

San Francisco Cornea, Cataract, and Refractive Surgery Symposium



In its 7th year, the SFCCRS Symposium continues to focus on practical applications of new developments in ophthalmology, optometry, and vision science. The new paradigms in diagnosis and treatment have been explored by local speakers as well as those who were invited to come from other parts of the US.

Ocular Surface

Dr. James Thimons (Ophthalmic Consultants of Connecticut, Stamford, CT) presented an inflammatory theory for etiology and pathogenesis of dry eye signs and symptoms. He spoke how a chronically inflamed lacrimal gland secretes activated T-cells and cytokines into tears. These cytokines damage the ocular surface, disrupting the neural arc to the brain which in turn disrupts the secretomotor nerve impulses to the lacrimal gland. Tear production decreases. Cytokines become more concentrated in a low tear volume, perpetuating inflammation of the ocular surface, leading to degradation of the extracellular matrix and tight junctions. Goblet cells are lost, resulting in decreased mucin production. The balance of proteins and growth factors in the tear film is altered.

Artificial tears are used as replacement therapy but they lack the complex mixture of proteins, mucins, and other factors found in healthy tears. They provide temporary, palliative relief but do not restore the normal tear composition nor do they reverse the ocular surface damage of a chronic dry eye. Punctal plugs are often used. But, they, in fact, can be counterproductive, according to Dr. Thimons. The plugs will prevent drainage of tears from the eyes, but they will keep the damaging cytokines on the surface, as well. A healthy tear film should be restored before using plugs.

Managing inflammation is the key to restoring a healthy tear film. Restasis, an ophthalmic cyclosporine 0.05% emulsion, is an immunomodulator that suppresses inflammation and T-cell activation resulting in increased tear

production. A 2000 study by Sall et al showed 56% of 238 patients on Restasis for 6 months had an increase in Schirmer scores and 15% showed a 10mm or more increase versus only 5% of the control group. Goblet cell density increased significantly as well (almost 200%) in a separate study of 11 patients by Sall et al. Improvements in vision, light sensitivity, itching, and artificial tear dependence was also seen. A study by Perry, Donnenfeld et al in 2004 showed a reduction of meibomian gland inclusions and improvement in corneal surface health after using Restasis for 3 months. The dosing of Restasis is bid, but, according to Dr. Thimons, using up the entire vial through the course of a day (tid-qid) can prove to be more effective.

Omega-3 and -6 fatty acids are essential to healthy tear film because they provide the raw material for meibum production, making it thinner and clearer. The optimum ratio of omega-3 and 6 fatty acids is 1:1, but in American diets the ratio is 1:20. Excessive ingestion of foods containing omega-6 fatty acids, such as red meat, for example should, therefore, be avoided. ■

Cornea

Dr. Jonathan Song (Department of Ophthalmology, Doheney Eye Institute, University of Southern California, Los Angeles, CA) discussed new methods of corneal transplantation. IntraLase Enabled Keratoplasty has emerged as a modern method for penetrating kera-

