

Orals Pharmaceuticals in Eye Care

Greg Caldwell OD, FAAO
Optometric Education Consultants
American Board of Optometry
Wednesday, February 3, 2026



1

Disclosures- Greg Caldwell, OD, FAAO

All relevant relationships have been mitigated

- Lectured for: Alcon, B&L, Dompé, Lenz
 - Disclosure: Receive speaker honorariums
- Advisory Board: Dompé, Tarsus, Envision
 - Disclosure: Receive participant honorariums
- I have no direct financial or proprietary interest in any companies, products or services mentioned in this presentation
 - Disclosure: Non-salaried financial affiliation with Pharmanex
- Healthcare Registries – Chairman of Advisory Council for Diabetes and AMD
- The content of this activity was prepared independently by me - Dr. Caldwell
- The content and format of this course is presented without commercial bias and does not claim superiority of any commercial product or service
- Optometric Education Consultants – Scottsdale, AZ, Pittsburgh, PA, Sarasota, FL, Barcelona, Spain, Orlando, FL, Mackinac Island, MI, Quebec City, Canada, and Nashville, TN- Owner



2

My Practice

- I am a clinician first then a scientist
 - Some are scientists first then clinician
 - I need to simplify for patient and patient care
 - Science is great, but not good if there isn't a clinical application
 - Some lectures are science based without clinical application.
 - My lecture will be a hybrid. Showing clinical applications of the science






It is wonderful to have someone who's juggling so many aspects of optometry scientific, clinical experience, teacher & lecturer. It is refreshing and very informative. -Sarah

4

Oral Pharmaceuticals in Eye Care Agenda

- ~ FDA Pregnancy Categories
 - Pre-June 30, 2015
 - Post-June 30, 2015
- ~ Antibiotics
 - Anti-infectives
 - Anti-inflammatory
- ~ Antivirals
 - Anti-infectives
- ~ How to apply them in patient care
- ~ Pitfalls to avoid
- ~ Increase confidence when selecting an oral antibiotic or antiviral

5

FDA Pregnancy Categories

- ~ Category A- studies in pregnant women...no risk
- ~ Category B- animal studies no risk but human not adequate...or...animal toxicity but human studies no risk...safe
- ~ Category C- animal studies show toxicity human studies inadequate but benefit of use may exceed risk...OR...there are no adequate studies in animals or humans...avoid (MOST new drugs are here)
- ~ Category D- evidence of human risk but benefits may outweigh risks...avoid
- ~ Category X- fetal abnormalities, risk>benefits...avoid

6

Pregnancy and Lactation Labeling Rule-FDA

December 4, 2014 Final Rule

- ~ **Effective June 30, 2015**
 - Effective now for new medications and a 3-5-year phase in period (application)
- ~ Labeling for human prescription drugs and biological products will include:
 - Pregnancy
 - Lactation
 - Females and Males of Reproductive Potential
- ~ Pregnancy (8.1)
 - Pregnancy Exposure Registry – omit if not applicable
 - Risk Summary – required subheading
 - Clinical Considerations- omit if none of the headings are applicable
 - Disease-associated maternal and/or embryofetal risk- omit if not applicable
 - Dose adjustments during pregnancy and the postpartum period - omit if not applicable
 - Maternal adverse reactions - omit if not applicable
 - Fetal/Neonatal adverse reactions- omit if not applicable
 - Labor or delivery - omit if not applicable
- Data- omit if none of the headings are applicable
 - Human Data - omit if not applicable
 - Animal Data - omit if not applicable

7

Pregnancy and Lactation Labeling Rule-FDA December 4, 2014 Final Rule

- ~ Lactation (8.2)
 - * Risk Summary- required subheading
 - * Clinical Considerations- omit if not applicable
 - * Data- omit if not applicable
- ~ Females and Males of Reproductive Potential (8.3) - omit if none of the headings are applicable
- ~ Pregnancy testing- omit if not applicable
- ~ Contraception- omit if not applicable
- ~ Infertility - omit if not applicable

