Over the past year, more military personnel, police officers and firefighters (including the Chief of SFFD, Mario Trevino) underwent LASIK at PVI than in the previous years. This is a testament to both safety of the procedure in carefully selected candidates and its acceptance in the military, police and fire departments.

Police officers and firefighters have been allowed laser vision correction since the approval of excimer lasers in 1995. Most police officers and firefighters have been able to return to active duty as early as 24 hours after LASIK. Prospective patients need to be carefully screened and those at risk for glare and decreased nighttime vision are advised against the procedure. A medical report has to be provided for some patients after the procedure, stating their uncorrected visual acuity in both light and dim conditions. Protective goggles are advisable for some patients depending on their anticipated level of exposure to dust, soot, fire, and contact force.

Laser vision correction has been performed in the U.S. military since 1993. The U.S. military allows PRK in all of its branches. LASEK is considered the equivalent of PRK. Aviators who had PRK can return to work in 4 days, but can't fly for at least 4 weeks after surgery. LASIK is allowed in all the branches of the military except for aviators, divers, and those in special forces who are allowed PRK or LASEK only. Active duty pilots can have LASIK as part of a study currently being conducted at Wilford Hall Warfighter Refractive Surgery Center and USAF School of Aerospace Medicine at Brooks AFB in San Antonio, TX.

The soldiers have been monitored after laser vision correction and they had no problems doing activities such as training with bayonets, performing night-time parachute jumps, and operating weapons. In fact, a military study of the weapons ability of patients before and after laser vision correction detected no difference. In fact, a small number of patients actually performed better.

LASIK appears to be safe in divers. A recent article in the Journal of Cataract and Refractive Surgery “Refractive change in response to acute hyperbaric stress in refractive surgery patients,” revealed no changes in visual acuity, refraction, intraocular pressure, and pachymetry when patients who had LASIK have been subjected to barometric pressure equivalent to 100 feet under sea.
Wavefront Technology Update

From contact lenses to laser vision correction, from testing devices to IOL designs the latest buzz in eye care is “super vision.” It has been hypothesized that if we can accurately measure all the aberrations in the eye’s optical system, we can then program this pattern of aberrations (a wavefront map) into the excimer laser that will then generate an ablation pattern on the cornea to compensate for these aberrations resulting in “aberration-free” or “super” vision. So, theoretically, we can potentially correct not only sphere and cylinder, but also higher order aberrations such as coma, spherical, defocus, etc. How close are we to realizing this hypothesis? A few years ago, only a handful of excimer laser manufacturers had aberrometers, much less the programs to link these aberrometers to the laser beam. Today, all the major manufacturers have systems on the market. Which one will prove to be the best? Will patients notice functional improvement in their vision? Who will benefit most from this technology? The answers to these questions remain unknown.

Alcon LADARVision-Custom Cornea (LADARVision 4000 excimer laser + LADARwave aberrometer) has recently been FDA-approved for wavefront-guided laser surgery in myopes up to −7.0 D.

VISX StarS3 Active Trak (VISX S3 excimer laser + WaveScan aberrometer) multicenter trial is ongoing.

Bausch & Lomb Zyoptix (Technolas 217z excimer laser + Zywave ABerrometer + Orbscan topographer) premarket approval application has been accepted by the FDA.

Nidek NAVEX (EC-5000CX Excimer laser + OPD Scan: aberrometer and topographer) is scheduled to begin trials by the end of this year.

LaserSight Astra Max (AstraScan Custom Laser System + AstraMax Stereo Topographer) will begin clinical trials for custom LASIK next year.

Lumenis Allegretto (Allegretto Wave Excimer Laser system) clinical trials for myopia treatment have been completed. Trials for custom LASIK are expected to begin next year.

So far, the data shows that even with wave-front guided ablations, aberrations are still present. Further data is needed to show if there is functional improvement in daily activities (such as reading, driving, etc) and in patient satisfaction rates after wavefront-guided LASIK vs. conventional LASIK.

What are some challenges in implementing wavefront-guided laser ablations?

Wavefront map may not be enough. Current wavefront sensors assume that cornea is a standard shape. Therefore, we don’t need to use full Munnerlyn formula to calculate ablation profile, i.e. we can ignore the corneal component of the wavefront map. So, in these average cases, excimer laser+aberrometer such as in LADARVision and VISX, for example, is enough. However, in higher myopes with steeper corneas or in patients with irregular corneas if corneal component is not accounted for, the accuracy of correction can be off.

