Dry Eye 101: Comprehensive Understanding and Practical Implementation

Inna Lazar, OD
Founder of Greenwich Eye Care & PRO EYECARE
Advisor, Speaker, Content Creator

William Trattler, MD
Center for Excellence In Eye Care
Miami, FL

Disclosures:
Inna Lazar, OD

GREENWICH EYE CARE
DR INNA LAZAR

- XXX

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William Trattler, MD

Baptist Hospital, Miami, FL

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Do you currently treat Dry Eye in your practice?

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Do you utilize treatments other than drop therapies for managing dry eye?

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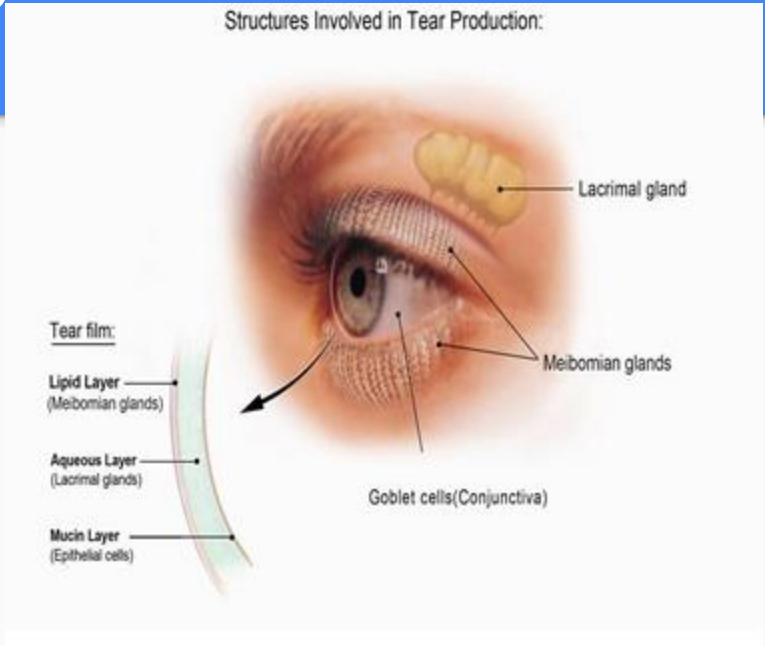
What is Dry Eye Disease?

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.



mul·ti·fac·to·ri·al
/ˌməltēˌfakˈtôrēəl/
adjective

1. Involving or dependent on a number of factors or causes.

OSD and Dry Eye Disease

What is the difference?

Ocular surface disease:

- A broader term that encompasses any condition affecting the ocular surface (conjunctiva, cornea, tear film)

- Includes dry eye disease but also has other conditions like allergic conjunctivitis, microbial keratitis, corneal abrasion

Dry Eye Disease

Dry eye disease, also known as dry eye syndrome, is a common eye condition that occurs when:

- eyes do not produce enough tears
- poor quality of the tears

Tear Film Instability

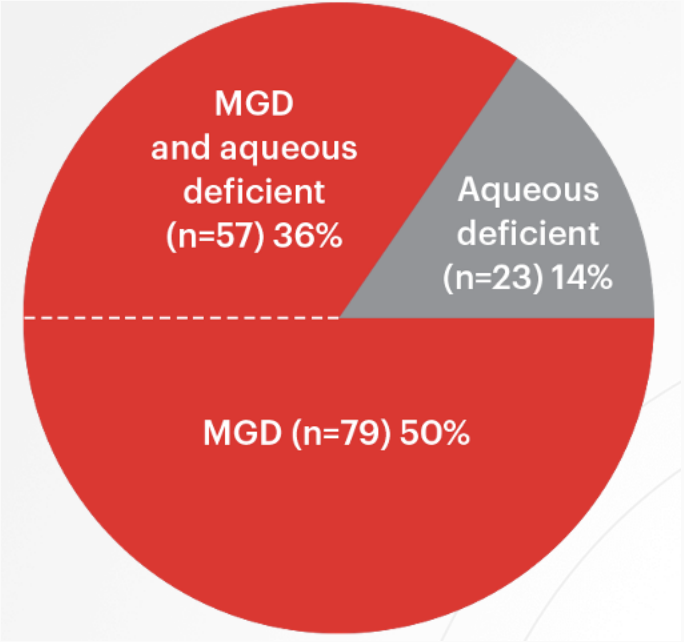
Dry Eye Disease:
Aqueous deficiency & **Evaporative Dry Eye**

- Two main subtypes of dry eye disease:
  - **Aqueous deficiency**
  - **Evaporative Dry eye**

Lemp

Evaporative Dry Eye (MGD) is Surprisingly a Leading Cause of Dry Eye Disease

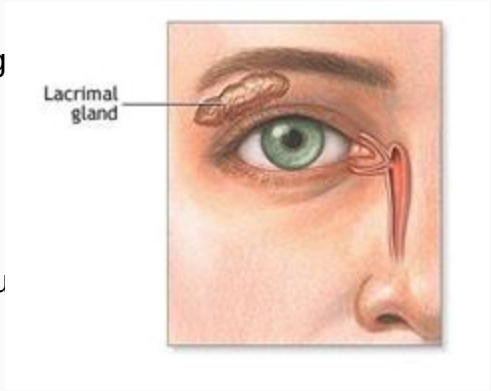
- Frequently, these co-exist:
  - 86% of patients have an evaporative component of DED



Reference: . Lemp MA, et al. Cornea. 2012;31(5):472-478

Aqueous Deficiency Dry Eye (ADDE)

1. **Definition and Cause:**
   - Aqueous deficiency is caused by reduced aqueous production from the lacrimal g
2. **Prevalence in Dry Eye Disease:**
   - Represents only about 15% of all dry eye disease cases.
3. **Types of Aqueous Deficiency:**
   - **Sjögren's Syndrome-Related:**
     - A part of Sjögren's syndrome, an autoimmune disorder that affects aqueou producing glands.
   - **Non-Sjögren's Syndrome-Related:**
     - Aqueous deficiency not linked to Sjögren's syndrome, possibly due to other systemic conditions or factors. (***Age, Lifestyle Factors, smoking, Medications)***
       - *Signs and symptoms can worsen after some ocular surgeries*



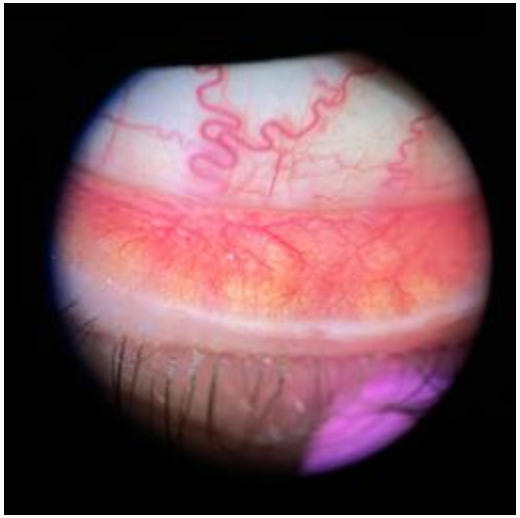
Evaporative Dry Eye (EDE)

1. **Overview of Evaporative Dry Eye:**
   - Caused by a deficient lipid layer in the tear film, leading to increased tear evaporation.
2. **Primary Cause - Meibomian Gland Dysfunction:**
   - Accounts for over 85% of dry eye disease cases.
   - Involves dysfunction of the glands responsible for the lipid layer in tears.
3. **Blepharitis: A Key Factor:**
   - Both a cause an effect of meibomian gland dysfunction.
   - Characterized by inflammation of the eyelid margins.

Evaporative Dry Eye (EDE)

MGD:

- Meibomian gland dysfunction (MGD) occurs when there is a disruption in the normal function of meibomian glands.
- This disruption can result from:
  - Gland obstruction,
  - Changes in meibum composition
  - Inflammation,
  - Impediments to meibocyte turnover.
- MGD is the leading cause or contributor to DED, accounting for nearly 86% of cases.
- In MGD, the lipid layer's integrity is compromised, leading to faster tear film breakup, reduced tear breakup time (TBUT), and evaporative dry eye.
- Disruption of the lipid layer can also trigger inflammation, exacerbating the condition



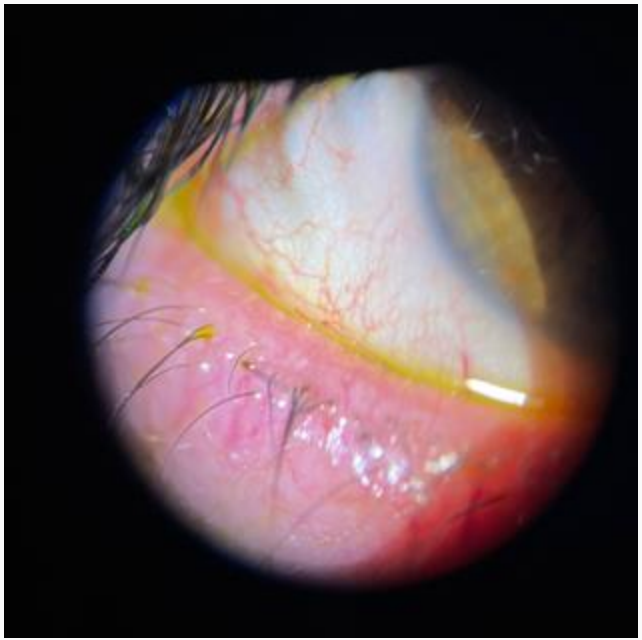
Causes of Blepharitis in Evaporative Dry Eye

1. **Conditions associated with Blepharitis/MGD:**
   - **Ocular rosacea** and atopy.
   - Seborrhoeic dermatitis.
   - Staphylococcal infection.
   - **Demodex mite** infestation.
2. **Interconnection with Dry Eye Disease:**
   - Tear deficiency can lead to increased susceptibility to infections.
   - Dry eye disease can be both a cause and a consequence of blepharitis.
3. **Clinical Implications:**
   - Importance of accurate diagnosis for effective treatment.
   - Consideration of underlying conditions in the management of evaporative dry eye.

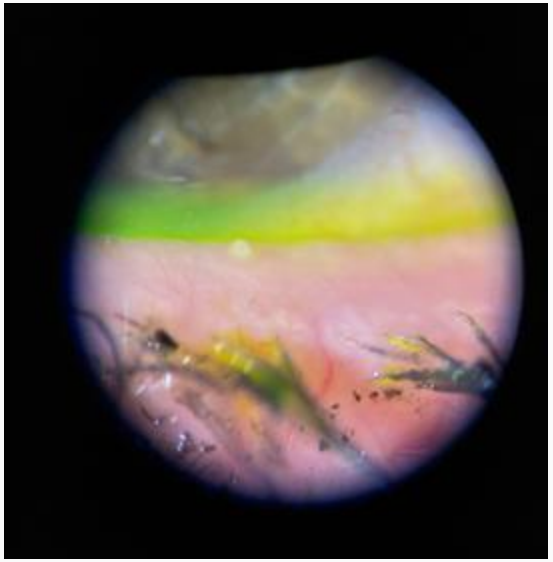
Differential Diagnosis of Blepharitis in Evaporative Dry Eye

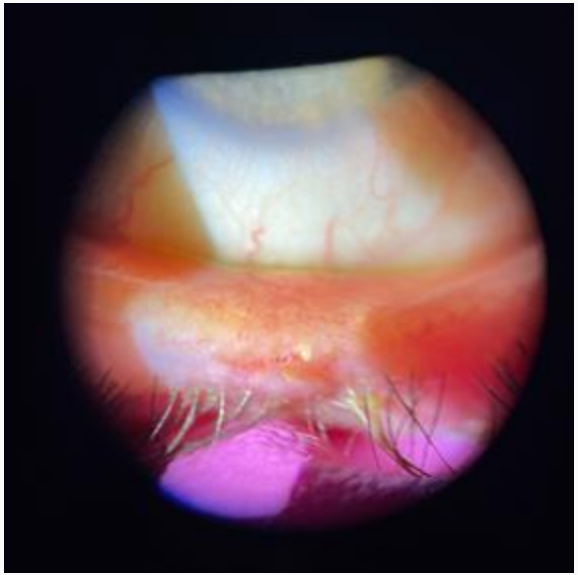
Ocular Rosacea

- Ocular rosacea features fine spider-like blood vessels called telangiectasia on the lid margin and conjunctiva, causing redness and irritation.
- Environmental triggers like heat, cold, spicy foods, alcohol, and cosmetics worsen inflammation and flushing of these vessels.
- Ocular rosacea affects sebaceous glands, including meibomian glands, leading to inflammation and Meibomian Gland Dysfunction (MGD).
- Altered meibum quality due to MGD can promote bacterial overgrowth, exacerbating MGD and inflammation.
- Increased epithelial cell turnover in rosacea may cause debris buildup, blocking meibomian gland orifices.
- Ocular rosacea causes significant eye and lid redness due to abnormal dilated vessels.
- An association exists between ocular rosacea and Demodex, often coexisting,

