

# NUTS AND BOLTS OF DRY EYE: BUILDING A DRY EYE CLINIC

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9

## CECELIA KOETTING DISCLOSURES

"All relevant relationships have been mitigated."

• Ocular Therapeutix	• RVL	+ Glaukos
• Glaukos	• Oyster Point	+ Avellino
• Horizon	• Allergan	+ B + L
• Quidel	• Alcon	+ Neric
• EyeVance/Santen	• Visus	+ Aldura
• Ivantis	• Thea	+ Claris Bio
• Orasis	• Bruder	+ Aldeyra
• Kala	• SCOPE	+ Twenty Twenty
• PRN	• Myze	
• Science Based Health		

10

"Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles."

TFOS DEWS II REVISED DEFINITION

11

## CLASSIFICATION OF DRY EYE DISEASE

```

    graph LR
      Normal --> Pre-Clinical_DED[Pre-Clinical DED]
      Pre-Clinical_DED --> DED
      DED --> Neurotrophic
      Neurotrophic --> Neuropathic
  
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12

WHO HAS DRY EYE?  
**EVERYONE!!!**

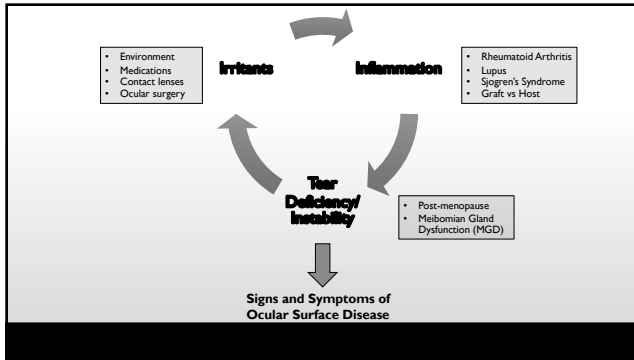
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## US PREVALENCE OF DRY EYE DISEASE (DED)

- Estimated >16 million patients have been diagnosed with DED<sup>1</sup>
- Estimates ~33 million patients suffering from dry eye symptoms<sup>1</sup>
- Almost all adults experience dry eye signs and symptoms
  - DED is often underdiagnosed and undertreated<sup>2</sup>
  - DED is the most common reason for visits to eyecare practitioners (ECPs)<sup>3</sup>
  - ~33% of patients present with complaints about dry eye<sup>1</sup>
- Prevalence is projected to increase due to:
  - Aging population
  - Increased screen time (computers and handheld devices)



14



15



16

- ### WHOLE BODY INFLUENCE
- Graves Disease
  - Thyroid eye disease
  - Sleep apnea
  - Diabetes
  - Rheumatoid Arthritis
  - Sjogrens
  - Lupus
  - Chron's disease
  - Rosacea
  - Eczema
  - Riley-Day syndrome
  - Allergies
  - Inflammatory disease

17

- ### MEDICATIONS
- Ocular medications
    - Glaucoma drops
    - Preservatives
  - Systemic medications
    - anti-depressants/anxiety
    - Sleeping pills
    - Pain relievers
  - Parkinsons medications
  - Chemotherapy
  - Birth control and hormones
  - Acne
  - Allergy
  - Diuretics
  - Blood pressure medications

18

- ### BEFORE THEY ENTER THE ROOM
- Use your techs!
  - Videos or materials in waiting room
  - Emails and newsletters
  - Questionnaires
    - SPEED
    - OSDI
  - Multiple points of contact to start the discussion and engage the patient



19

- ### TYPES OF DRY EYE DISEASE
- Evaporative dry eye
    - Resulting from excessive tear evaporation
    - Evaporation leading to Tear hyperosmolarity
    - Normally functioning lacrimal gland
    - Eyelid related causes
      - Meibomian gland dysfunction
      - Inadequate lid closure/blink related
  - Aqueous deficient dry eye (ADDE)
    - Resulting from from decreased tear secretion
    - Hyper-evaporative state leading to tear hyperosmolarity

20

NOT MUTUALLY EXCLUSIVE, IT CAN BE BOTH!

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21

How do we determine the underlying causes?

23

DIAGNOSTIC TESTING

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TRIED AND TRUE: SLIT LAMP EXAM

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25

DON'T FORGET ABOUT THE EYELIDS

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26

GRADE THE LID AND GLAND APPEARANCE


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- Any pitting?
- Any capping?
- Any lid structure abnormality?

27

### EXPRESS THE GLANDS

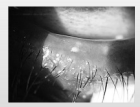
- Cotton tip applicator
- Your clean finger
- Gland expressor
- Meibomian gland evaluator (J&J)
- Just do it!