8

Pre-June 30, 2015

9

Post-June 30, 2015

10

Post-June 30, 2015

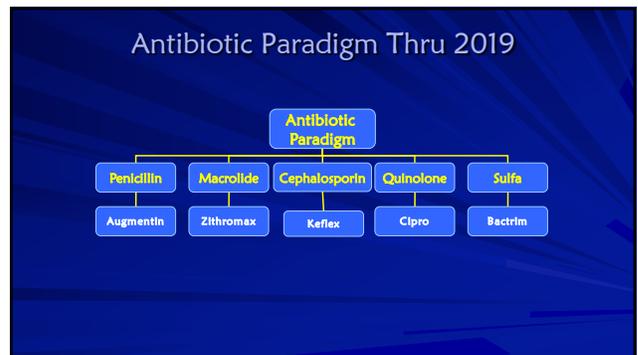
11

Dacryocystitis

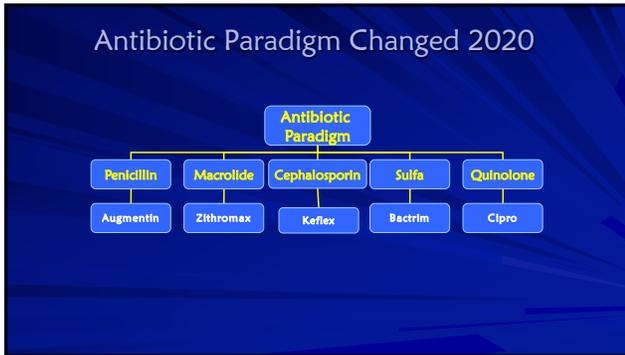
Patient as a severe allergic reaction to Penicillin and Keflex (EpiPen)
Which antibiotic would you use?

- A. Augmentin
- B. Azithromycin
- C. Cephalixin
- D. Bactrim
- E. Cipro

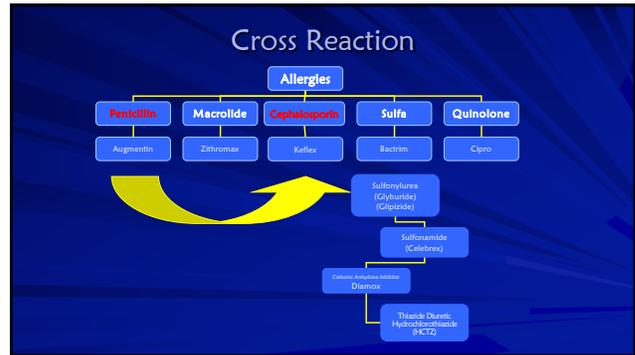
12



13



14



15

“Sulfa Antibiotic Allergy”

- ~ If a true allergy: Mast cell and IgE mediated, causing hives, itch, congestion, lip and tongue swelling, tightness in throat, and bronchial constriction
 - * Anaphylaxis
- ~ The “S” is typically not the hapten/antigen
- ~ The arylamine group is the hapten/antigen
- ~ 90% of people who say they are allergic to sulfa, are not allergic to all

16

What to ask about allergies

- ~ For the patient
 - * When did you react?
 - * What was the reaction?
 - Systemic versus topical
- ~ For you...
 - * For sulfa allergic patients
 - Antibiotic structure sulfa allergy
 - Sulfamethoxazole/trimethoprim
 - Non-antibiotic structure agents
 - Carbonic anhydrase inhibitors
 - Hydrochlorothiazide
 - Celecoxib (Celebrex)
 - Glipizide, glyburide, gliclazide

17

Amoxicillin + Clavulanic acid (Augmentin)

- ~ “Uber Amoxicillin”
- ~ Kills everything, good for everyone
 - 12 weeks old and older
- ~ Safe in pregnancy...category B
- ~ Watch for PCN allergies
- ~ Adults: 250, 500 and 875 mg
 - * Dose of clavulanate varies
- ~ Children <100 pounds: oral suspension 25-45 mg/kg divided into 2 doses
- ~ Covers *Staph*, *Strep* and *Haemophilus influenzae*

18

Azithromycin (Zithromax)

- ~ Macrolide antibiotic (erythromycin is prototype)
- ~ Drug of choice in PCN sensitive patients
- ~ All age groups and pregnancy category B
- ~ No renal adjustment
- ~ Adult:
 - * 250 mg bid (day1), 250 mg qd (day 2-5), 6 pack
 - * 500 mg qd x 3 days, tri-pack
- ~ Children <16: 10 mg/kg (day1), 5 mg/kg (day 2-5)
- ~ Covers *Staph*, *Strep* and *Haemophilus influenzae*
- ~ Better tolerated than erythromycin, little GI upset
- ~ Chlamydia...1 g qd

19

Zithromax (azithromycin)

☞ "The Vegas Drug" - Chlamydia...1 g qd



20

Cephalexin (Keflex)

