Captain Jack’s Guide to Contact Lenses

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This course is a track for the OSSO
New Horizons

- The Contact Lens Evaluation
- Silicone Hydrogel Issues
- Dailies
- Extended Wear
- Bifocal Contact Lenses
- Duette Hybrid lenses
- Scleral Contact lenses
- GPC
• New Bifocal C/L Biofinity
• Custom Toric SiHy Lenses
  • Specialty Contact lenses
  • Art Optic
  • Blanchard
• New solutions
  – Abbott – Revitalens
  – Bausch and Lomb: PureEyes
  – Alcon : 
New Products- GP

• Synergeyes
  – Sphericals
  – Multifocals
  – Keratoconics level I and II

• Scleral (18.0) and Mini Scleral(14-16)
  – Jupiter
  – Innovations in sight
  – Essilor lenses
The Medical Model: Contact Lens Evaluation

By Dr. Jack Schaeffer, O.D.
The Medical Model: Contact Lens Evaluation

Encompases:
- Patient history
- Patient Evaluation
- Contact lens/Disinfection Solution
- Patient Education

The BIG picture:
- YOUR Entire Practice Philosophy
- Patient-Care Delivery System
Patient History

Every contact lens evaluation must begin with a comprehensive patient history. This includes the patient's social history, ocular history, systemic history, family history, contact lens history, and compliance history. By examining your patient, you will begin to see the critical importance of history in the medical model.

• Social History: A social history includes occupation, preferred sports, activities, and personal and special needs. This information gives us insight as to whether the patient requires extended wear contact lenses, daily disposable lenses, or bandaided lenses for recreation or special occasions. It will also help you determine the most ideal replacement schedule—daily, weekly, monthly, or biannually.

• Ocular History: While this seems self-explanatory, ocular history is a fundamental part of your comprehensive evaluation. For example, if a patient has a history of idiopathic keratitis, you may decide to see him or her more frequently (every two or three months) than your patients with no history of complications. Also, this patient likely will require a particular lens material and solution that you might not consider prescribing to a patient with no significant ocular history.

• Medical History: A patient who presents with preexisting systemic conditions often will require specialized contact lenses as well as a personalized follow-up regimen. A patient with diabetes mellitus or hypertension is likely to require a higher level of suspicion or a lower level of tolerance for contact lenses. Patients with a history of depression, or who are currently taking medications that affect vision, may develop second-order problems with contact lens wear.

• Family History: To fully understand your patient, you must be familiar with his or her family history. If the patient has a strong family history of macular degeneration and you discover some early signs in him or her, rest assured that he or she will likely experience some visual complications in the future. However, if the patient has a strong family history of glaucoma, cataracts, or other eye disorders, you are likely to encounter some early signs of disease in his or her family members.

• Current Therapies: A patient’s current therapies may affect his or her vision and overall health. For example, a patient taking medications for high blood pressure or diabetes may have dry eyes or other systemic conditions that affect vision. It is important to ask about current medications and therapies before prescribing contact lenses.

• Lifestyle: A patient’s lifestyle may also affect his or her vision. For example, a patient who spends a lot of time outdoors may be more likely to develop UV-related eye problems. It is important to ask about a patient’s current lifestyle to determine which contact lenses are most suitable for his or her needs.

• Occupational Environment: A patient’s occupational environment may also affect his or her vision. For example, a patient who works in a dusty environment may be more likely to develop irritations or infections. It is important to ask about a patient’s current occupational environment to determine which contact lenses are most suitable for his or her needs.

• Environmental Considerations: A patient’s environmental considerations may also affect his or her vision. For example, a patient who lives in an area with high levels of pollution or dust may be more likely to develop irritations or infections. It is important to ask about a patient’s current environmental considerations to determine which contact lenses are most suitable for his or her needs.
**Patient History**

- **Social**- Gives insight to whether the patient needs extended-wear, dailies, or bifocal/multifocal lenses vs. Mono-vision. This information also provides the best replacement schedule.

- **Ocular**- Patients with history of complications

- **Medical**- Patients with pre-existing systemic conditions often require specialized contact lenses and personally tailored follow-up visits.

- **Family**- Be familiar with Patient’s genetic background.

- **Contact Lens History**- Most important evaluation. If previous lenses cause problems, then YOU must suggest strict follow-ups and different contact lenses.
Patient History

In a patient who is at slightly higher risk, you should consider prescribing a 30 day contact lens with instructions to discard every two weeks or a two-week extended contact lens with instructions to discard on a weekly basis. Be sure to schedule a high-risk patient for follow-up every three months or, every six months for a normal continuous wear patient.

Or, consider a patient who has experienced a previous ocular infection because he or she ever wore the lenses beyond his or her doctor's recommendation. This patient not only needs a comprehensive contact lens evaluation, but also a medical examination along with a possible dry eye evaluation before you prescribe any contact lenses. Instruct this patient to avoid contact lens wear for at least one to two months before returning for a complete contact lens evaluation.

As part of the contact lens medical history, ask the patient if he or she has an up-to-date pair of glasses to wear if and when the patient experiences a complication related to contact lens wear. Many eye infections are worsened when the patient continues to wear his or her contact lenses because he or she does not have a pair of glasses.

Clearly, an advanced state of corneal infection dramatically reduces the patient's chances for a good outcome and makes corneal scarring almost unpreventable.

Contact lens compliance history: It is likely that more than 50% of your patients are not compliant with their replacement schedule, solution usage, and/or cleaning regimens. It is up to you to make sure that your patients become more compliant. The only way that you can influence patients' rates of compliance is through patient education.

Your patients must understand the importance of compliance; they must be part of this compliance team. Put all contact lens and solution dispensing protocols in writing so that your patients have written instructions on proper care requirements. In addition to verbal and written education, it is important to use visual instruction in your office to visually reinforce everything that your patients need to know and understand.

Be certain to communicate the possible repercussions of poor compliance to your patients. For example, a frank discussion on corneal ulceration, corneal infection, and loss of vision should promote improved compliance with the lens care regimen.

If you follow up with a new contact lens patient within six months, take the time to review compliance protocols and address any questions he or she may have. When working with children, this step is
**Patient History**

*Contact Lens Compliance History*- Likely that more than 50% of YOUR patients are not compliant with their replacement schedules, solution usage and/or cleaning regimens.

- Patient education is the only way to influence their rate of compliance with their contact lens routine.

*Contact Lens Solution History*- Patients may change and exchange their lens solutions between office visits.

- To determine the best solution would be to examine him/her at follow-ups and to stain the eye.
Ocular Evaluation

Following the patient history, you must conduct an extensive ocular examination, including a dry eye screening. Your two primary goals in the medical model are disease prevention and a comfortable contact lens-wearing experience. An organized and systematic approach is always best in the medical model. Begin your evaluation with the most external structures and move in toward the cornea.

