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

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter 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

1

Financial Disclosure – Justin Schweitzer, OD, FAAO

- Aerie – C/L
- Alcon – C/L
- Allergan – C/L
- Bausch + Lomb – C/L
- Ocular Therapeutix - C
- EyePoint – C
- Sight Sciences – C/L
- Dompe – C
- Zeiss – C/L
- Visus - C
- Science Based Health – C
- Kala – C
- RVL - C
- Sun – C/L
- Equinox - I
- Reichert - C
- J&J – C/L
- Glaukos – C/L
- Horizon – C
- Quidel – C
- MediPrint – C
- LKC – C/L
- Avellino – C
- Novartis – C
- Iveric bio – C
- Occuphire - C

2

3

Case

19-year-old female with a painful, red, cloudy left eye. Does wear CL's but states that she does not sleep in them and cares for them well.
Has had a FB sensation for a few weeks.

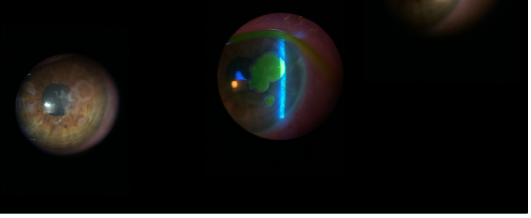
Primary MD put in a BCL for comfort and started Neo-Poly-Dex

20/40 BCVA OS

4

Slit Lamp Examination

Branching ulcer with satellite lesion
1+ cell
2+ injection of the conjunctiva



5

Culturing is Essential!

Bacterial
Gram stain
KOH prep
Fungal
Viral

1.Positive result for Nocardia farcinica

6

Aggressive Treatment is Essential!

1.Treatment w/ Amikacin q1h OS

7

When to Culture?

1. 3-2-1 Rule
   1. 3 mm in Size
   2. 2 lesions or more
   3. 1 mm of visual axis
2. Risk of perforation
3. Scleral tissue involvement
4. Injury with vegetative matter
5. Institutionalized patients where MRSA is possible
6. Lesion is not responding to treatment
7. Atypical features suggestive of fungal, amoebic or mycobacterial

8

"Quick Culture"

No significant difference in growth compared to direct plating[1]

McLeod SD, Kumar A, Cevallos V, Srinivasan M, Whitcher JP. Reliability of transport medium in the laboratory evaluation of corneal ulcers. Am J Ophthalmol. 2005 Dec; 140(6). Pp 1027-1031.

9

Chocolate

Haemophilus and Neisseria
Gram-negative

Blood

Streptococcus
Gram-positive
Fungi

10

Sabouraud's Medium

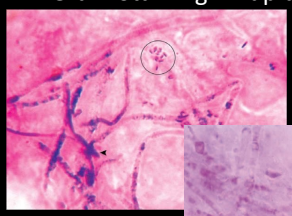
Fungal growth

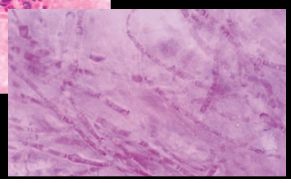
Thioglycollate

Anaerobic bacteria

11

Gram Staining – Rapid Identification





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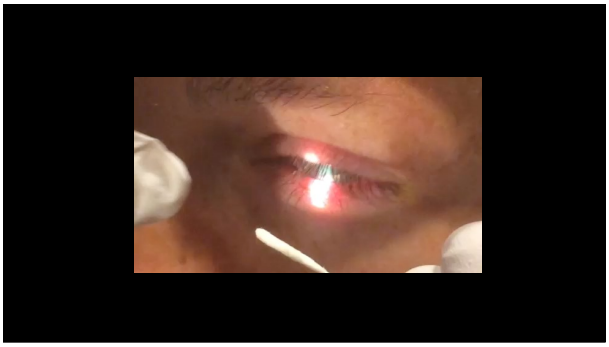