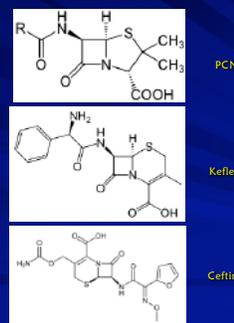
- ☞ Cross reaction with PCN sensitive patients
 - * Approximately 3 – 10%
- ☞ 1st generation, moderately effective against PCN-ase
- ☞ Good for Gram +, +/- for *Haemophilus* (-)
- ☞ Available in 250 and 500 mg
- ☞ Category B
- ☞ Adult: typically, 500 mg bid x 1 week
 - * Maximum 4 g in 24 hrs
- ☞ FYI...Drug of choice for blow out fractures

21

Cefuroxime (Ceftin)

- ☞ 2nd generation
- ☞ Better for *Haemophilus* (-)
- ☞ Children: 3 months to 12 years old, oral suspension 15 mg/kg divided into 2 doses x 10 days
- ☞ Available in 125, 250 and 500 mg
 - * FYI: adults typically 250 mg bid x 10 days
- ☞ Category B

22



Cross Reaction

23

Sulfa Drugs

- ☞ Limited use...last line of defense
- ☞ Bactrim SS
 - * 400 mg sulfamethoxazole/ 80 mg trimethoprim
 - * 1-2 tab PO bid
- ☞ Bactrim DS (double strength)
 - * 800 mg sulfamethoxazole/ 160 mg trimethoprim
 - * 1 tab PO bid

24

Sulfa ADRs

- ☞ Contraindicated in pregnancy and sickle cell disease
 - * Category C
- ☞ High incidence of Steven-Johnsons Syndrome (SJS) and Toxic epidermal necrolysis (TEN)
- ☞ Cross reaction with oral hypoglycemics, CAI' s, celebrex and thiazide diuretics...all sulfa based
 - * Reality?

25

Ciprofloxacin (Cipro) Levofloxacin (Levaquin)

- ~ In my opinion, an end of the line, antibiotic to use...allergic to PCN, cephalosporins, macrolides...
- ~ Really effective, because they are BROAD
- ~ Would avoid if pregnant, BF, and in kids
 - * Only use 18 years or older (oral)
- ~ Cipro and Levaquin available in 250, 500 and 750 mg
 - * Cipro 750 mg for only severe infections (usually life-threatening pneumonia)
- ~ 500 mg bid x 1 week-Cipro
- ~ 500 mg qd x 1 week-Levaquin
- ~ Levaquin-tendon ruptures

26

Fluoroquinolone ADRs

- ~ Retinal detachment (1 per 2,500 pts)
 - * WHAT!?!
 - Mechanism is possible through destruction of collagen and connective tissue...
- ~ QT prolongation in newer agents
- ~ Photosensitivity
- ~ Tendon rupture
 - * Watch shoulders, wrists, Achilles

27



Dacryocystitis

Patient as a severe allergic reaction to Penicillin and Keflex (Epipen)

Which antibiotic would you use?

- Augmentin
- Azithromycin
- Cephalexin
- Bactrim
- Cipro



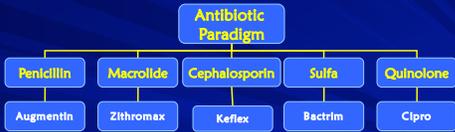
28



- ~ Remember...patient allergic to PCN and Keflex
- ~ Treatment
 - * Polytrim QID OD
 - * Zithromax
 - Disp: 5 day z-pak
 - Use as directed PO
- ~ Dilution and Irrigation
 - * Contraindication or indication?
- ~ Confirmed nasolacrimal duct blockage
 - * DCR, dacryocystorhinostomy

29

Antibiotic Paradigm Changed 2020



```

    graph TD
      AP[Antibiotic Paradigm] --> P[Penicillin]
      AP --> M[Macrolide]
      AP --> C[Cephalosporin]
      AP --> S[Sulfa]
      AP --> Q[Quinolone]
      P --> A[Augmentin]
      M --> Z[Zithromax]
      C --> K[Keflex]
      S --> B[Bactrim]
      Q --> CI[Cipro]
    
```



Oral (9:32) Antibiotic Review in Eye Care
YouTube - By Greg Caldwell, OD, FAAO

30

What group of antibiotics are we missing?