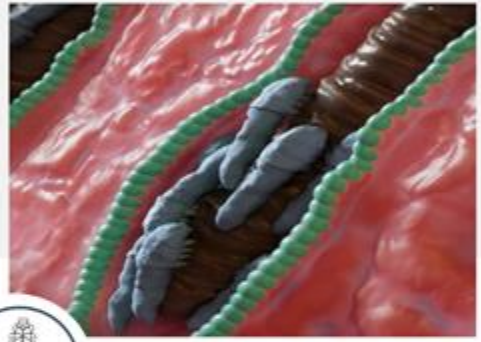


Differential Diagnosis of Blepharitis in Evaporative Dry Eye





DEMODEX BLEPHARITIS | MECHANISMS OF DISEASE

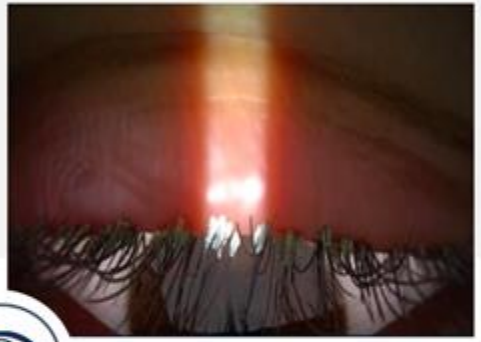


MECHANICAL

Lash distension occurs as *Demodex* mites attach to follicles.[1,3,4]

BACTERIAL

Demodex mites carry bacteria on their surface, and inside their abdomen, which may elicit immune responses.[2,4-6]



CHEMICAL

Demodex mites, along with their debris and digestive enzymes, can contribute to inflammation in the eyelid margins and surrounding tissues.[1,2]

1. Fromstein SR et al. *Clin Optom (Auckl)*. 2018;10:57-63. 2. Rhee MK et al. *Eye Contact Lens*. 2023;10.1097. 3. Zhang AC et al. *Ophthalmic Physiol Opt*. 2020;40(4):389-432. 4. Liu J et al. *Curr Opin Allergy Clin Immunol*. 2010;10(5):505-510. 5. Zhu M et al. *Front Microbiol*. 2018;9:1719. 6. Li J et al. *Ophthalmology*. 2010;117(5):870-877.

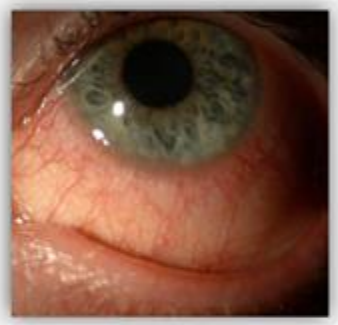
MANIFESTATIONS AND CO-MORBIDITIES OF *DEMODEX* BLEPHARITIS[1,2]

Eyelash Abnormalities

Image courtesy of Paul Karpecki, OD, used with permission.

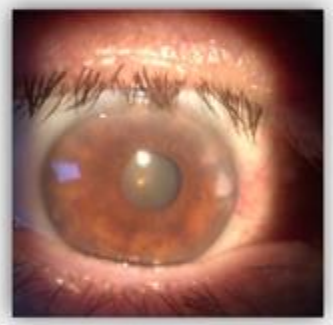
Lid Margin Inflammation

Image courtesy of Paul Karpecki, OD, used with permission.



Conjunctival Inflammation

Image courtesy of Elise Kramer, OD, used with permission.



Corneal Manifestations

Image courtesy of Cory Lappin, OD, used with permission.

Chalazia

Image courtesy of Cory Lappin, OD, used with permission.

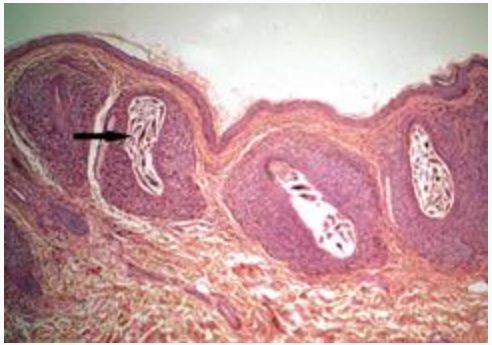
1. Fromstein SR et al. *Clin Optom (Auckl)*. 2018;10:57-63. 2. Rhee MK et al. *Eye Contact Lens*. 2023;10.1097

Introduction to the BEISTO

1. **Historical Perspective on Dry Eye Treatment:**
   - Early treatments predominantly focused on steroid drops for managing symptoms and immune response due to dry eye.
2. **Beyond Steroids - Recognizing Chronic Factors:**
   - Acknowledging the chronic aspect of meibomian gland disease in dry eye conditions.
3. **BEISTO - Concept by Dr. Laura Periman:**
   - A concise framework coined as BEISTO to encapsulate key factors in chronic dry eye disease.

B

Bugs and bacteria—Demodex mites and bacteria can cause inflammation or blockage of meibomian glands.



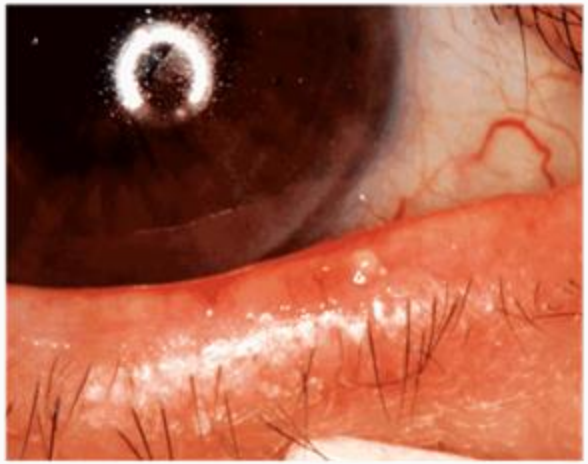
E

Enzymatic compromise—Medications, inflammation, and omega-3 deficiency can prevent the normal production of healthy meibum.

Inflammation—This can be local or systemic.

S

Stasis—If the meibum becomes too thick, it can’t move and clogs the pores.



Expression of the meibomian glands and noting the quality of the secretions is a key to diagnosis.

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Do you express in office for diagnostic purposes?

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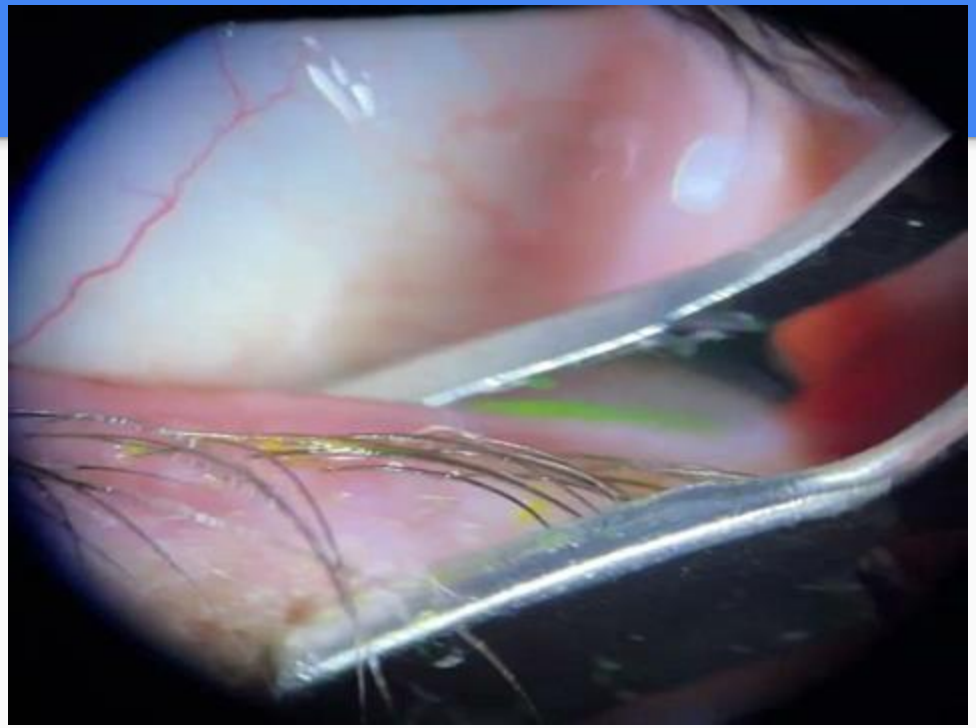


T

Temperature—Abnormal meibum melts at a higher temperature than normal meibum.

O

Obstruction—Whether from Demodex mites or abnormal meibum, clogged glands cause dry eye symptoms because of the lack of tears.

The Three Layers of Tears

Tears are made up of three layers: *oil, aqueous, and mucin*

Oil Layer

The *oil* layer is the outermost layer of tears and is produced by the meibomian glands in the eyelids. It helps to prevent the water layer from evaporating too quickly and keeps the eyes moist.

The Three Layers of Tears

Aqueous Layer

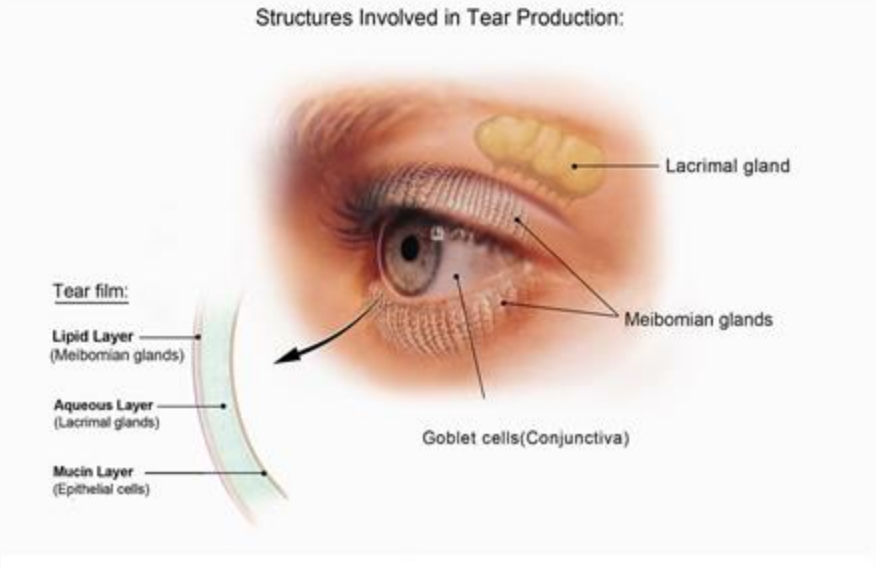
The *aqueous* layer is the middle layer of tears and is produced by the lacrimal gland in the eye. It helps to lubricate the eyes and remove debris and bacteria.

The Three Layers of Tears

Mucin Layer

The *mucin* layer is the innermost layer of tears and is produced by the goblet cells of the conjunctiva, a thin membrane that covers the white part of the eye. It helps to prevent irritants and bacteria from entering the eye.

The Three Layers of Tears



Causes of Dry Eye:

Dry eyes can develop for many reasons, including:

- Aging: Dry eyes are a part of the natural aging process—the majority of people over age 65 experience some symptoms of dry eyes.

- Gender: Women are more likely to develop dry eyes due to hormonal changes caused by pregnancy, the use of oral contraceptives, and menopause. (the prevalence in women is almost double that in men)

Causes of Dry Eye:

- Environmental factors: Dry air, wind, and smoke can all contribute to dry eyes.
  - **Failure to blink** regularly, such as when staring at a computer screen for long periods, can also contribute to the drying of the eyes.
- Medical conditions:
  - People with rheumatoid arthritis, diabetes, and thyroid problems are more likely to have symptoms of dry eyes.
- Topical ocular medications
  - **Glaucoma drops**
- Eye surgery:
  - A High percentage of patients have dry eye prior to undergoing eye surgery
  - Surgery itself can worsen dry eye short term
  - Post operative medications can exacerbate dry eye

Dry Eye Study: P.H.A.C.O.:

Prospective Health Assessment of Cataract patient's Ocular surface

Objective:

- To determine the prevalence of dry eye in patients undergoing cataract surgery

Methods:

- Prospective, multi-center study (9 sites)
  - Mark Packer, MD
  - Damien Goldberg, MD
  - Parag Majmudar, MD
  - Eric Donnenfeld, MD
  - Marguerite McDonald, MD
  - Karl Stonecipher, MD
  - Jon Vukich, MD
  - Chaz Reilly, MD
  - Gregg Berdy, MD
  - Ranjan Malahotra, MD
  - William Trattler, MD

Note: Prevalence of dry eye was expected to be 20-30%

- 136 patients (272 eyes) scheduled for cataract surgery
  - Avg Age: 70 yrs old (range: 54 to 87)

Unrestricted Grant from Allergan

Dry Eye Study: P.H.A.C.O.:
Prospective Health Assessment of Cataract patients Ocular surface

Are Cataract Surgery Patients Symptomatic for Dry Eye?