---Continued with Wavefront on page 3---
by as much as 1.0 D. Therefore, topography map needs to be added to the wavefront map to obtain the most accurate information for the most accurate correction. The systems that incorporate both topography and aberrometry with the excimer laser are NIDEK and B&L. Topography systems also provide higher resolution and measure over wider diameters than aberrometers. The NIDEK OPD scan, for example, measures 6480 data points over 11 mm diameter. Wavefront aberrometers alone measure up to 400 data points over 6 mm diameter (LADARVision) or 7 mm diameter (VISX).

- Corneal biomechanics, healing response, and LASIK flap-induced aberrations may limit accuracy of wavefront-guided ablations. Corneal biomechanical response to excimer laser ablation may be such that cornea may accept only certain ablation shapes and not accept the “ideal” shape that produces “ideal” correction. Postoperative healing response may obliterate fine changes from wavefront-guided ablations. LASIK flap alone induces aberrations (Journal of Refractive Surgery, Sept/Oct 2002). It could be difficult to correct 1-5 micron higher order aberrations when microkeratome induces 6-12 micron aberrations in unpredictable fashion.

- Accurate registration of wavefront information to the laser and its tracking system is challenging. Aberrometry and topography are done on a seated patient. The excimer laser beam is applied to a supine patient. Change in posture often leads to cyclotorsion. With just 10 degrees of misalignment from cyclotorsion, a second order cylinder correction can result in a 30% residual refractive error. Therefore, the maps need to be registered perfectly. With current alignment techniques, the eye can still drift during the procedure. Clearly, more accurate registration is required for accurate wavefront-guided ablation.

- Not all aberrations may be bad. What if we get rid of aberrations under certain conditions, i.e. distance viewing, but these aberrations may actually be beneficial under other conditions, i.e. reading in a dim light, for example. Would we be exchanging one set of visual symptoms for another?

- Wavefront is dynamic as eye ages. As we age, the aberrations of our optical system change. Are we chasing a dynamic phenomenon with static representation? Will our patients be willing to have LASIK every few years just to keep up with the aberrations?

In a recent Journal of Refractive Surgery article “Biomechanics of the Cornea and Wavefront-guided Laser Refractive Surgery,” Cynthia Roberts, PhD points out that “super vision” is a marketing concept that has not yet been realized. More data is needed to determine if such vision is, indeed, possible or even desirable. More data is needed to compare the efficacy of different technology platforms.

**What are realistic expectations of how wavefront technology can help our patients?**

- Correcting postoperative aberrations. If patients have glare, haloes, and decreased night time vision, a wavefront analysis may help explain and quantify these vision problems. They can subsequently be corrected with wavefront-guided ablation.

- Preoperative screening. Patients with lenticular changes generally aren’t good candidates for laser vision correction. Wavefront analysis used in conjunction with topography can help identify these patients.

- Improve best-corrected vision. Some patients seek refractive surgery to improve their vision beyond what they can see with contacts or glasses. Currently, refractive surgery aims to decrease the dependency on glasses and contacts and in most patients, best-spectacle corrected acuity can be achieved. Patients who want to improve their vision beyond best-corrected vision can either wait for the possibility of wavefront-guided ablations or have their refractive error corrected with current technology and then “upgraded” with wavefront-guided technology in the future.
**Intacs for Keratoconus**

We now have a safer alternative to corneal transplant - Intacs intracorneal ring segments. Initially used for treatment of mild myopia, Intacs have been found to be effective for treatment of select cases of keratoconus as well.

If you have patients with keratoconus who have any of the following problems, they may be candidates for Intacs, rather than corneal transplant:

- Can’t wear contact lenses comfortably
- Persistent epitheliopathy and/or neovascularization despite optimum contact lens fit
- Corneas so steep and irregular that they can’t be fitted with contact lenses
- Reduced best-corrected vision due to corneal irregularity

In a recent study published in Cornea (Cornea 2002;21(8):784-86), researchers concluded that in a cornea referral practice, 64.2% of patients with keratoconus eventually go on to penetrating keratoplasty in one or both eyes. The most common reasons for penetrating keratoplasty in patients with keratoconus are: inability to wear contact lenses and poor vision with glasses and corneal scarring. Corneal transplantation can produce excellent results in most patients. However, it is an invasive procedure with significant risks. Intacs are spacers in the peripheral cornea that shorten the arc length of the anterior corneal surface and flatten the cone. Treatment plan is developed based on whether the keratoconus is moderately or highly asymmetric, global, or central.