31

Treatment Failure

- ~ If you continue to think of doxycycline and minocycline as antibiotics, treatment failure will be the result
- ~ From this point on consider them a steroid

32

48-year-old man

OU red, gritty, sandy and dry feeling

Va 20 / 20 20 / 20 cc 20	Current Correction R -2.00 sphere L -3.00 sphere
--------------------------------	--

EOMS: full, unrestricted PERRL (-)APD
 CT: ortho D/N CF: full by FC OU

33



- ~ Diagnosis
 - * Rosacea
- ~ What findings support your diagnosis?
 - * Telangiectasias
 - * Erythema of the cheeks, forehead and nose
 - * Rhinophyma
 - Indicates chronic
- ~ Let us get a closer look

34

A Closer Look



35

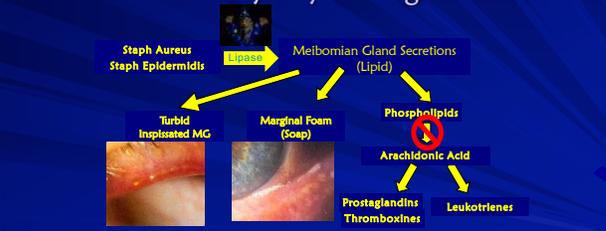
Rosacea Blepharitis

(Inflammatory Blepharitis, MGD)

- ~ Diagnosis?
- ~ Treatment?
 - * In my opinion, most under treated condition
 - * Warm compresses
 - * Lid hygiene
 - * Artificial tear
 - * Omega 3 fatty acid
 - EPA and DHA total 1500 mg (1000 mg minimum)
 - * Dermatological consult (Acne Rosacea)
 - * Oral antibiotics...???
 - Which one and why??

36

Tetracycline Analog



How About Steroids?



37

Minocycline / Doxycycline

- ~ Drug of choice for marginal inflammatory blepharitis, posterior blepharitis, MGD, evaporative disease
- ~ AB, anti-inflammatory and anti-collagenase
- ~ No renal adjustment
- ~ 50-100 mg qd-bid 2-12 weeks (pulse)
 - * Lower maintenance dose
- ~ 20 mg Periostat (Doxycycline)
 - * Helpful in those with stomach or GI sensitivity
 - * Excellent for those requiring long maintenance dose

38

My Paradigm for Minocycline / Doxycycline

- ~ Status of MG
 - * Inspissated
 - * Turbid
 - * Clear
- ~ Minocycline / Doxycycline Paradigm
 - * Maximum dosage for 2-12 weeks (pulse)
 - 100 mg BID, QD
 - * 50-100mg qd while turbid
 - * 20 mg longer treatments
 - Periostat (Doxycycline)
 - * 20 mg if maintenance dose needed

39

Successfully Treated



- ~ Warm Compresses
- ~ Lid Scrubs
- ~ Artificial Tears, Systane Balance
- ~ Omega 3 (1500 EPA and DHA)
- ~ Mino 100 mg PO 6 weeks, 50 mg 3 months, 20 mg maintenance (Doxy)
- ~ Steroids, Tobradex qid (5 weeks with taper)
 - * Moderately red and thickened lid margins
 - * Marginal infiltrates

40

Hyclate vs Monohydrate

- ~ I get calls from the pharmacist
- ~ Use chat box – which do you use hyclate or monohydrate
 - * Doxycycline
 - Doryx
 - Enteric coated hyclate pellet
 - Adoxa
 - Monohydrate



41

Doxycycline and Minocycline Adverse Drug Reactions

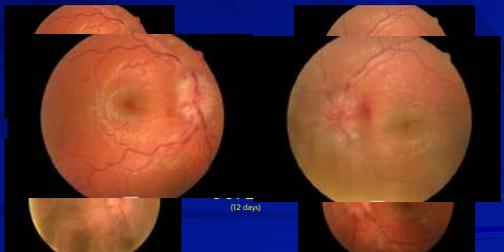
- ~ Enhanced photosensitivity
- ~ Avoid in children and pregnancy (Category D)
- ~ Can interfere with how penicillin kills bacteria
- ~ Enhances the effects of
 - * Coumadin
 - * Digoxin
- ~ ~~Lithiathic~~ Secondary intracranial hypertension
 - * Pseudotumor cerebri
 - * Isotretinoin (Accutane) – for severe acne and doxy/mino increase this risk
- ~ Hyperpigmentation
- ~ Antacids that contain aluminum, calcium, magnesium, bismuth subsalicylate, and iron may inhibit doxy/mino
 - * Same for seizure meds like barbiturates, carbamazepine, phenytoin



