

Advances in Ocular Surface Disease: Treating Dry Eye

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- Aerie, Akorn, Alcon, Allergan, Akorn, Anthem, Avellino, Bausch, Beaver Visitech, BioTissue, BlephEx, Bruder, Cambium Pharma, DGH Technology, eyeBrain, Essilor, Eyegate, Eyevance, Focus Labs, iCare USA, Imprimis, Ivantis, Jobson Healthcare, Johnson & Johnson Vision, Konan. Medical, LensTech, MacuHealth, Maculogix, Notal Vision, Oasis Medial, Ocular Sciences, Oculus, OcuSoft, Optometric Medical Solutions, Oyster Point Medical, PECAA, Quark Pharmaceuticals, Refocus, Reichert, Rendia, RxSight, Science Based Health, Sentiss Pharmaceuticals, Shire Pharmaceuticals, Sight Sciences, Silk Technologies, Sun Pharmaceuticals, Tarsus Medical, Tearfilm Innovations, TearLab, Topcon, Visant Medical, Visiometrics, Visionix, VitalTears, VMax, Zeiss



FINANCIAL DISCLOSURE FORM

DR JACK L. SCHAEFFER

I HAVE RECEIVED HONORARIUM, COMPENSATION, OR SERVE AS AN ADVISOR TO THE FOLLOWING COMPANIES

- ALCON
- ALLERGAN
- AMO/ABBOTT
- ARCTIC/Dx
- ATON
- BAUSCH AND LOMB
- BRIEN HOLDEN INSTITUTE
- BRUDER
- COOPERVISION
- CLEARPATH
- ESSILOR
- ISTA
- HOYA
- MIBOFLOW
- NICOX
- OPTOVUE
- OPTOS
- TEARSCIENCE
- VALEANT
- VISTAKON
- ZEIS VISION

Company	Consultant/Speaker	Advisory Board	Clinical Research Principal Investigator	Shareholder
Alcon	■	A		
Allergan	■	A		
Avellino		A		
Azura	■	A		
Bausch			P	
Bruder		A		
Dompe		A		
Eyedetec		A		S
Eyeport	■	A		
EyeVance	■	A		
Horizon	■	A		
Johnson and Johnson	■	A		
Kala	■	A	P	
Lumenis	■		P	
Novartis	■	A	P	
NuSight Medical	■	A		
Olympic Ophthalmics	■	A	P	
Quidel	■	A		
Science Based Health	■	A		
Sun	■	A		
Tarsus	■	A	P	
TearLab	■	A		
ThermaMEDx	■	A		
Visant	■	A		S



Disclosures

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DISCLOSURES, Laura Periman MD

Alcon: C, S, MAB

Allergan: C, S, MAB

Avellino: MAB

Azura: C, MAB

Bausch: PI

Bruder: MAB

Dompe: MAB

Eyedetec: MAB, Shares

Horizon: C, MAB

Johnson and Johnson: C, S, MAB

Kala: C, S, MAB, PI

Lumenis: C, S, PI

Novartis: C, S, PI

NuSight Medical: C, S, MAB

Olympic Ophthalmics: C, S, PI

Quidel: C, S, MAB

Science Based Health: C, S, MAB

Sun: C, S, A

Tarsus: C, A, PI

TearLab: C, MAB

ThermaMEDx: C, A

Visant: C, A, Shares



Objectives

- To establish a foundational knowledge of the evolution of dry eye disease as it is defined
- To describe diagnostic testing and how it can be clinically applied
- To provide insight into current and emerging treatment modalities for ocular surface disease
- To illustrate the advantages of proper use of diagnostics and therapeutics through case study
- To demonstrate the importance of evidence-based practice of optometry in the management of dry eye disease

DEWS

- *Dry eye is a **multifactorial disease** of the tears and ocular surface that results in symptoms of **discomfort**, **visual disturbance**, and **tear film instability** with potential damage to the ocular surface. It is accompanied by **increased osmolarity** of the tear film and **inflammation** of the ocular surface.*

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 etiologic roles.

—The Definition and Classification of Dry Eye Disease, DEWS II, TFOS 2017

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 etiologic roles.**

—The Definition and Classification of Dry Eye Disease, DEWS II, TFOS 2017

Dry eye is not just a
disease,
it's a complex, multi-
factorial disorder.

