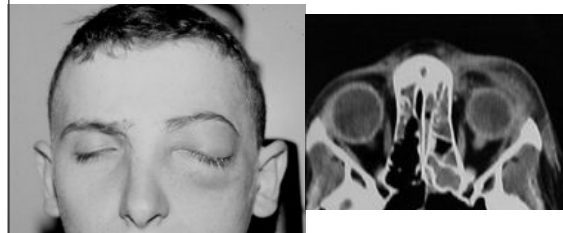
Cephalexin: similar to penicillins



Preseptal Cellulitis



ORBITAL CELLULITIS



Acknowledgement: Dufek

Cephalexin

- Dosing
 - Adults: 250-500 mg QID x 7-14 days
 - Children: 25-50 mg/kg QID x 7-14 days
- Other uses
 - Dacryocystitis
 - Dacryoadenitis
 - Blow-out fracture



Cephalexin

- Side effects
 - GI disturbances
 - Hypersensitivity reaction
 - Diarrhea, Pseudomembranous colitis
- Contraindications
 - Cephalosporins share slight cross-allergenicity with the penicillins, therefore...
 - Avoid in patients w/Hx of life threatening reactions to penicillin (2-4%)

Cephalexin



- **Pregnancy / nursing**
 - Category B
 - Presumed safe based upon animal studies
- **Children**
 - OK over age 5
 - 25-50 mg/kg/day divided into 4 doses
 - 7-14 days

Penicillin /Cephalosporin Adverse Reactions:

- Hypersensitivity reactions
~ 5% (rash, angioedema, anaphylaxis)
- Diarrhea
- Nausea
- Vomiting
- **Keflex: Sulfa cross-sensitivity in 15% of cases**

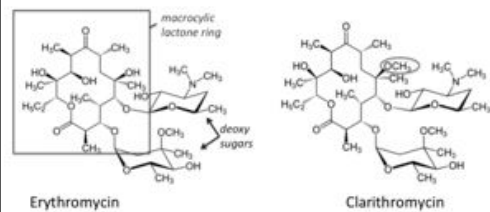
Cephalosporin antibiotics are classed Category B



Macrolides

- These drugs are chemically made of a large macrolide ring onto which are attached various sugars
- Interfere with bacterial ribosomal protein synthesis
 - Bacteriostatic in general
 - Can be bactericidal in higher doses

Macrolide Structure



Macrolides

Generic Name

Azithromycin*
Clarithromycin*
Clindamycin
Dirithromycin
Erythromycin

Lincomycin
Troleandomycin

Trade Name

Zithromax®
Biaxin®
Cleocin®
Dynabac®
E-mycin®,
Benzamycin®
Lincocin®
Tao®

Macrolides

MOA: Macrolides exert their antibiotic effect by binding irreversibly to the 30S or 50 S subunit of bacterial ribosomes.

Ribosomes are the protein factories of the cell, and by binding to the ribosome, macrolides inhibit translocation of tRNA during translation. (The production of proteins is under the direction of DNA).

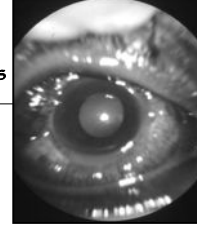
Although the cells of humans also have ribosomes, eukaryotic cellular protein factories differ in size and structure from the ribosomes of prokaryotes.

Azithromycin (Zithromax)

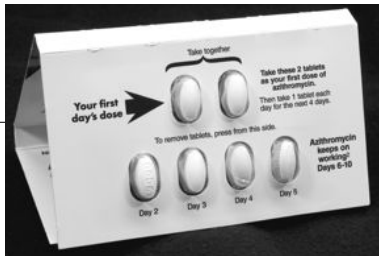
- Drug of choice for Chlamydia
- 1 gram either as a single dose or once weekly x 3 wks

• Z-PAK

- New Zithromax Tripak
- Three 500 mg tablets
- For adults



Indications



Macrolides

Mechanism of Action:

- Inhibit bacterial protein synthesis
- Bacteriostatic

Erythromycin (E-Mycin) 500mg BID x 1week (mainly gram +)

Azithromycin (Zithromax) Two 250 mg then 250 mg QD x 4 days

Clarithromycin (Biaxin) 250 mg or 500 mg BID x 7 days (gram +)

- Chlamydia – single dose 1000 mg Azithromycin

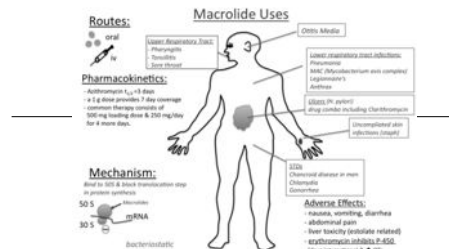
Important Note:

- Consider an oral fluoroquinolone over macrolides if penicillin allergy because macrolides are **bacteriostatic**.