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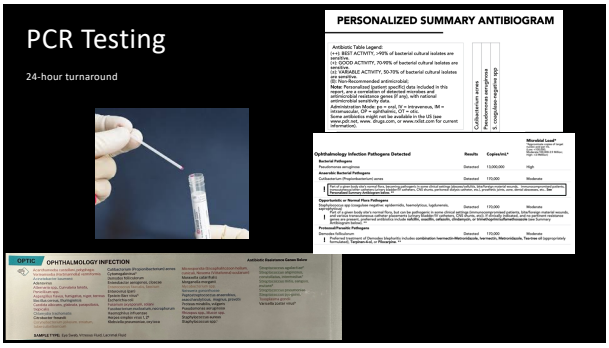
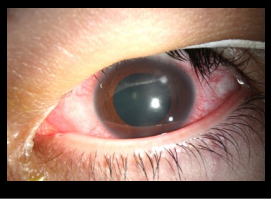
14


PCR Testing
24-hour turnaround
PERSONALIZED SUMMARY ANTIBIOGRAM
OPTIC
OPHTHALMOLOGY INFECTION

15

Clinical Findings: Location, location, location!

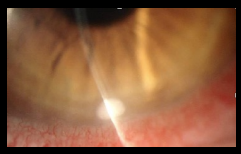
- Central –likely more virulent pathogen
- Peripheral – more likely staph marginal

16

Clinical Findings: Epithelial defect

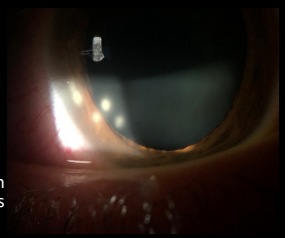
- Measure in mm
- Relative size
  - Compared to underlying infiltrate



17

Clinical Findings: Infiltrate

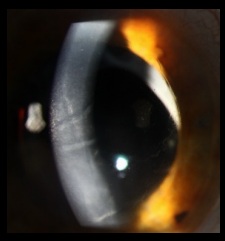
- Presence **or** absence!
- What do the borders look like?
  - Hazy/feathered → think fungal
- Single lesion or multiple?
  - Multiple infiltrates may be seen in satellite, atypical, or staph species



18

Clinical Findings: Stromal thickness

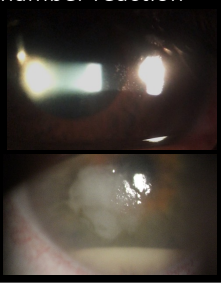
- Corneal edema
  - Often present!
  - Excessive edema
- Is there any thinning?
  - Monitor closely for melt



19

Clinical Findings: Anterior chamber reaction

- May be present in *any* ulcer, uveitis, or epithelial defect
  - AC reaction ≠ (always) infectious
- Hypopyon may be present in severe cases
- Granulomatous KPs could suggest herpetic



20

Clinical Findings: Pain

- Critical question!!
- Less than expected?
  - Check sensitivity in clinic!
  - Consider neurotrophic or herpetic
- More than expected?
  - Consider acanthamoeba

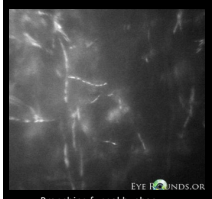
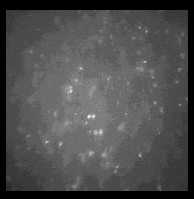
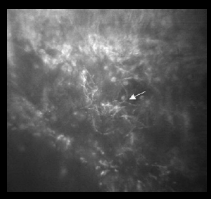
21

Clinical Findings: Perineuritis

- Uncommon finding
- Hallmark of acanthamoeba

22

Confocal Imaging

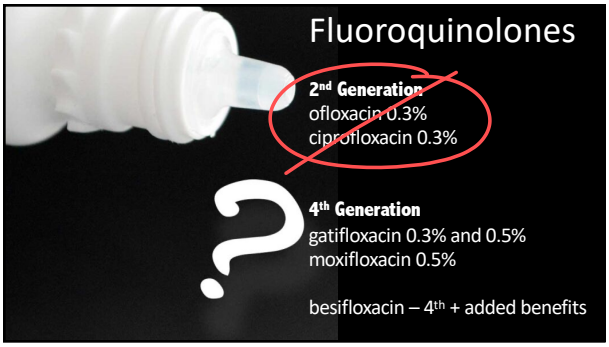
Fusarium[1]	Acanthamoeba	Nocardia asteroides[2]
		
Branching fungal hyphae through stroma	Double walled cysts , highly reflective round bodies	Reflective, thin branching filamentous bacteria

1. Graff JM, Goins KM, Sutphin JE. Fungal Keratitis - Fusarium: 41-year-old female contact lens wearer with persisting keratitis. EyeRounds.org. date accessed ; Available from: http://www.EyeRounds.org/cases/59-fusarium-fungal-keratitis-ReNu-MoistureLoc.htm;. 2. Vaddavalli PK, Garg P, Sharma S, Thomas R, Rao G. confocal microscopy for Nocardia keratitis. Ophthalmology. 2006; 113(8): 1415-1418.