Dry Eye / Ocular Surface Disease

Dry Eye /Ocular Surface Disease

- Medical Ocular condition or disease
- Ocular manifestation of a systemic problem
- Ocular complication from a medical Treatment

Dry Eye / Ocular Surface Disease

- WHY IS THIS IMPORTANT

Dry Eye / Ocular Surface Disease

- What Systemic Diseases, Medical and Surgical procedures and Medical Complications effect

Ocular **Homeostasis**

Dry Eye / Ocular Surface Disease

- Diabetes
- Thyroid Disease
- Autoimmune disease
- Hormonal changes
- Botox and Filler procedures
- Facial plastic procedures
- Graft VS Host disease (cancer Tx complications)

Dry Eye / Ocular Surface Disease

- Endocrinology
- Dermatology
- Facial Plastics
- Rheumatologist

Dry Eye /Ocular Surface Disease

- Typical MD to MD referral
 - Restasis bid
 - See you in 3 months
 - Or)

Dry Eye /Ocular Surface Disease

- I just bought a Lipiflow and you need this procedure today
- And here is Rx for restasis
- See you in 6 months and OH my goodness

Dry Eye /Ocular Surface Disease

- I just read about this new IPL treatment so be sure to stay in touch so as soon as I purchase one it will be marketed as my treatment of choice
- Here is a coupon for your first treatment when I learn how to do it!!!
- Oh there is no monetary amount on the coupon , it is just to let you know that I am a dry eye specialist

Dry Eye / Ocular Surface Disease

- The future of the new medical model
 - Typical Third party managed practice
 - Cash only fee for service model
- Cash only OSD practice
- Can you really do this ??

Dry Eye /Ocular Surface Disease

- Are you going to fall into the trap or
- Will you excel and deliver a real solution for the patient
- There are no cookbook treatments for Dry EYE

Atopic Dermatitis

Autoimmune Keratitis

Chalazia

Periman IPL Protocol

- Prep: Trader Joe's or Simple micellar make up remover wipes. Commercial eyelid wipes as needed. Proparacaine, PF AFT, sterilized laser-grade corneal shields, thin-medium layer of clear ultrasound gel (take great care to avoid gel getting into eyes), applied with long edge of tongue depressor.
- Step 1: Full face rosacea pass (choose either telangiectasia or erythema based on clinical findings)
- Step 2: Toyos settings tragus to tragus, double pass
- Step 3: Switch to small light guide, treat lids, avoid eyelashes by 2mm, double pass
- Step 4: Aesthetic clean up: angioma (VL presets), facial telangiectasia (VL presets), chalazia etc. For chalazia, stack 3 extra Toyos pulses.
- Post-Procedure: remove gel with long edge of tongue depressor, gauze remove residual (again, take great care no gel gets into eyes), wipe with warm water. Pat into skin one drop Alphagan P mixed with EltaMD or Skin Medica tinted sunscreen. Place 1:16 dilution of Alphagan P in Refresh Mega into eyes.



Rosacea

Case Presentation

- 52 yo male s/p LASIK OU 2005, enhancements 2005 and pCE/IOL 2015 presents with red, irritated eyes and lid margins, as well as complaints of fluctuating vision x 3 years
- No improvement with chronic OTC traditional vasoconstrictors
- No improvement with chronic topical steroids and IOP was 26 OU upon presentation
- Intermittent use of TrueTear with some improvement in conjunctival redness and also chronic allergic sinusitis

