

MGD and Demodex Management: The Missing Link..

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All financial relationships have been mitigated.

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Company	Role	Compensation
Allergan	Consultant, Research	Honoraria
Alcon	Consultant, Speakers Bureau	Honoraria
Bausch + Lomb	Consultant, Educator, Research	Honoraria
Johnson & Johnson Vision	Consultant	Honoraria
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Visus	Consultant	Honoraria
Zeiss	Consultant	Honoraria

All financial relationships have been mitigated.

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DEMODEX BLEPHARITIS | A PERVASIVE 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 blepharitis¹⁻⁴
 - Demodex mites are implicated in other diseases of the lid and lid margin, including blepharitis and meibomian gland dysfunction^{1,4}
 - Demodex mites are associated with acne vulgaris, folliculitis, rosacea, seborrheic dermatitis, perioral and scalp hair loss, and basal cell carcinoma^{1,4}
- Demodex folliculorum and Demodex brevis are the only 2 species found in humans⁵
 - The life cycle of the Demodex mite is approximately 14 to 18 days from the egg to the larval stage followed by the adult stage⁶
 - The life span of the mite is limited outside the living body; direct contact is required for transmission⁶

D. folliculorum



0.3-0.4 mm length
Colonizes the base of the lash follicle²

D. brevis



0.1 mm length
Colonizes the meibomian gland²



1. Mayo Clinic. Accessed June 26, 2026. <https://www.mayoclinic.org/diseases-conditions/blepharitis/symptoms-causes/syc-20076141>. 2. Wang A-D et al. Ophthalmic Physiol Opt. 2020;40(4):589-602. 3. Frenkel SM et al. Clin Ocul. 2017;15(3):270-285. doi: 10.1016/j.clo.2017.05.008. 4. Trachtman W et al. Clin Ophthalmol. 2022;15(1):105-110. 5. Lincoff D et al. JAMA Ophthalmol. 2017;135(1):12-21.

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US PREVALENCE OF OSD and DED

- Estimated >16 million patients have been diagnosed with DED¹
- Estimates ~33 million patients suffering from dry eye symptoms¹
- Almost all adults experience dry eye signs and symptoms
 - DED is often underdiagnosed and undertreated²
 - DED is the most common reason for visits to eyecare practitioners (ECPs)¹
 - ~33% of patients present with complaints about dry eye¹
- Prevalence is projected to increase due to:
 - Aging population
 - Increased screen time (computers and handheld devices)



REFERENCES: 1. Farnsworth L, Farnsworth M, Stettin M, Schuchman DA. Prevalence of Diagnosed Dry Eye Disease in the United States Among Adults Aged 18 Years and Older. Am J Ophthalmol. 2017;182:90-8. 2. Craig JP, Nichols KK, Akpek EK, et al. TFOS DEDW II Definition and Classification report. Ocul Surf. 2017;15(3):270-285. doi: 10.1016/j.clo.2017.05.008. 3. Chakravarti A, Quinlan GW III, Wilson-Bagshaw R, et al. A correlation between the signs and symptoms of dry eye and the duration of dry eye diagnosis. JOT. 2005;40:8 abstract 4450.

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Meibomian Gland Dysfunction

Meibomian Gland Dysfunction (MGD) is a chronic condition characterized by abnormal keratin production, leading to blocked glands

Normal Meibomian Glands



Blocked Meibomian Glands



- Decreased meibum quality and quantity in the upper and lower eyelids
- Tear film changes
 - Reduced visual function/quality of vision
 - Dry eye disease
 - Contact lens discomfort / intolerance
- Gland complications
 - Gland blockage/dilation
 - Irreversible glandular atrophy/loss
 - Bacterial growth
 - Lead to Blepharitis
- Ocular Surface Inflammation
- Corneal scarring

References: 1. Nichols KK, et al. Invest Ophthalmol Vis Sci. 2011;52(12):7616-7626. 2. Craig JP, et al. Invest Ophthalmol Vis Sci. 2017;58(10):3057-3065. 3. Farnsworth L, et al. JAMA Ophthalmol. 2017;135(1):12-21. 4. Wang A-D, et al. Ophthalmic Physiol Opt. 2020;40(4):589-602. 5. Lincoff D, et al. JAMA Ophthalmol. 2017;135(1):12-21. 6. Chakravarti A, et al. JAMA Ophthalmol. 2005;40:8 abstract 4450.

