

“A CRASH COURSE IN ANTERIOR SEGMENT DISEASE”

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COPE # 92429-TD

FINANCIAL DISCLOSURES:
Dr. Earley is a Key Opinion Leader and Paid Speaker for Alcon Vision Care, Lumithera, LKC Technologies, Notal Vision, Tarsus and MacuHealth.

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DEWS-II STUDY IS CELEBRATING ITS 8TH BIRTHDAY!!

Study results published in 2017

Changed the Definition of DED!!

Key to DED Management is to RETAIN TEAR FILM HOMEOSTASIS

TWO SUBTYPES:

- EVAPORATIVE/MGD - Issue is with the Meibomian Glands/Lipid
- AQUEOUS DEFICIENT - Issue is with the Lacrimal Gland/Aqueous Production

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Current Estimates are that 44 Million Americans Suffer from Dry Eye! (too low?)

Computer/Device Use! Contact Lens Wear...



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Multifactorial Disease: Causes are Numerous and Varied



- ▶ Aging
- ▶ Contact Lenses
- ▶ Fans/Heaters/Vents
- ▶ Dehydration- too little water consumption
- ▶ Screen Time
- ▶ Systemic Disease/Meds.
- ▶ Concurrent anterior segment disease

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IF THERE ARE 44 MILLION DRY EYE PATIENTS IN THE U.S. HOW DOES THAT AFFECT YOUR PRACTICE?

- ▶ About 42,000 Practicing Optometrists in the U.S.
- ▶ Each Practicing Optometrist has over 1,000 Dry Eye Patients presenting to clinic each year
- ▶ Are YOU actively identifying and managing DED?

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Some DED causes are under our control; Others: Not so much!

Patients need to be aware!



Lifestyle choices and DED are intimately linked!



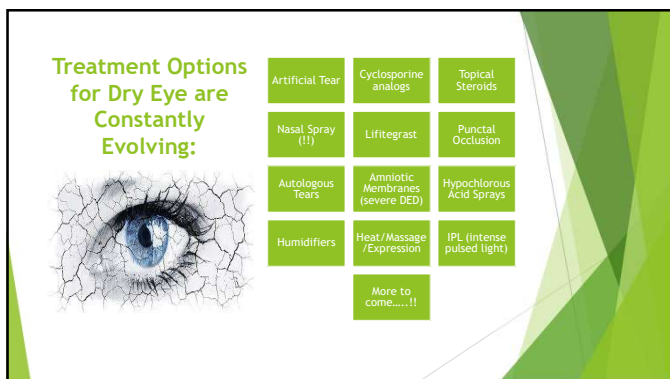
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TREATMENT OPTIONS CONTINUE TO GROW AS WE LEARN MORE ABOUT DED

- ▶ EACH PATIENT IS UNIQUE! SIMPLICITY OF PLAN WILL LEAD TO BETTER COMPLIANCE
- ▶ A 'ONE SIZE FITS ALL' APPROACH TO DED TREATMENT WILL LIKELY FAIL
- ▶ ASK GOOD QUESTIONS! REALLY LISTEN TO THE ANSWERS
- ▶ COMPLIANCE IS KEY; IF PATIENTS ARE NOT ABLE TO BE COMPLIANT, FIND MORE PASSIVE MEANS TO MANAGE THEIR DISEASE
- ▶ **AND REMEMBER:** THERE ARE LOTS OF DISEASE STATES THAT MIMIC DED! UNDERSTANDING ANTERIOR SEGMENT ANATOMY IS CRITICAL FOR MAKING A PROPER DIAGNOSIS AND TREATMENT PLAN

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LET'S TALK "PINK EYE"!!

DOES IT DRIVE YOU CRAZY WHEN PATIENTS THINK ALL "PINK EYE" IS THE SAME?