23

Infectious Keratitis Management and Treatment

24



25

Fortified Antibiotics

tobramycin - cefazolin
(gram -) (gram +)
(pseudomonas)

vancomycin - tobramycin
(gram +) (gram -)

26

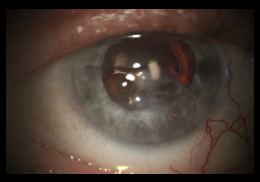
ARMOR (2015)

Antibiotic Resistance Monitoring in Ocular Microorganisms

1. *S. aureus* and Coagulase-negative staphylococci (CoNS) have high (42-49%) rates of methicillin resistance
2. Methicillin resistant organisms also showed higher resistance to fluoroquinolones, aminoglycosides, and macrolides
3. Besivance > other 4th generation fluoroquinolones > older 2nd or 3rd
4. S. pneumoniae, P. aeruginosa, H. influenza appeared pan-sensitive
5. Staphylococcal Isolates susceptible to vancomycin

27

The Role of Doxycycline and Vitamin C



28

Steroids for Corneal Ulcers Trial (SCUT) Study

500 eyes received 0.5% moxifloxacin every hour while awake for 48 hours

Randomized to either topical steroids or placebo

29

Steroids for Corneal Ulcers Trial (SCUT) Study (3 months)

Steroid group required more time to re-epithelialize

4 adverse events in the placebo group and none in the steroid group

No statistically significant difference in VA between the steroid and placebo group at 3 weeks or 3 months

No statistically significant difference in scar size at 3 weeks or 3 months

30

Steroids for Corneal Ulcers Trial (SCUT) Study (12 months)

Trend was…

Better long-term VA outcomes

In the steroid group

31

In Conclusion…

Follow 24-72 hours until signs of improvement

Treatment can last months

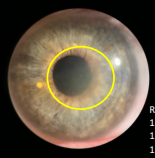
Q1h treatment day/night

32

Case

JS 44-year-old female presents with blurry VA, photophobia, and unspecified corneal edema OS Treated 2 months ago with some "big pills"

Dcc: 20/15 -2 OD; 20/600 OS
IOP: 12 OD; 14 OS
Pachymetry: OD 542; OS 684



Round area of 2+ edema
1+-2+Guttata
1 + injection
1+ cell in AC

KP's present

33

Case Considerations

- Infectious or Not Infectious?
- Key Clinical Findings?
- Treatment?

34

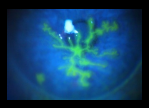
My Treatment

Valacyclovir 1000 mg 3 x a day
Topical corticosteroid qid

1 week later, edema was resolved, some mild scarring present, with some guttate and VA improved to 20/40.

35

HSV Keratitis Features



Unilateral presentation → always suspicious for HSV

Iritis with high IOP → always suspicious for HSV

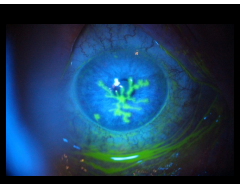
After 2nd episode , 70-80% had another recurrence within 10 years

Bilateral involvement or prolonged HSV suggests comorbid disease (immunodeficiency or immunosuppression)

36

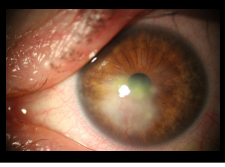
Epithelial

Dendritic epithelial ulcer
Geographic epithelial ulcer
Marginal epithelial ulcer



Stromal

Non-necrotizing keratitis
Interstitial keratitis
Immune stromal keratitis
Necrotizing keratitis



