


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 Conference Advisory Board considers content and speakers for future meetings to provide you with the best education possible.



1

Experience EXPO With Us!



- **Conference Happy Hour - Friday, Sept 29, from 4:30 – 5:30 PM in Room 504-V**
Kick off the weekend, join us for our Conference Happy Hour! Enjoy complimentary drinks and light snacks with your colleagues before your last course of the day or to simply end your day!
- **Innovation Stage - Exhibit Hall - Focus Neighborhood, Booth F1097**
Our Innovation Stage sessions feature free, promotional content for all attendees.
- **Vision Series - Thursday, Sept 28 and Friday, Sept 29**
Grab a bite to eat or drink and continue learning over breakfast or lunch!* Listen to industry leaders as they address the latest clinical innovations in a relaxed and collaborative environment.
**Open to Optometrists only. Not for Credit. Meals offered on first-come, first-serve basis to pre-registered attendees.*
- **Exhibit Hall Hours**

| | |
|-------------------|-----------------|
| Thursday, Sept 28 | 9:30am – 6:00pm |
| Friday, Sept 29 | 9:30am – 6:00pm |
| Saturday, Sept 30 | 9:30am – 3:00pm |

2

ARS Polling Instructions

Step 1 - Open the Vision West app and log in using your badge ID and last name

Step 2 - Head to the Connect & Learn tab and tap on All Education Sessions

Step 3 - Select the course you are attending from the list of sessions

Step 4 - Scroll to the bottom and select "Pre-course questions" prior to the session or "Post-course questions" after the session

Step 5 – Complete the survey question and Submit!

3

**MGD and DB:
New Technology for Diagnosis
and Management**

Marc Bloomenstein, OD FAAO
Scottsdale, AZ

Mark Schaeffer, OD
Birmingham, AL

Walt Whitley, OD MBA FAAO
Norfolk, VA

4

Disclosures for Marc Bloomenstein

- Presenter is on speakers panel/consultant of:
 - Alcon, Allergan, J&J, Bausch + Lomb, TruKera, OcuSoft, Sun Pharma, Bruder, Reichert, Visus, Tarsus, STAAR Surgical, Sight Sciences, Viatrix, Harrow, Thea, Lenz
- **All relevant relationships have been mitigated**

5

Financial Disclosures - Mark Schaeffer, OD

I Have Received Honoraria From:

- AesculaTech - Consultant
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- Allergan/Abbvie - Consultant, Speaker
- Bausch + Lomb - Consultant, Speaker
- CooperVision - Consultant
- Johnson & Johnson Vision Care - Consultant
- LENZ Therapeutics - Consultant
- Optase - Consultant
- ScienceBased Health - Clinical Advisory Panel
- Sight Sciences - Consultant
- Tarsus - Consultant
- Visus - Consultant

• All relevant relationships have been mitigated

- Founder, Dr. MES Consulting
- Founding Member, Intrepid Eye Society



6

Financial Disclosures – Walt Whitley

- Alcon: Advisory Board, Consultant, Speaker
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- Science Based Health: Advisory Board, Speaker
- Sun Pharmaceuticals: Speaker
- Tarsus Pharmaceuticals: Advisory Board, Consultant
- Thea Pharmaceuticals: Advisory Board, Consultant
- Visus Pharmaceuticals: Advisory Board

7

Questions for the Group

8

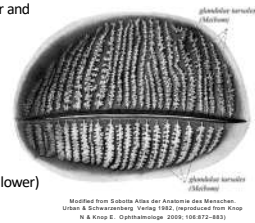
Pathophysiology

9

Meibomian Gland Anatomy

Large sebaceous glands with no direct contact to hair follicles; located in the tarsal plates of the upper and lower eyelids

- **Length**
 - Follows the tarsus
- **Number**
 - More in upper lid (30-40)
 - Less in lower lid (20-30)
- **Volume**
 - Higher in upper lid (26 μ l vs. 13 μ l)
 - Relative functional contribution (upper vs. lower) to the tear film lipid layer is unknown



10

Meibomian Gland Pathology

The International Workshop on Meibomian Gland Dysfunction defines MGD as "a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease."



Nelson JD. Invest Ophthalmol Vis Sci. 2011;52(4):1930-7.

11

Dry Eye and MGD

- In a survey of ophthalmologists and optometrists (N=204), participants widely agreed that MGD is the most common cause of evaporative DED.
- International Workshop on MGD: "MGD may well be the leading cause of dry eye disease throughout the world"

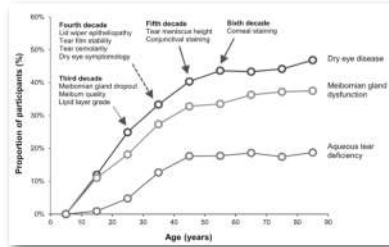


DED, dry eye disease; MGD, meibomian gland dysfunction
Lemp MA, Nichols KK. Ocul Surf. 2009 Apr;7(2 Suppl):S1-S14. Nichols KK et al. Invest Ophthalmol Vis Sci. 2011;52(4):1922-1929.

12

MGD and DED Across the Lifespan

A cross-sectional study evaluated individuals' (N=1331) dry eye symptoms, ocular surface, and tear film to determine the age of onset of signs and symptoms of MGD and DED.

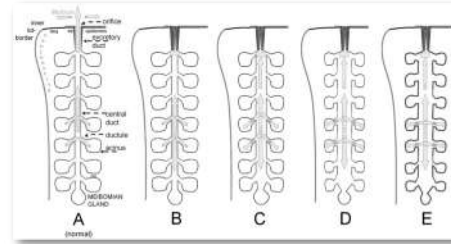


Wang MTM et al. Ocul Surf. 2020 Oct;18(4):736-741.

13

Meibomian Gland Pathology

Obstructive MGD leads to progressive ductal dilatation and acinar atrophy



Knop E, Knop N. Ophthalmologie.2009;106:980-987.