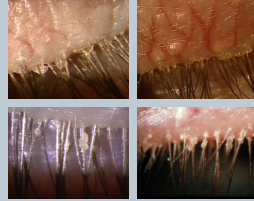
Non-Confidential

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What is *Demodex* blepharitis (DB)?

- DB is a common eyelid margin disease caused by an overgrowth of *Demodex* mites and characterized by collarettes, eyelid redness, inflammation, and ocular irritation.^{1,2}



References: 1. Fromstein SR et al. Clin Optim (Auckl). 2018;10:57-63. 2. Rhee MK et al. Eye Contact Lens. 2023;49(8):311-318.

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DEMOSEX BLEPHARITIS | Mechanisms of Disease



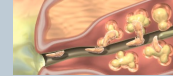
MECHANICAL

- Lash distension occurs as *Demodex* mites attach to follicles^{3,4}
- 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^{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

Images are the courtesy of Laura M. Proffens, MD, PhD, & Steven J. Lee, MD, PhD. *Ophthalmology*. 2020;127(12):2000-2005. <https://doi.org/10.1016/j.ophtha.2020.05.011>
 3. Proffens LM et al. Clin Optim (Auckl). 2018;10:57-63. 4. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005. 5. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005. 6. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005. 7. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005. 8. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005. 9. Lee JY et al. J Korean Ophthalmol Soc. 2020;61(12):2000-2005.

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CLINICAL MANIFESTATIONS OF DEMOSEX BLEPHARITIS



Disorders of Eyelashes^{1,2}

Infection of the eyelash follicles can result in collarettes and may lead to madarosis, trichiasis, and madarosis.



Meibomian Gland Dysfunction^{3,4}

Blockage leads to filling, swelling, and many enlarged glands (cysts) or infection. Chalazia are common granulomatous responses.



Lid Margin Inflammation^{5,6}

Severe lid margin inflammation can be caused by mechanical blockage and a delayed host immune hypersensitivity reaction.



Conjunctival Inflammation^{7,8}

Without proper hygiene, lid margin inflammation may spread over to the conjunctiva producing a condition known as blepharoconjunctivitis.



Corneal Manifestations^{9,10}

DB 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. Lee JY et al. Cornea. 2020;39(12):2000-2005. 2. Lee JY et al. Cornea. 2020;39(12):2000-2005. 3. Lee JY et al. Cornea. 2020;39(12):2000-2005. 4. Lee JY et al. Cornea. 2020;39(12):2000-2005. 5. Lee JY et al. Cornea. 2020;39(12):2000-2005. 6. Lee JY et al. Cornea. 2020;39(12):2000-2005. 7. Lee JY et al. Cornea. 2020;39(12):2000-2005. 8. Lee JY et al. Cornea. 2020;39(12):2000-2005. 9. Lee JY et al. Cornea. 2020;39(12):2000-2005. 10. Lee JY et al. Cornea. 2020;39(12):2000-2005.

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Demodex blepharitis (DB) is highly prevalent, but underdiagnosed^{1,2}

- DB affects ~58% of eye care patients in the US¹
- That's approximately 25 million patients²



~56% (n=245/440) of patients with cataracts have DB^{1,*}



60% (n=135/225) of patients treated for dry eye also have DB^{1,*}



~93% (n=26/28) of patients with soft contact lens intolerance were found to have *Demodex*^{3,†}

References: 1. Trullier W et al. Clin Ophthalmol. 2022;16:1153-1164. 2. O'Dell L et al. Clin Ophthalmol. 2022;16:2979-2987. 3. Tarkowski W et al. Biomed Res Int. 2015;2015:259109.

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of blepharitis cases are associated with *Demodex* mites¹

The number of mites correlates with:

- symptom severity
- density/severity of collarettes



References: 1. Trullier W et al. Clin Ophthalmol. 2022;16:1153-1164.

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Key Signs and Symptoms of DB

- Itching *most common symptom
- Dry eyes
- Missing/misdirected eyelashes
- Lid margin inflammation
- Sensitivity to light
- Blurred vision



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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 follicle^{1,3}
- 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 irritation³
- 100% of patients with collarettes have *Demodex* blepharitis^{1,5}**



Images courtesy of John Paul Singh, MD, used with permission.