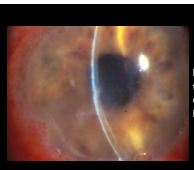
37

Endothelitis

Disciform keratitis

Area of corneal edema

No epi involvment pseudo-guttae and Descemet's folds



http://webeye.ophth.uiowa.edu/eyeforum/cases/160-hsv.htm

Neurotrophic

Ulcerated

Results from altered corneal innervation and decreased tear production

38

HSV Keratitis Treatment

Acyclovir (Zovirax)

400 mg 5 x daily for 7-10 days

Valacyclovir (Valtrex)

500 mg 3 x daily for 7-10 days

Famciclovir (Famvir)

250 mg 3 x daily for 7-10 days

Trifluridine ophthalmic solution 1% (Viroptic)

1 drop 9 x a day for 7 days; can decrease to 5 x a day after 7 days if ulcer not healed.

Ganciclovir ophthalmic gel 0.15% (Zirgan)

1 drop 5 x a day until ulcer heals followed by 1 drop 3 x a day for 7 days.

Acyclovir ophthalmic ointment (Avaclyr)

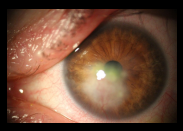
1 cm ribbon in lower cul-de-sac 5 x per day until healed then 3 times per day for 7 days.

39

HSV Keratitis Prophylaxis

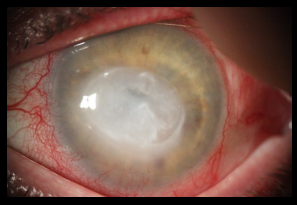
Why?

1. Multiple recurrences of HSV keratitis
2. Recurrent inflammation with scar/vascularization
3. Post-keratoplasty performed for HSV reasons
4. Postoperatively in patients with history of HSV undergoing any type of ocular surgery
5. In patients with a history of ocular HSV during immunosuppressive treatment



40

HSV Keratitis Prophylaxis



Acyclovir (Zovirax)

400 mg 2 x daily for 1 year

Valacyclovir (Valtrex)

500 mg 1 x daily for 1 year

Famciclovir (Famvir)

250 mg 2 x daily for 1 year

41

Treatment Principles

Treat epithelial disease 1st and stromal 2nd

When using steroids use either therapeutic or prophylactic dose of orals to prevent reoccurrence

In stromal cases that are controlled taper steroid gradually. Patient may never be able to get off in stromal disease and prophylactic orals may be required indefinitely.

42

"I have noticed a steady decline in my vision in the right eye over the last few months. No pain has been present, just a decline in my vision."

80-year-old white female

VAcc: 20/70-2 OD

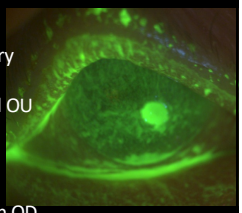
POHx: Moderate POAG OU, Cataract surgery OD

Ocular Medications: bimatoprost 0.01% qd OU

IOP: 15 mmHg OD 16 mmHg OS

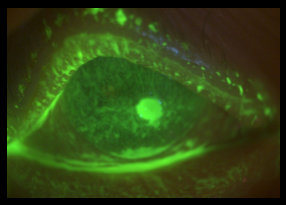
Corneal Sensitivity Testing: Absent in all quadrants OD

Posterior Exam: 0.75/0.75 w/ Inferior notch OD



43

Diagnosis: NK Stage 2



Treatment:

Inserted punctal plug OD

Preservative free AT's

Cenegermin 6 x a day OD

Moxifloxacin tid OD

Other Considerations?

44

1-Month Follow Up

VAcc: 20/50-1

Current Medications

Cenegermin 6 x a day OD

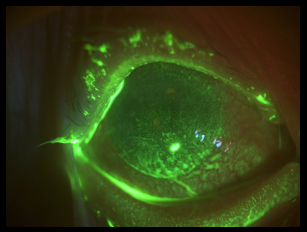
Bimatoprost qd OD

PF AT's 4-6 x a day OD

Moxifloxacin tid OD

Treatment

Continue with current medications



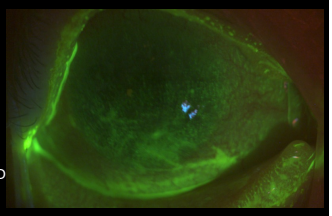
45

2-Month Follow Up

VAcc: 20/50-1

Current Medications
Cenegermin 6 x a day OD
Bimatoprost qd OD
PF AT's 4-6 x a day OD
Moxifloxacin tid OD