14

MGD Risk Factors

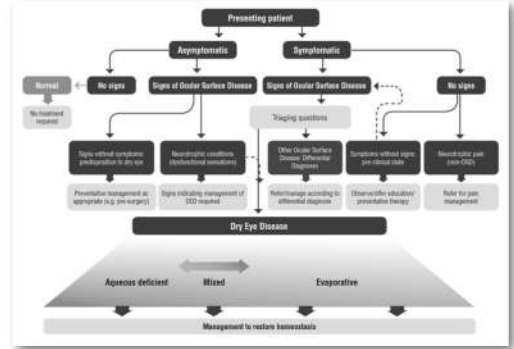
- Contact lens wear
- Chronic blepharitis
- Giant papillary conjunctivitis
- Demodex
- Aging
- Androgen deficiency
- Rosacea
- Sjögren syndrome
- Menopause

| Factor | Reference |
|--------|--|
| Age | Dix et al. ¹¹ DEWS ¹² Wong and Patel ¹³ Schwartz et al. ¹⁴ Schwartz et al. ¹⁵ Schwartz et al. ¹⁶ Schwartz et al. ¹⁷ Schwartz et al. ¹⁸ Schwartz et al. ¹⁹ Schwartz et al. ²⁰ Schwartz et al. ²¹ Schwartz et al. ²² Schwartz et al. ²³ Schwartz et al. ²⁴ Schwartz et al. ²⁵ Schwartz et al. ²⁶ Schwartz et al. ²⁷ Schwartz et al. ²⁸ Schwartz et al. ²⁹ Schwartz et al. ³⁰ Schwartz et al. ³¹ Schwartz et al. ³² Schwartz et al. ³³ Schwartz et al. ³⁴ Schwartz et al. ³⁵ Schwartz et al. ³⁶ Schwartz et al. ³⁷ Schwartz et al. ³⁸ Schwartz et al. ³⁹ Schwartz et al. ⁴⁰ Schwartz et al. ⁴¹ Schwartz et al. ⁴² Schwartz et al. ⁴³ Schwartz et al. ⁴⁴ Schwartz et al. ⁴⁵ Schwartz et al. ⁴⁶ Schwartz et al. ⁴⁷ Schwartz et al. ⁴⁸ Schwartz et al. ⁴⁹ Schwartz et al. ⁵⁰ Schwartz et al. ⁵¹ Schwartz et al. ⁵² Schwartz et al. ⁵³ Schwartz et al. ⁵⁴ Schwartz et al. ⁵⁵ Schwartz et al. ⁵⁶ Schwartz et al. ⁵⁷ Schwartz et al. ⁵⁸ Schwartz et al. ⁵⁹ Schwartz et al. ⁶⁰ Schwartz et al. ⁶¹ Schwartz et al. ⁶² Schwartz et al. ⁶³ Schwartz et al. ⁶⁴ Schwartz et al. ⁶⁵ Schwartz et al. ⁶⁶ Schwartz et al. ⁶⁷ Schwartz et al. ⁶⁸ Schwartz et al. ⁶⁹ Schwartz et al. ⁷⁰ Schwartz et al. ⁷¹ Schwartz et al. ⁷² Schwartz et al. ⁷³ Schwartz et al. ⁷⁴ Schwartz et al. ⁷⁵ Schwartz et al. ⁷⁶ Schwartz et al. ⁷⁷ Schwartz et al. ⁷⁸ Schwartz et al. ⁷⁹ Schwartz et al. ⁸⁰ Schwartz et al. ⁸¹ Schwartz et al. ⁸² Schwartz et al. ⁸³ Schwartz et al. ⁸⁴ Schwartz et al. ⁸⁵ Schwartz et al. ⁸⁶ Schwartz et al. ⁸⁷ Schwartz et al. ⁸⁸ Schwartz et al. ⁸⁹ Schwartz et al. ⁹⁰ Schwartz et al. ⁹¹ Schwartz et al. ⁹² Schwartz et al. ⁹³ Schwartz et al. ⁹⁴ Schwartz et al. ⁹⁵ Schwartz et al. ⁹⁶ Schwartz et al. ⁹⁷ Schwartz et al. ⁹⁸ Schwartz et al. ⁹⁹ Schwartz et al. ¹⁰⁰ |

Schaumburg DA et al. Invest Ophthalmol Vis Sci. 2011;52(4):1994-2005.

15

TFOS DEWS II: Classification of DED



Craig JP et al. Ocul Surf. 2017 Jul;15(3):276-283.

16

Ask Your Patients!

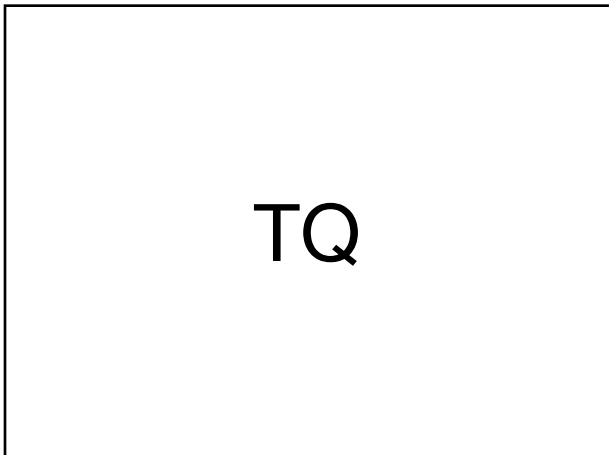
- Risk factor analysis
 - Smoking
 - Medications
 - Contact lens wear
 - Systemic history
- Symptom screening
 - DEQ-5 ≥ 6
 - OSDI ≥ 13

DEQ-5, Dry Eye Questionnaire. OSDI, Ocular Surface Disease Index

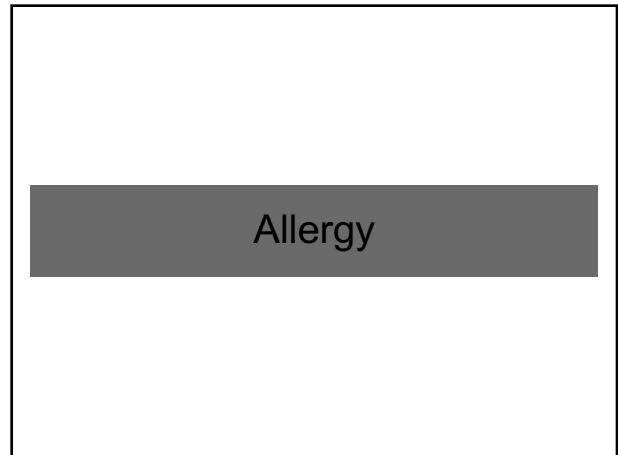
17

Dry eye/MGD triggers are high temperature, high pollen counts and high humidity
True
False