28

### MEIBOMIAN GLAND COMPRESSION

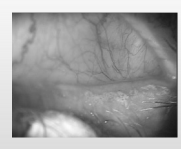
- Grade expressibility
- Meibum quality can be described as clear, cloudy, granular or inspissated, grading as follows:
  - Grade 1: olive oil, clear
  - Grade 2: turbid, cloudy
  - Grade 3: cloudy with debris
  - Grade 4: toothpaste-like, or inspissated



29

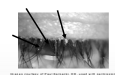
### BLEPHARITIS AND DEMODEX

- Saponification
- Lid margin debris
- Lidmargin biofilm
- Collarettes
- Telangiectasia
- Lid margin thickening




30

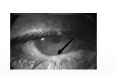
### CLINICAL MANIFESTATIONS OF DEMODEX BLEPHARITIS



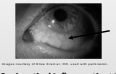
**Disorders of Eyelashes<sup>1,2</sup>**  
Infection of the lash follicles can result in collarettes and may lead to malalignment, trichiasis, and madarosis




**Meibomian Gland Dysfunction<sup>1,2</sup>**  
Blockage leads to firing, swelling, and many enlarged glands (ysts) or infection. Chalazia are common granulomatous responses



**Lid Margin Inflammation<sup>1,2</sup>**  
Severe lid margin inflammation can be caused by mechanical blockage and a delayed host immune hypersensitivity reaction



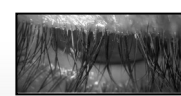
**Conjunctival Inflammation<sup>1,2</sup>**  
Without proper hygiene, lid margin inflammation may spread over to the conjunctiva producing a condition known as



**Corneal Manifestations<sup>1,2</sup>**  
D. brevis is commonly associated with inflammation that spreads to the cornea, causing sight-threatening corneal lesions, superficial

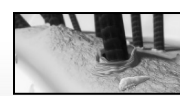
31

### DEMODEX BLEPHARITIS | MECHANISMS OF DISEASE



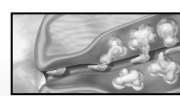
**MECHANICAL**

- Lash distension occurs as Demodex mites attach to follicles<sup>1,2</sup>
- Demodex mites deposit debris and digestive enzymes, causing further irritation to the eyelid margin<sup>1,2</sup>



**BACTERIAL**

- Demodex mites can contribute to blepharitis by carrying bacteria on their exterior surface that may elicit immune responses<sup>1,2,3</sup>



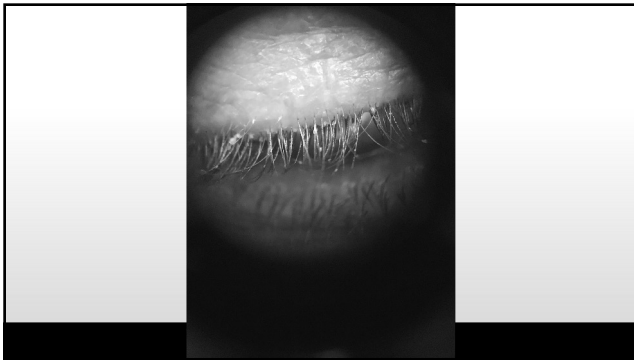
**CHEMICAL**

- Demodex mites have been associated with altered meibum composition<sup>2</sup>
- Debris from Demodex mites can potentially lead to chronic inflammation and degeneration of conjunctival tissue

32

**Clinical Pearl:** Have your patient look down to better identify demodex collarettes.

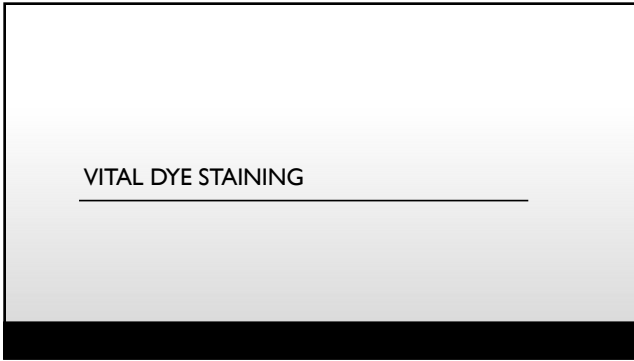
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35



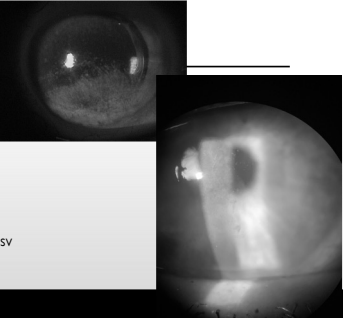
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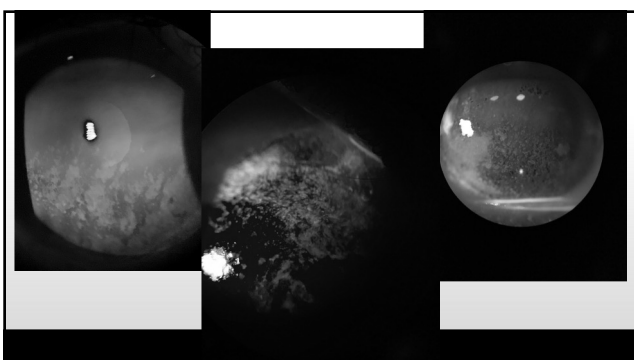
37

**CORNEAL STAINING**

- Sodium Fluorescein
  - Corneal staining
    - Pattern
    - Location
    - Severity
  - Tear break up time
  - Wratten #12 filter helps
- Rose Bengal
  - Corneal irregularities to rule out HSV



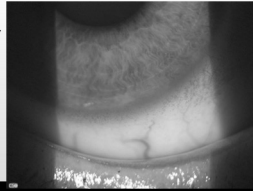
38



39

**LID AND CONJUNCTIVAL STAINING**

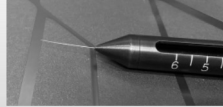
- Lissamine Green
  - Stains dead and degenerate cells
  - Lid margin for lid wiper epitheliopathy
  - Conjunctival staining



40

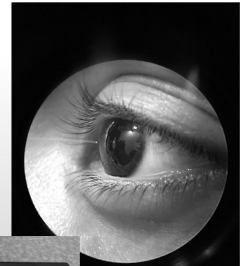
### CORNEAL SENSITIVITY TESTING: ESTHESIOMETRY

- Qualitative
  - Cotton tip applicator
  - Dental floss
- Quantitative
  - Cochet-Bonnet



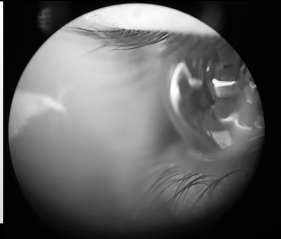
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### COCHET-BONNET



42

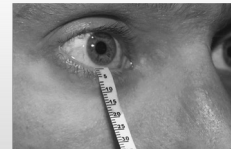
### COTTON TIP APPLICATOR



43

### SCHIRMER'S

- Test strip placed in later 1/3 of lower eye lid
  - Measure the amount of moistened paper after 5min
- Schirmer I =non anesthesia
  - Measures basic and reflex tearing
- Schirmer with anesthesia
  - Measures basal tear secretion
- <5mm severe dryness
- <10mm abnormally low level of tear production
- >10mm normal



44

### POINT OF CARE TESTING

45

### TEAR OSMOLARITY

- Changes in osmolality are caused by fluctuations in water content
  - Increased evaporation rate
  - Reduction in tear secretion
- Tear hyperosmolality is a trigger for cascade of signaling events
  - Stimulates epithelial cell death
  - Leads to release of inflammatory cytokine production, cell death and loss of goblet cells
- Tearlab name change in 2022 to TruKera Medical



46