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Causes of "Pink Eye": We See These in Clinic Every Day:



- ▶ Bacterial Conjunctivitis
- ▶ Viral Conjunctivitis
- ▶ Allergic Conjunctivitis
- ▶ DED
- ▶ Systemic Inflammatory Disease
- ▶ Environmental
- ▶ Toxic Exposure
- ▶ Foreign Body
- ▶ Abrasion/Injury
- ▶ Hemorrhage
- ▶ Hypoxia/CLS

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"PINK EYE" CASE



- 14 yo Caucasian Male
- ▶ Presents after ER visit
 - ▶ Diagnosed with "pink eye" and given Ab drops (sulfacetamide) 10 days prior
 - ▶ After a week, eye not getting better
 - ▶ Saw Pediatrician 3 days ago and was given Polytrim - no improvement
 - ▶ "Why won't this pink eye go away?"

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THIS WAS THE CAUSE OF THE "PINK EYE"



- ▶ Be sure to educate patients/parents
- ▶ Best way to evaluate an eye is with SLE
- ▶ Well-intentioned ER, GP, NP typically DO NOT have this equipment or have rarely used it!
- ▶ Build relationships with local GPs

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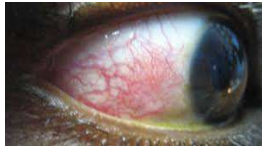
Can you Diagnose This Pink Eye?



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How about these?

- Pink Eye Tips:
- Is it Bilateral?
 - Acute or chronic?
 - Age of Patient
 - History of trauma or infection in family/work/school?
 - History of Allergies?
 - Associated symptoms?
 - Systemic Disease?
 - Contact Lens Wearer?



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Any ideas as to what caused this Pink Eye?

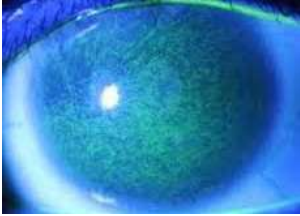
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CORNEAL STAINING: THE GREAT MASQUERADER!

DIFFERENT PATTERNS FOR DIFFERENT DISEASES

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Superficial Punctate Keratitis (SPK):



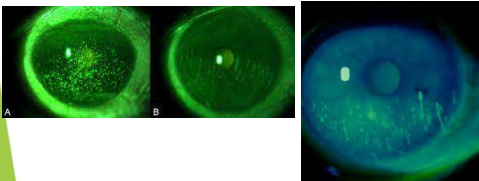
- ▶ Classic presentation of "Staining"
- ▶ Can be confluent or scattered
- ▶ Can be focal or diffuse
- ▶ Can be stained with fluorescein, lissamine green or rose bengal
- ▶ Any signs of staining are a cause for concern
- ▶ BUT...staining is not always DED

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Type of Staining can clue us in to cause:
That and a thorough patient history!

What do we have here?

See anything unique here?



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What's Going on Here??

- ▶ What is the leading cause of cornea-related vision loss in the United States?



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Herpes Simplex Keratitis

Can lead to corneal scarring

Scarring may lead to vision loss if not treated or if the condition is recurrent

However, I often see another viral infection more frequently...

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HERPES ZOSTER OPHTHALMICUS (HZO)

- ▶ INCIDENCE: ABOUT 31 OUT OF EVERY 100,000 PEOPLE
- ▶ TRANSLATES TO ABOUT 10-20% OF THE ESTIMATED 1 MILLION PEOPLE WHO DEVELOP ZOSTER ANNUALLY
- ▶ AGE OF ONSET AROUND 60 yo AND DROPPING
- ▶ MORE COMMON IN WOMEN AND IN WHITES COMPARED TO OTHER ETHNICITIES
- ▶ SHINGLES VACCINE EXISTS (2 DOSES)



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Causes of Corneal Staining are as numerous as our patients!

What caused this staining?



Is this DED? Cause?



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I SAW THIS ON SLE IN THE SAME 36-yo MALE PATIENT THREE TIMES IN 7 WEEKS...



