Optimizing the Ocular Surface: The Pursuit of Homeostasis

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Disclosures

- Alcon
- Barti
- Bausch + Lomb
- Bruder Healthcare and M&S Technologies (Hilco Vision)
- Dompé
- Lumenis
- Myze
- NuLids
- PRN Vision Group
- Rinsada
- Tarsus Pharmaceuticals
- Vital Tears

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“Optimizing the Ocular Surface”

What does this actually mean?

Homeostasis

Central Unifying Concept of Physiology

Walter Cannon, 1930

From Greek:

- **Hómoios** - “similar”
- **Stásis** - “standing still”

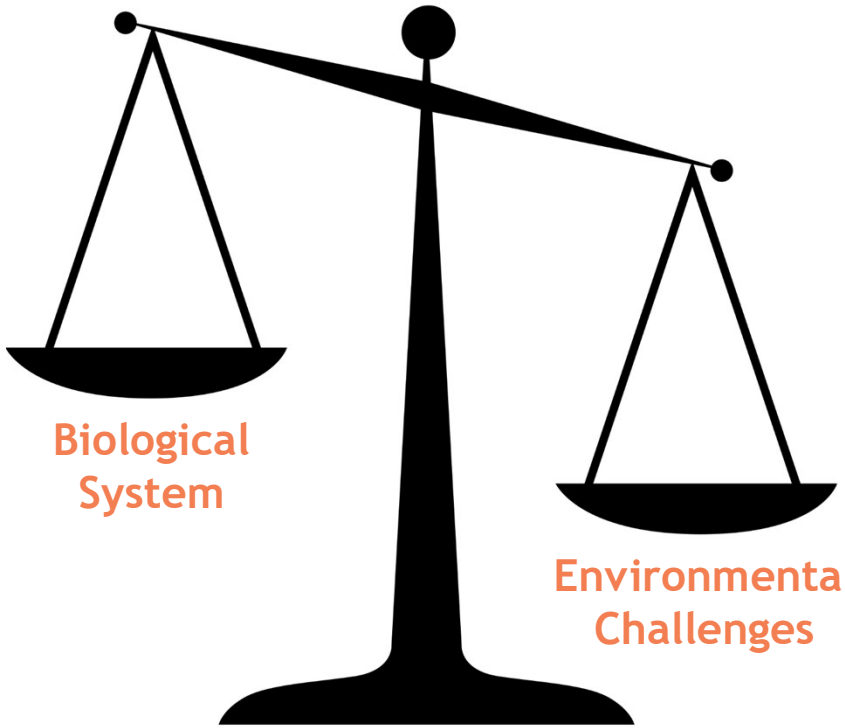
Homeostasis

Definition: a self-regulating process by which biological systems maintain stability while adjusting to changing external conditions

Homeostasis

Simplified: the body will try to keep physiological variables within/at a predefined range or set point, regardless of changes to the outside environment

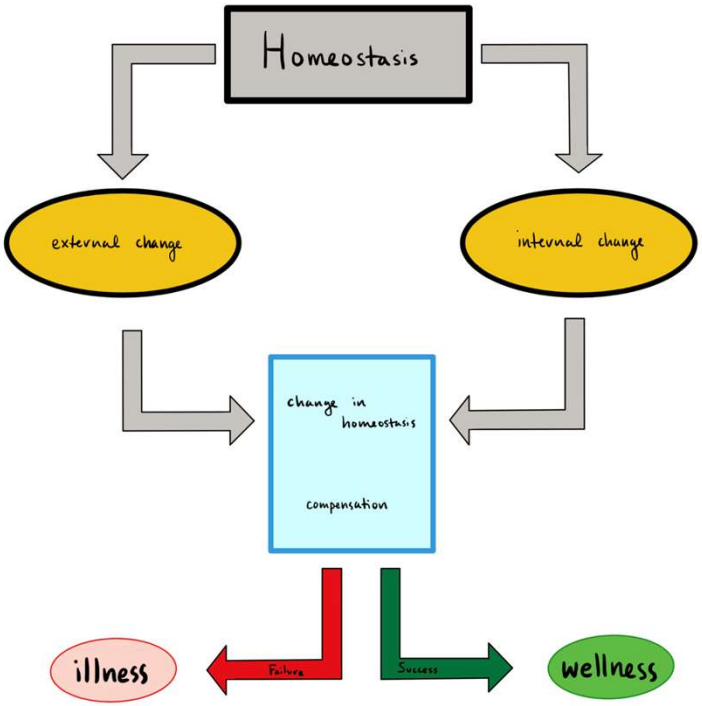
Homeostasis



Dynamic Equilibrium

- **State of balance**
  - Resists change
  - Continuously adjusted
  - Adapts to external challenges

Homeostasis



Feedback-Dependent Control

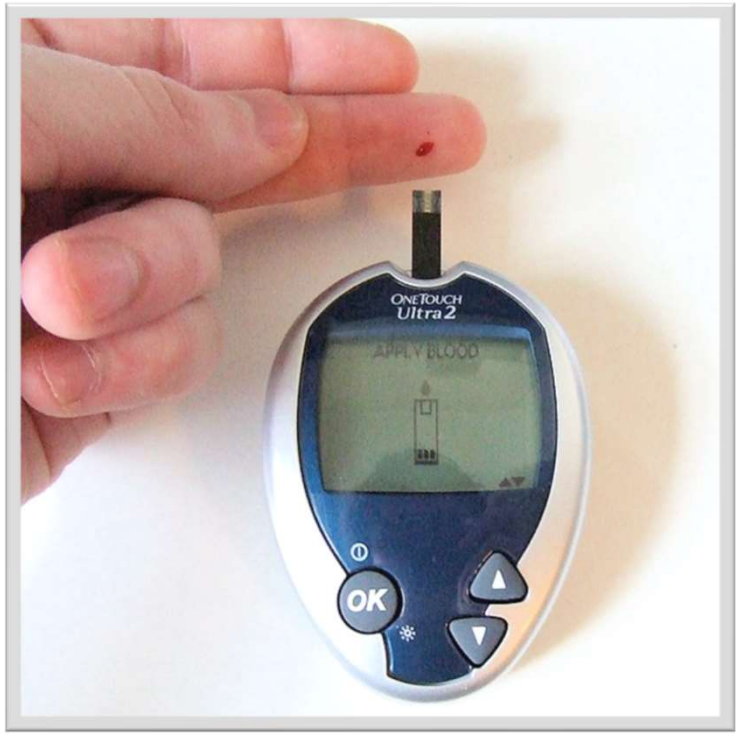
- Self-regulated
- Complex and integrated
  - Inputs from multiple systems
  - Can be modified by higher level control

Homeostasis

Physiology Example:
Body Temperature

- Set point is ~98.6˚F
  - **Too hot - sweat**
    - Evaporative cooling
    - Heat stroke
  - **Too cold - shiver**
    - Generate heat
    - Hypothermia

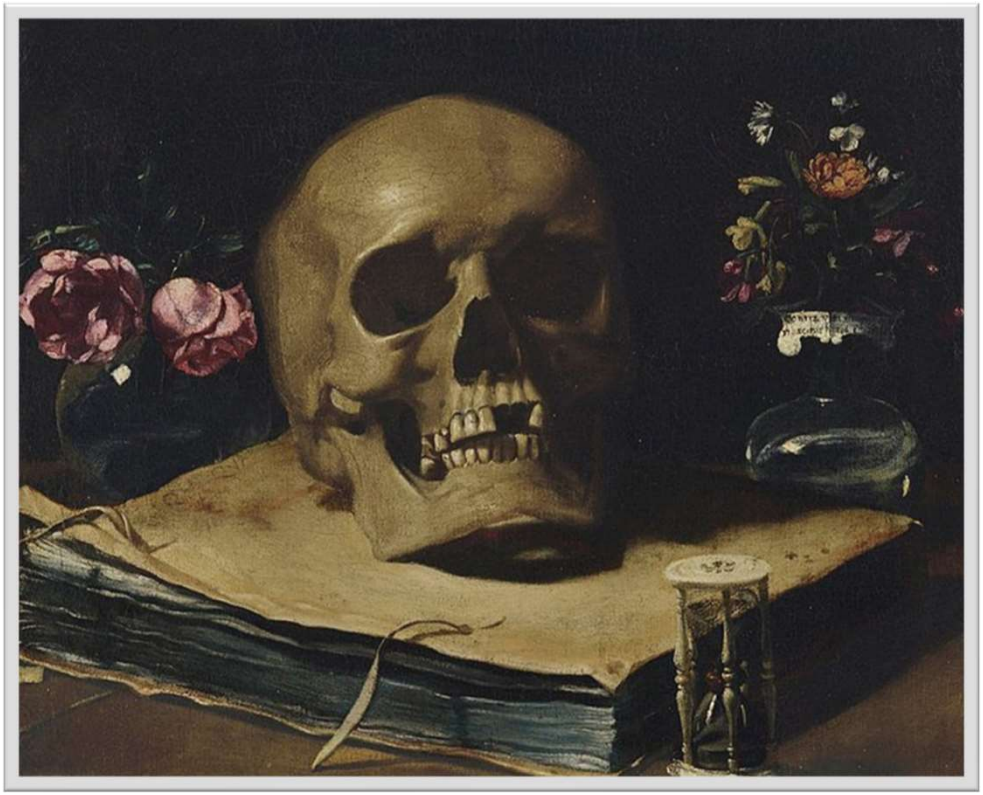
Homeostasis



Pathology Example: Diabetes

- **Loss of homeostasis**
  - Unable to maintain blood glucose levels within set range
- **Treatment**
  - Use of exogenous insulin to restore balance

Homeostasis



Inability to maintain homeostasis

Disease and Death

Homeostasis

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 etiological roles.

- TFOS DEWS II Definition & Classification Subcommittee Report

Homeostasis

"If one does not understand this self-regulating process, then it is not possible to comprehend fully the function of the body in health and in disease."

- George Billman

Using Homeostasis to Provide a Stepwise Approach to Optimizing the Ocular Surface

1. How is the system meant to function?
2. What causes the system to lose balance?
3. What is the result if balance is lost?
4. How do we attempt to restore balance?

Using Homeostasis to Provide a Stepwise Approach to Optimizing the Ocular Surface

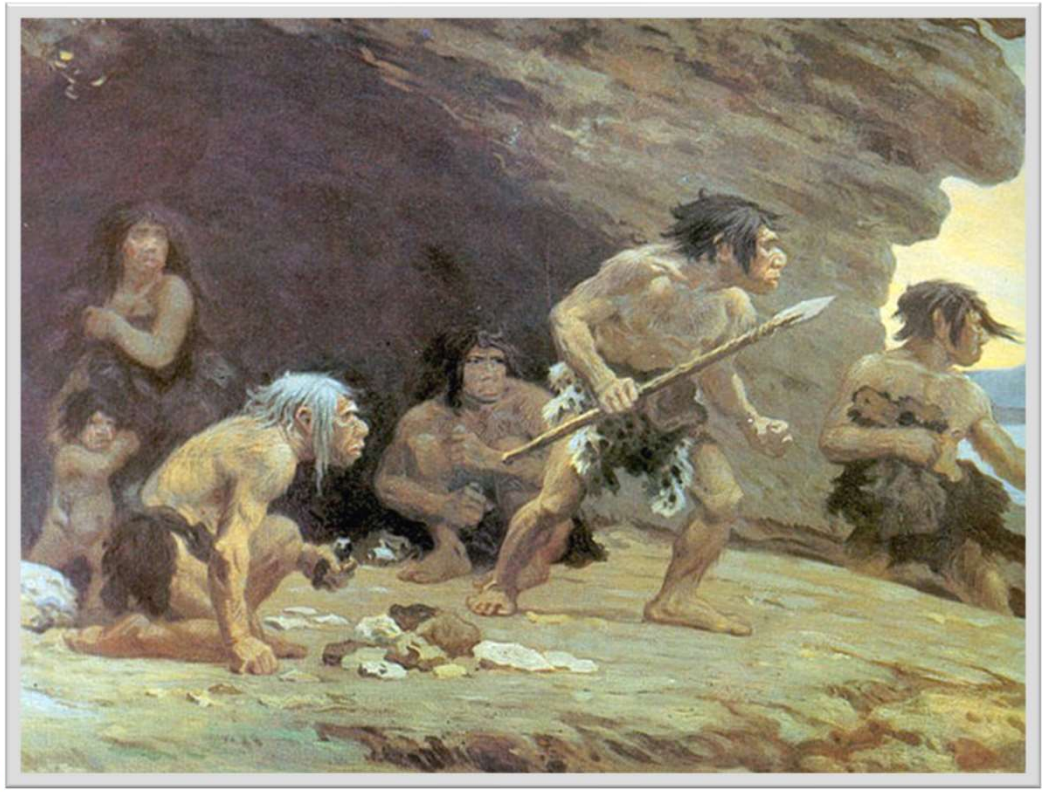
Goal of Treatment:

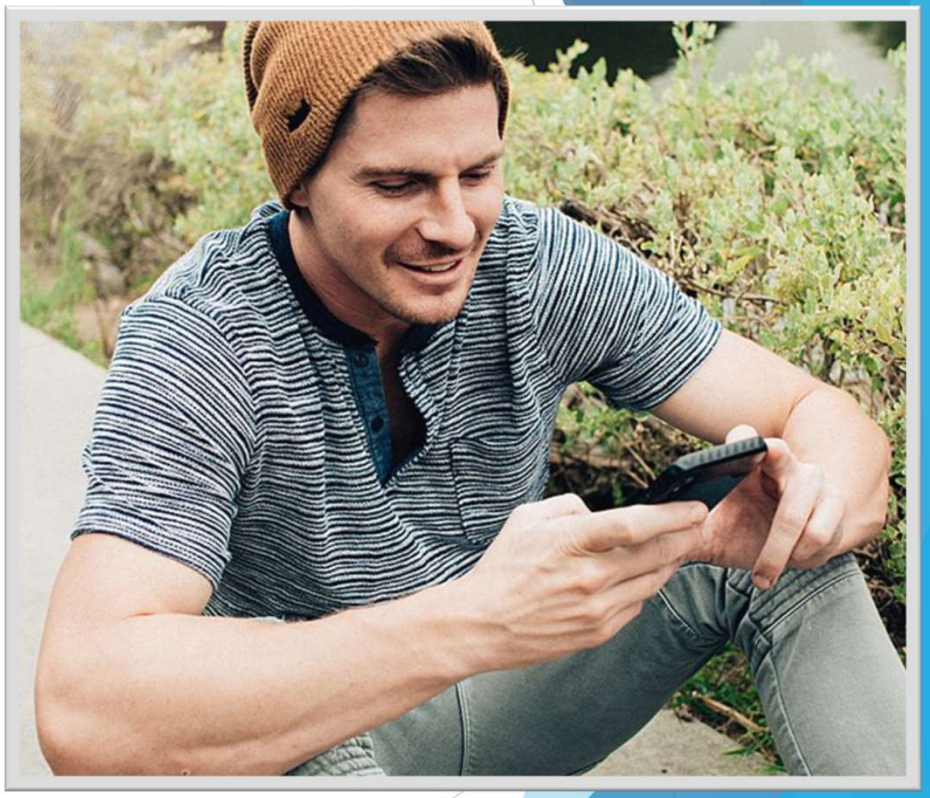
Attempt to Restore Homeostasis

=

Address Root Cause of Dysfunction

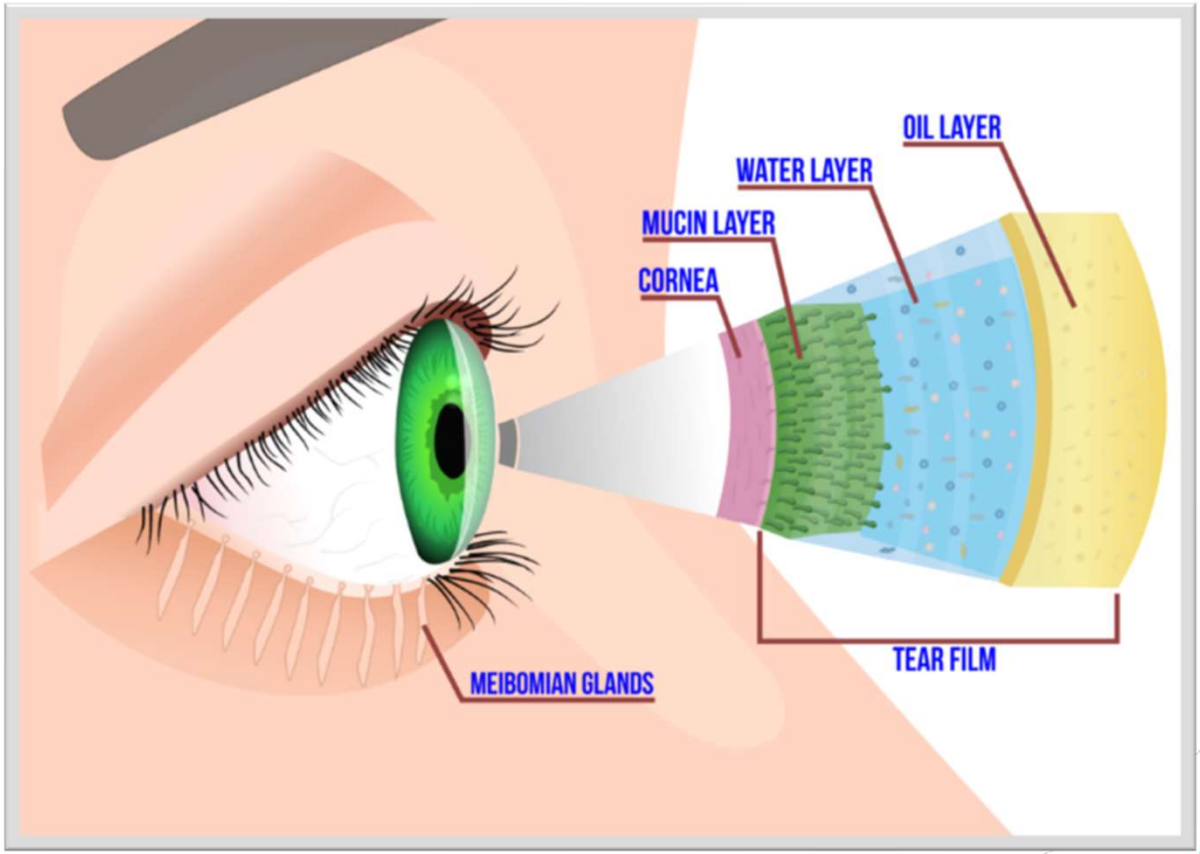
Dry Eye: A Modern Disease?



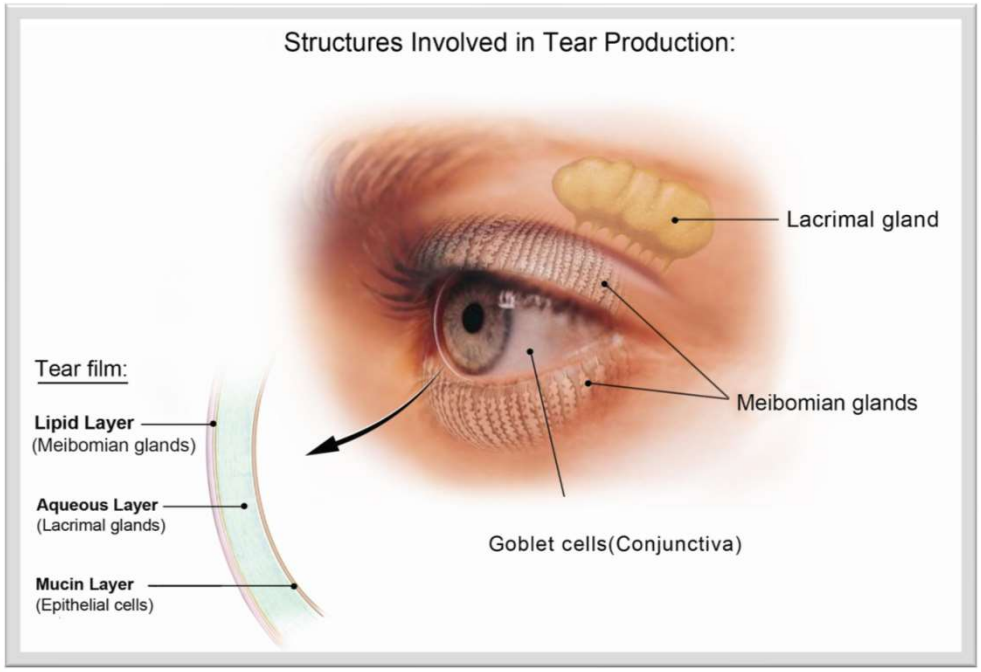


Mismatch between modern environment and evolutionary history

Tear Film & Ocular Surface



Mucin Layer

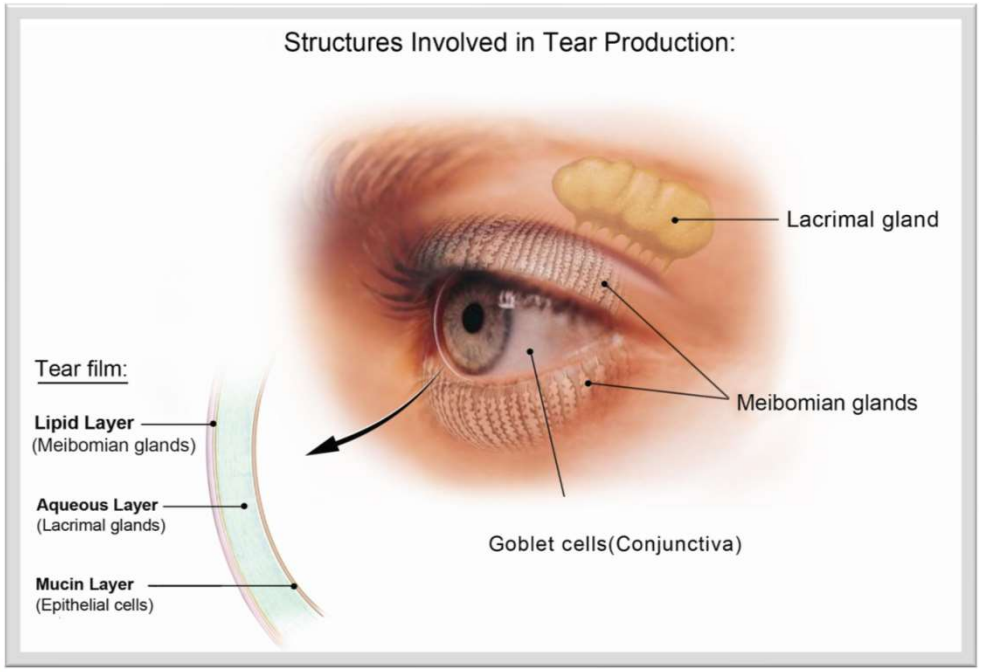


Origin
- Goblet cells (primary)
- Lacrimal gland and corneal epithelium (secondary)

