

## The Final Front Tear

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CPOT, ABOC, COA, OSC

## Objectives

1. Terminology related to dry eyes
2. Anatomy of the eye
3. Anatomy of the tear and impact on vision
4. Clinical evaluation of the ocular surface
5. Causes of dry eyes
6. Tear testing
7. Dry eye treatment

## Terms

- Dry Eye
- Inflammatory Dry Eye
- Aqueous Insufficiency
- Evaporative Dry Eye
- Sjogrens Disease
- Keratitis Sicca
- Osmolarity



## Terms

- Etiology – the cause of a disease or abnormal condition
- Dacryocystitis – inflammation of the lacrimal sac
- Epiphora – watering of eyes due to excess secretion of tears or obstruction of the lacrimal passage

## Terms

- **AD Aqueous Deficiency**
- DED – Dry Eye Disease
- DES – Dry Eye Syndrome
- DEWS – Dry Eye Work Shop
- DTS – Dysfunctional Tear System
- **Lipid Insufficiency**
- **MDG – Meibomian Gland Dysfunction**
- NLDO – Nasal Lacrimal Duct Obstruction
- OSD - Ocular Surface Disease
- OSDI - Ocular Surface Disease Index
- POTF – Pre-Ocular Tear Film
- SPEED – Standard Patient Evaluation of Eye Dryness
- Expression
- **Homeostasis of the tear film**
- **Symptoms correlation**

## Industry Issues

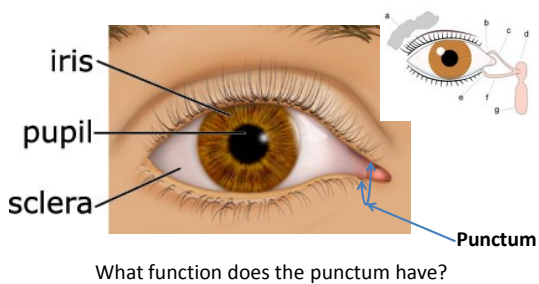
- Patients are leaving the office undiagnosed in too many cases
- Patients are not volunteering the necessary information
- Staff members are not asking the necessary questions
- If left undiagnosed, this can cause complications with eye surgery
- Systemic diseases can exacerbate the issue
- Medications can cause a significant decline in the condition



## Tech Evals in Pre-Screening

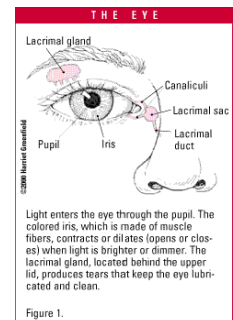


## Anatomy



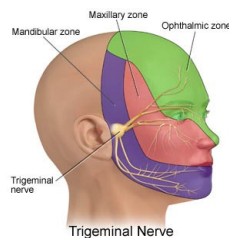
## Anatomy and Physiology of the ocular adnexa

- Eyelids
- Eyebrows
- Eyelashes (**permanent make-up**)
- Accessory glands
- Lacrimal Apparatus  
What is the opening between the upper and lower lid called?



## 5<sup>th</sup> Cranial Nerve - Trigeminal

- Corneal sensitivity
- Lacrimal gland innervation



## Lacrimal Apparatus

- Sometimes a person cannot produce natural tears they might need punctal plugs to prevent the tears from draining off the eye.

- Faucet

- Action

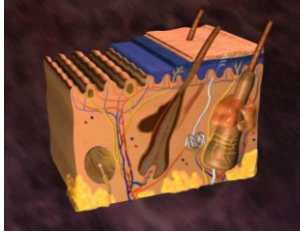
- Drain

Obstructive – vs- non-obstructive



## Tear Production – Secretory

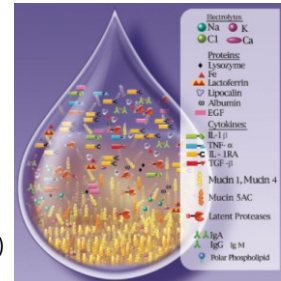
- Lacrimal gland
  - Reflex tearing
  - Too much tearing...epiphora
- Gland of Krause
  - Superior fornix
- Gland of Wolfring
  - Superior tarsal plate



## Tear Anatomy

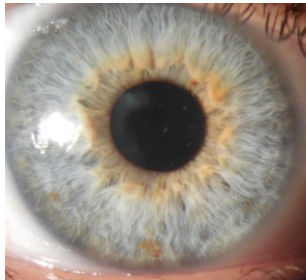
A complex mixture of proteins, mucins, and electrolytes coated by a lipid layer

- Antimicrobial proteins
- Growth factors & suppressors of inflammation
- Soluble mucin helps stabilize tear film
- **Electrolytes for proper osmolarity (295-300)**
  - pH slightly alkaline (7.4)

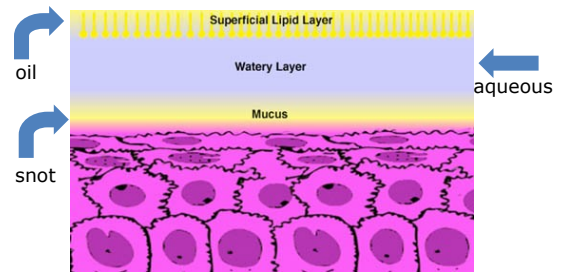


## The Impact Of Tears On Vision

- Refractive Status
- Health of the Cornea, the most refractive surface of the eye
- Visual Acuity
- **Fluctuating vision**

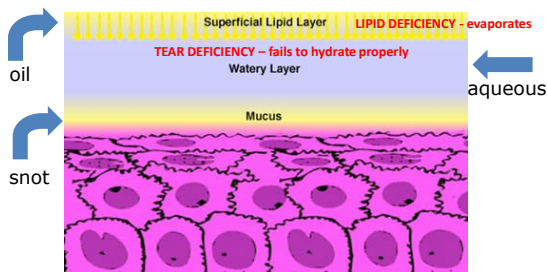


## Lacrimal System: Tear Film Layers

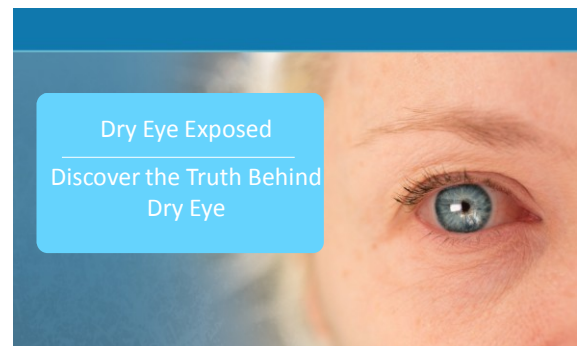


What functions does each layer of the tear perform?  
What are functions of tears?