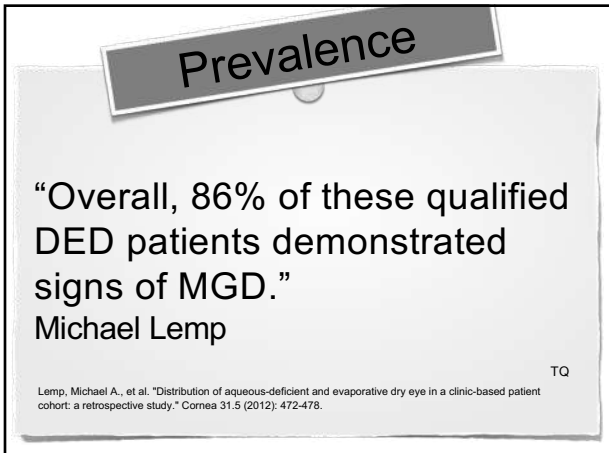
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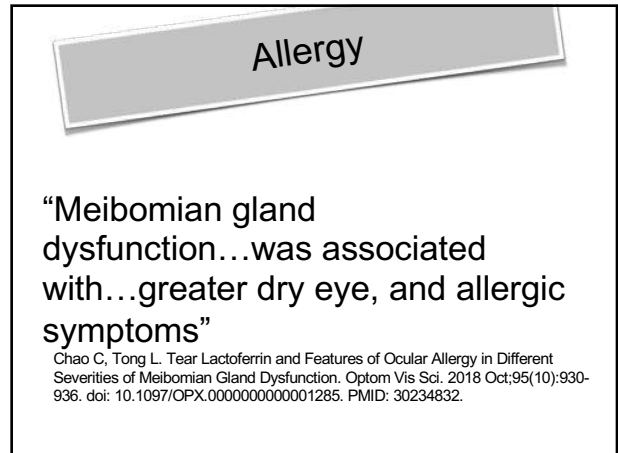
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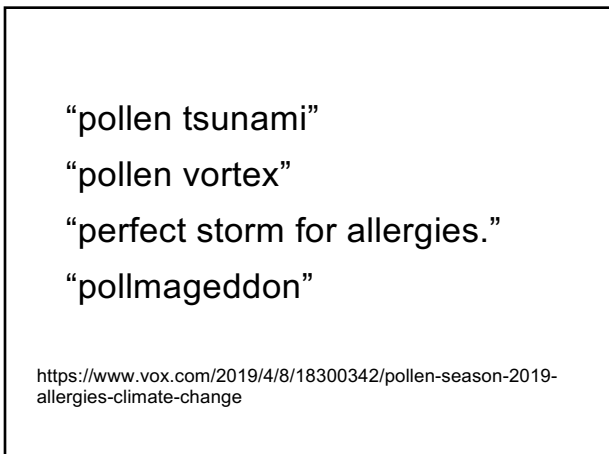
20



21



22



23



24

Pollen season getting longer

“Start taking...med[s]...around St. Patrick’s Day”

“Now start around Valentine’s Day”

Stanley Fineman, MD
Allergist, Atlanta

<https://www.nbcnews.com/health/allergies/nothing-sneeze-global-warming-triggers-earlier-pollen-n1257081>

25

| Weather | Asthma | Dry eye/MGD | Allergic conjunctivitis |
|-------------|------------------------|-------------|-------------------------|
| Temperature | High (or very cold) | High | High |
| Pollen | High | High | High |
| Humidity | High (or very dry) | Low | High (dust mites) |

Harthan JS, Hom MM, O'Dell L, Halleran CC. Humidity Levels and Temperature Effects on Dry Eye Symptom Scores. Optom Vis Sci American Academy of Optometry 2017 Chicago IL. TQ

Halleran CC, Hipolito K, Harthan J, Hom MM. The role of Pollen counts on the Signs and Symptoms of Ocular Surface disease. Optom Vis Sci American Academy of Optometry 2017 Chicago IL.

Hedhly, A., J. I. Hormaza, and M. Herrero. "The effect of temperature on pollen germination, pollen tube growth, and stigmatic receptivity in peach." Plant Biology 7.05 (2005): 476-483.

26

Your allergy patients have MGD

27

Depression

28

Depression

"Increased prevalence of depression has been found in patients with meibomian gland dysfunction (MGD)"

Wei Z, Liang J, Cao K, Wang L, Baudouin C, Labbé A, Liang Q. A multi-center study evaluating the correlation between meibomian gland dysfunction and depressive symptoms. Sci Rep. 2022 Jan 10;12(1):443. doi: 10.1038/s41598-021-04167-x. PMID: 35013413; PMCID: PMC8748897.

29

The COVID-19 pandemic has had a large and uneven impact on global mental health

Cases of mental disorders rose sharply during the pandemic

Cases in 2020: 76.2m (Anxiety disorders), 53.2m (Depression), 19.3m (Baseline cases), 29.8m (Total additional cases)

Younger people were hardest hit

Additional prevalence due to COVID-19, by age: Anxiety disorders (1% to 15%), Depression (1% to 15%)

Increases were higher among females than males

Additional cases due to COVID-19, by gender: Anxiety disorders (35.5m Female, 17.7m Male, Total 53.2m); Depression (51.8m Female, 24.4m Male, Total 76.2m)

Read the full paper: Santorelli SF, Martelli-Moreis VM, World J, et al. Global prevalence and burden of depression and anxiety disorders in 324 countries and territories in 2020 due to the COVID-19 pandemic. The Lancet 2021. Published online 14 October 2021.

THE LANCET | The University of Queensland | IHME

30

Depression

"Ocular Surface Disease Index score of the depression group was significantly higher than the control group"

Deng J, Zhou F, Hou W, Silver Z, Wong CY, Chang O, Huang E, Zuo QK. The prevalence of depression, anxiety, and sleep disturbances in COVID-19 patients: a meta-analysis. *Ann N Y Acad Sci.* 2021 Feb;1486(1):90-111. doi: 10.1111/nyas.14506. Epub 2020 Oct 2. PMID: 33009668; PMCID: PMC7675607.

32

Depression

"The characteristics of depression in the MGD group included: crying spells, sleep disturbance and depressed appetite"

Wei Z, Liang J, Cao K, Wang L, Baudouin C, Labbé A, Liang Q. A multi-center study evaluating the correlation between meibomian gland dysfunction and depressive symptoms. *Sci Rep.* 2022 Jan 10;12(1):443. doi: 10.1038/s41598-021-04167-x. PMID: 35013413; PMCID: PMC8748897.

