Orals Pharmaceutical Update

Greg Caldwell OD, FAAO
Optometric Education Consultants
Vision Expo – Orlando, FL
Wednesday, March 11, 2026

1

On behalf of Vision Expo, we sincerely thank you for being with us this year.

Reminder to Complete Your Session Evaluations!

Please be sure to complete your digital session evaluations for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

vision expo

2

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, Envision, Tarsus
  - 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 Nu Skin/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

3

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




5

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

6

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

7

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 embryo/fetal 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

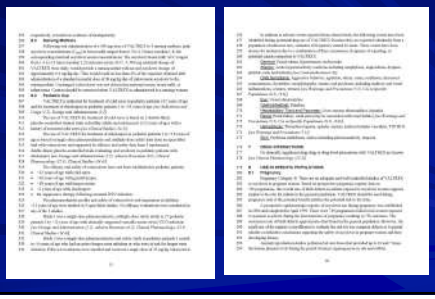
8

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

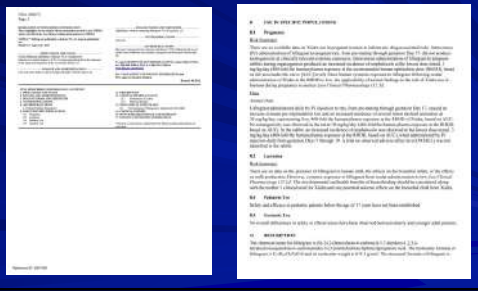
9

Pre-June 30, 2015



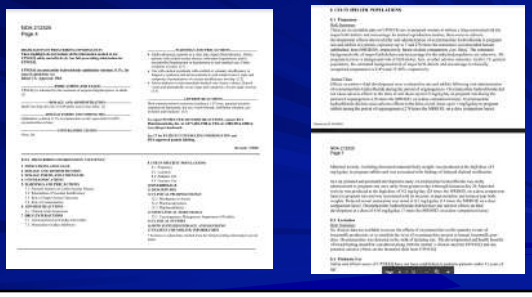
10

Post-June 30, 2015



11

Post-June 30, 2015



12

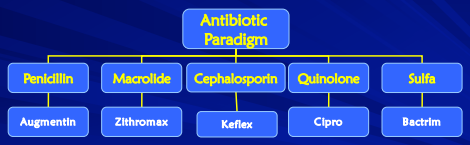
Dacryocystitis

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

A. Augmentin
B. Azithromycin
C. Cephalexin
D. Bactrim
E. Cipro

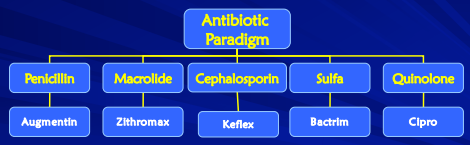
13

Antibiotic Paradigm Thru 2019



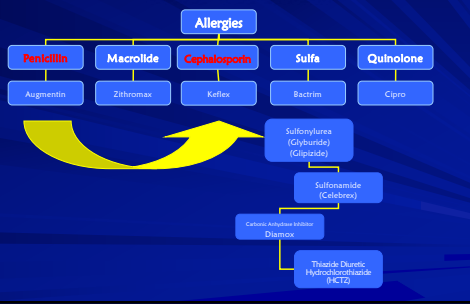
14

Antibiotic Paradigm Changed 2020



15

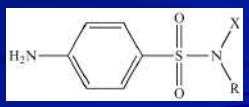
Cross Reaction



16

"Sulfa Antibiotic Allergy"

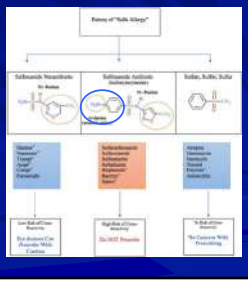
- If a true allergy: Mast cell and Ige mediated, causing hives, itch, congestion, lip and tongue swelling, tightness in throat, and bronchial constriction
  - Anaphylaxis
- The "S" is typically not the hapten/antigen
- The arylamine group is the hapten/antigen
- 90% of people who say they are allergic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