1. Zhang H et al. *Ophthalmic Physical Exam*. 2020;4(2):289-312. 2. Gao Y et al. *Invest Ophthalmol Vis Sci*. 2020;61(10):3089-3094. 3. Frenkel J et al. *Clin Ophthalmol*. 2016;9:1517-1523. 4. Tattler W et al. *Ophthalmic Physical Exam*. 2020;4(2):289-312. 5. Frenkel J et al. *Clin Ophthalmol*. 2016;9:1517-1523.

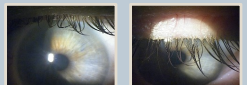
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DEMODEX BLEPHARITIS CAN BE DIAGNOSED DURING SLIT LAMP EXAMINATION

Collarettes are hardened excretions around the base of the eyelashes visible during slit lamp examination^{1,3}

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



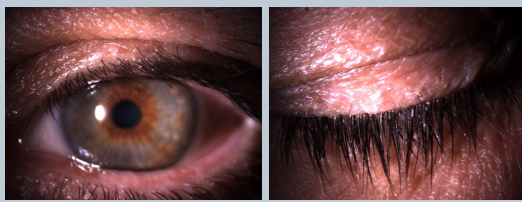
Images courtesy of Elizabeth May, MD, used with permission.

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 H et al. *Ophthalmic Physical Exam*. 2020;4(2):289-312. 2. Gao Y et al. *Invest Ophthalmol Vis Sci*. 2020;61(10):3089-3094. 3. Frenkel J et al. *Clin Ophthalmol*. 2016;9:1517-1523. 4. Tattler W et al. *Ophthalmic Physical Exam*. 2020;4(2):289-312.

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Diagnosing *Demodex* blepharitis (DB) is as simple as having your patients look down¹

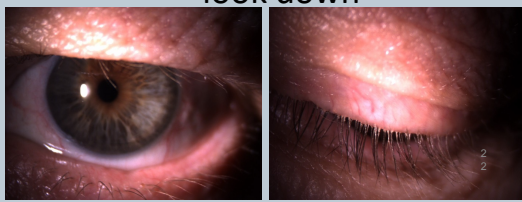


Images c/o Marc Bloomenstein, OD, FAAO

Reference: 1. Tattler W et al. *Clin Ophthalmol*. 2022;16:1153-1164.

21

Diagnosing *Demodex* blepharitis (DB) is as simple as having your patients look down¹



Images c/o Marc Bloomenstein, OD, FAAO

Reference: 1. Tattler W et al. *Clin Ophthalmol*. 2022;16:1153-1164.

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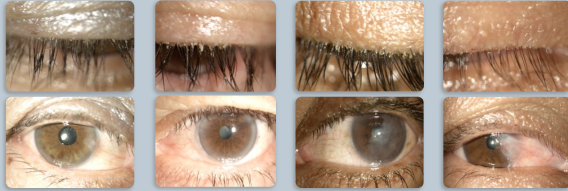
Video c/o Marc Bloomenstein, OD, FAAO

23



24

Lid health directly impacts the ocular surface examples of demodex blepharitis and conjunctival/corneal disease



References: 1. Arantes J, Gomes G, Silva R, et al. Blepharitis (ocular) [review]. *StatPearls*. 2023. 2. Arantes J, Gomes G. Diagnosis and management of blepharitis: an ophthalmologist's perspective. *StatPearls*. 2023. 3. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023. 4. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023. 5. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023. 6. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023. 7. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023. 8. Arantes J, Gomes G. Blepharitis (ocular) [review]. *StatPearls*. 2023.

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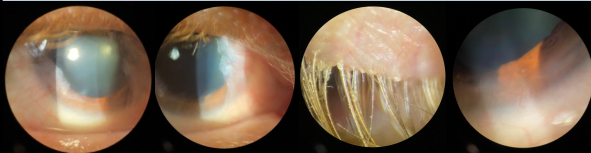
Mixed blepharitis presentation



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Demodex Blepharitis & Clinical Associations

- Also leads to **lid margin erythema, lid edema, eyelash misalignment or loss, recurrent chalazia** and, more rarely, **primary and recurrent pterygia, peripheral corneal vascularization, phlyctenule-like lesions and corneal opacity**⁵
- Other inflammatory diseases, such as **rosacea**, and **blepharokeratitis** and **blepharoconjunctivitis**.⁶



5. Zhang XG, Ding F, He W, et al. *Clin Ophthalmol*. 2018;11:589-592. 6. Fromstein SR, Hartman JJ, Patel J, et al. *Clin Ophthalmol*. 2018;10:57-63.