- **The lashes.** Begin your evaluation by inspecting the skin for any type of problems or systemic issues, such as contact dermatitis, herpes simplex virus (HSV) scars and basal cell carcinomas, which may compromise the safety of both contact lenses and the patient’s overall health.
- **The eyelids.** It is critical to examine your patient’s eyelids during the evaluation. Diagnosing and treating blepharitis, lid wiper epitheliopathy (LWE), meibomian gland disease (MGD), and rosacea can make a difference in a truly healthy, comfortable contact lens experience. Starting with two or more stains and meibomian gland expression will help in the diagnosis of LWE and MGD.

If you diagnose either condition, reschedule the patient to assure severity and institute treatment. Do not further analyze or treat any disease presentations that are found during your examination.

Remember, consider the medical model contact lens examination as solely a screening device for existing medical or ocular conditions.

- **The bulbar conjunctiva.** The upper lid is one of most important areas to examine for either the presence or absence of giant papillary conjunctivitis (GPC). Use of the proper lens, lens edge system and solution helps to prevent GPC.
- **The bulbar conjunctiva.** The bulbar conjunctiva must be documented as part of the medical model. Employing both central staining and conjunctival injection, be sure to check for pinguecula, lymphocytes and conjunctival changes. You may also note a presentation of dry eye or allergy.
- **The fornix.** Use of multiple stains will reveal the presence of eye infections, inflammations and allergies at the limbus. Here, you should also look for corns, neovascularization, cornet infiltmation and/or limbits.
- **The cornea.** A thorough examination of the cornea is the most important part of the medical model evaluation for contact lenses. Starting with the limbal corneal junction, look for the presence or absence of infiltrates, neovascularization, staining and defens (thinning). Moving toward the central cornea, look for staining, swelling...
Ocular Evaluation

**The Adnexa**- Inspect the skin for any type of problems/systemic issues such as dermatitis, herpes simplex virus (HSV) scars and basal cell carcinoma.

**The Eyelids**- Diagnosing and treating blepharitis, lid wiper epitheliopathy (LWE) can make all the difference in a truly healthy, comfortable contact lens experience.

**Palpebral Conjunctiva**- Upper lid is one of the most important areas to examine for the presence or absence of giant papillary conjunctivitis (GPC). Use of the proper lens, edge system, and solution helps prevent GPC

**Bulbar Conjunctiva**- Employing both corneal staining and conjunctival injection. Be sure to check for pinguecula, lymphectasia and conjunctival chalasis.

**Limbus**- Use of multiple stains will reveal the presence of eye infections, inflammations and allergies at the limbus. Look for corneal neovascularization, corneal infiltrates and/or limbitis.

**Cornea**- Thorough examination of cornea is the most important part of the medical model evaluation for contact lenses.
Specialized Testing and Contact Lens Selection

Specialized Testing

A medical model contact lens evaluation also will include specialized testing, as necessary: Contact topography, pachymetry, endothelial cell counts, anterior segment photography, and Schirmer’s test are just a few options.

Perform topography and document the patient’s anterior segment if you note any corneal abnormalities, record pachymetry readings on all corneal measurements, and note endothelial cell counts to determine any changes caused by any previous contact lens wear.

Contact Lens Selection

Now that you have completed your patient’s comprehensive history and have documented his or her ocular status, you must determine which contact lens and contact lens solution is best suited for this individual. If you are working with a patient who is at risk for a potential complication, you need to reconsider your usual lens and solution choices. And, remember to adjust an at-risk patient’s follow-up schedule as necessary.

For example, if a patient presents with slight early changes in the superior palpebral conjunctiva that indicate PFC, make sure to prescribe a lens that will not rub or irritate Krause’s fat. The space between the columnar cells and the ocular surface and does not bind proteins and lipids.

The lens type will differ per patient, and only a follow-up visit with lens surface inspection can determine if it is an appropriate option. Also, because this patient has sensitive eyes, consider prescribing a preservative-free lens.

Most importantly, you should recommend a daily disposable lens, although in a very early case of upper lid inflammation, discarding a lens on a weekly, bi-weekly or monthly basis is acceptable, proper care.

Ask the patient to return for follow-up in one or two months to check for any possible changes to the upper lid. At this follow-up appointment, be sure to look for points or lipid buildup on the lens, and examine the lens on the patient’s eye to determine clarity of the anterior surface.

On, if a patient presents with early changes at the limbal corneal junctions that are indicative of early neovascularization, suggest a soft, non-hydrogel lens, because it may offer the best permeability in the perforation.

In a patient who wears silicone hydrogel lenses, look for connective tissue bands or mixing at all follow-up visits. Also, be sure to check for small PFC patches in the center of the lid.

Finally, if a patient presents with early signs of anterior basement membrane dystrophy (ABMD) or dry eye, schedule him or her to return for a medical dry eye work-up. The work-up will help you determine if the patient is a candidate for preservative-free contact lenses.

Be sure to conduct this patient’s dry eye work-up and contact lens evaluation at separate visits to ensure the best care possible. The comprehensive dry eye work-up is a true medical visit that requires the dedicated time necessary to determine a complete diagnosis and treatment regimen.
Specialized Testing

- Corneal topography,
- pachymetry,
- endothelial cell counts,
- anterior segment photography and
- Schirmer’s test are some options.
Schaeffer Eye Center
Comprehensive Contact lens Programs

- Comprehensive Contact lens evaluation with Contact lens programs (always separate from eye exam),
- Scheduled follow up visits (with Staining)
- Prescribed solutions,
- Educational programs to ensure compliance
- Multiple lens programs and material choices
  - 1 --one days
  - 2-- all materials
    - Bifocals
    - Torics (.50 and up)
    - Monthly and Two Week
  - 3 GPs
- Number one COMPLAINT from Non compliant patients
Contact Lens Selection

- The lens type will differ per patient, and only a follow-up visit with lens surface inspection can determine if it’s an appropriate option.
- Ask the patient for follow-up in 1-2 months to check for any possible changes to the upper lid. Look for protein or lipid buildup on the lens.
- If a patient presents with early signs of Anterior Basement Membrane Dystrophy (ABMD), EBMD and/or mild dry eye, schedule them to return for a medical dry eye work-up.
Specialty Contact Lenses, Disinfection Solution, and Patient Education

Specialty Contact Lenses
The medical model practitioner should offer all of the contact lens modalities that are available on the market today. Most specialty contact lens practitioners offer more than 50 different brands of lenses. If you use the same lens brand on every patient, you are not running a medical model practice. In the medical model, you must seek the perfect lens for every patient.

For example, a lens that does not fit well should not be prescribed, even if there is full corneal coverage. The same goes for either excessive or limited lens movement. Both coverage and movement issues can be eliminated through selection of the most appropriate lens. Always keep several alternative contact lens choices and specialty lenses on hand (see "Specialty Contact Lens Options," below).