- Foreign body sensation complaints:
  - **59%**: Never
  - **28%:** Some of the time

  87%

FBS: Half, most or all of the time:
Only **13%** of patients

Tear Break up Time

- What time is considered abnormal?
  - 5 seconds?
  - 7 seconds?
  - 10 seconds?

Dry Eye Study: P.H.A.C.O.:
Prospective Health Assessment of Cataract patients Ocular surface

Results: Tear Break up Time

N = 136 patients (272 eyes) from 9 Centers

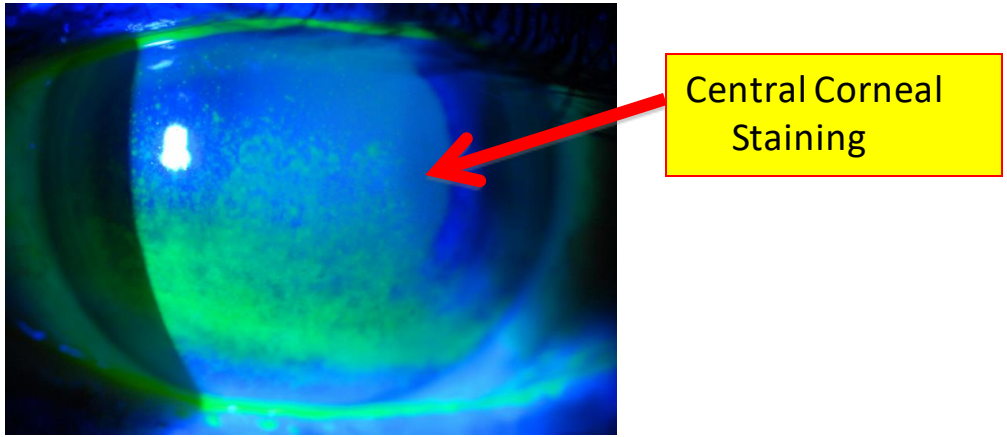
- Average TBUT: **4.95 seconds**
  - # of eyes with TBUT ≤ 5 seconds: 171 eyes **(62.9%)**

Dry Eye Study: P.H.A.C.O.:
Prospective Health Assessment of Cataract patients Ocular surface

Corneal Staining

N = 136 patients (272 eyes)

- Positive Corneal Staining: 209 eyes (76.8%)
- **Central** Corneal Staining: 136 eyes (50%)



Dry Eye Study: P.H.A.C.O.:
Prospective Health Assessment of Cataract patients Ocular surface

Schirmer's Scores

N = 136 patients (272 eyes)

- Eyes with Schirmer's score ≤ 5: 58 eyes (21.3%)
- Eyes with Schirmer's score ≤ 10: 132 eyes (48.5%)

Dry Eye Study: P.H.A.C.O.: Prospective Health Assessment of Cataract patients Ocular surface

Summary: Patients scheduled for cataract Surgery

- Patients are often **asymptomatic**
- Dry eye signs very common in patients scheduled for cataract surgery
  - TBUT:
    - More than **60%** with very abnormal TBUT (≤ 5 seconds)
  - Corneal Staining
    - **50%** with Central staining
  - Schirmer's score
    - **21.3%** with very low Schirmer's (≤5mm)

Additional Causes of Dry Eye

- Blepharitis/meibomian gland disease–rosacea, seborrhoeic dermatitis, staphylococcal infection, *Demodex* mite infestation
- Lagophthalmos – facial nerve palsy, proptosis, vertical lid shortening
- Decreased blinking – prolonged computer use or other visual task, Parkinson's disease
- Ocular autoimmune disease – atopy, cicatricial pemphigoid
- Systemic autoimmune disease – Sjögren's syndrome, lupus, scleroderma, chronic graft-versus-host disease, rheumatoid arthritis

Causes of Dry Eye

- Other medical causes – vitamin A deficiency, hepatitis C, thyroid disorders
- Antihypertensives, antihistamines and antidepressants
- Exogenous factors – radiation therapy, chemical injuries
- Low-humidity environments e.g. air conditioning or heating
- Low intake of omega-3 fatty acids (extremely underrated)

Hormonal Influences on Ocular Surface

- Sex Steroids: Androgens (such as testosterone), estrogens, and progestins.
- Glucocorticoids.
- Hormones from the hypothalamic-pituitary axis.
- Insulin-like growth factor 1.
- Insulin.
- Thyroid hormones.

Advancing age significantly increases the risk of developing dry eye disease.

*TFOS **DEWS II Report***

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what is the primary factor contributing to the increase in Dry Eye Disease (DED) prevalence with age?

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Hormonal Influences on Ocular Surface

Meibomian gland is an androgen target organ.

Androgens promote lipogenesis and suppress keratinization in this tissue.

Androgen deficiency can lead to MGD and evaporative DED.

Topical or systemic androgen administration has been reported to alleviate signs and symptoms of DED in both women and men

*TFOS **DEWS II Report***

Hormonal Influences on Ocular Surface

Investigational: Treatment with Topical Testosterone

Clinical trials have shown that treating Meibomian Gland Dysfunction (MGD) with topical testosterone improves the quality of meibomian gland secretions and reduces ocular discomfort. This indicates a hormonal influence in dry eye conditions.

*TFOS **DEWS II Report***

Common misconceptions related to Hormonal Influences on Ocular Surface

Menopause is associated with an increased occurrence of dry eye.

The report clarifies that while the prevalence of dry eye is higher in females than males across different life stages, and DED prevalence increases gradually with age, this is not solely due to an abrupt decline in ovarian estrogen at menopause.

Instead, it is more likely related to a decrease in serum androgen levels due to aging. This indicates that the link between hormones and dry eye is more complex than commonly assumed.

*TFOS **DEWS II Report***

Diagnosing Dry Eye Disease: Challenges and Patient Symptoms

Diagnostic Challenges:

- Variability in clinical presentation makes an accurate diagnosis of dry eye disease difficult.
- Importance of considering both **subjective** patient reports and **objective** clinical signs for accurate diagnosis

Diagnosing Dry Eye Disease: Challenges and Patient Symptoms

Non-specific symptoms often reported by patients include:

- Visual disturbances.
- Photophobia (sensitivity to light).
- Ocular discomfort, characterized by:
  - Foreign body sensation in the eye.
  - Grittiness.
  - Burning sensation.
  - My favorite, if not sure to ask about *eye fatigue

Diagnosing Dry Eye Disease: Challenges and Patient Symptoms

Symptoms of Dry Eyes

Dry eyes can cause a variety of symptoms, including:

- Dryness or grittiness in the eyes
- Watery eyes
- Redness or inflammation of the eyes
- Stringy mucus near the eye
- Blurred vision or sensitivity to light
- Stinging, scratching, or burning sensations
- *Eye Fatigue*

Paradoxical Symptoms of Dry Eye Disease

Excessive Wateriness as a Symptom:

- Despite being a condition characterized by 'dryness', patients may experience excessive tearing.
- This is a reflex response to ocular discomfort or evaporative dry eye (which one is it?)

Paradoxical Symptoms of Dry Eye Disease

The Reflex Tearing Mechanism:

- Discomfort in the eyes triggers a reflex that leads to excessive tear production.
- This reflex is the body's natural response to soothe the irritation.

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Would you use punctal plugs to treat this patient?

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Paradoxical Symptoms of Dry Eye Disease

Clinical Implications:

- Importance of recognizing reflex tearing as a symptom of dry eye, not as an indication of normal tear function.
- There is a need for patient education about this paradoxical symptom.

Correlation Between Symptoms and Clinical Signs

Variability in Symptom Severity:

- The severity of symptoms reported by patients often does not align with clinical signs observed at the slit lamp examination.

Some patients: Very symptomatic with only mild signs
Other patients: Minimal symptoms, but moderate to severe signs

Correlation Between Symptoms and Clinical Signs

Factors Influencing Discrepancy:

- **Low Pain Threshold:**
  - In some patients, symptoms may appear more severe than clinical signs indicate
    - Symptoms > Signs
- **Reduced Corneal Sensation:**
  - Conversely, some patients may show more severe signs than they report in symptoms
    - Signs > Symptoms
    - Rule out a neurotrophic cornea

Correlation Between Symptoms and Clinical Signs

Diagnostic Considerations:

- Need for a comprehensive approach considering both subjective patient reports and objective clinical findings.
- Awareness of these discrepancies is crucial for accurate diagnosis and treatment planning.

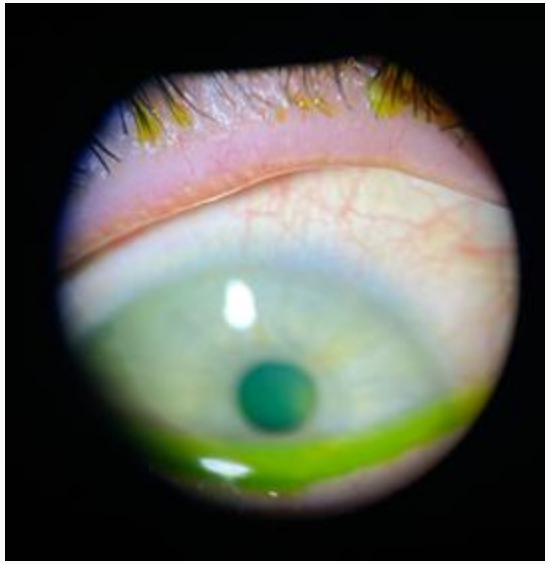
Differential Diagnosis and Referral in Dry Eye Disease

Beyond Dry Eye: Recognizing Differential Diagnoses

Symptoms Overlapping with Other Conditions:

- Dry eye symptoms may mimic those of unrelated eye conditions, such as:
  - Ocular allergy.
  - Corneal erosion.
  - Presence of a foreign body in the eye.
  - Nasolacrimal Duct Obstruction

Patient Unilateral Epiphora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Which symptom is most commonly associated with eye allergies?

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Which symptom is most commonly associated with Demodex Blephiritis?

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Which symptom is most commonly associated with DED?

ⓘ Click **Present with Slido** or install our Chrome extension to activate this poll while presenting.

Dry Eye Disease (DED) and Ocular Allergy (OA):

- DED and OA are the most common inflammatory disorders of the ocular surface.
- Global prevalence of DED: 5–50%; 16+ million Americans diagnosed.
- One-third of the global population is affected by systemic allergic disease
  - 40-80% of these have OA symptoms.
- Challenges in distinguishing between DED and OA; often coexist.
- Discrepancy between reported symptoms & observed signs in DED.

Psychological Impact and Quality of Life

- Up to 46% of DED and OA patients experience a decline in quality of life.
- DED has a significant psychological impact, affecting daily activities.

Reports of willingness to shorten lifespan for relief from DED

Diagnosis & Assessment

Ocular Surface Staining in Dry Eye Disease

Loss of Glycocalyx Barrier and Cell Shedding:

- Dry eye disease disrupts the protective glycocalyx barrier, leading to increased shedding of corneal and conjunctival epithelial cells.

