

## Examining the latest research in corneal refractive surgery

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### About the doctors

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**F**rom using state-of-the-art PRK to customized LASIK treatment and beyond, *EyeWorld* took a look at some of the latest refractive studies.

### PRK myth-busting

According to David TC Lin, MD, transepithelial PRK with a visual “wow” factor is possible with SmartSurf<sup>FACE</sup> (Schwind eye-tech-solutions). Most patients are able to see the clock in the room immediately postop, Dr. Lin said of the incision-less procedure.

Dr. Lin and coinvestigators evaluated visual recovery with the SmartSurf<sup>FACE</sup> approach in a retrospective case series.<sup>1</sup> “Traditionally with PRK, many said, ‘Patients cannot function for the first month until their vision improves, and there is so much pain,’” Dr. Lin said. He said these are now myths based on use of old technology. In the 1990s when laser profiles were rough, it could take a month before patients reaped the benefits of PRK. Now, a more Gaussian pulse profile is smoother and allows for good immediate vision, Dr. Lin noted.

The case series included 2,093 myopic eyes. Investigators found that monocularly, 62% of patients had 20/40 acuity or better immediately after surgery. When tested binocularly immediately after surgery, 82% of patients had 20/32 acuity, and more than 95% were at 20/40, Dr. Lin reported.

For pain management, Dr. Lin said he gives patients one drop of a topical nonsteroidal at the end of surgery and another before they leave. He finds that 99% of patients have minimal discomfort with this approach.

Dr. Lin said the SmartSurf<sup>FACE</sup> technology is a valuable addition to refractive surgery. “I think it increases the armamentarium and removes a lot of the myths about what PRK was,” Dr. Lin said.

### Chasing super vision

Daniel Durrie, MD, recently studied a different refractive approach, topography-guided LASIK.<sup>2</sup> The study looked for trends in the data from the FDA clinical trial as well as data culled from the original trial sites. “The one thing that

stuck out is there was a statistically significant number of patients who had super vision of 20/10, and that number was significantly better than the best corrected vision preoperatively,” Dr. Durrie said.

While preoperatively 1% of eyes had 20/10 corrected distance visual acuity, at 3 months postop 7% had 20/10 or better uncorrected distance visual acuity; by 12 months it had risen to 16%. The fact that vision continued to improve after 3 months is likely linked to a period of adjustment where patients neuroadapt to changes in higher order aberrations, Dr. Durrie said.

When excimer laser surgery first came out, the idea of super vision was overhyped, Dr. Durrie said. Though the technology has since evolved and many attain high 20/20 rates, there haven’t been a lot in the 20/10 to 20/12 range, he said. “We need to keep looking at if there is something that can make us go to the next level,” Dr. Durrie said, adding that when patients attain acuity of 20/16 or better, they have a tendency to refer more and build the market.

### SMILE in the mix

New refractive inroads are also being made with the more recently developed SMILE technique. In a fellow eye study, investigators led by Marcus Ang, MBBS, PhD, considered how the efficacy of SMILE stacked up to femtosecond LASIK.<sup>3</sup> Those enrolled in the study had moderate to high myopia and underwent SMILE in one eye and LASIK in the other. Investigators found that SMILE attained comparable refractive outcomes to LASIK. With both techniques, all patients attained 20/40 uncorrected distance visual acuity at 3 months postop; 87% of those who had LASIK attained 20/20 uncorrected distance acuity followed by 84% of SMILE recipients, Dr. Ang reported.

Secondary outcomes were also promising. “The patients were quite comfortable during SMILE even though SMILE takes slightly longer,” Dr. Ang said, adding, however, that they did feel a bit more uncomfortable during the lenticule extraction itself, though it wasn’t significant. Early on, patients had more subjective fluctuations in vision with SMILE.

Studies like this increase the refractive choices available to carefully selected patients, Dr. Ang said. “I think what’s helping us is the increased availability of refractive techniques, which increases the surgical options in suitable patients,” Dr. Ang said.

### Treating highly aberrated corneas

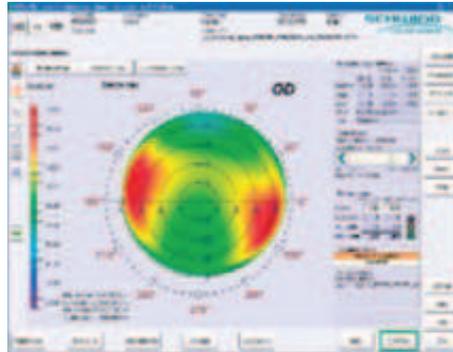
Also gaining ground is refractive treatment for abnormal corneas, according to Jorge Alio, MD, PhD. In a study, Dr. Alio and other investigators identified factors linked with a successful, customized, wavefront-guided treatment in a population with significantly aberrated corneas.<sup>4</sup> Calculations were done patient by patient. Treatment dealt with total eye aberrations, not just corneal ones, as studied preoperatively with the new technology of pyramidal aberrometry developed by CSO Technology, Dr. Alio said. The study was performed with the customized treatment platform of the Schwind Amaris excimer laser (Schwind eye-tech-solutions) guided by total eye pyramidal aberrometry.

Investigators found 72% of eyes achieved uncorrected visual acuity of 0.2 logMAR or better postop. There was a loss of one line or more corrected distance visual acuity in 11% of eyes, Dr. Alio said.

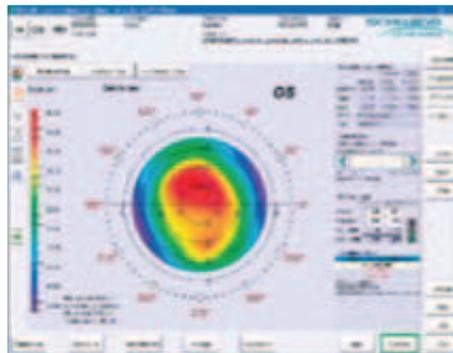
Outcomes for patients who had undergone prior refractive treatment varied depending on the type. “Patients who have been the subject of previous hyperopic treatments, decentered treatments, for instance, have a lot of coma and many times have smaller pupils,” Dr. Alio said, adding that these patients had the poorest outcomes. Meanwhile, those with a previous myopic surgery and a moderate amount of spherical aberration did well.

Dr. Alio hopes practitioners come away from the study with the recognition that there is now a customized treatment for aberrated corneas. However, it is not for everyone. “Some cases are not going to be successfully treated,” he said, adding that other tools need to be developed. The study offers practical information about what can be expected today when dealing with a highly irregular cornea, he concluded. ●

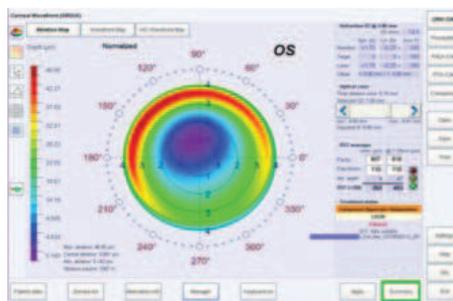
Hyperopic ablation profile with corneal wavefront



Myopic ablation profile with ocular wavefront



Treatment profile



With the customized wavefront-guided approach, the treatment addresses total eye aberrations.

Source: Jorge Alio, MD, PhD

### References

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### Relevant disclosures

- Alio: None  
 Ang: Carl Zeiss Meditec  
 Durrie: Alcon  
 Lin: Schwind eye-tech-solutions

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