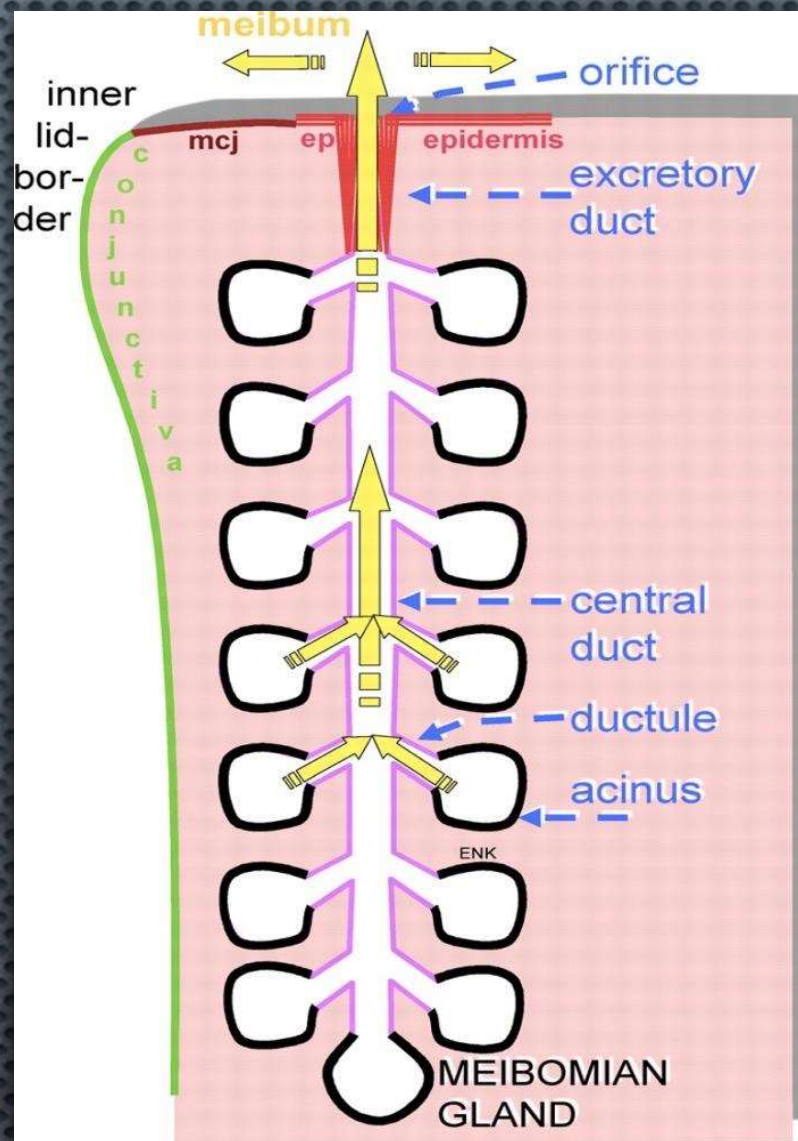


Conclusions

- Local-regional problems (e.g. rosacea, FES) can complicate the Dry Eye picture
- Systemic problems (e.g. suspected Obstructive Sleep Apnea) need to be addressed and may complicate the Dry Eye picture
- An integrated treatment approach that addresses the co-morbidities may enhance patient outcomes and satisfaction

