Diagnosis and Treatment of Ocular Surface Conditions: Focus on Blepharitis and Dry Eye

C. Lisa Prokopich, OD, MSc, FAAO
University of Waterloo, School of Optometry and Vision Science

COPE Course Code ID: 31662-SD  Expires: 04/01/2014  Qualified Credit: 2 hours

Thank you also to Drs. Karpecki, Melton, Thomas, Bartlett and Michaud for their contributions.

Learning Objectives

After completing this lesson, optometrists will be able to:

- Understand the epidemiology and etiology of blepharitis and dry eye
- Diagnose blepharitis and dry eye
- Manage and recommend treatment for these conditions
- Counsel patients for better self-management

Blepharitis

- Anterior blepharitis
- Posterior blepharitis
  - Meibomian gland dysfunction [MGD]
- Patients are 2x more likely to have dry eye symptoms
- Could be related to systemic conditions such as acne rosacea

Canadian Consensus 2009 Clinical Categories: Mild, Moderate, Severe

Dysfunctional Tear Syndrome

- Most common presentation: "No lid margin disease"
- Treatment decision based on severity level
Treatment Algorithm: Blepharitis (Anterior)

**LEVEL 1**
- Warm compresses (5-10 minutes) then massaged
- Lid scrub (if crusts): commercial eyelid cleaner or tea tree oil
- Order culture if severe cases or 3 resistance
- Educate the patient on chronicity of disease and need for long-term hygiene/treatment

**LEVEL 2**
- Oral antibiotics
  - If methicillin resistant, select alternative (topical/IV)
  - 1-2 g/day = long-term therapy
- Lid scrubs
- Topical antibiotics (if bacterial or parasitic): erythromycin, bacitracin, azithromycin, fusidic acid (1-4x/day for 2 weeks then twice weekly)

**LEVEL 3**
- Steroids (ointment)
  - Can be prescribed in combo drugs (antibiotics)
  - Dexamethasone with polymyxin B (Maxitrol®)
- Topical cyclosporine A (severe rosacea or for long-term anti-inflammatory)
- Adjunctive therapy: calcineurin inhibitors, sex hormones (androgen), humidifiers

**LEVEL 4**
- Steroids (ointment)
  - Can be prescribed in combo drugs (antibiotics)
  - Loteprednol etabonate or fluorometholone preferred
e - Refer for surgical therapy if there is a nodular mass, ulceration, extensive scarring, loss of lashes, or if patient is not responsive to medical therapy

---

**LEVEL 2**
- Oral antibiotics
  - If methicillin resistant, select alternative (topical/IV)
  - 1-2 g/day = long-term therapy
- Lid scrubs
- Topical antibiotics (if bacterial or parasitic): erythromycin, bacitracin, azithromycin, fusidic acid (1-4x/day for 2 weeks then twice weekly)

**LEVEL 3**
- Oral antibiotics
  - Tetracyclines 250 mg QID x 3-4 weeks then BID and DE over months or doxycycline 100 mg DE x 10 days then 50 mg/day x 6-12 weeks or minocycline (100 mg/day), cefalexin, rifampin, azithromycin (250-500 mg, 1-3 x/wk)
- Vancomycin if resistance (50 mg/ml QID)
- Erythromycin (for children, 250 to 500 mg/day)
- Topical cyclosporine A (severe rosacea or for long-term anti-inflammatory)
- Adjunctive therapy: calcineurin inhibitors, sex hormones (androgen), humidifiers

**LEVEL 4**
- Steroids (ointment)
  - Can be prescribed in combo drugs (antibiotics)
  - Loteprednol etabonate or fluorometholone preferred
e - Refer for surgical therapy if there is a nodular mass, ulceration, extensive scarring, loss of lashes, or if patient is not responsive to medical therapy

---

Lid Scrubs

- Lid-Care® (Novartis)
- I-Lid-N’ Lash® (I-MED Pharma)

---

Meibomian Gland Dysfunction – DX Stages

<table>
<thead>
<tr>
<th>Secretions</th>
<th>Symptoms</th>
<th>Corneal Staining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Modified</td>
<td>None</td>
</tr>
<tr>
<td>Level 2</td>
<td>Modified – turbid</td>
<td>Light</td>
</tr>
<tr>
<td>Level 3</td>
<td>Solidified</td>
<td>Moderate</td>
</tr>
<tr>
<td>Level 4</td>
<td>Toothpaste – No expression possible</td>
<td>Severe</td>
</tr>
</tbody>
</table>

