

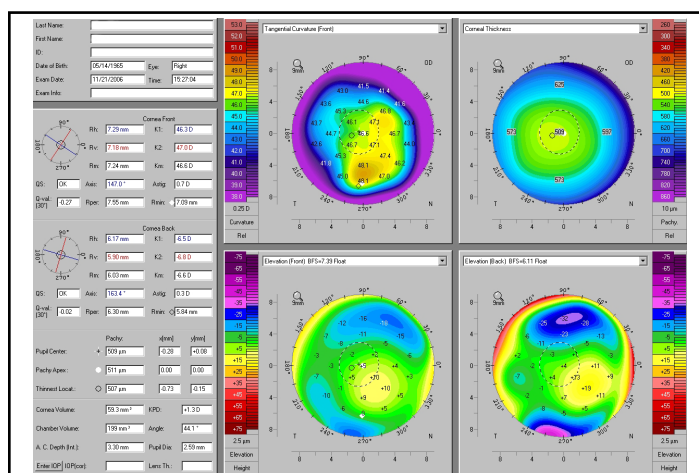
## PRK 2007: Managing your patients for successful outcomes

### Why PRK?

Over the past decade the number of patients interested in laser vision correction has been increasing. Most are familiar with LASIK and they often come in asking specifically for LASIK. Not all, however, are good candidates for lamellar laser vision correction. Patients whose corneas are too thin for the amount of correction they need, may be best treated with surface laser vision correction, i.e. PRK. Patients whose corneas are irregular may also be better candidates for PRK. Patients with epithelial basement membrane dystrophy are also best treated with PRK. Surface laser ablation remains an excellent option for patients who are not good candidates for lamellar procedures.

### Thin Corneas.

We recommend PRK to any patient with corneal thickness below 500 microns, regardless of their correction, even if it's -2.0D. If the corneal thickness is less than 450 microns, we don't recommend corneal surgery at all, but rather lens based procedures. In patients with corneal thickness above 500 microns, we calculate the amount of tissue that will have to be removed to correct their refractive error. We then add the flap thickness and subtract this total amount from the corneal thickness. If the residual stromal bed is below 250 microns (and that includes possible enhancements), we recommend surface rather than lamellar treatment. Although it is possible to make ultra-thin flaps with IntraLase, we don't recommend flaps thinner than 100 microns. Ultra-thin flaps may not be completely



**Figure 2.** Pentacam scan of a 45-year old myope with  $-7.25 + 1.25 \times 031$  Rx shows posterior elevation ("float"). Such patients do better with PRK rather than LASIK

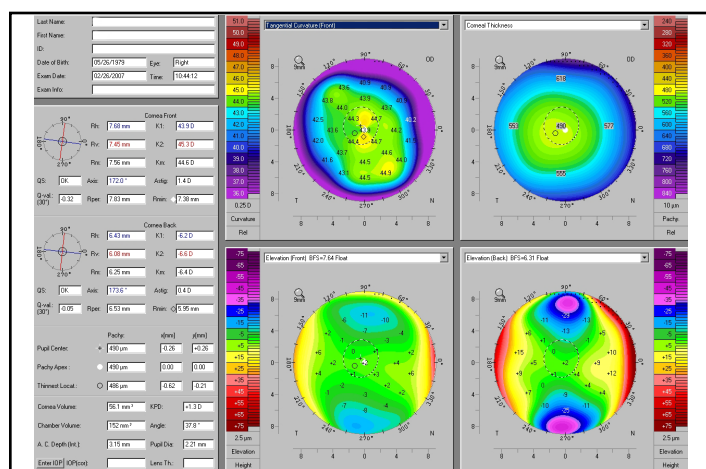
trans-epithelial and may result in a button hole. PRK may be a safer option rather than an ultra-thin flap LASIK. (Figure 1).