Structure
- Mucins
- Glycoproteins
- Intermixes with aqueous layer

Function
- Anchors tear film to cornea
- Lowers surface tension
- Protection

Aqueous Layer

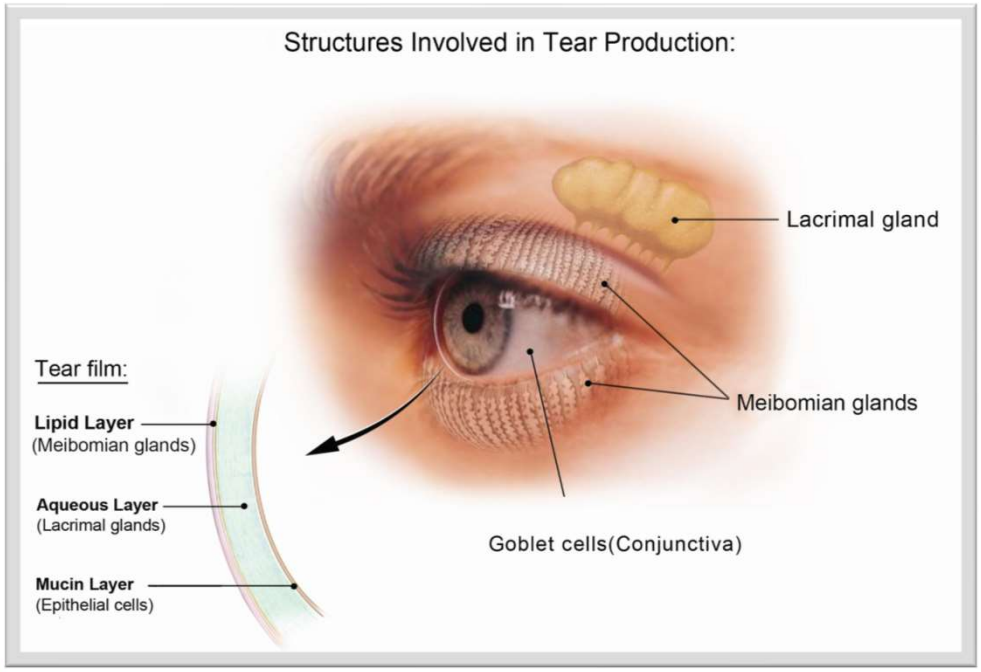


Origin
- Lacrimal gland
- Accessory lacrimal glands
  - Glands of Wolfring
  - Glands of Krause

Structure
- 98% water
- 2% gases, proteins

Function
- Lubrication and hydration
- Nourishment
- Protection

Lipid Layer

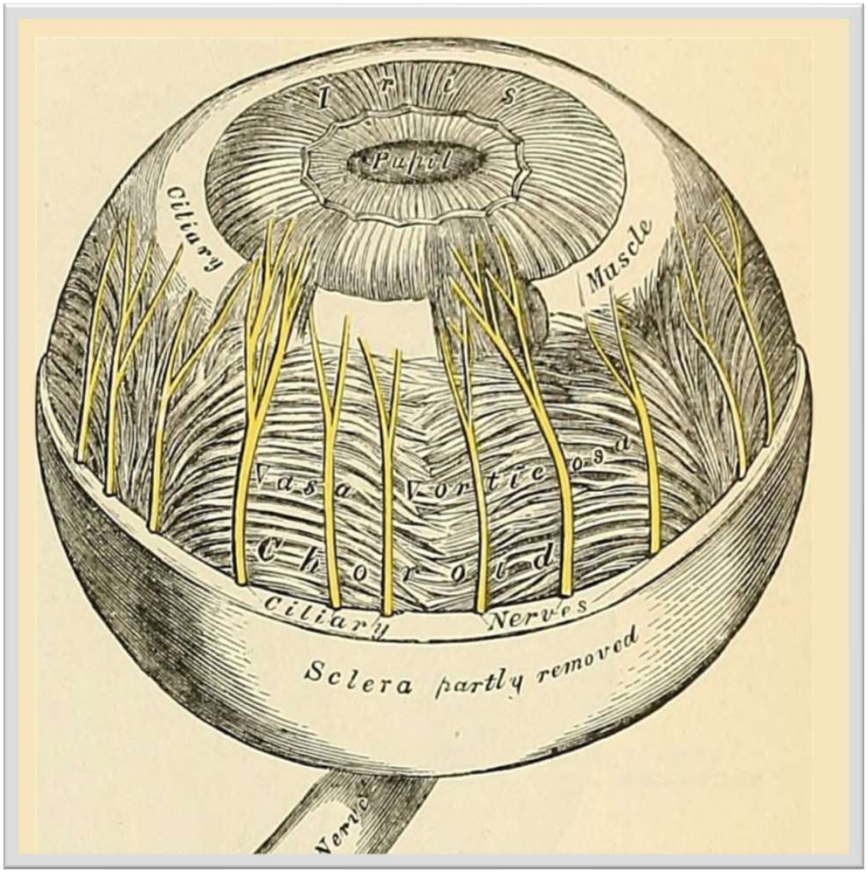


Origin
- Meibomian glands

Structure
- 50-100 nm in thickness
- 600+ unique lipids
  - Cholesterol esters
  - Wax esters
  - Phospholipids
  - Fatty acids
  - Triglycerides

Function
- Prevent evaporation
- Provide smooth optical surface
- Lowers surface tension

Neurogenic Control: Nerves of Sensation

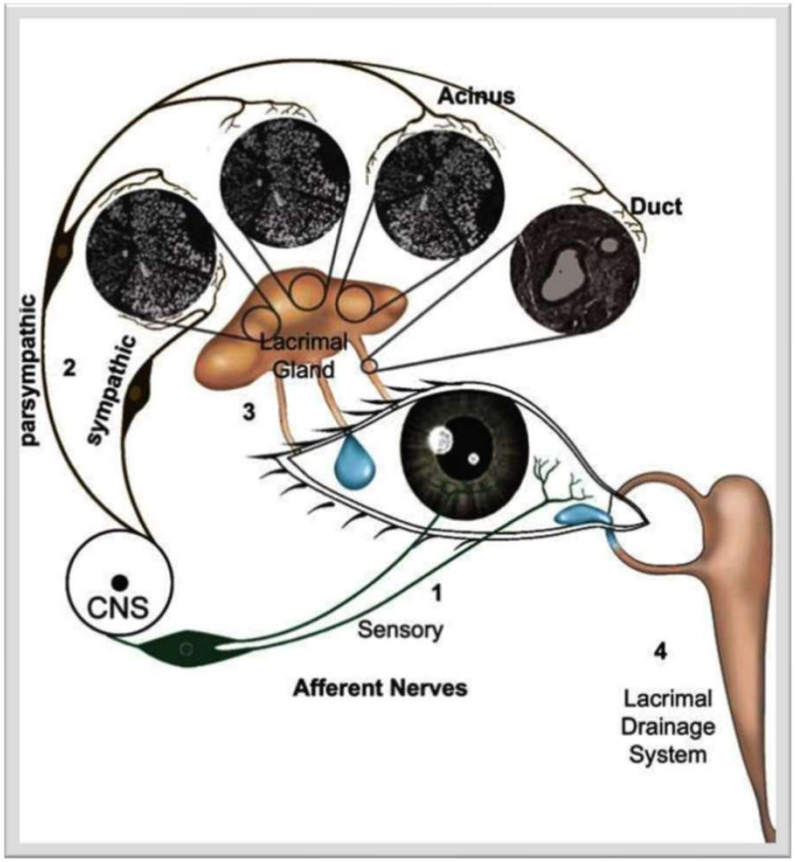


Sensory (Afferent) Nerves
- Corneal Nerves
  - Ophthalmic Branch (V1) of Trigeminal Nerve

Structure
- 7,000 nerve endings per mm^2

Function
- Sensation
- Epithelial cell turnover
- Wound healing
- Blinking and lacrimation

Neurogenic Control: Nerves of Secretion



From Dartt DA. Neural regulation of lacrimal gland secretory processes: relevance in dry eye diseases. Prog Retin Eye Res. 2009;28(3):155-177.

Parasympathetic Innervation: Motor (Efferent) Nerves

- Lacrimal Nerve

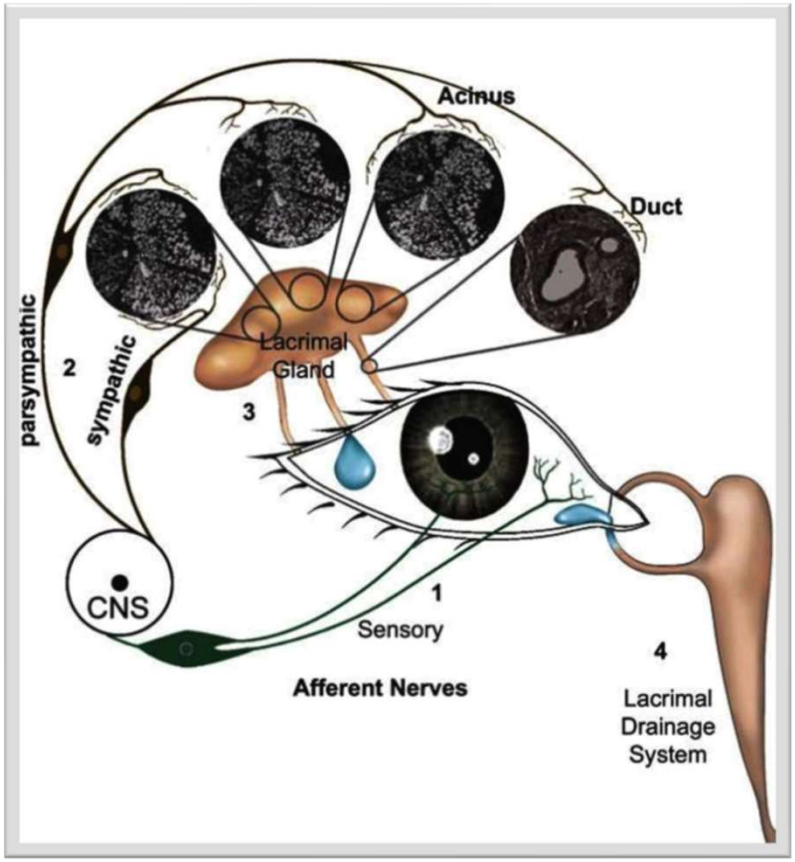
Structure

- Branch of Ophthalmic Division (V1) of Trigeminal Nerve
- Parasympathetic innervation from Zygomatic Nerve
  - Branch of Maxillary Division (V2)

Function

- Innervate lacrimal gland
  - Basal tear secretion
  - Reflex tearing

Neurogenic Control: Nerves of Secretion



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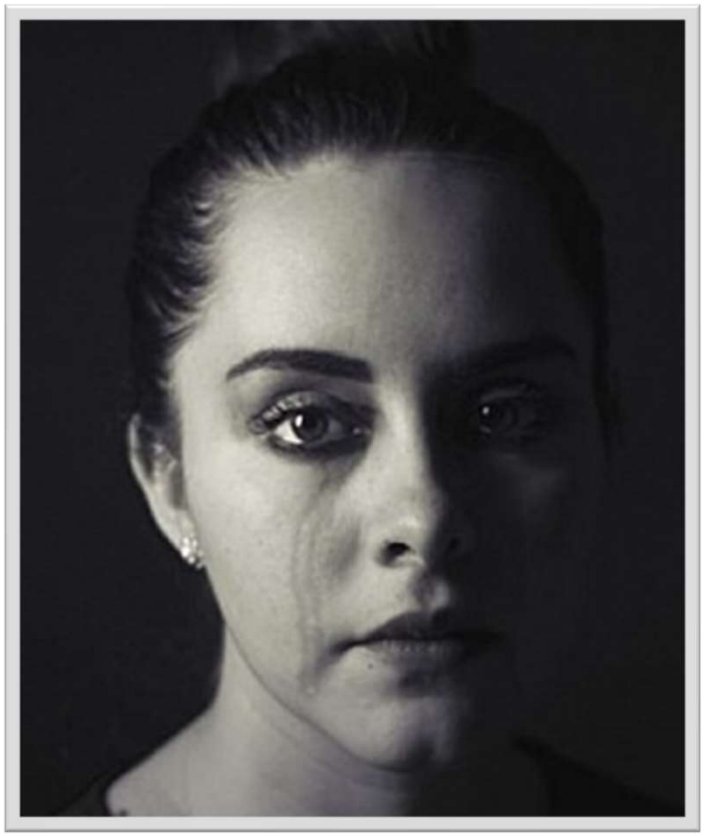
Parasympathetic Innervation: Motor (Efferent) Nerves

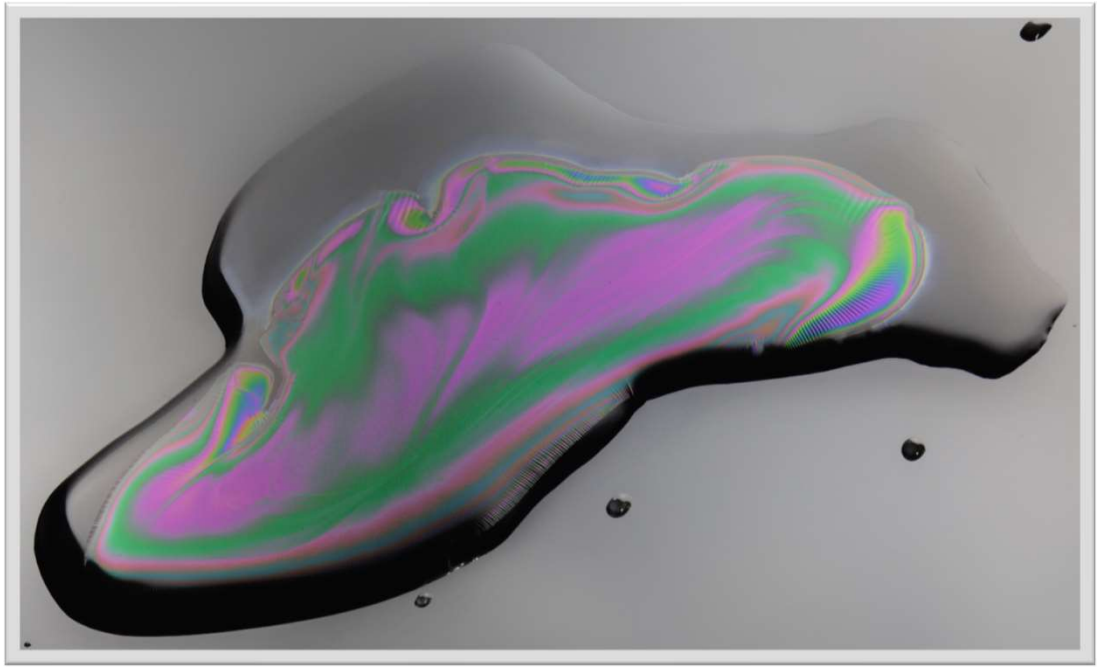
- Goblet cells
- Meibomian glands

Compensatory Mechanism: Epiphora



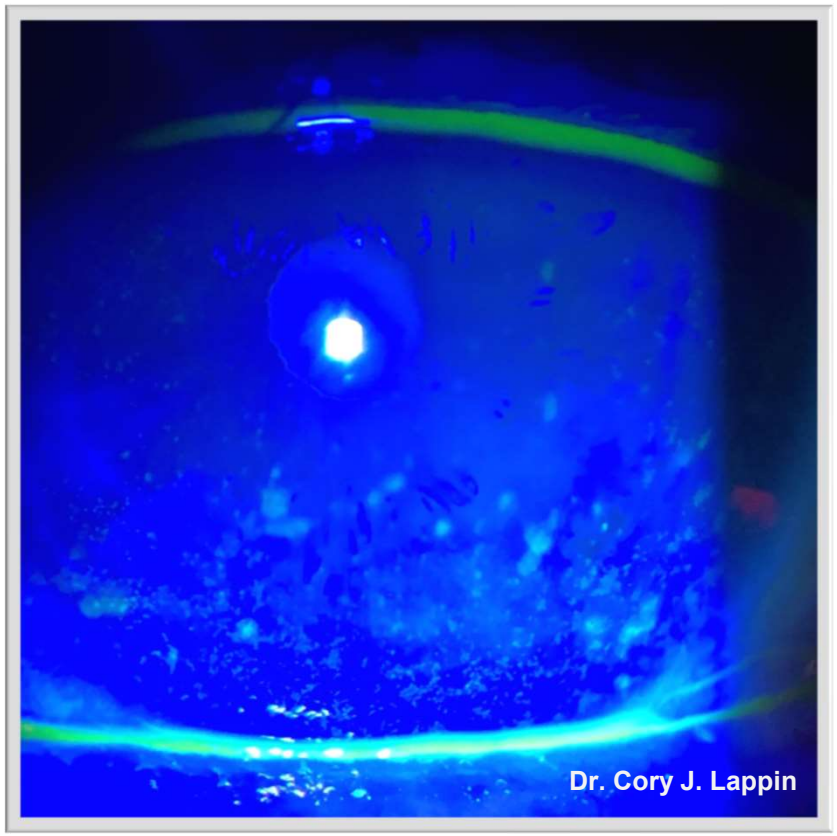
Stimulation of Reflex Tearing

Compensatory Mechanism: Oily Tears



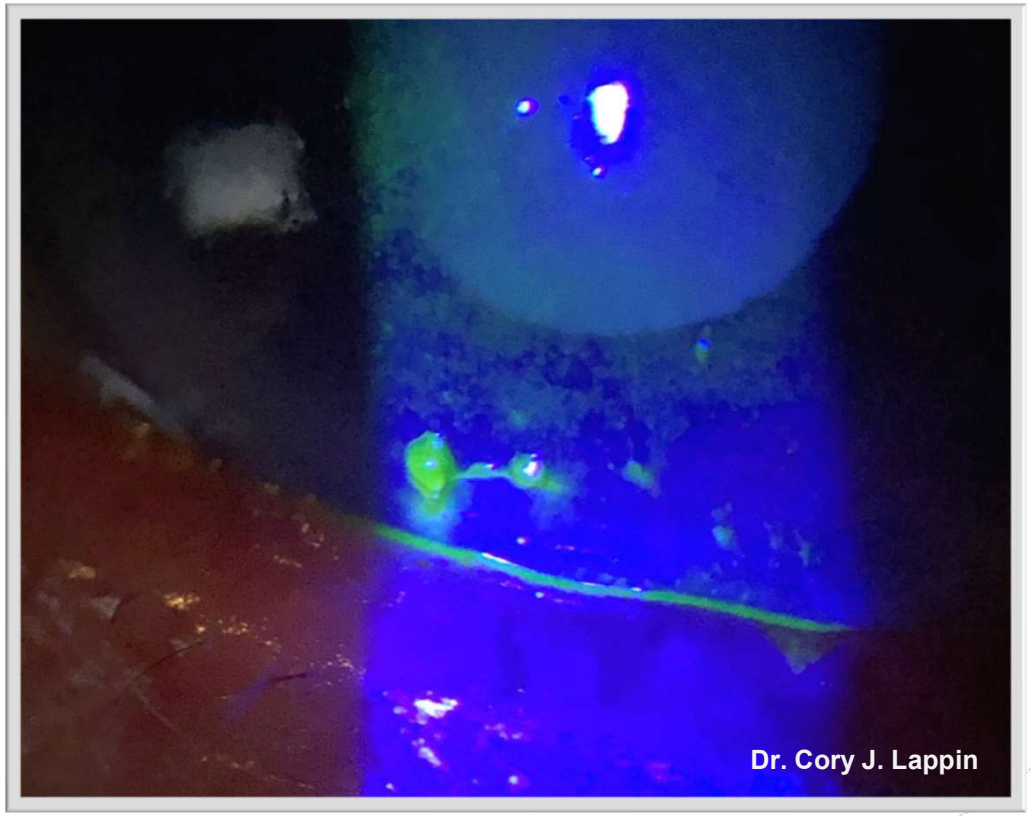
Increased Lipid Production

Compensatory Mechanism: Mucoid Tears

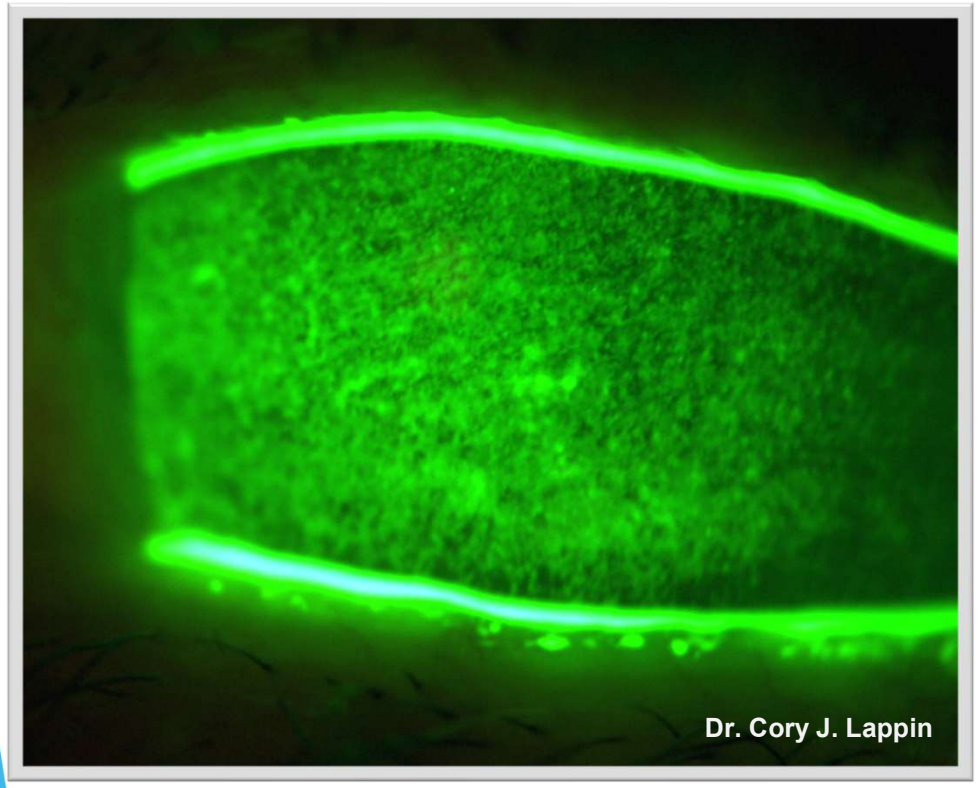


Increased Mucin Production

Compensatory Pathology: Filamentary Keratitis



Inflammation



Body's Last Resort

- Homeostatic systems fail
  - "Meltdown" of system
  - Vicious cycle

"Primary" vs "Secondary" Inflammation

- **Primary**
  - Inflammation is cause of disruption
    - Sjogren's Syndrome
    - Autoimmune conditions
- **Secondary**
  - Inflammation is result of disruption
    - MGD