---

Frothy/Foamy Tear Film

- Azithromycin
- Erythromycin
- Cefalexin

---

Treatment

- What and when to prescribe when tetracyclines are not an option:
  - Azithromycin
  - Erythromycin
Contraindication: Oral Tetracycline

- Pregnant, nursing or child-bearing age
- Children (pre-pubescent)

Cautions

- Photosensitivity
- Chelates with dairy products, antacids etc.
- Minocycline may cause vestibular toxicity
- Pseudotumor cerebri
- Number one drop-out reason?
  - GI problems or esophagitis

Tetracyclines

- Use for rosacea/blepharitis
- Antibiotics inhibit bacterial protein synthesis by binding 30S ribosome
- Anti-inflammatory properties
  - Decreases L-1, TNF-α
  - Decreases NO production
  - Decreases HLA Class II antigen expression
  - Decreases metalloproteinase production and activation
- Decrease symptoms and joint destruction in RA

How to Minimize Stomach Problems with Tetracycline

1. Do not take the second pill (b.i.d.) before going to bed
2. Do not take pills with acidic beverages
3. Take pills with food (except a high-dairy meal)
4. Prescribe the lowest dose available

Potential Chronic Changes

- Telangiectasia
- Dislocation of meibomian glands/gland atrophy
- Scarring
Lubrication

Educate patients about initial treatment and chronic treatments:
- Lipid-based artificial tears
  - Refresh® Ultra
  - Liposic®
  - Systane® Balance

Tear vs. Diagnosis

- Patients with MGD may benefit most from a lipid-based tear
  - e.g., Liposic®, Refresh® Ultra, Systane® Balance
- Patients with aqueous deficient dry eye may benefit most from aqueous ATs
  - e.g., Systane®, Refresh® Plus, GenTeal® or Blink® Tears
- Patients with severe dry eye may benefit most from preservative-free artificial tears
  - e.g., preservative-free Blink® Tears or Gel or Refresh® Tears PF, Tears Naturale FREE®, Bion® Tears, TheraTears®

Liposic® Drops and Gel

- Refreshing and soothing effect on the eyes
- Based on the structure of the natural tear film
- Replicates all 3 layers of the tear film
- Improves the stability of the tear film
- Provides long-lasting hydration

Product ingredients: Carboxymethylcellulose (0.3%), Benzalkonium chloride (0.0025%)

Liposic® Facts

- Proven to extend relief from persistent dry eye symptoms
- Demonstrated a 4X increase in tear film break-up time (TBF) after 3 months of treatment (p<0.001)
- Hydration is attributed to both cellulose and medium chain triglycerides
- Contains a hydrophilic polymer that resists tears, forming a lubricating, hydrating and wetting film on the surface of the eye
- Medium-chain triglycerides help to reinforce the lipid layer of the tear film
- Average grit of 2.6 g within the physiological range of the tear film, further evidencing patient comfort and durability

Refresh Ultra®

- To treat symptomatic dryness related to lipid layer deficiency
  - q.i.d. for most of the conditions
  - Use Celluvisc® (non-preserved) if >q.i.d.
- Product ingredients – CMC (Carboxymethylcellulose)

Blepharitis Pearls

- Determine if blepharitis or MGD is the greater component
- Affects treatment options
- Collarettes near the base of the lash indicate an acute presentation
- Antibiotics alone may work in this case
Dry Eye

- Lipid deficiency is by far the number one issue
- Evaporative dry eye is likely responsible for over 80% of dry eye

Tear Film Deficiencies

- Lipid Phase Deficiency
- Damaged Tear Film

Dry Eye: Predisposing Factors
- Age
- Gender
- Anterior segment disease
- Lid disease
- Allergy
- CL wear
- Previous ocular surgery

Environmental Risk Factors
- Dry climate/geography
- Air conditioners or heaters
- Airline travel
- Winter months, allergy season
- Ceiling fan
- Exogenous irritants
- Reading time/computer
Top 4 causes
- Smoking
- Caffeine (more than moderate)
- Diet
- Alcohol

Systemic medications are also top intake causes of dry eye

Risk Factors: Systemic Medications
- Antihistamines
- Diuretics
- Antihypertensives
- Anticholinergics
- Antidepressants
- Cardiac antiarrythmic
- Oral contraceptives
- Hormone replacement therapy
- Isotretinoin e.g., Accutane®
- Some chemotherapy drugs