42

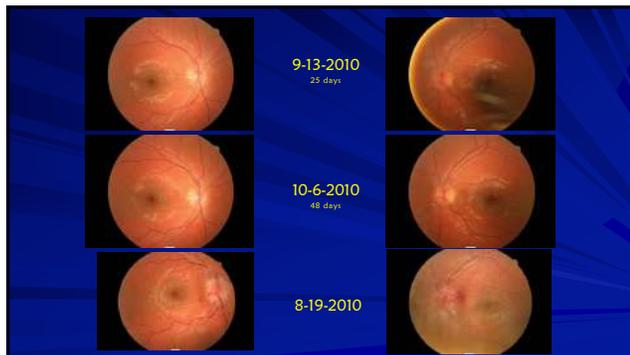
Benign intracranial hypertension

“It’s not rare if it’s in your chair”

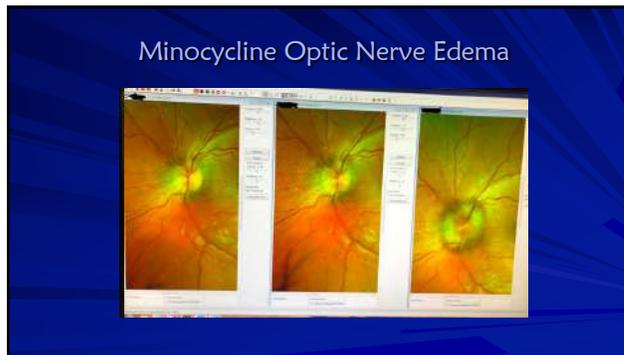


(12 days)