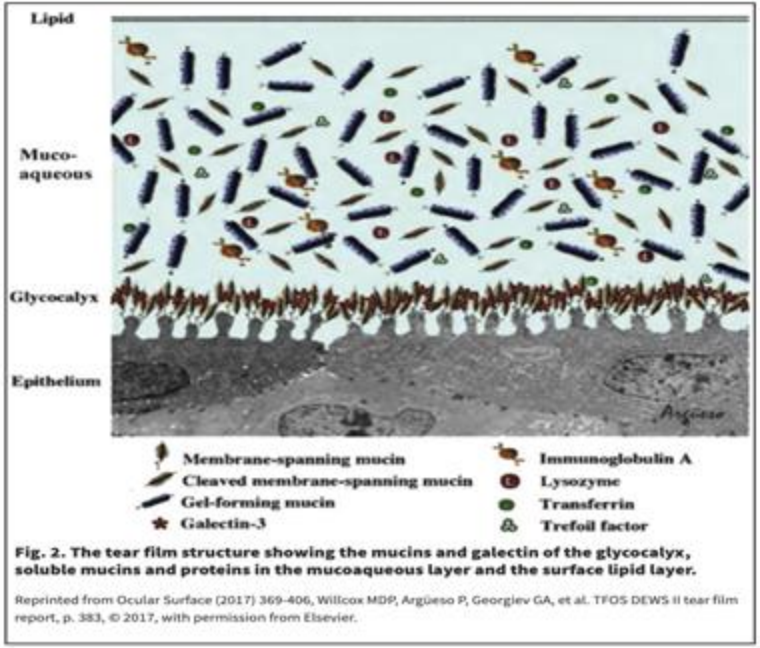


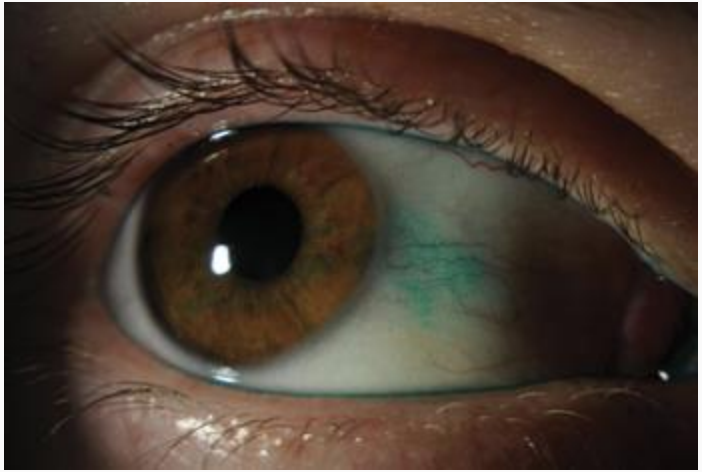
Fig. 2. The tear film structure showing the mucins and galectin of the glycocalyx, soluble mucins and proteins in the mucoaqueous layer and the surface lipid layer.

Reprinted from Ocular Surface (2017) 369-406, Willcox MDP, Argüeso P, Georgiev GA, et al. TFOS DEWS II tear film report, p. 383, © 2017, with permission from Elsevier.

Diagnosis & Assessment

Role of Vital Dyes in Diagnosis:

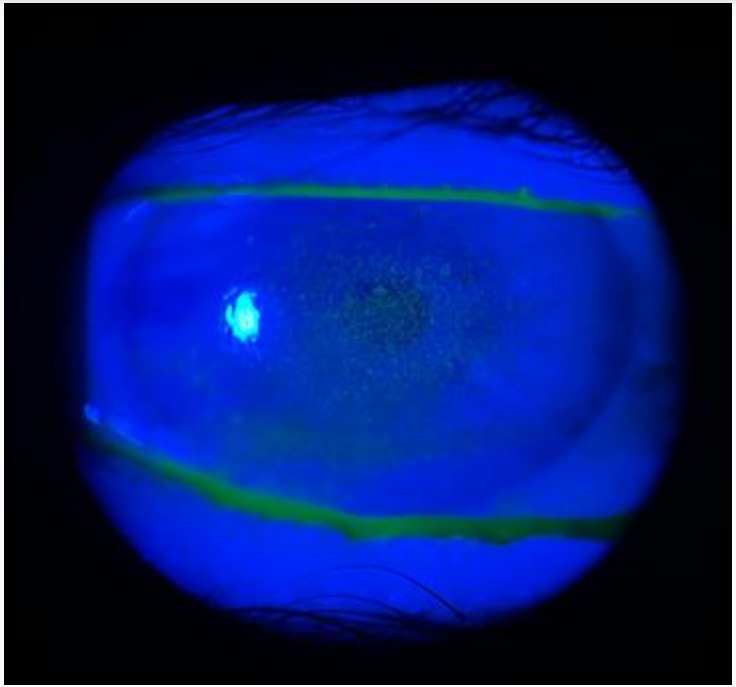
- Vital dyes like Sodium Fluorescein, Lissamine Green, and Rose Bengal are essential tools in modern eye care.
- Enhanced Diagnosis: provide clear visualization of ocular surface conditions.
- Safety: ability to penetrate without damage makes them a safe choice for repeated use.
- Versatility: Each dye has unique properties making them suitable for different diagnostic purposes.



Stains

Sodium Fluorescein (NaFl)

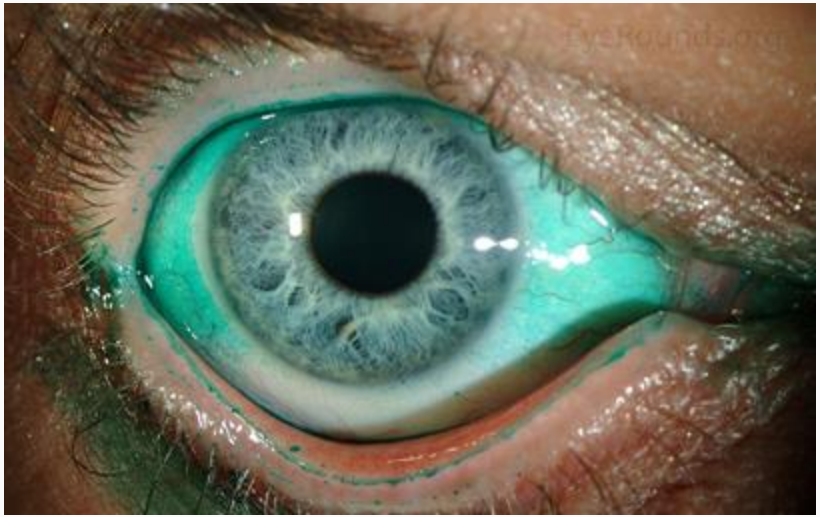
- Most commonly used vital dye in eye care practice
- Applications: Epithelial defects, corneal abrasions, corneal ulcers, and detecting foreign bodies, Seidel sign, Jones Dye Test nasolacrimal duct obstruction evaluating tear meniscus and TBUT



Stains

Lissamine Green

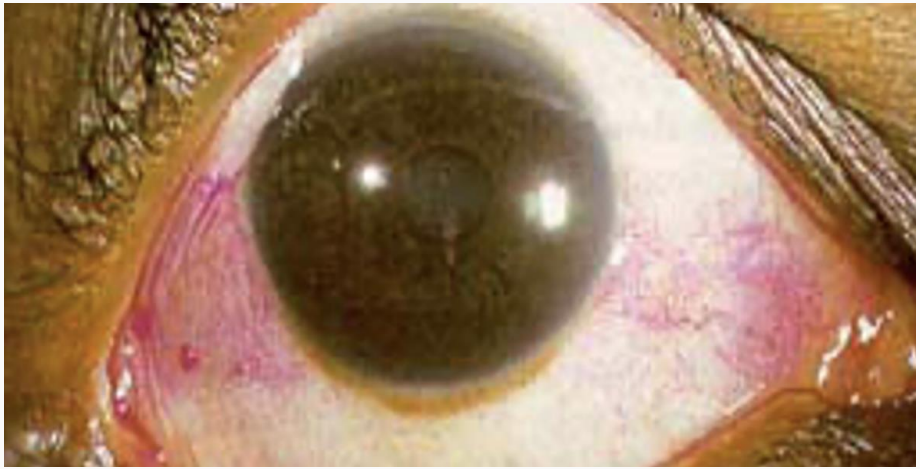
- Stains dead or devitalized cellular tissue
- Useful for evaluating the superior conjunctiva in cases of suspected SLK.
    - Significant stain of the superior bular conj will be visible
- A helpful tool for diagnosing conditions involving mucin layer disruptions particularly useful for dry eye syndrome.
    - In Dry eye – stainng of the conjunctival is visible



Stains

Rose Bengal

- Stains dead or devitalized cellular tissue
    - Staining of the conjunctiva is visible in dry eye disease



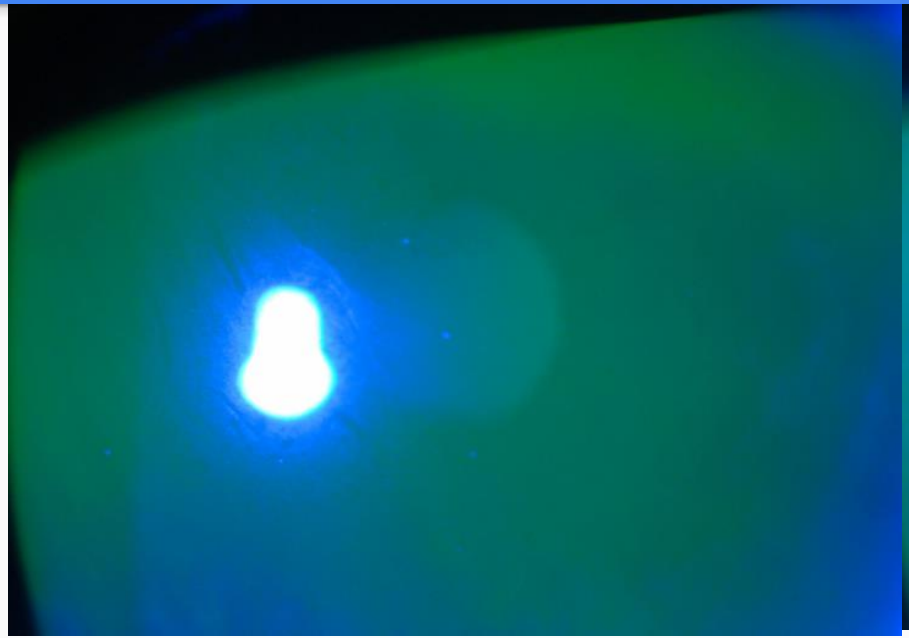
Tip of the day

- Question: After flourescein dye placed – how many seconds should one wait prior to determining the degree of corneal staining?
  - Immediately
  - 10 seconds
  - 30 seconds
  - 3 minutes

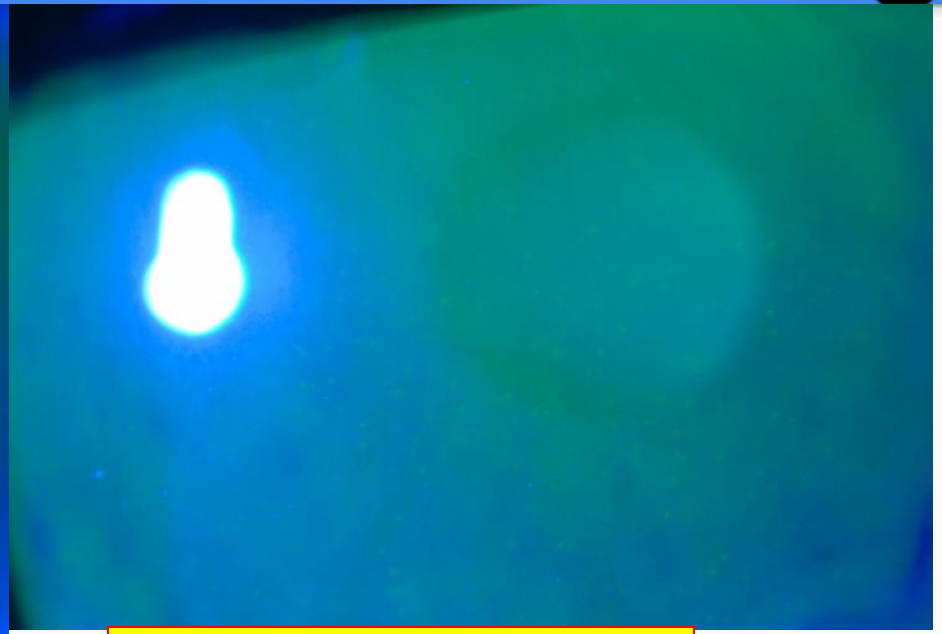
Tip of the day: Answer

- Maximal corneal staining will be seen in approximately 3 minutes
- Some staining may be visible quickly
- In some cases – no staining is visible immediately, but after 30 seconds staining becomes visible

Tip of the day: Maximal corneal staining will be seen in approximately 3 minutes



No staining visible immediately



Staining visible 30 seconds after administration of dye

slido

Do you perform your own refraction?

ⓘ Click **Present with Slido** or install our Chrome extension to activate this poll while presenting.

