

## "A CRASH COURSE IN ANTERIOR SEGMENT DISEASE"

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### FINANCIAL DISCLOSURES:

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

## "How have the findings of DEWS II changed our understanding of DED?"

- ▶ Overview and Summary of DEWS II and its findings
- ▶ Definition of Dry Eye:
  - ▶ Think "Homeostasis"
  - ▶ Two Main Types of DED (and a combo of both)

## DEWS-II STUDY IS CELEBRATING ITS 7<sup>TH</sup> 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

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?

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



## Multifactorial Disease: Causes are Numerous and Varied



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



How do we get our patients to tell us how their eyes REALLY feel??

## We ASK them!!

- SPEED - Standard Patient Evaluation of Eye Dryness
- OSDI - Ocular Surface Disease Index
- DEQ - Dry Eye Questionnaire
- TFOS - DEWS II - Tear Film and Ocular Surface Society

\* You can make your own that fits how you assess DED

### Some Great Options....

**SPEED**

**Standard Patient Evaluation of Eye Dryness**

1. How often do you experience dryness of the eyes?

2. How often do you experience irritation of the eyes?

3. How often do you experience burning of the eyes?

4. How often do you experience watering of the eyes?

5. How often do you experience itching of the eyes?

6. How often do you experience redness of the eyes?

7. How often do you experience discomfort of the eyes?

8. How often do you experience difficulty with contact lens wear?

9. How often do you experience difficulty with eye makeup?

10. How often do you experience difficulty with eye surgery?

11. How often do you experience difficulty with eye contact?

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**OSDI**

**Ocular Surface Disease Index**

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### SPEED Questionnaire: Score from 0-28

- 8 items assess frequency and severity of symptoms
- Symptoms include: dryness, grittiness, irritation, burning, watering, eye fatigue, soreness and scratchiness
- Are symptoms: Tolerable, uncomfortable, bothersome or intolerable?
- Higher the Score, the worse the DED is likely to be
- Sensitivity and Specificity of 90% and 80%, respectively

### More good options!

**TFOS - DEWS II**

**Tear Film and Ocular Surface Society**

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**DEQ**

**Dry Eye Questionnaire**

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### Treatment Options for Dry Eye are Constantly Evolving:



Artificial Tear	Cyclosporine analogs	Topical Steroids
Rest Spring (1)	Lifitegrast	Punctal Occlusion
Radiation Therapy	Amniotic Membranes (w/ or w/o DED)	Hypochlorous acid Spray
Humectants	Heat Massage/Expression	PL (retimer pulsed light)
More to come....!!		

## TREATMENT OPTIONS CONTINUE TO GROW AS WE LEARN MORE ABOUT DED

- ▶ EACH PATIENT IS UNIQUE!
- ▶ 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

## 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

## "PINK EYE" CASE



- 14 yo Caucasian Male
- ▶ Presents after visit to ER
  - ▶ 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 Polyttrin - no improvement
  - ▶ "Why won't this pink eye go away?"

## THIS WAS THE CAUSE OF THE "PINK EYE"



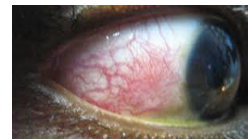
- ▶ Be sure to educate patients/parents
- ▶ Best way to evaluate an eye is with SLE
- ▶ ER, GP, NP typically DO NOT have this equipment or have rarely used it!
- ▶ Build relationships with local GPs

## Can you Diagnose This Pink Eye?



## How about these?

- Pink Eye Tips:
- ▶ Is it Bilateral?
  - ▶ Age of Patient
  - ▶ History (of trauma, CL wear, infection in family/work/school)?
  - ▶ History of Allergies?
  - ▶ Associated symptoms?
  - ▶ Systemic Disease
  - ▶ Contact Lens Wearer?



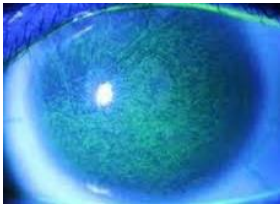


Any ideas as to  
what caused  
this Pink Eye?

## CORNEAL STAINING: FRIEND OR FOE?

DIFFERENT PATTERNS FOR DIFFERENT DISEASES

### Superficial Punctate Keratitis (SPK):

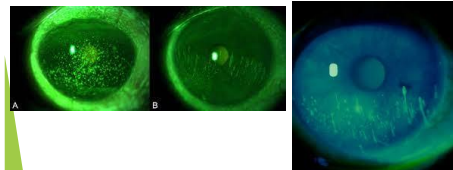


- ▶ Classic presentation of "Staining"
- ▶ Can be confluent or scattered
- ▶ Can be focal or diffuse
- ▶ Can be stained with fluorescein, lissamine green or rose Bengal
- ▶ Any signs of staining are a cause for concern
- ▶ BUT...staining is not always DED

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

What do we have here?