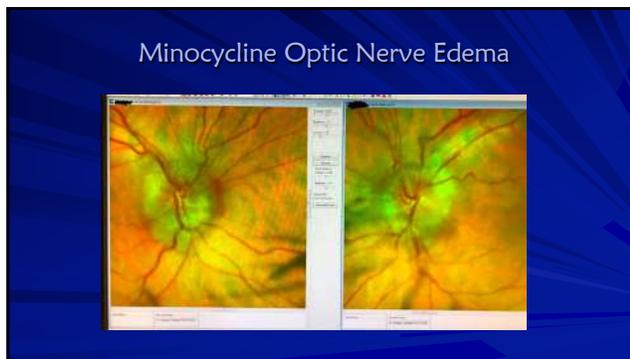
43



44



45



46



47



48



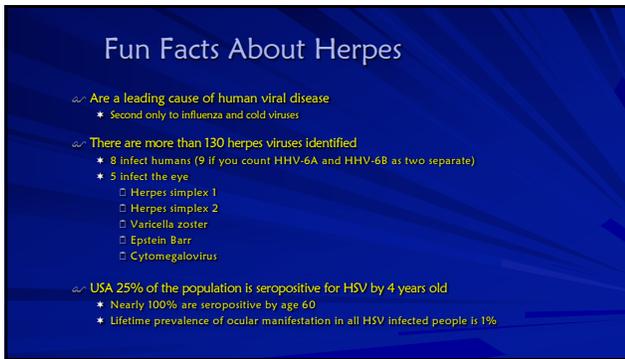
49



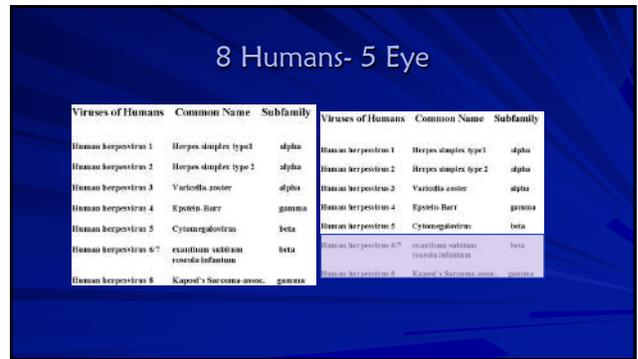
50



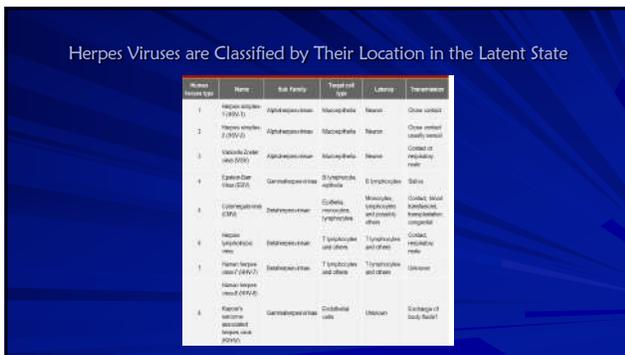
51



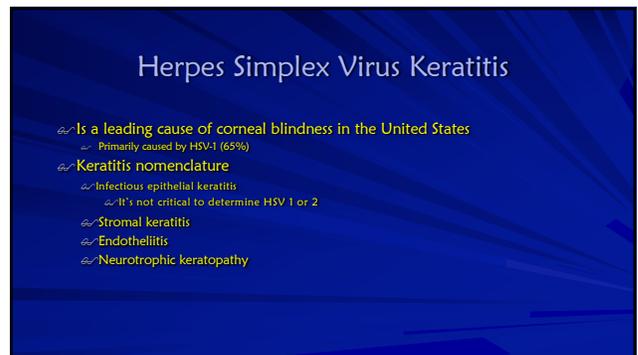
52



53



54



55

Herpetic Eye Disease Study

- HEDS I
 - Benefit from steroids in stromal keratitis
 - No benefit from oral Acyclovir in stromal keratitis
 - Benefit from steroids if iritis present
- HEDS II
 - * No benefit from Acyclovir to stop progression to stromal or iridocyclitis
 - * Maintenance dose 400 mg BID, decreases recurrence by 41% within 1st year

56

Cranium Keeper from HEDS 1 & 2

Percentages in HSV keratitis

- * 25% to return in 1 year after 1st episode
- * 43% to return after second episode in 12 months
- * 41% decrease with maintenance

57

Varicella-Zoster Virus (VZV)

- AKA: Herpes Zoster Virus or Herpes Human Virus 3
- Vesicles on tip of nose indicate nasociliary involvement
 - High risk of ocular manifestations




58

Varicella-Zoster Virus (VZV)

The best time to diagnose and treat



59



60

Ever wonder why a Primary Care Physician sends you with Herpes Zoster already on oral Valtrex and prednisone?



61

Varicella-Zoster Virus (VZV)



- ~ Vesicles on tip of nose indicate nasociliary nerve involvement
 - High risk of ocular manifestations
- ~ Ocular findings associated with VZV
 - * Epideritis
 - * Scleritis
 - * Keratitis
 - * Uveitis
 - * Iris atrophy
 - * Glaucoma
 - * Viritis
 - * Retinitis
 - * Choroiditis
 - * Optic neuritis
 - * CN palsy

62

Renal Impairment

- ~ Identify patients on hemodialysis
- ~ Adjustment made by patient's creatinine clearance (CrCl)...ml/min
 - * Work with patient's PCP/Internist

63

Zovirax (acyclovir)

- ~ Good for simplex and zoster
- ~ Available in 200, 400 and 800 mg, IV
- ~ Dosage: 800 mg/5 times/day (4 grams daily)
 - ~ Poor GI absorption
- ~ Maintenance dose: 200-400 mg bid
- ~ Caution if impaired renal function
 - * Excreted by kidneys
- ~ Category B

64

Off-Label

- ~ Valtrex and Famvir used for the eye
 - * Off label
 - * Only approved for genital herpes
 - * Won't find dosage in PDR for ocular usage

65

Famvir (famciclovir)

- ~ Available in 125, 250 and 500 mg
- ~ Dosage: Zoster 500 mg tid
 - Recurrent Simplex 125-250 mg bid
- ~ Caution if impaired renal function
- ~ Category B
- ~ No longer available via Norvartis in USA as brand name

66

Valtrex (valacyclovir)

- ~ Pro-drug of acyclovir
- ~ Available in 500 and 1000 mg
- ~ GI upset
- ~ HSV-1, HSV-2, VZV
- ~ Dosage: 1g tid x 1 week (3 grams daily)
- ~ Caution if impaired renal function
- ~ Category B

67

Beside the dosing frequencies...

~What is different about the oral antivirals?

~Main reason for early discontinuation of oral acyclovir in HEDS

- ~Gastrointestinal side effects
- ~Rash

Many patients on oral acyclovir have GI symptoms

68

Acyclovir vs. Valacyclovir vs. Famciclovir

What is the difference?

Zovirax® contains lactose

Presence or absence of lactose in generic acyclovir varies

Valtrex® and all generics are free of lactose

Generics available in the US contain lactose

* In Europe you can get generic famciclovir without lactose (Teva Pharmaceuticals, Israel)

69

Acyclovir vs. Valacyclovir vs. Famciclovir

What is the difference?

CNS Effects in Elderly Patients

- ~Acyclovir and valacyclovir carry a higher risk of CNS adverse effects in the elderly;
 - * Agitation
 - * Hallucinations
 - * Confusion
- ~Clinical Take Home Point:
 - ~Consider famciclovir in older patients who CNS side effects with acyclovir or valacyclovir
 - ~Other major concern with elderly patients is age-related reduced kidney function

70

24-48 hours

- ~Zirgan
- ~Viroptic
- ~Orals only
- ~Orals and Amniotic Membrane

71

Is there a difference in efficacy between topical and orals in the various forms of ocular herpes?