- FB sensation with pain upon awakening
- 5'10" 167 lb male who runs marathons and coaches soccer!
- Appears to be severe DED
- Not the greatest historian; his mom helped lead me to a diagnosis!
- Hint: He has difficulty sleeping

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CPAP DED is on the rise... Be sure to ask (not all patients fit the typical profile!)



CPAP-associated Red Eye

Clinical Problems

- Dry eye symptoms
- EOM CL int. coverage
- Recurrent corneal erosion
- Infectious conjunctivitis

Causes

- Air leaks
- Poorly applied or ill-fitting mask
- Inadequate humidification (water bubble test)

Treatment

- Lubricating ointments, HS, punctal plugs
- CPAP refitting: adjust headgear and pressure
- Intraocular surgery

Ophthalmology, 2007;78:152-155



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SOME MASK TYPES ARE MORE LIKELY TO CAUSE OCULAR COMPLICATIONS

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LET'S TALK LIDS! (and lashes)



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EYELID DISEASE AS A CAUSE OF CHRONIC "PINK EYE"

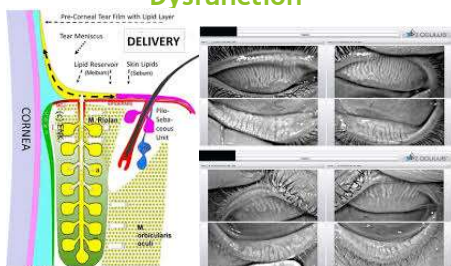


Crusting of the eyelids and redness of the lid margins are classic signs of blepharitis.

- ▶ MGD and blepharitis are often observed simultaneously in the same patient
- ▶ Treating the acute signs and symptoms is critical
- ▶ Need to establish a maintenance program to keep chronic inflammation at bay
- ▶ Educate patients on the chronic nature of these conditions

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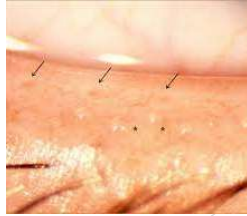
MGD - Meibomian Gland Dysfunction



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What a normal lid margin should look like!

- ▶ Meibomian gland orifices clear of debris
- ▶ Pores open and uncapped
- ▶ Expression reveals presence of clear, free-flowing lipid
- ▶ No to minimal lid margin thickening, redness, or signs of past inflammation (notching, gland dropout)



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IMAGE OF NORMAL MEIBOMIAN GLAND SECRETIONS

What percentage of patients with DED have MGD (lipid-deficiency DED)?

32

My Opinion: evaluation and expression of glands on all patients should be standard of care!

Moderate MGD with "soft" caps

Moderate MGD with hard, thick meibum



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More fun pictures....

Severe MGD - "toothpaste-like" secretions



Frothing of the Tear Film in Lipid-deficiency



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Evaporative Dry Eye/MGD: Effective Treatment Options All O.D.s Can Prescribe:

► Medi-Bead Heat Packs:

- Provide consistent heat/correct temp.
- Allow both eyes to be treated
- Are reusable
- Don't cool off too quickly
- Are superior to warm wash cloth
- What is the ideal temperature range for therapeutic heating?



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Some more options for Lid Hygiene: Hypochlorous Acid Sprays

Safe and Effective Way...



To Reduce Bacterial Load!



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Clean Lids are Happy Lids: Don't forget to clean those pores!

Lid Scrubs are inexpensive...

and often necessary early on!



Crusting of the eyelids and redness of the lid margins are classic signs of blepharitis.



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Eyelid cleaners are an effective choice for removing irritants from the lid margins:

Reduces Inflammation and Plugged Glands by Removing Debris



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CLEAN EYELIDS ARE HAPPY EYELIDS!

Demodex Infestation..

Staph Blepharitis



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LID SCRUBS HAVE BEEN USED TO TREAT SOME EYELID PATHOGENS...