33

Depression

"Antidepressants may have an impact on the course of eye dryness"

Koçer E, Koçer A, Özsiütçü M, Dursun AE, Kırnar İ. Dry Eye Related to Commonly Used New Antidepressants. *J Clin Psychopharmacol.* 2015 Aug;35(4):411-3. doi: 10.1097/JCP.0000000000000356. PMID: 26075491.
 Işık-Ulusoy S, Ulusoy MO. Influence of Different Antidepressants on Ocular Surface in Patients With Major Depressive Disorder. *J Clin Psychopharmacol.* 2021 Jan/Feb 01;41(1):49-52. doi: 10.1097/JCP.0000000000001325. PMID: 33347023.

34

1. Remeron (mirtazapine)
2. Lexapro (escitalopram)
3. Effexor (venlafaxine)
4. Zoloft (sertraline)
5. Celexa (citalopram)
6. Wellbutrin (bupropion)
7. Paxil (paroxetine)
8. Savella (milnacipran)
9. Prozac (fluoxetine)
10. Cymbalta (duloxetine)
11. Luvox (fluvoxamine)
12. Vestra (reboxetine)

TO

35

Lash serums

36

Lash serums



37

Lash serums

“Isopropyl cloprostenate is a synthetic type of compound known as a prostaglandin analog”

<https://www.buzzfeednews.com/article/stephaniemcneal/rodan-and-fields-lash-boost>

LASH BOOST

before

after

after + mascara

RODAN+FIELDS

38

Lash serums

212 responders

OTC Lash serums:
 Lash Boost (Rodan and Fields) 77%
 GrandeLash 16%
 Revitalash 13%

Doll T. et. al. Over-the-Counter Eyelash Growth Serum Use: Self-Reported Pervasiveness and User Satisfaction. ARVO 2020 TQ

39

Lash serums

“43% of users discontinued use with the primary reason being ‘side effects’”

Doll T. et. al. Over-the-Counter Eyelash Growth Serum Use: Self-Reported Pervasiveness and User Satisfaction. ARVO 2020 TQ

40

Lash serums

91% PGAs has MGD

Figure 1. Prevalence of meibomian gland dysfunction in patients who were on PG analogue therapy versus those who were on non-PG medications.

Figure 2. Depiction of percentage of patients who were diagnosed with different grades of meibomian gland dysfunction (MGD).

<https://www.eyedolatryblog.com/2017/04/is-your-lash-growth-serum-causing.html>

41

Your glaucoma patients
have MGD

42

Diabetes

43

Diabetes

“HbA1c≥7% is likely to result in meibomian gland...dysfunctions in T2DM [diabetes] patients”

TQ

Fan F, Li X, Li K, Jia Z. To Find Out the Relationship Between Levels of Glycosylated Hemoglobin with Meibomian Gland Dysfunction in Patients with Type 2 Diabetes. Ther Clin Risk Manag. 2021 Aug 6;17:797-807. doi: 10.2147/TCRM.S324423. PMID: 34393486; PMCID: PMC8355550.

44

Diabetes


Your patients with diabetes have MGD

Fan F, Li X, Li K, Jia Z. To Find Out the Relationship Between Levels of Glycosylated Hemoglobin with Meibomian Gland Dysfunction in Patients with Type 2 Diabetes. Ther Clin Risk Manag. 2021 Aug 6;17:797-807. doi: 10.2147/TCRM.S324423. PMID: 34393486; PMCID: PMC8355550.

45

Metformin

“After metformin treatment...morphology of MG was well maintained...inflammation and oxidative stress of MG were alleviated after metformin intervention”



Guo, Y., Zhang, H., Zhao, Z., Luo, X., Zhang, M., Bu, J., ... & Li, W. (2022). Hyperglycemia induces meibomian gland dysfunction. Investigative ophthalmology & visual science, 63(1), 30-30.

46

Eyecare workers

47

Eyecare workers

44 eyecare workers
 SPEED
 OSDI
 Lipid layer thickness
 MG dropout
 Meibography

TQ

Chan AYY, Chuang JC, Wong WVY. Evaluation of Meibomian Gland Dysfunction Among Ophthalmic Healthcare Workers. Clin Ophthalmol. 2021 Mar 19;15:1201-1206. doi: 10.2147/OPHTH.S299338. PMID: 33776416; PMCID: PMC7989054.

48

Eyecare workers

“Despite being more knowledgeable to MGD and more accessible to treatment, MGD is a highly prevalent condition among ophthalmic healthcare workers, with a 61.4% prevalence”

TQ

Chan AYY, Chuang JC, Wong WVY. Evaluation of Meibomian Gland Dysfunction Among Ophthalmic Healthcare Workers. Clin Ophthalmol. 2021 Mar 19;15:1201-1206. doi: 10.2147/OPHTH.S299338. PMID: 33776416; PMCID: PMC7989054.

49


Eyecare workers

You have MGD

Chan AYY, Chuang JC, Wong WY. Evaluation of Meibomian Gland Dysfunction Among Ophthalmic Healthcare Workers. Clin Ophthalmol. 2021 Mar 19;15:1201-1206. doi: 10.2147/OPHTH.S299338. PMID: 33776416; PMCID: PMC7989054.

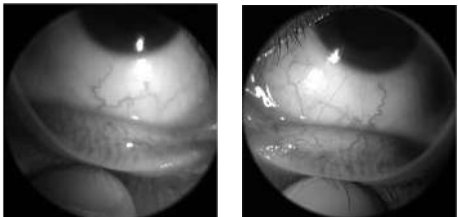
50

Meibography



| |
|--------------------------------------|
| LipiView II / LipiScan (TearScience) |
| Oculus Keratograph 5M |
| iLux2 (Alcon) |
| Meibox (Box Medical Systems) |
| MX2 (Shaffer Vision Solutions) |
| IDRA Ocular Surface Analyzer |
| LacryDiag (Quintel Medical) |

51



What if I don't have diagnostic equipment

52

Meiboscale heiko-pult.de

| Meiboscale – Lower Lid | | Area of Loss | Meiboscale – Upper Lid | | Area of Loss |
|------------------------|--|-----------------------|------------------------|--|-----------------------|
| | | Degree 0 =0% | | | Degree 0 =0% |
| | | Degree 1 <25% | | | Degree 1 ≤25% |
| | | Degree 2 26% – 50% | | | Degree 2 26% – 50% |
| | | Degree 3 51% – 75% | | | Degree 3 51% – 75% |
| | | Degree 4 ≥75% | | | Degree 4 ≥75% |

