

DISCLOSURE STATEMENT

Ron Melton and Randall Thomas are consultants to, on the speakers bureau of, on the advisory committee of, or involved in research for the following companies: ICARE, Valeant.

Course Title: **Therapeutic Strategies In Clinical Eye Care**

Lecturer: Ron Melton, OD
Randall Thomas, OD, MPH

Refractionist or Doctor

- A new world of vision testing and eye wear sales is dawning now that refractions and prescription fulfillment are being offered online.
- These developments may not be a negative for ophthalmology practices and patients.
- Websites:
 - Opternative
 - EyeMetra
 - MyVisionPad
 - Smart Vision Labs
 - Vmax Vision
 - Warby Parker
- Optometrists: Expand your scope of patient care services to protect your future!
- The AOA is aggressively fighting for optometry: Join the AOA!!

Eyenet, Aug 2017

What Makes a Happy Patient

“Time spent with the physician and ease of scheduling an appointment are the 2 most important factors in determining whether or not a patient will recommend a particular practice to others. Even practices that provide the highest-quality care will not be successful if patients have trouble making appointments and do not get what is perceived to be adequate time with the practitioner”

Long C, et al. Ophthalmology 2016;123:242-7

Eye Drops for Presbyopia

- EVO6 (Novartis) – new agent designed to restore crystalline lens flexibility
- Prodrug with lipoic acid choline ester 1.5% - converts to dihydrolipoic acid – breaks down disulphide bonds in lens – improved flexibility
- Goal is to maintain and possibly reverse lens hardening and allow lens to maintain or regain accommodation
- Liquid Vision drops – temporary presbyopia-correcting therapy lasting five hours or longer
- In Phase II a trials – combines aceclidine (miotic) with tropicamide (cycloplegic) to create super pinhole effect and moderate accommodation
- Developed by Presbyopia Therapies

Review of Optometry, June 15, 2017

Review of Optometry, June 15, 2017

Solar and Laser Retinopathy

- Similar pathophysiology: DDx- good Hx
- Central scotoma with mild to moderate reduction in BVA
- Small, focal yellowish macular lesion
- OCT: Compromise to RPE and outer layers
 - » Inner layer involvement in severe damage
- Light energy is absorbed by RPE resulting in heat damage to the tissue
- Some recovery of vision may occur over several months

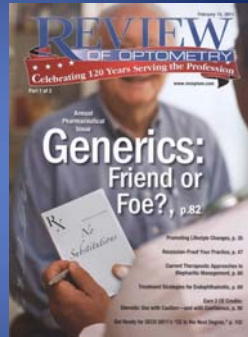
Hand-Held Laser Retinal Injury

- Delay in diagnosis is a common feature.
- Average age of exposure 9-16 years, mostly males. 50% admit to laser exposure.
- Vision decrease highly variable; modest recovery over time.
- Symptoms: Central scotoma, variable blurred vision.
- OCT is critical to the diagnosis; Focal RPE and outer retinal tissues are preferentially damaged.
- “The lack of awareness of such injuries among ophthalmologists is likely to contribute toward a delay in making the diagnosis, as evidenced by the fact that almost a third of children in this study were referred as retinal dystrophies.” This is likely true for most eye doctors.

Raouf N, et al. Am J Ophthalmol. 2016;171:88-94

Antibacterial Medications

- Sulfa Preparations
- Erythromycin
- Bacitracin
- Bacitracin / Polymyxin B
- Bacitracin / Polymyxin B / Neomycin
- Chloramphenicol
- Gentamicin
- Tobramycin
- Trimethoprim / Polymyxin B
- Fluoroquinolones
- Azithromycin
- Oral antibiotics



Are Generics OK?

“The more recent (since 1992) ophthalmic generics are approved according to strict criteria for sameness and are expected to behave in the same manner as the innovator.”

*Reference: Ophthalmology, June 2012.
Editorial by W. Chambers, MD of the FDA*

Off label

- “An estimated 50 percent of medications used routinely in ophthalmic practice are used off-label.”
- “Clinical practice should be guided by the best interest of the patient.”
- “In many instances, off-label treatments may be the best, or the only, available treatment, and withholding treatment would be unethical.”