Disinfection Solutions
There are many excellent contact lens disinfection solutions on the market today. That said, you must be knowledgeable about the chemical composition of various solutions and how well each of them works with different lens types.

When a solution and a contact lens are combined, a new contact lens entity is created: the "contact lens-solution complex." Every patient's contact lens-solution complex is unique.

The only way to determine each patient's optimum contact lens-solution complex is to write a prescription for both a specific solution and contact lens, and ask the patient to return for follow-up in two to three weeks. Be sure to instruct the patient to wear his or her lens for at least two to four hours before the appointment.

At the follow-up, evaluate the lens on the patient's eye. Then, remove the lens and stain the eye with fluorescein. Following staining, evaluate the corneoscleral, epithelial, and corneal for staining or any changes from normal.

If a change in lenses or solutions is warranted, a second follow-up visit will be necessary to determine the efficacy of the new contact lens-solution complex.

Depending upon the specific needs of your patient, specialty contact lenses, such as viscoelastic lenses, may be the most appropriate option.

Lens case hygiene is just as critical to comfortable contact lens wear as a prescribed disinfection solution. Many ocular infections, such as microbial keratitis, may result from improper cleaning of the lens case. Instruct your patients to replace their cases on a monthly basis, or every three months if they demonstrate effective lens case cleaning habits.

Patient Education
Patient education is one of the most overlooked aspects of the comprehensive medical model contact lens evaluation. Fortunately, it is your responsibility to inform your patients about contact lens regimen choices (see "Contact Lens Options," page 74) and disease processes related to contact lenses, as well as proper contact lens care, solution compliance and follow-up protocol. Here are a few steps and suggestions to consider in regard to proper patient education.
Specialty Contact Lenses

Most specialty contact lens practices offer more than 50 different brands.

You are NOT running a medical model practice if you use the same lens brand on every patient.

YOU SHOULD SEEK THE PERFECT LENS FOR EVERY PATIENT.
Disinfection Solution

- Be knowledgeable about the chemical composition of various solutions and how well each of them work with different lens types.

- When a solution and a contact lens are combined, a new contact lens entity is created: the “Contact lens-solution complex”

- Only way to determine each patient’s optimum contact lens-solution complex is to write a prescription for both a specific solution and contact lens.

- Lens case hygiene is just as critical to comfortable lens wear as a prescribed disinfection solution.
Patient Education

Contact Lens Options

- Daily wear or continuous wear
- Multifocal vs. monovision
- Silicone hydrogel vs. hydrogel
- Multipurpose solution vs. peroxide
- Disposable or replacement
- Gas permeable vs. soft
- Gas permeable vs. hybrid

Continuous-wear contact lenses. Patients who use continuous-wear contact lenses are approximately four to five times more likely to develop corneal infections than those who use daily-wear lenses.61 So, you must inform all patients who opt for continuous-wear lenses about the fundamental importance of lens hygiene and the recommended discard schedule.

Also, instruct continuous-wear patients to return for a follow-up evaluation in six months after the initial fitting, or at any time if they experience such complications as redness, blur or pain. If they do experience any associated complications, instruct them to remove the lens and make an appointment at your office immediately.

It is preferable to wear contact lenses continuously. However, many doctors and patients, continuous-wear lenses are not only an ideal, but also a comfortable modality. Just remember, when considering continuous-wear lenses, you are not simply selling contacts—you are selling a process that needs continuous care.

Mouvement contact lenses. Patients often have difficulty doing at night when first wearing mouvement lenses. Both for the patient's safety and the safety of other motorists, be sure to prescribe appropriate distance eyewear that can be worn in conjunction with the contact lenses.

The distance lenses will require another retraction over the mouvement lens.

Education supplementation and reinforcement. Because there is so much material to discuss during a medical model contact lens evaluation, your patients will likely feel overwhelmed. Consider the use of supplemental educational materials or consultations to reinforce the most essential aspects of proper contact lens care.

In our office, we ask each patient to watch a video that covers specific contact lens and disinfection solutions. Then, we have a contact lens technician sit one-on-one with each patient and discuss an organized written checklist of all the information covered during the initial evaluation.

We prefer that each patient meet with a technician—even if he or she has been wearing contact lenses for several years. Finally, we provide the patient with a written contact lens construction sheet to take home and review.

Progress visits. After patients are comfortable with the lenses, schedule them for a six-month follow-up progress visit. Ask them to bring their lenses, solutions and contact lenses case to this visit, so that you may judge their compliance level.

Patients with poor compliance, for example, may switch disinfectant solutions without first consulting you or may not clean their case adequately. Take this opportunity to further educate the patient about his or her lenses, address any compliance issues and answer any related questions.

This article has demonstrated and explained the importance of a medical model contact lens evaluation. As doctors who prescribe contact lenses as medical devices, we have three primary goals: to diagnose any eye disease that will affect contact lens wear or the patient's health; to prevent any medical complications from the contact lenses and solutions; and to ensure healthy, safe, comfortable contact lens wear.}

Patient Education

- **Continuous-wear Contact Lenses**
  - Patients who use these lenses are about 4-5 times more likely to develop corneal infections.

- **Mono-vision**
  - The distance lenses will require another refraction over the mono-vision lens.

- **Education Supplementation and reinforcement**
  - We ask the patient to watch a video, go through a 1-1 with a contact lens technician and discuss an organized checklist of all the information being covered during the evaluation.

- **Progress Visits**
  - Patients with poor compliance may switch disinfection solution without first consulting you or may not clean their lens cases adequately. This is an opportunity to further educate the patient about his/her lenses.
Making the Right Choice, What we will cover:

- Silicon Hydrogels: materials, design options, pros & cons
- Continuous Wear with Contact Lenses: “are we there yet?”
- Management & Issues with Dry Eye Contact Lens Patients
- Multifocal Contact Lens Technologies
- The Role of GP & Hybrid Contact Lenses
- Lens Replacement Frequency: “how frequent is frequent enough?”
Si HY Lenses

- Infiltrates
- Conj splitting
- GPC
- Ew toxicity
- Microbial Keratitis
Multicenter Case-Control Study of the Role of Lens Materials and Care Products on the Development of Corneal Infiltrates

Robin L. Chalmers*, Lisa Keay†, John McNally*, and Jami Kern†

ABSTRACT

**Purpose.** To evaluate the association of symptomatic soft contact lens (SCL)-related corneal infiltrative events (CIEs) with SCL material, lens care products (LCPs), and other risk factors.

**Methods.** Cases with symptomatic CIEs were identified in a retrospective, multicenter case-control study at five academic eye care centers. Each case was matched to three controls each who had received eye care near the time of the case’s last full examination at that center but were not matched for demographic or other factors. Infiltrate status was established by an expert panel who were masked to sponsor, SCL, and LCP brand. Stratified analyses were conducted removing all daily disposable (DD) and all extended wear (EW) cases.