Postoperative results demonstrate improved uncorrected and best-corrected vision, improved topography, and reduced mean keratometry. Follow up is available for up to two years in some eyes. Keratometry readings remain stable. Uncorrected and best-corrected visual acuity continues to improve over time.

Intacs for keratoconus is a 10-minute outpatient procedure, less invasive than corneal transplant, may improve the quality of vision, may even delay progression of keratoconus, and doesn’t preclude one from undergoing corneal transplant, if needed, in the future.

If you wish to send a patient with keratoconus to determine if he or she is eligible for Intacs, please contact us at (415) 922-9500 or ella@pacificvision.org.

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**What’s New In Dry Eye Management**

- FDA approved Oasis soft plug that lasts for three months (0.4 and 0.5 mm). Cost is $6. Recommended for postop use. Diagnostic occlusion collagen plugs are 0.2, 0.3, and 0.4 mm and the duration is up to one week. Silicone plugs 0.4 to 0.8 mm are permanent.
- Medennium SmartPlug receives FDA 510(k) clearance to be marketed in the US. It is made from thermodynamic hydrophobic acrylic polymer that transforms from a solid rod (similar to collagen plug) into a gel-like material within 20 seconds at body temperature. There could be no need for punctal sizing since the plug conforms to each individual’s punctum. Preliminary efficacy data suggests similarity to silicone punctal plugs. FDA approval is pending. Will it replace silicone punctal plugs? That remains to be seen. Currently the efficacy and duration of silicone punctal occlusion with appropriately sized punctal plugs is the standard to be matched.
- Allergan’s Refresh Endura drops are now available to treat patients with tear deficiency and evaporative dry eye. This tear supplement has castor oil for lipid layer, water for aqueous layer and lubricant for mucin layer. Results in patients with unstable tear film treated at PVI so far, have been encouraging. For example, patients with unstable tear film, even in the presence of tear deficiency dry eye and previous hourly use of other tear supplements, report reduced dry eye symptoms with only bid use of Refresh Endura.
- Topical steroids (such as Alrex, loteprednol etabonate) can be used to treat patients with dry eyes unresponsive to tear substitutes and punctal occlusion.
- Topical Cyclosporine A has been FDA approved for treatment of severe dry eyes unresponsive to other methods of treatment. Please contact PVI for more information.
Here are some Q&A's from a typical consultation. The answers may help the staff at your offices answer patient inquiries.

**Q: What does the procedure fee include?**

**A:** It includes preprocedural testing; procedure; all of your drops (some you start before the procedure and others you use after the procedure); the routine follow up visits after the procedure; any other visits you may need in addition to routine follow up visits; additional lubricating drops, if you need them; occluders for tear drainage passages, if you have dryness after the procedure; enhancements, if you need them. We don’t place a time limit on enhancements.

**Q: What are Dr. Faktorovich’s results?**

**A:** We track the results continuously and analyze outcomes carefully. The results depend primarily on your prescription. Patients with smaller corrections heal faster and typically don’t need a touch up. Patients with larger corrections heal slower and have a higher chance of needing a touch up. For example, patients with up to -6.00 D of nearsightedness have a 96% chance of seeing 20/20 or better after the procedure. The decision to do a touch up is up to you. If you feel that your vision could be improved and you have a small prescription that remains stable at three to six months after the procedure, Dr. Faktorovich may go ahead with a touch up.

In patients with up to -6.00 D of nearsightedness before the procedure, the chance of having a touch up is 7%. This number varies widely between different surgeons. It depends not only on what your prescription is after the procedure but also on the surgeon’s willingness to do the touch up. We will provide a spreadsheet of the results based on your specific prescription.

**Q: Is LASIK safe?**

**A:** With careful preprocedural testing (performed by both your primary eye doctor and the surgeon) and in the hands of experienced surgeon, LASIK is a procedure with a very low risk and excellent safety profile. Careful screening and testing is essential to make sure that you are an excellent candidate for LASIK. Sometimes, LASIK is not the best option for you and another type of laser vision correction or another eye procedure entirely may be recommended. There are many different options available to help you see better without glasses or contacts and the best one for you will be recommended.