See anything unique here?

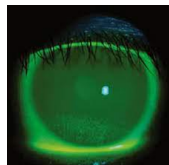


Causes of Corneal Staining are as  
numerous as our patients!

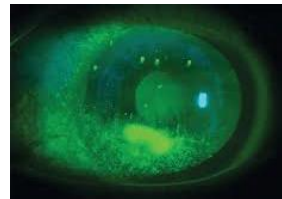
What caused this staining?



Is this DED? Cause?



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!
- ▶ Did not fit the profile, but had severe DED and RCE from his poorly fitting CPAP
- ▶ Eventually needed a cryo-preserved amniotic membrane to heal this area

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



**Masks Come in Many Shapes and Sizes;  
Some are More Gentle on the Eyes....**

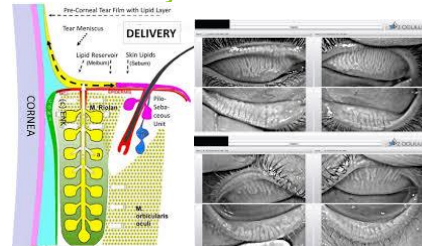
## EYELID DISEASE AS A CAUSE OF CHRONIC “PINK EYE”



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
- ▶ Consider Demodex in cases such as these

## MGD - Meibomian Gland Dysfunction



### 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)



**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



## More fun pictures....

Severe MGD - "toothpaste-like" secretions



Frothing of the Tear Film in Lipid-deficiency



## Evaporative Dry Eye/MGD: Effective Treatment Options that 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



## Moist Heat for MGD

Duration and Temperature are Critical



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

Lid Scrubs are inexpensive...



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

and often necessary early on!



## Treatment Options for MGD Involve Heat and Gland Expression

- Ilux 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



## TearCare: Yet 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





## Intense Pulsed Light Therapy (IPL) for Eyelid and Adnexa

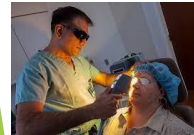
- Relatively New Treatment Option
- Non-Invasive and well-tolerated
- Works by stimulating the glands in the ocular adnexa
- Reduces Inflammation and has been shown to be effective with chalazia, styes, and MGD
- Destroys abnormal vessels that perpetuate inflammation
- Also shown to reduce Demodex



## IPL used in the Modern Optometric Practice -

Procedure is Safe.....

And Effective!



Before 1<sup>st</sup> session of IPL



After 1<sup>st</sup> session of IPL —



75% subjective improvement in dry eye and eye comfort and eyelid dry

## More IPL options are becoming available ...



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

Lower Lid Lagophthalmos



Proper Lid Position



## 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!

## Overnight Protection/Exposure-Related Treatments:

Dry Eye/Moisture Glasses



Humidifiers (Consider Whole House Units)





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

## CLEAN EYELIDS ARE HAPPY EYELIDS!

Demodex Infestation..



Staph Blepharitis



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

Reduces Inflammation and Plugged Glands



## 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 8 months
- ▶ Effective eradication of demodex mites within the 6 week course of treatment
- ▶ Work with company's sales professionals for pharmacy information and prior authorization protocol



BEFORE



AFTER

**Elimination of Collarettes!!**

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



Before and After Lid Treatment!







**If you don't have a Blephex, 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



**NOVEL DRY EYE TREATMENT**

**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

## Use of Amniotic Membranes for the Treatment of Corneal Defects

Several Options Exist...

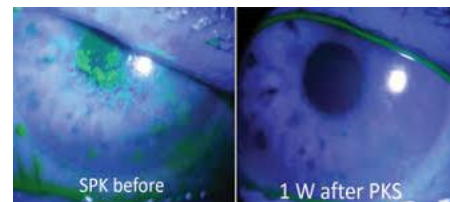
## Use of cryopreserved membranes - require freezing/refrigeration

Benefit of Different Membrane Thicknesses...