### Irregular Corneas.

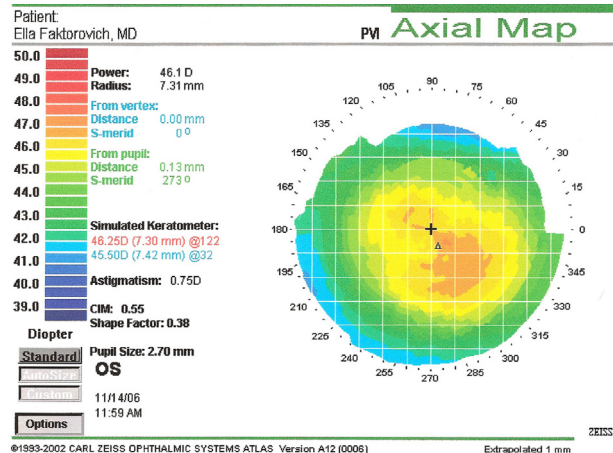
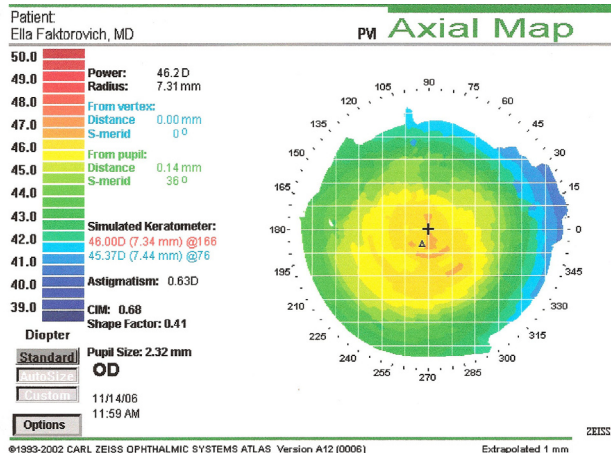
With advances in screening technology, we can now assess the symmetry of not only the anterior, but also the posterior corneal surface very accurately. Patients with posterior corneal asymmetry may be better candidates for PRK (Figure 2). Patients whose corneas are symmetric, but steepen rather abruptly in the center, especially if the astigmatism is oblique may also be better candidates for surface, rather than lamellar laser vision correction. (Figure 3A and 3B). With Pentacam, we can analyze the cornea extensively, using 8 different indices for keratoconus, including the corneal wavefront analysis. Such detailed analysis is very sensitive and is an excellent tool in guiding the patient toward the procedure that's the safest for them.

### Epithelial Basement Membrane Dystrophy (EBMD).

Even though IntraLase exerts minimal traction on the cornea compared to the mechanical microkeratome, patients with EBMD are at risk for loosening epithelium during the lamellar surgery. Loose epithelium takes a while to heal, reducing vision. These patients are also more likely to experience regression of the refractive effect and are at risk for epithelial ingrowth. At the preoperative examination, we examine the corneas very carefully for even the mildest evidence of EBMD – a microcyst, a tiny map line, a slight epithelial elevation with fluorescein. These patients are best treated with PRK. ■



**Figure 1.** Pentacam scan of a 32-year old -8.0 D myope shows 490 micron central corneal thickness. Anterior and posterior curvatures are normal. PRK was recommended for this patient with thin cornea.



**Figure 3A (right eye) & 3B (left eye).** Topography of a 48-year old myope with  $-4.50 + 0.50 \times 132$  OD and  $-5.00 + 1.25 \times 146$  OS. Asymmetric topography and asymmetric oblique astigmatism may suggest predisposition to corneal thinning with LASIK. Therefore, PRK was recommended.