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53

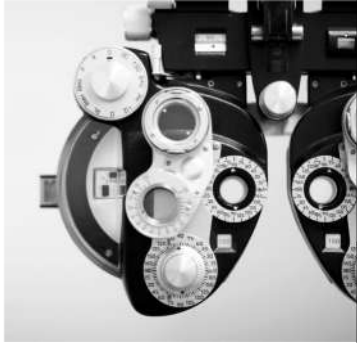
The Silver Medal of "Low Tech" Diagnostic Equipment for Dry Eye Disease



- Augmented Vision Labs
- iSLA adapter for slit lamp
- 3-D printed to fit ocular and smartphone

54

The Gold Medal of "Low Tech" Diagnostic Equipment for Dry Eye Disease



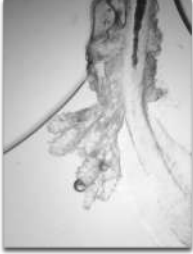
55

Demodex Blepharitis

56

DB
Demodex folliculorum
Demodex brevis

- Reside in sebaceous glands in facial skin
 - Nose
 - Nasolabial folds
- Eyelids
- Cheek
- Forehead
- Chin
- Neck



57

DEMODEX BLEPHARITIS IS PREVALENT IN YOUR EYE CARE CLINICS

Demodex blepharitis may be as prevalent as dry eye disease

| Titan study of 1032 patients in 6 OD/MD centers using collarettes for diagnosis ^{1,2*} | | Two-center study of 199 patients in New York using eyelash epilation for diagnosis ³ | |
|---|-------------------------------|---|-------------------------------|
| Percent of overall population | | Percent of overall population | |
| With Demodex blepharitis 58% | With dry eye diagnosis 58% | With Demodex blepharitis ⁴ 55% | With dry eye diagnosis 68% |

Diagnosing *Demodex* blepharitis via slit lamp (collarettes) or lash epilation results in similar prevalence.
 Collarettes are a pathognomonic sign of *Demodex* blepharitis

*In an IRB-approved retrospective chart review of 1032 patients examined for collarettes across 6 eye care clinics.
¹Ye et al, prospective, cross-sectional study of 199 patients, where the prevalence and risk factors for *Demodex* blepharitis were examined across 2 tertiary care outpatient ophthalmology clinics and 4 other non-tertiary eye practices.
²The calculator implements an unpublished algorithm that is based on data from a prospective case series of over 200 patients.
³DB, International review board, MD, Director of Research, OCU, Director of Ophthalmology.
⁴Tranter W et al. Clin Ophthalmol. 2022;16:1153-1164. 2. Tran A et al. Invest Ophthalmol Vis Sci. 2021;62(9):3236.

TQ

58


Prevalence

- Lopez-Ponce et al, average age in study was 54.9 years old
- 84% prevalence in these patients
- 100% in patients over 70 years old

59

Prevalence

- Ye et al, 2253 young males in Fujian province, China
 - 20.73% overall prevalence
 - Higher incidence in higher socioeconomic status
 - Not related to overall hygiene



TQ

60

Demodex and chalazia in pediatric population

- Huang et al
 - 446 children with chalazia vs 50 controls
 - Demodex found in 53% of patients with chalazia
 - 0 found in controls
 - Associated with recurrent / multiple chalazia


61

DEMODEX BLEPHARITIS IS PREVALENT IN YOUR EYE CARE CLINICS

Demodex mites are the leading cause of blepharitis

Titan study of 1032 patients in 6 OD/MD centers using collarettes for diagnosis^{1*}


Percent of blepharitis patients due to *Demodex* mites



69%

Two-center study of 199 patients in New York using eyelash epilation for diagnosis^{2,3}

Percent of blepharitis patients due to *Demodex* mites



62%

Diagnosing *Demodex* blepharitis via slit lamp (collarettes) or lash epilation results in similar prevalence.

Collarettes are a pathognomonic sign of *Demodex* blepharitis


*Titan is an approved retrospective chart review of 1032 patients examined for collarettes across 6 US eye care clinics. See a prospective, cross-sectional study of 499 patients, where the prevalence and risk factors for *Demodex* blepharitis were examined across 3 tertiary care outpatient ophthalmology clinics and 1000 eye care providers in a region. BK, an individual review board, MD, Doctor of Medicine, DO, Doctor of Ophthalmology. 2. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 3. Yeh A et al. *Invest Ophthalmol Vis Sci*. 2015;56:2081-2086.

62


DEMODEX BLEPHARITIS | A PERSISTENT AND DAMAGING EYE DISEASE

- Blepharitis is the inflammation of the eyelids causing irritation and redness**
- 69% of blepharitis cases are due to *Demodex* infestation leading to *Demodex* blepharitis⁴**
 - Demodex* mites are implicated in other diseases of the lid and lid margin, including blepharitis and meibomian gland dysfunction^{5,6}
 - Demodex* mites are associated with acne vulgaris, folliculitis, rosacea, seborrheic dermatitis, perioral and scalp hair loss, and basal cell carcinoma^{3,7}
- Demodex folliculorum* and *Demodex brevis* are the only 2 species found in humans⁸**
 - The life cycle of the *Demodex* mite is approximately 14 to 18 days from the egg to the larval stage followed by the adult stage⁹
 - The life span of the mite is limited outside the living body; direct contact is required for transinfestation⁹


D. folliculorum




0.3-0.4 mm length
Colonizes the base of the lash follicle¹⁰



D. brevis



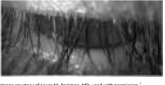
0.1 mm length
Colonizes the meibomian gland¹¹



1. Waga Clinic. Accessed June 28, 2023. <https://www.wagaclinic.org/resources/condition/blepharitis/epitheliocystic-cases> 2. Zhang AC et al. *Ophthalmic Physical Opt*. 2020;40(4):389-432. 3. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 4. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 5. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 6. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 7. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 8. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 9. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 10. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 11. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107.


63

DEMODEX BLEPHARITIS | MECHANISMS OF DISEASE




MECHANICAL

- Lash distension occurs as *Demodex* mites attach to follicles^{2,4}
- Demodex* mites deposit debris and digestive enzymes, causing further irritation to the eyelid margin^{4,5}



BACTERIAL

- Demodex* mites can contribute to blepharitis by carrying bacteria on their exterior surface that may elicit immune responses^{2,6,7}



CHEMICAL

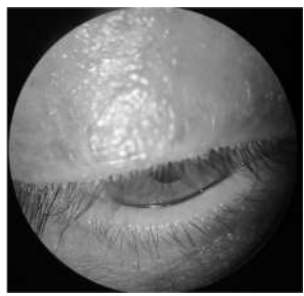
- Demodex* mites have been associated with altered meibum composition⁸
- Debris from *Demodex* mites can potentially lead to chronic inflammation and degeneration of conjunctival tissue⁹

1. Waga Clinic. Accessed June 28, 2023. <https://www.wagaclinic.org/resources/condition/blepharitis/epitheliocystic-cases> 2. Zhang AC et al. *Ophthalmic Physical Opt*. 2020;40(4):389-432. 3. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 4. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 5. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 6. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 7. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 8. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 9. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 10. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107. 11. Tricker W et al. *Ophthalmology*. 2012;120:1102-1107.