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Novel Demodex Topical Medication



Targets the mites directly - mites are found on 100% of lashes with collarettes



Active ingredient is: Lotilaner 0.25% ophthalmic solution

6 week course of therapy
Drop is used BID, OU
Well-tolerated with good safety profile



We've been prescribing this treatment for about 2 years



Effective eradication of demodex mites within the 6 week course of treatment

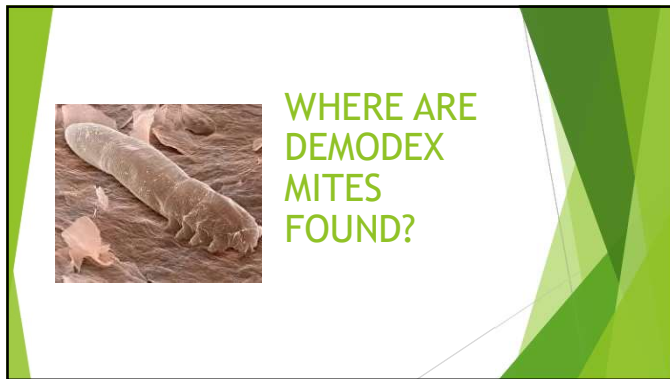
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DEMODEX TOPICAL MEDICATION

- ▶ OBSERVE COLLARETTES BEST BY HAVING PATIENT LOOK DOWN WHILE UNDER SLE
- ▶ CONVERSATION/EDUCATION IS KEY SO AS NOT TO "GROSS OUT" YOUR PATIENTS!
- ▶ "WE ALL HAVE THESE MITES, SOMETIMES THEY OVERPOPULATE THE EYELASHES ON SOME PEOPLE"
- ▶ MANUFACTURER USES SPECIALTY PHARMACIES (WALGREEN'S COMMUNITY)



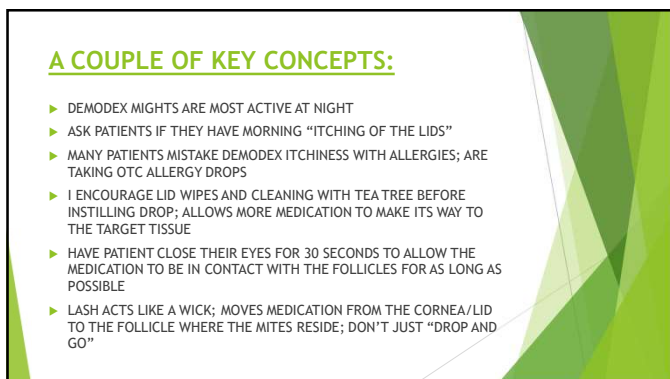
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presence of meibomian glands under infrared illumination

WHERE ARE THE DEMODEX MITES FOUND?

► RECENT STUDIES HAVE FOUND THE PRESENCE OF DEMODEX MITES IN THE MEIBUM AND THE MEIBOMIAN GLANDS OF PATIENTS WITH ACTIVE DEMODEX BLEPHARITIS!

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BEFORE **AFTER**

Elimination of Collarettes!!

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Blepharitis and MGD often occur simultaneously; treating one can improve the other!!!



Before and After Lid Treatment!

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GIVING PATIENTS' LIDS A HEAD START:



- ▶ IN-OFFICE LID CLEANING DEVICE(S)
- ▶ REMOVE SCURF AND DEBRIS PRIOR TO BEGINNING AT-HOME TREATMENT
- ▶ CAN BE REPEATED AS NECESSARY FOR RECURRENT EPISODES

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IF YOU DON'T HAVE A FANCY DEVICE, DON'T DESPAIR!



- ▶ Take a sterile cotton-tipped applicator
- ▶ Instill a drop of Fluress or Proparacaine (your patient will thank you!)
- ▶ Soak the cotton-tipped applicator in a Antibiotic/Steroid combo drop
- ▶ Scrub the base of the lashes while the patient looks away from the lid you are scrubbing
- ▶ Getting the worst of the debris off the lash line is a great way to jumpstart clean lids

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Treatment Options for MGD: Involve Heat and Gland Expression

- ▶ Can be performed by Doc or Technician
- ▶ Targeted Heat on Meibomian Glands
- ▶ Able to Treat both Upper and Lower Lids
- ▶ Gland Expression After Heating with the Same Device



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Another MGD Tool!