Loss of Homeostasis

Meibomian Glands and the Lipid Layer

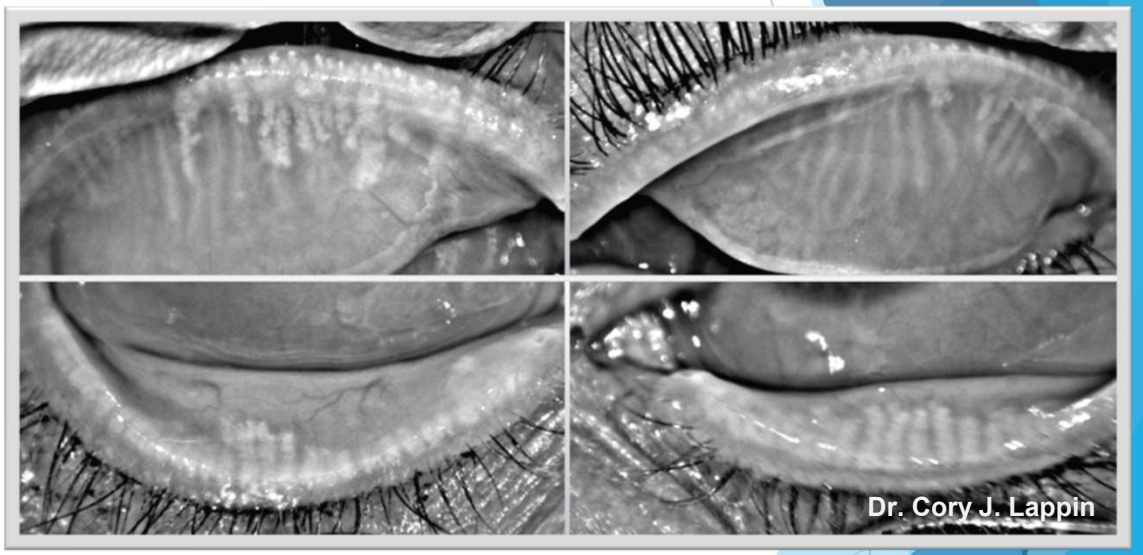
Maintenance of Homeostasis

- **Diet Rich in Omega 3 Fatty Acids**
  - Olive oil-like consistency of meibum
  - Easy secretion
- **Full Blinks**
  - Lids completely touch
  - Meibomian glands emptied upon completion of blink
- **Stable Tear Film**
  - Delayed evaporation
  - Stable vision
- **Eyes Comfortable**

Meibomian Glands and the Lipid Layer

Loss of Homeostasis

- **Diet Poor in Omega 3 Fatty Acids**
  - Toothpaste-like consistency to meibum
    - Increased melting point
    - Impaired secretion
- **Reduced and Partial Blinks**
  - Impaired secretion
  - Obstructed meibomian glands
- **Tear Film Instability**
  - Accelerated evaporation/reduced TBUT
  - Poor/fluctuating vision
- **Symptomatic**
  - Burning, stinging, irritation, FB sensation, redness, fluctuating vision



Meibomian Glands and the Lipid Layer

Treatment

- **Dietary Treatment**
  - Omega 3 fatty acid supplementation
    - Re-esterified, triglyceride-based formulation
    - 3:1 EPA to DHA ratio
    - 2 g of combined EPA and DHA
- **Blink Training**
  - Blink exercises
  - 20-20-20 Rule
- **Palliative Treatment**
  - Warm compresses + massage
  - Lipid-based artificial tear
    - Refresh Optive Mega 3

Meibomian Glands and the Lipid Layer

Treatment

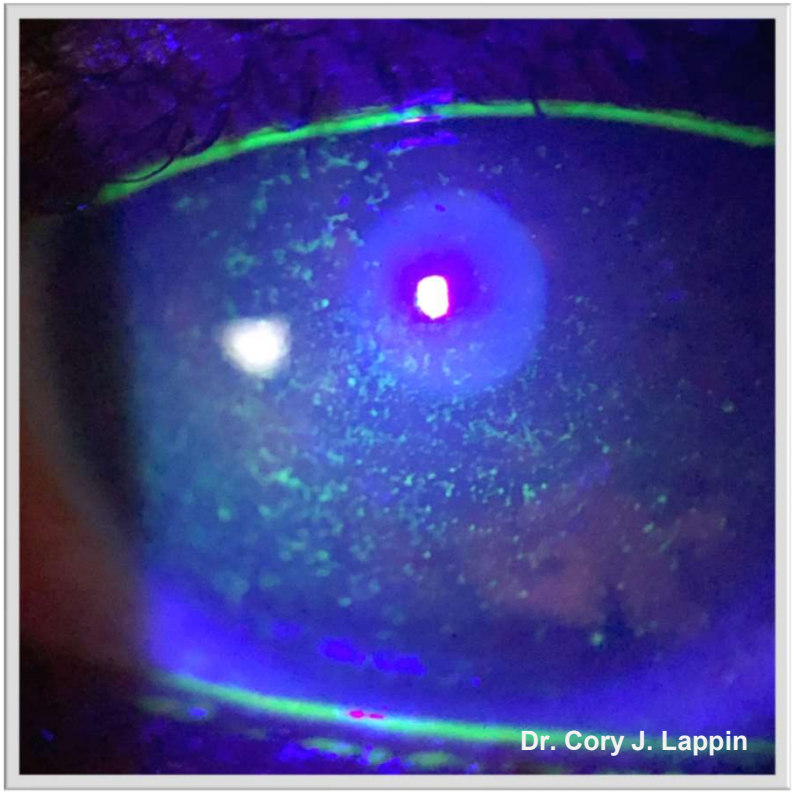
- **Procedures**
  - **Thermal Pulsation**
    - LipiFlow
    - iLux
    - TearCare
  - **IPL Treatment**
    - OptiLight
  - **RF Treatment**
    - OptiPlus
- **Tear Film Stabilizers**
  - Perfluorohexyloctane (Miebo)
- **Artificial Barrier Environments**
  - Scleral lenses

Lacrimal Gland and the Aqueous Layer

Maintenance of Homeostasis

- **Normal Tear Volume**
  - Cornea properly lubricated and hydrated
- **Ocular Surface Protected**
  - Debris, microbes, and foreign bodies removed
- **Eyes Comfortable**

Lacrimal Gland and the Aqueous Layer



Loss of Homeostasis

- **Reduced Tear Volume**
  - Poor lubrication
- **Loss of Protection**
  - Debris, microbes, and foreign bodies not adequately removed
- **Symptomatic**
  - Burning, stinging, irritation, FB sensation, redness
- **Inflammation**
  - Break down of ocular surface
- **Causes**
  - Often due to disorder of lacrimal gland
    - Sjogren's Syndrome

Lacrimal Gland and the Aqueous Layer

Treatment

- **Anti-inflammatories**
  - Immunomodulators
    - Lifitegrast (Xiidra)
    - Cyclosporine (Cequa, Vevye Restasis)
  - Steroids
    - "Soft" steroids (Eysuvis)
- **Neurostimulators**
  - Varenicline nasal spray (Tyrvaya)
  - iTear100
- **Lubricants**
  - Preservative-free artificial tears
    - Systane Hydration
  - Gels
    - Carbomer-based

Lacrimal Gland and the Aqueous Layer

Treatment

- **Regenerative Treatments**
  - Platelet-rich plasma (PRP)
  - Autologous serum
  - Amniotic membranes
    - Cryopreserved (Prokera)
    - Lyophilized
    - Dehydrated
- **Procedures**
  - IPL Treatment
    - OptiLight
- **Artificial Barrier Environments**
  - Scleral lenses

The Nerves and Feedback

Maintenance of Homeostasis

- Normal corneal sensation
- Maintenance of corneal epithelial cell turnover
- Successful corneal wound healing
- Normal blinking and lacrimation

The Nerves and Feedback

Loss of Homeostasis

- Reduced or absent corneal sensation
- Disrupted corneal epithelial cell turnover
- Impaired corneal wound healing
- Abnormal blinking and lacrimation
- Break down of ocular surface

- **Causes**
  - Herpetic infection
  - Surgery
    - Refractive surgery (LASIK)
    - Retinal surgery
  - Injury/Trauma
  - Medication use
    - Chronic preservative exposure (glaucoma)
  - Chronic ocular surface disease
  - Systemic disease (diabetes, stroke, etc.)

The Nerves and Feedback

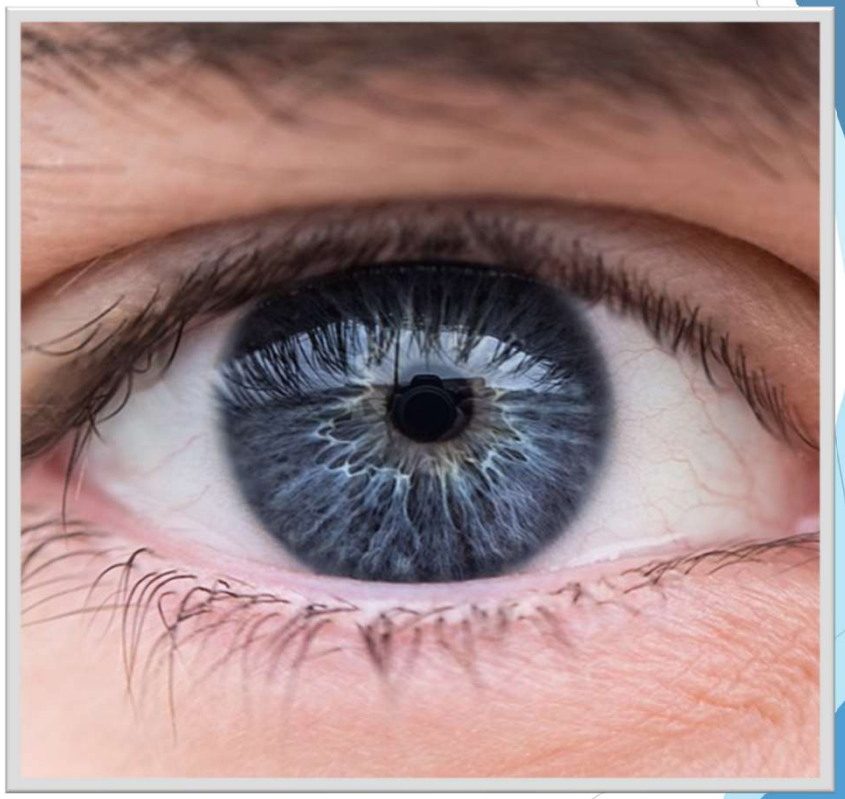
Treatment

- **Regenerative Treatments**
  - Cenegermin-bkbj (Oxervate)
    - Recombinant human NGF
  - Platelet-rich plasma (PRP)
  - Autologous serum
  - Amniotic membranes
    - Cryopreserved (Prokera)
    - Lyophilized
    - Dehydrated
- **Neurostimulators**
  - Varenicline nasal spray (Tyrvaya)
  - iTear100
- **Surgical**
  - Corneal neurotization
  - Tarsorrhaphy
  - Conjunctival flap

Mechanical Eyelid Issues: Exposure

Maintenance of Homeostasis

- **Lids Close Completely**
  - Tears properly spread over surface
  - Ocular surface protected
  - Ocular surface recovery during sleep



Mechanical Eyelid Issues: Exposure

Loss of Homeostasis

- **Incomplete Lid Closure**
  - Poor spreading of tears over ocular surface
  - Increased friction
  - Ocular surface exposed
  - Poor ocular surface recovery and repair during sleep
- **Causes**
  - Lagophthalmos
    - S/P Blepharoplasty
    - Bell's Palsy
  - Floppy eyelid syndrome
  - Ectropion
  - Age-related loss of lid elasticity

Mechanical Eyelid Issues: Exposure

Treatment

- **Nocturnal Lubrication**
  - Ointments
    - Hylo Night
  - Gels
    - Carbomer-based
- **Protective Barriers**
  - Sleep goggles
    - Eyeseals 4.0
  - Lid Patches
    - SleepTite/SleepRite
- **Artificial Barrier Environments**
  - Scleral lenses (day)
  - Soft BCLs (night)
- **Surgery**
  - Approach with caution

Microbiome and Microflora

Maintenance of Homeostasis

- **Bacterial (Staph)** and **Demodex** populations on lids and lashes controlled
- Normal meibum production and tear film function

Microbiome and Microflora

Maintenance of of Homeostasis

- Bacteria (Staph) and **Demodex overpopulate** on lids and lashes
- **Altered meibum** production and tear film function
  - Increased melting point
  - Saponification of tears
- **Lid margin and ocular surface inflammation**
  - MGD
  - Lid notching
  - Lash disruption

Microbiome and Microflora

Loss of Homeostasis

- **Bacteria (Staph)** and Demodex **overpopulate** on lids and lashes
- **Altered meibum** production and tear film function
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- **Lid margin and ocular surface inflammation**
  - MGD
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  - Lash disruption

Microbiome and Microflora

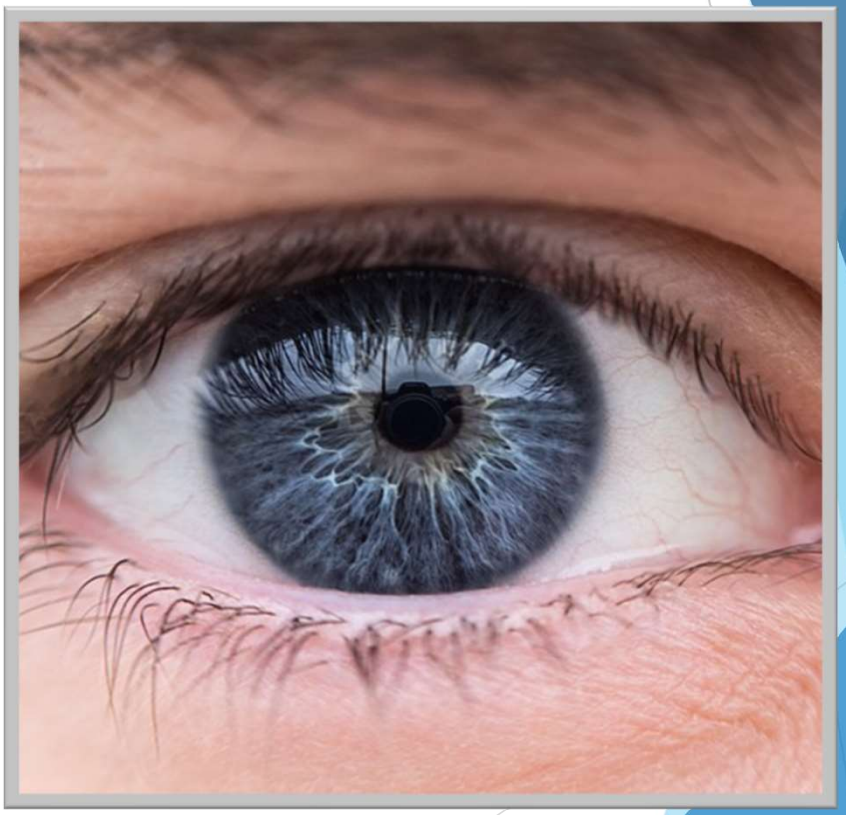
Treatment

- **Reestablish Control of Microbial Populations**
  - **Bacteria (Staph)**
    - Hypochlorous acid
  - **Demodex**
    - Lotilaner ophthalmic solution (Xdemvy)
    - Tea tree oil
    - Okra-based cleansers (Zocular)
  - **Manual Debridement**
    - NuLids PRO (in-office treatment)
    - BlephEx (in-office treatment)
    - NuLids (at-home treatment)
  - **IPL Treatment**
    - OptiLight

Ocular Rosacea

Maintenance of Homeostasis

- **Cathelicidin** (antimicrobial peptide)
  - Produced in response to potential pathogens
  - Part of our **innate immune system** response



Ocular Rosacea

Loss of Homeostasis

- **Cathelicidin** (antimicrobial peptide)
  - **Produced in response to normal environmental stimuli**
    - Cold weather, alcohol, spicy food, stress, etc.
  - **Increases VEGF production**
    - Development of telangiectatic vessels on ocular surface
      - Inflammation
      - Cosmetic redness

Ocular Rosacea

Treatment

- **Lifestyle Modifications**
  - Trigger avoidance
- **Anti-inflammatories**
  - Doxycycline
  - Steroids
  - Immunomodulators
- **Vasoconstrictors**
  - Brimonidine tartrate (Lumify)
- **Supportive Treatment**
  - Standard MGD Treatment
- **IPL Treatment**
  - OptiLight

Allergies and Hypersensitivities

Maintenance of Homeostasis

- Ocular surface remains stable despite presence of environmental allergens
- Inflammatory response controlled

Allergies and Hypersensitivities

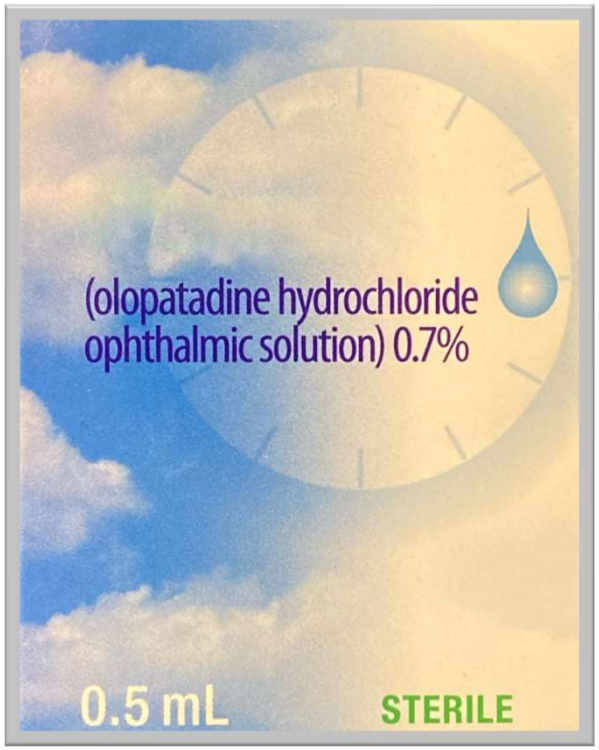
Loss of Homeostasis

- **Symptomatic**
  - Itching, redness, swelling, stringy or ropey mucus production
- **Inflammation**
  - Break down of ocular surface
- **Causes**
  - Seasonal Allergies
  - Contact Dermatitis
  - Atopic Keratoconjunctivitis (AKC)
  - Vernal Keratoconjunctivitis (VKC)

Allergies and Hypersensitivities

Treatment

- **Antihistamine-Mast Cell Stabilizer Combos**
  - Olopatadine (Pataday)
  - Alcaftadine (Lastacaft)
- **Preferential Exclusion**
  - Ectoin (Allegro)
- **Anti-inflammatories**
  - Steroids (topical and oral)
- **Immunomodulators**
  - Cyclosporine (Verkazia)



Environmental Challenges

Maintenance of Homeostasis

- Ocular surface remains stable despite challenges posed by **external environment and climate**

Environmental Challenges

Loss of Homeostasis

- **External Environment and Climate Challenges**
  - Too great for ocular surface to maintain stability
- **Common stressors**
  - **Outdoor Climate**
    - High temperatures
    - Low humidity
    - Poor air quality
  - **Indoor Environment**
    - AC
    - Ceiling fans
    - Furnace

Environmental Challenges

Treatment

- **Modify Environment**
  - Humidifier
- **Create Barrier to Environment**
  - Ziena moisture chamber specs
  - Scleral lenses
  - BCLs
- **Increase Ocular Surface Resiliency**
  - Standard DED Treatment

General Contact Lens Wear

Intrinsically Disrupts Homeostasis

- Introduces foreign body to ocular surface
- Proinflammatory?