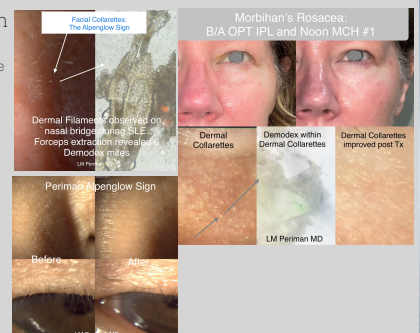
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The Alpenglow Sign

Look at the nasal bridge

- Rapid clinical exam finding to pick up cases of suspected demodex in patients with excellent lid hygiene

- ASCRS 2024, ARVO 2024



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Explaining the DB Diagnosis to Patients



There's a common misconception among patients that it's somehow their fault or caused by poor hygiene



Patients don't always understand how the mites cause problems



Many patients worry that the treatment process will be challenging.

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Keys Points when Delivering the DB Diagnosis to Patients

- DB is a prevalent condition and not a reflection of personal negligence.¹⁻³
- The condition results from an increase in tiny mites that can harm the eyelids.^{1,4,5}
- Treatment is straightforward and effective.⁶



References: 1. Triller W et al. *Clin Ophthalmol*. 2022;15:1153-1164. 2. O'Dell L et al. *Clin Ophthalmol*. 2022;15:2979-2987. 3. Liu J et al. *Curr Opin Allergy Clin Immunol*. 2010;10(5):555-510. 4. Gao YY et al. *Invest Ophthalmol Vis Sci*. 2005;46(11):3089-3094. 5. Fromstein SR et al. *Clin Ophthalmol*. 2018;10:57-63. 6. XDEMY [prescribing information]. Tarsus Pharmaceuticals, Inc. 2023.

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Common Treatments for *Demodex* Blepharitis

At-Home

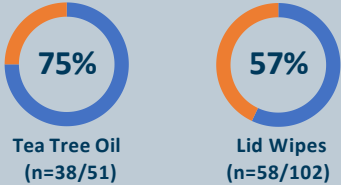
- Tea tree oil
- Lid wipes
- Topical ivermectin cream
- Cleansers containing hypochlorous acid
 - Lid scrubs
 - Antibiotics

In-Office

- Intense pulsed light therapy
- Microblepharoexfoliation

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Tea Tree Oil and Lid Wipes Manage the Collarettes but Aren't Treating the Root Cause

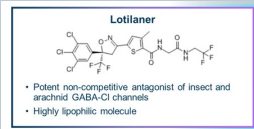


Reference: 1. Trattler W et al. Clin Ophthalmol. 2022;16:1153-1164.

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Lotilaner ophthalmic solution, 0.25%

- The first and only FDA-approved treatment for *Demodex* blepharitis (July 2023)
- Paralyzes and eradicates *Demodex* mites by selectively inhibiting parasite-specific GABA-Cl channels

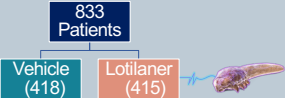


Reference: Tarsus Pharmaceuticals, Inc.; 2023.

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Studies to Know: SATURN-1 and SATURN-2

- Two 6-week, randomized, multicenter, double-masked, vehicle-controlled studies



- Patients were randomized to either lotilaner or vehicle at a 1:1 ratio, dosed twice daily in each eye

References: 1. You E, et al. Cornea. 2023 Apr 1;42(4):435-43. 2. Gaskie IB, et al. Ophthalmology. 2023 Oct 1;130(10):1015-23. 3. Sadr, E. Castillo, RM, and Jaladat, P. Presented at ASCRS 2023; May 5-8, 2023; San Diego, CA.