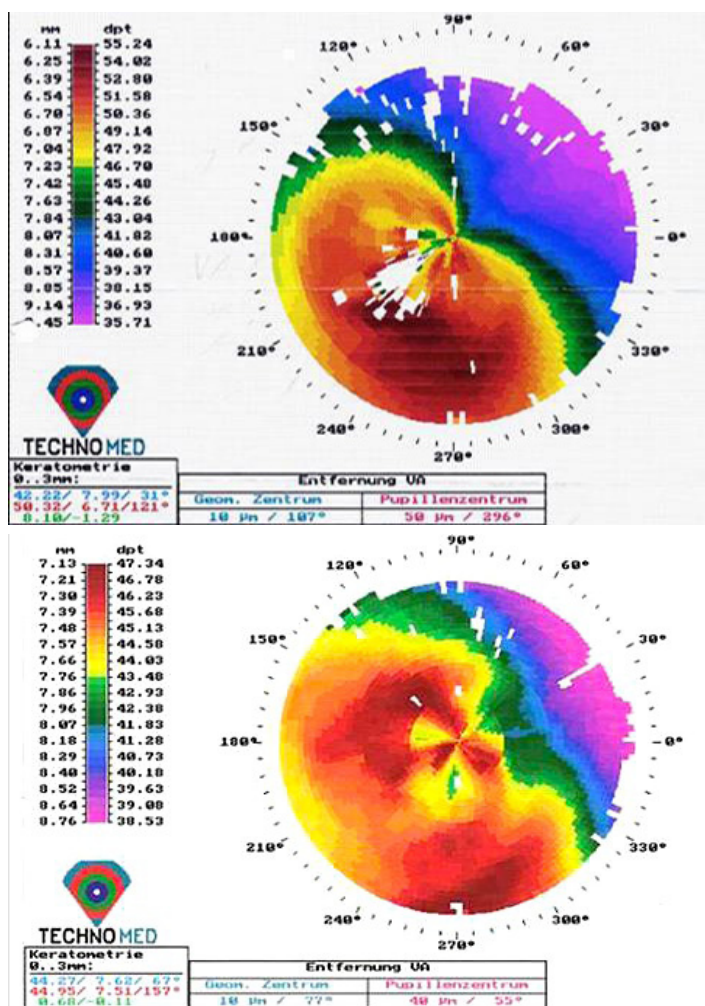


Figure 2. Topography of keratoconus before (A) and after (B) collagen cross-linking treatment. Better corneal symmetry is achieved.

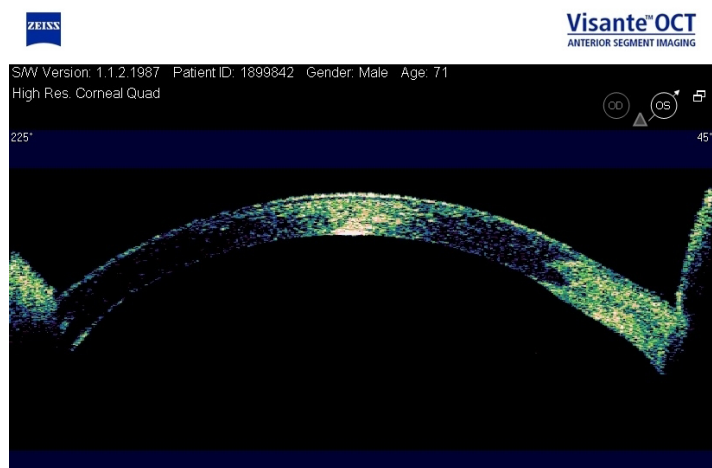


Figure 1. Anterior segment OCT scan following IntraLase Enabled Keratoplasty shows Zig Zag incision that allows good host-donor apposition.

toplasty. Femtosecond laser allows for multiple incision patterns, depending on the needs of a particular surgery. The mushroom incision profile preserves more host epithelium than the traditional trephine approach, the top-hat profile allows transplantation of large endothelial surfaces, and the zig-zag profile (Figure 1) provides more surface area for a smooth transition between the host and donor tissue for a tight, hermetic wound seal. Using the

IntraLase FS laser to create the incision may result in less irritation, faster healing (sutures are removed before 6 months), and less astigmatism.

Methods to treat bullous keratopathy through corneal transplant procedures have changed in the last 5 years. Improving upon Posterior Lamellar Keratoplasty, Deep Lamellar Endothelial Keratoplasty (DLEK) was developed using free hand dissection of the host lenticule and apposing the donor tissue to the recipient with Healon inside of the anterior chamber. Descemet's stripping endothelial keratoplasty (DSEK) evolved from DLEK. With DSEK, Descemet's is stripped off the host cornea instead of dissected off. A donor lenticule is then apposed to the recipient bed with a gas bubble. DSAEK is the automated version where the donor tissue is dissected with a microkeratome. The visual recovery of DSEK and DSAEK is remarkably faster. After penetrating keratoplasty, the visual recovery is about 12 months, whereas with DSAEK, visual recovery is approximately 1 month. This means the patient can get into glasses in only 3 months.

Dr. Song also reviewed collagen cross-linking procedure

Infiltrate Infectious or Not?		
	Infection	Inflammation
Location	Central	Peripheral
Size	Larger	Smaller
Number	1-2	Multiple
Depth	Deeper	Superficial
Pain	+++	+, -
Epithelial Defect	+	-
A/C	+ or -	-
Contact Lens	++ or -	+ or -

Table 1. Infiltrate, Infectious, or Not

for treatment of corneal thinning disorders. A common procedure in Europe, collagen cross-linking is currently in FDA trials in the US. Riboflavin is applied to the cornea first, followed by exposure to UV radiation for 30 minutes. This causes oxidation and intrahelical cross-linking of the collagen. It also results in intermicrofibrillar cross-linking which stiffens the collagen further. In preliminary studies, cornea stabilizes 80% of the time, astigmatism improves (Figure 2), and BCVA is gained. Corneal stabilization may take 24 months.