Reference: EyeNet. April 2011

Compounding of Rx Glaucoma Meds

“Our compounded drugs are not FDA-approved as a whole, but each ingredient we use is FDA-approved. Since we are a compounding pharmacy, that is FDA-registered and inspected, we are able to compound these FDA-approved ingredients. Let me know if I need to explain a little clearer. If you have any other questions, please let me know. Thank you!”

Imprimis Pharmaceuticals

FDA Pregnancy Categories

- A- Controlled studies show no risk
- B- No evidence of risk in humans
 - » **Either animal studies show risk, human studies do not; or if no human studies, animal studies negative**
- C- Risk cannot be ruled out.
 - » **Human studies lacking, and animal studies positive for fetal risk or lacking. Potential benefits may justify potential risks**
- D- Positive evidence of risk post-marketing data show risk to fetus. If needed in life-threatening
 - » **Investigational or situation or serious disease, drug may be acceptable if safer drugs cannot be used**
- X- Contraindicated in pregnancy
 - » **Fetal risk clearly outweighs any benefit to patient**



Treating During Pregnancy

- 6.3 million pregnancies reported in US each year
- Pregnancy creates a natural reduction in IOP (19.6% reduction is normal; 24.4% decrease in OH)
- Past FDA Pregnancy Categories no longer apply for drugs approved after June 30, 2015; Doctor must now read the package inserts and analyze the safety data to make an informed decision.
- Until new drugs are approved, use the more familiar pregnancy category labeling
- In glaucoma, brimonidine only category B (avoid during lactation- linked to CNS depression)
- Consult patient's OB/GYN or PCP prior to treatment

Herpes Gladiatorum

- Occurs most commonly among young wrestlers, or in other sports where there is very close skin contact.
- First described in the 1960's – NEJM
- It is an expression of HSV-I
- Lymph nodes (preauricular and/or submandibular) are commonly present on one or both sides
- Treated with oral antiviral for a week
- Like all HSV infections, can become recurrent in nature.
- Temporary isolation from sports while being treated is key to breaking cycle of perpetuation



Eczema Herpeticum

- Opportunistic non-unilateral expression usually of the face and neck
- These patients have atopy, of which eczema is the typical association - - get a good history
- Seen mostly in people in their teens and 20's
- Primary expression of HSV
 - » **Globe is rarely involved**
- Because of potential for a more virulent expression, use Zoster dosage of 800 mg of ACV 5XD, or 1,000 mg of VCV TID X 7-10 days
- Usually seen primarily by dermatology, but if periocular involvement, eye doctor consultation is common practice.

www.healthguideinfo.com/skin-allergies/p63286

Primary HSV Infection

- Vesicular eruptions on the eyelid skin and/or eyelid margin
- Can be limited to the skin or can also result in follicular conjunctivitis and/or corneal epithelial disease
- Treatment:
 - PO ACV 400 mg 5 x D x 1W
 - PO Valtrex 500 mg tid x 1W
- Vesicles resolve without scarring

Non-ophthalmic steroid: ointment/cream/lotion

- Triamcinolone - moderate potency steroid
- Available in cream, ointment and lotion (0.5%, 0.1%, 0.025%)
- Our favorite: the 0.1% cream

Reference: *Drug Facts and Comparisons*



Moore et al. *Journal of Ophthalmic Inflammation and Infection* 2017;7:13
DOI: 10.1186/s12344-017-0134-4

Journal of Ophthalmic Inflammation and Infection

ORIGINAL RESEARCH Open Access

Neomycin, polymyxin B, and dexamethasone allergic reactions following periocular surgery

Nicholas A. Moore^{1*}, Craig N. Cysz^{2,3}, Tracy D. Carter², Jill A. Foster⁴ and Kenneth V. Cahill⁴

Abstract

Background: The aim of this study was to evaluate the rate of periocular allergic skin reactions to topical neomycin, polymyxin B, and dexamethasone (NPD) ophthalmic ointment.