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SATURN-1 and SATURN-2 Study Results

1. Collarette Reduction (≤ 2 collarettes)

- 50% compared with 10% vehicle

2. Mite Eradication (0 mites/lash)

- 60% compared with 16% vehicle

3. Erythema Cure (Grade 0)

- 25% compared with 8% vehicle

4. Collarette Reduction (≤ 10 collarettes)

- 85% compared with 28% vehicle

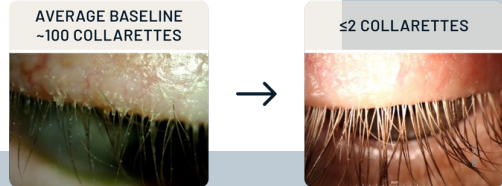
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SATURN-1 and SATURN-2 Study Results

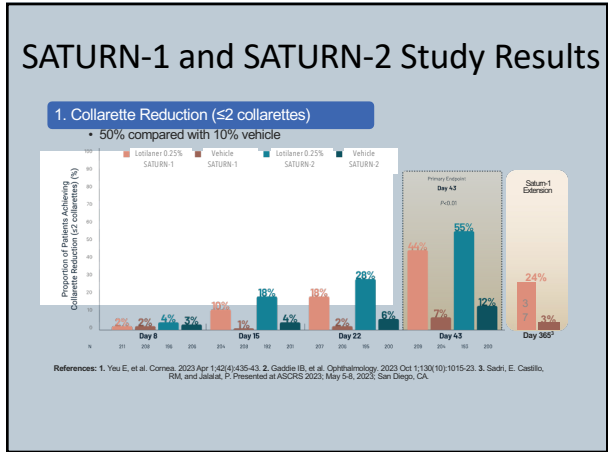
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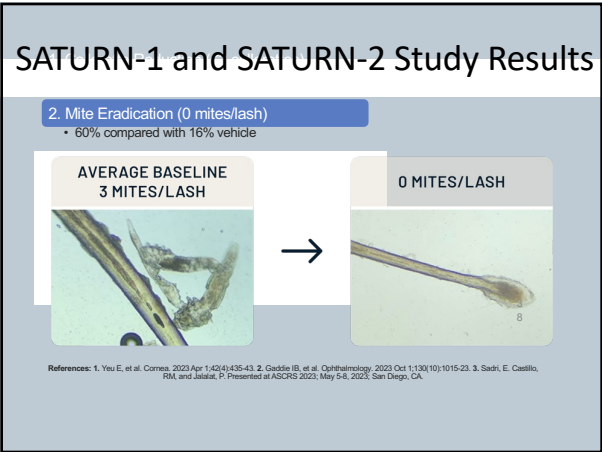


References: 1. You E, et al. Cornea. 2023 Apr 1;42(4):435-43. 2. Gaskie IB, et al. Ophthalmology. 2023 Oct 1;130(10):1015-23. 3. Sadr, E. Castillo, RM, and Jaladat, P. Presented at ASCRS 2023; May 5-8, 2023; San Diego, CA.