Macrolides

- Generally effective against gram + and some gram – bacteria
- Effective against chlamydia
- Also have anti-inflammatory properties, so good alternative when tetracyclines are contraindicated.

Indications



Macrolides



- Generally safe
- Most common side effects are on GI tract
 - Nausea, vomiting, diarrhea
 - Some are enteric coated to reduce these effects (EES 400)
 - Can cause an elongated QT interval, leading to abnormal heart rhythm.

Macrolide Rx'ing

- Clarithromycin (Biaxin) 500
 - 1 PO BID to TID
- Azithromycin (Zithromax, Z-Pak, TriPak)
 - Z-Pak: 500mg day 1 and 250mg day 2-5
 - Children: 10 mg/kg day 1, 5 mg/kg day 2-5
 - TriPak: 500mg X 3 days

Macrolides

- Use with caution in patients with known liver dysfunction
- Limited activity against Hemophilus
- Increasing resistance and limited spectrum
- Azithromycin and Erythromycin = Category B
- Clarithromycin, dirithromycin, troleandomycin = Category C

Chronic Lid AB Therapy

- When Rx'ing PO antibiotics for several weeks duration, GI toxicity can become a problem
- Yeast infections also become common in female patients
- May need to Rx po Diflucan, probiotics

Systemic Tx. For MRSA

- Bactrim (trimethoprim/sulfamethoxazole)
 - 1-2 tabs
 - q12h x 1 wk
 - Kills ocular, systemic MRSA
 - Not one of the FL Fourteen



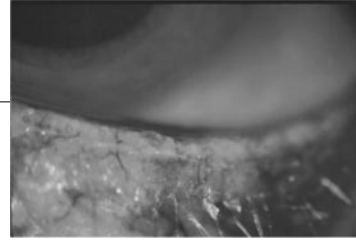
Questions and Comments?



CASE: 61 Y/O WM

- CC: red, burning, sandy feeling, crusty OU
- Oc Hx: LEE 2 yrs, unremarkable
- Med Hx: Rosacea x many years
- BVA: 20/20-1, 20/20-1
- FROM, FTFC OD OS, NO APD
- SLE: see photo
- IOP: 12/12 @ 9:40am
- DFE: unremarkable OU

61 Y/O WM



What is your plan?

Azithromycin 1% sol

- AzaSite® (Akorn)
- Macrolide AB
 - Broad-spectrum
 - Anti-inflammatory
- Approved for children >1 y/o
- Approved for bact conj only.

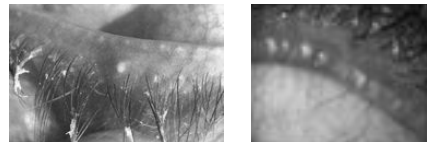


Azithromycin Ophthalmic Sol.

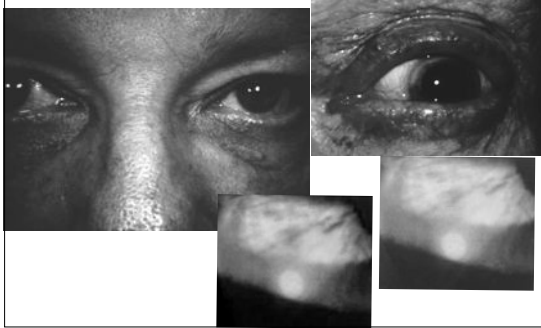
- Dosing
 - 1 drop bid for first two days
 - then 1 drop once daily for next five days.



Is topical Tx. enough for Rosacea-associated 3-4+ MGD and ant bleph?