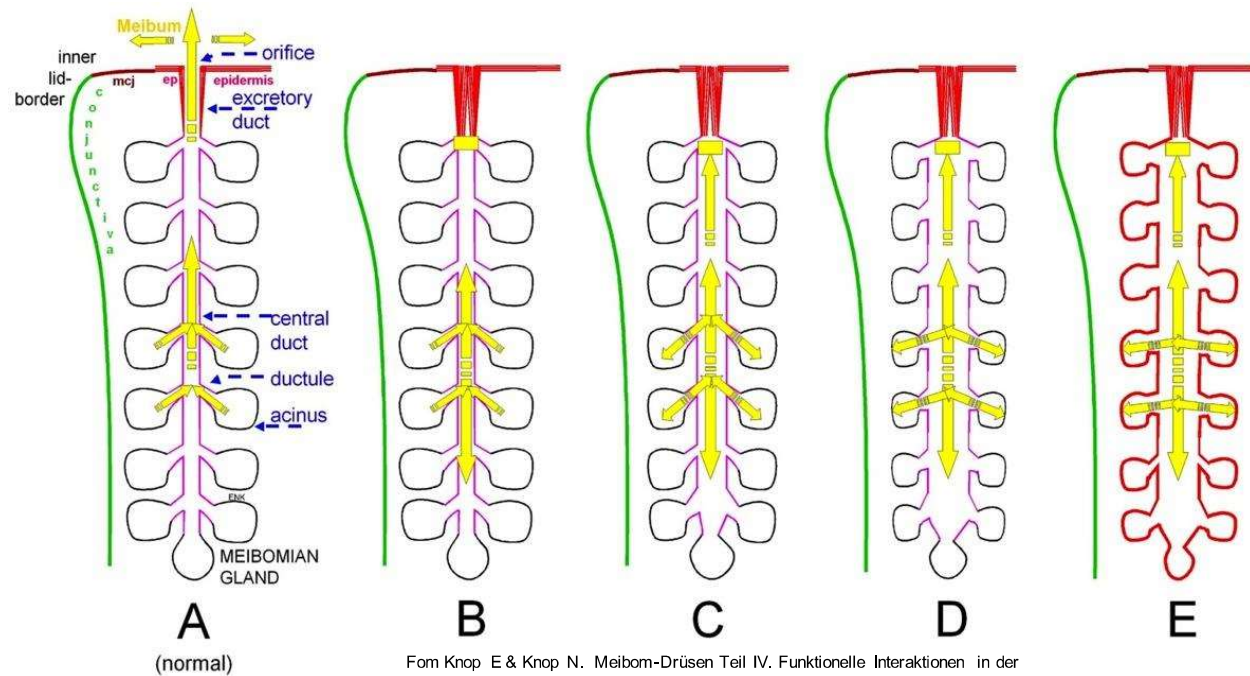


Exposure Keratitis after Complex Lagophthalmos Repair



Meibomian Gland – PATHOLOGY

- Obstructive MGD leads to a progressive ductal DILATATION and acinar ATROPHY



Fom Knop E & Knop N. Meibom-Drüsen Teil IV. Funktionelle Interaktionen in der Pathogenese der Dysfunktion (MGD). Ophthalmologe.2009;106:980–987



Aqueous Volume

Schrimer's Testing

- Requires anesthesia
- 5 minute testing time
- Mildly irritating
- Normal results: $> 10\text{mm}$

Phenol Red Thread

- No anesthesia required
- 15 seconds testing time
- Little discomfort
- Normal results: $> 20\text{mm}$




Categories of DED

Aqueous deficient Dry eye

- Describes conditions affecting:
 - Lacrimal gland function

Evaporative Dry eye

- Recognized to include:
 - Lid-related causes
 - MGD
 - Blink-related
 - Ocular surface- related causes
 - Mucin
 - Contact lens-related



If DED is on continuum, do doctors
need to differentiate which subset
(ADDE or EDE) is present?





Artificial Tears

Aqueous Supplementation

- Viscosity enhancing agents
- Carboxymethyl Cellulose (CMC)
- Hydroxypropyl Cellulose (HPMC)
- Hyaluronic Acid (HA)
- Combined CMC and HA
- Hydroxypropyl Cellulose
- Hydroxypropyl-Guar (HP-Guar)
- HP-Guar + HA
- Osmotic agents
- Osmoprotectants
- Antioxidants
- Preservatives/inactive ingredients/electrolytes

Lipid Supplementation

- Emulsions:
 - Macro
 - Nano
 - Micro



Artificial Tears

Biological Tear Substitutes

- Autologous tear substitutes
- Adult allogenic serum
- Umbilical cord serum
- Platelet preparations

Other Agents

- Mucolytic agents
- TRPV1 receptor antagonist





Do you recommend a specific type
artificial tear to your patients?





Aqueous Volume

- **Indications:**

- Symptomatic contact lens wear
- Dry eye related to refractive surgery
- ADDE
- Dry eye associated with a rapid TBUT
- Systemic medications that reduce tear film production
- Superior limbic keratoconjunctivitis (SLK)
- Corneal irregularities or scarring that affect tear stability
- Lid palsy or lid closure abnormalities
- Toxic epitheliopathy

- **Contraindications:**

- Presence of ocular surface inflammation could prolong the presence of pro-inflammatory cytokines
- A recent study showed that punctal occlusion resulted in:
 - ↓ corneal fluorescein staining
 - ↓ symptom scores
 - With no elevation of cytokine or matrix metalloproteinase (MMP)-9 levels



Who is a good candidate for an punctal plug?





Tear Stimulation

Neuromodulation

- Neuromodulation is a therapeutic strategy that involves interfacing directly with the nervous system through:
 - Electrical
 - Electromagnetic
 - Chemical
 - Optogenetic methodologies
- The goal is the long-term activation, inhibition, modification, and/or regulation of neural input to correct organ or tissue dysfunction and manage disease symptoms.