64

Signs and symptoms

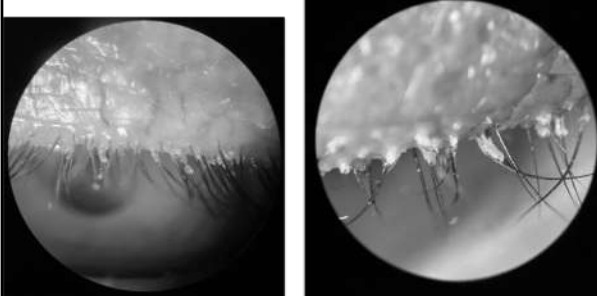
- Symptoms:**
 - Redness
 - Irritation
 - Itching
 - Watering
 - Foreign body sensation
- Signs:**
 - Cylindrical dandruff/Collarette (pathognomonic)
 - Keratinization of lid margin
 - Teleangiectasia



TQ

65

Enhance



66



67

CLINICAL MANIFESTATIONS OF DEMODEX BLEPHARITIS

Disorders of Eyelashes^{1,2}
Infestation of the lash follicles can result in collarettes and may lead to malalignment, trichiasis, and madarosis

Meibomian Gland Dysfunction^{1,2}
Blockage leads to filling, swelling, and many enlarged glands (cysts) or infection. Chalazia are common granulomatous responses

Lid Margin Inflammation^{1,2}
Severe lid margin inflammation can be caused by mechanical blockage and a delayed host immune hypersensitivity reaction

Conjunctival Inflammation^{1,2}
Without proper hygiene, lid margin inflammation may spread over to the conjunctiva producing a condition known as blepharoconjunctivitis

Corneal Manifestations^{1,2}
D. brevis is commonly associated with inflammation that spreads to the cornea, causing sight-threatening corneal lesions, superficial vascularization, marginal infiltrates, phlyctenule-like lesions, opacity, and/or nodular scars

1. Liu J et al. Curr Opin Allergy Clin Immunol. 2010;10(5):555-560. 2. Cheng AM et al. Curr Opin Ophthalmol. 2015;26(4):295-300.

68

COLLARETTES ARE A PATHOGNOMONIC SIGN OF DEMODEX BLEPHARITIS

Collarettes, or cylindrical dandruff, are composed of mite waste products and eggs¹

- Collarettes are translucent, solidified exudative excretions that form a cylindrical collar that cuffs around the base of the eyelash follicle¹⁻³
- Collarettes are displaced along the shaft of the lash as it grows, and they are also displaced due to bacterial overgrowth⁴
- Collarettes are composed of regurgitated undigested mite waste combined with epithelial cells, keratin, mite eggs, and secreted proteases and lipases that cause irritation⁵
- 100% of patients with collarettes have Demodex blepharitis^{2,5}**

1. Zhang JC et al. Ophthalmic Physiol Opt. 2020;40(4):288-302. 2. Guo Y et al. Invest Ophthalmol Vis Sci. 2005;46(12):3888-3894. 3. Frenkelson LR et al. Clin Ocul. 2016;34(7):42. 4. Elford C et al. Contact and Allergy Contact Sensitivity. 2001;15(4):230-236. 5. Kanchwala N et al. Br J Ophthalmol. 2017;101(1):2-7. 6. Data on file. Image courtesy of Peter Paul Dagh, MD, 2022.

69

DEMODEX BLEPHARITIS CAN BE DIAGNOSED DURING SLIT LAMP EXAMINATION

- Collarettes are hardened excretions around the base of the eyelashes visible during slit lamp examination¹⁻³
- Collarettes can be identified when the base of lashes on the upper lid are exposed as the patient **looks down**⁴
- Collarettes may be missed during a slit lamp exam even with a lid lift if a patient is looking straight ahead⁴

Image courtesy of Elizabeth Lee.

Asking a patient to look down during a slit lamp examination can reveal diffuse collarettes and misdirected or missing lashes that are strong signs of Demodex blepharitis

1. Zhang JC et al. Ophthalmic Physiol Opt. 2020;40(4):288-302. 2. Guo Y et al. Invest Ophthalmol Vis Sci. 2005;46(12):3888-3894. 3. Frenkelson LR et al. Clin Ocul. 2016;34(7):42. 4. Elford C et al. Contact and Allergy Contact Sensitivity. 2001;15(4):230-236. 5. Kanchwala N et al. Br J Ophthalmol. 2017;101(1):2-7. 6. Data on file. Image courtesy of Peter Paul Dagh, MD, 2022.

70

Diagnosing Demodex Blepharitis

- LOOK DOWN!
- Look at the lids!
- Pull lashes and look under microscope*
- *optional

73

Treatments

74

Treatments of Demodex

- Lid Hygiene
 - With Tea Tree Oil
 - Without Tea Tree Oil (Hypochlorous acid)
- Microblepharoxfoliation
 - BlephEx
 - NuLids
 - AB Max
- Intense Pulsed Light Therapy

75

Drawbacks of previous treatments

- No therapy eradicates all *Demodex* infestation
- Decreased compliance
- Patients don't follow instructions well
- Symptoms still persist
- Chen et al:
 - Tea Tree oil damages human epithelial cells of meibomian glands
 - In vitro study

76

New options

- Xdemvy (Lotilaner 0.25%,Tarsus)
- Yeu et al
 - Twice daily drops compared to control
 - Achieved reduction to less than 10 collarettes in 85% of patients (vehicle 15%)
 - Patients enrolled in study averaged 100 at baseline
 - Mite eradication in 73% (vehicle 21%)