Dr. Farid Eghbali (Maloney Vision Institute, Los Angeles, CA) discussed differentiating between infectious and inflammatory infiltrates. Table 1 summarizes the key differentiating points. If unsure, always err on the side of caution and protect against infection. White lesion in a quiet eye may not be infection or inflammation at all, but rather a scar, EBMD, or SPK. ■

Therapeutics

Dr. Terri Pickering (Glaucoma Center of San Francisco, San Francisco, CA) provided a comprehensive overview of the new ocular medications. Exciting developments in glaucoma include Combigan, a combination eyedrop of brimonidine and timolol. This medication, dosed twice a day has been shown in studies to decrease IOP slightly more than using both brimonidine and timolol individually and can provide a nice adjunct to the first-line prostaglandins. While Xalatan remains the dominant prostaglandin analogue in use today, Travatan Z has emerged in a new formulation without the preservative BAK, which has been shown to increase corneal surface toxicity, with the same IOP lowering effects of the original Travatan. Istalol is a new formulation of the popular beta-blocker timolol that allows once a day dosing providing increased bioavailability and decreased systemic absorption.

In ocular surface disease, Azasite which has been shown

to be effective in treating lid margin diseases such as blepharitis and meibomitis.

Dr. Pickering stressed the prevalence of ocular allergies and the multiple ways to treat them via non-pharmacologic means as well as medications taken orally, nasally, and topically. Among the newer eye drop formulations is Pataday, a once a day version of the popular Patanol. She also highlighted some of the formulations coming down the pipeline including vekacia, bepotastine, and alcaftadine. Overall, the world of ocular medications is ever expanding as new advances provide better drugs with the overall goal of improving patient safety, symptoms and compliance and decreasing side effects.

Dr. Ella Faktorovich (Pacific Vision Institute, San Francisco, CA) outlined her four-step approach to pain management: identify the cause, treat the cause, design and implement analgesic protocol, follow up. The first step is to listen to patient's description of their symptoms. "It

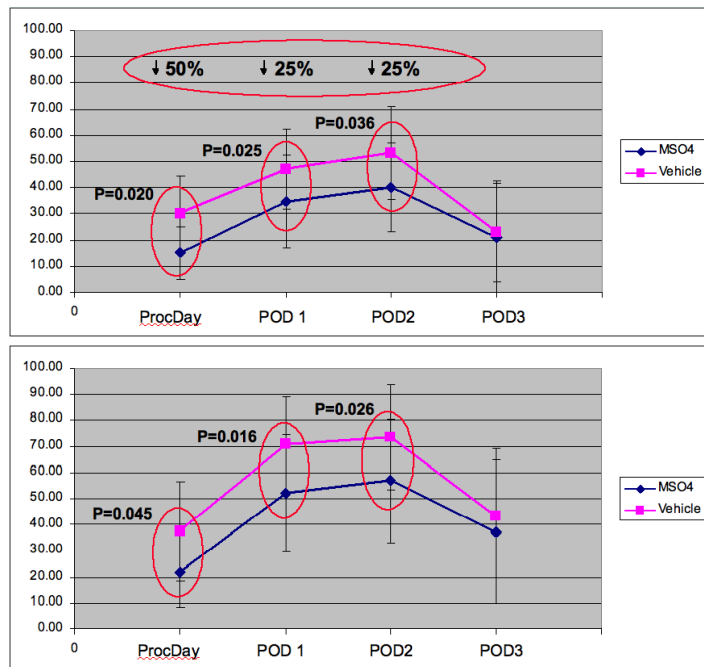


Figure 3. Results of pain assessment questionnaire in patients receiving topical 0.5% MSO4 vs. vehicle control. Topical morphine reduced pain by up to 50%.

feels like something is in there" can indicate an eyelash in the eye, concretions of the palpebral conjunctiva, or corneal microfilaments. Add tearing and light sensitivity and you may find an inflammatory component as with a corneal ulcer, foreign body, epithelial defect, or Thygeson's. If the eye aches and is light sensitive, consider uveitis. The next step is to treat the cause. Remove foreign bodies, treat conjunctivitis, treat inflammation, or whatever the patient presents with. The use of analgesics following treating is undergoing an evolution that will provide better pain management for the patient. Currently, the palliative methods include a bandage CL, cold non-preserved artificial tears, and cool compresses.