Tear Stimulation

Neuromodulation

- **TrueTear™ Intranasal Tear Neurostimulator**
(Allergan, Parkway Parsippany, NJ, USA)
 - Two pronged disposable hydrogel tip
 - Handheld device
 - Charging base
- The intranasal tear neurostimulator allows self-delivery of minute electrical currents to the anterior ethmoidal nerve





Lid Abnormalities

- Anterior blepharitis
 - Lid wipes
 - Baby shampoo
- Bacterial overload
 - Antibiotic ointments/drops – Short course
 - Macrolide
- Demodecosis
 - Topical 2% metronidazole gel
 - 1% mercury oxide ointment
 - 4% pilocarpine gel
 - Topical products containing tea-tree oil
 - Oral ivermectin



MGD

Ocular lubricants

- As MGD results in ↓ lipid layer thickness, it may be beneficial to replace the lipids with ocular lubricant eye drops or sprays that contain lipids
- A number of studies have found an improvement in signs and symptoms with the use of lipid-based drops
- To enhance the potential performance of lipid-based drops, **nanotechnology** concepts have been incorporated into lipid emulsion eye drops

Warm compress

- Despite the proven efficacy of warm compresses in many clinical studies, **compliance** is often poor due to the time required and the difficulty in maintaining the temperature of the compress for an extended period of time
- Several commercially available products
- Bundle method



Where do steroids fit into your dry eye treatment?



LFA-1 Antagonist


- Lifitegrast ophthalmic solution, 5.0%
 - Small molecule integrin antagonist
 - Engineered to mimic ICAM-1's binding domain to LFA-1
 - Believed to act as a competitive antagonist to block binding of LFA-1 and ICAM-1
 - Resulting in inhibition of T-cell activation, migration, cytokine release and reduction in further T-cell recruitment





Other Treatments

- Inflammatory modulation with systemic and topical antibiotics
- Macrolide therapy
- Tarsorrhaphy
- Surgical treatment for conjunctivochalasis
- Essential blepharospasm treatment with botulinum neurotoxin
- Lid corrections
- Dietary modifications
- General hydration state
- Essential Fatty Acids
- Local environmental factors
- Herbal remedies
- Honey
- Milk
- Acupuncture



Do you recommend any homeopathic products?

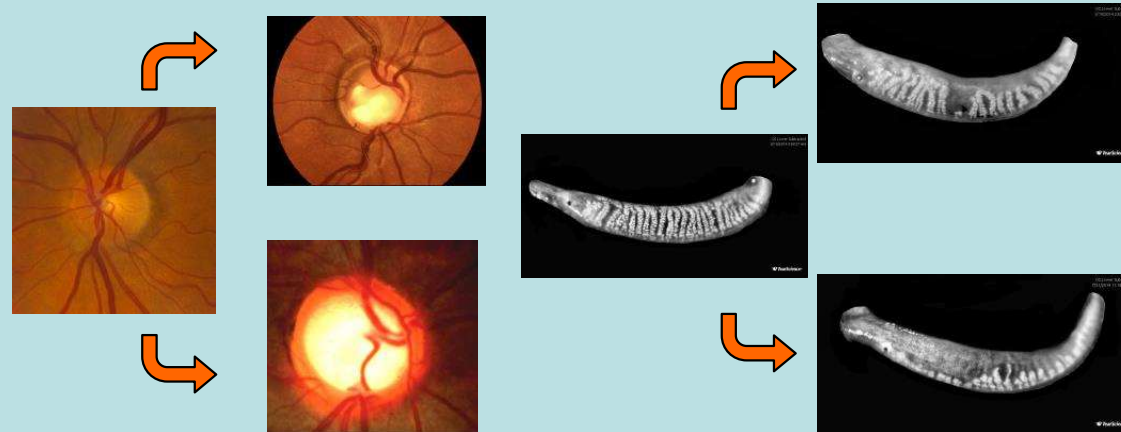




Advances in OSD: Treating MGD

Meibomian Gland Structure

Visualization Prioritizes Therapy



Now MGD is detected and managed with ability to also visualize structure
Any compromise to gland structure is an indication to consider therapeutic intervention

Non-Obvious MGD (NOMGD)

- MGD may be **nonobvious without inflammation** and without other obvious signs (NOMGD)
- NOMGD may **be precursor** to obvious MGD
- Highly prevalent and under-diagnosed – may be **most common** cause of evaporative eye disease
- In a recent dry eye study of the 52 subjects that had MGD, **48% of them had NOMGD.**

MGD : What is base cause

- OBSTRUCTION
 - OR
- INFLAMMATION

MGD Defined

Meibomian gland dysfunction (MGD) is 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