### THE WINNING NUMBERS ARE.....


- Most accepted < 308mOsm/L threshold to diagnose dry eye
  - Normal vs early stages
- > 316mOsm/L is an indicator for mild to moderate-severe dry eye
- Variability between repeat measurements increases with severity
- Variability between **ScoutPro** temp et al)
  - 6.9  $\pm$  0.9mOsm/L mild
  - 11.7  $\pm$  1.9mOsm/L moderate
  - 26.5  $\pm$  2.7mOsm/L severe



47

### MMP-9

- Released in the hyperosmolarity cascade
  - Is an inflammatory marker
- Current option Inflammadry
  - Qualitative, but not quantitative
- Newer testing in development

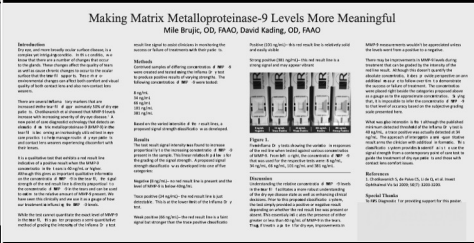


48

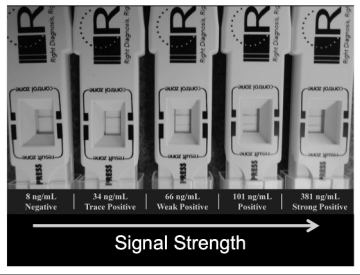
### STUDY BY DRS. BRUJIC AND KADING

#### Making Matrix Metalloproteinase-9 Levels More Meaningful

Mile Bruijic, OD, FAAO, David Kading, OD, FAAO



49



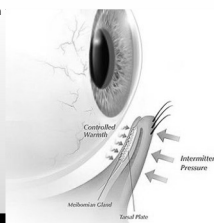
8 ng/mL Negative | 34 ng/mL Trace Positive | 66 ng/mL Weak Positive | 101 ng/mL Positive | 381 ng/mL Strong Positive

Signal Strength →

50

### MEIBOMIAN GLANDS

- Meibomian glands secrete the lipid layer of the tear film
- Meibomian gland dysfunction
  - Result of glands becoming clogged or atrophied
  - Leads to tear film disruption
    - Quicker evaporation of tears
    - Decreased tear break up time

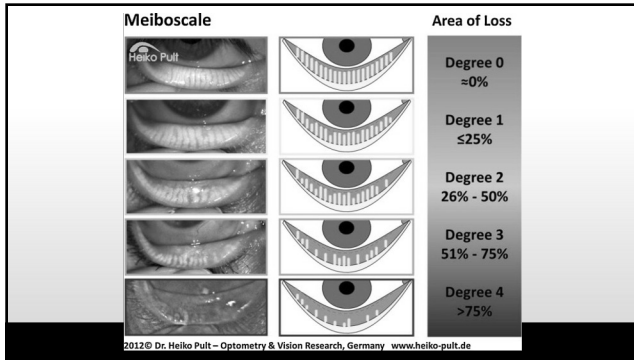


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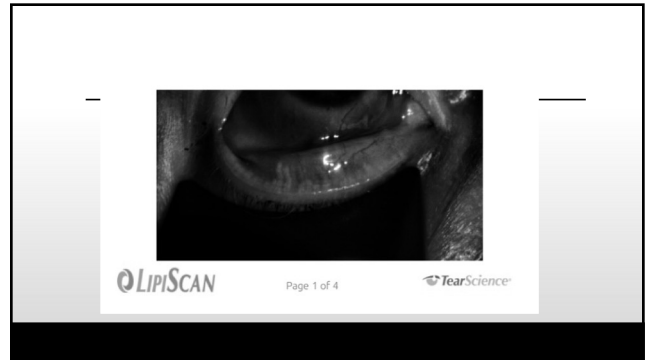
### MEIBOGRAPHY

- Infrared non contact viewing at the structure and health of the meibomian glands
  - Grading atrophy
    - Meiboscore
      - Grade 0 no atrophy
      - Grade 1 1-33%
      - Grade 2 34-66%
      - Grade 3 >66%

52



53



55

### PRE-OPERATIVE MEIBOGRAPHY STUDY

- J8J sponsored study Koetting & Yeu pre-operative cataract retrospective
  - 95.1% patients had some level of gland atrophy
  - Only 4.9% showed no atrophy on meibography
- Meibography vs SLE
  - More atrophy found on meibography vs the same patients SLE
- Further breakdown found that there was a correlation between decreased expressibility of meibomian glands to increased meibomian gland atrophy, but NOT between meibum quality and MG atrophy

56

### CORNEAL REFLECTIONS

- Detect the corneal irregularities often caused by tear film instability
- Non invasive tear break up time
- Placido disc images
  - Topography
- Schlemflug camera
- Manual keratometry

59

### IRREGULARLY SHAPED OR SMUDGY PLACIDO DISK

Placido Image Axial

Placido Image Axial

60

### OCULAR SURFACE DISEASE TREATMENT

69



**DEVELOPED PROTOCOLS AND STEPS: TFOS DEWS II**

**TABLE 1 TFOS DEWS II Staged Management and Treatment Recommendations for DED<sup>1</sup>**

**STEP 1.**

- Education regarding the condition, its management, treatment and prognosis
- Modification of local environment
- Education regarding potential dietary modifications (including oral essential fatty acid supplementation)
- Identification and potential modification/elimination of offending systemic and topical medications
- Ocular lubricants of various types (if MGD is present, then consider lipid-containing supplements)
- Lid hygiene and warm compresses of various types

**STEP 2. IF ABOVE OPTIONS ARE INADEQUATE, CONSIDER:**

- Nonpreserved ocular lubricants to minimize preservative-induced toxicity
- Tea tree oil treatment for Demodex (if present)
  - Tear conservation
    - Punctal occlusion
  - Moisture chamber spectacles/goggles
  - Overnight treatments (such as contact or moisture chamber devices)
  - In-office, physical heating and expression of the meibomian glands (including device-assisted therapies, such as LipiFlow)
  - Intense pulsed light therapy for MGD
  - Prescription drugs to manage DEDs
    - Topical antibiotic or antibiotic/steroid combination applied to the lid margins for anterior blepharitis (if present)
      - Topical corticosteroid (limited-duration)
      - Topical secretagogues
      - Topical non-steroidal immunomodulatory cyclosporine
    - Topical LFA-1 antagonist drugs (such as lifitegrast)
    - Oral macrolide or tetracycline antibiotic

**STEP 3. IF ABOVE OPTIONS ARE INADEQUATE, CONSIDER:**

- Oral secretagogues