Methods: A consecutive patient prospective study was performed. A total of 522 patients who had a procedure involving incision of the periocular skin with subsequent postoperative application of NPD ophthalmic ointment were included. Patients were evaluated for signs of allergy at 1 week postoperatively or prior if the patient had complaints. A periocular allergic reaction was defined as any periocular skin pruritus, erythema, edematous papules, vesicles, or plaques at the site of ointment application beyond that of the typical postprocedure presentation. The patients continued to be monitored for 30 days postoperatively.

Results: Of the 522 patients who completed the study, eight (1.5%) had a definitive periocular allergic contact dermatitis to the NPD ophthalmic ointment. Allergic presentation ranged from postoperative day 3 to 14.

Conclusions: The rate of periocular allergic reactions to NPD ophthalmic ointment is significantly lower than reported in the literature for other topical preparations of neomycin and polymyxin B. The low rate of allergy in this study suggests that NPD ophthalmic ointment can safely be applied to the periocular skin with a very minimal risk of inciting an allergic reaction.

Anti-inflammatory Effects of 0.1% Tacrolimus

- The topical calcineurin inhibitor, tacrolimus, has good anti-inflammatory properties.
- 0.1% tacrolimus eye drops can be highly effective in treating severe allergic conjunctival diseases.
- Tacrolimus eye drops often cause a stinging sensation or conjunctival redness, especially in the beginning of treatment of severely inflamed eyes. This can be avoided by topical steroid pretreatment.
- Tacrolimus eye drops did not have an immediate effect and required 1-2 weeks to be effective.
- In contrast, topical steroids are fast acting and can immediately relieve allergic symptoms. Although treatments eventually can be conducted without topical steroids, prompt relief of symptoms merits topical steroids.

Ophthalmology, March 2017

Systemic Prednisone

- Most common Rx'd systemic corticosteroid
- Common initial dosage 40-60 mg
- Available generically in both tablets and DosePaks (5 or 10 mg at 6 or 12 day course)
- Questions to ask before prescribing?
 - » Diabetic?
 - » Peptic Ulcer Disease?
 - » Tuberculosis?
 - » Pregnant?



Perspective on Posterior Vitreous Detachment

- Occurs mostly between ages 50 and 70 (peak incidence 62)
- No association with refractive error, except patients with -3.00D or more go to P.V.D. 5-10 years earlier
- 80-90% of breaks associated with P.V.D. are in the superior quadrants



Acute PVD and Retinal Tears

- The rate of an acute retinal tear associated with an acute symptomatic PVD is about 8% at the initial visit, and 1.5% of eyes without a tear on the initial visit are found to have a tear on follow-up examination.

Ophthalmology, January 2018

Treatment of Vitreous Floaters

- Treatment options:
 - » Live with them
 - » Vitrectomy
 - » Vitreolysis
- YAG laser – angle of focus can be changed to reach floaters; special vitreous lenses allow the laser beam to focus on floater
- Advantages: simple, noninvasive, no pain or discomfort
- Disadvantages: healthy eyes getting elective surgery, risk of retinal detachment, possibly worsening of symptoms
- Clear visualization of floaters key to successful treatment
- Treatment may require more than one laser session; symptomatic vitreous opacifications (SVO); only SVO's > 4mm from retina treated
- Patient decision on benefits vs risks *CRST, May 2016 (Stonecipher)*

Timing and RD Repair: Is there a hurry?

- Preoperative VA is the strongest predictor of postoperative VA
- When control vision is affected, about 30% of patients ultimately achieve 20/40 or better
- "There is no difference in VA outcomes among patients who underwent repair within the first week of onset."
- VA can improve for months to years after surgical repair
- There was no association between duration of macular detachment and postoperative VA
- "Clinical evidence suggests that the duration of macular detachment has a minor, if any, effect on visual outcome when repair is performed within about one week. Similarly, many fovea-sparing RD's can likely be deferred for a short period without affecting visual outcomes."

JAMA Oph. November 2013

Visual Recovery After Retinal Detachment with Macula-Off

- After 10 days, no rush for up to 30 days
- Enhanced result if surgery is done within the first 3 days

BJO, 2016; 100 (11)

Risk of Progression in Macula-On Retinal Detachment

- A “bullous configuration” of a macula-on rhegmatogenous RD portends a higher risk of macular detachment. This study suggests “prompt surgery in patients diagnosed with bullous macula-on rhegmatogenous RD.”