## PRK vs. LASEK vs. Epi-LASIK vs. Advanced Surface Ablation: Is there really a difference?

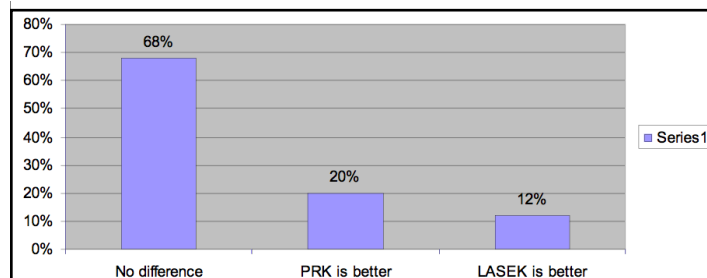
Fundamentally, there are only two methods of corneal laser vision correction: lamellar and surface. With the lamellar method, stroma is separated. With the surface method, epithelial basement membrane is separated from Bowman's membrane. Traditionally, the latter method has been called photorefractive keratectomy or PRK. With the increasing frequency of surface laser vision correction procedure, there has been an increasing proliferation of alternative names for this procedure. PRK now means that epithelium is removed and then discarded after laser ablation. It can be removed manually, with alcohol, or with a rotating brush. Epi-LASIK implies that a mechanical device, akin to a microkeratome, only called an epitome, is used to cleave the epithelium off the Bowman's. The epithelium is then either discarded or replaced after ablation. LASEK implies that the epithelium is replaced after laser ablation.

Regardless of the name, all surface laser vision correction procedures involve separating epithelial basement membrane from Bowman's, followed by laser ablation of Bowman's and the underlying stroma. If they are all the same procedure, why do we have so many different names for it? Does it matter how the basement membrane is separated from Bowman's? With an expensive epi-keratome? With alcohol? With laser? With a rotating brush? Does it matter if the epithelium is put back on? After all, the Bowman's is gone, so the epithelium can't reattach itself. It sloughs off and is replaced by the new epithelium just as it would if it was simply discarded in the first place.

The names may simply reflect our quest to solve the two dilemmas of surface laser vision correction: pain and slow visual recovery. If we save the epithelium and replace it back, would the patient be more comfortable? Would the vision come back faster? If we remove the epithelium with a mechanical device vs. manually, would that speed up the healing?

To answer these questions, we have reviewed all the published data comparing postoperative pain, visual recovery, refractive outcomes, and corneal haze in patients who underwent PRK in one eye and LASEK or epi-LASIK in the contralateral eye to correct their myopic astigmatism.<sup>1-7</sup> The data on 230 patients was pooled (Figure 3). Eighty eight percent of patients saw either no difference between their PRK or LASEK/Epi-LASIK eye or they actually preferred their

PRK eye.<sup>2-7</sup> Twenty percent of patients preferred their PRK eye.<sup>2,7</sup> Only 12% of patients preferred LASEK/Epi-LASIK eye.<sup>1</sup> Because the published data supports PRK rather than LASEK or epi-LASIK for surface correction of myopic astigmatism, we recommend PRK to our patients. ■



**Figure 4.** Comparison of postoperative pain, visual acuity, refractive outcome, and haze after LASEK in one eye vs. PRK in the contralateral eye to correct myopic astigmatism in 230 patients from 7 published peer-reviewed studies

## Preop counseling

When a patient comes in interested specifically in LASIK, they may be disappointed if we recommend another procedure to them, such as PRK, or phakic IOL, or refractive lens exchange, for example. They may even think we are offering them an inferior procedure. PRK, for example, is an outstanding procedure with proven track record, great results, and excellent safety profile, but patients may rely on outdated information to form their opinion about the procedure – lasers from a decade ago, older medication regimen, hear say from friend of a friend. We have to help them understand the benefits of the procedure and clear up any misconceptions they may have.

We also have to guide them about the differences in healing process. While with LASIK, the patients are often 20/20 the next day, with PRK, it takes longer. We, therefore, recommend they have their procedure done on Thursday. They would have Friday, Saturday, and Sunday to recover and, by Monday, most patients can drive to work, and carry on their usual activities.

We let the patient know that PRK will ultimately have the same results, ultimately, as LASIK. It may even be safer, since there is no "flap"! We also mention that patients who are 20/20 now with PRK look back at the healing time and say it was definitely worth it.

To better understand what is happening with vision and comfort, we educate the patient about exactly what is going on with the heal-

ing process. We explain what the epithelium or front surface is and what it goes through as it heals and how it affects the vision. People tend to be more relaxed when they have a fair amount of knowledge about what is going to happen to them.