**Results.** Clinical records from 166 patients with symptomatic CIEs and known EW status were included. Cases used >50 SCL brands and >10 LCP brands. Increased risk in univariate analysis for LCP was not significant after adjustment for other factors. In the multivariate analysis of all cases, use of reusable SCLs (4.03X; 95% C.I. 1.12 to 14.67) and EW (3.98X; 2.32 to 6.84) increased risk and patient age (per year older) was protective (0.96X; 0.94 to 0.98). Among daily wear cases (n = 102 cases), use of reusable SCLs (12.46X; 1.54 to 100.62) and silicone hydrogel (SiHy) (1.99X; 1.06 to 3.75) and age (0.95X; 0.92 to 0.97) were associated. Without DD cases (n = 162), EW (4.42X; 2.53 to 7.70), SiHy use (1.84X; 1.03 to 3.29), and patient age (0.96X 0.94 to 0.98) were significant factors. No specific SCL or LCP brands were associated with increased risk.

**Conclusions.** In this community-based trial, younger patients were at increased risk of infiltrative events. DD lenses were protective relative to reusable lenses. Overnight use increased risk in all analyses and silicone hydrogels increased risk in daily wearers, regardless of LCP brand. Improvements in lens storage case hygiene and environment may be a mechanism for reducing risk of CIEs related to SCL use.

(Optom Vis Sci 2012;89:1–)
Chalmers et al: OVS March 2012

- Retrospective, multicenter case-controlled study
  - 5 Schools of Optometry in US and Canada
  - 166 cases with corneal infiltrative events
  - 498 controls (matched for time of CL exam prior to events)
  - Clinical records redacted and scanned
  - Evaluated by expert panel (unaware of study purpose and products used)
Univariate analysis of all cases and controls

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cases (N = 166)</th>
<th>Controls (N = 498)</th>
<th>p</th>
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<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
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</tr>
<tr>
<td>Significant</td>
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<tr>
<td>Mean age</td>
<td>25.1 (9.4)</td>
<td>31.7 (14.0)</td>
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<td>Student status</td>
<td>97 (65.1)</td>
<td>242 (50.2)</td>
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<td>Mean refractive error</td>
<td>-3.47 ± 2.26</td>
<td>-2.84 ± 2.83</td>
<td>0.0006</td>
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<td>EW (any)</td>
<td>63 (38.0)</td>
<td>35 (8.5)</td>
<td>&lt;0.0001</td>
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<td>Increasing EW</td>
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<tr>
<td>DW</td>
<td>103 (62.1)</td>
<td>378 (91.5)</td>
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<td>FW</td>
<td>37 (22.3)</td>
<td>25 (6.1)</td>
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<tr>
<td>EW</td>
<td>19 (11.5)</td>
<td>8 (1.9)</td>
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<tr>
<td>CW</td>
<td>7 (4.2)</td>
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<tr>
<td>Silicone hydrogel</td>
<td>138 (83.6)</td>
<td>299 (60.2)</td>
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<td>DD</td>
<td>3 (1.8)</td>
<td>66 (13.3)</td>
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<td>Lens care solution</td>
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<td>OptiFree Replenish</td>
<td>76 (45.8)</td>
<td>177 (35.5)</td>
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<td>Not significant</td>
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<tr>
<td>Full time</td>
<td>121 (93.1)</td>
<td>328 (88.9)</td>
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Only wearers with complete data for that variable were included in each comparison. Missing data were excluded. FW, flexible wear; CW, continuous wear for 30 nights.
Multivariate analysis

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<th>Factors listed in decreasing odds ratio (referent)</th>
<th>Univariate odds ratio (n = 166)</th>
<th>Multivariate odds ratio All cases (n = 166)</th>
<th>Multivariate odds ratio DW only (n = 102)</th>
<th>Multivariate odds ratio No DD (n = 162)</th>
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<td>Significant in univariate &amp; multivariate models</td>
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<td>Reusable SCL (DD)</td>
<td>8.47 (2.62–27.37)</td>
<td>4.03 (1.12–14.67)</td>
<td>12.46 (1.54–100.62)</td>
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<td>EW (DW)</td>
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<td>4.42 (2.53–7.70)</td>
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<td>Silicone hydrogel (hydrogel)</td>
<td>3.46 (2.18–5.47)</td>
<td>1.72 (0.97–3.05)</td>
<td>1.99 (1.06–3.75)</td>
<td>1.84 (1.03–3.29)</td>
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<td>Age (per yr older)</td>
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<td>0.96 (0.94–0.98)</td>
<td>0.95 (0.92–0.97)</td>
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<td>Student (non-student)</td>
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<td>Optifree Replenish (all others)</td>
<td>1.63 (1.11–2.39)</td>
<td></td>
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</tr>
<tr>
<td>Mean Rx (absolute DS)</td>
<td>1.09 (1.02–1.16)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Not significant in any model</td>
<td></td>
<td></td>
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<tr>
<td>Optifree Replenish &amp; OASYS (all other combinations)</td>
<td>1.50 (0.76–2.98)</td>
<td></td>
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<tr>
<td>Complete (all other LCP)</td>
<td>2.20 (0.91–5.33)</td>
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<tr>
<td>OASYS (all other SCLs)</td>
<td>1.22 (0.80–1.86)</td>
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<tr>
<td>Male (female)</td>
<td>1.20 (0.84–1.74)</td>
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<tr>
<td>Hydrogen peroxide (all MPS)</td>
<td>0.98 (0.59–1.63)</td>
<td></td>
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<tr>
<td>Smoker (non-smoker)</td>
<td>0.76 (0.30–1.95)</td>
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<tr>
<td>More frequent CL use</td>
<td>0.77 (0.47–1.27)</td>
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</tbody>
</table>

Bold values indicate significant difference. Only significant factors are shown in multivariate models. DS, diopter sphere; MPS, multi-purpose solution.
Conjunctival Splitting
Corneal Infiltrates
GPC
Giant Papillary Conjunctivits
PATHOGENESIS OF CLPC – GPC
ANTHROPOLOGICAL DESIGN OF UPPER LID

FOUR KEY POINTS

2. Not made to rub
   Columnar epithelium

3. Made to rub
   Squamous epithelium
   The Lid Wiper

Ocular Surface
PATHOGENESIS OF CLPC – GPC
A VIOLATION OF KESSING’S SPACE

FOUR KEY POINTS

4. Rubbing columnar cells must result in inflammation & CLPC - GPC
MORPHOLOGY OF CLPC – GPC

The *first* inflammatory response and subsequent papillae *start* in areas that suffer physical trauma