- Autoimmune/allergic serum eye drops
- Therapeutic contact lens options
  - Soft bandage lenses
  - Rigid scleral lenses

**STEP 4. IF ABOVE OPTIONS ARE INADEQUATE, CONSIDER:**

- Topical corticosteroid for longer duration
- Amniotic membrane grafts
- Surgical punctal occlusion
- Other surgical approaches (eg tarsorrhaphy, salivary gland transplantation)

70

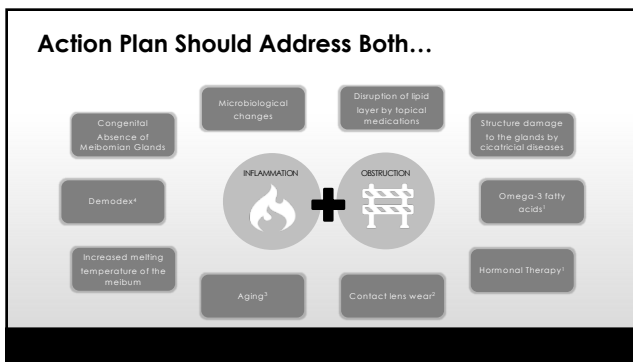
**DEVELOPED PROTOCOLS AND STEPS: CEDARS**

**TABLE 3 CEDARS Treatment Options and Performance by Tear Dysfunction Category**

Treatment option	Mild tear deficiency	Regenerative gland dysfunction (responsive or nonresponsive)	Globet cell deficiency/mucin deficiency	Exposure-related DJS
<b>First Line*</b>	Tear supplements and lubricants (i.e. drops, gels, ointments, sprays, lubricating inserts)	Regenerative gland dysfunction (responsive or nonresponsive)	Globet cell deficiency/mucin deficiency	Exposure-related DJS
	Nutritional Supplements	Lid hygiene and lid scrubs (i.e. cleansers, warm compress, massage)	Tear supplements and lubricants (i.e. drops, gels, ointments, sprays, lubricating inserts)	Tear supplements and lubricants (i.e. drops, gels, ointments, sprays, lubricating inserts)
	Topical cyclosporine	Nutritional supplements	Topical cyclosporine	Taping of the eyelids
	Topical lifitegrast	Topical cyclosporine	Topical lifitegrast	Moisture chamber eyewear
	Topical secretagogues	Topical lifitegrast	Vitamin A ointment- retinoic acid (compound)	
	Moisture chamber eyewear	Topical erythronium/ bacitracin	Moisture chamber eyewear	
		Topical azithromycin	Topical secretagogues	
<b>Second Line*</b>	Oral secretagogues	Topical steroids or antibiotic/steroid	Scleral lens	Scleral lens
	Topical hormones (compound)	Oral doxycycline tetracycline		
	Autologous serum (compound)	Topical metronidazole ointment or drops (compound)		
	Albumin (compound)	Topical doxycycline (compound)		
	Bandage contact lens/ scleral lens	Topical diposone (compound)		
	Topical diposone (compound)	Topical clindamycin (compound)		
	Topical tacrolimus (compound)	Topical dehydroepiandrosterone (compound)		
	Topical N-acetylcysteine	Topical N-acetylcysteine		
<b>Procedures*</b>	Punctal plug	In-office thermal pulsation and/or lid massage		eyelid surgery (i.e. correction of lid malposition, tarsorrhaphy)
	Caustic occlusion	Debridement of the lid margin		
	Amniotic membrane	Intense pulsed light		

\*The order of treatment in each category is left to the clinical judgement of the clinician and to the preference of the patient

71



72

**ALL ARTIFICIAL TEARS ARE NOT CREATED EQUAL**

73


- THINGS TO CONSIDER**
- 
- |  |  |
|--|--|
| <b>DO'S</b>  | <b>DON'TS</b>  |
| <ul style="list-style-type: none"> <li>Suggest specific brands                             <ul style="list-style-type: none"> <li>Give sample if possible or send Rx</li> </ul> </li> <li>Preservative Free</li> <li>Hyaluronic Acid</li> <li>Gels and ointments</li> <li>Lipid supplementing</li> </ul> | <ul style="list-style-type: none"> <li>Vasoconstrictors/redness relief</li> <li>BAK</li> </ul> |

74

- HYALURONIC ACID**
- 
- Glycosaminoglycan**
    - High molecular weight polysaccharide
    - In our connective tissue, synovial fluid, and AH and vitreous of the eye
  - Ability to bind or retain water**
    - Bind up to 1000 times its weight
  - Viscoelasticity**
    - Helps stabilize tear film
  - Wound healing**
    - Aids in epithelial cell proliferation, healing and migration

75

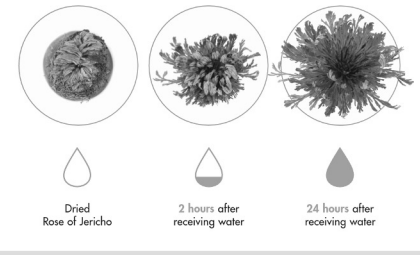
### TREHALOSE



- Used frequently outside US
- Found in nature as a bioprotectant and osmoprotectant
- Helps to protect corneal cells from desiccation and high osmolarity
  - Fortifies the cell membrane
  - Prevents denaturation of proteins in the absence of water
- Schmid's 2015 trehalose-containing drops increased patients' tear film thickness as measured by OCT, after instillation of only one drop, up to 240 minutes compared with drops without trehalose

76

### ROSE OF JERICO




Dried Rose of Jericho      2 hours after receiving water      24 hours after receiving water

77

### TOPICAL AND ORAL PRESCRIPTION MEDICATIONS

- Steroids are ok!