**Q: My optometrist will handle preprocedural measurements and postprocedural visits. Is the surgeon involved in any of the post-procedural care and how is the information communicated to the surgeon? Can I see the surgeon any time I wish?**

**A:** When your optometrist sees you for the exams, the information is faxed to the surgeon (in most cases, on the same day as your visit). The surgeon reviews your results carefully. If any questions arise, the doctors discuss them. If you or your optometrist decide you should see the surgeon, you are certainly welcome to come in.

**Q: What laser is going to be used for my procedure?**

**A:** Dr. Faktorovich uses four different types of excimer lasers. The choice will be made based on your unique situation such as the type of prescription, pupil size, corneal thickness, and corneal examination, to name just a few.

**Q: How can I make the procedure affordable?**

**A:** At PVI, we have many payment options and we will work with each patient individually to develop a payment plan that works well with your needs. Some patients prefer payment with a credit card to earn frequent miles. Others select a payment plan. We have six different financing options, including one-year interest free. We also offer in-house payment plans and these are tailored to your individual needs as well.
Over the past several years, PVI trained over 100 staff members from the Bay Area optometric practices to help educate the patients about laser vision correction and other options for surgical vision correction. A typical training session lasts three to four hours. Breakfast or lunch is provided depending on the time of the day the session is held. The optometrists are notified when the session will be held. The staff members are required to RSVP since we limit the number of participants to allow for adequate discussion time, to make sure that all the questions are answered, and each participant receives adequate attention. The participants also view live LASIK procedure and have the opportunity to ask the patient about their experience during the procedure. The staff also receives a binder with the most commonly asked Q&A’s. They can use that as a reference to help answer patient questions either over the phone or in the office. At the end of the course, each participant receives the certificate of completion and contact information for the PVI staff to help with any questions that may arise once the OD staff returns to their practice.

The following is a composite interview of staff members who attended our recent training sessions. They come from the practices of Drs. James Wong, Robert Monetta, Leona Landers, Christine Brischer, Ashby Jones, Clifford and Edna Lee, Bernard Feldman, Kyna Wong, Terrence Chan, Jonah Yee, Patricia Chang, Isabel Kazemi, Surveen Singh, Bruce Dong, Richard Simsarian, Jennifer Quirante, Lassa Frank, and others in the Bay Area.

Q: Why did you attend the PVI staff training session?
A: Patients ask me all the time about LASIK and I want to be able to answer their questions. I wanted to learn more how the procedure works. I attended to find out what PVI is all about and to meet Dr. Faktorovich. I was interested in seeing the live LASIK. I wanted to become more educated about LASIK. My doctor suggested I go.

Q: Was the training helpful?
A: I liked the Q&A part; it will help me answer patient questions. It was helpful to put faces to names and to meet the PVI staff. It was helpful to see what's involved in the patient care at PVI as opposed to other offices. I got the information I needed and feel more confident I can answer patient questions. I will be more comfortable now explaining LASIK to patients at my doctor's office.

Q: How was it to view the live procedure?
A: I was a little squeamish. Loved it! Very interesting, non stressful. Very impressive, very sterile. Want to see more close up.

Q: How useful will the binder with most frequently asked questions be to you?
A: I will use it as a reference when patients ask me questions. It will help if I can answer some questions when my doctor is busy. Patients ask me about results all the time and this way I can look it up exactly.

Q: What would you like to improve about the training session?
A: I want to see more close up of procedure. Limit the number of participants even more so that each person can get all their questions answered. Can't think of anything at this time. To walk one of us through the entire consultation process at PVI.

If you are interested in reserving a space for your staff to one of the upcoming PVI training sessions, please contact Amie Ahlers at (415) 218-9271 (direct line) or (415) 922-9500 (PVI main number).
The AIDS/LifeCycle Ride is a 7-day, 575 mile bicycle ride from San Francisco to Los Angeles. The ride symbolizes the challenges that patients with AIDS have to go through on a daily basis. It also serves to increase awareness about this devastating disease and to raise funds to fight it. Thousands of cyclists overcome challenging terrain, adverse weather, and fatigue to achieve their personal best and to help those suffering from AIDS.