Treatment
Completed cenegermin course 6 x a day OD
D/C moxifloxacin OD
Bimatoprost qd OD
PF AT's 4-6 x a day OD



46

Treatment Considerations in NK

Topicals	In-office Procedures	Surgical Intervention
Artificial Tears (PF)	Contact Lenses	Tarsorrhaphy
Corticosteroids	Punctal Occlusion	Conjunctival flap
Autologous serum	Non-surgical eyelid closure	Corneal transplant
Antibiotics	Amniotic Membrane	Direct neurotization
Cenegermin-bkbj	Tissue adhesives	Sutured AMT

47

Neurotrophic Keratitis: Etiology

1. Infectious: HSV, VZV, leprosy
2. CN V palsy
   - Surgery for trigeminal neuralgia, neoplasia (acoustic neuroma), aneurysm, facial trauma, congenital, familial dysautonomia (Riley-Day syndrome), Goldenhar-Gorlin syndrome, Möbius syndrome, familial corneal hypesthesia
- Topical medications: anesthetic abuse
- Iatrogenic: LASIK/PRK, corneal incisions (RK, AK), contact lens wear, scleral bands, vitrectomy and photocoagulation to treat diabetic retinopathy[1,2]
- Chemical and physical burns
- Systemic: DM, multiple sclerosis, Vit A deficiency
- Increasing age, chronic DED[3]

1. Banerjee PJ. JAMA ophthalmology 2014;132:750-2.
2.Tinley CD. Eye 2009;23:1819-23
3. Ocul Surf. 2007 Apr;5(2):75-92.

48

Neurotrophic Keratitis: Classification

Mackie classification

- Stage I is characterized by hyperplasia and/or irregularity of the epithelium, evolving to punctate keratopathy, corneal edema, neovascularization, stromal scarring.
- Stage II is defined by a recurrent or persistent epithelial defects or a PED without stromal thinning.
- Stage III: stromal involvement leads to corneal ulcer, melting and perforation

Mackie IA. Neuroparalytic keratitis. Current Ocular Therapy. Philadelphia, PA: WB Saunders; 1995:452-4.

49

Corneal Assessment

- Assessment of corneal sensation is essential to diagnose NK
- Methods of assessing corneal sensation:
  - Clinical: "Wisp" of cotton, dental floss
    - Performed easily in the clinic
    - Patient's reaction is noted and compared between each eye
  - Cochet-Bonnet esthesiometer
    - Different lengths (60 to 5 mm) of nylon filament applied to the cornea
    - Longer the length, the higher (normal) the sensitivity
  - Automated esthesiometer
    - Quantitative data to monitor over time

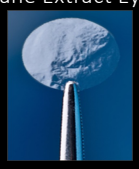
Image courtesy of Stephen C. Pflugfelder, MD

Dua HS, et al. *Prog Retin Eye Res.* 2018;66:107-131.

50

Amniotic Membranes
Amniotic Membrane Extract Eye Drop (AMEED)

Cryopreserved Membranes



Dry Membranes

51

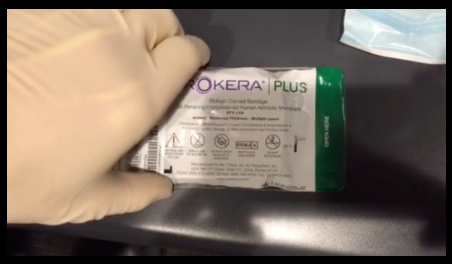
Amniotic Membrane for NK

- Self-retaining fresh-frozen option good for acute in-office use in nonhealing epithelial defects
- Long-term (12-month) prospective studies using AM transplantation:

Study (Year)	Number of Eyes/Patients	AM Method	Healing Rate	Epithelial Healing, Days	Rate of Vision Improvement	Follow-Up, Months
Kruse et al (1999)	10/10	Multiple layers	100% (10/10)	Range: 21-28	44.4% (4/9)	12 ± 0
Nubile et al (2011)	9/9	Multiple layers	88.9% (8/9)	13.8 ± 4.7	–	12 ± 0

Mead OG, et al. *Taiwan J Ophthalmol.* 2020;10(1):13-21.