Clinical Signs



Lissamine Green Staining

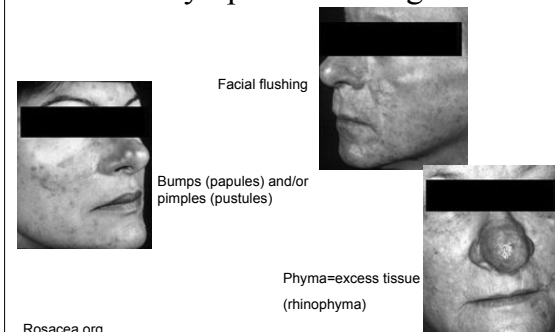


Doxycycline

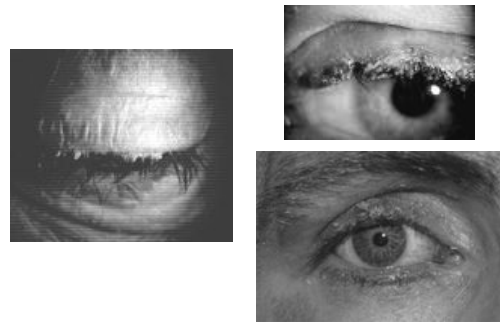
- Brand names
 - Adoxa, Doryx, Monodox, Oracea, Periostat, Vibramycin, Doxy-100, Vibra-tabs
 - Generic
- Mechanism
 - Inhibits protein synthesis
 - Restores lipid production
 - Effective against gram + and gram -
- Uses
 - Blepharitis
 - Meibomianitis, Hordeola
 - Preseptal Cellulitis
 - Dacryocystitis/adenitis



Rosacea Symptoms and Signs



Common Case



Doxycycline

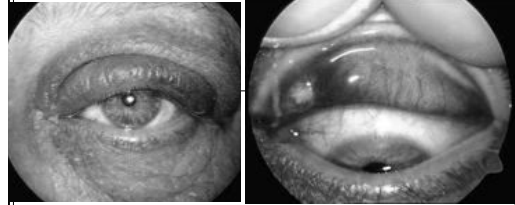
- Dosing for bleph/MGD
 - 100 mg qd-bid for 2-6 weeks, then taper slowly
 - Some need 20-50 mg/d indefinitely

Other Ophthalmic Uses

- Recurrent corneal erosion
- Chlamydia / trachoma
- Lyme disease
- Bartonella Neuroretinitis



Internal Hordeolum w/Preseptal Cellulitis



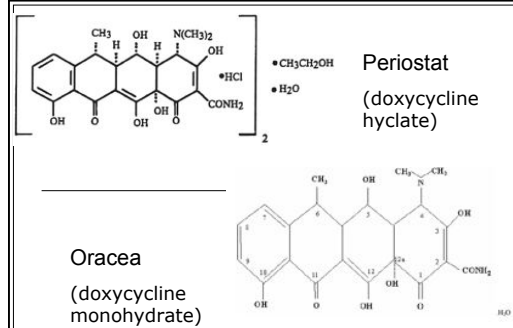
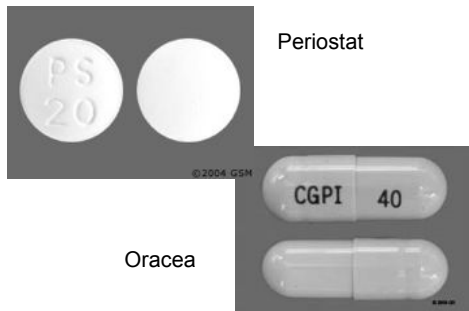
Tetracyclines

- Generally bacteriostatic, though higher doses may be bactericidal.



Tetracyclines

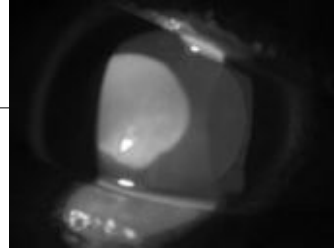
- When longer-term therapy is needed:
 - Periostat (doxycycline hyclate)
 - 20mg tab
 - Qd or bid
 - Initially developed for periodontitis
 - Now available as generic.
 - Oracea (doxycycline monohydrate)
 - \$\$\$



Oracea

- FDA approved in 4/2006 Oracea (doxycycline, CollaGenex Pharmaceuticals) to treat inflammatory rosacea in adults.
 - 1st drug approved for Papulopustular Rosacea only
 - Contains 30mg of immediate-release medication and 10mg delayed-release medication in capsule
 - Exhibits anti-inflammatory and not antimicrobial properties, so no drug resistance issues

Recurrent Erosion



PO Doxy for RCE

Wang L, Tsang H, Coroneo M. Treatment of recurrent corneal erosion syndrome using the combination of oral doxycycline and topical corticosteroid. Clin Exp Ophthalmol. 2008 Feb;36(1):8-12.