Dr. Albert Lee is an optometrist at Urban Eyes in San Francisco. He originally heard about the ride from his friend and business partner, Dr. Lawrence Tom. He admired his friend's determination and bravery in completing the Ride. Several years ago, Dr. Lee decided to do it himself. But, first, he had to learn to ride a bicycle. After countless falls and crashes, Dr. Lee was ready for the challenge. He completed his first ride in 2001. Dr. Lee learned, firsthand, that “scenic” is a code for “hilly”, that even when going downhill, you still have to pedal to overcome headwinds, that there is a magic “balm” that can ease the soreness from long pedaling days on the bicycle seat. He also discovered the breathtaking vistas of our beautiful state, the excitement of making new friends, the joys of camaraderie at end of a long day. The experience was life changing. In overcoming fatigue, hunger, thirst, pain, terrain, and weather, every participant learns that they have what it takes to make it to the camp every night. They have what it takes to get up in the morning and face another day of challenges. They have what it takes to support their friends and to encourage them to keep going. This is exactly the kind of strength and determination patients with chronic illness need to find within themselves to face each day.

This year, Dr. Lee took the challenge again. And again, he succeeded in completing the Ride. Not only did he succeed, but his friend and fellow optometrist, Dr. Irene Chew, joined him and also completed the Ride. She originally decided to do it as a personal challenge, but the camaraderie of this moving community of cyclists, the support and the cheering of the communities along the route, created a fever for Irene. Both she and Dr. Lee will ride again next year.

Next year, there will be something a little different about Dr. Lee on his bicycle. On July 11, 2002, Dr. Lee underwent LASIK by Dr. Faktorovich to correct his myopic astigmatism. While riding this year, the oncoming winds were so strong, that one of his contact lenses dried and fell out. He had to stop and insert a new one. To prevent this problem from recurring, Dr. Lee rode downhill alternating closing his eyes to reduce the drying effect of the wind to keep his contacts from coming out again. For the next year's AIDS/LifeCycle Ride, Dr. Lee will not need to focus on keeping his contacts in his eyes. He can focus, instead, on training for the Ride and on the cause his is riding for.

All of us at PVI and Dr. Albert Lee encourage you to become involved in 2003 AIDS/LifeCycle Ride. Please feel free to contact Dr. Lee with any questions.
Q: Would you enhance –0.5 D myopia after LASIK? A: That depends. In a presbyopic or pre-presbyopic patient, –0.5 D in a non-dominant eye may be just what the doctor ordered, even if our initial refractive goal was plano. On the other hand, –0.5 D in a younger patient, in a dominant eye, or in a distance eye of a monovision patient can be bothersome to the patient. Several precautions need to be taken prior to performing –0.5 D enhancement. First, make sure the refraction is stable. Second, perform cycloplegic refraction with Cyclogyl to rule out accommodation or hyperopia in the contralateral eye. Prescribe –0.5 D in spectacles first and instruct patient to note if he or she needs to wear the glasses most of the time or not. If they say that prescription makes “a world of difference”, then they may benefit from enhancement. Finally, I let the patient know that the laser beam precision is +/- 0.5 D and they are at the limit of the resolution. So, overcorrection is possible. If they are willing to take a risk, then we go ahead with enhancement. Our results so far have been excellent.

Q: How do I help a patient with post-LASIK glare at night? A: First, you need to establish what causes glare in your patient. The most common cause of postop glare is refractive error. Even mild myopia, astigmatism, or hyperopia can cause glare at night. This patient may be a candidate for either glasses at night or enhancement once the vision stabilizes. Another common cause of glare at night is dry eyes with punctate keratopathy or uneven tear film. Another cause of glare could be a combination of high correction and large pupil. Typically, we screen patients very well prior to surgery and if someone has a large pupil, we expand treatment zone accordingly. However, even with a large treatment zone, some patients may still have glare in the first few months after the procedure. Generally it improves without any intervention. In fact, less than 1% of patients in my practice have glare that persists beyond six months after the procedure. In the interim, yellow tinted lenses may improve contrast sensitivity. Alphagan P may be used at night to prevent wide papillary dilation. I avoid Pilocarpine due to undesirable side effects of brow ache and induced myopia. However, 0.25% may be tried in a patient not responding to Alphagan P. And finally, RGPs can be tried to improve the corneal contour in a patient not responding to the above measures. Wavefront-guided ablations also hold the promise of helping patients with persistent night time glare.