17

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 anyhydrase inhibitors
      - Hydrochlorothiazide
      - Celecoxib (Celebrex)
      - Glipizide, glyburide, glimepiride



18

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*

19

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

20

Zithromax (azithromycin)

- "The Vegas Drug"- Chlamydia…1 g qd

21

Cephalexin (Keflex)

- Cross reaction with PCN sensitive patients
  - Approximately 3 – 10%
- 1st generation, moderately affective 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

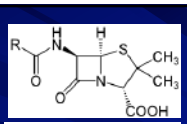
22

Cefuroxime (Ceftin)

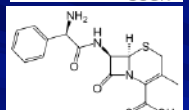
- 2nd generation
- Better for *Haemophilus (-)*

- 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

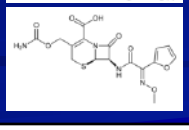
23



PCN



Keflex



Ceftin

Cross Reaction

24

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

25

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?

26

Ciprofloxacin (Cipro) Levofloxacin (Levaquin)

- In my opinion, an end of the line, antibiotic to use…allergic to PCN, cephlosporins, 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

27

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

28

Dacryocystitis

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

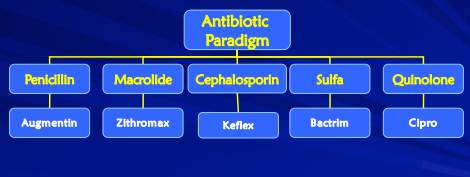
A. Augmentin
B. Azithromycin
C. Cephalexin
D. Bactrim
E. Cipro

29

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

30

Antibiotic Paradigm Changed 2020



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

31

What group of antibiotics are we missing?

32

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

33

48-year-old man
OU red, gritty, sandy and dry feeling

Va 20/20 cc 20/20

Current Correction
R -2.00 sphere
L -3.00 sphere

EOMS: full, unrestricted
CT: ortho D/N

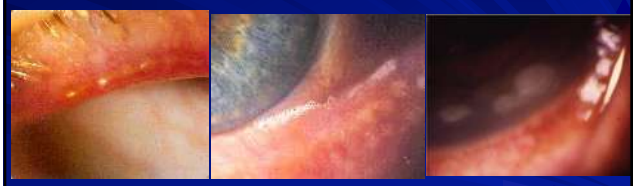
PERRL (-)APD
CF: full by FC OU

34

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

35

A Closer Look



36

Rosacea Blepharitis
(Inflammatory Blepharitis, MGD)

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

37

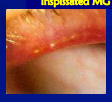
Tetracycline Analog

Staph Aureus
Staph Epidermidis

Lipase

Meibomian Gland Secretions (Lipid)

Turbid Inspissated MG



Marginal Foam (Soap)

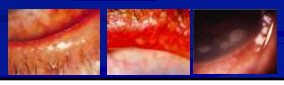
Phospholipids

Arachidonic Acid

Prostaglandins
Thromboxines

Leukotrienes

How About Steroids?



38

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

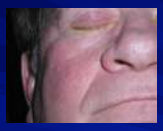
39

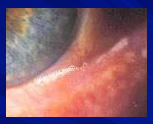
My Paradigm for Minocycline / Doxycycline

- 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

40

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

41

Hyclate vs Monohydrate

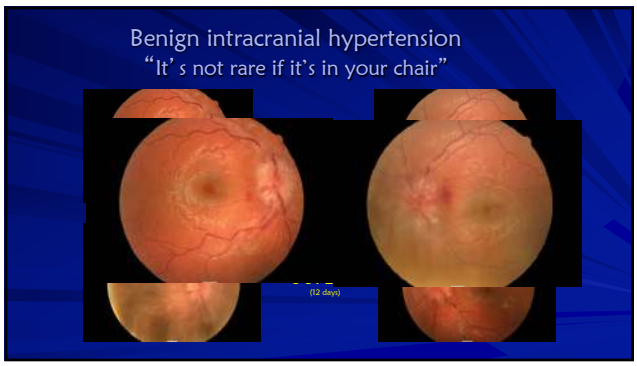
- I get calls from the pharmacist
- Use chat box – which do you use hyclate or monohydrate
  - Doxycycline
    - Doryx
      - Enteric coated hyclate pellet
    - Adoxa
      - Monohydrate