Clinical and Experimental ophthalmology, August, 2017

Acute and Chronic Conjunctivitis Due to Over-the-Counter Ophthalmic Decongestants

“Conclusion: Nonprescription decongestant eyedrops can produce acute and chronic forms of conjunctivitis by pharmacological, toxic, and allergic mechanisms. Once recognized, conjunctival inflammation often takes several weeks to resolve.”

Reference: C Saparkar et al. Arch of Ophthalmol. January 1997

Brimonidine Dermatologic Gel

- Used to address the erythema and flushing commonly expressed in facial and eyelid rosacea
- Causes microvascular vasoconstriction
- Comes in a 30 gram tube – applied once daily
- Provides a “somewhat effective” clinical response
- Available as a .33% gel (Mirvaso) by Gladerma



Reference: The Medical Letter, October 2013

Lumify (brimonidine 0.025%) Ophthalmic Solution

- FDA approved in December 2017 – OTC product
- Major upgrade to help the chronic red eye
- Superior to early generation vasoconstrictors
- No rebound hyperemia
- Used once or twice a day PRN
- Marketed as Lumify OTC by Bausch & Lomb

Glaucoma Update



Perspective on Central Corneal Thickness (CCT)

- CCT has become “standard-of-care” in the POAG (or suspect) work-up
- Thinner corneas are a strong risk factor for POAG because true IOP is actually higher than the measured IOP.
- Some patients with measured ocular hypertension may simply have a thicker CCT, thus reducing POAG risk because the true IOP is actually less than the measured IOP
- “CCT is the most heritable aspect of ocular structure (more than refraction, axial length, or optic disc size), suggesting that it is under exquisite genetic control.” (Ophthalmology, Nov. 2007)
- “Stop adjusting IOP measurements” *JAMA, May 2017*



Stop "Adjusting" Intraocular Pressure Measurements

James D. Bruck, MD

Following its introduction 60 years ago, Goldmann applanation tonometry (GAT) quickly became the reference standard for the clinical estimation of intraocular pressure (IOP) owing to the device's simplicity, ease of use, reproducibility, and easy integration into the slit-lamp examination. In the article introducing their device, Goldmann and Schmidt pointed out that IOP estimates

standard they believe to be closest to "true" IOP, and evaluated the discordance between DCT measurement, conventional GAT measurement, and "corrected" GAT measurement at various stages of glaucoma.

First described in 2009⁸ and commercialized soon thereafter, the DCT uses a contoured tip with an embedded piezoelectric pressure sensor. By hydraulically coupling the corneal surface to the tonometer tip, the DCT essentially measures a transcorneal fluid column continuous with the anterior chamber. Many

So what should the clinician caring for patients with glaucoma do? First of all, stop "adjusting" IOP measurements using CCT and any of the so-called correction nomograms. It is very tempting to do so—we have a reasonably precise (reproducible) IOP estimate in GAT and we have a remarkably precise and accurate measurement of CCT with ultrasonic pachymeters. Both measurements take just a few seconds. Why not just let our devices or electronic health records do the math for us? Because it turns out that by doing so we are decreasing the reliability of our IOP estimates, including among patients with advanced disease who certainly need our clinical vigilance.

JAMA Ophthalmol, October, 2017

Corneal Thickness (µm)	Correction Value
445	7
455	6
465	6
475	5
485	4
495	4
505	3
515	2
525	1

535	1
545	0
555	-1
565	-1
575	-2
585	-3
595	-4
605	-4
615	-5
625	-6
635	-6
645	-7

Correction values for applanation tonometer readings according to corneal thickness
 Calculation based on data of Ehlers et al (1975)
 Modified from Stodtmeister (1998)
 Arithmetic mean of corneal thickness in healthy subjects: 545 µm (Doughty and Zaman 2000)
 Correction values according to corneal thickness of 545 µm

Role of Self-IOP Measurements in Glaucoma Management

- Home tonometry – logical step in understanding and management of glaucoma
- Recent FDA approvals of devices
 - » Triggerfish (Sensimed) – contact lens
 - » ICARE Home (ICARE USA) – rebound tonometry requiring no anesthetic
- Home tonometry helpful in better understanding the IOP changes and to support future glaucoma management

News on "HOME" Tonometry

- "Up to 75% of individuals have peak IOP outside of office hours."
- "Most patients (73%) were able to accurately measure their own IOP after a short training session. Self-tonometry was deemed comfortable and relatively easy to perform and has the potential to improve patient engagement in their own care."
- "Patients with glaucoma may not only find self-monitoring of IOP acceptable, but also soon demand it."