- Lens edge?
- Lens periphery?
- Lens flexure?
- Polymer Modulus – CSI example
- Depth of Kessing’s Space?
- Antigens
- Sutures
- Scleral lenses – artificial eyes

*Why no GPC on lower lid – movement?*
New Science in GPC

- Hydrogel lenses: in 2 weeks, 10% of lens weight is lysozyme
  - Virtually all of protein is normal, i.e. not denatured

- Silicone hydrogel lenses: in 2 weeks, only @ 40 ugm of protein
  - Virtually 100% denatured
SUMMARY
CLPC – GPC & HYDROGELS IN 2007

• Trauma a primary inciting factor
• Immune component
• Silicone hydrogels
  – modulus higher than SCL – CSI – RGP
  – design
  – surface characteristics
Schaeffer GPC treatment Protocol
Schaeffer Treatment Protocol

• 1 remove lenses 2-6 weeks
• Rx: Lotemax qid 2 weeks  bid 4-6 weeks
• Rx: Antihistamine/ Mast cell stabilizer  BID 6 weeks
• Restart C/L’s ( 2-4 weeks ) dailies only
• 1-6 months ( or forever )
• 6 months if clear 1 week( 2 week lenses) lenses or 2 weeks ( monthly lenses)
• 3 month office visits if a Child/young adult: 6 month for adult
GPC Prevention

• 6 months C/L evaluations

• Patient Compliance tracking

• All children / young adults
  • DAILY
  • WEEKLY MOADLITIES
  • Mandatory 6 month re evaluations
GPC  Fee Sheet
SUMMARY – RESPECT KESSING’S SPACE

KESSING’S SPACE (1977)

Acta Ophth

Rubbing columnar cells must result in inflammation & CLPC – GPC

Ocular Surface
ACKNOWLEDGEMENTS

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John P. Herman, OD
Joan M. Exford, OD
Victor M. Finnemore, OD
Preston Richmond, OD, MD

Australian Colleagues who have renamed GPC to CLPC
Key Message

- A contact lens is a MEDICAL vision correction device

- As a medical device, Safe Contact lens wear requires an intact Doctor – patient relationship

- Patients trust the Doctor to advise them of the best choices for healthy Contact lens wear
Protocol for Doctors

- Studies indicate that some lens-solution combinations may contribute to corneal staining.

- Patients with corneal staining are three times more likely to experience inflammatory events.

- When switching a patient to a different solution, advise the patient to make a return appointment to check for compatibility.
Protocol for Doctors

- Some patients are at greater risk for contact lens-related complications.

- Complications may be infectious, inflammatory, mechanical/traumatic or hypoxic. Patients at risk for complications include, but are not limited to, those who have dry eye, meibomian gland disease/blepharitis, corneal erosions or a past history of inflammatory or infiltrative events, continuous wear contact lens patients, patients who are exposed to water sources, and patients with various systemic illnesses.

- Patients with increased risk should be counseled appropriately and scheduled at appropriate follow-up intervals.
Protocol for Doctors

- Some doctors recommend children who wear contact lenses, as well as new contact lens wearers, should be seen after six months to ensure healthy lens hygiene habits.

- Some Drs (Me) feel that all children and young adults should be wearing One day Contact lenses.
Evidence Based Medicine

Good news and Bad news
Evidence Based Medicine

- **Bad news:** There are no studies that prove that One day lenses are safer than any other non extended wear modalities.

- **Good news:** There are no studies that prove that One day lenses are safer than any other non extended wear modalities.
  - We can use all other modalities and One days are just another option for our patients.
EBM VS Common Sense

1. GPC and Lens build up
   - Lipids S/H
   - Proteins Hema

2. Allergy and environmental factors

3. Contaminated environments
   - Hands
   - Sinks
   - Cases
Multifocals Vs. Monovision

Evidence based medicine
What EBM supports Bifocals over Monovision?

- Lets look at the issues with Monovision and evidence based medicine that supports Multifocal as Modality of choice

1) Depth perception-stereopsis
   - Airlines restrictions (Driving PM?)

2) Vision
   - contrast sensitivity
   - mid range-computers
   - night driving

3) Doctors perception of patients desires
   - Successful Monovision Contact Lens Wearers Refitted With Bifocal Contact Lenses.
Why are we still using Monovision as Modality of choice?

1) Time: It takes more in office time to adequately evaluate the lenses

2) Expertise: The doctors and staff need more training to understand and be proficient at the multifocal specialty

3) Cost: This will cost the patient increased fees and most doctors are not equipped to present a fee to compensate for the time and expertise
MONOVISION INFORMED CONSENT

Monovision is an alternative option for patients who have not been successful wearing multifocal contact lenses. With monovision one contact lens is worn to correct distance vision and the other contact lens to correct near vision. The distance vision lens is usually worn in your dominant eye.

You should be aware that as with any type of lens correction, there are advantages and compromises to monovision contact lens wear. The benefit of clear near vision in straight ahead and upward gaze that is available with monovision is usually accompanied by compromised vision that may reduce your visual acuity and depth perception for distance and near tasks. Some patient experience symptoms, such as blurred vision, dizziness, headaches and a feeling of slight imbalance, these may last for a brief moment or for several days. If the symptoms last more than 3 to 4 days discontinue monovision contact lens wear and contact our office for an appointment. During this adaptation period you should avoid visually demanding situations. We recommend that you first wear your new contact lenses in familiar situations only. You may only drive with monovision correction if you wear driving glasses as prescribed by the doctor.

LIMITATIONS OF MONOVISION

The downside of monovision is that each eye works more or less alone rather than "binocularly," meaning in concert with each other. The result:

- You may have to adjust your head position more often to see clearly.
- You also may lose some depth perception.

Monovision contact lens wear is not optimal for such activities as:

- Visually demanding situations such as operating potentially dangerous machinery or performing other potentially hazardous activities; and
- Driving. Driving glasses are a requirement for all patients wearing monovision contact lenses. Driving glasses are used to improve vision and to reduce night glare.

The effects of monovision are most noticeable in low lighting conditions and when performing tasks requiring very sharp vision.

I have been informed and understand the risks associated with wearing monovision contact lenses. In addition, as a condition of wearing monovision contact lenses I understand that I need to wear a pair of glasses over my monovision contact lenses to correct my vision properly for safe driving.

PATIENT'S SIGNATURE

DATE

TECHNICIAN'S SIGNATURE

DATE
Why Multi-Focal FIRST?

- Practice differentiation
  - Contact lens specialty practice

- Practice growth
  - largest potential referral base
  - Increased professional fees (Rx release laws)
  - Increased product margin
Fitting for Success-Staff

- Education
- Motivation
- Staff – Patient presentation
  - Roll play
  - Fee explanation
- Evaluation training
  - Over refraction
  - Understanding next steps
What is available today in soft bifocal C/Ls?