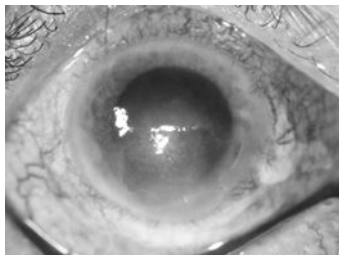
- In one study, patients with RCE received 50mg oral doxycycline BID and topical fluorometholone 0.1% TID for at least 4 wks.
- After eight weeks of treatment, 71% of the subjects were symptom free.
- Further, 73% of patients denied any symptoms suggestive of relapse at either 6 or 12 months, respectively.

Bascom Palmer study:

Used oral doxycycline 50 mg BID for two months and topical steroids TID for two weeks.

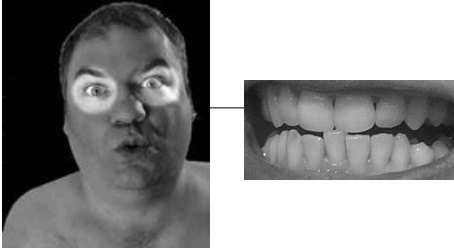
The results showed no recurrences in any of the patients for ~ 22 months = Recurrent Corneal Erosions

Chemical Burn

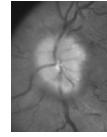


- ❖ Oral doxycycline (100 mg po bid) may be used in the acute phase of chemical burns of the cornea
- ❖ Reduces collagenase activity and sterile ulceration
 - This activity is independent of its antimicrobial properties
 - Probably due to chelation of zinc at active site of the enzyme
 - Inhibits neutrophil (PMN leukocyte) and MMP (matrix metalloproteinase) activity

Side Effects

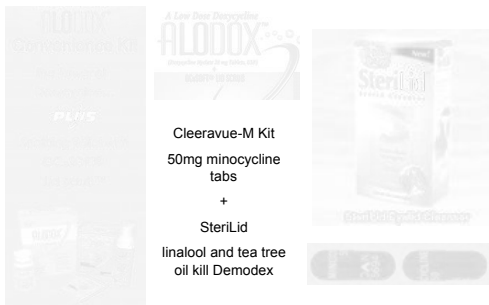


Doxycycline



- Side effects (all Tetracyclines)
 - Photosensitivity
 - Pseudotumor cerebri (rare), blood dyscrasias
 - Decreased bone growth, teeth discoloration
- Contraindications (all Tetracyclines)
 - Under age 8
 - Pregnancy Category D
 - Nursing
 - Liver dysfunction

Combination Therapy



Doxycycline

- Children
 - OK over age 8 (12)
 - 1-2 mg/kg Q12-24 h. Duration not to exceed 5 d
- Miscellaneous information
 - Take with or without meals
 - With food may reduce absorption by 20%
 - Without food may cause GI irritation
 - Oral contraceptives may not work

Minocycline



Minocycline

- Has extended MIC bioavailability
 - Adults: 50-100 mg BID x 1-6 wks
 - Children over age 8 (12): 50 mg Q12h not to exceed 5 d
- MIC levels measured in lids remain elevated for weeks after medication discontinued
 - Chronic therapy (4-8 weeks) can result in extended MIC levels

Minocycline

- Minocycline and Neuroprotection
 - Minocycline has been clinically implicated in offering potential neuroprotection for:
 - Cerebral ischemia
 - Traumatic brain injury
 - Degenerative brain diseases
 - Research being conducted looking at minocycline role in Retinal Ganglion Cell (RGC) death

Questions and Comments?



Dendritic Keratitis



Traditional Topical Treatment



Contemporary Treatment



Topical Gel for HSVK

- Zirgan (Sirion/Alcon)
 - Ganciclovir ophthalmic gel 0.15%
 - Targets replication of viral DNA in infected cells
 - Low corneal toxicity
 - Pregnancy category C
 - Approved for ages 2+
 - 1 gt 5x/d until dendrite resolves, then 1 gt tid x 7d



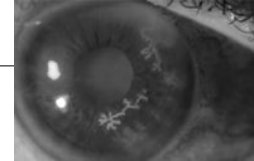
HSVK: Systemic Treatment

- Acyclovir (Zovirax®)
 - provides initial, recurrent, and suppressive therapy for HSV Keratitis
 - acute infection - 400 mg PO 5x/day X 7-10 d
 - little evidence supports its use of for primary oral-labial HSV or lid HSV



Preventing Recurrent HSV: HEDS

- Acyclovir may be effective in suppressing recurrent genital, oral, or ocular herpes infections.
 - 400mg bid
 - HEDS: 12 months duration



The Herpetic Eye Disease Study II

- In the treatment of HSV epithelial keratitis, there was no benefit from addition of oral Acyclovir to treatment with topical Viroptic in preventing the development of *stromal keratitis* or *iritis*.
- Oral Acyclovir, reduced by 41% the probability that any form of herpes of the eye would return in patients who had the infection the previous year. Oral Acyclovir (400mg BID for 12 months).