JAMA Ophthalmol, October, 2017

Prostaglandin Receptor Agonists

- Latanoprost (Xalatan and generic) 0.005%
- Travoprost (Travatan Z) 0.004%
- Bimatoprost (Lumigan) 0.01%
- Tafluprost (Zioptan) 0.0015%

Latanoprostene Bunod 0.024%

- FDA approved in November 2017
- First nitric oxide – donating prostaglandin
- One molecule – two mechanisms of action
 - » Enhances uveoscleral outflow
 - » Enhances trabecular meshwork outflow
- Reduces IOP by 6 – 7 mm Hg
- Preserved with 0.2% BAK
- Used once daily in the evening (6% red eyes)
- Comes in a 5 ml opaque bottle
- Refrigerate until opened
- Marketed as VyZulta by Bausch & Lomb

Each Millimeter of IOP Reduction Matters

- “Our current understanding of the relationship between IOP lowering and glaucoma onset or progression translates to the effect of each mm Hg IOP reduction on the development of progression of visual field loss.”

de Moraes CG, et al. Survey Ophthalmol 2016;61(5):597-615

“Glaucoma Treatment: by the Highest Level of Evidence”

- The risk reduction could be about 19% per mm Hg, confirming results from the Early Manifest Glaucoma Trial and Canadian Glaucoma Study, and showing that IOP reduction is highly effective, and that every mm of pressure counts.
- These results should serve as a stimulus to the pharmaceutical industry to continue development of new and even more potent drugs.

Heijl, A. The Lancet, April 5, 2015

Perspective on IOP and Progression on Glaucomatous Optic Neuropathy

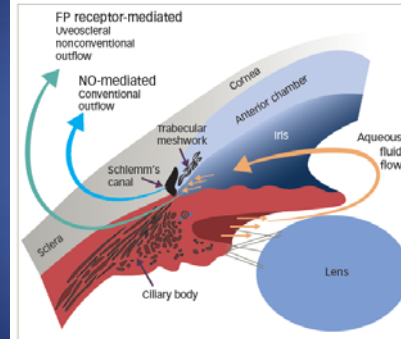
- “Progression was closely linked to the magnitude of the initial IOP reduction with treatment. The initial change in IOP (from baseline to the initial follow-up visit) was strongly associated with progression, with about a 10% lowering of the risk with each mm Hg of IOP reduction.”

Leske M, et al. Arch Ophthalmol, Jan 2003

- “Elevated IOP is a strong risk factor for glaucoma progression, with hazard ratio increasing by 11% for every 1 mm Hg of higher IOP”

Bengtsson B, et al. Ophthalmology, Feb 2007

Figure 2: Intraocular pressure homeostasis and the dual activity of latanoprostene bunod



FP = prostaglandin F receptor; NO = nitric oxide.

Table 2: Summary of studies key investigating latanoprostene bunod 0.024% for the lowering of intraocular pressure