The first few days are the most intense part of the healing and we suggest the patients take it easy through those days. The general rule of thumb is if they feel up to it they can go out to eat, use a computer, watch TV, etc.; whatever their eyes will allow them to do, but it may be somewhat blurry. They may want to make the font on the computer larger and increase the contrast for the first few weeks. They can drive in familiar areas, but may need to get close to the street signs to read them. Week by week the vision will become better and they will be happy they had their vision corrected. ■

## Postop management

With PRK, the groundwork for great vision is laid out. Now, it's up to the patient to keep up with their eyedrops and it's up to us to guide them through the healing process. We can monitor their progress, to make sure they are using the drops as directed, and to reassure them that everything is going according to plan. Someone can tell when the vision goes from 20/200 to 20/20, but when we're seeing the small change from 20/40 to 20/30 and so on to 20/20 the patient can't tell the vision is improving and may get frustrated at times. We remind the patients that we expect definite, but gradual improvement.

The eye drop regimen is essential for proper healing. Vigamox or Zymar is used for a week as the epithelium is regenerating and because a bandage contact lens is used during the first 4 days. Econopred is used for the first week and then is switched to FML four times a day. This is continued through the first month. Then, FML is changed to twice a day for a month and then discontinued. We make sure the patient is using the steroid as directed since some patients may become non-compliant after a couple of weeks.

Frequent lubrication with non-preserved artificial tears with carboxymethylcellulose is essential to promote epithelial smoothing and healing allowing the foggy vision to improve. We let the patient know that lubrication will improve the vision. This helps them take control of their healing. We recommend the tears to be used every hour while awake making the distinction that the drops are for healing and is not just for dryness. When the vision improves and stability is achieved, the tears are tapered.

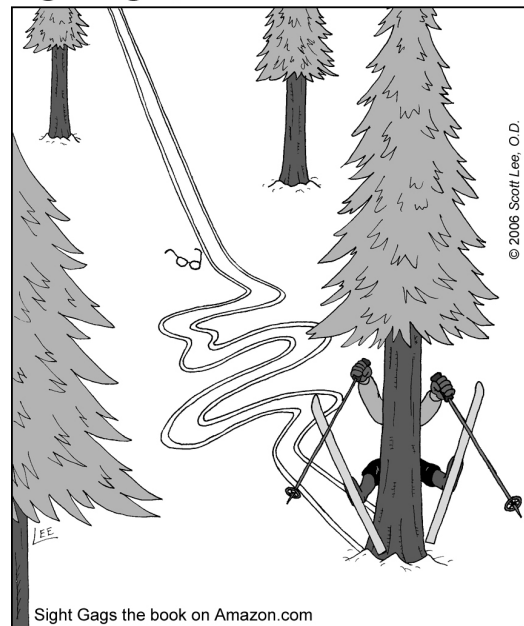
Some patients heal quickly and reach 20/20 between 1 and 2 months out. Others heal more gradually. Our goal should be reached by 3 months, but patients with high prescriptions can take up to 6 months. Initially, we may notice epithelial haze at the slit lamp. It may contribute to the foggy vision. The patient may even report doubling of vision. As the epithelium clears and becomes smoother, the vision improves. With refraction, we typically see about 1D of cylinder early on and even some hyperopia which can all be attributed to the rough epithelium. With the scanning beam lasers and the intraoperative use of Mitomycin C for high corrections, stromal haze is now rare. But, if it does appear, it is typically grade I-II or less. It looks more reticular than epithelial haze and gradually decreases over time. It rarely affects the vision and rarely requires treatment.

Because the healing time is more gradual with PRK, we consider enhancements at 9 months after PRK, vs. 6 months after LASIK. ■

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### Sight Gags by Scott Lee, O.D.



Sight Gags the book on Amazon.com

### 2007 calendar of the Upcoming Events for PVI Affiliated Doctors:

03/23/07:	6th Annual San Francisco Cornea, Cataract, & Refractive Surgery Symposium. Ritz Carlton Hotel, San Francisco. Four hours of CE credit.
04/01/07 to 05/31/07	Pentacam training workshops. By invitation only.

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