

Supplement to EyeWorld May 2014

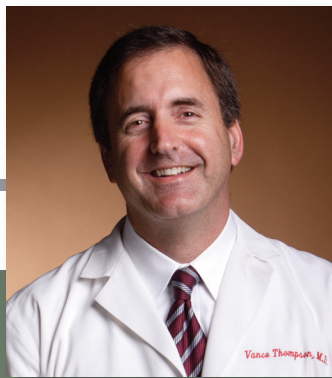
## ***Achieving new levels of patient outcomes and satisfaction with today's refractive and cataract technologies***

- Integrating femtosecond assisted cataract surgery: Arcuate incisions, lens fragmentation, and practice models
- New approaches to extracting lens material after femtosecond laser surgery
- Maximizing outcomes with toric IOLs
- PRK vs. LASIK: Patient outcomes, satisfaction, and your practice
- Driving a new level of laser vision correction outcomes to increase volumes
- Today's refractive and cataract technologies: Are we moving beyond the 20/20 benchmark?
- Key astigmatism data from the ASCRS membership survey

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Vance Thompson, MD

**“Often, patients feel the investment is even more worth it when they learn that the advanced technology implants’ reading and intermediate vision does not deteriorate over the years like their natural lens did.”**

## Talking to patients about refractive cataract surgery advanced technology options

by Vance Thompson, MD

**W**hen I ask cataract surgery patients if they are interested in seeing without glasses after surgery with advanced technology options, in general, one-third say “yes,” one-third say “no” and they are fine with wearing glasses, and one-third say they “don’t know.” Education is key in all of these patients. When all is said and done, in my practice, 40% of patients choose the “premium implant/surgery, minimize glasses wear” journey, and 60% choose the “traditional implant/surgery, wear glasses” journey.

I start out these discussions on options with a lesson in accommodation. I want patients to understand the function of their natural lens. I call it their “reading lens.” It makes sense to them when I explain how the reading lens got stiff in their 40s and they then needed reading glasses or bifocals for near work. I go on to say, “That’s the first thing that goes wrong with your reading lens.” I explain that the second thing that goes wrong with that same reading lens is why they are in my clinic today: “Your lens is now cloudy and is blurring your vision ... it has become a cataract.” I want them to understand that these two things (loss of reading ability and loss of clarity) went wrong with their lens because it helps them to understand that certain lens implant technologies will replace only one issue (the cloudiness) and certain implant technologies will replace both issues (the cloudiness and the reading function).

Many patients in my practice who are interested in advanced technology choose a multifocal or an accommodating lens because they want quality near, intermediate, and distance vision. I explain to patients that multifocal technology is probably the most powerful form of near vision that we can give them. They may experience some nighttime glare or subtle loss of contrast sensitivity in certain low light situations though, so if they seem to be perfectionists or they believe they will have trouble adjusting, they may want to con-

### What do patients want?

- 1/3 Want advanced technology
- 1/3 Don't want advanced technology
- 1/3 Don't know

**Education is key**

- 40%
  - premium implant/surgery “*minimize glasses wear*” journey
- 60%
  - traditional implant/surgery “*wear glasses*” journey

**Education is key for all patients, regardless of their stated preference.**

### Refractive laser-assisted cataract surgery ReLACS

Premium implant  
+

Laser-assisted cataract surgery  
+

Intraoperative aberrometry  
+

Refractive enhancement

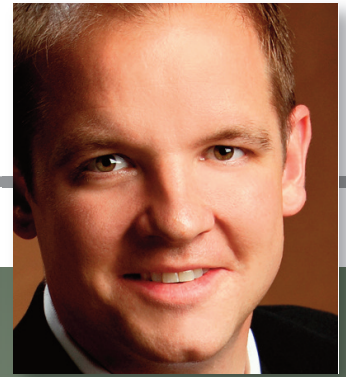
**Patients are receiving a new level cataract procedure with today’s technology.**

sider accommodative technology. I educate them that accommodative technology will give them the best low-light image quality, such as nighttime driving, but that the near may not be as powerful as they like and thus readers may be needed for some small print reading. This same accommodative technology in its current state can give seamless vision at all three distances if the patient is willing to accept a small amount of monovision, say  $-0.75$  D. No technology is perfect, though,

and patients are often very comfortable accepting that as long as they are told all the facts preoperatively. If you are operating on a cataract patient who is younger than 60 years old, it is important to remember that he or she often has some accommodative ability. For example, if you operate on a 47-year-old cataract patient who is in bifocals and you don’t tell him that with a monofocal implant he may be using a trifocal for intermediate vision

# Integrating ReLACS into today's practice

by Matt Jensen

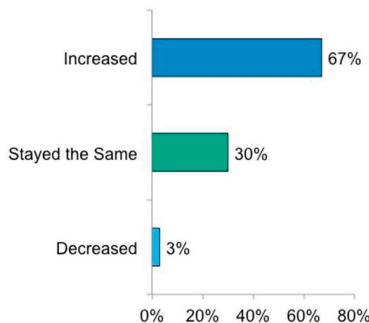


Matt Jensen

***“Of the 35,821 laser cataract procedures performed between January 2013 and December 2013, 57% were conventional IOLs, 24% were presbyopic IOLs, and 19% were toric IOLs.”***

## Impact of Laser on Elective Lens Packages

Since offering laser cataract surgery, the number of patients choosing an elective lens package has...