  - Steroid response (less than 15%)
  - Cataracts
- Dry eye flares
  - 2-4 week use vs every day
- Topical steroids
  - Eysuvis on label FDA approved for signs and symptoms of dry eye
  - Fluoromethalone, loteprednol, prednisolone, dexamethasone
  - PF compounded dexamethasone
  - PF loteprednol ointment



79

### TOPICAL AND ORAL PRESCRIPTION MEDICATIONS

- Topical cyclosporine
  - Multiple strengths
- Topical lifitegrast
- Rosacea and Blepharitis
  - Oral doxycycline or azithromycin
- Sjogrens or more severe DES
  - Oral pilocarpine
- Amniotic membrane drops
- Amniotic membrane
- Autologous serum drops

80


### HOMEWORK YES, REALLY, YOU SHOULD DO IT EVERY DAY

- Warm compresses
- Lid Hygiene
- Nutraceuticals

81

### LID HYGIENE

- Day to day cleaning
- Blepharitis
- Demodex
- Lid scrubs cleaning
  - Coconut oil
  - Tea tree oil
  - HA



83

## WARM COMPRESSES

- Difficult to maintain the temperature needed
- Melting point of meibomian glands that are obstructed is higher
  - 40 degrees Celsius
- Thermal applicators for at home
  - Plug in warm compress
  - Microwarable warm compress
- Heated cleaning pads
  - ThermoMEDx, Evertears
- A study of subjects with MGD showed that 12 weeks of lid warming therapy resulted in a therapeutic benefit, with excess ocular surface phospholipase activity (which is detrimental to tear film stability) being reduced

84

## MATTERS OF MAKE-UP

- Important Pearls
  - Remove makeup at night
  - **NO WATERPROOF** mascara
    - Replace mascara at least every 3 months
  - Waterlining or tightlining should be avoided
  - Clean brushes
  - Avoid BAK, Alcohol, parabens, retinol, formaldehyde (Quaternium-15)
  - Eyelash/eyebrow tinting or perming is a big no
  - Eyelash extensions not great either

85

## A STEP FURTHER? MAKEUP SUGGESTIONS

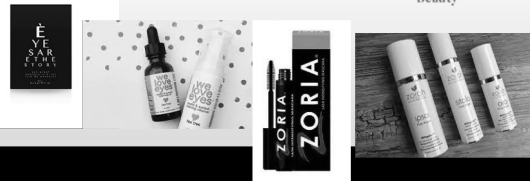
- Start simple
  - Mascara – non waterproof and replace every 3 months
  - Liner- avoid tight lining
  - Good make up remover and lid cleaner
    - Same lid hygiene
  - Lash extensions- a whole lecture in itself
    - Start with promoting use of lid spray to keep clean – Optase Protect spray, Twenty Twenty lid hygiene spray
- Next Step
  - Suggest eye safe cosmetics and facial products
    - Eyes are the Story, Twenty/Beauty

86

## BECAUSE IT MATTERS

- If you want to be more involved, go a step further
  - Suggest specific eye friendly brands or carry them in office

twenty  
twenty  
beauty



87

## Top 10 Eye Makeup Nasties\*

1. Angeline (Acetyl tetrahydro-1 or Acetyl tetrahydro-2)
2. Benzalkonium chloride (BAK)
3. Carbon black
4. Chlorophanes
5. Formaldehyde and Formaldehyde donors (Quaternium-15, Ethox, DMDM hexamine)
6. Inorganic aluminum salts of phosphoric acid or phosphoric acid salts (aluminum phosphate)
7. Parabens
8. Phenoxyethanol
9. Retinols
10. Retinoids (most effective ingredient of sea tree oil)

\* This list is intended, left or right, to be a general guide only.