Successful Contact Lens Wear

- Minimize disruption to homeostasis
- Daily disposable modality
- Polymers that mimic or are compatible with ocular surface

Microblepharoexfoliation

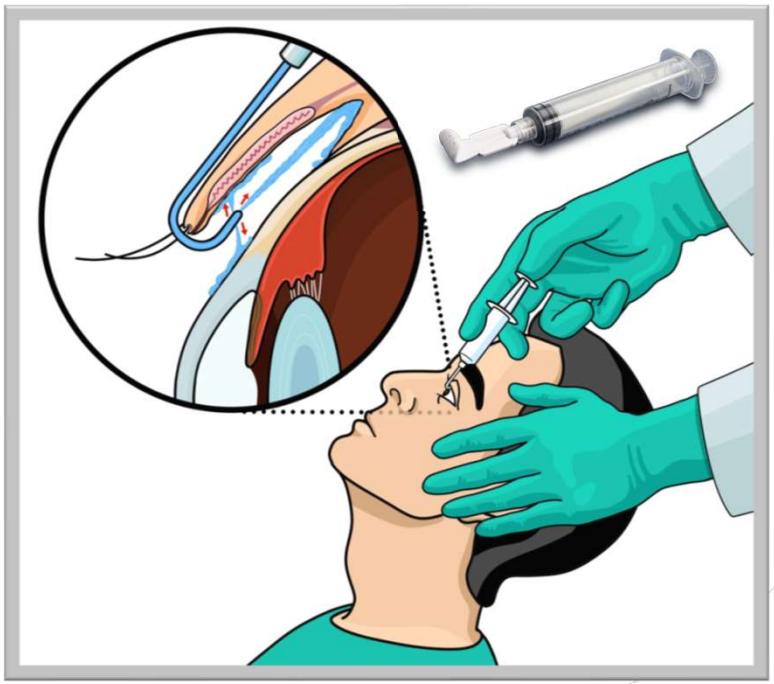
Benefits

- **Blepharitis**
  - Reduces bacterial and Demodex populations
  - Removes lid debris, biofilm, and collarettes
- **MGD**
  - Clears duct openings
  - Removes pro-inflammatory pathogens and factors
- **Devices**
  - In-office: BlephEx, NuLids PRO
  - At-home: NuLids

Ocular Surface Lavage

Benefits
- High pressure saline irrigation
- “Resets” ocular surface

- **Devices**
  - Rinsada



https://www.rinsada.com/

Thermal Pulsation

Benefits

- **MGD**
  - Improves meibomian gland structure, function, quality of meibum, and tear breakup time
  - “Resets” meibomian glands
- **Devices**
  - LipiFlow
  - iLux
  - TearCare

Intense Pulsed Light (IPL)

Benefits

- **MGD**
  - Improves meibomian gland structure, function, quality of meibum, and tear breakup time
- **Inflammation**
  - Reduces inflammatory factors found in tear film and ocular surface
- **Ocular Rosacea**
  - Destroys proinflammatory telangiectatic blood vessels
- **Blepharitis**
  - Decreases Demodex and bacterial populations on lids and lashes
- **Devices**
  - OptiLight

Radiofrequency (RF)

Benefits

- **Targeted heat delivery**
  - Frequency specific
  - Liquefies meibum
- **Improves skin quality**
  - Stimulates collagen synthesis
  - Potentially improves blink mechanics
- **Devices**
  - OptiPlus

Punctal Plugs

Benefits vs Cost

- **Controversial**
  - Based on antiquated understanding of DED
- **“Cesspool” Effect**
  - Potential to exacerbate inflammation
- **Counter to Homeostasis**
  - Fundamentally alters ocular surface environment
  - Do not address underlying issue
  - Sometimes just as beneficial to remove punctal plugs as to place them
  - Effects often diminish with time
    - Recalibration of homeostasis

Artificial Barrier Environments

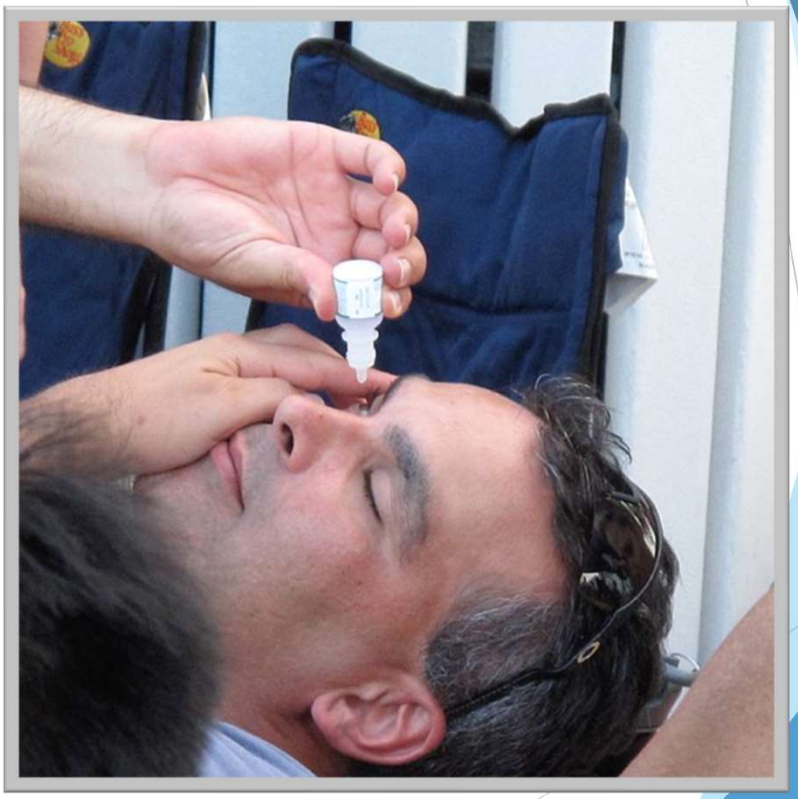
Benefits
- Creates “new” homeostatic environment
- “Last resort”

- **Methods**
  - Soft bandage contact lenses
  - Scleral lenes

Artificial Tears

“Band-Aid in a Bottle”

- Quick relief
  - But short-lived
- More palliative than therapeutic
  - Do not address underlying issues
- Preservative-free gels and drops

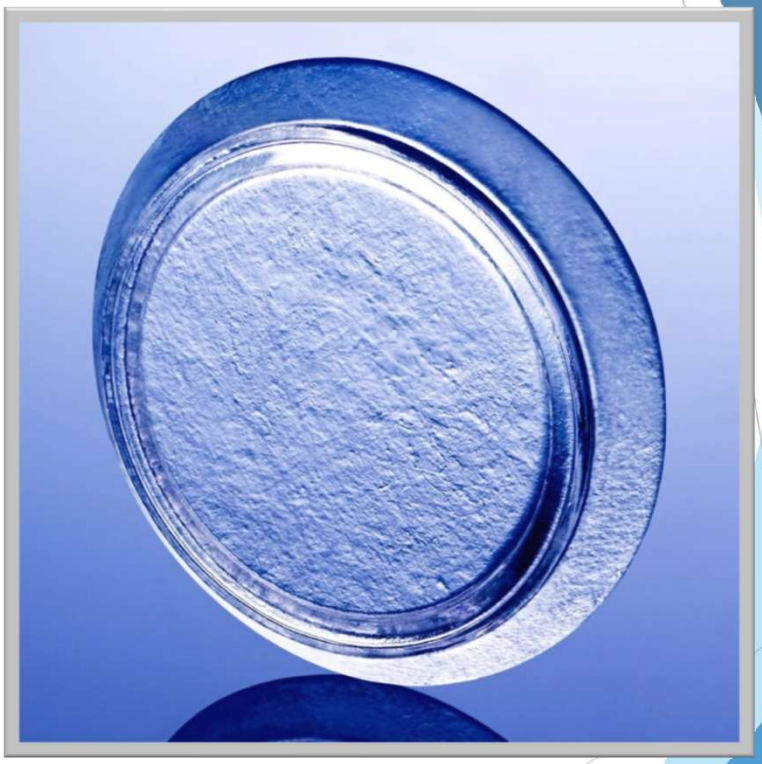


Regenerative Treatments

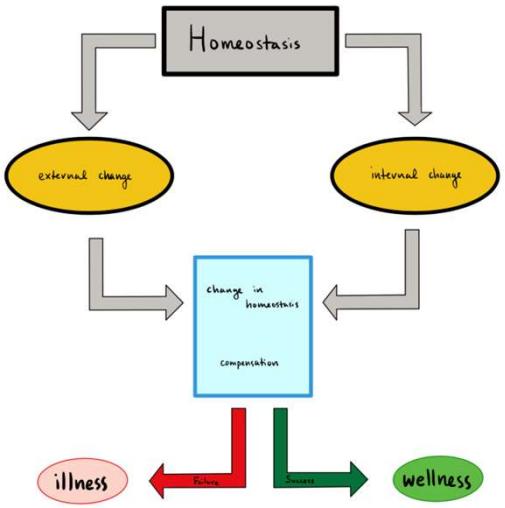
Restorative

- Fundamental goal is restoration of function at a base level

- **Examples**
  - Recombinant human NGF
    - Cenegermin-bkbj (Oxervate)
  - Amniotic membranes
    - Cryopreserved (Prokera)
    - Lyophilized
    - Dehydrated
  - Blood-derived products
    - Platelet-rich plasma (PRP)
    - Autologous serum



Summary



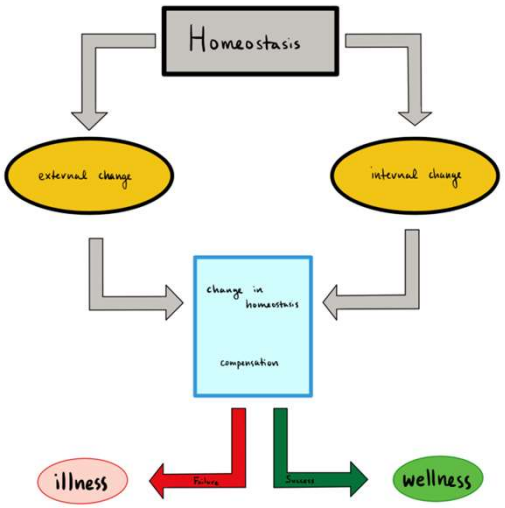
To optimize the ocular surface you must understand homeostasis

To understand homeostasis you must know how the ocular surface functions in health

Once you understand how the system is meant to function you can determine:

What causes the ocular surface to lose balance?
What is the result when balance is lost?
How do we attempt to restore balance?

Summary



By evaluating dry eye and ocular surface disease through this homeostatic perspective, you can:

Determine the best treatment options for your patients

Optimize the ocular surface by attempting to restore homeostasis

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Thank you!

Instagram: @cory.lappin

CONTACT LENSES AND DRY EYE: THE IMPACT OF SOFT LENS WEAR ON OCULAR SURFACE HOMEOSTASIS

Cory J. Lappin, OD, MS, FAAO

- Alcon
- Barti
- Bausch + Lomb
- Bruder Healthcare and M&S Technologies (Hilco Vision)
- Dompé
- Lumenis
- Myze
- NuLids
- PRN Vision Group
- Rinsada
- Tarsus Pharmaceuticals
- Vital Tears

DISCLOSURES

The content of this COPE accredited course was prepared independently. I have received no financial or commercial support for this presentation. All relevant relationships have been mitigated.

HOMEOSTASIS

Homeostasis

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 ETIOLOGICAL ROLES

- TFOS DEWS II Definition & Classification Subcommittee Report

SOFT CONTACT LENS WEAR & OCULAR SURFACE HOMEOSTASIS

SOFT CONTACT LENSES: A HOMEOSTATIC CHALLENGE

Benefits

- Refractive
  - Vision correction
- Therapeutic
  - BCL
- Interventional
  - Myopia management

Challenges

- Innately disrupts homeostasis
  - Foreign body on the ocular surface
  - Disrupts tear film
  - Intrinsically inflammatory
- Complications
  - Infection
  - Inflammation

UP TO 51% OF CONTACT LENS WEARERS ULTIMATELY END UP DISCONTINUING USE

20% dropout within the first year of wear

WHY DOES THIS HAPPEN?
WHAT CAN WE DO TO AVOID IT?

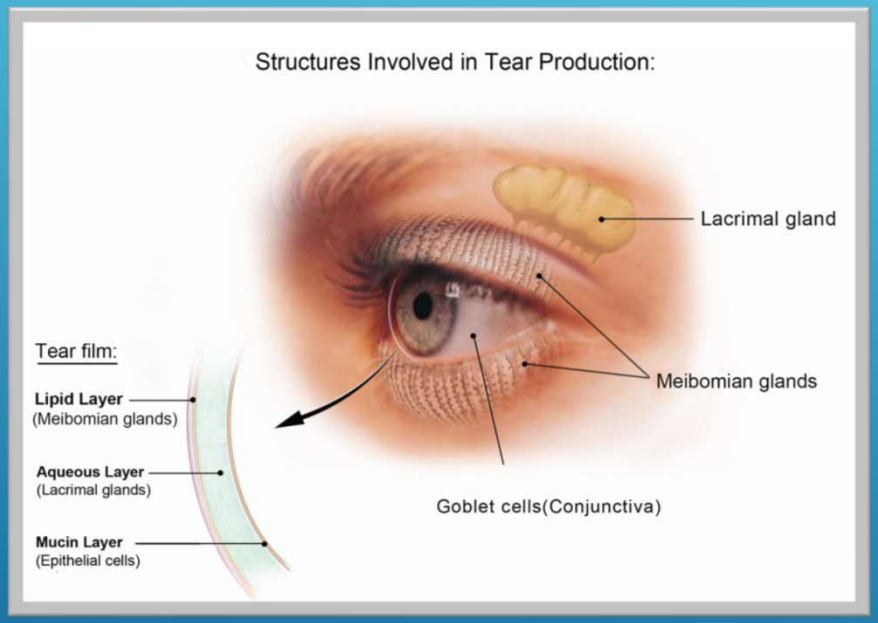
THINGS TO KEEP IN MIND

- Conflicting findings
- No consensus on many points
- Some effects more historical

BUT

- General trends have emerged

SOFT CONTACT LENS WEAR & THE OCULAR SURFACE



OCULAR SURFACE

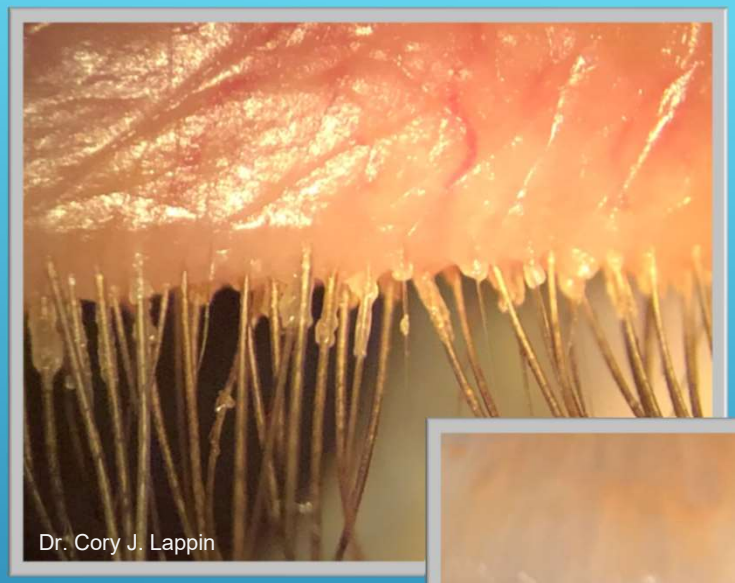
- Cornea
- Conjunctiva
- Eyelids & Lashes
- Meibomian Glands
- Main & Accessory Lacrimal Glands
- Goblet Cells
- Tear Film

LIDS & LASHES

Function

- Protection
- Tear spread

- **Lens Impact on Surface**
  - Increased blink rate
  - Increased incidence of ptosis
- **Surface Impact on Lens**
  - Demodex blepharitis
    - Collarettes
  - Bacterial blepharitis
    - Saponification

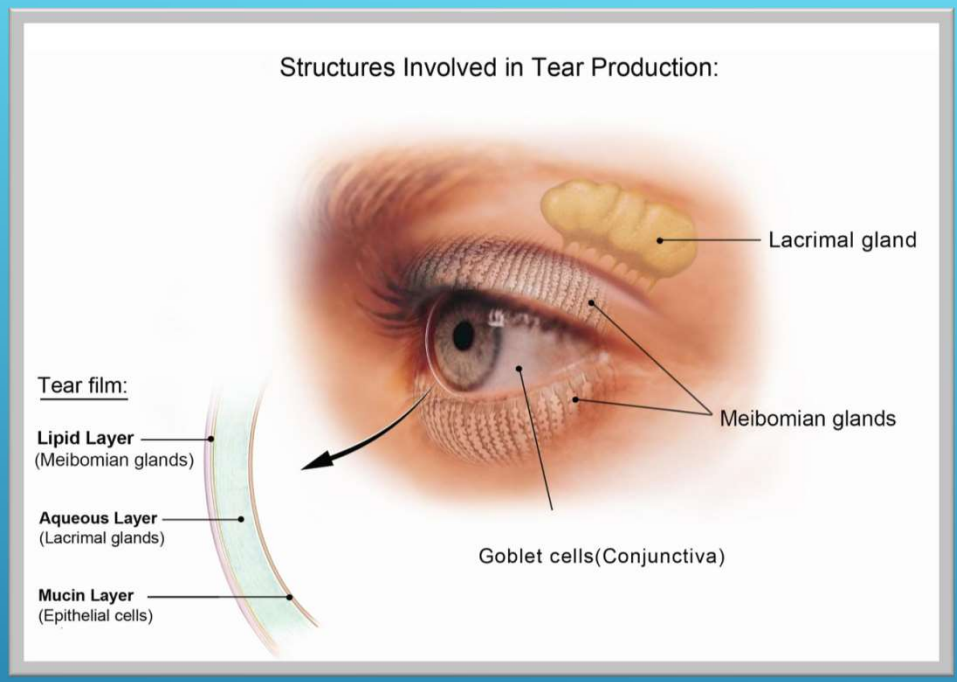


SOFT CONTACTS LENSES: LIDS & LASHES

TEAR FILM

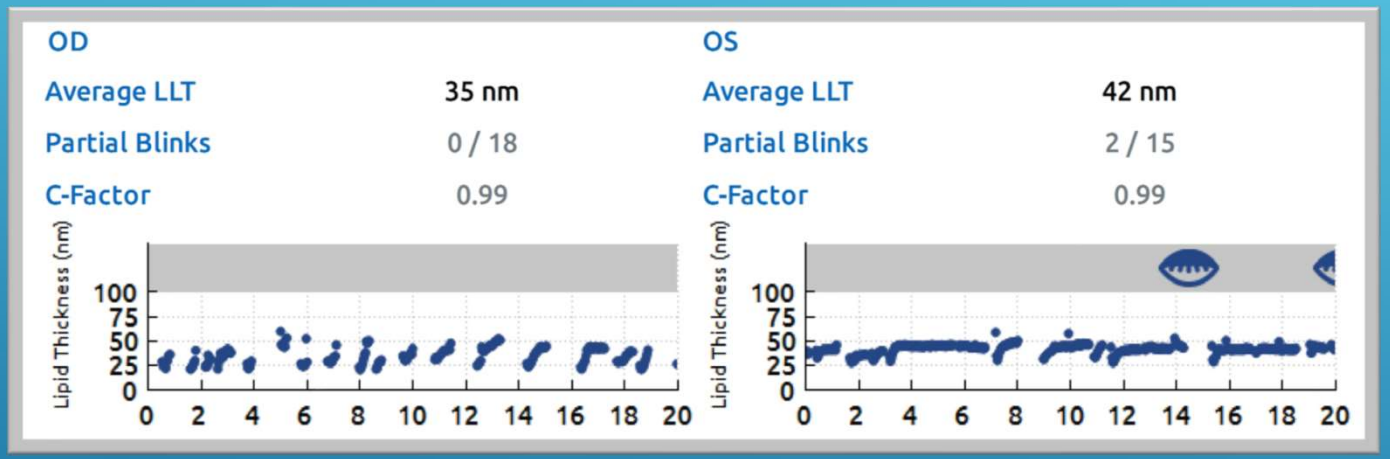
Function

- Protection
- Nourishment
- Smooth optical surface
- Refract light



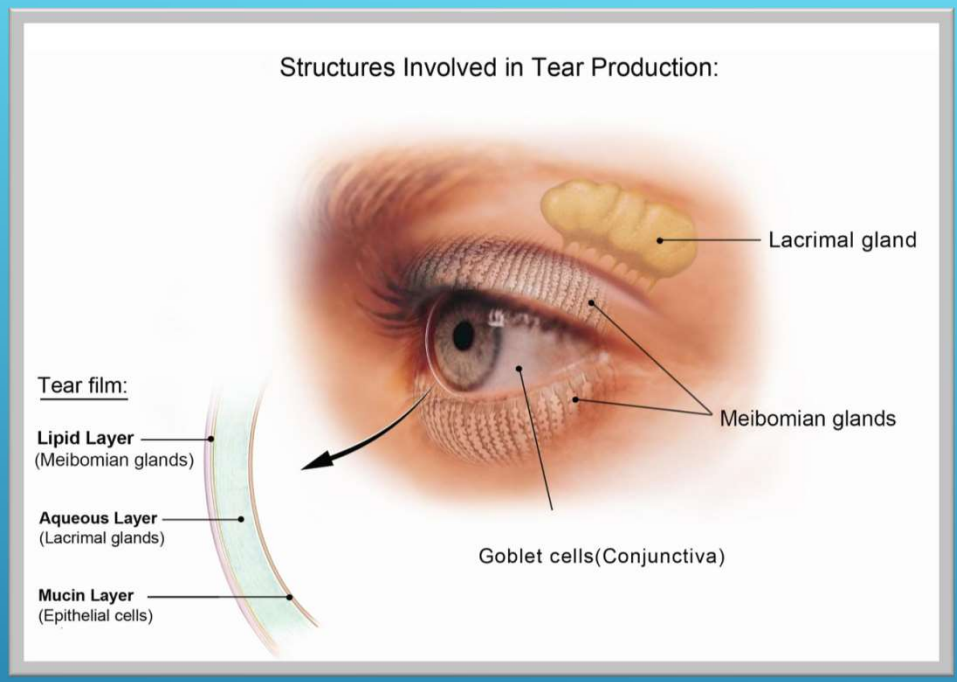
SOFT CONTACTS LENSES: TEAR FILM

- **Lens Impact on Surface**
  - Splits tear film into two
    - Pre-lens tear film
    - Post-lens tear film
  - Reduced
    - Lipid layer thickness
    - Tear volume
    - Tear film turnover
    - TBUT
  - Increased
    - Evaporation
    - Osmolarity