Risk Factors: Systemic Disease
- Diabetes (most common; cell damage, medications, metabolic issues)
- Rheumatoid arthritis
  - Sjögren’s syndrome
- Lupus (SLE)
- Thyroid eye disease
- Rosacea & psoriasis

Risk Factors: Behavioural

Prevalence of Dry Eye

Gender and Age
- Sjögren’s: Dry eye is characterized by a triad of dry eye, dry mouth, and associated auto-immune disorders
  - Prevalence
    - 0.4%: overall number of patients with Sjögren’s
    - 85% women

Sjögren’s Syndrome
- Lymphocytic infiltration of lacrimal and salivary glands
- 0.4% prevalence
- 5-8% incidence of B-cell non-Hodgkin’s lymphoma
  - Women > men (younger women)
- Much lower androgen counts
Sjögren’s Syndrome
- Treat underlying immune disorder
- Co-manage with patient’s physician
- Secretagogues
  - Salagen® 5 mg (Pilocarpine tablets)
    - Avoid in asthma patients, GI ulcer, acute iritis or narrow angles
    - Monitor carefully
    - Side effects:
      - Scalp and back sweats
  - Cevimeline e.g., Evoxac® 30 mg t.i.d. – saliva stimulating drug
    - Very effective with a lot less side effects
    - Not yet available in Canada

Symptoms of Dry Eye
- Burning
- Stinging
- Transient blur
- Dryness
- Photophobia
- Epiphora
- Asthenopia
- Contact lens intolerance
- Injection
- Increased blink rate
- Foreign body sensation
- Grittiness
- Transient blurred vision
- Visual degradation

Epiphora
- SLEx finding – conjunctivochalasis or trichiasis
- Nasolacrimal sac obstruction
- Lid laxity conditions – ectropion
- Dry eye

Examination
External Examination

- Skin
- Eyelids
- Cranial nerve function
- Hands

Diagnostic Tests

- Pt questionnaire
- Tear meniscus height
- Tear break-up
- NAFL Dye
- Rose Bengal or Lissamine Green*
- Schirmer’s test – phenol thread test
- Tear
- Lab osmolarity

Osmolarity Definition

- What does osmolarity measure?
- The concentration of solutes compared to solution in the tears

TearLab™Osmolarity

- Requires 10 milli-microlitres of tears
- Instant measurements of osmolarity in your clinic!
- Note: no drops in eye before test

*Supply of these dyes could be temporarily difficult in Canada
Practice Management

- Practice management based on result
- Basis of diagnosis/part of dry eye screening
- May indicate low level of inflammation
**Treatment**

- Make your differential diagnosis
- Evaporative vs. volume
  - If evaporative: lipid- or mucin-based deficiency
- Blepharitis (Y/N): if yes: rosacea (Y/N)
- Initial Tx + adjunct Tx: according to Ddx
- Educate patient
- Eliminate exacerbating factors
- Increase water intake

---

**Patient CCF**

- Husband present: states no notice of nocturnal lagophthalmos
- Slit lamp exam as shown also shows complete blink OU

---

**Patient CCF**

- Began with treatment of the lid disease
  - Hot compresses hs x 5 min for 2 weeks
  - Lid expression/massage
- Antibiotic/anti-inflammatory ointments (loteprednol etabonate e.g., Zylet®)
- Lipid-based artificial tears

---

**Patient CCF**

- Returns 1 month later, same complaints
  - Begin loteprednol 0.5% e.g., Lotemax® again with cyclosporine 0.05% ophthalmic emulsion e.g., Restasis® b.i.d. to plan on using Restasis® long term
- Consider doxycycline if not cleared
Patient CCF

- Returns in 2 months
- Eyelids significantly better, inferior line of staining still present
- Continue doxycycline 20 mg q.d. for 1 more month
- Continue cyclosporine 0.05% ophthalmic emulsion e.g., Restasis® b.i.d.
- Punctal plugs?
- Tear chemistry makes a difference

Patient CCF

- Went back over environmental
- Computer monitor?
- Elevated!!! — placed on first shelf above desk to make more room on the desk!!
- Lowered to eye level, continued current therapy