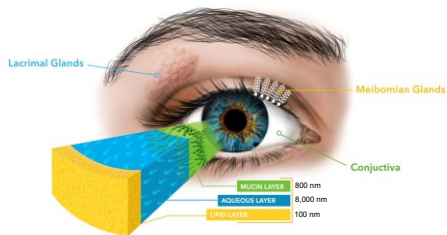
## Lacrimal System: Tear Film Layers



What functions does each layer of the tear perform?  
What are functions of tears?

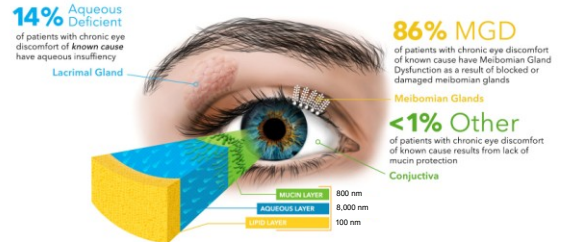


## A Healthy Tear Film



A healthy tear film is comprised of 3 layers: Mucin, Aqueous, and Lipid

## Two Primary Forms of Dry Eye



The two primary forms of dry eye are Evaporative Dry Eye, also known as Meibomian Gland Dysfunction or MGD and Aqueous Dry Eye. The majority of dry eye sufferers have MGD.

## Oil & Water

Remember science class? Oil floats.



Oil does not mix with water, but rather sits on top of water.

Oil is what keeps water from evaporating.

## The Tear Film Structure In Our Eyes



The aqueous (water) layer provides natural lubrication and is produced by the lacrimal glands.

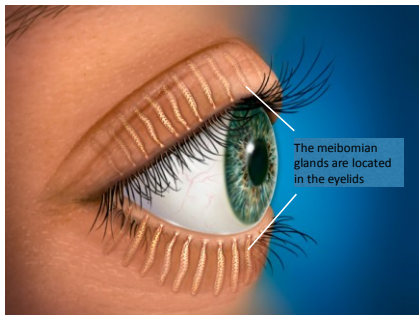


The aqueous layer is protected by the lipid (oil) layer that is produced by the meibomian glands located in the eyelids.



When your meibomian glands do not produce sufficient oil, water evaporates causing burning, redness, dryness, irritation and eye fatigue. This is called Meibomian Gland Dysfunction or MGD.

## The Meibomian Glands

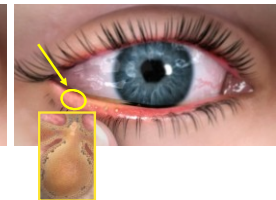
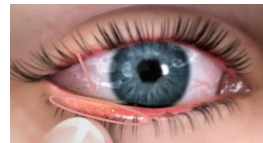


The meibomian glands are located in the eyelids

## Meibomian Glands & Blinking

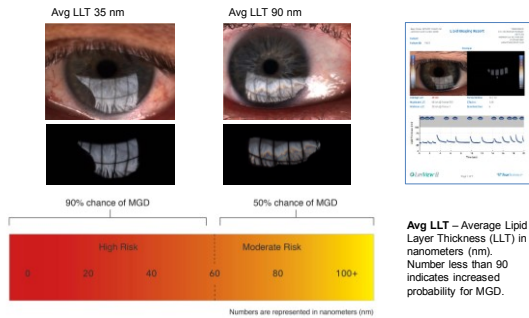
When we blink the meibomian glands express the necessary protective oils

Blockages in the meibomian glands result in insufficient oil to coat the tear film



Blinking stimulates the meibomian glands to secrete oils and spread a protective oil layer across the tear film. When we partially blink the eyelids do not touch, so no pressure is applied at the meibomian glands to release these oils. Over time the oils harden in the glands and blockages develop.

## LipiView II: Interferometer



## LipiView II: Partial Blink Analysis

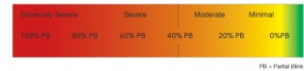


A decrease in lipid layer thickness is associated with incomplete blinking.

Increase in visual fatigue is associated with incomplete blinking.

Presence of partial blinks greater than 40% of total blinks is considered contributory to dry eye condition.

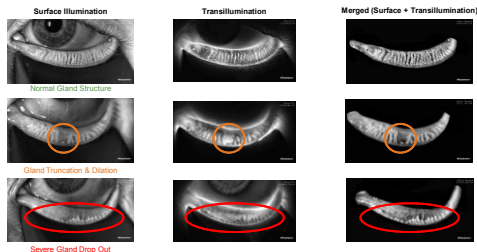
If partial blinking is present, patient education and blink training should be considered.



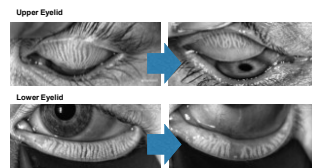
## LipiView II: Dynamic Meibomian Imaging

Meibomian gland structure is observed with Dynamic Meibomian Imaging (DMI). DMI produces three images (surface illumination, transillumination and merged) to capture a comprehensive view of meibomian gland structure.

If left untreated, the glands can shrink and deteriorate. The loss of glands is unlikely to be reversible. Failure to treat blocked glands is likely to lead to further structural compromise.

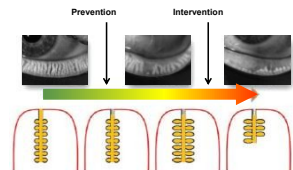


## Intervention & Prevention



Current model of treatment is interventional.

Future of MGD treatment must be preventative.