SOFT CONTACTS LENSES: TEAR FILM

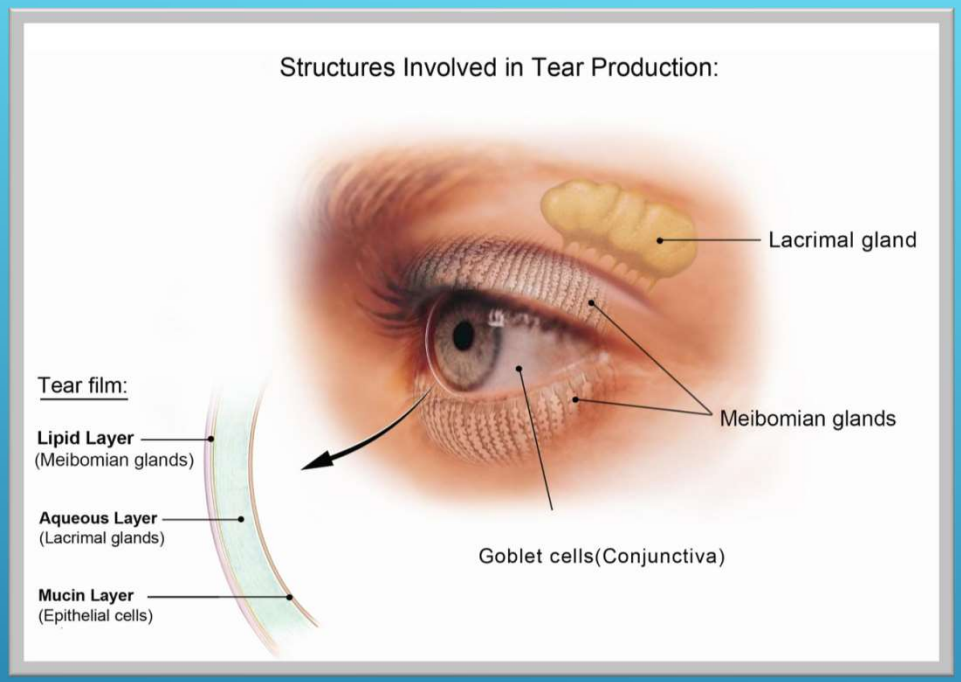
- **Surface Impact on Lens**
  - Poor tear quality reduces
    - Comfort
    - Wear time
    - Visual quality
  - Lens dehydration
    - Tightening



MEIBOMIAN GLANDS

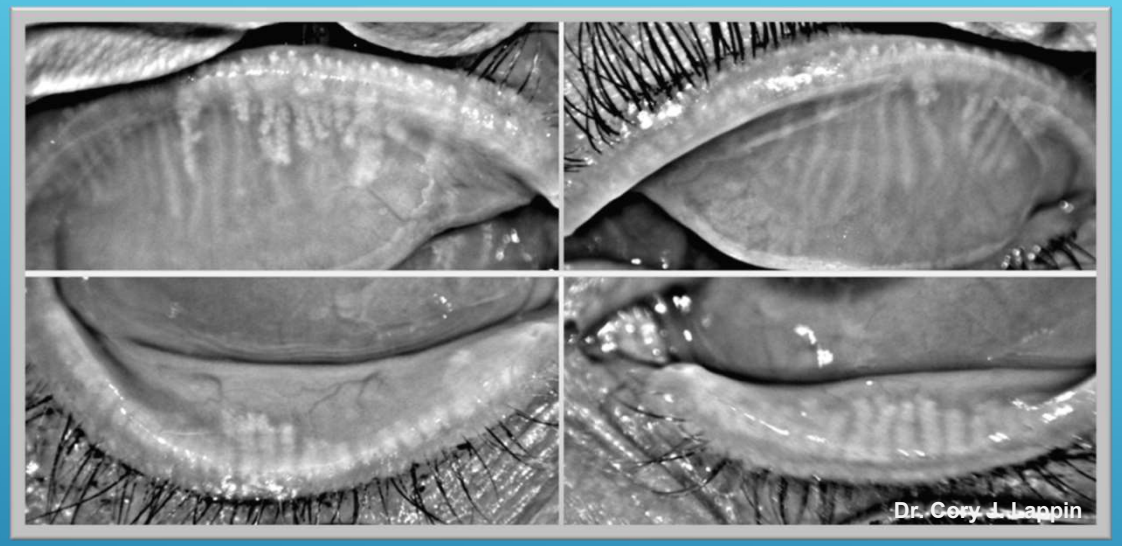
Function

- Produce meibum component of tear film
  - Prevents evaporation
  - Provides smooth optical surface
  - Lowers surface tension



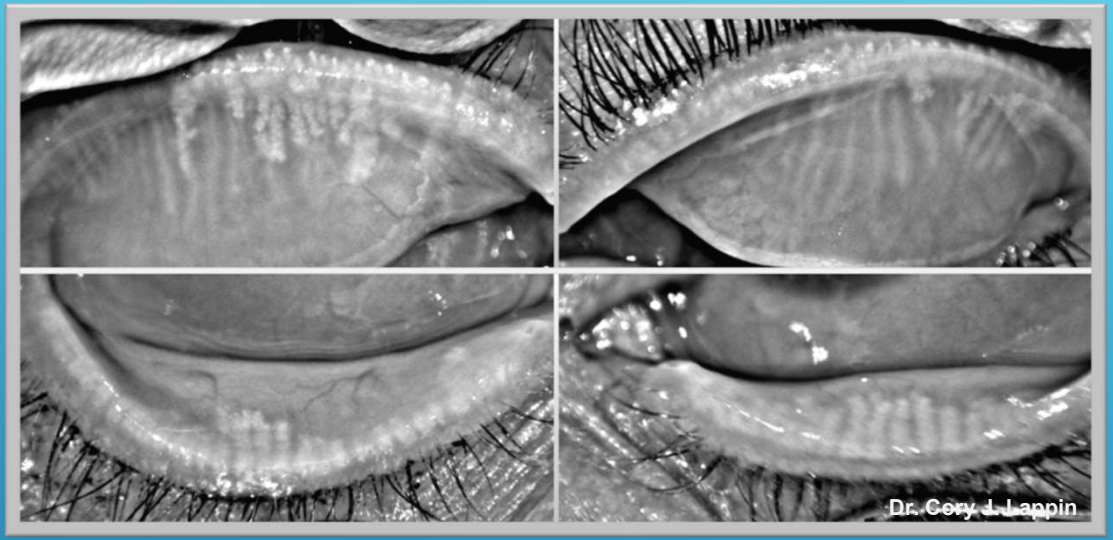
SOFT CONTACTS LENSES: MEIBOMIAN GLANDS

- **Lens Impact on Surface**
  - Altered meibum quality
    - Higher melting point
    - Independent of structural changes
  - Altered meibomian gland structure
    - Controversial
    - May worsen with wear
      - Starts after 1 year of wear
      - Stops after 2-3 years of wear
    - Upper lid glands more affected



SOFT CONTACTS LENSES: MEIBOMIAN GLANDS

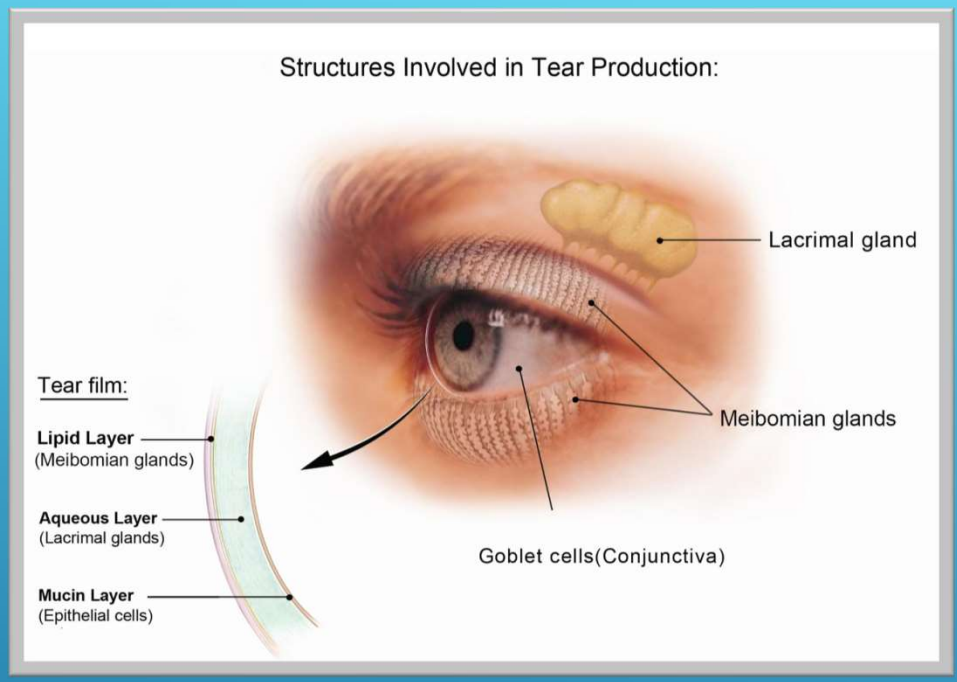
- **Surface Impact on Lens**
  - Reduced tear film stability
    - Reduced
      - Comfort
      - Wear time
      - Visual quality



MAIN & ACCESSORY LACRIMAL GLANDS

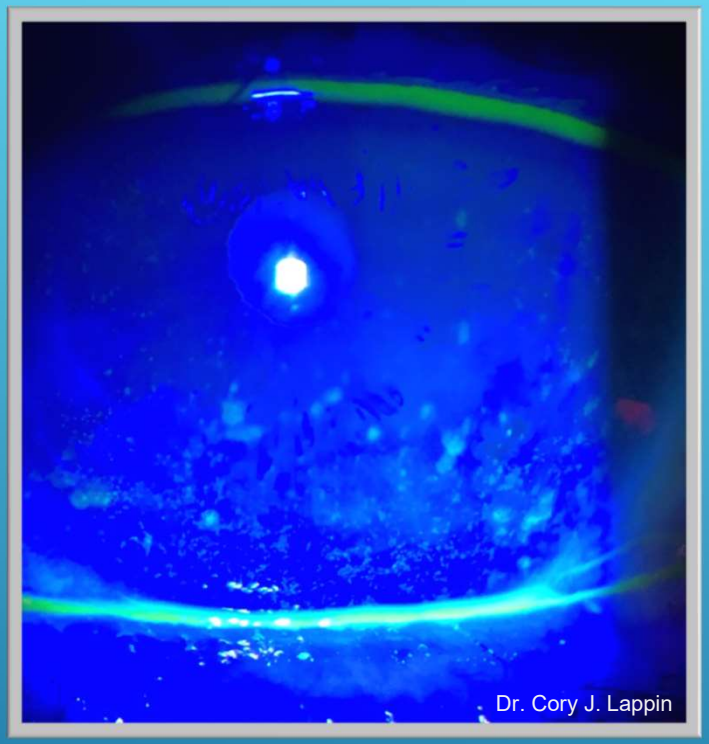
Function

- Produces aqueous component of tears
  - Lubrication and hydration
  - Nourishment
  - Protection



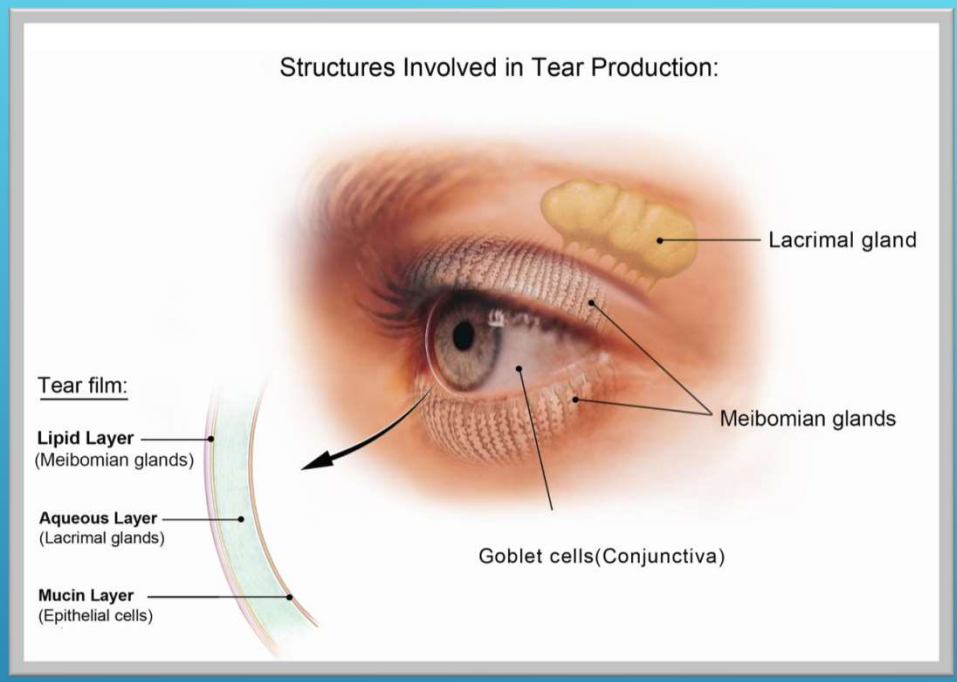
- **Lens Impact on Surface**
  - Splits tear film
- **Surface Impact on Lens**
  - Can stabilize cornea and ocular surface
    - Sjogren's Syndrome

SOFT CONTACTS LENSES: LACRIMAL GLANDS & AQUEOUS TEARS



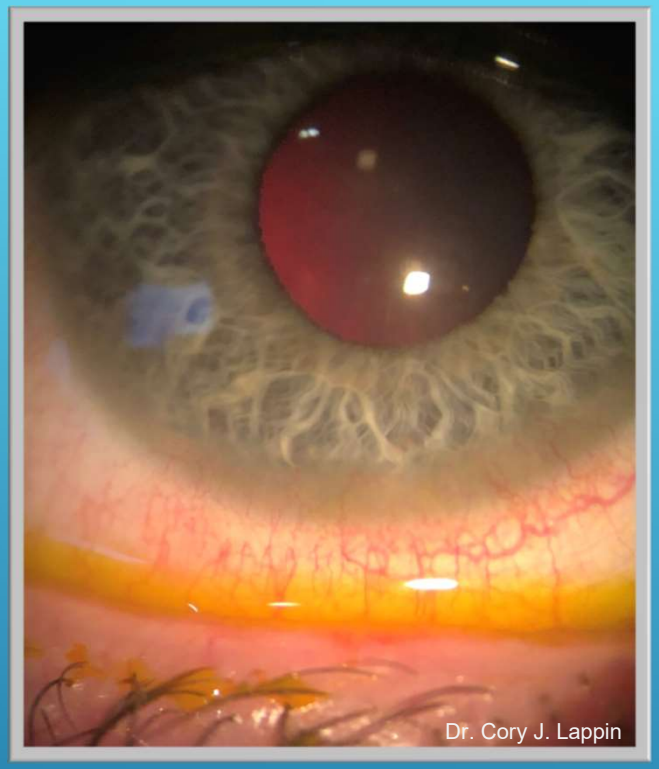
Function

- Protection
  - Immune
- Contribute mucin component of tear film
  - Anchors tear film to cornea
  - Lowers surface tension
  - Protection



CONJUNCTIVA & GOBLET CELLS

- **Lens Impact on Surface**
  - Hyperemia & Staining
    - Circumlimbal
      - Lens fit, edge interaction
  - Reduced
    - Goblet cell density
    - Mucin production
  - Increased
    - **Lid-parallel Conjunctival Folds (LIPCOF)**
      - Friction



SOFT CONTACTS LENSES: CONJUNCTIVA & GOBLET CELLS

- **Lens Impact on Surface**
  - **Giant Papillary Conjunctivitis (GPC)**
    - Giant papillae (≥1mm)
    - Due to mechanical friction
      - Lens surface dryness, deposits
    - **6-12% of Hydrogel wearers will develop GPC**
    - **Reduced likelihood with daily disposable CLs**

SOFT CONTACTS LENSES: CONJUNCTIVA & GOBLET CELLS

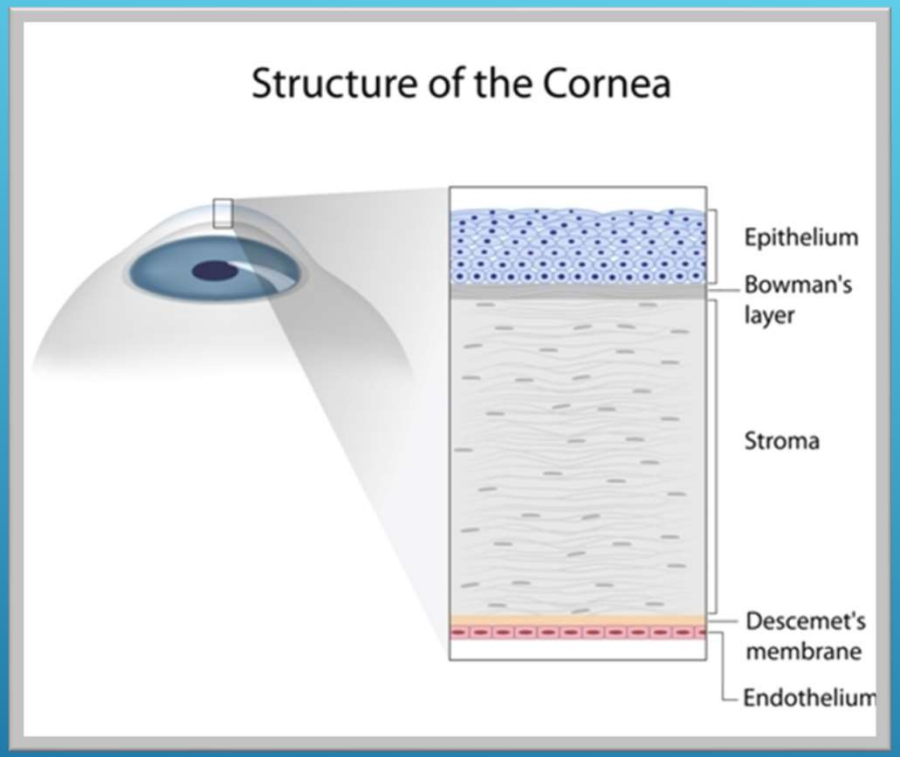
- **Lens Impact on Surface**
  - **Lid Wiper Epitheliopathy (LWE)**
    - Region is adjacent and posterior to the line of Marx
      - In contact with globe
    - Spreads tears across ocular surface
    - Staining of lid wiper due to friction
      - Microtrauma with blinking
      - More common with SCL wear
        - Poorly wettable surface
      - **Less severe with SiHy wear**

SOFT CONTACTS LENSES: CONJUNCTIVA & GOBLET CELLS

CORNEA

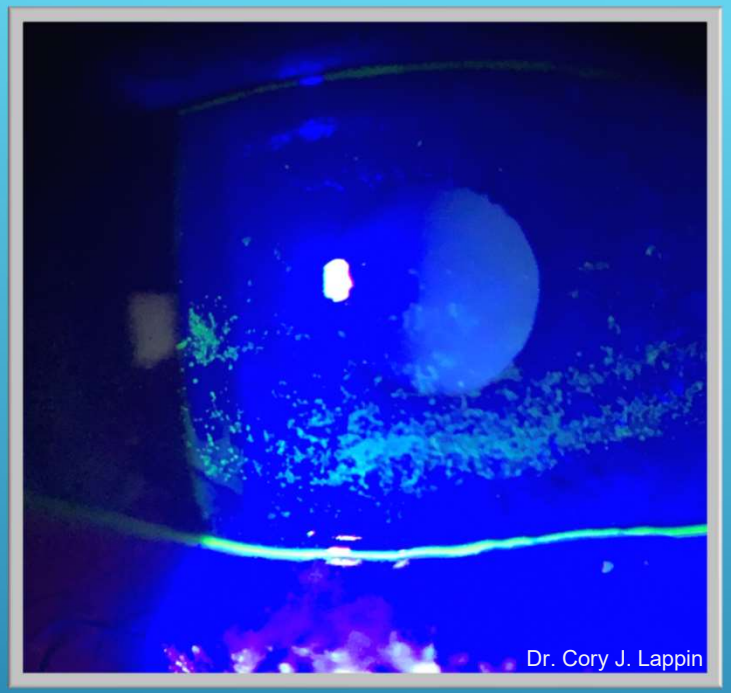
Function

- Protection
- Optical clarity
- Refract light

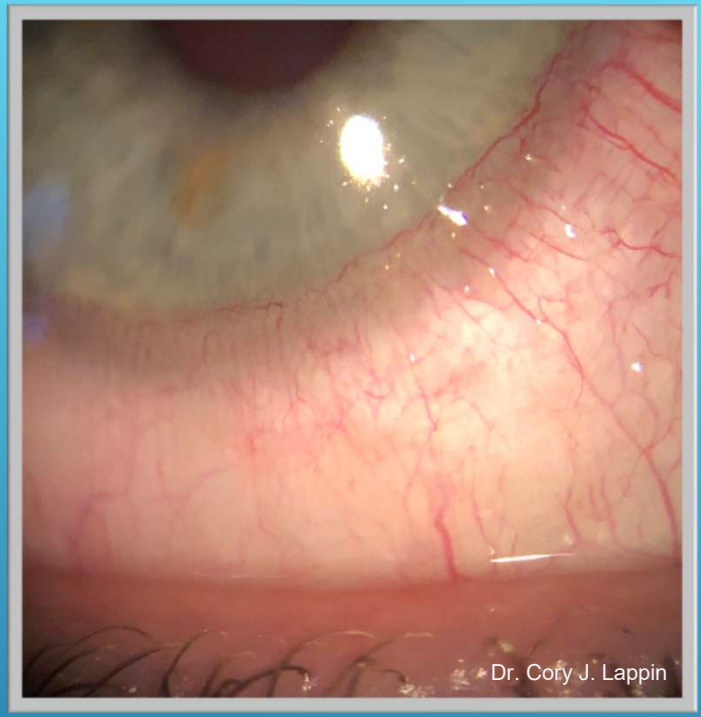


SOFT CONTACTS LENSES: CORNEA

- **Lens Impact on Surface**
  - **Staining**
    - Present in 54% of SCL wears
      - **Less with SiHy wear**
    - “Smile” pattern
      - Lens desiccation
    - Limbal staining
      - Excess movement