**REFERENCES**  
 1. [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100] [101] [102] [103] [104] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147] [148] [149] [150] [151] [152] [153] [154] [155] [156] [157] [158] [159] [160] [161] [162] [163] [164] [165] [166] [167] [168] [169] [170] [171] [172] [173] [174] [175] [176] [177] [178] [179] [180] [181] [182] [183] [184] 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[517] [518] [519] [520] [521] [522] [523] [524] [525] [526] [527] [528] [529] [530] [531] [532] [533] [534] [535] [536] [537] [538] [539] [540] [541] [542] [543] [544] [545] [546] [547] [548] [549] [550] [551] [552] [553] [554] [555] [556] [557] [558] [559] [560] [561] [562] [563] [564] [565] [566] [567] [568] [569] [570] [571] [572] [573] [574] [575] [576] [577] [578] [579] [580] [581] [582] [583] [584] [585] [586] [587] [588] [589] [590] [591] [592] [593] [594] [595] [596] [597] [598] [599] [600] [601] [602] [603] [604] [605] [606] [607] [608] [609] [610] [611] [612] [613] [614] [615] [616] [617] [618] [619] [620] [621] [622] [623] [624] [625] [626] [627] [628] [629] [630] [631] [632] [633] [634] [635] [636] [637] [638] [639] [640] [641] [642] [643] [644] [645] [646] [647] [648] [649] [650] [651] [652] [653] [654] [655] [656] [657] [658] [659] [660] [661] [662] [663] [664] [665] [666] [667] [668] [669] [670] [671] [672] [673] [674] [675] [676] [677] [678] [679] [680] [681] [682] [683] [684] [685] [686] [687] [688] [689] [690] [691] [692] [693] [694] [695] [696] [697] [698] [699] [700] [701] [702] [703] [704] [705] [706] [707] [708] [709] [710] [711] [712] [713] [714] [715] [716] [717] [718] [719] [720] [721] [722] [723] [724] [725] [726] [727] [728] [729] [730] [731] [732] [733] [734] [735] [736] [737] [738] [739] [740] [741] [742] [743] [744] [745] [746] [747] [748] [749] [750] [751] [752] [753] [754] [755] [756] [757] [758] [759] [760] [761] [762] [763] [764] [765] [766] [767] [768] [769] [770] [771] [772] [773] [774] [775] [776] [777] [778] [779] [780] [781] [782] [783] [784] [785] [786] [787] [788] [789] [790] [791] [792] [793] [794] [795] [796] [797] [798] [799] [800] [801] [802] [803] [804] [805] [806] [807] [808] [809] [810] [811] [812] [813] [814] [815] [816] [817] [818] [819] [820] [821] [822] [823] [824] [825] [826] [827] [828] [829] [830] [831] [832] [833] [834] [835] [836] [837] [838] [839] [840] [841] [842] [843] [844] [845] [846] [847] [848] 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88

## NUTRACEUTICALS

- Essential fatty acids
  - Omega 3 and 6
    - Long chain DHA/EPA (oily fish)
    - Short chain ALA (flaxseed, chia)
  - Help to reduce systemic inflammation
  - DHA/EPA ratio of 3:1
- Remember not mandated by FDA
  - Independent groups evaluate

89

### TO OMEGA 3 OR NOT TO OMEGA 3, THAT IS THE QUESTION

- DREAM study
  - controversial conclusions, stating that there were no beneficial effects of taking omega-3 over the placebo
  - Placebo was olive oil.
  - did show that there was statistically significant improvement in the OSDI symptoms score in both groups,
    - with not statistically significant difference between the groups.
- VITAL-Dry eye JAMA Ophthalmology July 2022
  - VITAL study looked at the use of 2000 IU Vitamin D3 and/or marine omega-3 FA at 1g daily in prevention of cancer and CVD in 25,871 adults.
  - This study was specifically looking at preventing DED. The findings showed that when the
    - Group taking marine omega-3 only is compared with the omega-3 placebo, the same amount of patients developed dry eye, so it did not prevent DED
    - Incidence of DED was 0.7% placebo and 0.7% Omega 3 in those 50-65 YOA and 1.24% placebo 1.16% Omega 3 in patients over 65 YOA.
- Study limitations
  - The Omega 3 FA used was EPA and DHA in a 1.2:1 ratio vs suggested 3:1
  - Lower dosage of 1 gram vs the suggested 2 grams
  - None of the patients who were included had dry eye disease as determined by a questionnaire
    - Only when symptoms were reported at the follow up questionnaire 1 year later, were records from eye care physician obtained.
  - Contents of the placebo Omega-3 is not published, so could be that this is another oil that contains some FA benefits.

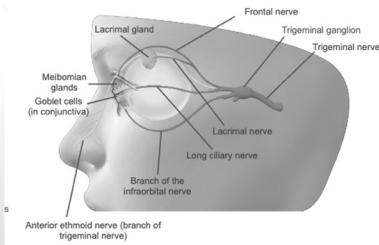
90

### NASAL SPRAY FOR DRY EYE

- Varinicine solution nasal spray
  - Activates the trigeminal parasympathetic pathway via the nose
    - Increased basal tear film production
    - Produced by 3 structures innervated
      - Lacrimal gland
      - Meibomian gland
      - Goblet cells



91



92

### ORAL AZITHROMYCIN VS ORAL DOXYCYCLINE FOR MGD

#### Oral azithromycin and oral doxycycline for the treatment of meibomian gland dysfunction: A 9-month comparative case series

Giacomo De Benedetti, Agostino S Vaiano

**Purpose:** To compare the efficacy and safety profile of oral azithromycin with that of doxycycline over 9 months in patients experiencing failure with conservative and topical treatment for Meibomian gland dysfunction (MGD), to assess recurrence of MGD, and to determine the number of treatments required.  
**Methods:** This is a randomized controlled trial with a cross-over design at a tertiary care center. In all, 115 consecutive patients underwent a complete ophthalmological examination before being randomly assigned to oral treatment with doxycycline (4 g for 30 days) or azithromycin (125 mg for 5 days). Patients were evaluated at 3, 6, and 9 months. Therapy was switched or conservative management maintained according to signs and symptoms. **Results:** In the azithromycin group, 83.25% of the patients were stable after one treatment, 16.5% needed a further one or two treatments (some had previously been switched to doxycycline), and 5.77% did not improve despite treatment. In the doxycycline group, 33.79% of patients were stable after one treatment, 66.21% needed a further one or two treatments (some had previously switched to azithromycin), and 29.41% did not improve despite treatment ( $P < 0.05$ ). **Conclusion:** Both antibiotics were effective and safe for treating patients with persistent MGD, although azithromycin was superior when the reduced dose and the shorter course of therapy (5 days vs. 4 weeks) were taken into consideration. Given the chronic nature of the disease and the improvement in some signs with minimal adverse effects, a shorter therapy seems a safer and more logical alternative to longer regimens.