In Office Diagnostic tools

1. DEQ5/SPEED Standard Patient Evaluation of Eye Dryness Questionnaire
2. Tear Osmolarity
3. Shirmer's Test
4. InflammaDry
5. Meibography
6. *REFRACTION*
7. Slit Lamp Exam (lid structure and blink dynamics)
8. Lash/ Lid analysis (telangiectasia, ect)
9. Meibomian gland expressibility
10. Eyelids and Corneal (where is SPK)
11. TBUT and Tear Prism
12. Vital dyes (Sodium Fluorescein (NaFl)/ Lissamine staining)

Dry Eye Triaging

- How severe is the eye discomfort?
- Do you have any mouth dryness or swollen glands?
- How long have your symptoms lasted & was there any triggering event?
- Is your vision affected, and does it clear on blinking?
- Are the symptoms or redness much worse in one eye than the other?
- Do the eyes itch, appear swollen or crusty, or have given off any discharge?
- Do you wear contact lenses?
- Have you been diagnosed with any general inflammatory health conditions
- Are you taking any medication?
- *Patient history (Lash Growth serums, Accutane® Isotretinoin)*

Tip of the Day

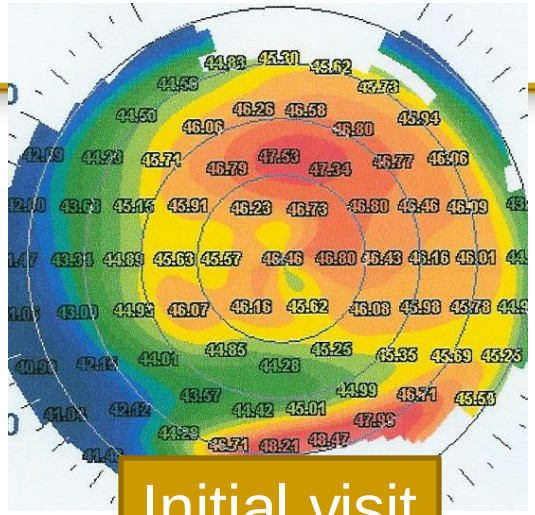
- *Ask your patient about Lash Growth serums and Accutane® Isotretinoin use*

Prevalence of Dry Eye Disease (DED): **Global Impact**:

- 5%-50% worldwide[1]
- Papas et al 2021, reported a **global prevalence of 24.9%** (Bayesian analysis; DEWS II dx criteria)[2]
- Factors associated with greater prevalence: increasing **age**, **female** sex, **Asians** > whites, use of **visual displays**[1,3-5]

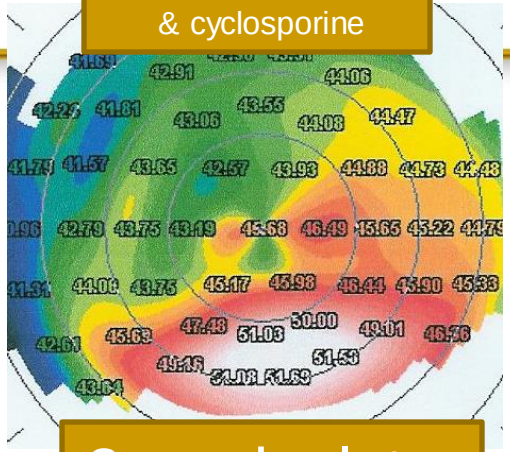
1. Stapleton F, et al. *Ocul Surf*. 2017;15(3):334-365.
2. Papas B, et al. *Ophthalmic Physiol Opt*. 2021;41:1254-1266.
3. Farrand KF, et al. *Am J Ophthalmol*. 2017;182:90-98.
4. Moss SE, et al. *Arch Ophthalmol*. 2000;118(9):1264-1268.
5. Caffery B, et al. *Ocul Surf*. 2019;17(3):526-531.

Challenging case: 72 yr old asymptomatic female with a cataract



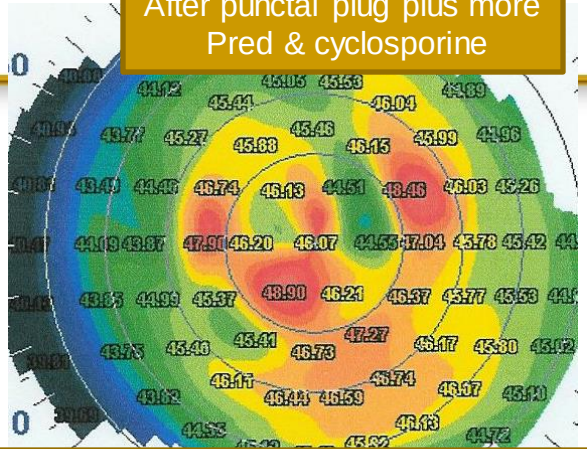
Initial visit

After 2 weeks of Pred & cyclosporine

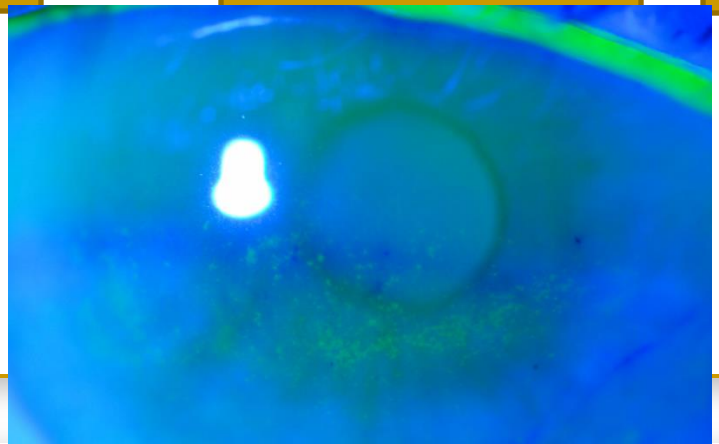


2 weeks later

After punctal plug plus more Pred & cyclosporine



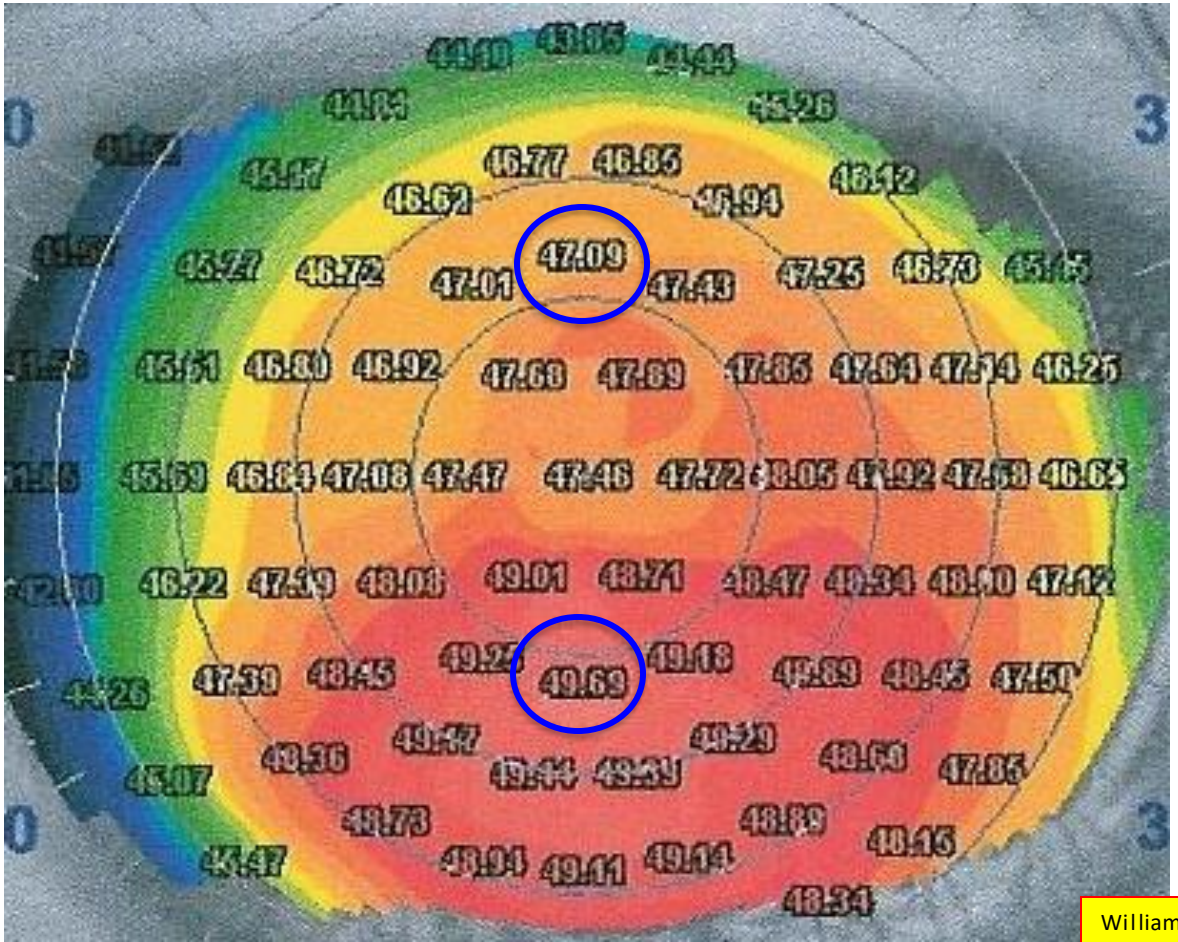
3 weeks since baseline



After 3 weeks of Pred Forte TID,
Restasis BID,
and lower punctal plug

Note: No EBMD present

75 year old female scheduled for cataract surgery?
Should we consider crosslinking first?



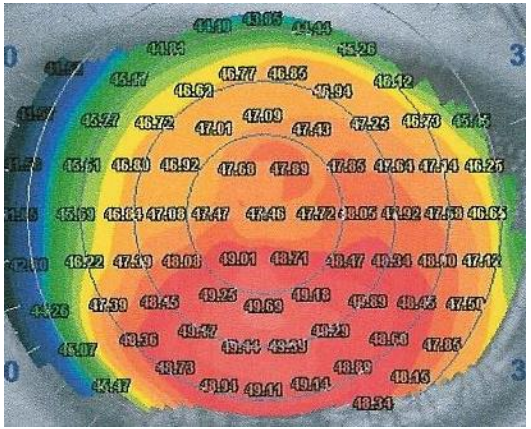
William Trattler,

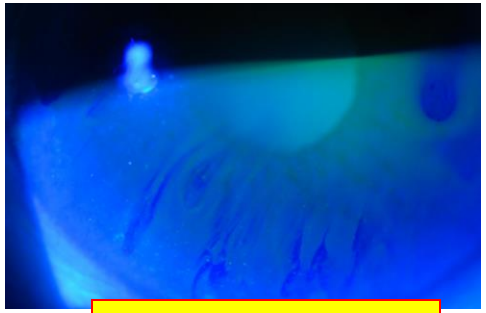
Thoughts on IOL Master Readings for this patient with mild keratoconus?

IOL Master

K1:	47.27 D	@	11°
K2:	48.08 D	@	101°
ΔD:	+0.81 D	@	101°
K1:	47.27 D	@	5°
K2:	48.42 D	@	95°
ΔD:	+1.15 D	@	95°
K1:	47.74 D	@	11°
K2:	48.08 D	@	101°
ΔD:	+0.34 D	@	101°

Topo OS





Rapid Tear Break UP

Why is the astigmatism so variable?

William Trattler,

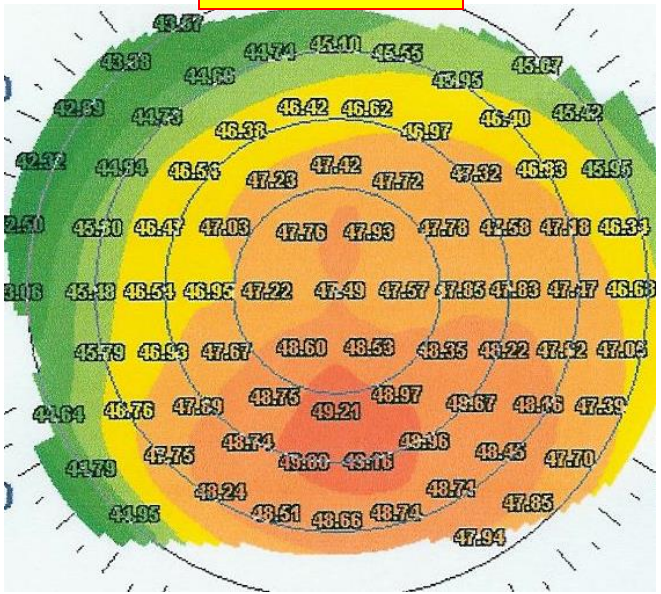
After 5 days of treatment:

-Topical steroids & Azithromycin

IOL Master

K1:	47.27 D	@	173°
K2:	48.28 D	@	83°
ΔD	+1.01 D	@	83°
K1:	47.27 D	@	3°
K2:	48.42 D	@	93°
ΔD	+1.15 D	@	93°
K1:	47.27 D	@	2°
K2:	48.63 D	@	92°
ΔD	+1.36 D	@	92°