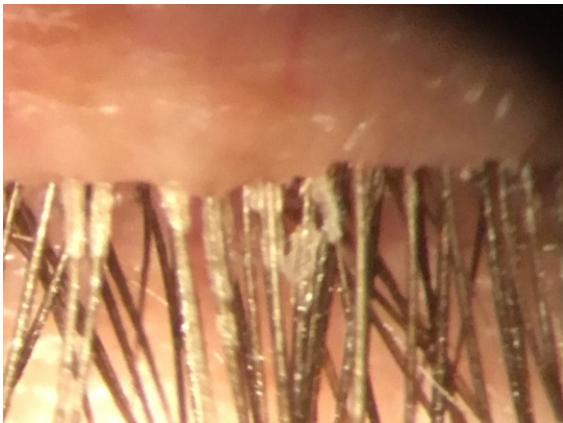
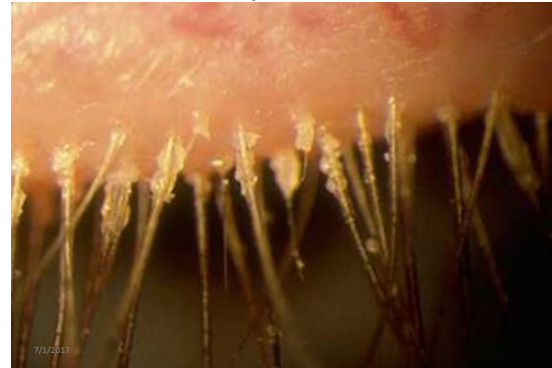
## Mucus Layer

One key component of DED is a breakdown of the mucin layer that is responsible for converting the hydrophobic (**repels water**) corneal surface of the eye to one that is hydrophilic (**attracts water**). This allows the pre-corneal tear film (PCTF) to coat the surface of the eye filling in surface irregularities and providing optimal coverage





Blepharitis



## Blepharitis The Disease

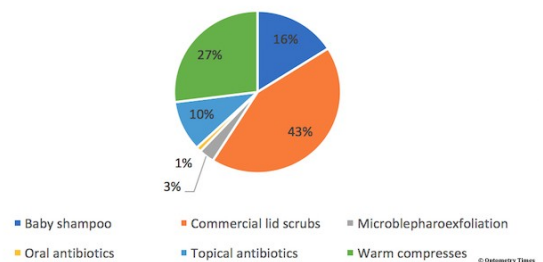
- **Blepharitis** is an inflammatory condition of the eyelids leading to red, irritated, itchy, and dandruff-like scales that form on the eyelashes. It is a common eye disorder caused by bacteria or a skin condition, such as dandruff of the scalp or acne rosacea.<sup>1</sup> No matter the cause, the only way we can beat blepharitis is to determine the location as anterior, posterior, or mixed; differentiate among the causative factors, and treat according to the severity of the condition.

## Treatment for Blepharitis

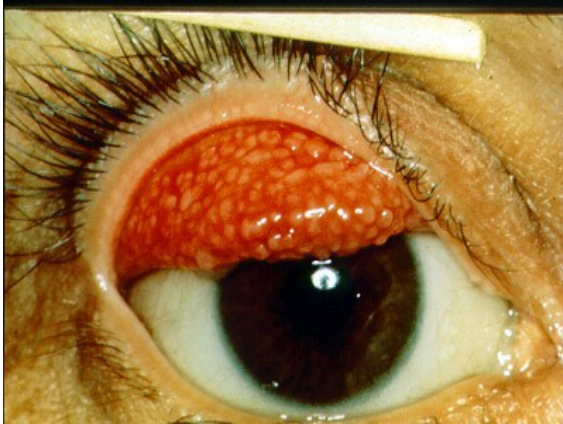
- In a poll fielded on the *Optometry Times* website, we asked ODs what they used for first-line therapy for blepharitis patients.
- A total of 382 responses were tallied. The multiple-choice poll answers included:
  - Baby shampoo
  - Commercial lid scrubs
  - Microblepharoexfoliation (blephex or LipPro)
  - Oral antibiotics
  - Topical antibiotics
  - Warm compresses

<http://optometrytimes.modernmedicine.com/optometrytimes/news/ods-look-lid-scrubs-first-blepharitis-treatment>

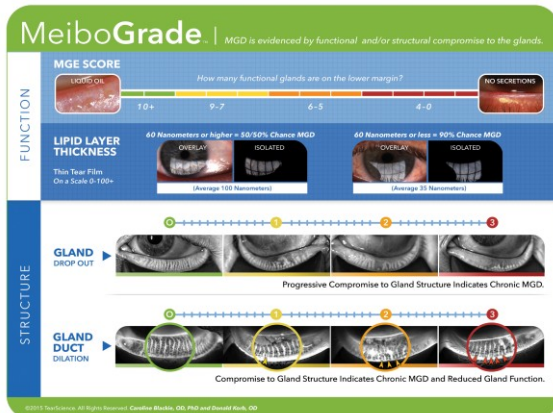
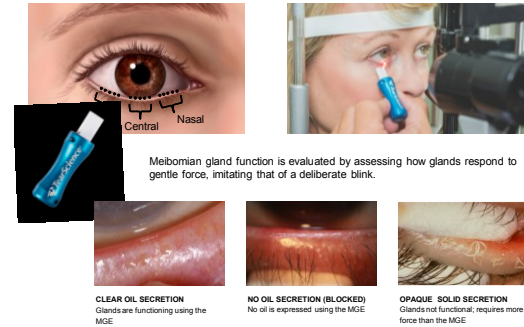
First-line therapy for blepharitis



<http://optometrytimes.modernmedicine.com/optometrytimes/news/ods-look-lid-scrubs-first-blepharitis-treatment>



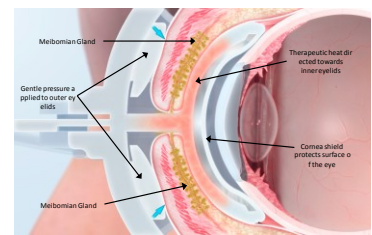
## Meibomian Gland Evaluator



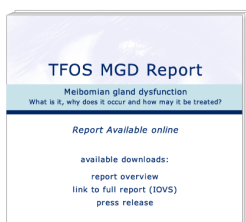
## LipiFlow: Cross Section

While there are multiple choices available for treating MGD, LipiFlow is the only FDA-cleared device for removing gland blockages and restoring gland function.

Through advances in the application of Vectored Thermal Pulsation (VTP™) technology, the LipiFlow treatment utilizes a patented algorithm of heat applied to the inner eyelids and massage to remove the obstructions in your meibomian glands.