Access this article online  
<https://www.ejso.com>  
 DOI: 10.4153/ejso.L10\_1244\_17

Quick Response Code

93

### TAKE AWAY

- Doxy 4 weeks 400mg vs Azithromycin 125mg for 5 days
- Both Doxycycline and Azithromycin found effective and safe for MGD
- Azithromycin superior for reduced dose and duration of therapy

94

### TOPICAL AZITHROMYCIN IN DURASITE

- Known antibacterial and anti-inflammatory aspects of topical azithromycin 1% in DuraSite
- Results from early studies in subjects with chronic blepharitis (both anterior and posterior) are encouraging, although the results are limited by the study designs
- Difficulty obtaining?

95

### AMNIOTIC MEMBRANES



96

### USES OF AM DROPS AND GRAFTS

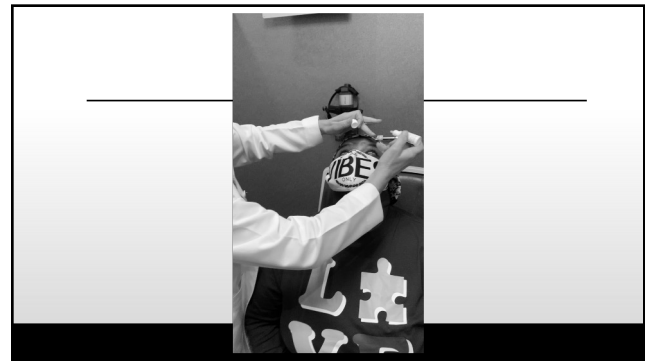
- Moderate and severe DRY EYE
- Chemical burns
- Corneal abrasions
- Corneal ulcers
- **CPT Code 65778** (placement of amniotic membrane on the ocular surface; without sutures) (0 day global period)

ICD-10	Indication	ICD-10	Indication
H16.23	Neurotrophic Keratoconjunctivitis	H18.52	Epithelial Corneal Dystrophy
H16.21	Exposure Keratoconjunctivitis	H18.83	Recurrent Erosion of the Cornea
H16.12	Filamentary Keratitis	H16.0	Corneal Ulcer
H16.14	Punctate Keratitis	B00.52	Dendritic Corneal ulcer

97

Pro Tip: put the dried amniotic membrane in the contact lens well with a drop of artificial tear BEFORE applying to the eye

98



99

### VITAMIN A OINTMENT

- Vitamin A regulates the proliferation and differentiation of corneal epithelial cells,
  - Preserves conjunctival goblet cells
- Vitamin A is an essential nutrient present naturally in tear film of healthy eyes
- Vitamin A plays an important role in production of the mucin layer



100

### A comparison of vitamin a and cyclosporine a 0.05% eye drops for treatment of dry eye syndrome

Eun Chul Kim <sup>1</sup>, Jun-Sub Choi, Choun-Ki Joo  
 Affiliations + expand  
 PMID: 18848318 DOI: 10.1016/j.ajo.2008.08.015

**Abstract**  
**Purpose:** To compare the efficacy of vitamin A (retinyl palmitate) and cyclosporine A 0.05% eye drops in treating patients with dry eye disease.

**Results:** Both vitamin A eye drops and topical cyclosporine A 0.05% treatments led to significant improvement in blurred vision, tear film BUT Schirmer I score results, and impression cytologic findings in patients with dry eye syndrome (P < .05) compared to the control group treated with preservative-free artificial tears alone.

101

MY PERSONAL REGIMEN



102

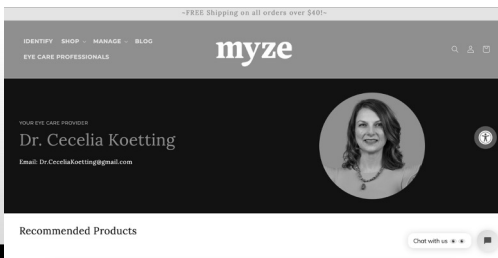
IN OFFICE SALES VS THIRD PARTY ONLINE

- Office size, foot print
- Decision making ability
- Profits to you?
  - In office sales
  - Amazon
  - Direct from manufacturer
  - DryEyeRescue
  - NEW Myze



103

HELPMYZE.COM



104

SCLERAL LENS

- Provides constant lubrication
  - Autologous serum or Amniotic membrane drop within?
- Provides coverage and protection of cornea
  - Mechanical rubbing
  - Helps facilitate healing
- Superior optics
- Cant sleep in
- Poor fit may cause limbal rubbing
- Often not covered by insurance
- Time consuming to fit

105

IN OFFICE DED/OSD TREATMENT

106

PUNCTAL OCCLUSION

- "Permanent"
  - Can be removed
  - Doesn't work with all lid anatomy
- Temporary
  - 1 week
  - 3 month
  - 6 month
- Punctal cauterization

107

### IPL

- IPL
  - Photothermolysis is one of the proposed mechanisms of action of IPL for dry eye
  - Wavelengths selectively destroy blood vessels by targeting chromophores within the blood vessels
  - Destruction of telangiectasias along the eyelid inhibits access of inflammatory mediators to the meibomian glands
  - Other potential mechanisms include a mild local warming effect to allow better expression of meibum and destruction of bacteria that cause inflammation at the level of the meibomian glands.