**After incorporating laser cataract surgery, most practices say that the number of patients choosing an elective lens package has increased.**

**R**efractive laser-assisted cataract surgery (ReLACS) is a simple procedure that is performed with a femtosecond laser—technology that our industry has known and loved for quite a while. The distinction between ReLACS and LACS is important because even the nomenclature is a cue that helps determine how the procedure is charged for and reimbursed.

The first femtosecond laser used for ReLACS was labeled by the FDA for four uses: the incision, the capsulorhexis, the breaking up of the lens, and arcuate incisions. This is important because three of these four items are already covered cataract services by payers.

Because of the heavy capital expense associated with using a femtosecond laser for cataract surgery, surgeons need to be aware of what they can actually charge payers for. In 2005, there was a marquee event in the advanced implant world for cataract surgery—practices were now able to charge for refractive diagnostics that, when combined with advanced IOLs, could reduce refractive errors, such as presbyopia and/or astigmatism.

This was an important event in ophthalmology because it unbun-

dled the combined portions of the cataract surgery package that were previously locked down. Now, there are the traditional or medical components of cataract surgery, and there are the elective portions of surgery that patients might pay for additionally.

There have always been many regulations overseeing the traditional or medical components of cataract surgery. Today, practices need to understand what they can bill for and what will be reimbursed regarding the elective components of the procedure. Things that might be included in the refractive portion of the consultation are refraction, OCT, and wavefront that might be used for laser vision correction. True, many of these diagnostics may be covered with a chief complaint, but many refractive cataract surgeons feel they benefit from the information these tests provide. For the astigmatic or presbyopic lenses, the patient pays an additional fee. After surgery, there could be a laser fine-tune performed.

By navigating reimbursement appropriately for those services, practices can align the work they're performing with the reimbursement and can find ways to add new technology, like femtosecond lasers,

to their premium IOL program. This is how practices can bring this to market and set up their billing.

According to a recent survey conducted by Spectacle in association with SM2 Strategic, practices with femtosecond cataract lasers are ramping up quickly to an average of 30% laser penetration of their cataract practices. Additionally, most lasers are exceeding the volumes needed for a positive return on investment. In fact, most single-surgeon centers are achieving at least near breakeven volumes, and nearly all multi-surgeon centers are doing so.

This survey included 330 lasers that were installed by the end of 2013. Data collected cover the 35,821 ReLACS cases from January 2013 to December 2013. Surgeons averaged 741 cataracts per year, with 21% of their implants being premium IOLs (10% toric and 11% presbyopic lenses).

Practices were asked whether the adoption of the laser affected the volume of cataract procedures performed by the practice. Sixty-seven percent of practices reported their volume increased, 30% said there was no change, and 3% reported that their volume decreased.

Of the 35,821 laser cataract procedures performed between January 2013 and December 2013, 57% were conventional IOLs, 24% were presbyopic IOLs, and 19% were toric IOLs.

According to the survey results, 3% of surgeons felt the laser had already paid for itself, 79% felt the volume had surpassed the breakeven point, and 18% had a positive outlook but had not yet broken even. Given their experience, 84% said they were likely to recommend that their peers get involved and begin performing laser cataract surgery.

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Robert Rivera, MD

***“Dr. Rivera tells his patients that LACS makes the procedure easier on them, as well as the surgeon.”***

## Top 5 pearls for integrating LACS into a refractive cataract practice

Robert Rivera, MD

**R**obert Rivera, MD, of Hoopes Vision in Draper, Utah, spoke about his top 5 pearls for maximizing outcomes in today's laser-assisted cataract surgery (LACS) practice at an EyeWorld education symposium at the ASCRS•ASOA Symposium & Congress.

“For so many years, we talked our patients out of the belief that cataract surgery was done with lasers. Now we find ourselves talking our patients into believing their cataract surgery should be done with a laser,” said Dr. Rivera.

When speaking about reasons why physicians would want LACS for their patients, he listed the following reasons:

- Precision and standardization of corneal incisions across multiple surgeons
- Precision of capsulotomy, including size and centration of the limbus, pupil, and capsule, and improvements in effective lens position.
- Softening of the nucleus to minimize phaco

Dr. Rivera said that some doctors not performing LACS have the “perfect surgeon” mentality. “Some doctors believe they perform cataract surgery flawlessly or that the femtosecond laser doesn't do anything better than can be performed by hand. Others may consider the femtosecond an expensive ‘toy,’ or that their results are already as good as is possible,” he said.