1) Bausch And Lomb
   - PureVision multifocal
   - Soflens multifocal

2) Ciba
   - Focus dailies progressive
   - Focus progressives
   - Cibasoft progressive torics
   - Air Optics Multifocal

3) Cooper
   - Proclear Multifocals
   - Frequency 55 Multifocals
   - Ultravue PC MF toric
   - Biomedics EP
   - Biomedics Progressive

4) Vistakon
   - Acuvue Bifocal

5) Blanchard and other specialty labs
   - Quattro Multifocals
   - Quattro MF toric
Current Designs

**Multi-zone Concentric**
- Acuvue Bifocal
- CooperVision Frequency 55 Multifocal

**Two-zone Concentric**

**Aspherics**
- CIBA Focus Progressives
- SofLens MF Low Add
- SofLens MF High Add

**DISTANCE VISION**

**NEAR VISION**
Balanced Progressive Technology

The Lens Design

**D Lens: Dominant Eye**
- **Distance vision**: Spherical central zone (2.3 mm)
- **Intermediate vision**: Aspherical annular zone progressive plus power (5.0 mm)
- **Near vision**: Spherical zone (8.5 mm)
- **Lens edge**

**N Lens: Non-Dominant Eye**
- **Near vision**: Spherical central zone (1.7 mm)
- **Intermediate vision**: Aspherical annular zone progressive minus power (5.0 mm)
- **Distance vision**: Spherical zone (8.5 mm)
- **Lens edge**

**Overall lens diameter 14.4 mm**
Proclear Multifocal Toric
Power Profiles: Low vs. High

- **Low ADD**
  - Power gradually becomes more plus (+) towards lens center

- **High ADD**
  - Power becomes more positive towards lens center, plus a distinct central zone of greater plus (+) power
BAUSCH & LOMB Soflens Multifocal

- Polymacon/38% H2O Group I nonionic
- 8.4 dk/L
- 8.5, 8.8/14.5
- -10.00/+6.00 Low ADD (up to +1.50) High ADD (up to +2.50)
- 2 week disposal
- Aspheric design (anterior surface, near center)
CIBA Focus Progressive

- Vilfilcon A/55% H2O Group IV Ionic
- 16.0 dk/L
- 8.6 or 8.9/ 14.0
- available +8.00 to –9.00 with up to a +3.00 add
- 2 week or 1 month disposal

- Aspheric **NEAR** center with distance periphery
  7.8 mm optic zone
Keys To Success With Multifocal Contact Lenses

- “Have the tools”
  - Lenses to maximize vision
  - Lenses to maximize “comfort”
- Patient selection - motivation and realistic expectations, match designs to patient needs and visual perceptual styles.
- Design combinations & unilateral fits
- “Mono-plus” & “Mono-minus” (modified “stereovision”)
The Science of Duette™

Flex$_2$O™ silicone hydrogel skirt:

- 84 DK
- Low modulus: durable, resists protein deposits, & improves wearability
- Patent-pending HealthyEyes™ surface treatment increases wettability to maximize comfort

Proprietary MaxVu™ RGP center:

- 130 DK
- High modulus flexure resistant edge lift
- Class II UV blocker: >80% of UVA & >95% of UVB
- Low wetting angle keeps lens moist & comfortable
Duette™ Lens Specifications

- 130 Dk RGP Center (petrafocon A)
- 32% Water Silicone Hydrogel Skirt (hem-larafilcon A)
- 14.5 mm Overall Diameter
- 8.4 mm Rigid Center Diameter
- UV Blocker: >80% of UVA, >95% of UVB
How does the design work?

- RGP portion never touches cornea
- Prolate asphericity of Duette™ RGP coupled with reverse geometry of skirt produces an ideal lens-to-cornea alignment
- Alignment fit helps support & distribute the force of the lens on the cornea, enhancing tear exchange, movement and all-day comfort
1. **KESSING’S SPACE (1977)**

*Acta Ophth*

The space separating the surface of the tarsal palpebral conjunctiva of the upper eyelid from the ocular surface.
Contact lenses and the Dry Eye

• The treatment of the dry eye is part of any Contact lens management program

Medical management Philosophy
Dry eye work-up

Patient Name: ____________________________ Date: ____________________________

Subjective: demographics and history

Subject's Date of Birth: __________ / __________ / __________ Age: __________

Sex: Male □ Female □ Ethnicity: ____________________________

1. Special considerations: please check all that apply:
   □ Pregnant or nursing
   □ Tobacco user
   □ Air travel more than 2x per month
   □ Routinely use ceiling fan in bedroom
   □ Ocular surgery (LASIK, PRK, cataract surgery)
   □ Computer use more than 1 hour/day
   □ Allergies

2. Systemic medications (check all that apply):
   □ Birth control pills
   □ Blood thinners
   □ Antihypertensives
   □ Diabetics "water pillows" (LASIK)
   □ Antihistamines
   □ Anti-depressants
   □ Hormonal replacement therapy
   □ Glaucoma medications (Fanmary, Nasonex)
   □ Fasenra

3. Ocular medications (check all that apply):
   □ B?racine drops
   □ Allergy drops
   □ Restasis

4. Do you use artificial tears?:
   □ Yes □ No

5. If yes, how many times a day do you need them:
   □ 1x/day □ 2x/day □ 3x/day □ 4x/day □ > 4x/day

6. If yes, what type of artificial tears do you use?:
   □ Refresh Tears
   □ Restasis
   □ Genentech Dry Eye Therapy
   □ Symte	
   □ Systeme Free
   □ Visite
   □ Thea Lenses
   □ Other

7. Have you been diagnosed with dry eye?
   □ Yes □ No

8. Do you think you have dry eye?
   □ Yes □ No

8a. Do you have dry nasal passages or dry mouth?
   □ Yes □ No

9. Previous dry eye treatments:
   (At, punctual occlusion, punctum plugs, lid scores/masses, Restasis, etc.):

10. Successful (resistant)?

11. Contact lens wear: □ Yes □ No
    If yes, lens and lens care information:

12. Number of comfortable wearing hours: __________

13. Do you have dry eye symptoms when not wearing lenses?
   □ Yes □ No

14. Which of the following conditions have you been diagnosed with? (check all that apply):
   □ Thyroid disease
   □ Arthritis
   □ Diabetics
   □ Lupus
   □ Acne Rosacea
   □ Sjogren's syndrome
   □ Migraines
   □ Psoriasis
   □ Acne (dust mites)

15. How often do you experience dryness? Choose one: Never □ Sometimes □ Frequently □ Always

Notes: ____________________________

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## Dry Eye Work-up

### Subjective: Symptomatology

1. Do your eyes ever feel dry?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

2. Do you ever feel a gritty or sandy sensation in your eye?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

3. Do your eyes ever have a burning sensation?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

4. Are your eyes ever red?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

5. Do you notice much crusting on your lashes?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

6. Do your eyes ever get stuck shut in the morning?  
   - Never  
   - Rarely  
   - Sometimes  
   - Often  
   - All of the time  