Study	Phase	No. of subjects (patients) ITT/enrolled	Patient group	Baseline IOP Mean (SD) mmHg	IOP at follow up or IOP reduction from baseline	Main Findings	Reference
VIAGER	II	413 ITT	OAG or OHT	26.01 (1.67) (durnal)	-6.00 mmHg	Significantly greater IOP lowering and comparable side effects versus latanoprost 0.005%	Worren et al. (2015)*
APOLLO	III	417 ITT	OAG or OHT	26.7 (2.5) (durnal)	Range, -7.7 to -9.1 mmHg over 3 months	Significantly greater IOP lowering than timolol 0.5% BID throughout the day over 3 months of treatment	Worren et al. (2016)*
LINEAR	III	414 ITT	OAG or OHT	26.6 (2.39) (durnal)	Range, -7.5 to -8.8 mmHg over 3 months	LBN 0.024% QD in the evening was noninferior to timolol 0.5% BID over 3 months of treatment, with significantly greater IOP lowering in subjects with OAG or OHT at all but the earliest time point evaluated	Medeiros et al. (2016)*
LYSTER	III	130 enrolled	OAG or OHT	19.6 (2.9)	22.0% reduction in IOP to 15.3 (3.0) mmHg was achieved by week 4, and reductions greater than 22% were observed at every subsequent visit	1-year treatment with LBN 0.024% provided significant and sustained IOP reduction	Kawase et al. (2016)*
CONSTELLATION	II	25 enrolled	OHT or OAG	21.6 (2.8) (daytime) 25.7 (2.8) (nighttime)	17.4 (2.5) mmHg (daytime) 23.2 (3.4) mmHg (nighttime)	LBN 0.024% reduced IOP over 24 hours while timolol only reduced IOP during the daytime. LBN also improved ocular perfusion pressure versus baseline during the daytime and versus timolol during the nocturnal period	Lu et al. (2016)*
IRONUS	I	24 enrolled	Healthy subjects	13.6 (1.3) (24 h IOP)	-3.6 mmHg	Significantly lowered mean IOP in healthy Japanese subjects over 24-h	Araie et al. (2015)*

QD = twice-daily; IOP = intraocular pressure; ITT = Latanoprostene Bunod, a Dual-acting Nitric Oxide Donating Prostaglandin Analog for IOP Reduction; QD = once daily; SD = standard deviation.

Robert N. Weinreb, Tony Reolin, Rohit Varma
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Rhospessa (netarsudil 0.02%)

- FDA approved in December 2017
- First rho kinase inhibitor
- MOA purported to be enhancement of conventional trabecular outflow
- Use once daily in the evening
- Reduces IOP about 4-5 mm Hg
- Preserved with 0.015% BAK
- Comes in a 2.5 ml bottle
- In phase III, 53% experienced red eyes
- Marketed by Aerie Pharmaceuticals

The Eye and the ED

- Why people go to the ED with Eye problems

Most common ICD Diagnosis

Conjunctivitis	33%
Corneal injury	13%
Corneal F.B.	8%
Hordeolum	4%



- Mean ED charge \$989.30 for eye visit
- Eye visits: 1.5% of all visits
- 32,000 eye-related visits per year

Vazini K, et al. *Ophthalmology* 2016;123(4):917-19

Adenoviral Infections

- Common cause of “red eyes”
- Assume adenovirus until proven otherwise
- Often have pre-auricular node
- Non-purulent watery discharge
- Usually starts in one eye and spreads to fellow eye in a few days
- Always evert lids to survey tarsal conjunctiva
- With EKC, spotty sub-epithelial infiltration in 50 to 75% of untreated cases

Literature on Adenoviral Keratoconjunctivitis

- Pseudo-membranes are a frequent complication of EKC
- In untreated cases, 50% of corneas develop subepithelial infiltrates – a cellular immune reaction against viral antigens
- AdenoPlus® is highly sensitive, specific, simple and inexpensive
- Bacterial superinfection is rare
- “Topical steroids relieve symptoms, and 5% betadine kills the virus in tears, thus reducing the risk of disease spread.”
- Restasis does not affect the natural course of the disease.

Jhanji V, et al. *Survey Ophthalmol.* 2015;60(5):435-43

Povidone - Iodine 5% ophthalmic solution

- Broad spectrum microbicide
- Indicated for “irrigation of the ocular surface”
- “Off label” use: Tx adenoviral keratoconjunctivitis
 - Anesthetize with proparacaine
 - Instill 1 or 2 drops of NSAID
 - Instill several drops Betadine 5% in eye(s), close eye(s)
 - Swab or rub excess over eyelid margin
 - After 1 minute, irrigate with sterile saline
 - Instill 1 or 2 drops of NSAID
 - Rx steroid qid x 4 days
- No reports in clinical trials of adverse reactions.
- Avoid use if patient is allergic to iodine
- Marketed as Betadine 5% ophthalmic prep solution (30 ml opaque bottle) by Alcon surgical
- CPT 99070 supply code



Perspective on Betadine

- “The instillation of 5% povidone iodine solution in the conjunctival sac to prevent endophthalmitis has been shown to be effective and has been widely used for decades.”
- “One in three ASC’s prepares the 5% solution by diluting commercially available 10% povidine-iodine with saline solution. This practice has been shown to be safe and effective despite the labeling ‘do not use in the eye’ present on the 10% Betadine solution.”