Treatment of HSVK

- Famciclovir (Famvir®)
 - acute infection - 250 mg PO tid X 1 wk
 - suppressive therapy 250 mg PO bid
- Valacyclovir (Valtrex®)
 - acute infection - 500 mg PO tid X 1 wk
 - suppressive therapy 500 mg PO qd
- Famciclovir and Valacyclovir offer better dosing schedule, generic!



Famvir (Famciclovir)

- Has the best bioavailability among AVs
- Can be used in Herpes Simplex keratitis (first episode or recurrent)
- Pro-drug of penciclovir (Denavir)
 - Denavir cream available for cold sores
- 125mg, 250 mg and 500 mg tablets
- Category B – Pregnancy classification

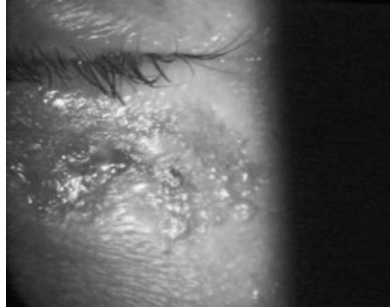


Valtrex (Valacyclovir)

- Prodrug of Acyclovir
- 500 mg and 1000 mg tablets
- Can be used in Herpes Simplex keratitis (first episode or recurrent)
- Category B – pregnancy classification



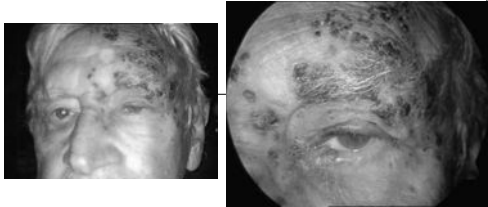
HSV Blepharodermatitis



Consider Oral Anti-Virals:

- Herpes Zoster-- All forms
- Herpes Simplex -- Primary lid lesion
- Herpes Simplex -- Keratitis (non-stromal)
- Herpes Simplex-- Keratitis, Stromal
- Herpes Simplex ~Iridocyclitis

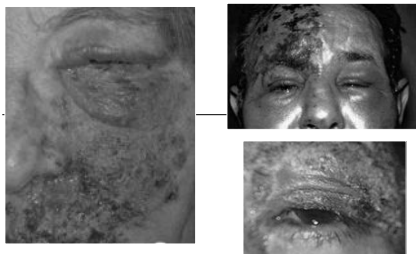
H. Zoster



HZO Keratitis ("Pseudodendrite")



WHAT ARE YOU GOING TO DO?



Go-to med for all Herpetic Eye Dx:



WHAT'S NEW?

■ Generic Valtrex, Famvir

To Treat Shingles (VZV), Give Double the Dose Used for HSV

Antiviral Drug	Dosing for H. Zoster	Dosing for HSV
Acyclovir	800mg 5x q.d. x 1wk	400mg 5x q.d. x 1wk
Valacyclovir	1,000mg t.i.d. x 1 wk	500mg t.i.d. x 1 wk
Famciclovir	500mg t.i.d. x 1 wk	250mg t.i.d. x 1 wk

Source: Review of Optometry 2010 Clinical Guide to Ophthalmic Drugs, Melton and Thomas

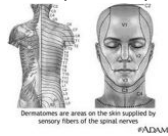
Herpetic Eye Disease Treatment

- Valtrex, Famvir are better absorbed and thus more bioavailable than Acyclovir.
 - Therefore they require lower amounts and less frequent dosing.
 - Better SE profile than Acyclovir.
- Headache is a common side effect of all oral antivirals.

ACYCLOVIR for H. Zoster Oph

■ DOSING

- 800 MG 5X PER DAY FOR 7-10 DAYS
- **MUST** be initiated within **48 hours** of onset of rash to be effective and prevent post-herpetic neuralgia.



H. Zoster Vaccine

- A live, attenuated virus vaccine that reduces risk of getting HZV in people 50 and older.
- Reduces by 50% the risk of reactivation of varicella zoster virus, the same one that causes chicken pox and remains dormant in the body after recovering.



ZOSTAVAX is not indicated for the treatment of zoster or postherpetic neuralgia.

H. Zoster Vaccine

- Approved in 2006
- CoSt = \$200
- Covered by Medicare Part D, not Part B
- In 2008, CDC indicated that people w/Hx. of HZV can be vaccinated to reduce recurrence.