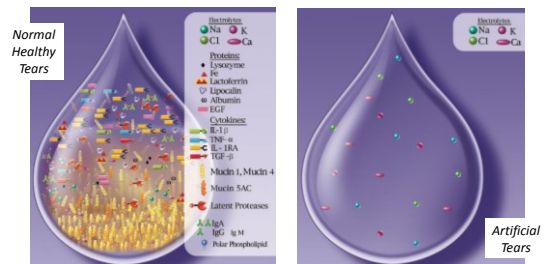
LipiFlow Treatment Cross Section



**Need three volunteers**  
**TEST TIME**

<http://www.tearfilm.org/mgdworkshop/index.html>

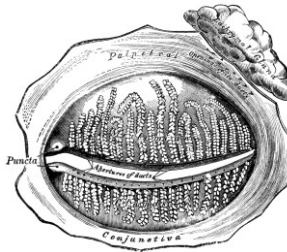
## Artificial Tears



- Artificial tears contain electrolytes – But they lack the complex mixture of proteins, mucins & other factors found in normal healthy tears

## Tear Components Review

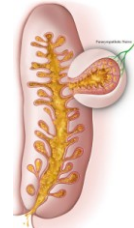
- Lipid Layer – prevents evaporation
- Aqueous Layer - hydration
- Mucus Layer – sticks tear to the eye (goblet cells)
- Other components



## Lipid Secretion: Meibomian Glands



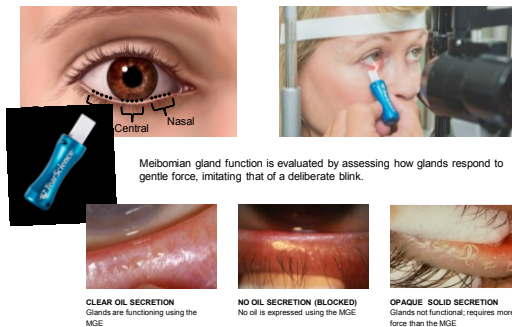
Left:  
Transillumination of  
eyelid showing  
meibomian glands



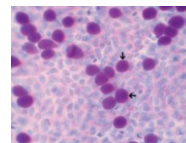
Right:  
Secretion of lipid  
at lid margin

- The lipid layer restricts evaporation to 5-10% of tear flow
  - Also helps lubricate

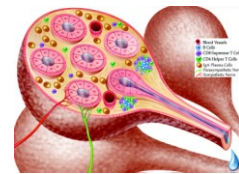
## Meibomian Gland Evaluator



## Mucin Secretion: Goblet Cells



Superficial layer of bulbar conjunctiva.  
Goblet cells violet, epithelial cells blue.



- Soluble mucins
  - Lower surface tension allowing tear film to spread over surface

Lipid    Aqueous    Mucin

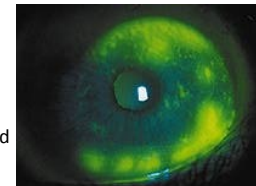
## With Every Blink

- Cleansing
- Removal of old flora
- New fresh flora
- Draining of a tear
- Use of the lacrimal system
- Eye, nose, and throat



## What is in a blink?

- Normal blink rate is 24k a day
- Lateral side higher than medial side
- Starts laterally and moves towards the medial and goes down the punctum
- The lid continues to close depressing the lacrimal sac and pushing tears towards the nasal duct
- This action also causes a suction for new tears



Partial blinking presents a significant problem

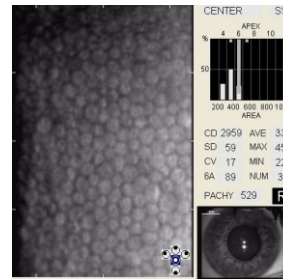


## Primary Corneal Endotheliopathies

- Corneal guttata
- Fuch's endothelial dystrophy
- Posterior polymorphous dystrophy
- Iridocorneal endothelial syndrome
- Age-related changes in endothelial cell morphology

Bourne WM. Biology of the corneal endothelium in health and disease. Eye. 2003;17:912-918

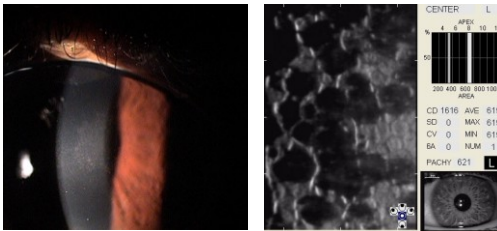
## Specular Photomicrograph



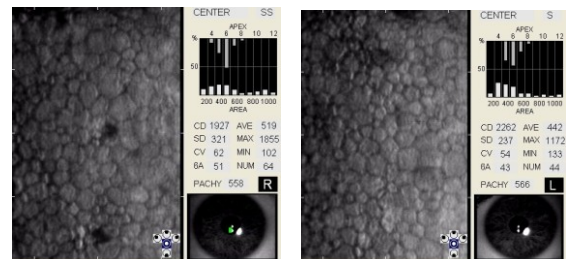
- Normal corneal endothelium in a 21-year-old woman
- Normal endothelial cell density
- Normal rate of polymegethism
- No pleomorphism
- No corneal guttata

## Clinical Evaluation

### Stage 2 Fuch's Endothelial Dystrophy

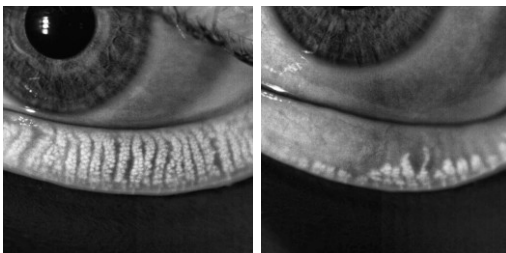


### Contact Lens-Induced Endotheliopathy



35-year-old woman with 20 years of full-time soft contact lens wear.