Oral analgesics such as NSAIDS, Tylenol, or Schedule III and II controlled substances can be used. Consider adverse reactions, however. Ibuprofen can cause upper GI bleeding and perforated ulcers. Tylenol can lead to liver damage. Schedule III drugs such as Vicodin can cause nausea, constipation, and dependence and schedule II drugs can lead to respiratory depression if taken excess amounts. Topical analgesics, such as dilute anesthetics and NSAIDs, may result in punctate keratopathy and delayed epithelial healing. Increased corneal permeability, swelling, and loss of transparency are seen in anesthetic use and infiltrates and corneal melt with NSAIDs.

To decrease the incidence of adverse reactions, new methods of pain management are being investigated. Dr. Faktorovich and Dr. Scott Lee conducted a prospective, randomized, double blind study of safety and efficacy of topical 0.5% morphine (MSO4) in treating pain after PRK. Twenty patients were randomized into 0.5% MSO4 and 20 into vehicle control group. The drops were used QID for four days following PRK. Analysis was based on patient-completed pain assessment questionnaires, corneal healing, visual acuity, and refractive outcomes. Results showed a significant improvement in comfort (up to 50% less discomfort) for patients using topical MSO4 (Figure and no difference in epithelial healing was observed. Currently, Drs. Faktorovich and Lee are conducting a study of safety and efficacy of 1% topical MSO4 and topical sumatriptan (Imitrex) in reducing post-PRK discomfort. PVI received an IND approval by the FDA for the use of sumatriptan in the eye. Unlike topical anesthetics that block the Na⁺/K⁺ pump on all cell membranes (nerve cells and replicating epithelium), topical opiates and triptans target receptors on nerve cells only. They represent the new type of topical analgesia – target specific and safe to the surrounding tissues. ■

Refractive Surgery

Dr. Ella Faktorovich emphasized that multi-modal approach to refractive surgery is essential to achieving successful outcomes with LASIK and PRK. It involves multi-modal diagnostics to screen patients and multi-modal technology to treat them. Topography alone may not be enough for screening. Pentacam and Visante Anterior Segment OCT may aid in assessing corneal structure in greater detail. Pentacam, for example, displays pachymetry profiles and a keratoconus analysis that compares 8 different indices of corneal shape. The Visante Anterior Segment OCT captures hi-resolution corneal image allowing visualization of flap-bed interface. When considering a LASIK enhancement, the OCT scan lets us determine the residual stromal thickness (Figure 4). If it is too thin, a PRK enhancement is recommended.