ZOSTAVAX is not indicated for the treatment of zoster or postherpetic neuralgia.

ACYCLOVIR

- Side effects
 - Nausea, vomiting, diarrhea
 - Malaise
 - Headache
- Contraindications
 - Renal disease
 - (BUN/Creatinine)



ACYCLOVIR

- Pregnancy / nursing
 - Category B
 - Presumed safe based upon animal studies
 - Caution to those lactating
- Children
 - OK over age 2
 - 20 mg/kg/day over 4 doses in suspension

Questions and Comments?



Pain

- Pain is a feeling triggered in the nervous system.
- It may be sharp or dull.
- Pain may come and go, or it may be constant.
- It may result from various ophthalmic and other causes.



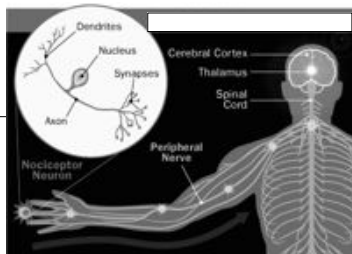
Pain is...

An "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."

Source: International Association for the Study of Pain



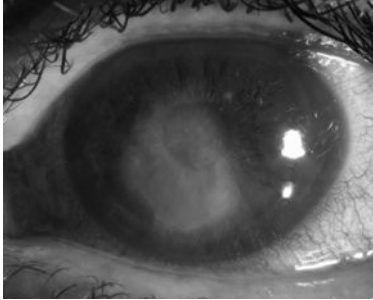
Nociception (from the Latin word for "hurt"), is the process by which a painful stimulus is relayed from the site of stimulation to the central nervous system.



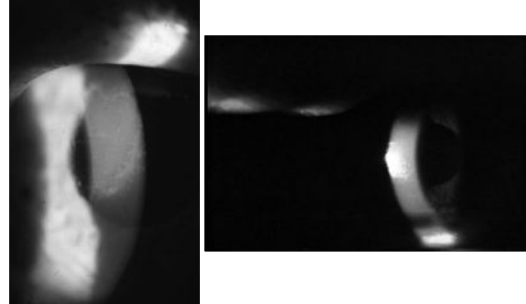
Analgesics...

work either peripherally (NSAIDs and aspirin) at the end receptors or centrally (opioids and acetaminophen) in the nervous system.

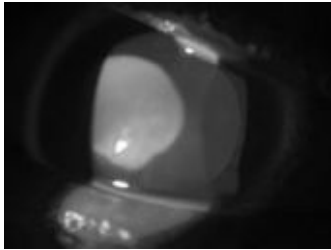
Large corneal abrasion



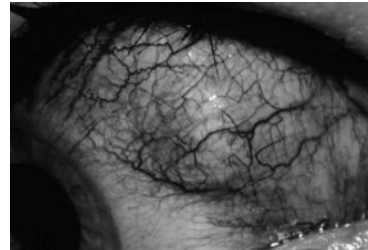
Large corneal abrasion



Recurrent Erosion



Moderate-severe Ocular Pain



Oral Med Quiz

- What is the current mainstay for systemic treatment of scleritis?
- a. nonsteroidal anti-inflammatory drugs (NSAIDs)
- b. immunosuppressants
- c. antibiotics
- d. corticosteroids

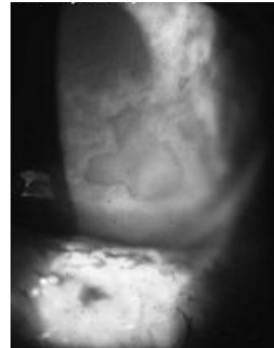
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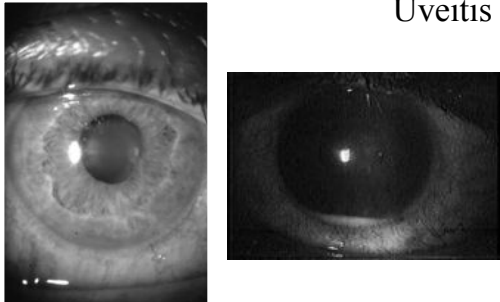
Systemic Steroids: Side Effects

- Weight gain
- PSC
- IOP rise
- Central Serous Chorioretinopathy

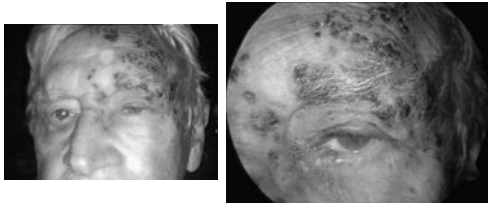
Herpetic Lesion



Uveitis



H. Zoster



5 Schedules of Drugs Under DEA

Schedule 1 : no approved or acceptable medical use in the United States
(Heroin, LSD)