52



53

Cenegermin Pivotal Trials

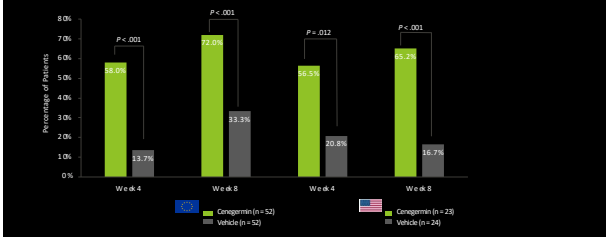
	NGF0212 (REPARO)[1,2] (N = 156)	NGF0214[2,3] (N = 48)
Geography	Europe 6 countries (Italy, Germany, United Kingdom, France, Spain, Poland) 32 clinical centers	United States 11 clinical centers
Design	3 treatment arms: Vehicle, cenegermin 10 µg/mL, cenegermin 20 µg/mL	2 treatment arms: Vehicle, cenegermin 20 µg/mL
NK stage	**2 and 3**	**2 and 3**
Vehicle and cenegermin composition	Without antioxidant	With antioxidant (methionine)
Duration of follow-up	48 weeks	24 weeks
Unilateral/Bilateral disease	Unilateral	Unilateral and bilateral
Corneal healing end point*	Primary analysis was corneal healing at week 4; key secondary end point was corneal healing at week 8	Primary analysis was healing of the neurotrophic lesion after 8 weeks of masked treatment

1. Bonini S, et al. *Ophthalmology.* 2018;125(9):1332-1343.
2. US National Library of Medicine. Cenegermin-bkbj solution/drops. Package insert. Updated November 1, 2022. Accessed March 6, 2023. https://dailymed.nlm.nih.gov/dailymed/
3. Pflugfelder SC, et al. *Ophthalmology.* 2020;127(1):14-26.

54

Cenegermin Efficacy: Complete Corneal Healing*

Complete corneal healing in up to 72% of patients receiving cenegermin at week 8



1. Bonini S, et al. Ophthalmology. 2018;125(9):1332-1343. 2. Pflugfelder SC, et al. Ophthalmology. 2020;127(1):14-26. 3. US National Library of Medicine. Cenegermin-bkbj solution/drops. Package insert. Updated November 1, 2022. Accessed March 6, 2023. https://dailymed.nlm.nih.gov/dailymed/

55

Adverse Events (Pooled)

	Cenegermin (n = 75)	Vehicle (n = 76)
Eye pain	12 (16%)	6 (8%)
Corneal deposits	3 (4%)	0 (0%)
Foreign body sensation	2 (3%)	1 (1%)
Lacrimation increased (tearing)	4 (5%)	2 (3%)
Ocular hyperemia	5 (7%)	2 (3%)

US Food and Drug Administration. August 14, 2018. Accessed March 6, 2023. https://www.accessdata.fda.gov/drugsatfda_docs/nda/2018/761094Orig1s000SumR.pdf

56

Other Considerations

Serum/PRP Drops

Serum/PRP has reported efficacy as primary or adjunct therapy.

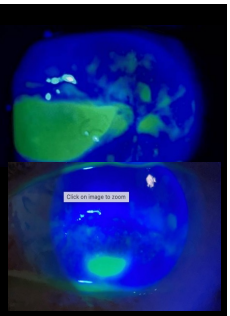
20% is a good starting spot 5-10 x daily until resolution

Retrospective study of 11 patients with all NK (all stages) treated with 20% topical AS 5-10 x daily until =resolution.[1]

Scleral Lenses

Ocular protection
- Ocular surface coverage
- Full corneal vault

Continuous lubrication
- Fluid reservoir



1. Matsumoto Y, et al. *Ophthalmol*. 2004;111(6):1115-1120.

57

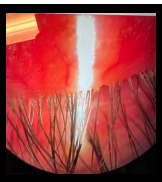
29-year-old WF with complaints of fluctuating vision, irritated eyes, and some redness. She owns a flower business, but states this has never been a problem in the past. I am tired of wearing my contact lenses and is interested in refractive surgery.