Ganciclovir ophthalmic gel

Oral antivirals: Acyclovir, Valacyclovir, Famciclovir

72

Epithelial keratitis

There seems to be equivalence

60 patients with HSV dendritic ulceration included a small number with stromal involvement keratitis randomized to oral vs. topical acyclovir

No statistically significant difference in time to resolution (mean = 5 days)

*Oral acyclovir alone appeared as effective as topical antiviral therapy in the treatment of simplex epithelial keratitis.

Oral delivery appears to get to corneal target even though it is an avascular tissue!

73

Post Herpetic Neuralgia (PHN) Treatment

- Approaches to management of post herpetic neuralgia include
 - Preventing herpes zoster through vaccination and/or antiviral treatment
 - Administering specific medications to treat pain
- First-line drugs
 - Anti-convulsant -neuropathic pain
 - Calcium channel $\alpha 2\text{-}\delta$ ligands
 - gabapentin (Neurontin) and pregabalin (Lyrica)
 - Tricyclic antidepressants
 - amitriptyline, nortriptyline, desipramine
 - Topical lidocaine patches
 - Works because PHN is a peripheral neuropathy
 - Radicular pain** is a type of **pain** that radiates into the lower extremity directly along the course of a spinal nerve root (topical lidocaine not effective)

74

Vaccines

- Zostavax™ – live vaccine; 60 years and older
 - "the only game in town..."
 - 50-90% effective; 1 dose
 - Efficacy wanes after 4-5 years
- Shingrix™ – has replaced Zostavax™
 - We are moving in the right direction!
 - Recommended for 50 years and older
 - 90+% effective; 2 doses; IM; recombinant vaccine
 - Efficacy *seems* solid up to 7-8 years

75

What is your go to oral analgesic regimen?



76

I was hit in the eye with a tree branch
My eye really hurts – 7 of 10 pain scale



77

Combination Pain Scale

Verbal Descriptor Scale	No pain	Mild pain	Moderate pain	Severe pain	Very severe pain	Worst pain possible
Wong-Baker Faced Grimace Scale	0	1-3	4-6	7-9	10	
	No pain	You feel some pain or discomfort but you can still complete most activities.	The pain makes it difficult to concentrate and may interfere with your ability to do certain normal activities, such as reading, watching TV, having a phone conversation, etc.	The pain is quite intense and is causing you to avoid or limit physical activity. Cannot concentrate on anything except pain.		

78

Healing Well Nociceptive Pain



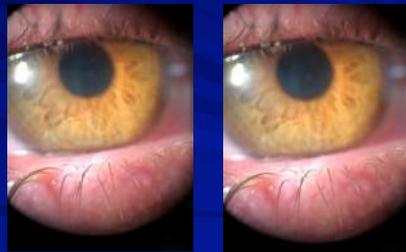
79

Curling Iron Burn



80

A "bit" Too Close
Pain Scale 6 of 10



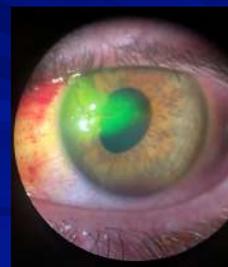
81

How Deep



82

I was prying a break of my car and the
screwdriver slipped – 7 of 10 pain scale



83

DSEK – no drops and no follow up
6 of 10 pain scale



84

Morphine Products

- Standard for comparison of other agents
- Used for severe pain
- Multiple Brand/Trade names for long-acting morphine products, with very diverse delivery and release systems
 - MSIR (IR caps) (q 3-4 hours prn)
 - MS Contin (CR tabs) (q 8-12 hours)
 - Kadian (CR caps) (q 12 – 24 hours)
 - Avinza (CR caps) (q 24 hours)

85

Tramadol – another great choice

Tramadol (Ultram) tabs
Tramadol with 325 mg APAP (Ultracet), Tramadol ER tabs

- Tramadol (50 – 100 mg q 4 – 6 hours; do not exceed 400 mg/day)
- Dual action: **mu** receptors & inhibits neuronal uptake of **serotonin** & **norepinephrine**.
- Lowers seizure threshold; increases serotonin levels
 - Watch drug interactions with other meds that ↑ serotonin
 - Selective serotonin reuptake inhibitors (SSRIs): fluoxetine/Prozac
 - Migraine meds ("triptans"): sumatriptan/Imitrex
- Not controlled**
 - AS OF AUGUST 2014, NOW A C4 (Schedule IV)
 - "Tramies" = abuse potential; helps decrease withdrawal symptoms