Schedule 2 : Written Rx with no refills
(High potential for abuse - oxycodone, methadone, morphine)

Schedule 3 and 4: Verbal or written Rx with up to 5 refills for 6 months
(Lower potential for abuse - codeine, hydrocodone, propoxyphene)

Schedule 5 : Rx filled as authorized by practitioner
Limited abuse potential - none in this group used for ocular analgesia
(Robitussin)

Ultram – Tramadol HCL (DEA #)

• CNS agent – reduces the perception of pain

- Equal in effectiveness to Tylenol 3
- Weak opioid receptor binding
- Can be taken w/o regard to meals



- Minimal side effects (constipation, dizziness and nausea)
- One 50 mg tablet QID or more frequent
 - not to exceed 400 mg / day

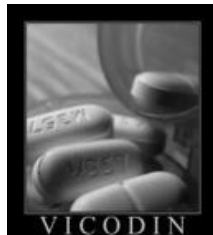
TYLENOL #3 Narcotic Analgesic

- Acetaminophen 300 mg
- Codeine Phosphate 30 mg
- Doses may be repeated up to every 4 hours
- Binds to opiate receptors in the CNS, causing inhibition of ascending pain pathways.
- Alters the perception of and response to pain.



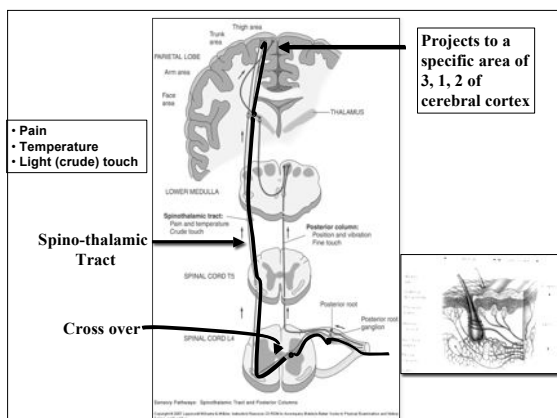
Managing Severe Ocular Pain

- Lortab, Vicodin
- Acetaminophen
 - acetyl para aminophenol 500mg
- + hydrocodone 2.5mg
- Not one of the FL Fourteen

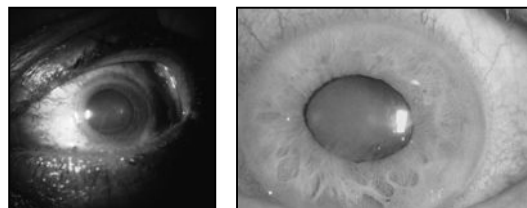


Contraindications for Narcotic Analgesics

- Known hypersensitivities
- COPD
- Liver and kidney problems
- Pregnancy
- History of pain medication abuse



- Acute Angle Closure: rapid rise in IOP due to blockage of trabecular meshwork
- Definitive Tx. With LPI



Oral CAIs

- Give two 250mg tablets of Diamox (acetazolamide) as first step in reducing IOP in angle closure, or any other form of acute IOP increase.
 - (Since Diamox 500mg Sequels are time released, don't use them for acute situations)
- The typical dosage of acetazolamide for acute pressure spikes is two 250mg tablets, followed by an additional dose in 3 to 4 hours, if needed.



Oral CAIs

- The typical dosage for methazolamide (Neptazane) is 25mg bid, stepping up to 50mg bid as needed.
- Methazolamide is usually well-tolerated and carries a much reduced risk of renal calculi (kidney stones) compared to acetazolamide.

Oral CAIs

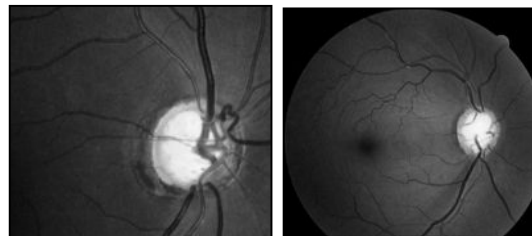


Oral CAIs

- Ocular side effects:
 - idiosyncratic sulfonamide-related transient angle-closure, myopia and choroidal thickening, but these are rare
- Systemic side effects:
 - gastrointestinal upset, paresthesias, diuresis, metabolic acidosis, malaise, anorexia, metallic taste, tingling of fingers, renal calculi, and potassium depletion, especially with prolonged use.