42

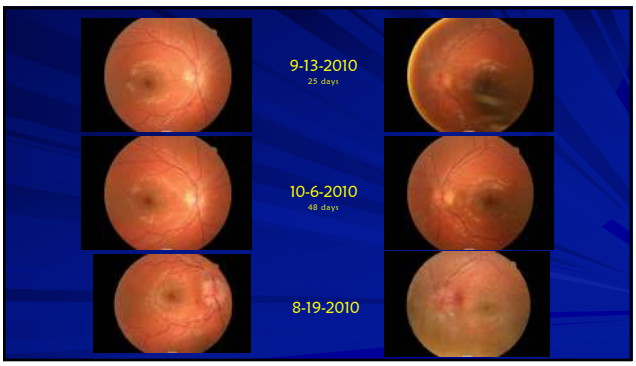
Doxycycline and Minocycline
Adverse Drug Reactions

- Enhanced photosensitivity
- Avoid in children and pregnancy (Category D)
- Can interfere with how penicillin kills bacteria
- Enhances the effects of
  - Coumadin
  - Digoxin
- Idiopathic 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

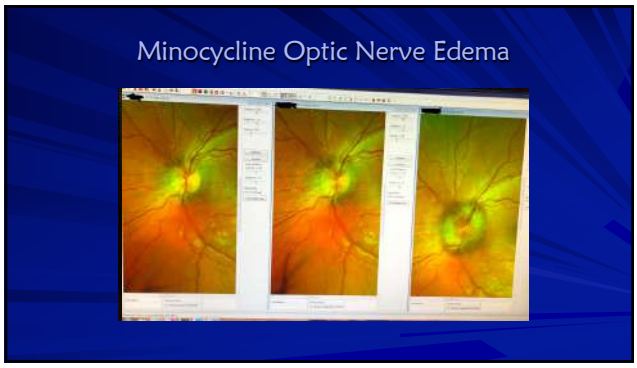
43



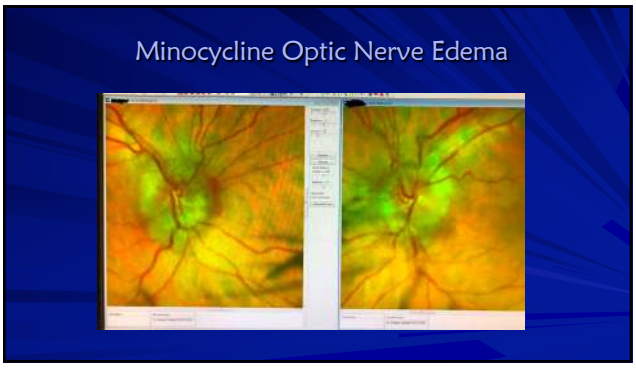
44



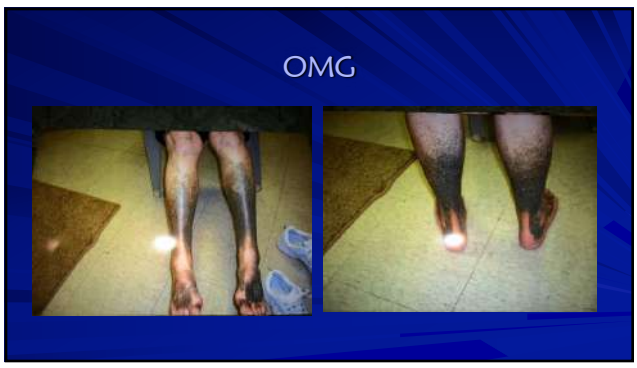
45



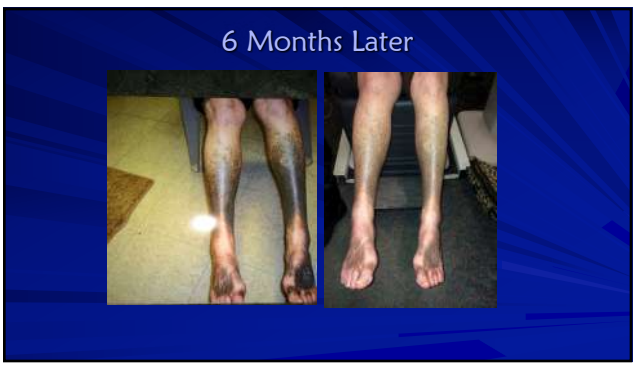
46



47

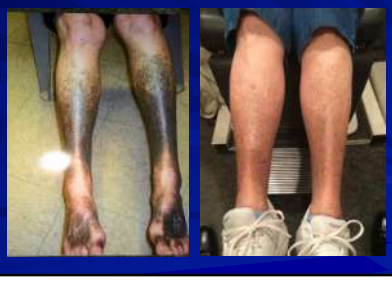


48



49

1 Year Later



50

Anti-Virals

51

Orals in Herpetic Eye Disease

- Valtrex
- Acyclovir
- Famvir

- Neurontin
- Lyrica
- Doxycycline
- L-Lysine
- Tagamet
- Tricyclic antidepressants
  - Amitriptyline, nortriptyline

52

Fun Facts About Herpes

- Are a leading cause of human viral disease
  - Second only to influenza and cold viruses
- There are more than 130 herpes viruses identified
  - 8 infect humans (9 if you count HHV-6A and HHV-6B as two separate)
  - 5 infect the eye
    - Herpes simplex 1
    - Herpes simplex 2
    - Varicella zoster
    - Epstein Barr
    - Cytomegalovirus
- USA 25% of the population is seropositive for HSV by 4 years old
  - Nearly 100% are seropositive by age 60
  - Lifetime prevalence of ocular manifestation in all HSV infected people is 1%

53

8 Humans- 5 Eye

Viruses of Humans	Common Name	Subfamily
Human herpesvirus 1	Herpes simplex type1	alpha
Human herpesvirus 2	Herpes simplex type 2	alpha
Human herpesvirus 3	Varicella-zoster	alpha
Human herpesvirus 4	Epstein-Barr	gamma
Human herpesvirus 5	Cytomegalovirus	beta
Human herpesvirus 6/7	exanthum subitum roseola infantum	beta