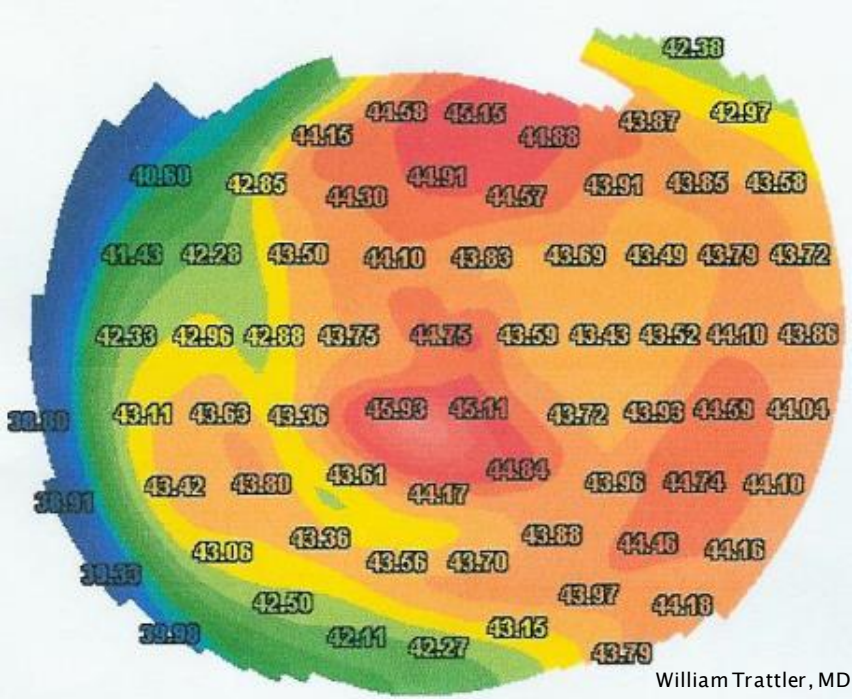
Topo OS



Improved reliability of IOL Master K's – but requires continued treatment

William Trattler,

pre-op topography



William Trattler, MD

86 year old Female:
Initial Consultation for cataract surgery

AL: 23.88 mm (SNR =
K1: 44.94 D / 7.51 mm
K2: 46.49 D / 7.26 mm
R / SE: 7.38 mm / 45.72 D
Cyl.: 1.55 D @ 49°
ACD: 3.34 mm

Status: Phakic

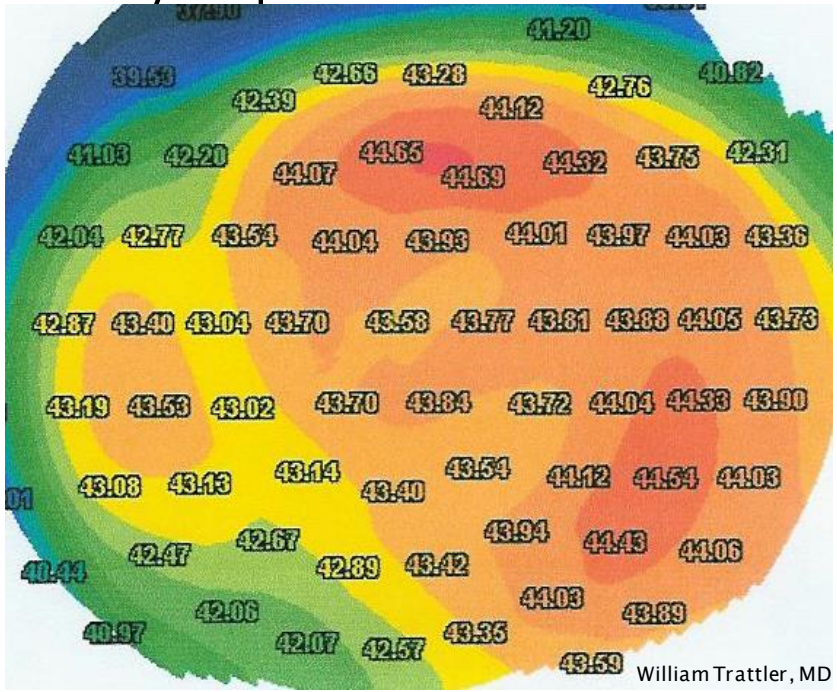
TECNIS MF1 ONE ZMB00

A const:	119.3
IOL (D)	REF (D)
20.5	-1.55
20.0	-1.23
19.5	-0.91
18.5	-0.28
17.5	0.34

William Trattler,

Dry Eye Identified:

One month later –
after topical steroids for one week &
cyclosporine BID for one month



2 D shift in IOL power (from 18.5D to 20.5D)

AL: 23.93 mm (SNR =
K1: 43.55 D 7.75 mm
K2: 43.89 D 7.69 mm
R / SE: 7.72 mm / 43.72 D
Cyl.: 0.34 D @ 103°
ACD: 3.25 mm

Status: Phakic

TECNIS MF1 ONE ZMB00

A const: 119.3

IOL (D)	REF (D)
22.5	-1.63
22.0	-1.29
21.5	-0.95
21.0	-0.61
20.5	-0.28
20.0	0.05
19.5	0.38

William Trattler,

The Prevalence of DED in the USA

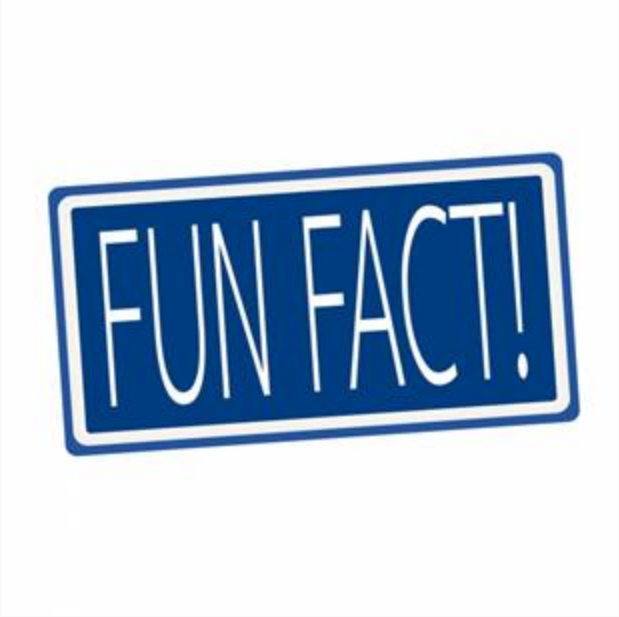
- **Official Diagnoses**:
  - 16 million Americans diagnosed with DED.
- **Potential Undiagnosed Cases**:
  - Actual numbers **significantly higher**.
- Higher in **women** than in men

- 2022 meta-analysis reports
  - US DED prevalence of 8.1%
  - MGD prevalence of 21.2%

339,996,563 people in the USA 2023

Reports & Presentations of DED

Depending upon the type of practice setting, up to 80% of patients have dry eye, while only maybe 20% are treated.



slido

Do you have Dry Eye Symptoms?

ⓘ Click **Present with Slido** or install our Chrome extension to activate this poll while presenting.

Rising Concern in Pediatric Population

- **Emerging Trend**:
  - Children are experiencing dry eyes at a rising rate.
  - New lifestyles and early-age screen use are major contributors.
  - Not well-known and often overlooked.
  - There is an urgent need to assess and manage Pediatric DED better.
  - How many times have you looked at the MG and seen a dropout and changes to the glands?

Lack of blinking

What do we know thus far about Pediatric DED?

- **Significant Concerns in Pediatric DED Management**:
  - Requirement for specific diagnostic tests.
  - Urgency for normative data.
  - Need for validated diagnostic thresholds.
  - Demand for a therapeutic algorithm tailored for children:
    - Efficacy
    - Safety
    - Impact on children's quality of life.

Screens are mesmerizing!

Implementing Dry Eye Disease Specialty into your Practice

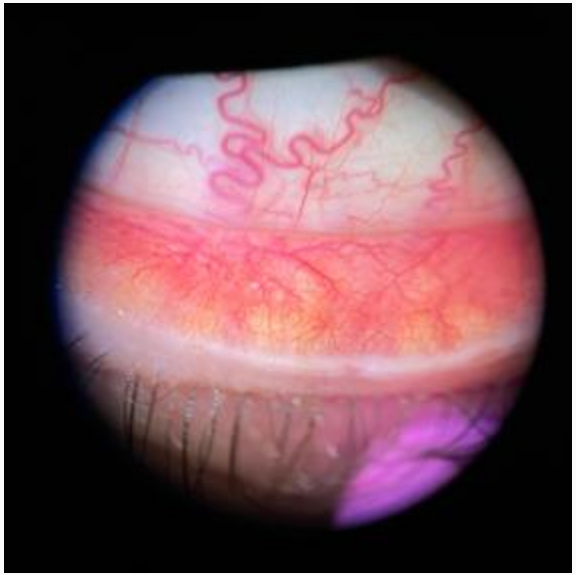
Step 1.

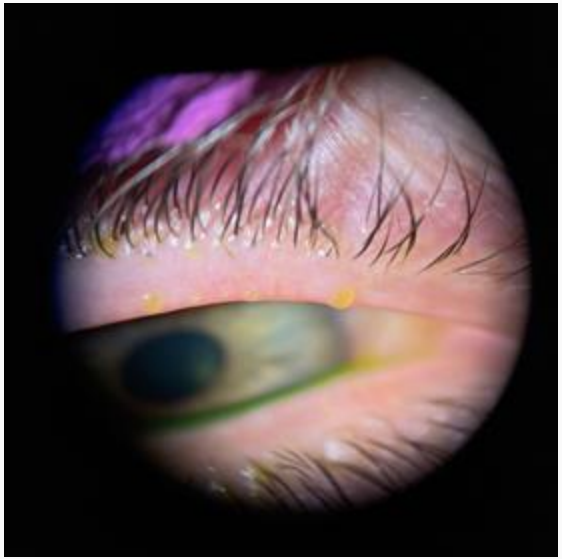
Prioritize disease detection, patient communication, and education,

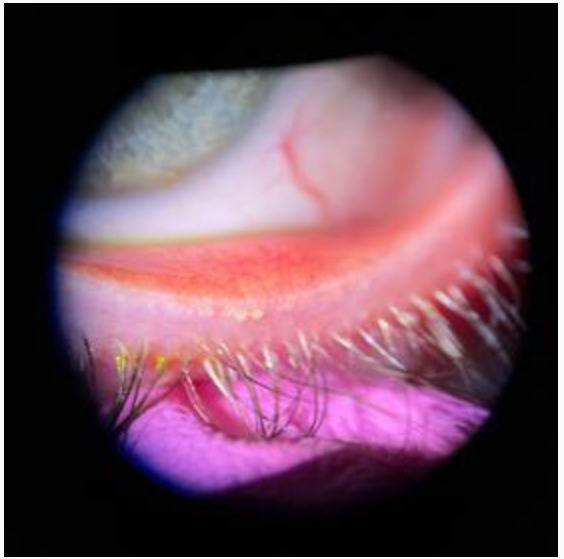
While advanced equipment can assist in measuring dryness, adopting a proactive approach to managing and treating Dry Eye Disease is great, cost-effective, and rewarding.

Implementing Dry Eye Disease Specialty into your Practice

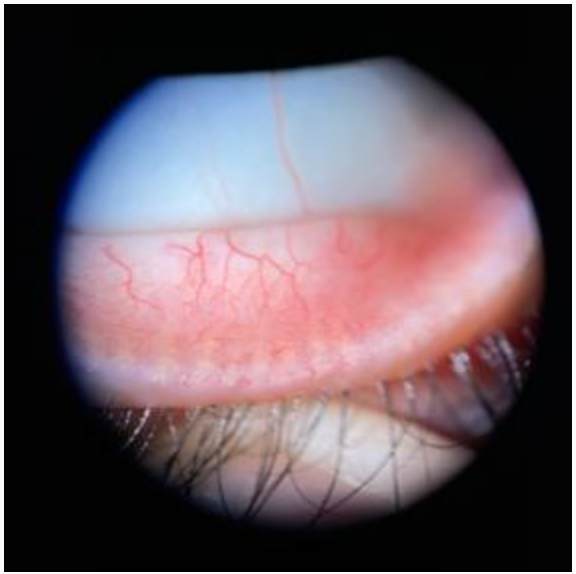
Implementing Dry Eye Disease Specialty into your Practice

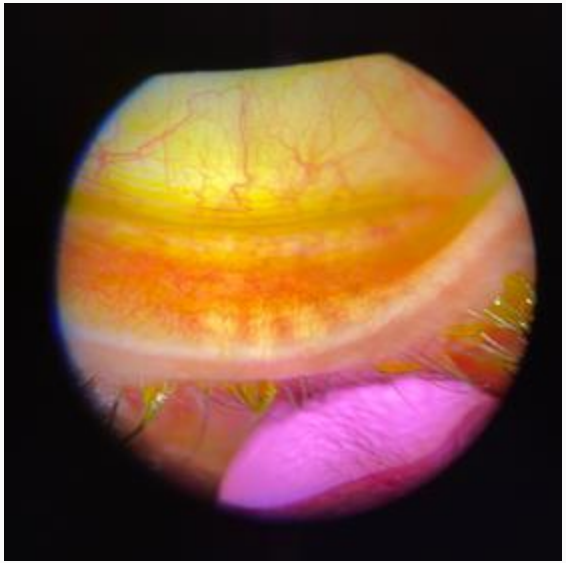






Implementing Dry Eye Disease Specialty into your Practice





Tip of the Day

ask the right questions behind the Slit lamp

Your Slit Lamp is your lie detector

Implementing Dry Eye Disease Specialty into your Practice

Step 2.