- ▶ Able to treat both eyes simultaneously
- ▶ Focused Heat on Upper and Lower Lids
- ▶ Able to control Heat and Contact Time
- ▶ Express Glands After the Procedure



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Intense Pulsed Light Therapy (IPL) for Eyelid and Adnexa

- ▶ Relatively New Treatment Option
- ▶ Non-Invasive and well-tolerated
- ▶ Works by stimulating the glands in the ocular adnexa
- ▶ Reduces Inflammation and has been shown to be effective with chalazia, styes, and MGD
- ▶ Destroys abnormal vessels that perpetuate inflammation
- ▶ Also shown to reduce Demodex



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Formal: Dr. Sean Paul

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IPL used in the Modern Optometric Practice -

Procedure is Safe.....

And Effective!



Before 1st session of IPL



After 1st session of IPL --
75% subjective improvement in dry eye
and eye comfort and eyelid signs



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Abnormal Lid Position can mimic Dry Eye Disease - similar symptoms.....

Lower Lid Lagophthalmos

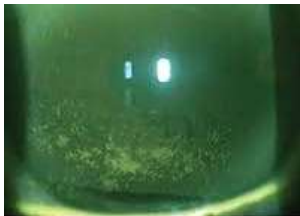


Proper Lid Position



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Staining pattern looked like this:



- ▶ Upper lid unable to come into contact with lower lid
- ▶ Leaves lower cornea "exposed" throughout the day
- ▶ Pt. often has reduced corneal sensation and epiphora
- ▶ Treatment in this case is not dry eye-related; Time for a surgical consult!

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Overnight Protection/Exposure-Related Treatments:

Dry Eye/Moisture Glasses



Humidifiers (Consider Whole House Units)



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Interesting Case: 31 y.o. female with a brain tumor that affected ability to close one eye post-resection...



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She'd lost the ability to close her right eye - exposure was a big problem!



Copious lubricants and ointment at night

Moisture Goggles for daytime wear

Eventually, a gold weight was placed in the RUL

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**RECENT ADDITIONS
TO OUR TOPICAL
EYEDROP TOOLBOX**

- ▶ ONE USED TO TREAT LIPID-DEFICIENCY DRY EYE
- ▶ ONE AN UPDATE TO AN OLD FAVORITE

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**Perfluorohexyloctane
Ophthalmic Solution**

- ▶ Preservative Free
- ▶ QID dosing
- ▶ Single-molecule eyedrop
- ▶ Designed for patients with Meibomian Gland Deficiency/evaporative DED
- ▶ Very 'thin' drop - use care when instilling medication

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**There is also a new Cyclosporine
Eyedrop with FDA approval (VEVYE):**

- ▶ Cyclosporine 0.1%
- ▶ First and only water-free cyclosporine; dissolved in semifluorinated alkane
- ▶ Allows for more even spreading, longer contact time with tissue, and increased penetration into the eye
- ▶ Preservative Free
- ▶ 99.8% of trial patients experienced "no" or "mild" site instillation irritation

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Use of Amniotic Membranes for the Treatment of Corneal Defects

Several Options Exist...

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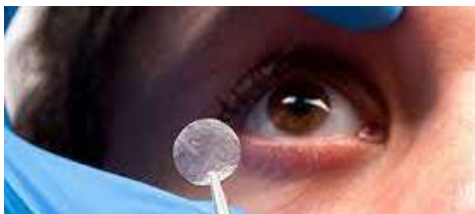
Use of cryopreserved membranes - require freezing/refrigeration

Benefit of Different Membrane Thicknesses...