Human herpesvirus 8	Kaposi's Sarcoma-assoc.	gamma

Viruses of Humans	Common Name	Subfamily
Human herpesvirus 1	Herpes simplex type1	alpha
Human herpesvirus 2	Herpes simplex type 2	alpha
Human herpesvirus 3	Varicella-zoster	alpha
Human herpesvirus 4	Epstein-Barr	gamma
Human herpesvirus 5	Cytomegalovirus	beta
Human herpesvirus 6/7	exanthum subitum roseola infantum	beta
Human herpesvirus 8	Kaposi's Sarcoma-assoc.	gamma

54

Herpes Viruses are Classified by Their Location in the Latent State

55

Herpes Simplex Virus Keratitis

- Is a leading cause of corneal blindness in the United States
  - Primarily caused by HSV-1 (65%)
- Keratitis nomenclature
  - Infectious epithelial keratitis
    - It's not critical to determine HSV 1 or 2
  - Stromal keratitis
  - Endotheliitis
  - Neurotrophic keratopathy

56

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

57

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 maintanence

58

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

59

Varicella-Zoster Virus (VZV)

- The best time to diagnose and treat

60

61

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

62

Varicella-Zoster Virus (VZV)

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

63

Renal Impairment

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

64

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

65

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

66

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

67

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

68

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

69

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)

70

Acyclovir vs. Valacyclovir vs. Famciclovir

What is the difference?