The good news is that the most recent LACS technology addresses most of these concerns. Many of these doctors have not seen the latest LACS lasers in action, not learned to adapt, and may be left behind if they continue to wait.

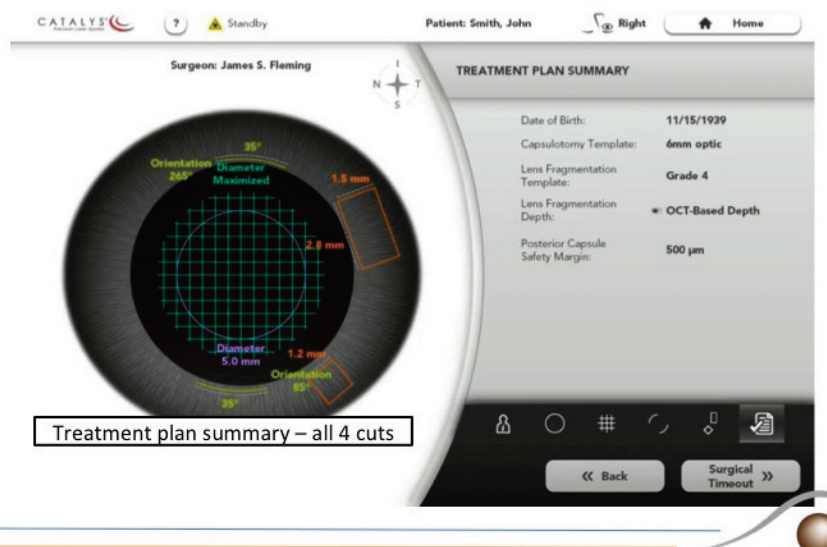
Once a decision has been made to introduce LACS into a practice, it is critical to set appropriate expectations and make the necessary adjustments for success.

Dr. Rivera has learned several lessons from his LACS experiences to date:

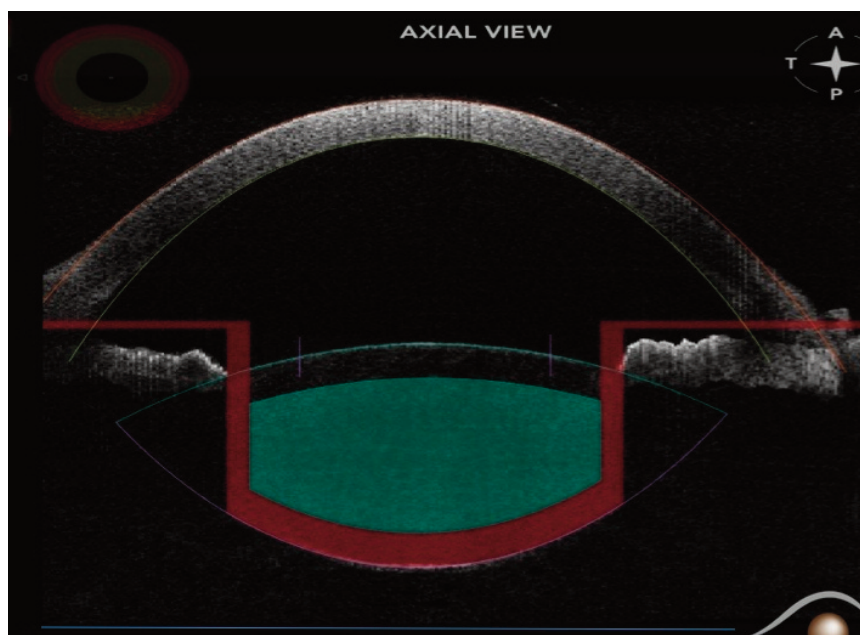
- The laser won't sell itself; proper patient education and counseling is key.
- A public bias already exists in favor of laser.
  - Patients may not understand premium IOLs.
  - Everybody knows laser is better.
- The largest percentage of patients opting for LACS is actually the monofocal group.
- Post-refractive patients are already familiar with out-of-pocket payments for premium results.

He shared his 5 top pearls for a practice considering or in the process of integrating LACS.

### Customizing cataract surgery



Treatment planning options with laser cataract surgery



Axial view of the OCT planning of a lens ablation

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## Changing the approach to lens extraction with femtosecond laser-assisted cataract surgery