77

The forgotten option: Artificial tears

78

Artificial tears

1. Availability
 2. Cost
 3. Save the Big guns
-
1. Confusion
 2. They are all the same
 3. Not as effective?

79

Artificial tears

Virtually every DED treatment regimen includes artificial tears

86

| Product | Mechanism of action | Ingredient | Category |
|---|--|--|--|
| Systane Ultra/Classic | pH activated | HP Guar | Viscosity |
| Refresh | mucro-adhesive | cmc | Viscosity |
| Refresh PM/Systane Nighttime/Soothe Lubricant Nighttime | ointment | Mineral oil/white petrolatum | Viscosity |
| Optive | compatible solutes | L-carnitine/erythritol/cmc | Osmo-protectants/Viscosity |
| Soothe XP | oily tears | mineral oil | Emulsion |
| Systane Balance | oily tears | mineral oil | Emulsion |
| Systane Complete | oily tears/nanomicellular | HP Guar | Viscosity |
| Refresh Digital | oily tears compatible solutes | castor oil L-carnitine/erythritol/cmc | Emulsion Osmo-protectants/Viscosity |
| Refresh Optive Mega-3 | oily tears nanomicellular | trehalose castor oil L-carnitine/erythritol/cmc | Cytoprotective Emulsion Osmo-protectants |
| Optase Advanced MGD | Oily tears | Trehalose Sacha inchi seed oil Sodium hyaluronate (HA) | Emulsion Osmo-protectant HA |
| iVizia | high shear thinning | trehalose sodium hyaluronate (HA) | Cytoprotective HA Osmo-protectants |
| Blink tears | high shear thinning | sodium hyaluronate (HA) | HA |
| Refresh Relieva | high shear thinning compatible solutes | sodium hyaluronate (HA) L-carnitine/erythritol/cmc | HA Osmo-protectants/Viscosity |
| Biotrue Hydration Boost | high shear thinning | sodium hyaluronate (HA) | HA |
| Optase HyloRelief | High shear thinning | Sodium hyaluronate (HA) Glycerin | HA |

87

Azithromycin drops

| | |
|--|--|
| <p>Abstract Title J Clin Ther. 2011 Mar;34(2):203-6. doi: 10.1111/j.1444-0208.2010.02945.x. Epub 2010 Nov 15.</p> <p>Efficacy of azithromycin 1% ophthalmic solution for treatment of ocular surface disease from posterior blepharitis</p> <p>Shawhan C, Gao Y, Nouri F, Taylor</p> | <p>Abstract Title J Cornea. 2010 Aug;29(8):971-7. doi: 10.1097/COR.0b013e3181d9104d.</p> <p>Multicenter open-label study evaluating the efficacy of azithromycin ophthalmic solution 1% on the signs and symptoms of subjects with blepharitis</p> <p>Nosa M, Hodge T, Gao Y, Tschikow, Kurt, Stralman, Richard C, Zink, Nigel P, Fawcett, Francis S, Sani, Stephen C, Pflugfelder</p> |
| <p>Abstract Title J Adv Ther. 2010 Nov;23(9):658-65. doi: 10.1007/s12325-010-0058-6.</p> <p>Efficacy of topical azithromycin ophthalmic solution 1% in the treatment of posterior blepharitis</p> <p>Shah C, Gao Y</p> | <p>Abstract Title J Cornea. 2010 Aug;29(7):701-4. doi: 10.1097/COR.0b013e3181d9104d.</p> <p>Topical azithromycin therapy for meibomian gland dysfunction: clinical response and lipid alterations</p> <p>Gao Y, Hodge T, Douglas-Borchman, Gloria, Nappert, Sung-yeop, Kim, John W, Srinivas</p> |

TQ

88

MIEBO

- 100% Perfluorohexyloctane
- First drop to treat dry eye disease associated with Meibomian Gland Dysfunction
 - All other medications are open/off-label
- QID dosing
- GOBI and MOJAVE studies
 - Phase III
 - 599 / 620 subjects respectively
- Statistically significant improvement on Day 57 vs hypotonic saline
 - Total Cornea staining score
 - Primary Symptoms on VAS scale of dryness

89

Procedures

90

Remember the anatomy...

91

Hand Expression

92

Types of expression forceps

| | | |
|---|--|--|
| <p>MIEBO Long Nose Expressor</p> <p>On Meibomian Gland Expression: 1.5" (3.8 cm) long. The long nose allows for deep penetration into the gland orifice.</p> | <p>MIEBO Roller Expressor</p> <p>On Meibomian Gland Expression: 2.0" (5.1 cm) long. The roller design allows for gentle, controlled expression.</p> | <p>MIEBO Rectangular Expressor</p> <p>On Meibomian Gland Expression: 2.0" (5.1 cm) long. The rectangular design allows for deep penetration into the gland orifice.</p> |
| <p>Collins Expression Forceps</p> | <p>TearCare Clearance Assistant</p> | |
| <p>Battle Expression Forceps</p> | | |


93

To Heat or not to Heat?

94

LipiFlow

- The device that started it all
- Based on research by Donald Korb
- Thermal pulsation technology
- Activator heats from inside lid and massages eye externally



95

Clinical studies

Clin Ophthalmol. 2018; 12: 189-193. PMID: 3062575749
 Published online 2018 Jan 17. doi: 10.2147/OPTO.S328877 PMID: 29388951

A single vectored thermal pulsation treatment for meibomian gland dysfunction increases mean comfortable contact lens wearing time by approximately 4 hours per day

Geetha A. Bhatia,¹ Chiranjiv A. Chakrabarti,¹ Rishi K. Mittal,² Laxman Jaiswal,³ Puneet G. Chahal,⁴ Rishi Mishra,⁵ Vivek L. Mathew,⁶ Leslie L. O'Day,⁷ and Arjun Srivastava⁸

Long-Term (3 Year) Effects of a Single Thermal Pulsation System Treatment on Meibomian Gland Function and Dry Eye Symptoms

Oxley, Jack K. M.S., D.S., D.O., F.R.C. Ophthalmol.
 Author information @
 Eye & Contact Lens, Science & Clinical Practice March 2019 - Volume 42 - Issue 2 - e 99-107
 doi: 10.1080/10420172.2019.1600000

TQ

96

MiBoFlo



97



98

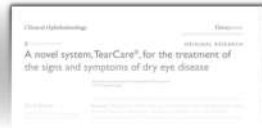
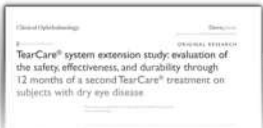
TearCare Pilot Study Conclusions^{1,2}

6 Month Pilot Study

- Published in *Clinical Ophthalmology*, April 2018
- The findings of this pilot study suggest that the TearCare System is a safe and effective treatment option for patients with DED, with the treatment effects persisting for at least 6 months.

Extension Study: Evaluation Through 12 Months

- Published in *Clinical Ophthalmology*, January 2019
- The findings of the extension study through 12 months suggest that a second TearCare treatment after 6 months provides additional improvement in the signs and symptoms of DED.