• Open Angle Glaucoma

• Angle Closure Glaucoma



Oral CAIs

- Potassium depletion is more likely if the patient is also taking a hydrochlorothiazide diuretic, digitalis or a corticosteroid. Potassium levels should be monitored in these circumstances.
- More severe reactions, such as renal stones, blood dyscrasias or Stevens-Johnson syndrome, are possible but uncommon.
- **Contraindications for Diamox and Neptazane include sulfa allergies or a history of renal stones or renal failure.**
- Care should be exercised if a patient is susceptible to metabolic acidosis, is a brittle diabetic, has hepatic insufficiency, or has chronic obstructive pulmonary disease with acidosis.
- Note: simultaneous regular aspirin use can lead to CAI accumulation and toxicity.

Remember

Your ABCDs:

A = Allergies

B = Body weight

C = Current Medications

D = Diseases



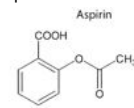
My Go-to Mild-Mod Pain Meds

- MOTRIN, ADVIL (Ibuprofen)
- ASPIRIN (Acetylsalicylic acid)
- TYLENOL (Acetaminophen)



Tylenol (acetaminophen)

- Is the leader in OTC pain control
- Remember it has no anti-inflammatory properties
- Use at 325 mg every 4 hours
- Typically no SEs
- Rare but severe skin Rxn



Aspirin (acetylsalicylic acid)

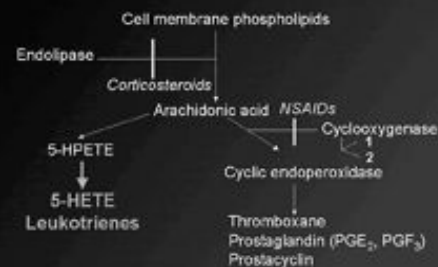
- Do not give to children and teenagers = Reye's syndrome
- May cause GI bleeding
- May induce asthma
- Avoid in patients with nasal polyps – increased incidence of allergy
- Do not give if patient is on Coumadin, Heparin
- Renal insufficiency and Congestive Heart Failure – contact PCP

IBUPROFEN



- Brand names
 - Advil, Motrin, Midol, Neoprofen, Proprinal, Ultrapin
 - Generic
- Mechanism
 - Non-steroidal antiinflammatory
 - Antipyretic, analgesic
 - Inhibits prostaglandin synthesis by decreasing the activity of cyclooxygenase
- Uses
 - Scleritis, uveitis, trauma

NSAIDs Mechanism of Action



Ibuprofen (Motrin, Advil, Nuprin)

Comes in 200 mg brown tablets

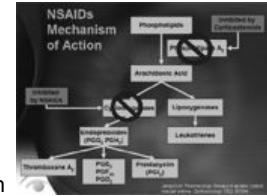
Use at 400 mg QID

No NSAID to a diabetic patient

Ibuprofen at 400 mg QID = to Tylenol 3 ****

Ibuprofen

- Dosing
 - 400-600 mg qid
- Other uses
 - Episcleritis
 - K abrasion/erosion
 - Mild-moderate pain



IBUPROFEN

- Side effects
 - Dizziness, rash, heartburn, tinnitus
 - Epigastric pain, nausea
- Contraindications
 - Pregnancy (3rd trimester)
 - GI disease
 - Pain associated with coronary artery bypass
 - Bleeding disorders

IBUPROFEN

- Pregnancy / nursing
 - Category C
 - Benefit must outweigh risk
 - Animal studies show teratogenic effects on fetus
 - Risk to fetus in 3rd trimester
 - Caution to those lactating
- Children
 - 4-10 mg / kg every 6-8 hours

IBUPROFEN

- Miscellaneous information
 - Take with food
 - Avoid alcohol due to gastric irritation / bleeding
 - Overuse may cause rebound
 - 400 mg qid is comparable to acetaminophin / codeine
 - Tylenol #3
 - May interfere with aspirin's anti-platelet effect
 - Take 30-120 minutes after or 8 hours before aspirin

Access and Assistance

- Rebate programs
- GoodRx.com
- Lower-priced options
 - Polytrim
 - Maxitrol
 - Acyclovir
 - Pred sodium phosphate 1% sol

Conclusions

- The ability to prescribe therapeutic agents has enabled optometry to establish itself as a true primary health care profession.
- “With great power comes great responsibility.”
 - Uncle Ben in Spiderman
- Prescribe wisely!



Thank you!



Joe