CNS Effects in Elderly Patients

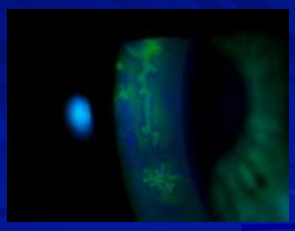
- Acyclovir and valacyclovir carry a higher risk of CNS adverse effects in the elderly:
  - * Agitation
  - * Hallucinations
  - * Confusion
- Clinical Take Home Point:
- Consider famciclovir in older patients who CNS side effects with acyclovir or valacyclovir
- Other major concern with elderly patients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

71

24-48 hours

- Zirgan
- Viroptic

- Orals only
- Orals and Amniotic Membrane

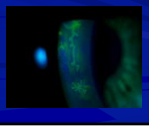


72

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



73

Epithelial keratitis
There seems to be equivalence


Oral acyclovir (Zovirax) in herpes simplex dendritic corneal ulceration

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 to 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!

Cochrane Database Syst Rev 2010;(12):1-198.

74

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 α2-δ 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)

75

Vaccines

- Zostavax™ – live vaccine; 60 years and older
  - "the only game in town…"
    - 50-ish% 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

76

What is your go to oral analgesic regimen?

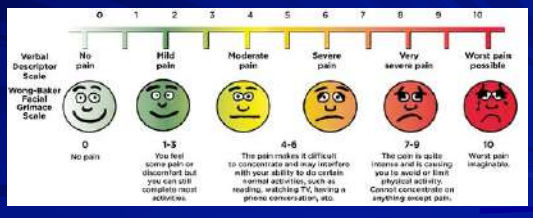
77

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



78

Combination Pain Scale



79

Healing Well
Nociceptive Pain

80

Curling Iron Burn

81

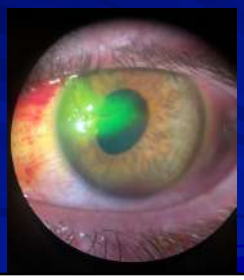
A "bit" Too Close
Pain Scale 6 of 10

82

How Deep

83

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



84

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

85

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)

86

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

87

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

88

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

89

Synergism with OTC Pain Relief

Know your maximum daily allowances for peripheral acting analgesics:

- APAP (acetaminophen) 3000 mg (4000 mg*) — 2 ibuprofen and 2 Tylenol
- ASA 6000 mg — 4 ibuprofen and 2 Tylenol
- Ibuprofen 3200 mg
- Naproxen Sodium 1650 mg (Aleve/Anaprox)
- Naproxen 1500 mg (Naprosyn)

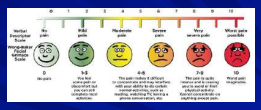
* 4000 mg used to be the maximum daily dose

90

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

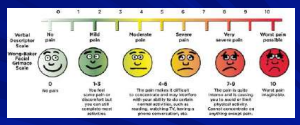
- Tramadol (Ultram) – mid to high dosing
- Tylenol with codeine (Tylenol #3)
- Acetaminophen with oxycodone (Percocet)
- Acetaminophen with hydrocodone (Vicodin) – lower dosing

91

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)



92

"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

93

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!**

94

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"

95

On behalf of Vision Expo, we sincerely thank you for being with us this year.

Reminder to Complete Your Session Evaluations!

Please be sure to complete your digital session evaluations for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

vision expo

96

Questions and Thank You!

Orals Pharmaceutical Update

Greg Caldwell OD, FAAO
Optometric Education Consultants
Vision Expo – Orlando, FL
Wednesday, March 11, 2026

97