OSN 9-10-15

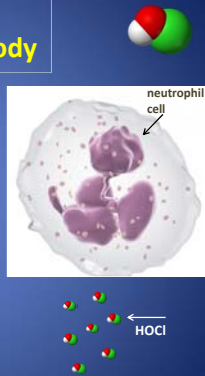
Hypochlorous Acid

- Pure hypochlorous acid (HOCl) is released from neutrophils
 - » Essential part of body’s immune response
- In the body, HOCl:
 - » Kills microorganisms
 - » Neutralizes inflammatory toxins released from pathogens
 - » Helps suppress the body’s inflammatory response
 - » Prevents biofilm formation
- Ophthalmic strength HOCl has comparable microbial spectrum to Betadine
- Covers some bacterial strains missed by Betadine (*Serratia marcescens*)
- Onset of activity twice as fast as Betadine (1 min vs 2 min)
- Remains active with a toxicity level 1000x lower than Betadine

Antimicrobial Activity Comparison of Pure Hypochlorous Acid (0.01) with other Wound and Skin Cleansers at Non-Toxic Concentrations. Hoon, Rani, Najafi, Wang, Debabov; SAWC Spring 2013 and WHD
Klocek, MS, et al. Time-Kill Comparison of Povidone Iodine to Hypochlorous Acid Against Endophthalmitis Isolates of Staphylococci. ARVO Annual Mtg 2016 Abstract Number 5861

The Role of Pure Hypochlorous Acid in the Body

- Pure hypochlorous acid (HOCl) is released from neutrophils
 - » Essential part of the body's immune response
- In the body, HOCl:
 - » Kills microorganisms
 - » Neutralizes inflammatory toxins released from pathogens
 - » Helps suppress the body's inflammatory response
 - » Prevents biofilm formation



Avenova® In Vitro Comparisons with Betadine

- Avenova has a comparable microbial spectrum to Betadine*
- Covers some bacterial strains missed by Betadine, like Serratia marcescens*
- Avenova onset of activity is twice as fast as Betadine (1 min vs 2 min)†
- Avenova remains active with a toxicity level 1000x lower than Betadine*

* Antimicrobial Activity Comparison of Pure Hypochlorous Acid (0.01) with other Wound and Skin Cleansers at Non-Toxic Concentrations, Russell Hoon, Suriani Abdul Rani, Ramin Najafi, Lu Wang, Dmitri Debabov; SAWC Spring 2013 and WHD 2013

† Klocek, M.S., Mammen, A., Dhaliwal, D., Kowalski, R. Time-Kill Comparison of Povidone Iodine to Hypochlorous Acid against Endophthalmitis Isolates of Staphylococci. ARVO Annual Meeting 2016 Abstract Number 5861

Acute Conjunctivitis and Antibiotic Use

- "Conjunctivitis is the most common cause of red or pink eye, but most (up to 80%) are viral."
- "Topical antibiotics (for bacterial infection) provide only a very modest beneficial effect on clinical remission."

Antibiotic Rx	Combo Rx
- OD's – 44%	OD's – 30%
- MD's – 35%	MD's – 23%
- Non-Eye Dr's – 60%	Non-Eye Dr's – 8%

- One-fifth of all Rx's were for a combination antibiotic-steroid "which are contra-indicated in acute cases of conjunctivitis." (Not True!)
- Use of AdenoPlus may reduce diagnostic uncertainty and increase comfort with deferring antibiotic therapy.