86

Hydrocodone Products

- As of August 2014, hydrocodone products are ALL CII
 - Moved from schedule III to schedule II
- Immediate-Release Products
 - Hydrocodone 7.5 mg + IBU 200 mg**
 - Vicoprofen
 - Hydrocodone + acetaminophen:**
 - Vicodin = 5/300; 7.5/300; 10/300
 - Lortab = 2.5/300, 5/300, 7.5/300, 10/300
 - Norco = 5/325, 7.5/325, 10/325
- Take 1 – 2 tabs/caps every 4 – 6 hours as needed for pain
 - Not to exceed 3 grams of APAP per day
 - 30mg PO morphine = 20mg PO hydrocodone

87

Codeine tablets

- WEAK analgesic: 30mg PO morphine = 200mg PO codeine
 - Weakest of morphine, hydrocodone, and oxycodone
- Add acetaminophen/ aspirin – Schedule III
 - Tylenol #2 = 300 mg acetaminophen & 15 mg codeine
 - Tylenol #3** = 300 mg acetaminophen & 30 mg codeine
 - Tylenol #4 = 300 mg acetaminophen & 60 mg codeine
- 1 – 2 tablets every 4 – 6 hours as needed for pain
 - Not to exceed **3 grams** of APAP per day
- Add expectorant – Schedule V

88

Synergism with OTC Pain Relief

Know your maximum daily allowances for peripheral acting analgesics:

- APAP (acetaminophen) 3000 mg (4000 mg*)
- ASA 6000 mg
- Ibuprofen 3200 mg
- Naproxen Sodium 1650 mg (Aleve/Anaprox)
- Naproxen 1500 mg (Naprosyn)

2 ibuprofen and 2 Tylenol
 4 ibuprofen and 2 Tylenol



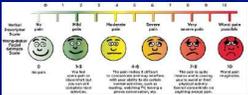
* 4000 mg used to be the maximum daily dose

89

Specific Medications Using Numeric Pain Scale

Mild pain = 1 – 3

- Acetaminophen (APAP; Tylenol)
- Ibuprofen (Advil, Motrin)
- Naproxen sodium (Aleve)
- Tramadol (Ultram) - low dose



Moderate pain = 4 – 6

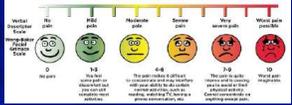
- Tramadol (Ultram) – mid to high dosing
- Tylenol with codeine (Tylenol #3)
- Acetaminophen with oxycodone (Percocet)
- Acetaminophen with hydrocodone (Vicodin) – lower dosing

90

Specific Medications Using Numeric Pain Scale

Severe pain = 7 – 10

- Tylenol with hydrocodone
 - Vicodin, etc. – higher doses
- Tylenol with oxycodone
 - Percocet, etc. – higher doses
- Morphine (MSIR)
- Hydromorphone (Dilaudid)
- Fentanyl (Duragesic patch; Actiq lozenge on a stick)



91

“Ceiling Effect”

- ~ Commonly used when discussing *analgesics*
- ~ Phenomenon in which a drug reaches a maximum effect
 - * Increasing the drug dosage does not increase its effectiveness
- ~ Central Nervous System Agents
 - * No ceiling effect
 - * Part of the problem
- ~ Peripheral Nervous System Agents
 - * Has a ceiling effect

92

Respiratory Affects

- ~ Inhibition of cough reflex
- ~ Respiratory depression
 - * This is what kills a patient
 - * **Important to make sure that the patient doesn't**
 - Increase dose on their own
 - Add another CNS depressant with it!

93

Opioid Effects/ADRs

- ~ CONSTIPATION-anticipate it!
 - * All patients should receive a stool softener + stimulant
 - * Combo: docusate + senna = Senna S
- ~ Sedation
- ~ Euphoria – mu receptors
- ~ Dysphoria/Hallucinations – kappa receptors
- ~ Pruritis – allergy versus normal release of histamine
- ~ Nausea/vomiting
 - * Triggers CTZ
 - * Codeine “allergy”

94

Questions and Thank You!

Orals Pharmaceuticals in Eye Care

Greg Caldwell OD, FAAO
Optometric Education Consultants
American Board of Optometry
Wednesday, February 3, 2026



95