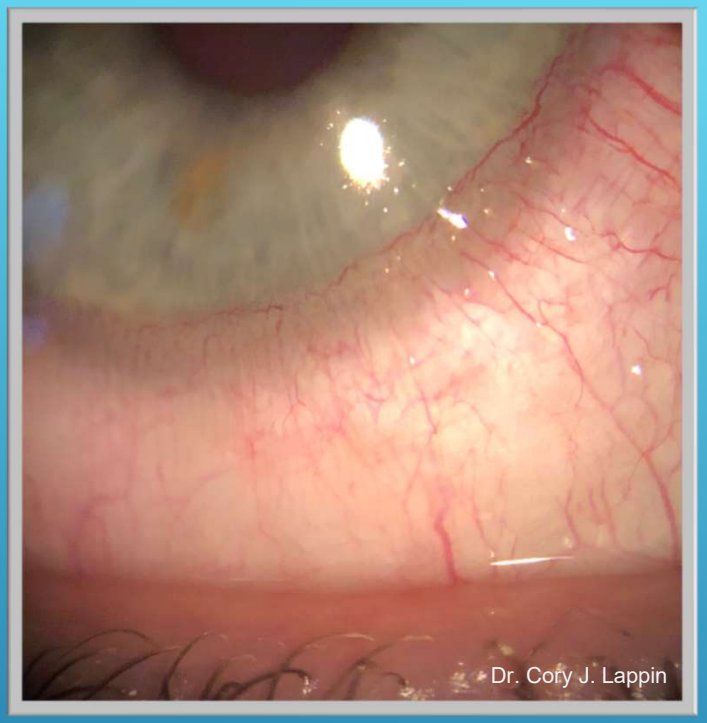
- **Lens Impact on Surface**
  - **Hypoxia**
    - Reduced epithelial cell metabolism and mitosis
    - Epithelial thinning
    - Premature endothelial cell loss
    - Increased bacterial binding to surface
    - **Epithelial microcysts**
      - Reverse illumination (appear dark)
      - Degenerated basal epithelial cells
      - **Associated with Hydrogels**
      - **Rare with SiHy wear**
    - **Vacuoles**
      - Fluid between epithelia cells
      - Unreversed illumination
    - Neovascularization
    - Edema



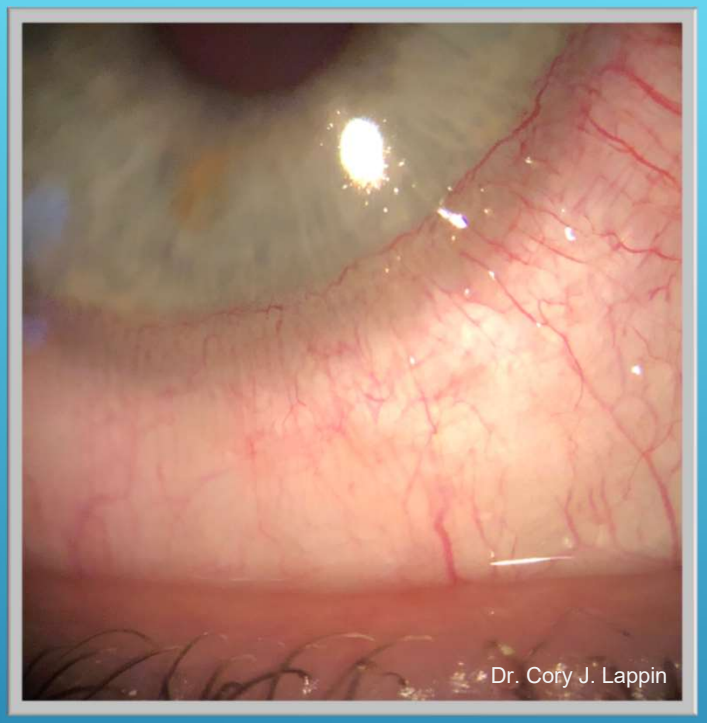
SOFT CONTACTS LENSES: CORNEA

SOFT CONTACTS LENSES: CORNEA

- **Lens Impact on Surface**
  - **Neovascularization**
    - Due to hypoxia
    - Limbal injection
      - Precursor
    - Lipid exudation
    - Scarring
    - Greater risk with overnight lens wear



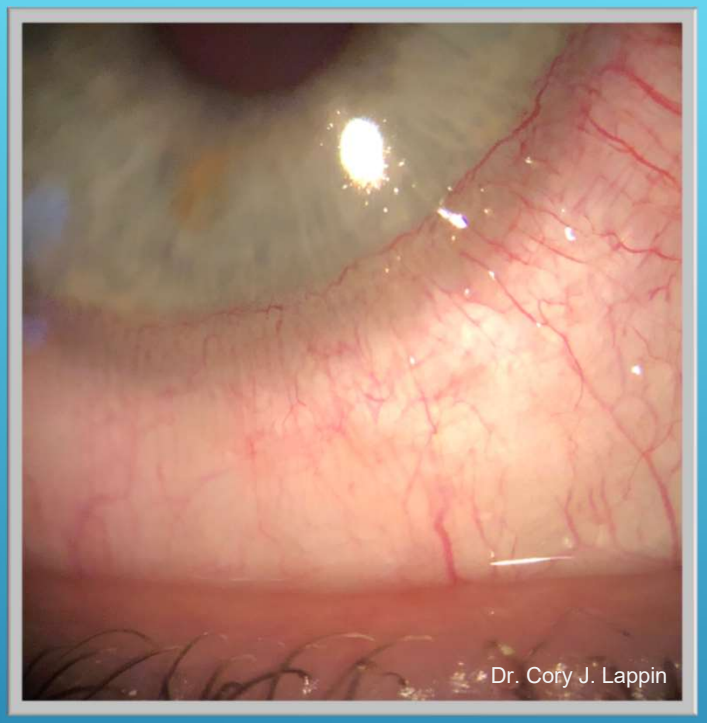
- **Lens Impact on Surface**
  - **Edema**
    - CL wear can reduce oxygen availability
      - Increased anaerobic metabolism by epithelial cells
      - Lactic acid byproduct diffuses into stroma and alters osmotic gradient
        - Stromal edema
          - Striae and/or folds
    - Visual disturbances
      - Glare, halos, rainbows
    - Increased risk with overnight lens wear
    - **Less common with SiHy wear**



SOFT CONTACTS LENSES: CORNEA

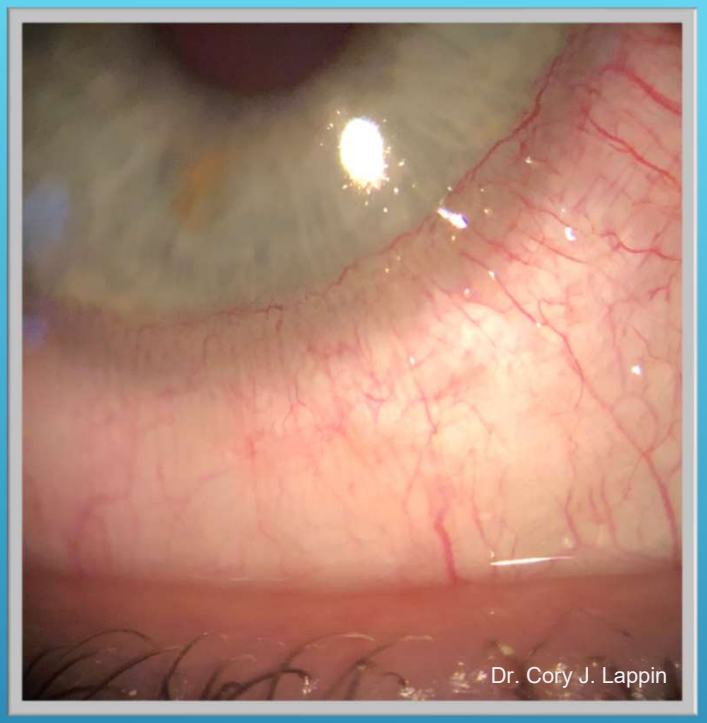
SOFT CONTACTS LENSES: CORNEA

- **Lens Impact on Surface**
  - **Stromal thinning**
    - Reduced keratocyte density
    - Due mechanically induced inflammation
    - **Present in both SiHy and Hydrogel wear**



SOFT CONTACTS LENSES: CORNEA

- Lens Impact on Surface
  - **Corneal warpage**
    - Increased regular astigmatism
    - Irregular astigmatism
    - **More common in older, low Dk/t Hydrogels**



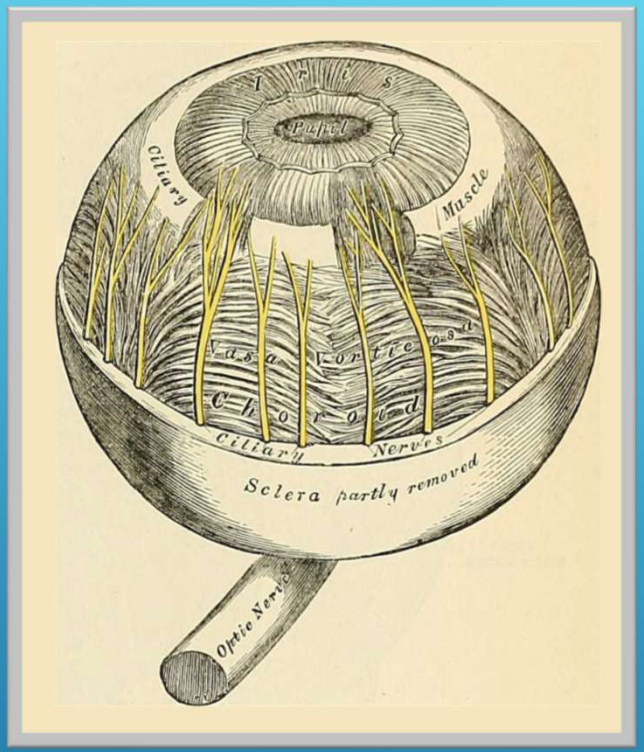
SOFT CONTACTS LENSES: CORNEA

- **Lens Impact on Surface**
  - **Limbal Stem Cell Deficiency (LSCD)**
    - Chronic contact lens-induced:
      - Limbal hypoxia
      - Mechanical trauma to limbus
    - Results in loss of limbal stem cells
      - Impaired wound healing
      - Reduced epithelial cell turnover
      - Corneal conjunctivalization
        - Neovascularization
        - Loss of transparency

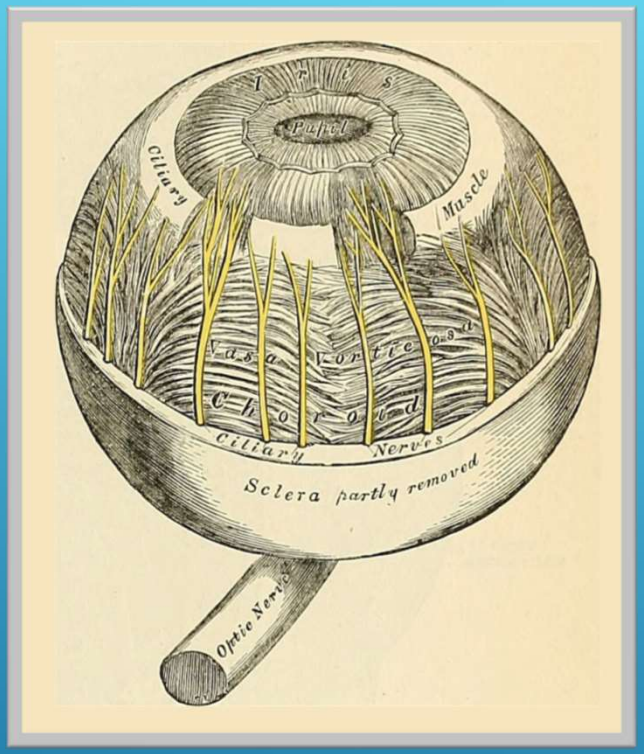
NERVES

Function

- Cornea densely innervated
  - 7,000 nerve enders per mm^2
- Control
  - Sensation
  - Blinking & Lacrimation
  - Protection
- Corneal surface maintenance
  - Routine epithelial cell turnover
  - Wound healing
  - Nourishment and metabolism



- **Lens Impact on Surface**
  - Reduced corneal sensitivity
    - Adaptation
  - Increased sensitivity at limbus
    - Interaction with lens edge
    - Specialized pressure sensors
  - Reduced palpebral conjunctival sensitivity
  - Reduced lid margin sensitivity
    - Second most sensitive ocular surface structure
  - NGF upregulated in contact lens discomfort
    - Sign of nerve damage



SOFT CONTACTS LENSES: NERVES

- **Lens Impact on Surface**
  - **Neurotrophic Keratitis (NK)**
  - Can be induced by chronic CL-related inflammation
    - Damages corneal nerves resulting in loss of sensation
      - Impaired blinking and lacrimation
      - Reduced epithelial cell turnover
      - Disrupted wound healing

SOFT CONTACTS LENSES: NERVES

- **Surface Impact on Lens**
  - **Neuropathic Ocular Pain**
  - Pain derived from nerves rather than external stimulus
    - Peripheral or Central
    - Leads to hypersensitivity of cornea
      - Allodynia
        - Photoallodynia
      - Hyperalgesia
    - Lens wear can improve or exacerbate condition

SOFT CONTACTS LENSES: NERVES

SOFT CONTACTS LENSES: INFLAMMATION

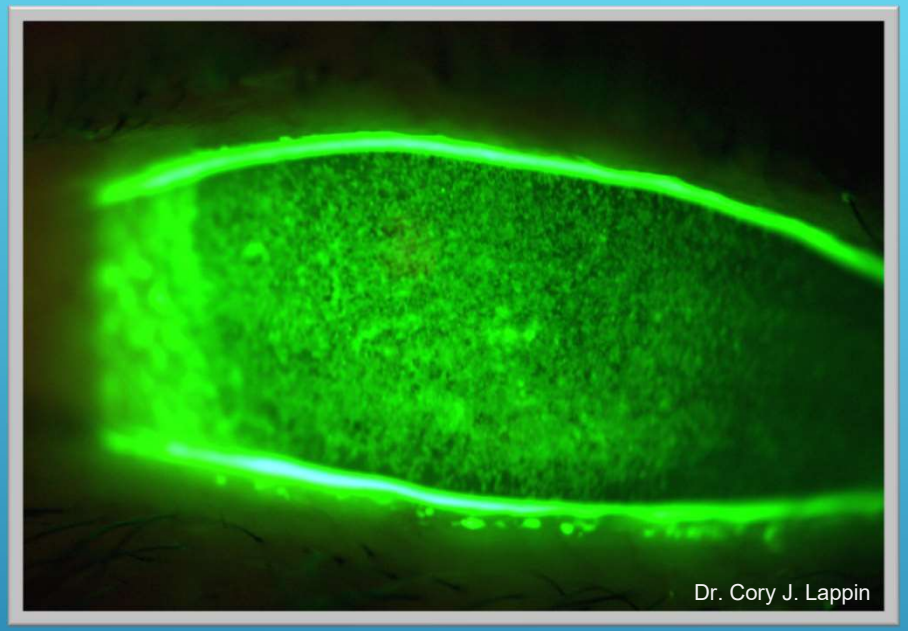
- **Lens Impact on Surface**
  - CLs may be intrinsically inflammatory
    - Subclinical
    - Dendritic cells (DC)
      - pathognomonic for immune response
  - Bulbar Conjunctiva and Lid Margin
    - Transient increase in DC
      - Due to deposits, microbes on case
  - Cornea
    - Transient increase in DC
    - Possible microtrauma
    - **Less pronounced with daily disposables**

SOFT CONTACTS LENSES: ALLERGIES

- **Surface Impact on Lens**
  - Ocular Allergies
  - 40% of contact lens wears experience allergies
  - Lens discomfort
    - Itching
    - Mucus discharge

SOFT CONTACTS LENSES: PACKING SOLUTIONS AND CARE SYSTEMS

- **Impact on Surface**
  - Packing solutions
    - Borate
    - Phosphate
    - Both potentially cytotoxic to corneal epithelium
  - Care solutions
    - Multipurpose
      - Preservatives as Antimicrobials
        - PBHB
        - Polyquad (BAK-derived)
      - Potential preservative toxicity



- **Lens Impact on Surface**
  - **Contact Lens Discomfort (CLD)**
  - Due to lens itself, **NOT** external condition
    - Only occurs when lens is worn, discomfort improves upon removal
  - Mechanism unknown
    - Likely nervous component
  - Can be influenced by
    - Lens material
    - Lens design
    - Wear schedule
    - Care solution

SOFT CONTACTS LENSES: CONTACT LENS DISCOMFORT (CLD)

MANAGEMENT

Soft Contact Lens and Ocular Surface Management

Lens Selection

Ocular Surface Optimization

LENS SELECTION

LENS SELECTION: SOFT CONTACT LENS MATERIAL PROPERTIES

- **Dk/t**
  - Oxygen permeability
- **Modulus**
  - Rigidity
- **Lubricity**
  - Friction
- **Wettability**
  - Tear spread & adherence
- **Surface treatments**
  - Surfactants
  - Plasma
  - Wetting Agents
    - Polyvinyl alcohol
    - Hyaluronic acid

LENS SELECTION: SOFT CONTACT LENS DESIGN

- **Base curve**
  - Flatter
  - Steeper
- **Diameter**
  - Larger
  - Smaller
- **Lens edge design**
  - Rounded
  - Knife
  - Chisel
- **Thickness**

LENS SELECTION: SOFT CONTACT LENS POLYMER TYPES

Silicone Hydrogels

- High oxygen permeability
- Better comfort
- Silicone intrinsically hydrophobic
  - Requires surface treatments
- Lower water content
- Lipid deposition
- “Stiffer” modulus

Hydrogels

- Relatively lower oxygen permeability
- More potential issues with comfort
- More hydrophilic
- Higher water content
- Protein deposition
- “Softer” modulus

LENS SELECTION: WEAR SCHEDULES

Daily Disposables

- Deposits negligible
- Increased comfort
- Care solutions not required
- Parameter limitations (relative)
- Convenience
- Higher cost
- Environmental concerns

Monthly & Biweekly Replacement

- More prone to deposit buildup, lens degradation
- Variable comfort with wear duration
- Require care solutions
- Wider parameters (relative)
- Cost effective
- Compliance issues

CARE SOLUTION SELECTION

Hydrogen Peroxide

- Convenience
  - One step
- Preservative-free
- Better comfort
- Better protection
  - Coverage against Acanthamoeba

Multipurpose Solutions

- Compliance issues
  - Two-step (Rubbing or Rinsing)
- Preservative-containing (Antimicrobial agents)
  - Polyquaternium-1 (PQ-1)
  - Polyhexamethylene biguanide (PHMB)

Lens Selection: Takeaways

DAILY DISPOSABLES WHENEVER POSSIBLE

SILICONE HYDROGELS TEND TO PROVIDE BETTER COMFORT

HYDROGEN PEROXIDE SOLUTIONS ARE THE CARE SYSTEMS OF CHOICE

OCULAR SURFACE MANAGEMENT

DRY EYE AND OCULAR SURFACE DISEASE TREATMENTS

- Omega-3 fatty acid supplementation
  - High quality, re-esterified, triglyceride-based supplement with 3:1 EPA to DHA ratio and at least 2 grams of combined EPA and DHA
- Warm compresses
  - May not be ideal for all patients, use with caution in patients with ocular rosacea
- Artificial tears
  - Primarily palliative
  - Recommend preservative-free, lipid-based formulations or gels
- Blink exercises
- Lid hygiene
  - Hypochlorous acid
  - Tea tree oil
  - Okra-based cleansers (Zocular)
- Immunomodulators
  - Lifitegrast (Xiidra)
  - Cyclosporine (Cequa, Vevye, Restasis)
- Neurostimulators
  - Varenicline nasal spray (Tyrvaya)
  - iTear100
- Tear film stabilizers
  - Perfluorohexyloctane (Miebo)
- Nocturnal exposure
  - Gels or Ointments
  - Moisture goggles
- Allergies
  - Antihistamine-Mast Cell Stabilizer Combos
    - Olopatadine (Pataday)
    - Alcaftadine (Lastacaft)
  - Preferential Exclusion
    - Ectoin (Allegro)
  - Immunomodulators
    - Cyclosporine (Verkazia)
    - Tacrolimus
  - Ketotifen-eluting Contact Lenses
- Biologics
  - Platelet-rich plasma (PRP)
  - Autologous serum
  - Amniotic membranes
  - Cenegermin-bkbj (Oxervate)
- Other treatments
  - Lotilaner (Xdemvy)
- Advanced procedures
  - Microblepharoexfoliation
    - NuLids
    - BlephEx
  - Ocular surface lavage
    - Rinsada
  - Intense Pulsed Light (IPL)
    - Improves symptoms in contact-lens related DE
    - OptiLight
  - Radiofrequency (RF)
    - OptiPlus

CLINICAL PEARLS

CLINICAL PEARLS

- A sign of things to come
- Do not overestimate adaptation
- Discuss expectations
- Save wearing time for when most needed
- “If it ain't broke, don't fix it”
- Do not fear spherical equivalent
- The right artificial tear for the job
- Red means stop
- Rinse lenses out of blister pack
- Part-time wearers are excellent candidates for dailies
- When in doubt, go with dailies
- Complications: Strike one…you're still out (and into an new lens)
- Lens selection **AND** ocular surface optimization, **NOT OR**
- Personally try lenses

SUMMARY

Summary

SOFT CONTACT LENS WEAR PRESENTS A HOMEOSTATIC CHALLENGE

PROPER LENS SELECTION MINIMIZES DISRUPTION TO THE OCULAR SURFACE

OPTIMIZING THE OCULAR SURFACE WILL MAXIMIZE CONTACT LENS COMFORT AND SUCCESS

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THANK YOU!