Insertion Eased by Design of the Attached Ring



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



**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.

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

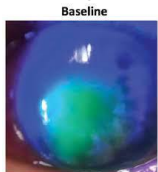
- Cenegermin 0.002% Ophth Soln. (Oxervate)
- Form of Recombinant Human Nerve Growth Factor (NGF)
- Address the lack of corneal nerve supply that is the cause of reduced corneal sensation and neurotrophic disease
- 8-week course shipped to patient
- Well tolerated (16% report stinging) with over 70% total heal rate



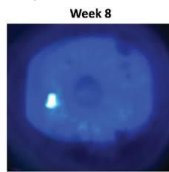
This is the type of corneal epithelial defect we are treating; Recurrent and not healing with traditional treatments!

### Patient (Post Trauma 10+ years ago) with unresolving/recurring Neurotrophic Ulcer:

Fluorescein Image Before...



And After Treatment with Cenegermin 0.002%



### As we discussed briefly, Lid Position is Critical for a Normal Tear Film.



- Drop now 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

### 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 -currently no samples available ☹
- Direct-to-Consumer pharmacy will collect payment and direct ship to patient
- Available in a 30-day and a 90-day supply



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.."



10 Minutes After Drop Instillation .....

Lids Show Lifting and Pupil Is More Visible



When I Lift Her Upper Lid Skin Manually, WOW!!!

In this case, Patient Opted for a Consultation with our Oculoplastic Surgeon.

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

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.

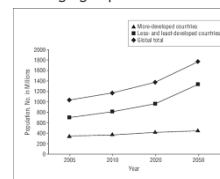
## Big Changes are Coming in Presbyopia Management

From New Eyedrop Therapies to IOLs and Presbyopic  
Contact Lenses...

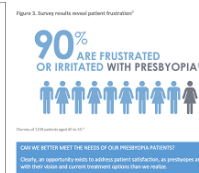
Change is in the Air!

Presbyopia is one of the most common  
conditions we treat, HUGE opportunity!

The Aging Population .....



Is Very Frustrated .....



## This Just In: There is an Eyedrop 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



## 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 parasympathetic miotic agent) plus brimonidine in a PF formula
- 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

## 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 acetidine, a novel new chemical entity; miotic reduces pupil to 1.5 to 2.0 mm with no distance blurring in phase 2 trials

## Lens softening drops/therapies:



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

## 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 (DHLLA)
  - This combination of molecules reduces disulfide bonding in the lens, thus restoring lens elasticity



## WHAT'S NEW IN PRESBYOPIC-CORRECTING IOL TECHNOLOGY?

## First Generation “Bifocal”, Accommodating, and MF IOLs



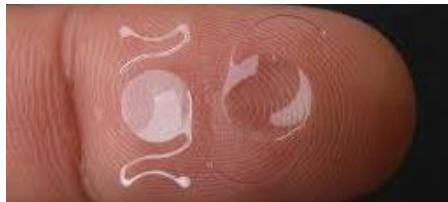
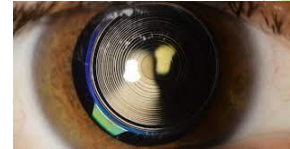
►Often relied on the concept of simultaneous vision. Also attempted to mimic the accommodative systems using a hinged design.

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

Rings Evident on SLE



Size, Location and Number Vary based on Manufacturer



### 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.

## Some More Recent IOL Designs...

Increased Depth of Field



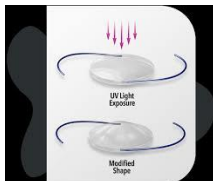
Trifocal IOL Design



## 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

## New IOL Materials are also Changing Patient Outcomes - “Glisten Free”

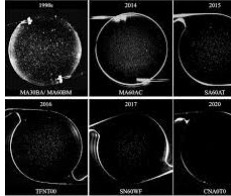


►HAVE YOU EVER NOTICED THE “SPARKLING” OR “GLISTENING” NATURE OF IOLs AS THEY AGE IN A PATIENT’S EYE? EVER WONDER WHY THAT OCCURS?



## IOL Glistening Through the Years...

- The Ability of an IOL to Remain "Glisten-Free" has been a problem
- Caused by small, refractile microvacuoles in hydrophobic acrylic IOL materials
- Changes in Polymer Technology and manufacturing processes
- Better Visual Experience



**Brimonidine....Isn't that a glaucoma drop??**

The Active Ingredient in Lumify is Low Dose Brimonidine Tartrate



**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

**Longtime Patient With Chronic  
Redness Post-trauma (OD>OS)**



**The safe use of redness relieving drops  
can make both doc and patient happy!**



**Thank You!! It has been  
my pleasure!**