1. Redford D. A novel system, TearCare® for the treatment of the signs and symptoms of dry eye disease. *Clinical Ophthalmology* 2018;12: 483-494. 2. 3. Redford D. TearCare® system extension study: evaluation of the safety, effectiveness, and durability through 12 months of a second TearCare treatment on subjects with dry eye disease. *Clin Ophthalmol*. 2019; 13:189-196.

99

Systane iLux²

- All-in-one imaging and treatment handheld device
- HD video and imaging as meibography
- Treatment is 8-12 minutes for both eyes
- Customizable heat and compression for targeting meibomian glands

Opt. Ophthalmol. 2020; 14: 492-498
Published online 2020/14/15 doi: 10.1177/1077138520954909

PMCID: PMC7628781
PMID: 32522462

Comparison of the iLUX and the LipiFlow for the Treatment of Meibomian Gland Dysfunction and Symptoms: A Randomized Clinical Trial

Robert Swain,¹ James Owen,² Marc Bisschops,³ John Truswell,⁴ and Mark A. Rubman⁵

- Decrease in IDEEL symptom survey lasted for 12 months
- Increase in Meibomian Gland Score (0-45) that sustained for 12 months

100

iTear100


Transl Vis Sci Technol. 2020 Nov; 19(2): 28.
Published online 2020 Nov 17 doi: 10.1167/jov.19.11.28

PMCID: PMC7690869
PMID: 33226443

Novel Extranasal Tear Stimulation: Pivotal Study Results

Mario H. Ji,¹ Carlos M. Montenegro,¹ Laura Pizarro,² David Kadny,³ Cristina Matuszewska,⁴ Gerald Sherman,⁵ Scott Madigan,⁶ Andy Ma,⁷ Ann Johnson,⁸ Michael Dietzen,⁹ Paul Karasick,¹⁰ and David A. Friedman⁹


- Exploratory end results showed increase in Meibomian Gland score pre- and post- iTear usage
- Showed improvements by Day 30
- “The data notwithstanding, the effect of neurostimulation on meibum secretion is exploratory and not conclusive, requiring further study.”



101

Low Level Light Therapy

- Photobiomodulation
 - Athermal, atraumatic cellular activation from light emitting diodes of specific wavelengths
 - Stimulates production of collagen and elastin
 - Results in repair to damaged cells and improvement in healthy cells
 - Decrease inflammation in lids/glands
 - 830nm



TQ

102

LLLT

- 15 minute procedure
- Repeat 24-72 hours later
- 3-4 sessions within 7-10 days
- Other studies show improvement in symptoms, corneal staining, other dry eye metrics
- Improvements but not statistically significant differences in meibomian gland expressibility, structure, etc.

WVO Annual Meeting Abstract | June 2020

Low-Level Light Therapy in the Treatment of Meibomian Gland Dysfunction

Authors Full

Investigative Ophthalmology & Visual Science June 2020, Vol 61, 10, doi

Effect of low-level light therapy in patients with dry eye: a prospective, randomized, observer-masked trial

Full Text, View Full Text, Session 10m & Young Jin Cho

Scientific Reports | 12, Article number: 1675 (2022) | Cite this article

103

Photomed Laser Surg. 2015 Jan 1; 33(1): 41-46.
doi: 10.1089/pho.2014.3819

PMCID: PMC4298157
PMID: 25594779

Intense Pulsed Light Treatment for Dry Eye Disease Due to Meibomian Gland Dysfunction; A 3-Year Retrospective Study

Rolando Toyos, MD,¹ William McGill, PhD,² and Dustin Briscoe, OD³

Intense Pulsed Light

- Used in dermatology for treatment of rosacea for decade
- Photochromatic light in different wavelengths absorbed by chromophores like melanin, hemoglobin and water
- First reported by Toyos in 2015 for ocular indication

104

IPL Mechanism of Action


- Unclear but few possibilities:
 - Abnormal blood vessel thrombosis
 - Meibum heating and liquefaction
 - Photomodulation
 - Demodex eradication
 - Secretion modulation of pro and anti-inflammatory molecules
 - Matrix metalloproteinase suppression

TQ

105

Treatment Pattern

- Tragus to Tragus
- Typically single pass
- Below lid margin and over the nose



- Patient and doctor wearing eye protection
- Usually 3-4 sessions spaced 3-5 weeks apart

Skin Types

The Fitzpatrick Scale

| | | | | | |
|---|---|---|---|---|--|
| | | | | | |
| TYPE I Lightest skin tone Freckles, blue eyes Always burns, never tans | TYPE II Light skin tone Freckles, blue eyes Burns easily, tans with difficulty | TYPE III Medium skin tone Freckles, blue to olive Burns moderately, tans gradually, hard to burn | TYPE IV Medium-dark skin tone Freckles, olive, tan well Hardly burns, tan easily | TYPE V Dark skin tone Tan easily, hardly burns, tans very easily | TYPE VI Darkest skin tone Burns very rarely, tans easily, never burns |


- IPL for Types I – IV
- Not absorbed in V, VI

TQ

106

Nutritional Support


- HydroEye
- GLA



- Superior to just fish oil, this patented formula offers GLA, the Dry Eye Omega, plus other key nutrients.
- Smaller capsules
- No fishy smell/aftertaste.
- Better tolerated
- Specialized formula for better results
- Works for 85%-90% of all users

TQ

107



Dream

108

Omegas

“patients with dry eye disease...who...receive...3000 mg of n-3 fatty acids for 12 months did not have significantly better outcomes than...placebo”

Dry Eye Assessment and Management Study Research Group. "n- 3 Fatty Acid Supplementation for the Treatment of Dry Eye Disease." *New England Journal of Medicine* 378:18 (2018): 1681-1690.

TQ

109

Why not multiple procedures?

110

Studies showing stacking or multiple procedures

- IPL + LipiFlow
 - HS Chung, *Int Ophthalmology*, May 2022
- IPL + LLLT
 - K Stonecipher et al, *Clinical Ophthalmology*, June 2019
 - Severe MGD patients failed on prior treatments
 - 5 IPL pulses + LLLT x 15 minutes
 - Decrease in % of patients with <6 second TBUT
 - 70% of patients had 1 step or greater improvement in MGD

111

Treatments

- Lots of different options
- Mix and match for patient types, expectations, results
- Simple, straightforward to innovative, advanced
- Find what fits into your practice

112

Dry eye/MGD triggers are high temperature, high pollen counts and high humidity

True

False

113