by Shachar Tauber, MD

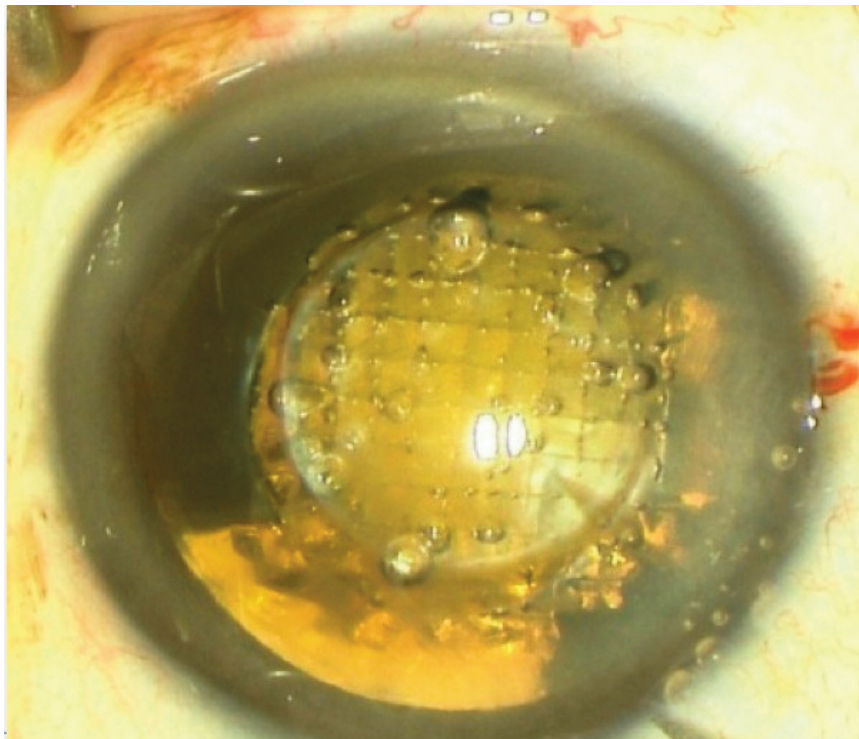
**W**e incorporated femtosecond laser-assisted cataract surgery into our practice a year ago, and it has been a wonderful addition that has changed almost everything about routine cataract surgery.

In our OR, the Catalys (Abbott Medical Optics, Santa Ana, Calif.) sits right next to the microscope and the Signature unit. The femto part of the procedure includes the incisions, the fragmentation, and the capsulorhexis. The great thing is that the parts of the procedure that use the most energy and have the most potential for surprise are done with the femtosecond laser. It's a whole new puzzle to look at because the tricky parts are already done.

Immediately after we started using the femtosecond laser, we found that the rhexis was incredibly strong and forgiving. The lens came out in such a way that we changed the way we approached the phaco unit. The phaco unit was no longer a huge engine that required a lot of ultrasound energy. Once we understood that, we had to change our parameters for phaco, and I didn't use the same divide-and-conquer or cracking technique simply because it wasn't necessary. It was excessive, and it didn't make sense.

The first thing we noticed was that phaco time decreased dramatically. We have five surgeons in my practice, and we all have very different ways to approach a cataract. One surgeon does divide-and-conquer. We have crackers and splitters, and we have a doctor who essentially bowls out the cataract. We quickly saw not only the phaco times go down, but also the amount of infusion of fluid going into the eye. We never change bottles anymore, and we used to have about 200 mL of balanced salt solution going into the eye.

With the femto laser, the lens is already divided up once the phacoemulsification process begins. Prior to femto, we were very comfortable with peristaltic. We knew how to have a rock steady chamber, and we knew how to do our different techniques. None of us



**With the femto laser, the lens is already divided up once the phacoemulsification process begins.**

really had experience with Venturi, but the Venturi side of the machine works quite well.

Cubes are becoming popular with all of the femto lasers for dividing up the lens, and we got them consistently from day 1. Out of the box, we were making these cubes, 350 to 500 depending on the consistency of the lens, and it took a little bit of time for us to understand that a 40-year-old with a posterior subcapsular cataract is different from a 90-year-old with a "catarock"—a 4+ brunescient cataract. But getting the cubes to come in, by telling the femto to cube it in such a way, has made the disassembly very controlled.

Use caution because the cubes are very small, and sometimes they will park themselves in the paracentesis. As we are implanting the IOL, we will put some viscoelastic through the paracentesis, and every so often, a little cube comes out. It comes out very easily with I/A, but that control piece is wonderful.

With Venturi, you have to be patient. You can't go fishing like you do in peristaltic. There is value in

being able to switch from peristaltic to Venturi. Most of us have come from peristaltic, so there is a sense of comfort with it. The ideal situation is to remove the first piece with peristaltic, remove the two other quadrants with Venturi, and then go back to peristaltic. It's a nice transition. There are certain instances where different techniques do better. In phaco flip techniques, I think peristaltic would do better, but I don't think that long term we will see a lot of peristaltic surgeons out there. The more complex surgeries that we see, which is really where the femto has no competitor, is where surgeons are going to want their Venturi.

This is the future of cataract surgery in our opinion. Last month, we completed our first year of this, and we have enjoyed the added precision and accuracy. It has been a great addition to our practice.