Insertion Eased by Design of the Attached Ring

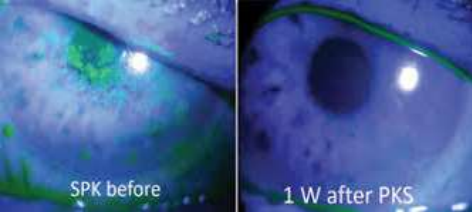


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Dehydrated Membranes are another good option....
Need a bandage CL to keep the membrane in place

66



AMNIOTIC MEMBRANE FOR TREATMENT OF UNRESOLVED DED

SPK NOT RESOLVING WITH STANDARD TREATMENTS - PATIENT HAD MIXED DRY EYE AND WAS TREATED WITH PUNCTAL OCCLUSION, CYCLOSPORINE MEDICATION, PF ART. TEARS AND GELS/LUBRICANTS.

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First Biologic FDA-Approved for the Treatment of Neurotrophic Corneal Disease:

- ▶ Cenegermin 0.002% Ophth Soln. (Oxervate)
- ▶ Form of Recombinant Human Nerve Growth Factor (NGF)
- ▶ Address the lack of corneal nerve supply that is the cause of reduced corneal sensation and neurotrophic disease
- ▶ 8-week course shipped to patient
- ▶ Well tolerated (16% report stinging) with over 70% total heal rate
- ▶ One drop 6x/day (roughly two hour intervals)
- ▶ Each shipment good for 14 days in fridge

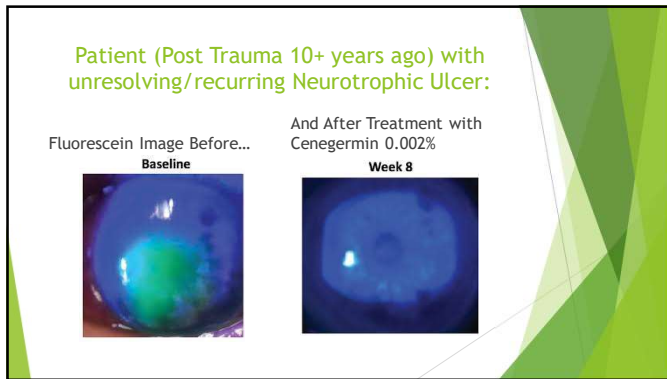


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This is the type of corneal epithelial defect we are treating; Recurrent and not healing with traditional treatments!

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AS WE DISCUSSED EARLIER, LID POSITION IS IMPORTANT FOR NORMAL TEAR FLOW



- ▶ Drop available for patients suffering from mild to moderate acquired ptosis (0.1% oxymetazoline HCl)
- ▶ Allows for a lifted upper lid and a more normal lid "sweeping" motion
- ▶ Allows more light flow into the eye
- ▶ May allow patient to delay unwanted/unnecessary lid surgery

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Oxymetazoline HCl: An Eye-Opening Experience!



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Another Nice Response!!



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A Few Things to Remember:

- ▶ Eyedrop works on the muscle of Mueller, causing it to constrict
- ▶ Drop also has the bonus benefit of making the conjunctiva nice and white!
- ▶ Patients can expect the drop to last about 10 hours
- ▶ Available in PF vials
- ▶ Direct-to-Consumer pharmacy will collect payment and direct ship to patient
- ▶ Available in a 30-day and a 90-day supply

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Longtime Patient Says She "Looks Tired" and Wants to Try Oxymetazoline HCl topical drop; "I don't want to do surgery unless I have to.."

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10 Minutes After Drop Instillation
Lids Show Lifting and Pupil Is More Visible

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When I Lift Her Upper Lid Skin Manually, WOW!!!
In this case, Patient Opted for a Consultation with our Oculoplastic Surgeon.

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Hoods don't just come on sweatshirts!!



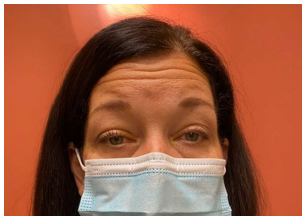
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Blepharoplasty: Refer if the Lid Issue is
Dermatochalasis Related



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One of my happiest Patients on this drop:
Young Lady says: "I always look tired"....