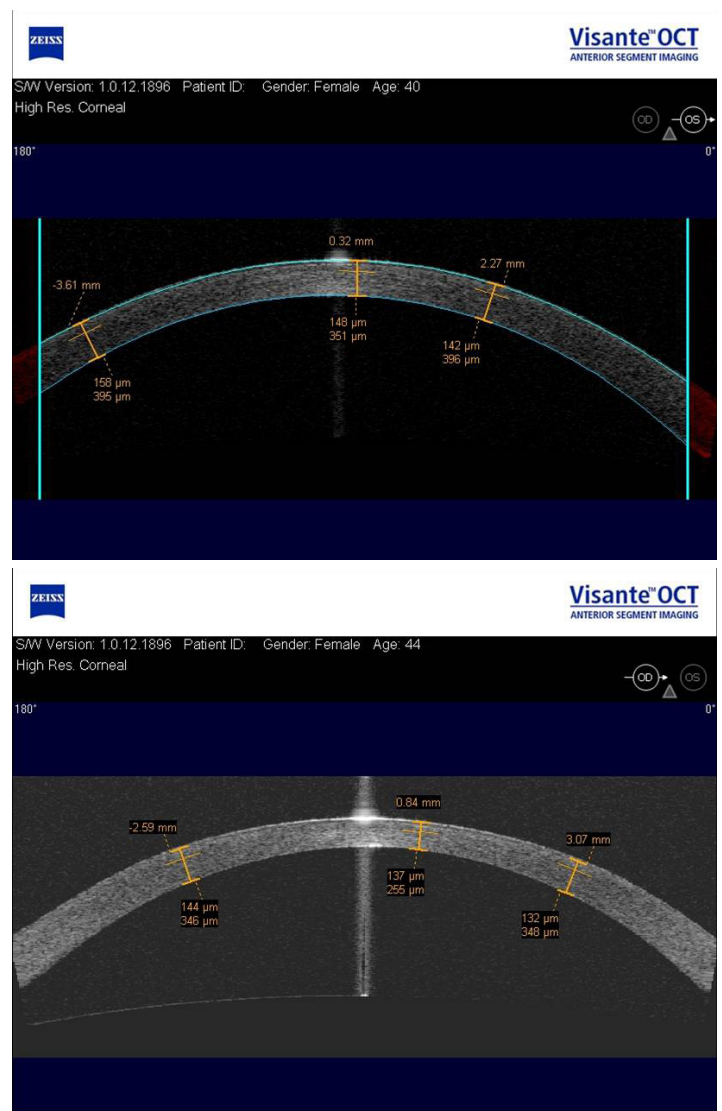


Figure 4. Thickness of the residual stromal bed after LASIK can be measured with a high resolution Visante OCT corneal scan. Feasibility of additional laser vision correction can be determined in patients considering post-LASIK enhancement. Residual stromal bed thickness is 351 microns in (A) and 255 microns in (B). LASIK enhancement can be performed in A and PRK enhancement in B.

Even though femtosecond lasers have introduced a new level of safety to LASIK flap creation, Dr. Faktorovich discussed a role for a mechanical microkeratome. While a patient with a clear cornea benefits from a femtosecond laser, patients with significant corneal scarring or previous RK surgery, may be better served with a mechanical microkeratome. Dr. Faktorovich also discussed the multiple femtosecond laser systems currently on the market in both US and abroad.

Multi-modal approach can be taken with excimer lasers as well, depending on patient's characteristics. Alcon's LADAR 4000 provides allows for accurate alignment of the astigmatism axis, making it especially useful in patients with higher astigmatism. Excimer ablations with Alcon's Wavelight laser preserve corneal asphericity. It is, therefore, useful in patients with flatter corneas and higher corrections. VISX StarS4 laser is well-suited for PTK in patients with corneal scars and/or epithelial base-

ment membrane dystrophy (EBMD).

LADARWave wavefront mapping is performed with a pharmacologically dilated pupil. Therefore, it allows the capture of accurate aberration maps, especially in eyes with high HOA's peripherally (i.e. patients with symptomatic spherical aberrations after refractive surgery). An aberrometer used on an undilated pupil must extrapolate data if the pupil is smaller or even much larger than the treatment zone. ■

Cataract and Lens Surgery

Dr. Steve Chang (Pacific Vision Institute, San Francisco, CA) engaged the audience in interactive review of cases from his patient database. Systematically taking the participants through his decision making process of matching the right procedure with the right patient, he outlined the indications for LASIK, PRK, phakic IOL, Refractive Lens Exchange, and cataract surgery. Among the highlights from the cases he presented were the results and safety of Visian ICL phakic IOL as an alternative to laser vision correction and better option in patients with very high myopia, irregular or thin corneas, large pupils, or significant dry eyes. Compared to PRK, he stated,



Figure 5. Dr. Steve Chang explaining various options available to the patient

ICL provides faster results and less pain.

Dr. Chang stressed that refractive lens exchange with presbyopia correcting IOLs is an excellent option for patients over 50 who are hyperopic and presbyopic. These patients are dependant on glasses or contacts for both distance and near so they tend to be your happiest and most satisfied patients. Furthermore, because they are hyperopic, their risk for complications such as retinal detachments is significantly reduced. He cautioned that patients who are myopic and presbyopic may not be the best refractive lens exchange candidates as their near visual demands tend to be unrealistic as everything is “crys-

tal clear” at near without glasses normally. Also, myopic patients tend to be at a higher risk for complications such as retinal detachments.

Dr. Chang concluded that overall, success with presbyopia correcting IOLs lies in strict selection criteria and management of patient expectations. For patients with normal ocular health and realistic expectations, the multifocal IOLs provide excellent results and happy patients. However, for patients with some posterior segment pathology such as mild drusen, RPE changes, or glaucoma, the Crystalens accommodating IOL may be the better option as it does not decrease contrast acuity. Ultimately, for patients with unrealistic expectations and/or significant ocular pathology, the presbyopic lenses may not be a good option at all.