## Meibomian Gland Dysfunction



## Heated Eye Pad

www.heatedeyepad.com

RETAIL SALES:

**MAYO CLINIC**  
13400 E. Shea Blvd  
Scottsdale, AZ 85259  
Call (480) 301-8000

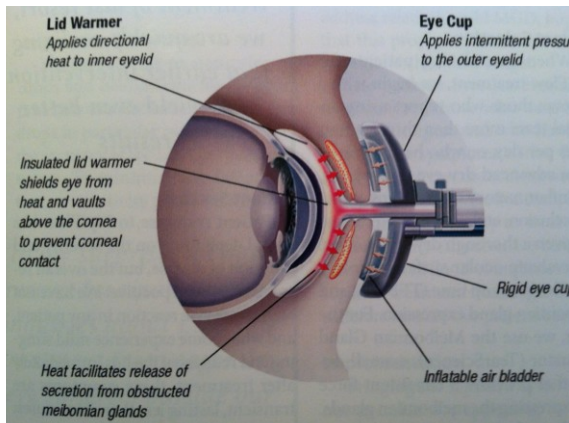
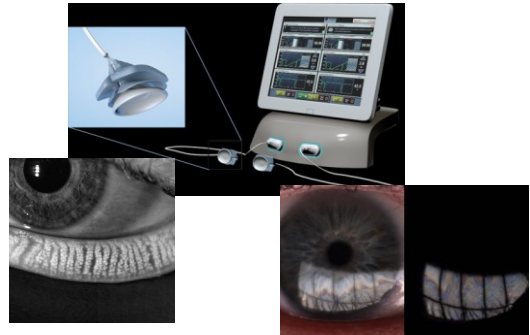
## MiBo Thermoflo / LidPro

- Supplies continuous controlled heat to the outer skin of the eyelid using ultrasound gel for conduction of heat to the posterior lid where the Meibomian glands reside
- Clearing the scurf (staph) is important



[http://www.mibomedicalgroup.com/mibovideo/mibothermoflo\\_intro/mibothermoflo\\_intro.mp4](http://www.mibomedicalgroup.com/mibovideo/mibothermoflo_intro/mibothermoflo_intro.mp4)

## LipiView/LipiFlow



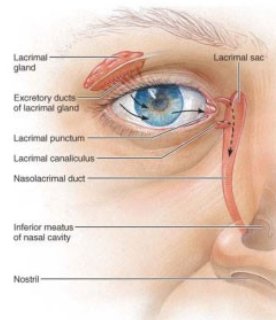
## Causes of Tearing

- Punctal agenesis
- Poor/blocked drainage
- Trichiasis
- Superficial foreign bodies
- Poor pump action
  - Eyelid mal-positions
  - Eyelid disease MGD is only one of them**
- Tear deficiency or instability
- Trigeminal nerve irritation



## Causes of Tearing Cont...

- Foreign body sensation
- Hypersecretion
  - Lacrimal secretion and drainage imbalance
  - Primary or reflex tearing (reflex tearing is more common with ocular surface irritation)
- Epiphora
- Lacrimal pump failure
- Lacrimal drainage obstruction
- S/P Surgery



## Environmental Factors

- Clean house
- Bedding
- Wood floors
- Pollen
- Animal dander
- Dust mites
- Ceiling fans
- Air conditioner vents
- Yard work
- Ipheones
- Computers
- TVs
- Reading
- Video games
- Sports

## Causes

- Anatomy
- Insufficient tear production
- Ocular surface disease
  - Demodex
- Meibomian Gland Dysfunction
- Improper blink rate
- Smoking
- Ceiling fans
- Medications (OTCs too)
- Chronic Diseases (thyroid, diabetes, etc...)
- Contact Lens Wear
- Ocular Surgery (CRS)



## Clinical Presentation

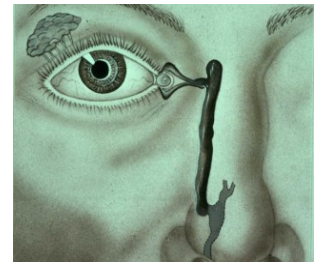
- Chief Complaint
- History of present illness
- Past medical history
- Clinical examination
- Nasal Examination



## Screening Questions

- Do activities like watching TV, looking at computers, reading a book make your eyes uncomfortable or hurt?
- Do your eyes ever feel dry ever? In the morning or late evening?
- Do you sleep under a ceiling fan or work/ sit under a ceiling fan?
- Do your eyes ever feel uncomfortable?
- Do you ever find yourself rubbing your eyes

Is this possible? You be the judge



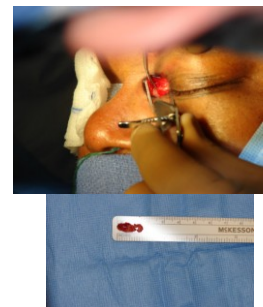
## NLDO Test: Lacrimal Irrigation

- Nose inspections
- S-Tubes 3-4 months
- Jones Tubes



## Nasal Lacrimal Duct Obstruction

- Correct through surgery called a DCR
- Stones in the lacrimal sac
- Stenosis of the punctum



## Conjunctivitis

- The “infamous” pink-eye
- Numerous causes:
  - Bacteria
  - Viruses
  - Allergies
  - Toxic Reactions (chemicals)
  - Often difficult to diagnose exact etiology



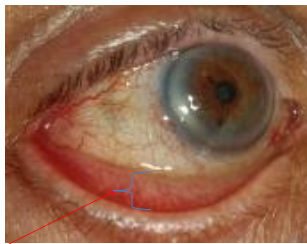
What is the most accurate measure of intraocular pressure?

Call it



## Hypersecretion = Pump Failure

- Crocodile-tears Syndrome
- Gustatory Hyperlacrimation or Gustatory epiphora or Gustolacrimal reflex (could be congenital)
- Ocular Surface Irritation



The tear lake is really high

What is a normal tear lake measurement?

## Eyelid Positions

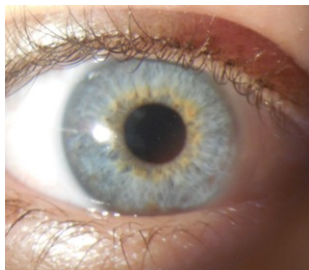
Disease:

- Trichiasis
- Entropion ... drain
- Ectropion ... drain
- Tear deficiency / instability
- Trigeminal nerve (5<sup>th</sup> CN) irritation
- Lagophthalmos



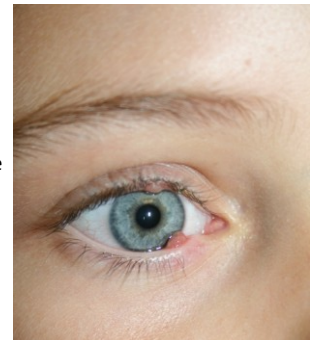
## Lacrimal Pump

- Pump Action
  - Lids
    - Lateral/medial
    - Muscles
    - Disease
  - Punctum
  - Canaliculi
- Lacrimal Sac
- Nasolacrimal Duct
- Facial Nerve Palsy (7<sup>th</sup> CN)