**Total:**  
(score of greater than 7 indicates dry eye)

**Scoring:**  
Never = 0, Rarely = 1, Sometimes = 2, Often = 3, All of the time = 4.

### Objective: Testing

**Visual Acuity:**  
(With or without glasses, circle one)  
OS  
OD  

**Fluorescein Tear Break-up Time:**  
< 7 seconds is patent, 7-14 seconds is slightly dry, 15-29 seconds is dry/unstable  
OD: ___________________ Average: _______ (sec)  
OS: ___________________ Average: _______ (sec)

**Meibomian Gland Evaluation - Expression**  
OD  
OS  

**Expression:**  
0 = normal, clear; 1 = ophthalmic; 2 = opaque with normal viscosity; 3 = opaque with increased viscosity; 4 = severe thickening (toothpaste); 5 = no expression (glands totally blocked)

**OSOII Score:**

### Objective: Tear Volume Assessment

**Schirmer Test**  
(amount of wetting in 5 minutes; < 5 mm = Aqueous Tear Deficiency)  
With anesthetic  
OD: _______ (mm)  
OS: _______ (mm)

Without anesthetic  
Tape the strips/threads

**Phenol Red Thread Test**  
(amount of wetting in 15 seconds; normal >15 mm)  
OD: _______ (mm)  
OS: _______ (mm)
Dry eye work-up

Patient Name: ____________________________ Date: ____________________________

Objective: Biomicroscopy: OD

Objective: Biomicroscopy: OS

Objective: Fluorescein staining: OD

Objective: Fluorescein staining: OS

Objective: Lissamine green/rose bengal staining: OD

Objective: Lissamine green/rose bengal staining: OS

Objective: Lid Wiper Epitheliopathy: OD

Objective: Lid Wiper Epitheliopathy: OS

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# Dry Eye Work-up

**Patient Name:**

**Date:**

## Objective: Additional Testing

**NIBUT using Xeroscope, Keratometer or Topographer** (average of three readings; 30 secs between readings)

<table>
<thead>
<tr>
<th></th>
<th>O.D.</th>
<th>Average</th>
<th>Note: &lt; 10 secs = unstable tear film</th>
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**Tear Meniscus Height** (mm, measured with reticle eyepiece; > 0.10 mm = normal)

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<thead>
<tr>
<th></th>
<th>O.D. (mm)</th>
<th>O.S. (mm)</th>
<th>-normal: normal serum, pseudophakic, reflex</th>
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## Assessment

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<tbody>
<tr>
<td>Dry Eye Syndrome</td>
<td></td>
</tr>
<tr>
<td>Diseases</td>
<td>Concomitant condition</td>
</tr>
<tr>
<td>Meibomian gland dysfunction</td>
<td></td>
</tr>
<tr>
<td>Reversals</td>
<td>Reversals</td>
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<tr>
<td>LWE</td>
<td>LWE</td>
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## Plan: Treatment and Management

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<table>
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<tbody>
<tr>
<td>Artificial tears</td>
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<tr>
<td>Ointments</td>
<td>Glasses</td>
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<tr>
<td>Prescriptions</td>
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<td>Steroids</td>
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<tr>
<td>Lid Scrubs</td>
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<tr>
<td>Hot Compresses</td>
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<td>Contact lenses</td>
<td>Glasses</td>
</tr>
<tr>
<td>Punctal plugs</td>
<td>Glasses</td>
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<tr>
<td>Retraction</td>
<td>Glasses</td>
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Continuous Wear Contact Lenses

Are We There Yet?
What must happen in the practice?

- Continuous Wear is a new science for the doctor and a new service for the patient
  - THIS IS NOT ABOUT THE PRODUCT

- Re-invent the current policies and procedures established in the office

- Consider the rollout of Excimer Laser and the internal/external marketing effort
PRACTICE EDUCATION PROGRAM - Patients

- Patient Handouts

- Continuous wear brochures
  - Wearing schedules
  - Replacement calendars
  - Instructions and emergency numbers
  - Solutions instructions
CONTINUOUS WEAR CONTACT LENS PROGRAM

Schaeffer Eye Center has developed a program to help you see naturally 24 hours a day while maintaining the health of your eyes. As a leader in Continuous Vision, we are confident that our expertise in this specialty will enhance your ability to achieve near perfect vision.

SILICONE HYDROGEL LENSES

Silicone Hydrogels, a new generation of contact lenses that provides much more oxygen to the eye than conventional soft lenses. Not only do the materials in silicone hydrogels make overnight wear a safer option than before, they deliver so much more oxygen to the cornea that they have been approved for 30 days of continuous wear (CW). The key to your success will be determined by your compliance to the suggested care and follow-up schedule that has been personalized for you below.

Benefits of Silicone Hydrogel Lenses:

- Allows natural levels of oxygen to reach the cornea
- Overnight corneal swelling equivalent to no lens at all
- Significantly reduced bacterial binding, theoretically minimizing the risk of infection
- No increased bacterial binding unlike other extended wear hydrogel lenses
- Dramatic reduction of lens surface deposits

Despite all the advancements in contact lens technology, sleeping in contact lenses still carries a greater risk of complications than nightly removal of the lenses. Exposure to smoke, swimming with lenses, and previous acute red-eye reactions has been shown to be risk factors for continuous wear contact lens complications. A way to avoid a problem with continuous wear lenses is to “listen” to your eyes and take action if necessary. Your eyes should:

- Look good
- Feel good
- See well
Schaeffer Eye Center
Contact Lens Instructions Checklist

- Watch Instructional Video
- Wash Hands
- Insertion and Removal (3 times)
- Review Contact Lens Do’s and Don’ts
- New Wearing Packet reviewed & dispensed
- Back Up Glasses and Sunglasses
  - Light Sensitivity
  - Ultraviolet Protection
  - 10% Discount
- Symptoms for removal and consultation
- Review Fees and Risk Fees
  - 90 Day exchange period on RGP’s and custom toric
- Wearing Schedule
  DW  FW  CW  (Circle one and discuss)
- Office Visits
  - No charge for PRP patients
  - $39 Minimal Office Visit Fee
  - Monovision and Toric evaluations include 1 follow-up visit

Special Instructions:

__________________________

__________________________

__________________________

__________________________

Patient’s/Parent’s Signature                         Date

__________________________

Clinical Technician’s Signature                        Date
OTHER CONSIDERATIONS

- CHARGE FOR YOUR TIME AND KNOWLEDGE

- EMPHASIZE YOUR SERVICE AND CARE….NOT THE PRODUCT

- HOW TO DEAL WITH PATIENT OBJECTIONS TO HIGHER COST
C/L Progress Exams

- Initial evaluations
  - 1 week DW – 1-2 nights EW – exam
  - 1 month
  - 6 months