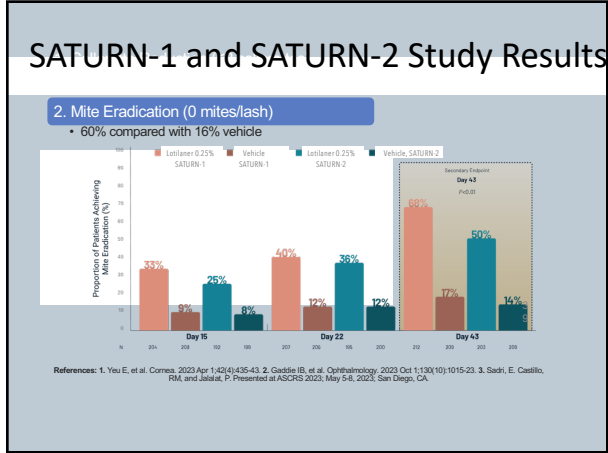
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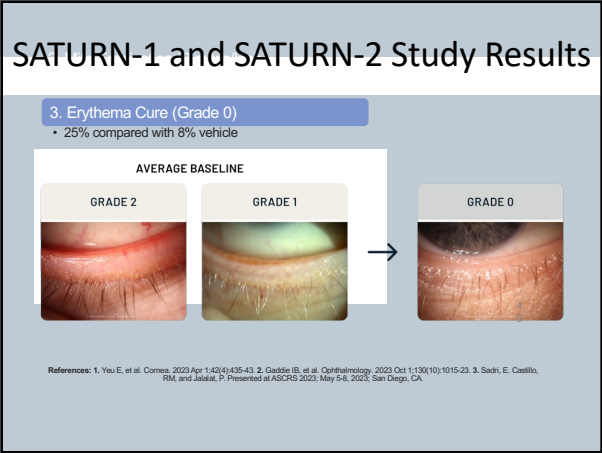
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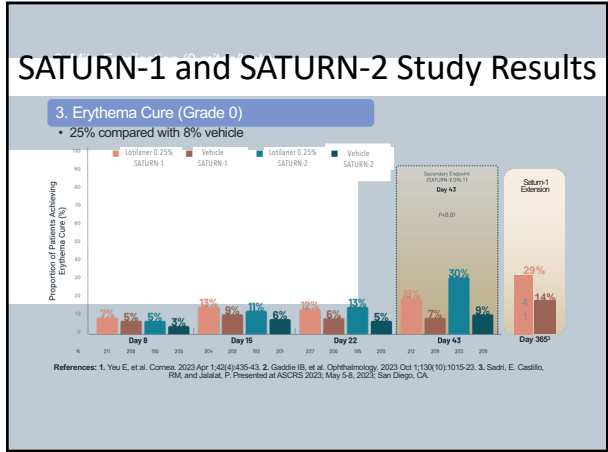
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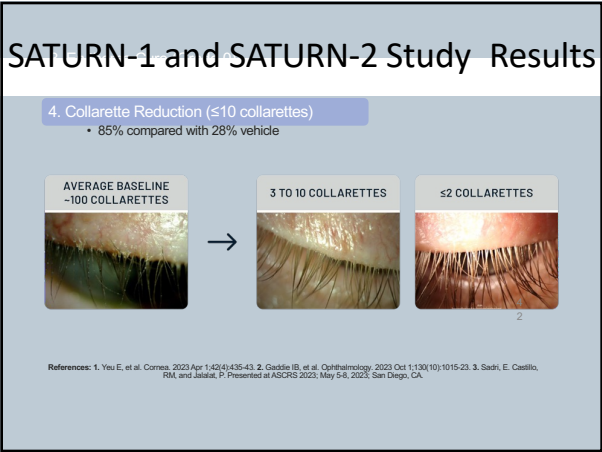
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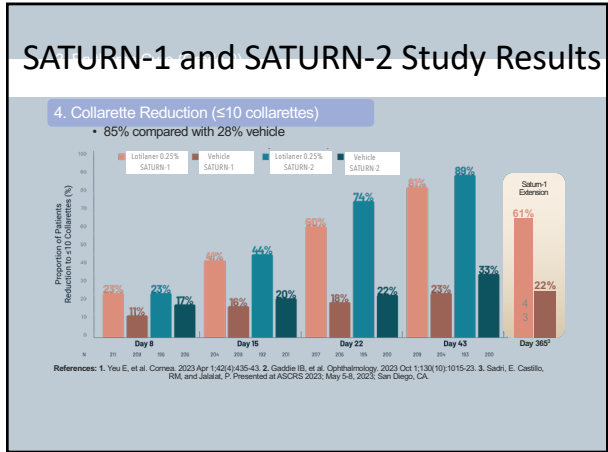
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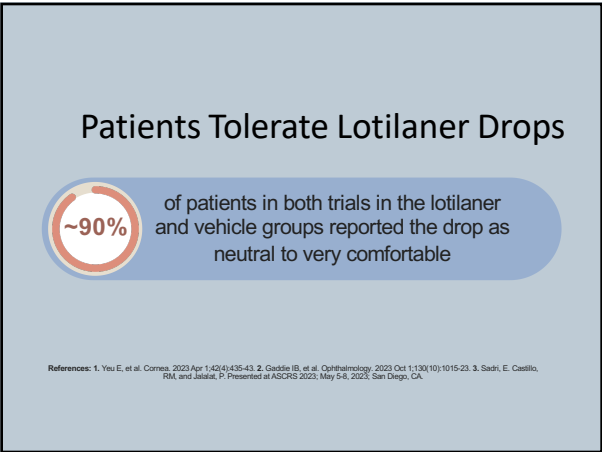