Patient CCF

- Returned in 1 month – completely cleared
- No SPK, no symptoms
- Maintain loteprednol 0.5% b.i.d. for 4 weeks, then cyclosporine 0.05% ophthalmic emulsion e.g., Restasis® b.i.d. out to 6 months
- Continue artificial tears

Canadian Consensus 2009 Treatment Algorithm: Dry Eye

- LEVEL 1
  - No improvement add level 2 interventions
  - Patient education
  - Environmental modifications
  - Control systemic medications
  - Preserved tears
  - Anergy control

- LEVEL 2
  - No improvement add level 2 interventions
  - Unpreserved tears
  - Gel/moisturizing drops
  - Nutritional support
  - Cyclosporine A
  - Topical steroids
  - Secretagogues

- LEVEL 3
  - No improvement add level 2 interventions
  - Tetracyclines
  - Punctal plugs (control inflammation 1st)

- LEVEL 4
  - Systemic anti-inflammatory therapy
  - Acupuncture
  - Marine goggles
  - Surgery (punctal cautery)
Treatment – Artificial Tears vs. Layer Deficiency

Nucler Split Fat Acids

Omega fatty acids shown to help with dry eye disease:
- ALA: e.g., flaxseed oil
- EPA/DHA: e.g., fish oils
- GLA: e.g., black currant seed or evening primrose oil

Nutritional Supplements: Essential Fatty Acids

- Defined by the number of carbons, double links and their respective position
  - Ex: LA 18:3 ω-3
  - Linoleic acid: composed with 18 carbons, with 3 double links
  - The first one being at 3 carbons from the end (this defines an omega 3)

- Long or short chain
  - (SC): considered essentials – cannot be metabolised
  - Long chain (LC) – can be metabolised from short chains

How an Omega Works...

- ω-3 and ω-6 = eicosanoids precursors
- Hormones with a local action against inflammation
  - 4 families:
    - Prostaglandins (PG)
    - Prostacyclins (PGIs)
    - Thromboxanes (TXs)
    - Leukotrienes (LTs)

Antagonist Actions(2)

- ω-3 vs ω-6
- Compete each other for the same enzymes that break them down
- All omegas have some pro-inflammatory properties and all can be anti-inflammatory. However, overall action is:
  - ω-3: an i-inflammatory. Action on T cell and interleukins.
  - ω-6: pro-inflammatory and anti-platelet aggregation
  - However, primrose oil (GLA) positively influences DGLA rate and acts against ocular dryness

Table of ω

<table>
<thead>
<tr>
<th>Fatty acids (Name)</th>
<th>Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omega-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha-linolenic acid</td>
<td>ALA</td>
<td>SC-PUFA 18:3 ω-3</td>
</tr>
<tr>
<td>Eicosapentaenoic acid</td>
<td>EPA</td>
<td>LC-PUFA 20:5 ω-3</td>
</tr>
<tr>
<td>Docosahexaenoic acid</td>
<td>DHA</td>
<td>LC-PUFA 22:6 ω-3</td>
</tr>
<tr>
<td>Omega-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linoleic acid</td>
<td>LA</td>
<td>SC-PUFA 18:2 ω-6</td>
</tr>
<tr>
<td>Gamma-linolenic acid</td>
<td>GLA</td>
<td>LC-PUFA 18:3 ω-6</td>
</tr>
<tr>
<td>Dihomo-gamma-linolenic acid</td>
<td>DGLA</td>
<td>LC-PUFA 20:3 ω-6</td>
</tr>
<tr>
<td>Arachidonic acid</td>
<td>AA</td>
<td>LC-PUFA 20:4 ω-6</td>
</tr>
</tbody>
</table>
Omega Balance
- North American diet (type)
  - 1.6 g/day of ALA (ω-3) (oils, fatty fish, egg white)
  - 12-16 g/day of ω-6 (meat, fried meals)

- Ideal diet (g/day)
  - 3 ω-3: means to increase daily consumption x 2
  - 7.55 ω-6: means to reduce daily intake x 2

- Ideal ratio (3/6)
  - 1:4 to 1:2.5

Omega and Dry Eye
- LA / GLA (ω-6)
  - Increase "good" PG (PGE-1)
  - Against ocular surface inflammation
  - Increase tear production


- Help to maintain MG function (Masco, 2008)

Omega and Dry Eye
- ALA (ω-3; flaxseed oil)
  - Helps to restore ocular health
  - Blocks cytokine release (IL-1) and release of necrosis factors (TNF-α)
  - Reduce local leukocytes action
  - Contra-indicated if GI problems