- Been a patient for years
- Notice the furrowed brow!
- She is working so hard to keep her lids above her pupil margin
- Was considering a surgical option until I suggested we try Oxymetazoline HCl

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Note the brow crease and the significantly increased aperture....



- Patient was very excited!
- Feels much more comfortable not having to raise her lids with her forehead muscles.

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A congenital ptosis that responded nicely.



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Big Changes are Coming in Presbyopia Management

From New Eyedrop Therapies to IOLs and Presbyopic Contact Lenses...
Change is in the Air!

84

Eyedrops for Presbyopia!

- Increases Depth of Field by reducing Pupil Size
- Released in Q4 2021 (1.25% pilocarpine HCl)
- Once daily dosing currently- **FDA approved BID dosing as of March 2023**
- Some side effects possible
- Reduced Pupil Size:
 - May cause lighting to seem "dimmer"
 - May be contraindicated in some patients
 - Browache



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The pipeline for presbyopia drops is long and exciting!

- Brimochol (Visus): uses longer lasting carbachol and brimonidine which reduces symptoms of redness and headache
- LNZ100 (Lenz Therapeutics): 1.75% aceclidine (also a parasymphathetic miotic agent) plus brimonidine in a PF formula. **Latest trial showed that 71% of participants showed significant improvement at near with no loss of distance acuity at 3 hours post instillation (n=1,059) - Goal is maximizing the ideal pupil size for improved near vision without reduction in VA at distance (2.0 mm?)**
- Microline (Eyenovia): 1% and 2% Pilo using proprietary Optejet technology (mist application as opposed to a drop)
- Nyxol plus low-dose Pilo (Ocuphire Pharma): PF phentolamine 0.75% plus low dose Pilo; phentolamine has been used as a means to reverse medically-induced pupil dilation

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More pharmacological agents using pupil constriction:

- CSF-1 (Orasis Pharmaceuticals): Preservative Free formula for BID dosing of low dose Pilo - **Approved by FDA in October 2023 (Qlosi 0.4% pilo) - Up to BID dosing, efficacy in 20 minutes; duration up to 8 hours - statistically significant improvement of up to 3 lines of near VA vs. placebo**
- EyeFocus and EyeFocus+ (OSRX Pharmaceuticals): compounded product that will not go the FDA route for approval; contains low concentrations of pilo, phenylephrine, pheniramine (anti-histamine), and ketorolac
- Liquid Vision/PRX-100 (Presbyopia Therapies): Uses acclidine, a novel new chemical entity; miotic reduces pupil to 1.5 to 2.0 mm with no distance blurring in phase 2 trials

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Lens softening drops/therapies:

- ▶ Allows lens to regain flexibility/accommodation
- ▶ Limited to phakic eyes
- ▶ Currently two drops in the pipeline:
 - ▶ VP1-001
 - ▶ Dioptin

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Lens softening drops currently in clinical trials:

- ▶ VP1-001 (Viewpoint Therapeutics):
 - ▶ Uses a proprietary molecule aimed at stabilizing alpha-crystallin
 - ▶ Alpha-crystallin functions to maintain lens clarity and flexibility
- ▶ Dioptin (Novartis): **FAILED PHASE III TRIAL ENDPOINT GOALS - WILL NOT COME TO MARKET ☹**
 - ▶ R-lipoic acid and choline are metabolized into choline dihydrolipoic acid (DHCLA)
 - ▶ This combination of molecules reduces disulfide bonding in the lens, thus restoring lens elasticity

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WHAT'S NEW IN PRESBYOPIC-CORRECTING IOL TECHNOLOGY?

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First Generation “Bifocal”, Accommodating, and MF IOLs

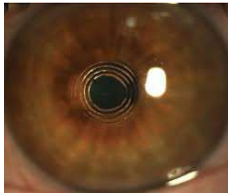


► Often relied on the concept of simultaneous vision. Also attempted to mimic the accommodative systems using a hinged design.