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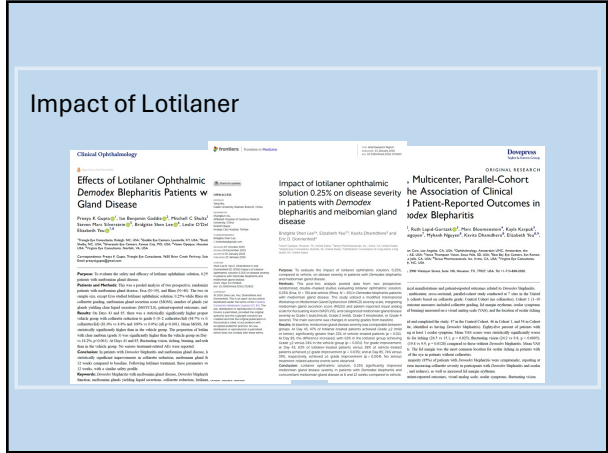
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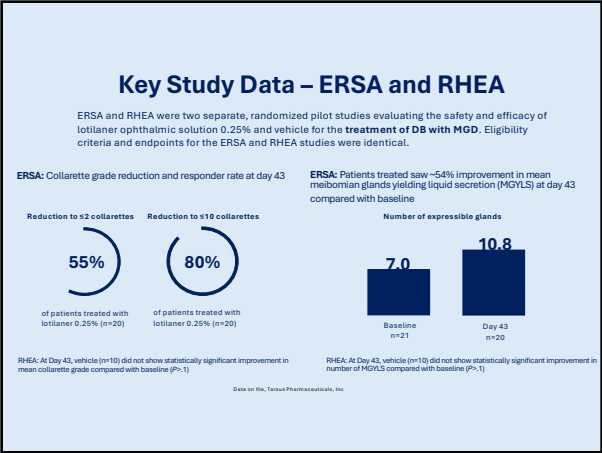
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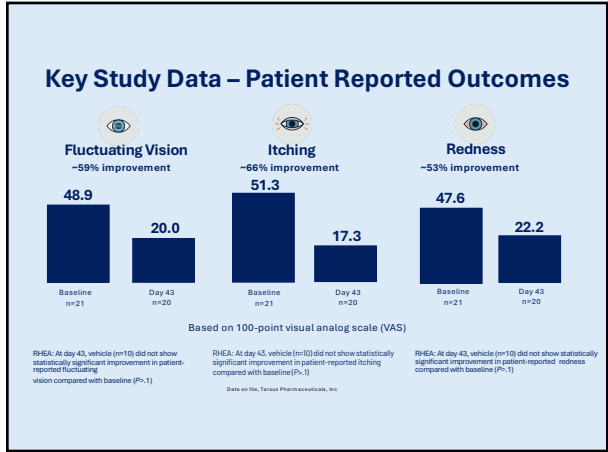
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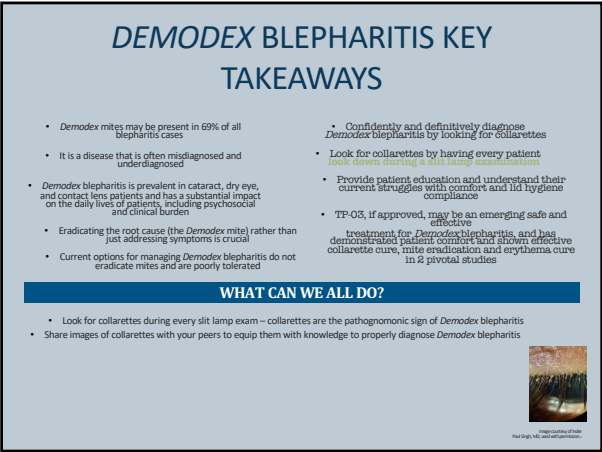
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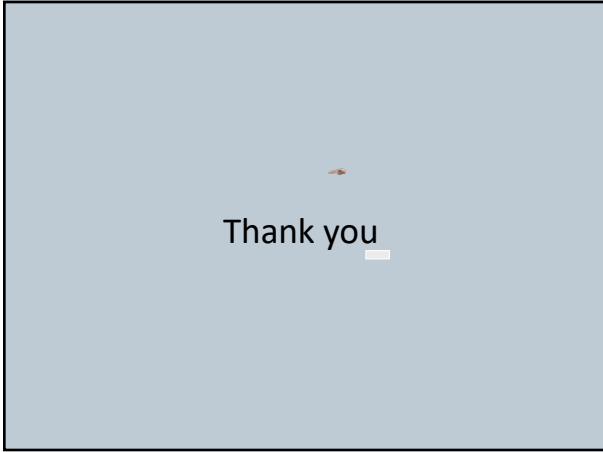
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