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Shachar Tauber, MD

***"We had to change our parameters for phaco, and I didn't use the same divide-and-conquer or cracking technique simply because it wasn't necessary."***





Eric Donnenfeld, MD

**“Femtosecond arcuate incisions are fully customizable and adjustable, now making refractive incisions more of a science instead of an art form.”**

## New levels of precision available for refractive cataract surgeons with femtosecond arcuate incisions

by Eric Donnenfeld, MD

In a presentation at an EyeWorld CME Education symposium, **Eric Donnenfeld, MD**, Long Island, N.Y., discussed the future of astigmatic incisional surgery.

Today, some surgeons are performing limbal relaxing incisions (LRIs), however these incisions include several positives and challenges, according to Dr. Donnenfeld. The pros include that they are inexpensive, easy to perform, there is minimal instrumentation involved, they can be done at the time of cataract surgery, there is no impact on cataract healing and can be repeated. However, some of the challenges are that they include a variable and unpredictable treatment and response. This is because many LRIs performed via hand have imprecise depth, length, angulation, and position of the incision.

“LRIs are an art form, not a science,” said Dr. Donnenfeld. The response remains unpredictable. This variable response in incision is due to age, corneal diameter/curvature, pachymetry, corneal biomechanics and IOP fluctuations.

Femtosecond laser-assisted arcuate incisions are a new alternative to manually performed LRIs. These femtosecond arcuate incisions are fully customizable and adjustable, now making refractive incisions more of a science instead of an art form. With a femtosecond laser, surgeons are able to place desired incisions at the exact size, place and depth that is intended and planned with sophisticated planning software. Dr. Donnenfeld is currently performing these incisions both with the Catalys (Abbott Medical Optics, AMO, Santa Ana, Calif.) and LenSx Laser (Alcon, Fort Worth, Texas), and also the iFS femtosecond laser (AMO).

Dr. Donnenfeld also finds laser arcuate incisions highly adjustable. He is able to titrate response by using the laser to adjust the line separation, spot separation, energy and angulation of incision. Dr. Donnenfeld’s nomogram for LRI and arcuate incisions is shown in Figure 1.

Dr. Donnenfeld’s latest applications of femtosecond arcuate incisions involves the creation of intrastromal ablations for astigmatism. These incisions are placed by the laser below Bowman’s membrane and can be opened partially or fully

### Starting laser nomogram

Donnenfeld nomogram for limbal relaxing incisions		Nomogram for 9 mm arc incisions
0.50 D	1 incision, 1 ½ clock hours (45 deg. each)	1 incision, 1 clock hours (30 deg. each)
0.75 D	2 incisions, 1 clock hour (30 deg. each)	2 incisions, 2/3 clock hour (20 deg. each)
1.50 D	2 incisions, 2 clock hours (60 deg. each)	2 incisions, 1 1/3 clock hours (40 deg. each)
3.00 D	2 incision, 3 clock hours (90 Deg. Each)	2 incision, 2 clock hours (60 deg. each)
*Use 5 degrees more for against-the-rule-astigmatism *Use 5 degrees more for younger patients *Use 5 degrees less for older patients		85% depth

Dr. Donnenfeld provides nomograms for femtosecond arcuates.

### Precision of femtosecond arcuate incisions



**Femtosecond arcuate incisions provide greater accuracy and precision over manual incisions.**

at the surgeon’s discretion postoperatively, to adjust the level of effect. “The full effect of the incision is not achieved until the incision is manually opened either intraoperatively or postoperatively,” he said.

Overall these intrastromal incisions are less effective than full thickness incisions, so a smaller optical zone should be used. By keeping Bowman’s membrane intact, the patient has less pain, reduced loss of corneal sensation, less dry eye, greater wound stability, and no need for antibiotics.

In summary, Dr. Donnenfeld believes LRIs and arcuate incisions are now playing an increasingly important role in refractive cataract

surgery. Today, most ophthalmologists do not perform astigmatic incisions (as discussed in Dr. Vukich’s article later in this supplement), and the femtosecond laser may increase the number of doctors performing these procedures.

“Femtosecond arcuate incisions may now be made at the time of cataract surgery with increased precision and safety. Additionally, intrastromal arcuate incisions will play an important role in astigmatism management moving forward,” he concluded.

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more than he did with the natural lens, you may end up with a frustrated patient. Many 47-year-old cataract patients are not using their bifocals at computer intermediate distance, but once they have a traditional monofocal implant, they won't have the same intermediate vision they did preoperatively. They like knowing this ahead of time so they can make an informed decision. As you can see, I have not even mentioned thus far some of the other technologies that I use in refractive cataract surgery. This is because I believe patients want to hear about their vision options first rather than have to decide in an à la carte fashion what technologies I am going to use to get them there. But once I have figured out what vision they want to achieve, we go into the technology we use to achieve their goals.