Ophthalmology, August, 2017

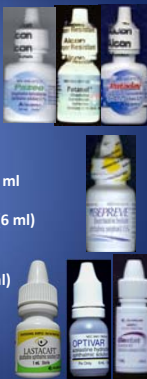
Treatment Options - Ocular Allergy

- Artificial Tears
- Mild Vasoconstrictors
- Decongestant / Astringents
- Vasoconstrictor / Antihistamines
- Antihistamines
- Antihistamine / Mast Cell Stabilizers
- Mast Cell Stabilizers
- Non-steroidal Anti-inflammatories
- Mild Corticosteroids
- Systemic Antihistamines
- Potent Corticosteroids
- Homeopathic Formulations

Antihistamine/Mast Cell Stabilizer

- Highly selective H1 receptor blockers with prolonged receptor binding
- Good mast cell stabilization
- All bid dosing, except Pataday and Lastacraft qd


Olopatadine 0.1%	(Patanol) (5 ml)
0.2%	(Pataday) qd (2.5 ml)
0.7%	(Pazeo) qd (2.5ml)
Bepotastine 1.5%	(Bepreve) (5, 10 ml)
Epinastine 0.05%	(Elestat and generic) 5 ml
Alcaftadine 0.25%	(Lastacraft) qd (3 ml)
Azelastine 0.05%	(Optivar and generic) (6 ml)
Ketotifen 0.025%	(generic and OTC) (Claritin Eye) (5 ml)
	(Zyrtec Itchy Eye) (5 ml)
	(Zaditor) (5 ml)
	(Alaway) (10 ml)
	(Refresh) (5ml)
	(TheraTears) (5 ml)



Cetirizine 0.24% ophthalmic solution

- Now Indicated for ocular itching associated with allergic conjunctivitis
- Instill 1 drop in each affected eye BID (8 hr apart)
- Adverse Effects:
 - » Hyperemia (1-7%)
 - » Instillation site pain (1-7%)
 - » Reduced visual acuity (1-7%)
- Marketed by Nicox as Zerviate ophthalmic solution

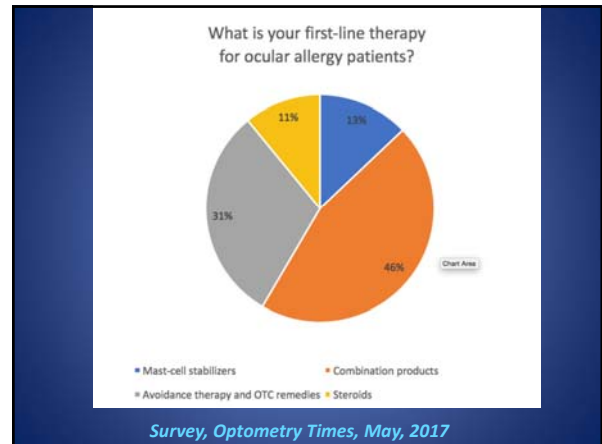
Treatment of Ocular Allergies



Minimal	Mild	Moderate	Severe
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Antihistamine/
Mast Cell
Stabilizer

Loteprednol



A Fresh Look at Ocular Allergy

Avoidance:

- ~ Bathe after being outdoors
- ~ Dust mite covers for pillows and mattresses
- ~ HEPA filters

Treatments:

- ~ Chilled artificial tears
- ~ Cold compresses (frozen bag of peas or corn)
- ~ Alrex with glycerin moisturizer
- ~ Topical antihistamines selectively blocking the H1 receptor to avoid exacerbating dry eye such as Bepreve or Lastacaft

Jackson MA. Start your drops: Allergy season has arrived. Ocular Surgery News, May 10, 2017.

Intranasal Steroids for Ocular Symptoms in Allergic Rhinitis

- In a randomized trial, intranasal steroids relieved both nasal and ocular symptoms.
 - » Because intranasal steroids are the most effective medications for allergic rhinitis symptoms (especially congestion), guidelines recommend them as first-line agents for moderate-to-severe disease
 - » As many as 85% of patients with seasonal allergic rhinitis also have ocular symptoms
 - » For these patients, many clinicians prescribe oral antihistamines or ocular products rather than (or in addition to) intranasal steroids