PMHx: Unremarkable
POHx: Contact Lenses x 14 years
Systemic Meds: None
Topical Meds: AT's off and on
Allergies: NKDA
FMHx: None
Social Hx: Nothing to report

58

SPEED: 6/28
BCVA: 20/15 OD 20/15 OS
MRX: -3.50 OU
IOP: 12 OD 12 OS
MMP-9 Testing: Positive OU
Osmolarity: 300 OD. 322 OS

SLEx:
Lids/Lashes: See photo's; Minimal meibum secretions noted
Conjunctiva/Sclera: Trace injection noted OU, no staining
Cornea: Clear; TBUT: 7 seconds OU
A/C: Deep and Quiet OU
Iris: Flat OU
Lens: Normal



59

Case Considerations

- OK To Proceed Refractive Surgery?
- How do you educate this patient?
- Treatment Considerations?

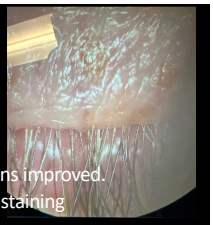
60

What I Did

1. Heat and gland clearing treatment in clinic OU
2. Start loteprednol bid x 1 month OU
3. Start lotilaner bid OU x 6 weeks OU
4. At home maintenance
5. RTC in 6 weeks for a recheck

61

Patient states VA seems better.
BCVA: 20/15 OD 20/15 OS
IOP: 14 OD 14 OS
Osmolarity: 300 OD 300 OS



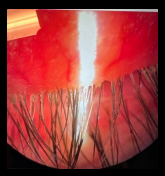
SLEx:
- Lids/Lashes: See photo; Meibum secretions improved.
- Conjunctiva/Sclera: Clear, no injection or staining
- Cornea: Clear; TBUT: >10 seconds OU
- A/C: Deep and Quiet OU
- Iris: Flat OU
- Lens: Normal

62

Lotilaner FDA-approved treatment for *Demodex* blepharitis[1]

How Does it Work?

1. Is a lipophilic agent in an aqueous drop
2. Acts specifically via mite GABA-gated chloride channels
3. Targets, paralyzes, and kills *Demodex* mites



References: 1. XDEMVY [prescribing information]. Tarsus Pharmaceuticals, Inc. 2023. **2.** Toutain CE, et al. *Parasit Vectors.* 2017;10(1):522. **3.** Yeu E, et al. *Cornea.* 2023;42(4):435-443. **4.** Gaddie IA, et al. *Ophthalmology.* 2023;S0161-6420(23)00392-5.

63

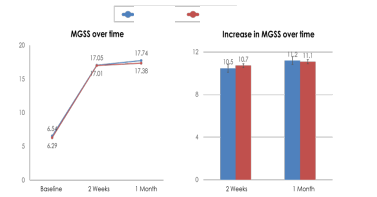
A Novel, Targeted, Open Eye, Thermal Therapy and Meibomian Gland Clearance in the Treatment of Dye Eye:

A Randomized Controlled Investigator masked Trial (OLYMPIA)

Preeya K. Gupta, MD, Edward J. Holland, MD, John Hovanesian, MD, Jennifer Loh, MD, Mitchell A. Jackson, MD, Paul M. Karpecki, OD, Kavita Dhamdhere, MD, PhD

64

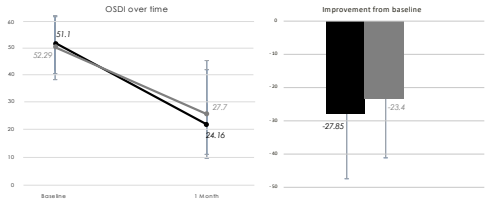
Primary Endpoint: Meibomian Gland Secretion Score (MGSS)



- Statistically significant increase ($p<0.0001$) in mean MGSS in both groups at all f/u time points

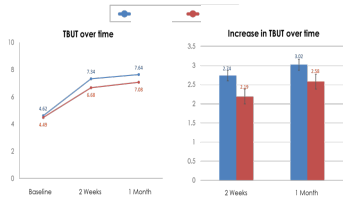
65

Olympia: Ocular Surface Disease Index (OSDI)



66

Primary Endpoint: Tear Film Break-Up Time (TBUT)



- Statistically significant increase ($p<0.0001$) in mean TBUT in both groups at all f/u time points

67

justin.schweitzer@vancethompsonvision.com

68