INSTAGRAM: @CORY.LAPPIN

Seeing Red: How to Manage Ocular Rosacea

Cory J. Lappin, OD, MS, FAAO

Disclosures

- Alcon
- Barti
- Bausch + Lomb
- Bruder Healthcare and M&S Technologies (Hilco Vision)
- Dompé
- Lumenis
- Myze
- NuLids
- PRN Vision Group
- Rinsada
- Tarsus Pharmaceuticals
- Vital Tears

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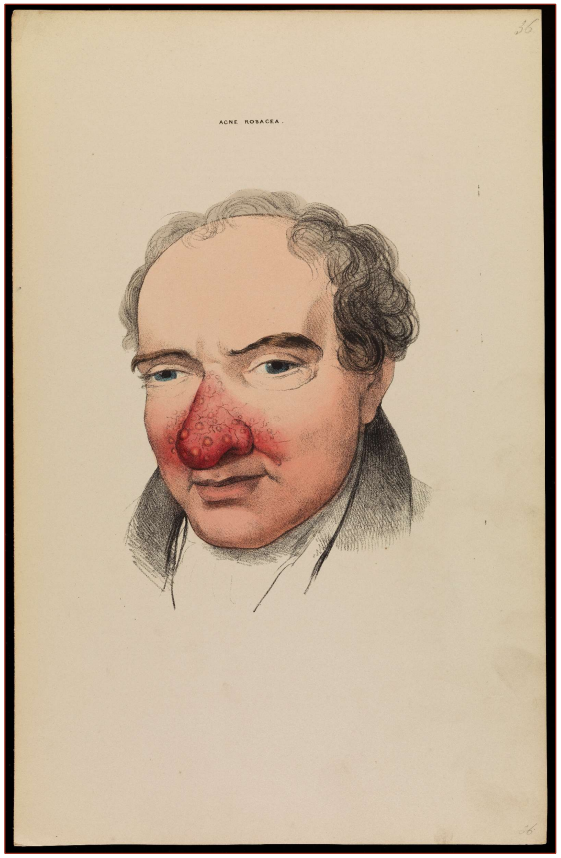
What is Rosacea?

- **Chronic inflammatory disease of skin due to hypersensitivity to normal environmental stimuli**
  - Affects skin of face, sebaceous glands
  - Development of telangiectatic vessels
  - Relapsing and remitting
    - Signs and symptoms exacerbated by triggers
  - Negative impact on cosmetic appearance, tissue function

Epidemiology – Rosacea

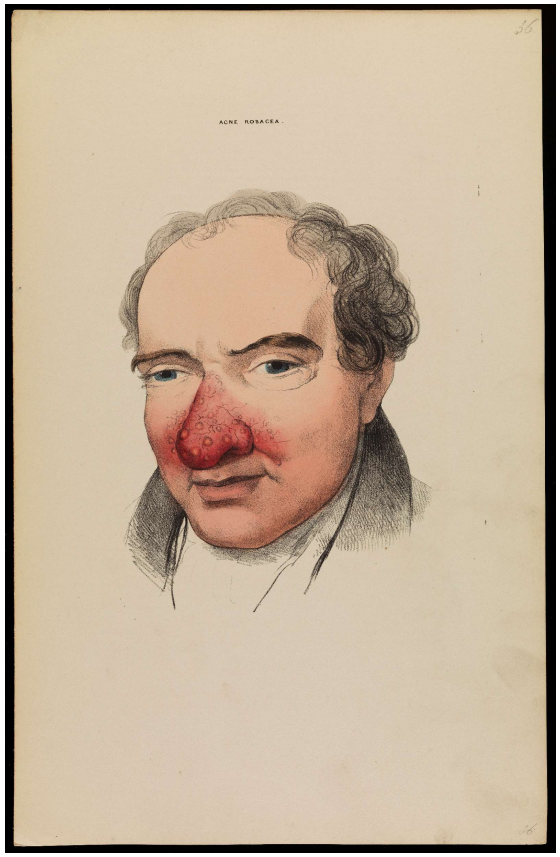
- **Affects estimated 5% of population**
- **16 million people in US with rosacea**
- **Most common in middle-age**
  - 80% 30+ years old
  - Peak incidence 40-59 years of age
  - Relatively uncommon in children
- **Females > Males?**
  - Differences in care seeking behaviors
- **Can affect any race**
  - More common in Caucasians

Diagnosing Rosacea



- **Clinical diagnosis**
  - No histologic or serologic markers
- **Varying signs**
  - Many combinations of signs and symptoms
- **National Rosacea Society Guidelines**
  - Help standardize diagnosis

Diagnosing Rosacea

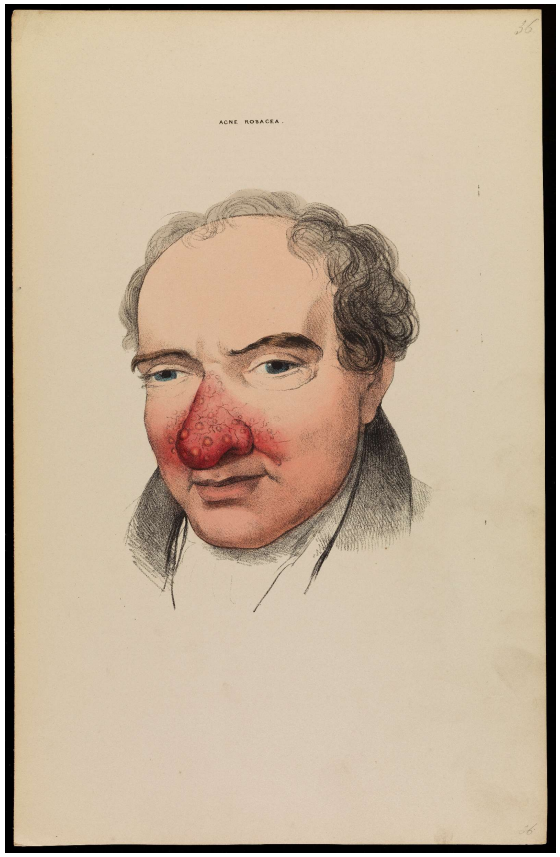


National Rosacea Society Guidelines

- **Primary Features***
  - Flushing (transient)
  - Erythema (non-transient)
  - Papules and/or pustules
  - Telangiectasia

***Will exhibit one or more**

Diagnosing Rosacea



National Rosacea Society Guidelines

- **Secondary Features***
  - Burning and/or stinging
  - Plaques
  - Dry appearance to skin
  - Phymatous changes
  - Ocular Manifestations
  - Peripheral locations

***Typically appear along with Primary Features but can be independent**

Types of Rosacea

The National Rosacea Society Expert Committee Rosacea Subtypes

1. **Erythematotelangiectatic**
2. **Papulopustular**
3. **Phymatous**
4. **Ocular Rosacea**
   - **Granulomatous variant**

Types of Rosacea - Erythematotelangiectatic

- **Characterized by**
  - Facial flushing
  - Persistent facial erythema (classic appearance)
  - +/- visible telangiectatic vessels

Types of Rosacea - Papulopustular

- **Characterized by**
  - Facial erythema
  - Transient papules and pustules
    - Can vary in size

Types of Rosacea - Phymatous

- **Characterized by**
  - Thickening and enlargement of affected tissues
  - Rhinophyma most commonly
    - Can also affect chin, forehead, cheeks, and ears

Types of Rosacea - Granulomatous variant

- **Characterized by**
  - Non-inflammatory, indurated papules or nodules
    - Nodules are uniform in size
    - Can lead to scarring

Types of Rosacea - Ocular Rosacea

- **Characterized by**
  - Telangiectasia
    - Affects lid, lid margin, and ocular surface
  - Meibomian gland dysfunction
  - Chronic inflammation
- Can occur independently of facial rosacea

Types of Rosacea - Ocular Rosacea

- 58-72% of rosacea patients have OR
- Incidence of 6-72%
- OR occurs first in 20% of rosacea cases
- Facial rosacea subtle in 90% of cases involving both cutaneous and OR
- Females = Males

Pathophysiology

- **Inflammatory condition**
  - Exact cause unknown
- **Mechanism widely agreed upon**
  - Hypersensitivity to normal environmental stimuli

Pathophysiology

Hypersensitization of innate immune system

- Abnormally high expression of TLR2 receptors in keratinocytes
  1. Environmental stimuli triggers TLR2 receptors
  2. Enhanced KLK5 (serine protease) activity
  3. Increased cathelicidin production
     - Antimicrobial peptide of innate immune system
  4. Increased VEGF expression
  5. Development of telangiectatic blood vessels

Pathophysiology

Other implicated factors

- **MMP-8 and 9**
- **Interleukin-1α and ß**
- **ICAM-1**
- **TNF-α**
- **Phospholipase A2 Group IIA**
  - Antimicrobial proteins, kill Gram-positive bacteria

Pathophysiology

- **Proposed etiologies**
  - **Bacterial**
    - Helicobacter pylori and Staphylococcus epidermidis
  - **Parasitic**
    - Demodex folliculorum and Demodex brevis
  - **“Hybrid”**
    - Demodex as vector for other infectious microorganisms (Bacillus olenorium)
  - **Genetic**
    - More common in certain races and ethnicities

Ocular Rosacea – Clinical Presentation

Signs

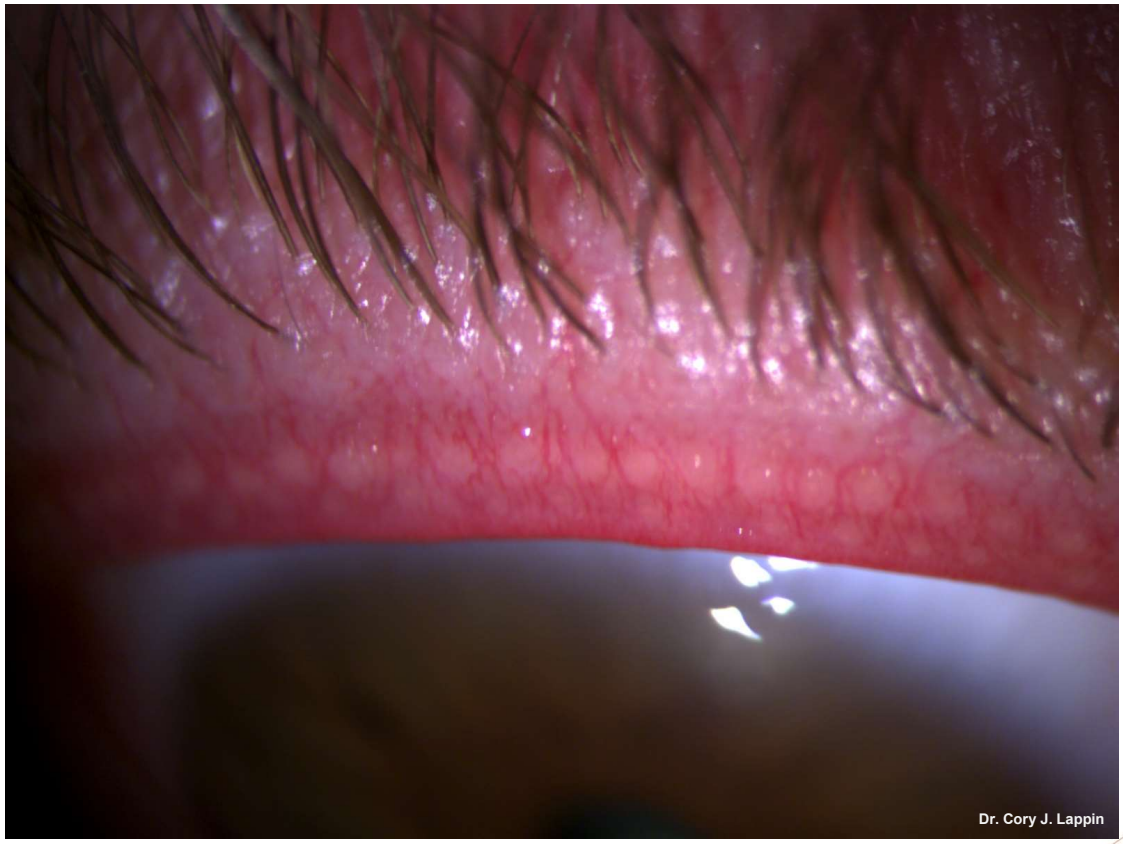
- Telangiectatic vessels
- Lid margin scalloping/notching
- Inspissated meibomian glands
- Recurrent hordeola and chalazia
- Papillary reaction
- Lash debris/collarettes
- Saponification
- Corneal neovascularization
- Conjunctival hyperemia (most pronounced in interpalpebral region)

Symptoms

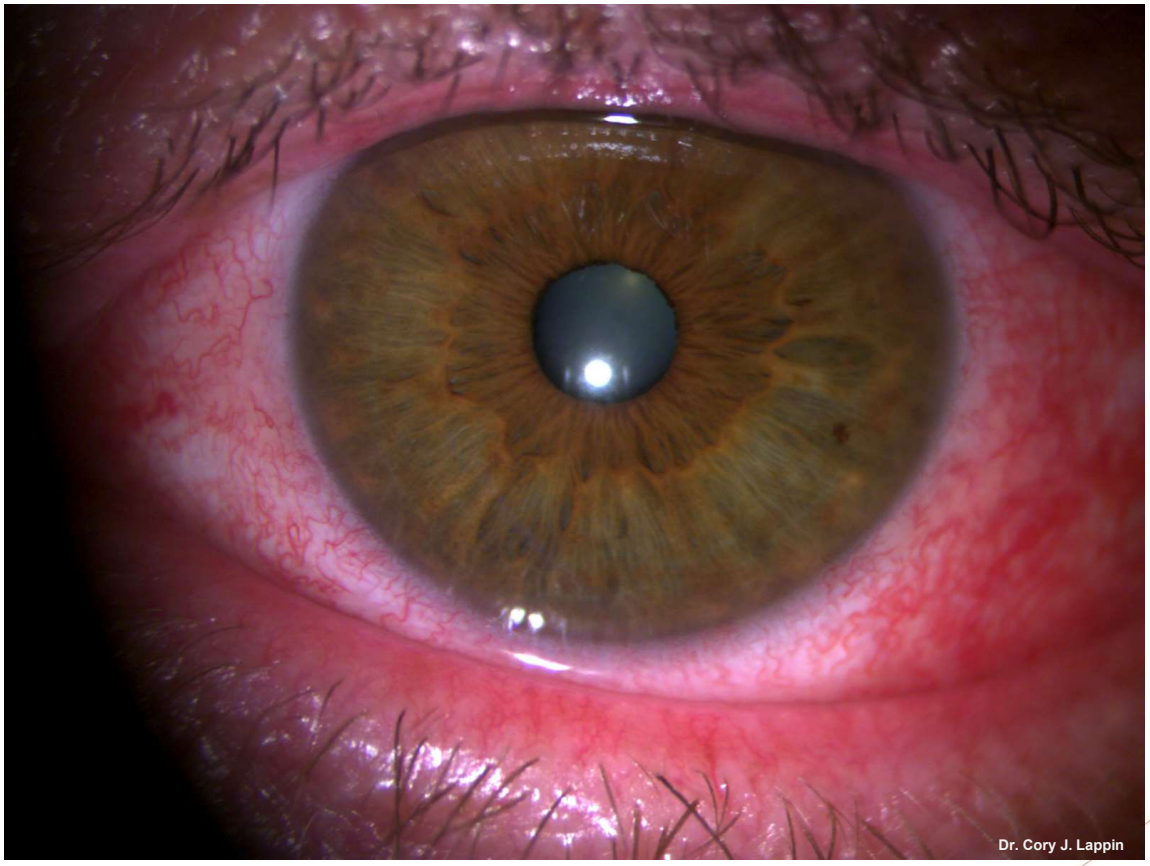
- Chronic redness
- Foreign body sensation
- Burning/stinging
- Dryness
- Itching
- Photophobia
- Epiphora
- Blurred/fluctuating vision