Targeted Treatment
- Treatments aimed at local inflammatory processes
  - Topical corticosteroids (loteprednol etabonate e.g., Lotemax™)
    - Ester-based steroid
    - Effective anti-inflammatory agents
    - Site-specific steroids
  - Cyclosporine A (e.g., Restasis®)

Dry Eye Syndrome – A Real Condition that Needs More than a Palliative Solution
- "Dry eye is a disorder of the tear film due to tear deficiency or excessive tear evaporation which can cause damage to the interpalpebral ocular surface."
- Artificial tears provide temporary palliative relief

"Artificial tears are inadequate because they fail...to prevent progression of Dry Eye disease."

Corticosteroids
- Bind to nuclear receptors that bind DNA and regulate gene expression
- Interfere with transcription regulators [e.g., AP-1 & NF-κB]
  - Most inflammatory pathways
    - Cytokine production
    - Lipid mediators (PGs)
    - Cell adhesion molecules
    - Lymphocyte trafficking
    - Vascular permeability
  - Ring modifications alter potency and membrane stabilizing effects
Steroids and Dry Eye

- Symptomatic improvement in irritation symptoms in 83% and objective improvement (redness, dye staining and tarsal papillae, FTC) in 80% of 70 patients treated for 2 weeks with non-preserved methylprednisolone

Patients often have long-lasting relief after 2-week pulse therapy (used for two weeks at a time)

Ester steroids may be used for longer but still important to monitor IOP

Sjögren’s Syndrome KCS

Steroids Effectively Treat KCS (Marsh, Ophthalmology 1999)

Anti-inflammatory Therapy of KCS

- Improve signs and symptoms
- Improve tear clearance
- Normalize mucus production
- Often have sustained benefit after a 2-week pulse
- Bioengineered steroid loteprednol etabonate is effective

Ester vs. Ketone Steroids

- Ester Steroids are inactivated by naturally occurring esterases
  - Fewer side effects, better safety profile
  - No rebound effect
- Ketone Steroids are not inactivated and have propensity to remain in anterior chamber post-breakdown as active metabolites
  - Benefits/risk of use e.g., cost
  - Switching from other steroids to ester steroids

Steroids Effectively Treat KCS

Corticosteroids

- Pre-Steroid
- Post-Steroid

Loteprednol ➔ Ester steroids
Prednisolone ➔ Ketone steroids
Fluorometholone
Dexamethasone
Betamethasone
Steroid Treatment

- Loteprednol 0.2% (Alrex®); 0.5% (Lotemax™)
- Fewer side effects (M Abelson, 88 patients 35 days)
  - IOP rise, secondary infection or PSC formation: 0%
  - No reported cases of PCS cataract in over 66 million prescriptions (IMS Health Data)
  - Almost no systemic absorption – so no need to taper

How Does Cyclosporine Ophthalmic Emulsion 0.05% (Restasis®) Work?

  - Activated T cells produce inflammatory cytokines that result in:
    - Recruitment of more T cells (Stern, et al. IOVS 2002; 43:2609.)
- Topical Cyclosporine
  - Cyclosporine Ophthalmic Emulsion 0.05% (Restasis®) in castor oil vehicle
    - Useful in long-term management of inflammatory DES
    - b.i.d. dosage
    - 3-4 months to achieve clinically significant effect, 6 months for full therapeutic potential
      - 59% patients achieved improvement from baseline Schirmer scores at 6 months
    - Excellent safety profile
Change in Goblet Cell Density

Percentage Change in Average Goblet Cell Density From Baseline

Vehicle 13% (n = 12)

RESTASIS® 191% (n = 11)

P = 0.013

Expectations During the First 6 Months of Therapy

Patients notice an onset of benefit
Further increase in tear production
Significant improvement in tear production
Improvements are maintained with continuation of therapy

Cyclosporine

Cyclosporine Ophthalmic Emulsion 0.05% (Restasis®) Safety: Ocular Adverse Events (%)