- The prescription is only valid for 6 months

- Monitor compliance
C/L Progress exams
Year 2

- Because of the extensive yearly evaluation, the fees are the same as year one

- Compliance and Patient re-selection are the key to success and healthy patients
Poor Candidates for Continuous Wear Contact Lenses

- 1. History of Microbial Keratitis (MK)
- 2. External eye disease (Blepharitis & Meibomian gland dysfunction)
- 3. Chronic smoker – age 25
Poor Candidates for Continuous Wear Contact Lenses

- 4. Dry eye – severe
- 5. Systemic disease & medication that would interfere with corneal health
- 6. Allergies – chronic, GPC
Continuous Wear
Risk Factors

• 1 SiHy same risk factors as HEMA with infiltrative keratitis- but less severe

• 2 Reduced keratitis the longer the lenses are in the eye

• 3 Swimming – showering controversies
CONTINUOUS WEAR CONTACT LENSES
COMPLICATIONS- Categories

- MECHANICAL ........ Corneal Abrasions
- TOXICITY ................. Infiltrative Keratitis
- HYPERSENSITIVITY ........ Papillary Conjunctivitis
- HYPOXIA ................. Edema & Neovascularization
- INFECTION ............... Corneal Ulcers
Acanthamoeba Keratitis & Contact Lens Wear
Acanthamoeba
Trophozoites and Cysts
Acanthamoeba Keratitis

- Over 1300 cases in the literature
- Approx. 90% contact lenses wearers
  - Non-disposable contact lenses
  - Poor lens care: homemade saline, tap water rinse, ineffective products, non-compliance
  - Wearing lenses while swimming
- *Acanthamoeba* can be isolated from swimming pools, lakes, hot tubs
  - Not correlated to the bacteriologic quality of the water
- *Acanthamoeba* cysts are very resistant to chlorine
- Isolates from swimming pools have been shown to be more pathogenic than isolates from natural fresh water sources
Multiple Studies

- 10 different solutions
- 7 different lens materials
- Looked at comfort and staining
- One masked observer
- Randomized order of solution testing
- N=30 for each combination
Study Procedures

- Successful hydrogel CL wearers
- CL soaked in solution overnight - precycled cases
- Baseline exam
- CL inserted
- 2 & 4 hour exam
  - Rated comfort and symptoms (100-point scale)
  - Examined cornea for staining
    - NaFl with cobalt and Wratten (yellow) filter
Staining Scales

- **Staining TYPE**
  1. Micropunctate
  2. Macropunctate
  3. Coalesced
  4. Patch

- **Staining AREA**
  - Divided cornea into 5 sectors
  - 0% to 100% in 10% increments
Staining Area

• Based upon our scale how much staining area is tolerable?

  Color Code
  - MINIMAL – less than 10%       Green
  - MARGINAL – 10% to 20%         Yellow
  - EXCESSIVE – greater than 20%  Red

Please apply your own criterion to what is Clinically Significant in your practice.
Study Results

- Examined over 2000 patients
- Majority of staining was micropunctate
- Plot staining area vs. wearing time
  (baseline, 2 hrs, 4 hrs)
- Show results by lens type
Important Message

Nearly impossible to predict (and remember) which lens/solution combinations will cause unacceptable/marginal staining.

Staining Grid!
Corneal Staining: Summary

- Corneal staining occurs in all patients regardless of whether they wear contact lenses.
- No evidence that mild staining indicates an increased susceptibility to microbial keratitis.
- Corneal staining described as “trace,” “transient,” “micropunctate,” or “asymptomatic” has not been associated with any adverse events, discomfort, or change in vision.
- Trace corneal staining does not appear to correlate with corneal toxicity.
- Patients have been using solutions with PHMB disinfectant for 2 decades and have enjoyed safe, comfortable lens wear.
Graft Vs Host Disease

• Extreme OSD

• Scleral Lenses
Severe OSD
### Scleral Lenses - Medlens

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Scleral lenses
Scleral Lens RGPLI Complications
Complication: Conjunctival Compression

- Scleral lenses semi-seal on the scleral conjunctiva.
  - Conjunctival tissue is spongy. The lens depresses the tissue and a compression ring can be seen when removed.
  - No injection or hyperemia with removal: Not a concern.
Complication: Conjunctival Blanching

Location localized to peripheral curves along the horizontal meridian;

Eye physically non-rotationally symmetric scleral:
Muscle insertions are different distances from the limbus.
Nasal being approximately 1.5mm closer

Also lateral rectus is attached. Medial rectus comes loose from the globe with medial eye movement.

The equatorial length of the eyeball is 24mm transverse and 23.6mm vertically. Implying the shape is unequal in all meridians.

Pacific University The Scleral Shape Study: Limbal shape and scleral angels. Average eye the nasal portion typically is flatter compared to the rest which agrees with topography where the nasal cornea is the flattest quadrant

May need a non-rotationally symmetric lens: toric or quadrant specific
Complication: Mucus and Debris Buildup

- Location:
  - Lens Surface
  - Under lens in tear Lake
- Can affect comfort and vision
- Can cause hyperemia
Complication: Mucus and Debris Buildup

• Location:
    • Worse in pts with atopic dz, OSD, and post surgical eyes
    • Toxicity from preservatives or reduced tear exchange
      – Remove and refresh the post lens tear lake with NP sterile saline every 4-6 hours
      – Is patient using other topical treatments? Are they preserved?
Fluorescein Evaluation

• Instill Fluoro after lens is on the eye

• Re instill after 1 month and 6 months

• Remember Lens / Cornea relationship changes over time
Complication: Air Bubbles

• Location:
  – Air Bubbles trapped behind lens: May cause problems with comfort and vision can lead to areas of dryness at site of bubble.

• Insertion technique: Patient may not be filling lens completely with sterile saline upon insertion, or “dumping” fluid when inserting. Check technique
Complication: Air Bubbles

- Air Bubbles *trapped behind lens*.
- **Related to fit:** look at location and size
  - Central bubbles indicate that the central sagittal height is too large. Decrease sagittal height.
  - small moving pinpoint bubbles can be acceptable
Complication: Lens Adhesion

• Review the fit:
  - Tight edges in the peripheral curve system usually produce suction and difficulty in removal. Adjust fit.
  - Low corneal clearance seem to have more adherence: Increase the sagittal height.
  - Lens flexure: Increase lens thickness.
  - Conjunctival swelling from lack of limbal clearance
  - Dry eye conditions: Heavy lubrication and remove and replace fluid reservoir every few hours.
Scleral Lens Design

Add artificial tears to lubricate and then break suction by placing finger on sclera and gentle pressing, then try removal again. Can also gentle press on sclera while removing with plunger.