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Use of IOLs That Rely on Diffraction/Simultaneous Vision Design...

Rings Evident on SLE



Size, Location and Number
Vary based on Manufacturer



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PATIENT OPTIONS CHANGE/IMPROVE AT A RAPID RATE

Important to maintain a close relationship with your cataract surgical team
Know what technology they are utilizing and be prepared to discuss with patients

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Some More Recent IOL Designs...

Increased Depth of Field



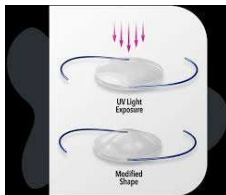
Trifocal IOL Design



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IOL Design Allowing Surgeon to Alter IOL Power Weeks After Cataract Surgery....

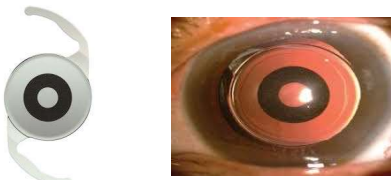
Use of UV light changes lens shape/refractive power



Scheduled light treatments allow for "tweaking"

Light Treatment Schedule	
Initial Light Treatment	Approximately 2-3 weeks after surgery
Secondary Light Treatment	Approximately 3 days after initial light treatment
Additional Light Treatments (if required)	Approximately 3 days after each prior light treatment

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Monofocal IOL with aperture for extended depth of focus (EDF)
IC-8 Small Aperture IOL

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New IOL Materials are also Changing Patient Outcomes - "Glisten Free"



► HAVE YOU EVER NOTICED THE "SPARKLING" OR "GLISTENING" NATURE OF IOLs AS THEY AGE IN A PATIENT'S EYE? EVER WONDER WHY THAT OCCURS?

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Longtime Patient With Chronic Redness Post-trauma (OD>OS) - BEFORE AND AFTER LOW-DOSE BRIMONIDINE



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How Does it Work? Why is it Safer than Visine?

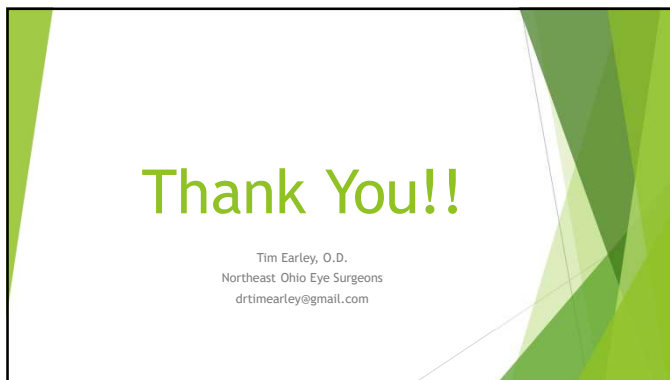
► Vasoconstrictors act on the Arterioles, depriving the eye of a normal blood flow

► Brimonidine acts on the Venous System, thereby not affecting normal blood flow to the ocular tissues

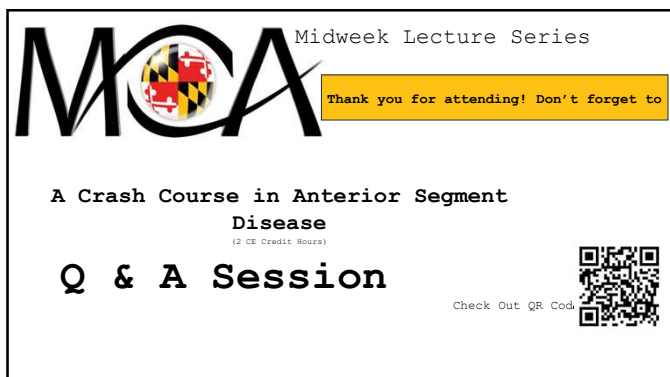
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