MGD: New Technology for Diagnosis and Management
Milton M. Hom, OD, FAAO.
Mark Schaeffer, OD

Course description (2 hours): Seems like we hear about a new treatment for MGD and dry eyes every week. Coupled that with the constant flow of new research appearing almost daily. In this class, we will attempt to give you guidelines for diagnosis and management of MGD in this era of information overload.

Learning objective:
1. Learn about dry eye classifications
2. Learn about meibomian gland dysfunction (MGD) and causes
3. Know the comorbidities with MGD
4. Understand the concepts behind MGD devices
5. Learn about treatment strategies for ocular surface disease
6. Learn about the options for management of MGD and comorbidities

Prevalence of dry eye *(10 min)*
299 normal subjects and DED patients (M:81 F:218)
10 sites European Union & US.

"Overall, 86% of these qualified DED patients demonstrated signs of MGD."
Michael Lemp
Lemp, Michael A., et al. "Distribution of aqueous-deficient and evaporative dry eye in a clinic-based patient cohort: a retrospective study." *Cornea* 31.5 (2012): 472-478.

"MGD is currently thought to be the leading cause of dry eye."
Donald Korb
Caroline Blackie

"eye care professionals are shifting their focus to the role of the meibomian glands in dry eye, and away from traditional inflammation-driven models of disease etiology."

"we know that while dry eye can be academically classified as ADDE or evaporative dry eye (EDE) in nature, both forms become virtually indistinguishable as the disease progresses, rendering attempts to make the distinction fairly meaningless."

Blackie, Caroline A., and Donald R. Korb. "MGD: getting to the root cause of dry eye: *Review of Optometry* 149.6 (2012): 30-37.
Bron AJ, Yokoi N, Gafney E, et al. Predicted phenotypes of dry eye: proposed consequences of its natural history. Ocul Surf. 2009 Apr;7(2):78-92.

Allergy and MGD *(10 min)*

“Meibomian gland dysfunction…was associated with…greater dry eye, and allergic symptoms”

Chao C, Tong L. Tear Lactoferrin and Features of Ocular Allergy in Different Severities of Meibomian Gland Dysfunction. Optom Vis Sci. 2018 Oct;95(10):930-936. doi: 10.1097/OPX.0000000000001285. PMID: 30234832.

“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

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
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.

Lash serums and MGD *(10 min)*
212 responders

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

“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

91% PGAs has MGD

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

Diabetes and MGD *(10 min)*
“HbA1c≥7% is likely to result in meibomian gland…dysfunctions in T2DM [diabetes] patients”
“we speculated that…long-term hyperglycemia causes peripheral neuropathy, which causes lacrimal gland secretion disorders, resulting in…decrease…tear film stability”

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.

Eyecare workers and MGD *(5 min)*
"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”

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

Depression and MGD *(10 min)*
"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.

Vaping and MGD *(10 min)*

"Vapers showed moderate-to-severe symptomatic dry eye and poorer tear film quality"

Md Isa NA, Koh PY, Doraj P. The Tear Function in Electronic Cigarette Smokers. Optom Vis Sci. 2019 Sep;96(9):678-685. doi: 10.1097/OPX.0000000000001422. PMID: 31479023.

"It is concluded that smoking and vaping appear as a risk factor for...ocular conditions [dry eye]."

Makrynioti D, Zagoriti Z, Koutsojannis C, Morgan PB, Lagoumintzis G. Ocular conditions and dry eye due to traditional and new forms of smoking: A review. Cont Lens Anterior Eye. 2020 Jun;43(3):277-284. doi: 10.1016/j.clae.2020.02.009. Epub 2020 Feb 25. PMID: 32111452.

Treatments: (35 min)

1. Supplementation
    a. DREAM Study- Omega 3s
        i. Limitations
        ii. Drawbacks
        iii. Findings
        iv. Overall impression
        v. Current Medical grade Omega 3
            1. PRN- Dry eye formula
            2. Retaine Flax
            3. FitEyez
            4. MaxiTears
            5. Nordic Natural Omega 2000
            6. Eyetamins
    b. HydroEye
        i. Omega 6/ Omega 3
        ii. Gamma lineolic acid
        iii. Study published in Cornea magazine
2. Drops
    a. Azasite
        i. Controversial topic
        ii. Foulks et al *Cornea* 2010
        iii. Improvement of lipids and decrease of symptoms in MGD patients
    b. Novaliq / Bausch + Lomb- NOV03
        i. Perfluorohexyloctane
        ii. Phase 3 trials
        iii. Signs and symptoms of DED associated with MGD
        iv. GOBI / MOJAVE studies
        v. Expected NDA / Approval date?

    c. Artificial Tears
        i. Systane Balance
        ii. Retaine MGD
        iii. Refresh MEGA-3
3. Procedures
    a. Hand Expression
    b. Maskin Probing
    c. Thermal heating with expression
        i. MiBo Thermoflo- Mibo Medical
        ii. TearCare - SightSciences
        iii. iLux 2 - Alcon
        iv. iTear 100 – Olympic Ophthalmics
            1. Not directly studied in their clinical trials, but saw increase in meibomian gland expression
            2. Addressed Lacrimal functioning Unit which also affects meibomian gland dysfunction
    d. Thermal Pulsation – LipiFlow
        i. Mechanism of Action
        ii. Clinical studies
        iii. Extended contact lens wear
    e. Low-Level Light Therapy
        i. Photobiomodulation
        ii. Red near-infrared therapy
        iii. Clinical studies
    f. Intense Pulsed Light Therapy (IPL)
        i. Mechanism of action(s)
            1. Destruction of superficial blood vessel
            2. Fluidification of meibum
            3. Down-regulation of epithelial turnover
            4. Photomodulation
            5. Antimicrobic effect
            6. Anti-inflammatory effect
            7. Anti-oxidative effect
        ii. Toyos Protocol
        iii. Considerations
            1. Skin types
                a. Fitzpatrick scale
                b. Not for Types V, VI
            2. Scope of practice laws
        iv. Clinical studies
4. Conclusion
    a. Holistic and procedural approach
    b. Treating MGD has a lot of options available