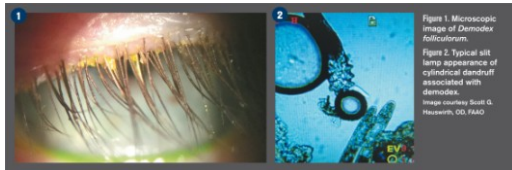
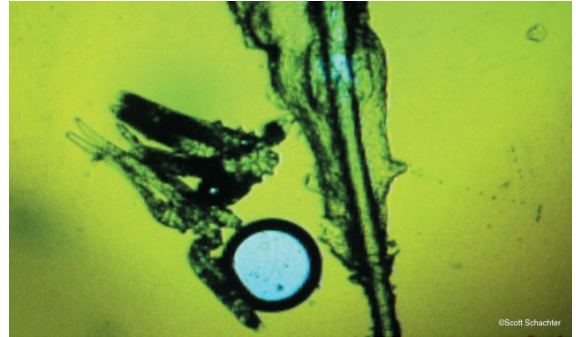
## Anatomical Functional Issues

- Entropion
- Ectropion
- Punctal Stenosis
- NLDO
- Floopy Eyelid Syndrome
- Lid Trauma
- Nerve Innervations
- Lid Disease





## Demodex



Demodex mites are microscopic ectoparasites found in human skin. They are extremely common, and their rate of infestation increases with age. The life span of demodex outside the living body is very limited. Direct contact is thought to be required for transmission of the mites. The lifecycle of demodex from egg/molting to an adult is quite short and no longer than two to three weeks. The adult stage is less than a week, and this is when mating occurs.

[http://optometrytimes.modernmedicine.com/optometrytimes/news/what-s-all-craze-about-demodex?utm\\_campaign=Sponsored+Resource+Center&utm\\_source=hs\\_email&utm\\_medium=email&utm\\_content=27975804&\\_hsenc=p2ANqtg-8RajCusGARW9KdewHdPGSW9\\_GFvzPTVsmuZAugW95Rtbq3-20\\_X9FiLxABA8bqzjNT-VaXgqWKR0K0Kc\\_3d1nUw8\\_hsm=27975804](http://optometrytimes.modernmedicine.com/optometrytimes/news/what-s-all-craze-about-demodex?utm_campaign=Sponsored+Resource+Center&utm_source=hs_email&utm_medium=email&utm_content=27975804&_hsenc=p2ANqtg-8RajCusGARW9KdewHdPGSW9_GFvzPTVsmuZAugW95Rtbq3-20_X9FiLxABA8bqzjNT-VaXgqWKR0K0Kc_3d1nUw8_hsm=27975804)

## Demodex

- Demodex can be found on the base of the eye lash and can be seen by using a microscope
- They live on the lash approximately for 4-6 weeks, so treatment has to last for 8 weeks to destroy the mites and their eggs. Eliminate the food source and mites die.
- Bolo for patient's with Rosacea
- Children have Demodex too
- Mites are more active a night, medicate BID

<http://www.reviewofophthalmology.com/content/c/36411#.dpuf>

## New Treatments

- Ocular Lid Scrubs
- Avenova with neutrox
  - Hypochlorous acid has a killing capacity
  - Everyday lid care
  - Removes germs and bacteria
  - Stable for 3 years in glass bottle



Contact: Rhonda Schuletes 225-397-1335

## Current Studies/Data

Evidence based medicine



## DEWS Report

- Sponsored by The Tear Film & Ocular Surface Society
- The Ocular Surface, April 2007
- Dry eye grading scale: Levels 1 - 4
- Based on Ocular Surface Disease Index (OSDI)
- Level 1 dry eye recommendations: Education and environmental/dietary modifications, Elimination of offending systemic medications, Artificial tear substitutes, gels/ointments, Eye lid therapy
- Level 2 dry eye recommendations: *If Level 1 treatments are inadequate, add: **Anti-inflammatories**, Tetracyclines (for meibomianitis, rosacea), Punctal plugs, Secretagogues, Moisture chamber spectacles*



## DEWS Report

### Table 3. Dry eye menu of treatments

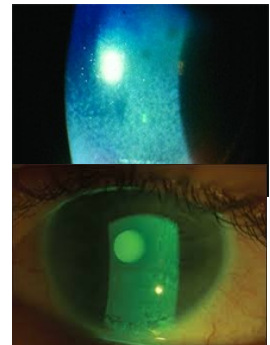
- Artificial tears substitutes
- Gels/Ointments
- Moisture chamber spectacles
- Anti-inflammatory agents (topical CsA and corticosteroids, omega-3 fatty acids)**
- Tetracyclines
- Plugs
- Secretagogues
- Serum
- Contact lenses
- Systemic immunosuppressives
- Surgery (AMT, lid surgery, tarsorrhaphy, MM & SG transplant)



## MGD Workshop

- Tear Film & Ocular Surface Society: Dr. Kelly Nichols, chairperson
- International Workshop - 50 dry eye experts
- Published in IOVS – 2011, volume 52, #4
- Dry eye grading scale: Stages 1 – 4
- Level 1 dry eye recommendations: *Inform patient about MGD, the potential impact of diet and the effect of work/home environments on tear evaporation, and the possible drying effect of certain systemic medications.*
- Level 2 dry eye recommendations: *Advise patient on improving ambient humidity; optimizing workstations and **increasing dietary omega-3 fatty acid intake.***

## Ocular Surface Disease Index (OSDI)



## BOLO Non-Ocular Diseases

- RA rheumatoid Arthritis
- HTN (high blood pressure)
- Thyroid
- Diabetes
- Fuch's Disease
- Lupus
- Sjogren's
- Leukemia
- Vitamin A deficiency
- Accutane



## Risk Factors

- Age is #1
- Gender (Women)
- Chronic Systemic Disease
- Medications
- Environmental
- Anatomical
- CPAP Machines
- Contacts (CLIDE)



## Medications BOLO

- Antihistamines
- Blood pressure meds
- Thyroid meds
- More...

\*ask patients if they have recently started any new medication



## Common Complaints

- Though is present, pt may not present with a chief complaint
- It is best to ask the question about dry eyes even if the patient does not volunteer
- Fluctuating vision
- Redness
- Painful
- Gritty
- Foreign body sensation
- Discharge
- Eyelid sticks
- Hard to open eyes
- Early in the a.m. or late in the evening extra stress

## Symptoms

- Redness
- Burning
- Watery eyes
  - Reflex tearing
- Itchy
- Foreign body sensation
- Discharge
- Excessive blinking
- Eye fatigue



## Tear Balance

- Osmolarity and osmolality are units of solute concentration that are often used in reference to biochemistry and body fluids. Learn what osmolarity and osmolality are and how to express them.
- Both osmolarity and osmolality are defined in terms of osmoles. An osmole is a unit of measurement that describes the number of moles of a compound that contribute to the osmotic pressure of a chemical solution.