Dr. Mark Owens (Eye Care Associates of Kentucky, KY) shared his pearls and extensive experiences co-managing cataract and lens surgeries. He stressed the importance of a thorough pre-operative ocular examination paying close attention to specific pathology (macular disease, pseudoexfoliation, etc.) He also noted the importance, especially in this internet age, to have a good working knowledge of cataract surgery and the various lens options so you can comfortably discuss expectations with your patients. He mentioned that some optometrists may be uncomfortable co-managing cataract surgery cases because they are unfamiliar with the warning signs and don't want to be left in an uncomfortable situation. To alleviate this issue, Dr. Owens stressed the importance of good communication with the ophthalmologist and a very low tolerance for sending the patient back to the surgeon for evaluation. That being said, it is also vital to become familiar with the abnormal signs and symptoms post-operatively such as:

- Significantly decreased pinhole visual acuity unless clinically correlated with expected corneal edema
- IOP elevated above 30mmHg
- Excessively low IOP associated with a flat anterior chamber or leaking wound
- Abnormal dysphotopsias
- Redness, pain, or a milky pupil (possible signs of endophthalmitis which can occur within 4-10 days post-op)
- Well centered PCIOL

Become familiar with CME that can occur 3-4 weeks after surgery and secondary membranes that can occur at any time after surgery. Ultimately though, he emphasized, excellent communication is the key to success and can foster a healthy and satisfying co-management experience. ■

Vision Therapy

Dr. Gina Day (Larkspur Landing Optometry, Larkspur, CA and Pacific Vision Institute, San Francisco, CA) addressed the process of in-office and computer-based vision therapy to treat patients presenting with symptoms of binocular vision dysfunction (BVD) after LASIK. She described her work with patients who are essentially emmetropic after LASIK, but who complain of blur associated with convergence insufficiency and/or accommodative spasm. She conducts extensive testing, including cover test, nearpoint BI & BO fusion ranges, MRx and CRx. According to Dr. Day, pre-operative risk factors include a difference between MRx and CRx of $>.37D$, astigmatism $>.95D$, and hyperopic spherical equivalent. Her study also found an occupational bias towards visually demanding professions such as lawyers and computer programmers. Patients at risk are discovered during the pre-op and counseled before surgery. The treatments can be done with conventional optometric vision therapy

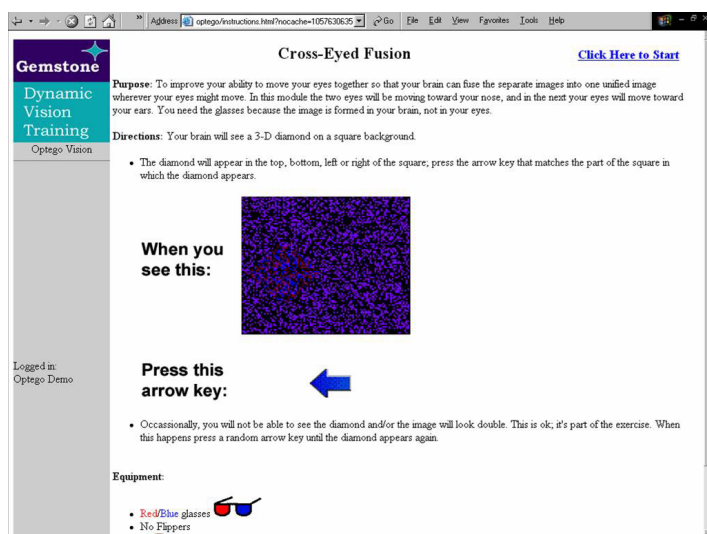


Figure 6. Internet-based VT program is available through Gemstone Foundation

(before or after surgery) or internet-based vision therapy (alone or combined with in-office VT).

Dr. Maureen Powers (Gemstone Foundation, Rodeo, CA and Pacific Vision Institute, San Francisco, CA) presented the results of VT for symptomatic BVD after LASIK. In the study, 18 patients within the last 30 months presented with BVD symptoms after LASIK and were offered VT. 12 accepted and started the internet-based VT (Figure 6). 9 of the 12 completed at least 7 sessions (19 avg, 30 max). The internet-based program covered basic orthoptic exercises including accommodative facility, smooth pursuit, saccadic practice, convergence practice using 3D images, and divergence practice using 3D images. Sessions lasted 20 minutes

for 30 days at home or at the work place. Following VT, near point of convergence, fusion ranges, near phoria, and convergence insufficiency all improved. Symptoms resolved entirely in 6 out of 9 patients who used internet-based VT only. ■

Calendar of PVI Grand Rounds

By invitation only:

- 07/24/08 Ocular diagnostics
- 08/28/08 Ocular infections
- 09/25/08 Cataract and Lens Surgery
- 10/23/08 Refractive Surgery
- 11/20/08 Glaucoma
- 12/18/08 PVI Holiday Dinner
- 01/22/09 Retina
- 02/26/09 Binocular vision
- 04/23/09 8th Annual San Francisco Cornea, Cataract, and Refractive Surgery Symposium

Sight Gags by Scott Lee, O.D.



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