Staff Education and Consistency

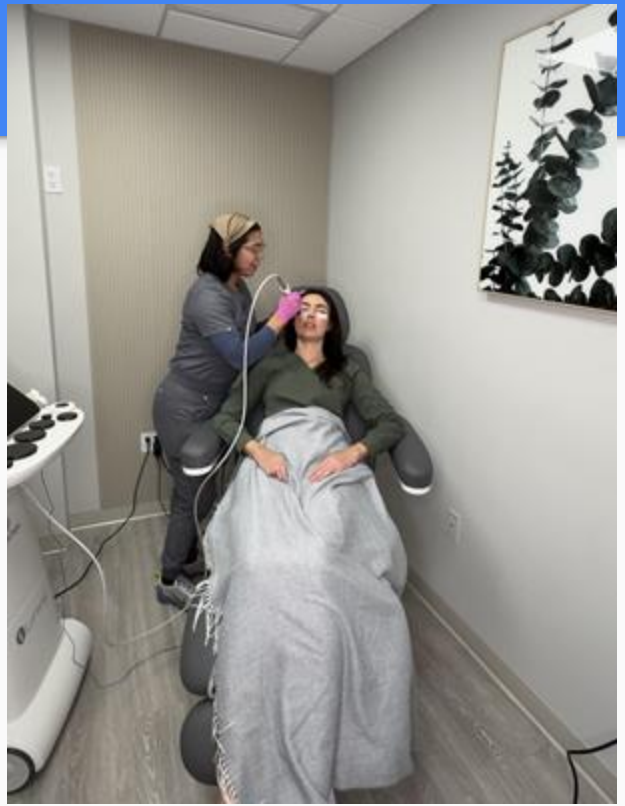
- Educate staff on terminology, processes, & your mission.
- Involve reps to assist in staff education.
- Ensure consistent language and protocols.
- Teach staff how to explain dry eye treatment to patients and have them memorize it.
- Maintain uniform language to prevent confusion.

Implementing Dry Eye Disease Specialty into your Practice

Step 2.

Enhanced Staff Involvement and Specialization

- Involve staff in experiencing dry eye treatments. (everyone)
- Appoint a full-time dry eye specialist. (key)
- Develop clear follow-up protocols for staff decision-making.
- Train your dry eye specialist to be the second-in-command.
- Responsibilities include patient education, financial discussions, in-treatment assistance, and follow-ups.
- Provide training to new staff in dry eye care.
- Educate scheduling for efficient triage and appointment scheduling. (everyone)



Implementing Dry Eye Disease Specialty into your Practice

Step 3

Develop Treatment Protocols:

Initiate therapies beyond just recommending a lubricating drop

Implementing Dry Eye Disease Specialty into your Practice

Prescription Medication for Dry Eye - available for the past 3+ years (all are anti-inflammatory mediations)

Types of Prescription Drops:

- Immunomodulators:
  - Restasis (cyclosporine ophthalmic emulsion) 0.05%
  - Xiidra (lifitegrast ophthalmic solution)
  - Cequa (cyclosporine ophthalmic solution) 0.09%
- Steroid
  - Eysuvis (loteprednol etabonate ophthalmic suspension) 0.25%
  - Lotemax SM (loteprednol etabonate ophthalmic gel) 0.38%
  - Prednisilone Acetate 1%

- For Severe Dry eye
  - Augologous Serum
  - Platelet Rich Plasma (PRP)
  - Regener-Eyes
  - Amniotic grafts
    - Cryopreserved (Prokera)
    - Dry (multiple types)

What percentage of dry eye disease do these medications address?

Implementing Dry Eye Disease Specialty into your Practice

What do we do with the rest of the 85% of patients?

Implementing Dry Eye Disease Specialty into your Practice

Step 3

Develop Treatment Protocols: EDE

- Address Inflammation First
- Focus on the lid margins (86% have Evaporative dry eye)
  - Rosacea Screening
  - MG expression
- Treatments for evaporative dry eye
  - Hypochlorous acid spray to the eyelashes
  - Warm Compresses
  - Topical Azasite (Azithromycin)
  - Oral Azithromycin/Doxycycline
  - Oral Omega 3s
    - Re-esterification triglyceride form Omega-3

Implementing Dry Eye Disease Specialty into your Practice

Step 3

Develop Treatment Protocols: EDE follow up visit

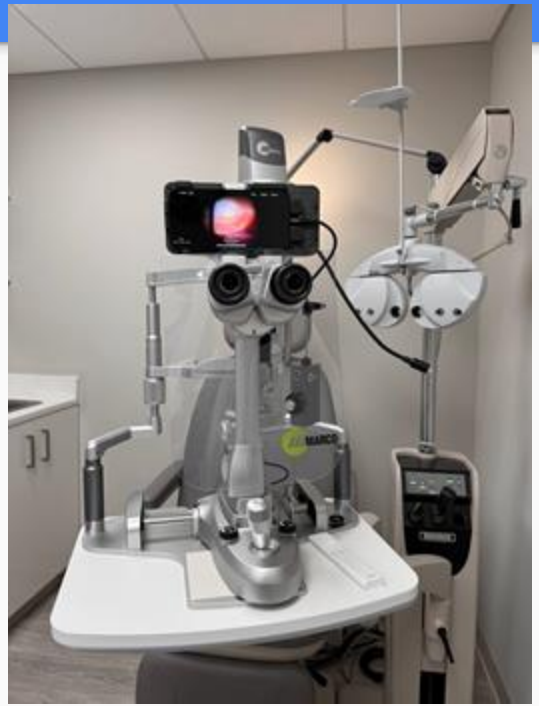
- Punctal plugs
- Thermal Procedures:
  - Automated vectored thermal pulsation: LipiFlow
  - External heat and manual expression: TearCare,
  - Semiautomated thermal pulsation: iLux
- Microblepharoexfoliation: BlephEx
- Intense Pulsed Light Therapy: Light Based Therapy, LLLT
- Radiofrequency: RF

Implementing Dry Eye Disease Specialty into your Practice

Step 4.

Invest in Diagnostic Equipment:

- Speed
- Slit lamp with Camera
- Topography that performs automated dry eye tests
- Meibographer

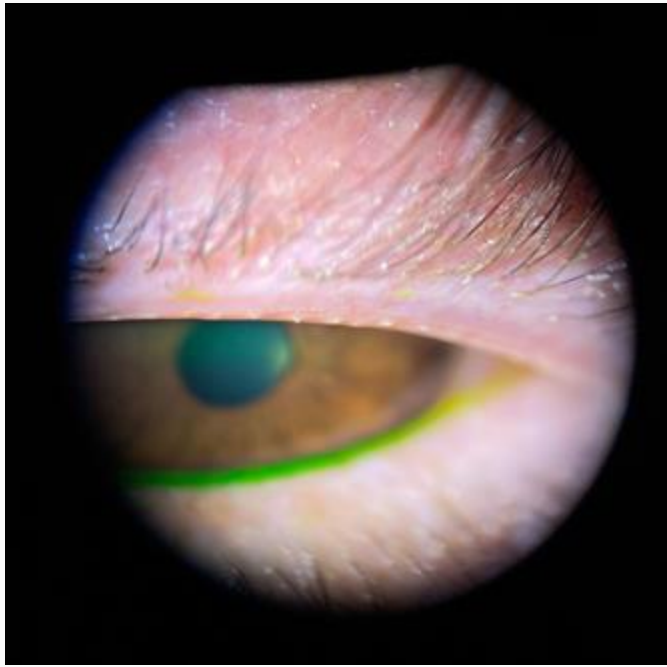


Implementing Dry Eye Disease Specialty into your Practice

Step 5.

Determine your fees

- Treatment options: Decide if you will treat patients once or offer a package of multiple treatments.
- Fee structure: Determine the underlying cost for each individual treatment option.
- Insurance billing: Consider whether you will bill the treatment costs to the patient's medical insurance
    - Punctal plugs are typically covered



Implementing Dry Eye Disease Specialty into your Practice

Step 6.

Marketing and Outreach:

- SEO and Google My Business
- Online Reviews
- Website
- Local marketing: Partner with local healthcare providers for referrals, refractive, cataract, glaucoma surgeons, oculoplastics, plastic surgeons, dermatologists, GYN.
- Patients referrals
- Social media

New Treatments

Pharmaceuticals/Topicals

Tyrvaya (Varenicline 0.03 mg) neural stimulation nasal spray

MOA: bind to cholinergic receptors to activate the trigeminal parasympathetic pathway, resulting in increased production of Basal tear film (all 3 layers)

Side effects: sneezing, not understanding the proper application process.

Some patients show nasal telangiectasia and report increased ash growth due to vasodilation capabilities

New Treatments

Pharmaceuticals/Topicals

NEOX FLO

is a sterile, particulate human placental tissue product.

used for treating eye conditions such as corneal erosions, and other surface eye disorders where healing and regeneration of the ocular surface are needed.

New Treatments

Pharmaceuticals/Topicals

Oxervate

Is the only FDA-approved treatment option that targets the underlying cause of NK (neurotrophic) to enable complete corneal healing in most patients.

Is typically prescribed for a duration of eight weeks. During this treatment period, the patient is instructed to administer the eye drops six times a day, roughly every two hours.

Side Effects: eye pain

New Treatments

Pharmaceuticals/Topicals

Autologous serum eye drops (ASEDs)

Made from the serum portion of a patient's own blood

Serum is the liquid part of blood that remains after the blood has clotted, and it lacks blood cells and clotting factors.

Serum eye drops contain a multitude of growth factors, vitamins, and nutrients

The serum is then separated, diluted with a sterile solution (like saline), and formulated into eye drops.

Various concentrations, QID.

New Treatments

Pharmaceuticals/Topicals

MYE Drop (PRP eye drops)

Blood is drawn from the patient and then centrifuged without allowing it to clot, resulting in a concentration of platelets in plasma. This platelet-rich plasma is then formulated into eye drops.

- High concentration of platelets suspended in plasma
- PRP eye drops are more focused on delivering a high concentration of specific growth factors for enhanced tissue regeneration and healing.

PRP therapy is an effective way of treating several ocular surface conditions:

- Non healing corneal ulcers
- Post LASIK, PRK or cataract surgery dry eye
- Recurrent corneal erosions, corneal abrasion or trauma
- Neurotropic or neuropathic dry eye
- Sjogren's Syndrome related dry eye

New Treatments

Pharmaceuticals/Topicals

Serum Eye Drops vs. PRP Eye Drops

Mechanism of Action:

- Serum Eye Drops: They mainly provide lubrication, nutrition, and some growth factors to the ocular surface, promoting a favorable environment for healing. Serum eye drops are particularly rich in vitamins and nutrients that support the health of the eye's surface.
- PRP Eye Drops: They have a more concentrated action in terms of promoting regeneration and healing due to the high concentration of growth factors. These growth factors play a direct role in stimulating cellular growth, proliferation, and tissue repair.

New Treatments

Pharmaceuticals/Topicals

MIEBO™
FDA-Aproved (perfluorohexyloctane ophthalmic solution)
The first and only Rx eye drop for dry eye disease that directly targets evaporation.

One single molecule
No water, no preservatives

MOA: inhibits evaporation by forming an anti-evaporative layer
Reduces friction-> promotes healing.