## Dry Eye Syndrome/Disease

- Approximately **25%** of all visits to Eye Care Professionals
- Up to **40 million** Americans have symptoms or risk
- Dry eye increases with age
  - 5.7% of women under age 50 (**3.2 million**)
  - 14.6% of patients age 65 and older (**post menopausal**)
  - 9.8% of women age 75 and older
- Despite prevalence, dry eye remains under-diagnosed

1. O'Brien PD, Collins LMT. *Curr Allergy Asthma Rep*. 2004;4:314-319.

2. Sheppard JD. *Manage Care*. 2003;12(suppl):6-8.

3. Schein OD, Munoz B. *Am J Ophthalmol*. 1997 Dec;124(6):723-8.

4. Schaumborg DA, Sullivan DA. *Am J Ophthalmol*. 2003 Aug;136 (2):318-26.

5. Perry HB, Domestici ED. *Curr Opin Ophthalmol*. 2004;15:299-304.

## Meibomian Gland Dysfunction

- Chronic, diffuse abnormality of the meibomian glands characterized by terminal duct obstruction and/or quality or quantity changes in glandular secretions.
- May result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease.
- Approximately 70% of dry eye is MGD related

Compliments of ZeaVision

## Contact Lens Wearers and Dry Eye

- Recent studies estimate that the frequency of contact lens related dry eye is about **50%**.<sup>(1)</sup>
- Approximately **77%** of patients discontinue contact lens wear at one time or another due to discomfort.<sup>(2)</sup>
- 16%** of contact lens wearers stop wearing contact lenses, representing an annual revenue loss of \$275 per patient, **\$45,000** per year for the typical practice. (compliments of ZeaVision)

- Ramamoorthy P, Smith LT, Nichols JJ. Treatment, Material, Care, and Patient Factors in Contact Lens-Related Dry Eye. *Optom Vis Sci*. 2008; 85(8): 764-772.
- Prichard N, Fonn D, Brazeau D. Discontinuation of contact lens wear: a survey. *JCLC* 1999; 26(6): 157-162.
- Rampakia J. New data on contact lens dropouts: an international perspective. *Rev Optometry*. 2010;4:47-57.



## Testing

- Florescein staining
- Schirmer Tear **Quantity** Tests (paper in 1901)
- Lissimine Green (conjunctival staining)
- TBUT (tear **quality** test)
- "SJO" Test (Sjogrens test)
- Tear Lab
- Lipi-flow
- RPS



- Florescein staining
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- "SJO" Test (Sjogrens test)
- Rose Bengal

## Testing



## Schirmer Testing



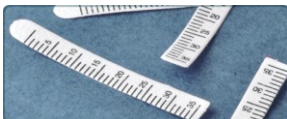
Schirmer 1 – dry strip

Schirmer 2 – anesthetic

- The human eye maintains a stable level of moisture and eliminates foreign particles by producing tears. When your eyes are too dry or too wet, you may be given Schirmer's test. This test will show whether your eyes produce too few or too many tears to maintain optimal eye health. Schirmer's test is primarily used to diagnose dry eye conditions.
- Schirmer's test is also known as a dry eye test, tear test, tearing test, or Basal secretion test.

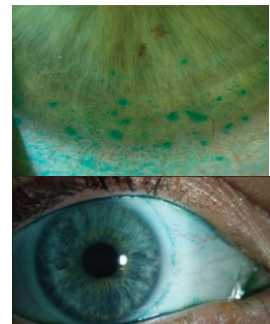
## Schirmer Test Results

- If your eyes are healthy, each test paper should contain more than 10 millimeters of moisture. Less than 10 millimeters of moisture indicates that your eyes are dry. The diagnosis of dry eyes could mean that you have other health issues, such as rheumatoid arthritis or a bacterial infection. More tests will likely be required to diagnose the specific cause of your dry eyes. If your eyes produce far more than 10 to 15mm of moisture, further tests may also be required to determine the cause of your watery eyes.



## Lissimine Green

- Staining is a really great way to identify surface defects



## Causes of Excess Tearing

- a strong emotional response (crying)
- climate (including cold and/or windy weather)
- allergies
- infections
- blocked tear ducts
- complications from dry eyes
- irritation of the eye (from stray eyelashes or other debris)
- ingrown eyelashes
- relaxation of eye muscles (limits the eye's ability to drain)
- the [common cold](#)
- pink eye ([conjunctivitis](#))
- reactions to certain medications (antihistamines, eye drops, [diuretics](#), sleeping pills, etc.)

## Treatments

- Artificial tears
- Medications (Restasis, doxycycline, ...) **pregnant!!**
- Cyclosporine
- Azithromycin (Azasite) \$\$\$
- Punctal Plugs
- Ammino grafts (Bio-Tissue)
- Lipi-flow
- Supplements (start early)
- Humidifiers
- Lid scrubs

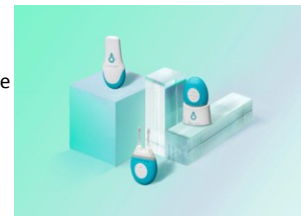


## Options: Drops, Gels, Ung, Sprays



## New Intra-Nasal Device


**Allergan** Granted Marketing Authorization by the FDA for TrueTear™, the First Intranasal Neurostimulating Device Proven to Temporarily Increase Tear Production



<http://www.prnewswire.com/news-releases/allergan-granted-marketing-authorization-by-the-fda-for-truetear-the-first-intranasal-neurostimulating-device-proven-to-temporarily-increase-tear-production-300444980.html>

## Supplements For The Eyes

### EyePromise EZ Tears Formulation



Vitamin A-Retinyl Palmitate	1,000 IU
Vitamin D3	2,000 IU
Fish Oil EE 70%	1,480 mg
Total Omega 3's	1,100 mg
EPA	590 mg
DHA	440 mg
Proprietary Blend (ingredients below)	220 mg
Evening Primrose Oil	100 mg
Turmeric Extract	50 mg
Green Tea Extract	50 mg
Mixed Tocotrienols/Tocopherols	20 mg

## What Are Omega-3 Fatty Acids?

- Considered essential fatty acids
- We need them in our body for it to work
- They are not made naturally in our body so we need to get it from our diet
- All omega-3s are not the same

### Health benefits:

Reducing inflammation in blood vessels and joints

## Omega 3 Risks

- Surgical risks are equated omega-3s to Plavix (clopidogrel, Bristol-Myers Squibb), a medication used to prevent platelets from clotting in patients with a history of heart attack or stroke. Surgeons reported patients losing skin grafts and suffering excessive bruising due to fish oil supplementation—most often when patients did not report taking it preoperatively.