Because the femtosecond laser precision (incisions, capsulotomy, nuclear division/softening, and astigmatic keratotomy) has become so core to our refractive cataract program, we call it refractive laser-assisted cataract surgery (ReLACS). In addition to the femtosecond laser, we use intraoperative aberrometry for helping us achieve the most accuracy in our implant power selection. We then let the patient heal for 3 months. If his or her vision is not ideal 3 months postoperatively, we then use the laser to perform an enhancement via PRK or LASIK.

I emphasize to patients that cataract surgery, for the most excellent visual outcome, is often a two-step process with either traditional or advanced technology lenses. If they choose a traditional approach and implant, we perform the surgery, and then a month later the second step to fine tune their vision to its very best is prescribing quality glasses. If they choose an advanced technology surgery and implant, we perform the surgery, and then use a

laser PRK or LASIK as the second step to fine tune the result to its best.

In our practice, it is the doctor who explains how advanced technology requires an investment by patients above and beyond what their insurance reimburses for therapeutic cataract surgery. Even though our surgical counselors cover the details, we find it is helpful for the doctor to begin the financial counseling about the cost of the patient's choice. Often, patients feel the investment is even more worth it when they learn that the advanced technology implants' reading and intermediate vision does not deteriorate over the years like their natural lens did. This is an important point to explain. As long as their eye health stays good, they will not experience gradual deterioration, so they are investing in a lifetime of vision.

When I go into a refractive cataract surgery case, I am glad that I'm using a laser. It is more precise, and I can reproducibly create better incisions, better capsulotomies, and better nuclear division so less phacoemulsification energy is required. I am also glad that I have intraoperative aberrometry to help me with implant power selection so I can hit a home run on achieving their uncorrected vision goals. If I don't hit that absolute goal, I get close enough that they do not need temporary glasses while waiting 3 months for the refractive enhancement. Traditional cataract surgeons can start out in a smart way as they enter this premium arena but with time and growth in their advanced implant cases I predict they will become like I have—dependent on the femtosecond laser and the intraoperative aberrometer in my refractive cataract practice.

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First, he said they should understand and believe in the technology. "If you don't have conviction, patients will sense this. Give a firm, consistent recommendation to patients, and visit a practice with proven success with LACS," he said. He recommended learning from how others invented their processes to give you a good idea about how to create your processes.

Second, he recommended designing a practice around the femtosecond laser as much as possible. "Don't make it look like an afterthought. Engineer around footprints, flow, efficiency, and engage your staff in the process. If your staff hates your laser or its flow, their day is not made easier. A more difficult day for staff translates into a more difficult day for the patient," he said.

Third, never assume a patient won't be interested in LACS. "Astigmatism management means better vision without glasses," he said. Dr. Rivera tells his patients that LACS makes the procedure easier on them, as well as the surgeon.

Fourth, treat every patient until they reach not just "20/happy," but

"20/ecstatic." Dr. Rivera has a preop discussion on patient expectations and speaks to the strengths of the technology. "However, always speak to weaknesses of the technologies as well," he said.

Finally, take a serious look at the personality of your practice. "Do not be afraid to modify it when needed. LACS represents a premium mindset, and a premium mindset demands a premium experience. It's important to remember that it is not just cataract surgery anymore," he said.

"LACS is not a fad. Overall it minimizes case-to-case variability, minimizes trauma to adjacent non-target tissue, and continually makes tough cases easier, and complicated cases more routine," Dr. Rivera noted.

Minimizing phaco energy makes the procedure no longer "femtophaco" but "femtoemulsification" according to Dr. Rivera. "LACS represents the greatest innovation in cataract surgery since the advent of phacoemulsification. Femtoemulsification is here to stay and is not about practice revenue; it is about obtaining the best patient outcomes," he concluded.

## Dr Rivera's top 5 pearls for LACS integration

1. Understand and believe in the technology.
2. Design your practice around the femtolaser as much as possible.
3. Never assume a patient won't be interested in LACS.
4. Treat patients until they reach not just "20/happy," but "20/ecstatic."
5. Take a serious look at the personality of your practice and don't be afraid to modify it when needed.





Elizabeth A. Davis, MD, FACS

**“In Dr. Schallhorn’s study, patients’ satisfaction went down linearly as the amount of astigmatism went up.”**

## Achieving good outcomes with toric IOLs

by Elizabeth A. Davis, MD, FACS

**T**he key to achieving good visual results with toric IOLs is understanding the importance of stability of the IOL and the effect of rotation on vision. Even small amounts of rotation can result in significant cylinder power loss. For example, 1 degree of rotation causes a 3% cylinder power loss, 10 degrees causes a 35% loss, and 30 degrees causes a 100% loss. Additionally, 90 degrees of rotation doubles the amount of astigmatism.

To determine the effect of residual astigmatism on vision, Steve Schallhorn, MD, conducted a study of 4,970 consecutive eyes undergoing multifocal IOL implantation. According to the study results, 81.3% of patients who had no postoperative cylinder had 20/20 uncorrected distance visual acuity (UCDVA), 54.3% of those with 1.0 D of postoperative cylinder had 20/20 UCDVA, and only 10.9% of those with 2.0 D of postoperative cylinder had 20/20 UCDVA.