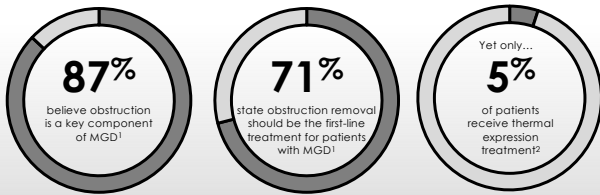
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### THERMAL + EXPRESSION

- The purpose of applying physical treatment to the meibomian glands is to improve and/or restore the function of the glands by ameliorating or removing ductal obstruction, thus allowing the glands to become functional
- Meiboflow
- Lipiflow
- Ilux
- TearCare

109

### Why the Disconnect?



110

### 3 YEAR STUDY LIPIFLOW

Jack Greiner, DO, PhD

- MGS scores increased from 4.5 at baseline to 12 at one month ( $p \leq 0.001$ ). This improvement continued at three years (score: 18.4). TFBUT at baseline was 4.1 seconds, and improved to 7.9 seconds at one month ( $p \leq 0.05$ ). However, the difference between TFBUT at three years wasn't statistically significant (score: 4.5 seconds).
- Average OSDI score improved significantly from a 26 at baseline to 14.7 at one month ( $p \leq 0.001$ ), but returned to baseline levels at three years (22.5;  $p > 0.05$ ).

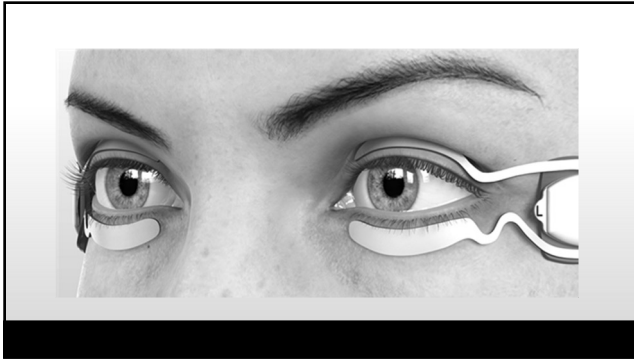
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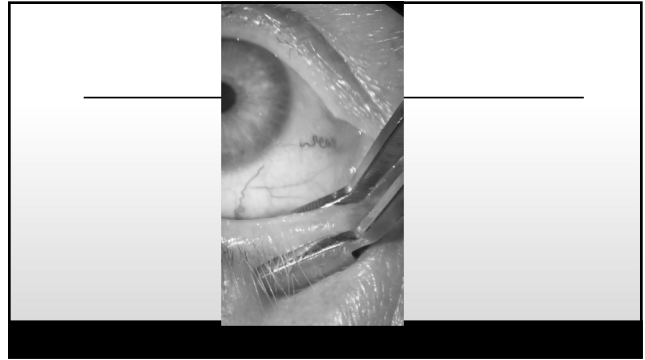
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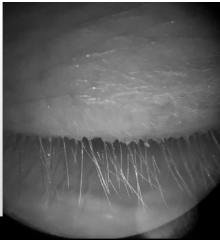


115

### BLEPHARO EXFOLIATION

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- Removes biofilm
  - Can be used for blepharitis or demodex with different solutions
  - Can improve expression of meibomian glands when coupled with thermal expression
  - In patients with MGD, blepharitis, demodex and ocular rosacea, exfoliation of the eyelid at the lash line helps to remove the inflammatory biofilm that causes chronic lid disease and discomfort.<sup>19</sup>
- Blepharo exfoliation
  - Blephex
  - NuLids (at home)



116

### EYELID EXFOLIATION + THERMAL EXPRESSION

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- Study Moon et al. of 48 eyes
- Patients with moderate to severe MGD
- Treatment with lid exfoliation combined with meibomian gland expression
- Measurements
  - Clinical findings
  - Symptoms
  - Meibomian gland function
  - Ocular surface MMP-9 levels.

118

### TAKEAWAYS

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- You have all the tools already!
- Have you patients look down to evaluate for demodex
- Don't get frustrated, there are always more options
- Get your patients involved in their treatment

119

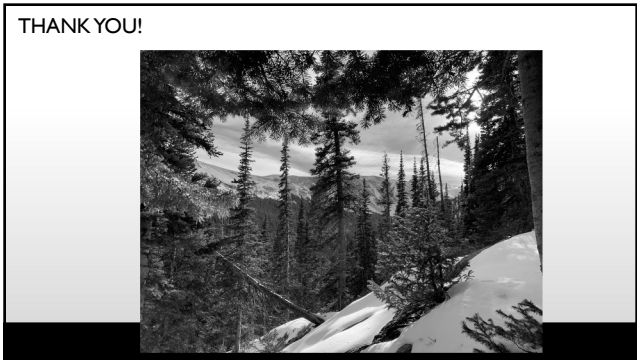
### QUESTIONS?

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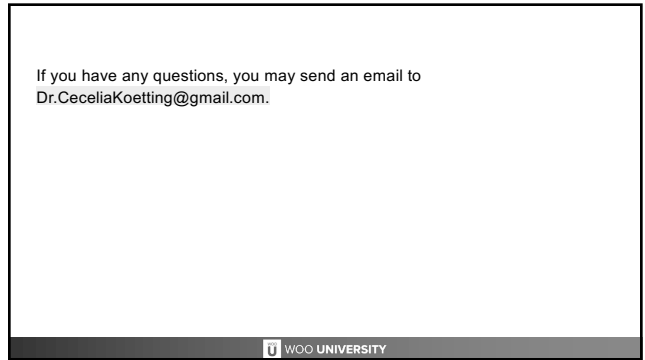
[Dr.CeceliaKoetting@gmail.com](mailto:Dr.CeceliaKoetting@gmail.com)

120





121



122

Thank you! Please join us for our next COPE events

 <b>OCULAR SURFACE DISEASE LIDS, LASHES &amp; DRY EYE</b> <i>Speaker</i> Selina McGee, OD 	 <b>SCLERAL LENS SOIREE</b> <small>Hosted by Woo University and the Scleral Lens Education Society</small> 
<b>Date:</b> May 11, 2023 <b>Time:</b> 5:30 PM - 6:30 PM PST	<b>Date:</b> May 20-21, 2023 <b>Time:</b> 8:00 AM - 3:00 PM PST

123