New Treatments

Pharmaceuticals/Topicals

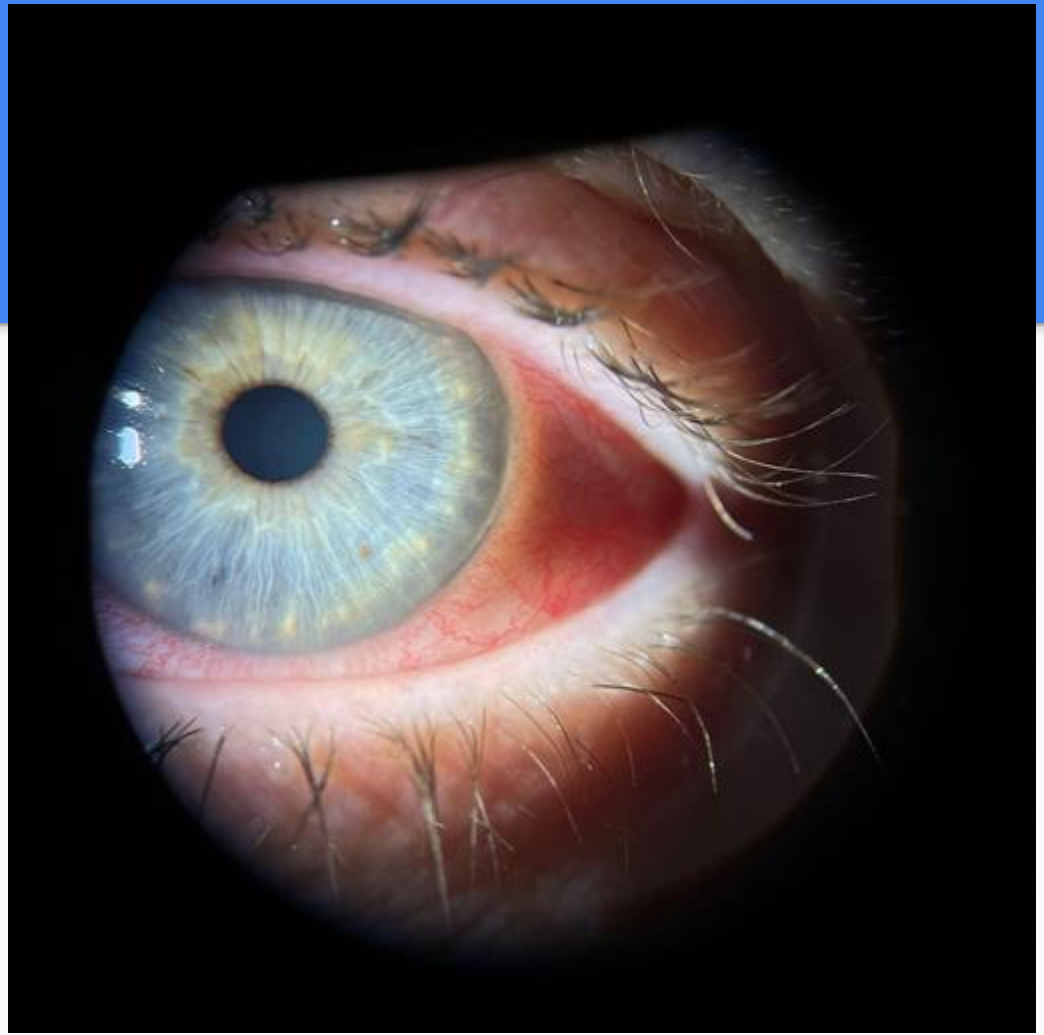
XDEMVY (LOTILANER OPHTHALMIC SOLUTION 0.25%) NOW APPROVED FOR THE TREATMENT OF *DEMODEX* BLEPHARITIS

- Lotilaner is a gamma-aminobutyric acid **(GABA)-gated chloride channel inhibitor selective for mites**. Inhibition of these GABA chloride channels causes a paralytic action in the target invertebrate organism, leading to its death.1,2,*

Dosing: One drop BID OU for 6 weeks.

Side effects: burning in 10% of patients

1. XDEMVY [prescribing information]. Tarsus Pharmaceuticals, Inc; 2023. 2. Gonzalez-Salinas R, Yeu E, Holdbrook M, et al. *Collarette Elimination and Demodex Mite Eradication with Topical Lotilaner Ophthalmic Solution, 0.25. J Ocul Pharmacol Ther.* 2021;37(8):479-484.



Light-Based Therapy

Optilight (IPL)

FDA Approved for the treatment of DED.

Focus on Dry Eye Syndrome, Meibomian Gland Dysfunction (MGD), and Ocular Rosacea

- Improves meibomian gland structure, function, quality of meibum, and tear breakup time (TBUT)
- Reduces inflammatory factors found in the tear film and on the ocular surface
- Destroys telangiectatic blood vessels (ocular rosacea), which are a major source of inflammation to the eyelids
- Decreases Demodex and bacterial load on eyelids
- Potentially improves blinking mechanics by increasing the tone of lid skin and improving lid margin notching and scarring through stimulation of collagen synthesis

Tip of the Day

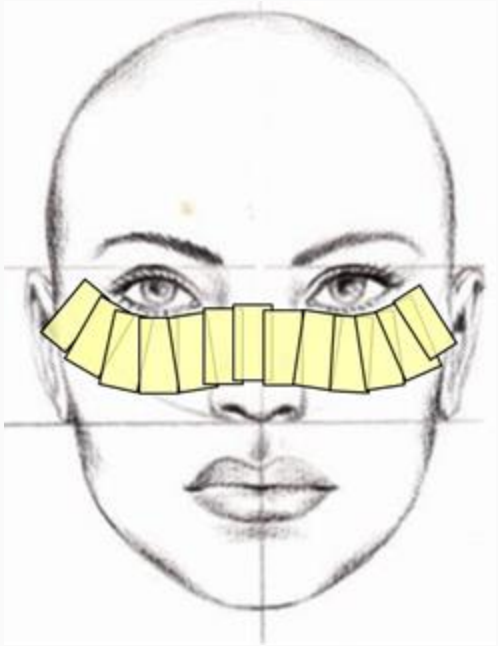
Remember: 86% of dry eye cases also have obstructive meibomian gland dysfunction (MGD), the treatment should include “unclogging those glands”

Light-Based Therapy

Optilight (IPL)

Fitzpatrick Skin Type dependent

1. Treatment Protocol: Eyelids margins 2 x passed, Tragus-Tragus 2 x passes
2. Heat (warm compress, LLLT, RF)
3. Gland expression is highly recommended



Tip of the Day

Why express at every treatments?

1. To remove the keratinization of the meibomian glands and also to assess the quality and volume of the meibum. This will guide your treatment. If there is a narrow opening (ask about Accutane use), you will see this patient again in 10-14 days for a second treatment once the quality of the meibum improves.

Light-Based Therapy

Low Level Light Therapy (LLLT)

NOT Fitzpatrick Skin Type dependent

Photobiomodulation: (stimulate, heal, regenerate tissue)
Application: for MGD, Dry Eye, and Chalazion
Devices in Eye Care: Marco, Celluma
Combining Photobiomodulation with IPL, RF, Heat, and Manual Meibomian Gland Expression

Light-Based Therapy (LLLT)

Red Light
Stimulates production of collagen and elastin — Red light is absorbed by mitochondria and stimulates ATP increasing cellular action, enhancing its activity1.

Yellow Light
Specific action on the lymphatic system — Yellow light stimulates cells' metabolism promoting a detoxifying action to relieve swelling conditions2.

Blue Light
Purification action — Blue light is recognized to be the ideal wavelength to solicit porphyrins to obtain a bacteriostatic effect with a consequent elimination of bacteria3.

1. Hamblin MR. Mechanisms and applications of the anti-inflammatory effects of photobiomodulation. AIMS Biophys. 2017;4(3):337-362. doi: 10.3934/biophy.2017.3.337. Epub 2017 May 19. PMID:28748217; PMCID; PMC5523874
2. Menezes PFC, Urbaczek AC, Matta RFD, Bagnato VS (2020) Photobiomodulation Using Amber Led and Infrared Laser to Controlling the Pigmentation and Flaccidity from Skin. Journal of Aesthetic & Reconstructive Surgery. Volume 6 No.2:8 DOI: 10.36648/2472-1095.6.2.57
3.Sulek A, Pucelik B, Kobielusz M, Barzowska A, Dabrowski JM. Photodynamic Inactivation of Bacteria with Porphyrin Derivatives: Effect of Charge, Lipophilicity, ROS Generation, and Cellular Uptake on Their Biological Activity in Vitro. International Journal of Molecular Sciences. 2020; 21(22):8716. https://doi.org/10.3390/ijms21228716

Light-Based Therapy (LLLT)

Celluma

Radiofrequency (RF)

OptiPLUS

FDA Cleared for the treatment of DED.

DUAL FREQUENCY
RF TECHNOLOGY
Precisely deliver heat across several skin layers, improve meibomian glands functionality and enhance collagen production. 1,2,6

Aesthetic benefits

1. Javate RM, Cruz RT Jr, Khan J, Trakos N, Gordon RE. Nonablative 4-MHz dual radiofrequency wand rejuvenation treatment for periorbital rhytides and midface laxity. Ophthalmic Plast Reconstr Surg. 2011 May-Jun;27(3):180-5. doi: 10.1097/IOP.0b013e3181fe8e5a. PMID: 21283035.
2. Rabkin JM, Hunt TK. Local heat increases blood flow and oxygen tension in wounds. Arch Surg. 1987 Feb;122(2):221-5. doi: 10.1001/archsurg.1987.01400140103014. PMID: 3813871.
3. Chelnis J, Garcia CN, Hamza H. Multi-Frequency RF Combined with Intense Pulsed Light Improves Signs and Symptoms of Dry Eye Disease Due to Meibomian Gland Dysfunction. Clin Ophthalmol. 2023;17:3089-3102

Radiofrequency (RF)

NOT Fitzpatrick Skin Type dependent

Major contraindication: Pacemaker

Monopolar or Bipolar

Very pleasant feeling, relaxing, also aesthetic benefits.

Heats up the MGs, dilates BVs (nutrients), tightens the skin for improved quality blink.

RF

42C MGD and Collagen

Monopolar (5 min per eye)

Bipolar (10 min per eye)

Nocturnal Lagophthalmos

Works well

SleepTite
SleepRite™

An OTC product to help patients with nighttime lid closure issues

RF

Implementing Dry Eye Disease Specialty into your Practice

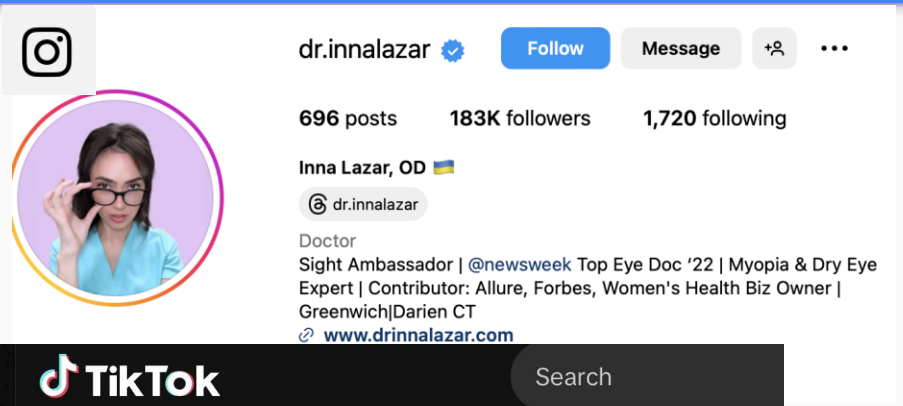
Steps you will do tomorrow at the office:

1. Use basic office tools to investigate DED signs and symptoms.
2. Assess lids and lashes, corneal staining, and meibomian gland function.
3. Spend extra time with patients for education, showing pictures.
4. Educate patients about their condition and available treatment options.

All done simultaneously

Questions


William Trattler, MD
Cataract/Refractive/Corneal Surgeon and Director of Cornea at the Center For Excellence In Eye Care, Miami. FL
Talks about #keraroconus
Miami, Florida, United States · Contact info
7,759 followers · 500+ connections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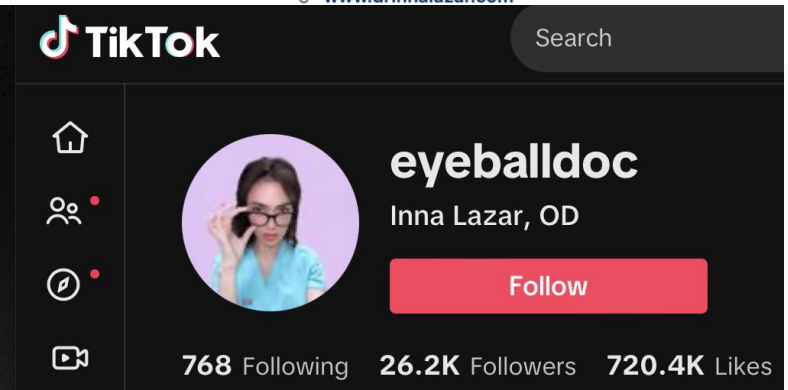
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William Trattler, MD
Center For Excellence In Eye Care
3054795298
wtrattler@gmail.com
www.centerforeyecare.com