<table>
<thead>
<tr>
<th>0.05% Cyclosporine</th>
<th>Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burning upon instillation</td>
<td>17</td>
</tr>
<tr>
<td>Stinging</td>
<td>3</td>
</tr>
<tr>
<td>Discharge</td>
<td>3</td>
</tr>
<tr>
<td>Foreign-body sensation</td>
<td>3</td>
</tr>
<tr>
<td>Conjunctival hyperemia</td>
<td>2</td>
</tr>
<tr>
<td>Pruritus</td>
<td>2</td>
</tr>
<tr>
<td>Visual disturbance</td>
<td>2</td>
</tr>
<tr>
<td>Pain</td>
<td>1</td>
</tr>
<tr>
<td>Epiphora</td>
<td>1</td>
</tr>
</tbody>
</table>

Burning and Stinging:

#1 Reason to Discontinue Restasis®

- 17% of patients experienced burning or stinging
  - Patients with dry eye have chronic ocular disease and are more sensitive to ocular insults
  - Patients with dry eye syndrome have anesthetic corneas
  - With return of tear function there is a return of corneal sensation, burning and stinging
  - Patients with dry eye are accustomed to treatment failure and are not willing to continue therapy which may make them feel temporarily worse

Topical Loteprednol Improves Patient Compliance and Cyclosporine Ophthalmic Emulsion 0.05% (Restasis™) Efficacy

- Corticosteroids have been shown to improve tear production by controlling inflammation
- Corticosteroids decreases irritation associated with use of Restasis® by 75%
- Recommend a mild corticosteroid such as loteprednol q.i.d. for 2 weeks and then b.i.d. for 2 weeks for patients who complain of irritation with Restasis®, high maintenance patients, and patients who want more rapid relief

Clinical Pearl

- Start anti-inflammatory treatment by ester steroid-based products
- If this works, you can consider Restasis®
  - Taper loteprednol over 4-6 weeks while Restasis® will be fully effective
- If loteprednol fails to improve ocular condition and symptoms...
  - Restasis® won’t work either!!!
Established Safety Profile
- Favourable safety profile for Cyclosporine Ophthalmic Emulsion 0.05% (Restasis®)
- Safety parameters monitored:
  - Adverse events
  - Blood chemistry
  - Intraocular pressure (IOP)
  - Visual acuity
  - Biomicroscopy
  - Conjunctival microbiology
  - Cyclosporine blood levels

Please see slides 6 & 7 for important safety information.

No Cyclosporine in Blood
- No detectable cyclosporine in blood of any cyclosporine ophthalmic emulsion 0.05% (Restasis®)-treated patient
- Toxicity associated with systemic or oral cyclosporine was not observed with cyclosporine 0.05% ophthalmic emulsion

Please see slides 6 & 7 for important safety information.

Progression of Dry Eye Syndrome
- Dry eye is a progressive, potentially irreversible disease
- Left untreated, the cycle of inflammation and dysfunction may cause permanent damage to the lacrimal gland

Regimen
- Manage contributing factors
- Artificial tears
- Nutrition/essential fatty acids
- Lotemax™ q.i.d. for 2 weeks then b.i.d. for 6 weeks then PRN (no refills just remaining bottle)
- Restasis® b.i.d. to 6 months
- Punctal plugs
- Refer to corneal specialist for stage 3-4

Punctal Occlusion
- May worsen certain conditions:
  - Allergies
  - MGD
  - Inflammatory dry eye syndrome
- Ideal treatment after inflammation is under control in dry eye disease
- First-step treatment in cases of:
  - Neurotrophic keratitis
  - Lagophthalmos
  - Post-LASIK dry eye
Options for Treatment Failures

- Autologous serum
- Surgery

Dry Eye Pearls

- Signs and symptoms rarely correlate in dry eye
  - Treat either signs or symptoms
- If a systemic disease such as an auto-immune condition is noted in a dry eye patient:
  - The dry eye will not fully resolve without management of the systemic disease

Dry Eye Pearls

- Sjögren’s Syndrome
  - Discuss dry mouth treatments as well
  - Note the high association with non-Hodgkin’s lymphoma and educate the patient
  - Follow the patient more often

Dry Eye Pearls

- Contact lens wear in dry eye patients?
  - Consider:
    - Daily disposables
    - Certain SiHy lenses on a daily wear basis
    - Increase use of ATs or re-wetting drops
    - Use therapeutics before and after lens insertion
    - Change contact lens solutions
      - Preservative-free, H2O2
      - Biotrue™ with sodium hyaluronan

Ocular Surface Disease: Conclusions

- Ocular surface disease conditions are the most common optometry will face
- Numerous new management options that are more effective
- Build a practice where patients will return for all primary eye care needs