Residual astigmatism also has an effect on patient satisfaction. Because patients are paying a premium for good refractive outcomes, they are obviously disappointed if their uncorrected visual acuity is not what they had hoped for. In Dr. Schallhorn’s study, patients’ satisfaction went down linearly as the amount of astigmatism went up. For example, 73.2% of patients with no postoperative cylinder said they were very satisfied, 66.9% of patients with 1.0 D of postoperative cylinder were very satisfied, and 47.1% of patients with more than 1.5 D of postoperative cylinder were very satisfied.

Residual cylinder also exacerbates glare and halos. In achieving good refractive outcomes and quality of vision, surgeons aim to minimize both sphere and cylinder to have the best quality of vision. This is especially true with higher levels of cylinder correction. The effect of rotation is even more significant on quality of vision with a higher power toric lens than a lower power.

In Dr. Schallhorn’s study, 24.8% of patients with no postoperative cylinder had glare compared with 29.2% of patients with 1 D of postoperative cylinder and 28.6% of patients with more than 1.5 D of postoperative cylinder.

Similarly, 24.9% of patients with no residual cylinder had halos, compared to 32.2% of those who had 1 D of residual cylinder and 35.7% of those who had more than 1.5 D of postoperative cylinder.

Once surgeons understand the importance of stability in toric lenses, they will appreciate the Tecnis Toric (Abbott Medical Optics, Santa Ana, Calif.), which stays in the position it is implanted. Investigators evaluated the rotational stability of the Tecnis Toric in a prospective, multicenter, two-armed study. The study was conducted at 14 sites in the U.S. and Canada. High-resolution digital slit lamp retroillumination photographs were analyzed using validated, axis-measurement software. The program used iris and/or scleral landmarks to align images from later time points with the baseline image of a given eye.

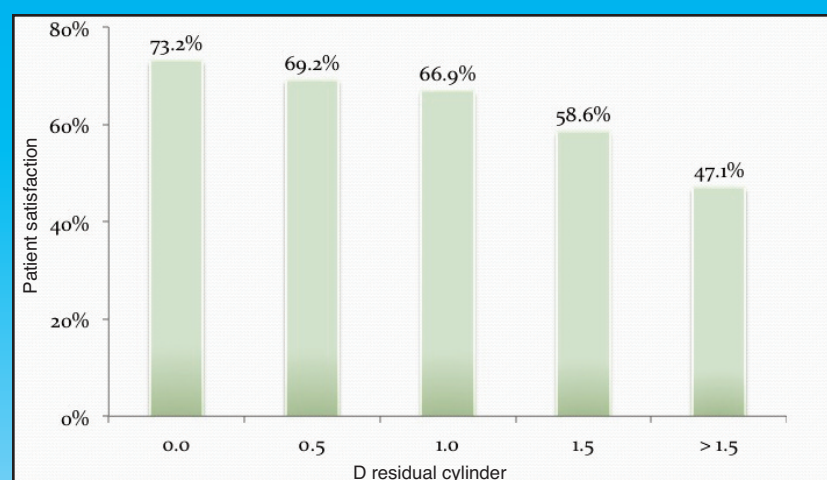
More than 93% of all of the Tecnis Toric IOL first eyes had less than a 5-degree change in axis

between their 1- and 3-month visits and between their 3- and 6-month visits, and the average was less than 3 degrees. The ANSI standard for a toric IOL is greater than 90% for a less than 5-degree axis change, so it well exceeded that standard.

The 2013 ASCRS Clinical Survey found that surgeons’ preferences are varied with regard to how to treat astigmatism. This survey was completed in April 2013 and included 1,041 respondents. Of all the cataract surgeries performed in the United States, about 15% are toric. This percentage is higher (23%) outside the United States.

Surgeons’ opinions were mixed with regard to how to manage a patient with 1.25 D of astigmatism. Twenty-five percent of U.S. surgeons would manage this amount of astigmatism with LRIs or AK, approximately 50% of U.S. surgeons

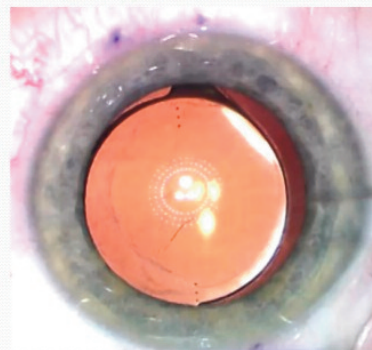
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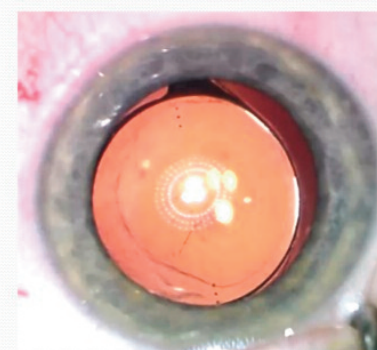
**Patient satisfaction goes linearly down as residual astigmatism goes up.**