<http://optometrytimes.modernmedicine.com/optometrytimes/news/risks-associated-omega-3-supplementation>

## Vitamin A (as retinal palmitate)

- A fat soluble vitamin that is essential for corneal surface health, as well as mucosal, conjunctival, Meibomian, and lacrimal gland health. It is needed in genes and cells that express mucin (a polysaccharide) of major importance in one of the three tear layers.

## Vitamin D3

- A fat soluble vitamin, aka cholecalciferol, which is the form of vitamin D that our bodies make from exposure to sunlight (UVB), it also usually comes from meat and fish. Vitamin D3 aids in building up your immune system and aids in systemic inflammation

## Vitamin E (d-alpha tocopherol)

- A fat soluble vitamin that is essential for reduction of systemic and ocular inflammation, also important in stabilizing omega-3 fatty acids

## Dry Eye Patient Study

- **56 Subjects**
  - 96% described symptoms as moderate to severe
- **Results:**
  - 86% reported symptomatic relief at 4 weeks
  - 93% reported no after taste
  - 89% reported little or no GI side effects
  - All patients were able to take the softgels



## EZ Tears Contact Lens Comfort Study

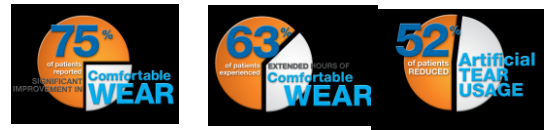
- 90 Patients
- Results:
  - 89% of patients reported improved contact lens comfort in 4 weeks
  - 32% saw improvement in hours per day of comfort (avg. 2.2 hours)
  - 45% reduction in contact lens removal
  - 11-13 day average onset of improved contact lens comfort
  - 85% of patients said they were likely to continue taking EZ Tears
  - 91% said they would recommend EZ Tears to others



## EZ Tears Contact Lens Comfort Study

### Results:

- Significant improvement in comfortable wear
- Extended hours of comfortable wear
- Reduced artificial tear usage



## ONIT Clinical Study Ocular Nutrition Impact on Tear Film

- IRB reviewed & approved
- FDA registered trial (clinicaltrials.gov)
- Study Investigators
  - Dr. Bruce Koffler (Ophthalmologist)
  - Dr. Rob Davis (Optometrist)
  - Dr. Sean Mulqueeny (OD: Principal Investigator)
- Currently enrolling patients

## ONIT Clinical Study Ocular Nutrition Impact on Tear Film

- 80 patients
- Objective: To determine whether EyePromise EZ Tears benefits patients with dry eye.
- Baseline, 1, 4, 8 week follow-up
- Patient Inclusion Criteria (Must Meet 4 of 7 criteria)
 

Tear Osmolarity	OSDI Survey
Tear breakup time	Corneal Staining
Conjunctival Staining	Tear Meniscus Height
Phenol red thread	

## EyePromise

### Start-up Kit

- Free to ECP's
  - Coupons
  - Product Samples
  - Brochure holders
  - Staff Training
  - Patient Education materials
  - Print & web



## EyePromise

### Patient Brochures

- Dry Eye
- AMD
- Visual Performance
- Brand Specific Brochures



## Identify Patients With Dry Eye

### OSDI Survey Form

#### Key Reminder:

Up to 50% of Contact Lens  
Wearers experience  
Contact  
Lens Induced Dry Eye  
(CLIDE)

**Ocular Surface Disease Index (OSDI)**  
All four questions in the following 12 questions, and circle the number in the box that best represents each answer. Then, fill in boxes A, B, C, D, E, and F according to the transition table each.

How do you experience any of the following symptoms in your eye?	Always	Most of the time	Some of the time	Not much of the time	Never
1. Itchy	4	3	2	1	0
2. Burning	4	3	2	1	0
3. Stinging	4	3	2	1	0
4. Watery eyes	0	1	2	3	4
5. Red eyes	4	3	2	1	0
6. Eye strain	4	3	2	1	0

Subtotal score for answers 1 to 6:

How often do you experience any of the following symptoms in your eye?	Always	Most of the time	Some of the time	Not much of the time	Never
7. Itchy	4	3	2	1	0
8. Burning	4	3	2	1	0
9. Stinging	4	3	2	1	0
10. Watery eyes	0	1	2	3	4
11. Red eyes	4	3	2	1	0
12. Eye strain	4	3	2	1	0

Subtotal score for answers 7 to 12:

Add subtotals 6, 8, and 12 to obtain  
Total number of questions answered (do not include questions answered NA)

Subtotal score for answers 1 to 12:

Please turn over the questionnaire to calculate the patient's final OSDI score.

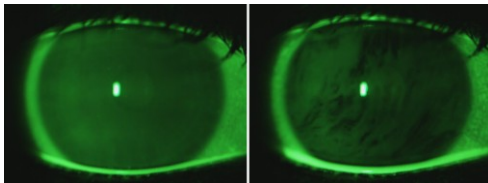
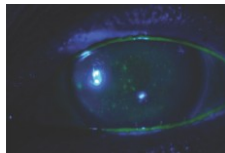
## Benefit To The Practice

- \$700- \$800 per pt per year
- Potential \$200,000 per year
- Ophthalmology treating



## Reference Material

- ZeaVision
- Allergan
- Wikipedia



## Reference

- Endoscopic Surgery of the Orbit and Lacrimal System 2006... Acquired Nasolacrimal Duct Obstruction David M. Mills M.D., Dale R. Meyer M.D. FACS

Thank you to:

- Images from Eye Imaginations
- Reports: from ZeaVision
- Images from TearScience
- <http://www.aoa.org/patients-and-public/eye-and-vision-problems/glossary-of-eye-and-vision-conditions/dry-eye?sso=v>

Thank You

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