Clinical Presentation

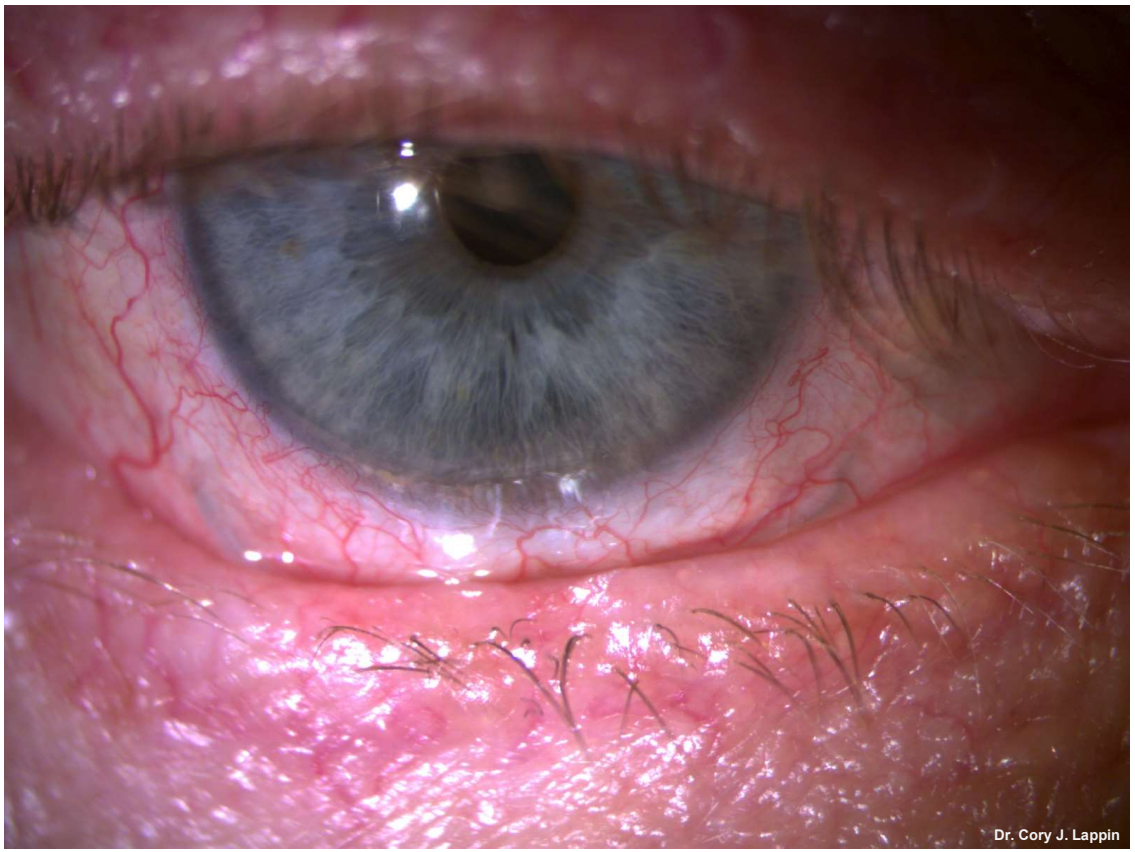
Clinical Presentation



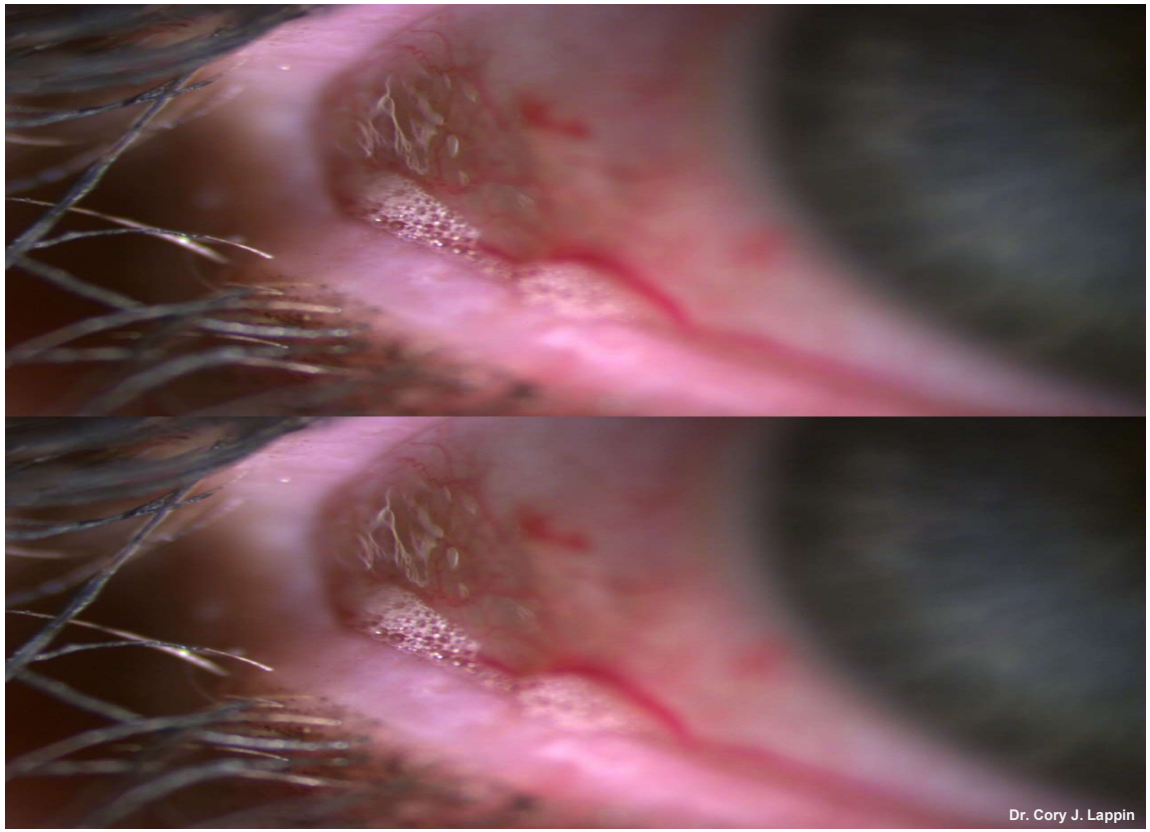
Clinical Presentation



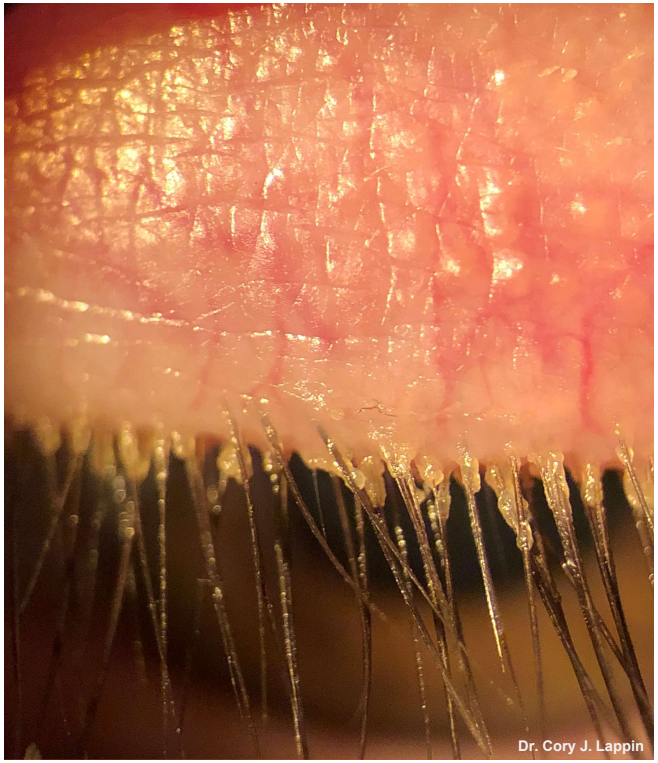
Clinical Presentation



Clinical Presentation



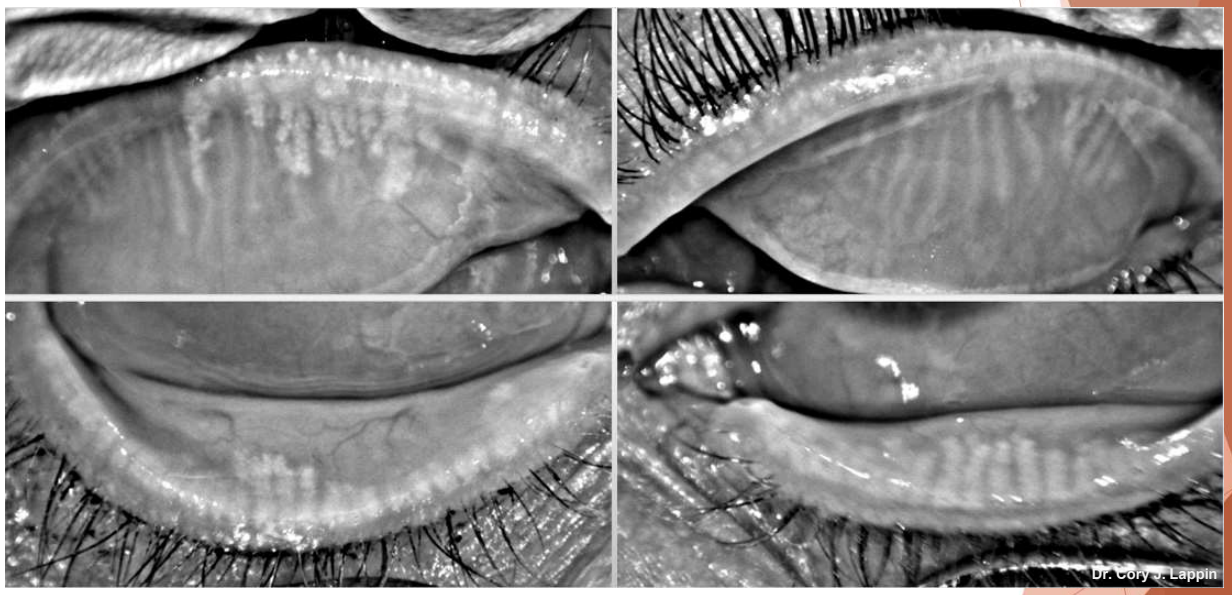
Clinical Presentation



Clinical Presentation

Clinical Presentation – Comorbidities

- **Dry Eye**
  - 52-62.5% of OR cases
- **MGD**
  - 92% of OR cases
- **Blepharitis**
  - Common



Clinical Presentation – Diagnosis

- **Signs and symptoms are nonspecific**
  - Overlap with manifestations of other ocular surface diseases
    - Often comorbid
  - Easily overlooked or misattributed to other condition

Clinical Presentation - Diagnosis

The National Rosacea Society Expert Committee recommends considering a diagnosis of ocular rosacea if ANY of these signs or symptoms are present

Clinical Presentation – Diagnosis

- **Can result in significant disruption to the eyelids and ocular surface**
  - Negative impacts on
    - Vision
    - Comfort
    - Cosmetic appearance

Clinical Presentation – Diagnosis

- **Diagnosis of all forms of rosacea made clinically**
- Appears similar and often concomitantly with other OSD conditions
  - National Rosacea Society Expert Committee recommends considering OR if any of previously signs or symptoms noted
- Differentiating characteristics
  - Lid and lid margin telangiectasia
  - Exacerbations with environmental triggers

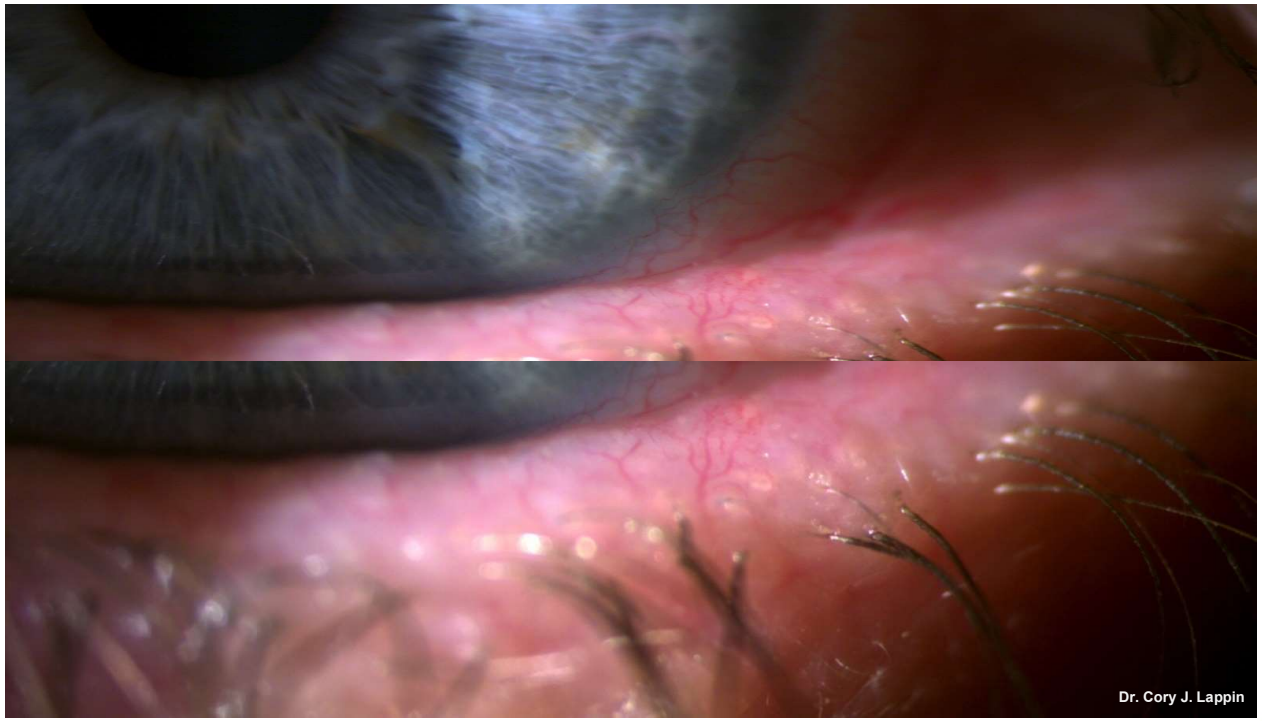
Grading Severity

The Global ROSacea COnsensus (ROSCO) Expert Panel Grading System

- Based on extent of tissue involvement
  1. Mild OR: blepharitis with lid margin telangiectasia
  2. Mild-to-Moderate OR: blepharoconjunctivitis
     - Chronic inflammation can lead cicatrization
  3. Moderate-to-Severe OR: blepharokeratoconjunctivitis
     - Corneal involvement in 1/3 of cases
  4. Severe OR: sclerokeratitis and/or uveitis

Mild Ocular Rosacea

- Blepharitis with lid margin telangiectasia



Mild-to-Moderate Ocular Rosacea

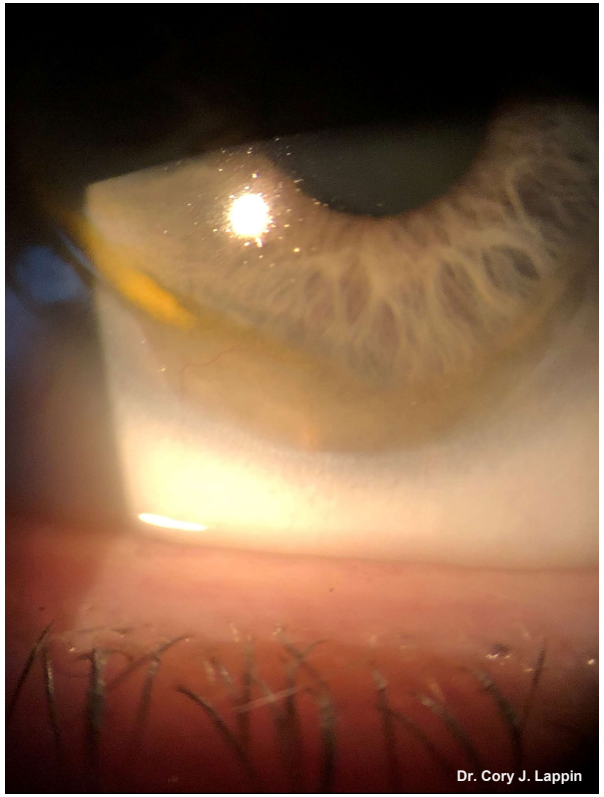
- **Blepharoconjunctivitis**

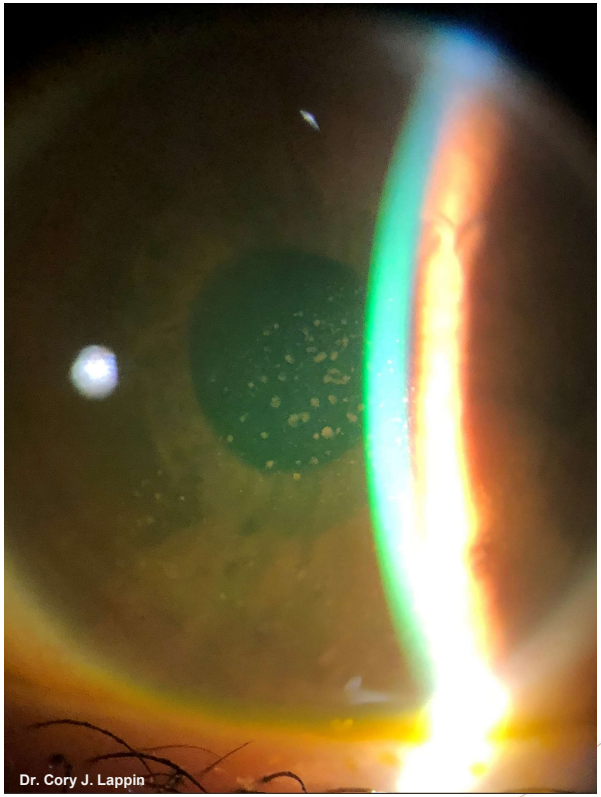
Moderate-to-Severe Ocular Rosacea

- **Blepharokeratoconjunctivitis**

Severe Ocular Rosacea

- Sclerokeratitis and/or uveitis





Treatment – Overview

- **No cure for OR**
  - Goal is management
- **Chronic condition**
  - Manage acute and chronic signs and symptoms
- **Dry Eye, MGD, Blepharitis are common comorbidities**
  - Significant treatment overlap
- **Need to address all elements of condition for successful treatment**
  - Lifestyle modification
  - Prescription treatments
  - Diet and supplements

Trigger Avoidance

- **Environmental stimuli**
  - Extreme heat, Extreme cold, Wind and sun exposure
- **Emotional triggers**
  - Stress, Anger, Embarrassment
- **Physiological stimuli**
  - Strenuous exercise
- **Dietary triggers**
  - Caffeine, Chocolate, Alcohol, Dairy products, Hot beverages, Spicy food
- **Pharmaceuticals and supplements**
  - Nasal and topical (cutaneous) steroids, Beta blockers, Amiodarone, Niacin, Vitamins B6 and B12
- **Cosmetics**

Topical Cutaneous Treatments

- **Metronidazole**
  - Topical antibiotic
  - 0.75% and 1% gel and cream
  - Dosed BID
- **Azelaic acid**
  - Topical antiseptic
  - 15% gel and 20% gel and cream
  - Dosed BID
- **Primarily for facial rosacea**
  - May be beneficial for eyelid-related inflammation
- **Consult comanaging dermatologist**
- **Avoid topical cutaneous corticosteroids**
  - Can trigger rosacea flares

Artificial Tears

- **Primarily palliative**
  - Offer quick relief
  - Avoid irritation with prophylactic use
  - Dosed QID-PRN
    - If using >QID, recommend preservative free AT
- **Lipid-based ATs**
  - Drops of choice
  - Stabilize lipid component of tear film
  - May reduce inflammatory factors in tear film

Lid Hygiene

- **Lotilaner ophthalmic solution (Xdemvy)**
  - Addresses associated Demodex overgrowth
- **Tea Tree Oil (Melaleuca alternifolia)**
  - 50% formulation (foams, scrubs)
  - Anti-inflammatory
  - Antimicrobial
- **Okra-based cleansers (Zocular)**
  - Anti-inflammatory
  - Antimicrobial

Lid Hygiene

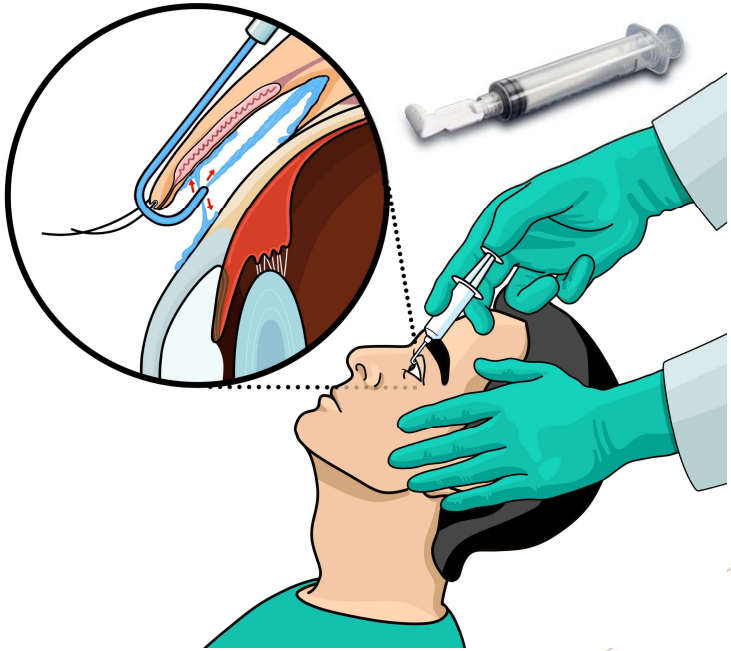
- **Hypochlorous Acid (HOCl)**
  - 0.01%
  - Anti-inflammatory
  - Antiseptic/Broad Antibacterial
  - Naturally produced by leukocytes
  - Dosed BID
  - Reducing overgrowth of Staphylococcus epidermidis

Lid Therapies

- **Warm compresses**
  - **Use with caution**
    - Cold better option?
- **Thermal Pulsation**
  - LipiFlow
  - iLux
  - TearCare
- **Microblepharoexfoliation**
  - NuLids PRO (in-office)
  - BlephEx (in-office)
  - NuLids (at home)

Ocular Surface Lavage

- **High pressure saline irrigation**
  - Flushes proinflammatory factors from ocular surface
  - “Resets” ocular surface
- **Devices**
  - Rinsada



Oral Antibiotics

- Considered standard of care by many
- Oral tetracyclines
- Doxycycline is drug of choice
  - Used for anti-inflammatory properties rather than antibacterial
  - Dosed below minimum effective dose for antibacterial activity

Oral Antibiotics

- **Doxycycline**
  - Higher loading dose, followed by lower maintenance dose
  - Typical Dosing: 40-100 mg BID for 1-2 weeks, followed by 20-40 mg QD for 1-4 months
- **Oracea**
  - 40 mg tablet (30 mg of immediate-release and 10 mg of extended-release)
  - Dosed QD

Oral Antibiotics

- **Contraindications**
  - Pregnant and nursing women
  - Children 7 years old and younger
- **Side Effects**
  - GI disturbances
  - Photosensitivity

Oral Antibiotics

Doxycycline Alternatives

- **Azithromycin**
  - 500 mg BID x 2 weeks
- **Tetracycline**
  - Dosed QID
- **Minocycline**
  - Less supporting evidence
- **Isotretinoin**
  - Significant side effects
    - Blepharitis, conjunctivitis, and meibomian gland destruction

Topical Antibiotics

- **Erythromycin ung**
  - Dosed QHS
  - Can reduce bacterial burden
  - Provide lubrication
- **Azithromycin**
  - Dosed QHS x 2-4 weeks once every other night for maintenance
  - Anti-inflammatory
  - Improves MGD

Topical Anti-Inflammatories

Short-Term Inflammation Management

- **Soft Steroids**
  - 0.5% loteprednol etabonate BID-QID
  - Mild inflammation, periodic flares
- **Traditional Steroids**
  - 1% prednisolone acetate
  - Longer taper (4-3-2-1 dosing)
  - Significant inflammation
- **Side Effects**
  - IOP spikes/glaucoma
  - Cataracts

Topical Anti-Inflammatories

Long-Term Inflammation Management

- **Immunomodulators**
  - **Xiidra** (5% lifitegrast ophthalmic solution)
    - Blocks LFA-1 from binding ICAM-1
  - **Cequa** (0.09% cyclosporine ophthalmic solution)
    - Inhibits calcineurin
  - **Vevye** (0.1% cyclosporine ophthalmic solution)
    - Inhibits calcineurin
  - **Restasis** (0.05% cyclosporine ophthalmic emulsion)
    - Inhibits calcineurin
  - **Tacrolimus** 0.03%
    - Inhibits calcineurin

- **All dosed BID**
- **All inhibit T cell activity**
  - Differing mechanisms by which this is accomplished

Diet and Supplements

- **Omega-3 supplementation**
  - High quality, re-esterified, triglyceride-based omega-3
  - 3:1 EPA to DHA ratio
  - At least 2 grams of combined EPA and DHA
- **Dietary Considerations**
  - Avoid triggering foods
  - Probiotics
  - High Fiber diet

Intense Pulsed Light (IPL)

- **Basics**
  - High intensity polychromatic light (400-1200 nm)
  - 4 treatments spaced 2-4 weeks apart
- **FDA-approved for treatment of MGD and dry eye**
  - OptiLight IPL Device

Intense Pulsed Light (IPL)

- **Mechanisms of action**
  - **Photobiomodulation**
    - Decreases inflammatory factors
    - Increases anti-inflammatory cytokines
  - **Improves MGD**
    - Liquifies clogged oil
  - **Antimicrobial**
    - Eradicates Demodex
    - Decreases bacterial burden
  - **Improves cosmetic appearance**
    - Destroys telangiectatic vessels

Other Treatments

- **Vasoconstrictive agents**
  - Lumify (0.025% brimonidine tartrate ophthalmic solution
    - highly selective α2-adrenergic agonist
- **Punctal Plugs**
  - Controversial
  - **"Cesspool" effect**
- **Amniotic Membranes**
  - Excellent for cases involving cornea/ulcers
- **Tear film stabilizers**
  - Perfluorohexyloctane (Miebo)

Contact Lens Wear in Ocular Rosacea

- **Avoid CL wear during flares**
- **Ideally avoid CL wear until inflammation is controlled**
  - CL wear may be intrinsically inflammatory
- **Daily disposable CLs recommended**
- **Discontinue CL wear indefinitely if use worsens condition**
  - Increased irritation, neovascularization

Patient Education

- **Emphasize condition is not curable, but can be managed**
  - Set expectations
- **Explain what is occurring**
  - Increase understanding
- **Explain each element of treatment plan**
  - Improves compliance

Summary - Address all components of OR

- **Identify triggers**
  - Environmental, Emotional, Physiologic, Dietary, Pharmaceutical, Cosmetics
- **Provide comfort**
  - Artificial Tears (preservative free lipid-based)
  - Compresses (warm vs cold)
- **Manage inflammation**
  - Oral Antibiotics (Doxycycline, Azithromycin)
  - Steroids (short-term)
  - Immunomodulators (long-term)
    - Xiidra, Cequa, Vevye, Restasis, Tacrolimus
  - Omega-3 supplementation
- **Treat comorbidities: MGD, Dry Eye, Blepharitis, Demodex**
  - Lid Hygiene (Tea Tree Oil, Hypochlorous Acid)
  - Antiparasitics
    - Xdemvy
  - Lid Therapies (Thermal pulsation, Microblepharoexfoliation)
  - Intense Pulsed Light (IPL)
  - Radiofrequency (RF)
  - Tear film stabilizers
    - Miebo
- **Address cosmetic appearance**
  - Vasoconstrictive agents (Lumify)
  - Cutaneous treatments (Metronidazole, Azelaic Acid)

Summary

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Thank you!

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