Data courtesy of Optical Express

### Before Rotation After Rotation



-1.00 + 1.75 x 150  $V_{a_{sc}}$  20/60



plano + 0.50 x 112  $V_{a_{sc}}$  20/20

**Proper toric alignment is critical to ensure optimal outcomes.**

# Incrementally improving patient outcomes

by Jason P. Brinton, MD

**W**hen laser vision correction was first performed 25 years ago, patients and surgeons alike were thrilled to be able to reduce high levels of myopia to much more manageable lower levels, complete with thinner spectacles. With time, advances in excimer lasers have brought more sophisticated ablation profiles, reduced ablation depths, optimized or customized ablation shapes and blend zones, iris registration, dynamic eye trackers, and intraoperative correction for both dynamic and static cyclotorsion. Femtosecond lasers

improved flap quality, and we were now consistently providing patients with 20/20 vision.

But is 20/20—as measured on an eye chart—good enough today? The simple answer is, “Not anymore.” More importantly, how we measure refractive success is as important as how we achieve it for our patients. A 2013 ASCRS Clinical Trends survey found almost 20% of respondents don’t have a standardized method for determining if their patients are successful. We need better metrics.

### The visual performance angle

Years ago the decision to get LASIK was to end spectacle or contact lens

use. Today people want postop vision to be better than their best corrected visual acuity (BCVA). At Durrie Vision, we use a variety of laser and femtosecond platforms and prospectively evaluate patients scheduled to undergo bilateral LASIK to develop new outcome metrics. Achieving 20/20 with the tools we have available, however, doesn’t account for issues that may adversely impact the perception of good vision—contrast sensitivity, night driving issues or higher order aberrations, or fluctuating vision early on.

We concentrated on the speed of visual recovery (how fast could patients return to normal activity, etc.) and subjective evaluations. By month 1, 100% of the eyes were 20/20, and 92% were 20/16.

Subjectively, 77% felt comfortable sending a text message immediately after surgery, and 100% felt comfortable driving after 4 hours.

Our internal analyses found that levels of patient-reported dry eye were significantly lower than what patients reported preoperatively (dry eye was not induced in patients without a history of dry eye). Halos, glare, and night vision problems were also significantly better than preop levels for wavefront-guided and wavefront-optimized treatments.

For us, the key subjective question is how likely the patient is to refer a family member or friend. Refractive practices survive and prosper on word-of-mouth referrals. Our marketing research found that practices used to be able to overcome one unhappy patient by having 9 happy ones. These days, social media has drastically altered those numbers—it will now take an extra 33 happy patients to overcome one unhappy patient. We simply cannot afford to have unhappy patients.

### Preoperative evaluations

A decade ago, 90–95% of our patients were happy. These days, we believe those numbers need to be closer to 100%.

To do this, we employ comprehensive testing on all new patients. In addition to the standard battery of preoperative tests (manifest refraction, ocular dominance testing, etc.), we measure endothelial cell counts via spectral microscopy,



Jason P. Brinton, MD

**“It will now take an extra 33 happy patients to overcome one unhappy patient.”**

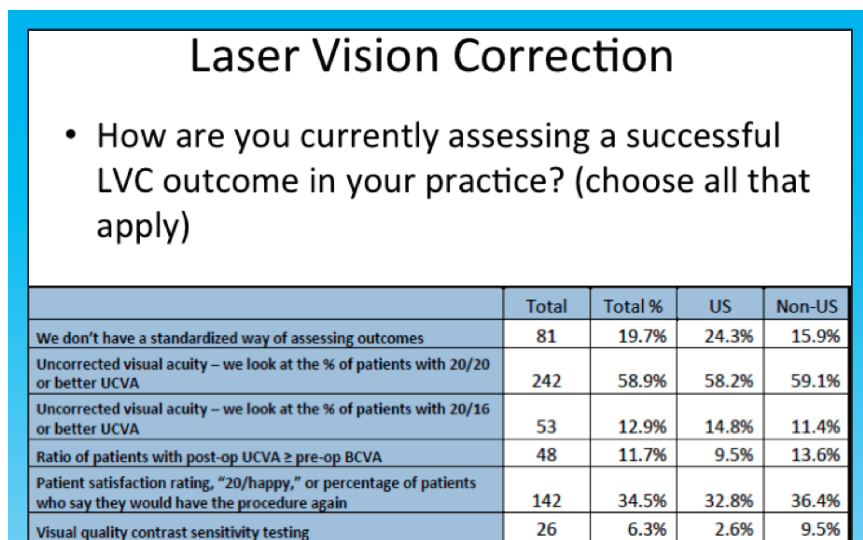


Figure 1. Measuring laser vision correction outcomes  
Source: 2013 ASCRS Clinical Survey

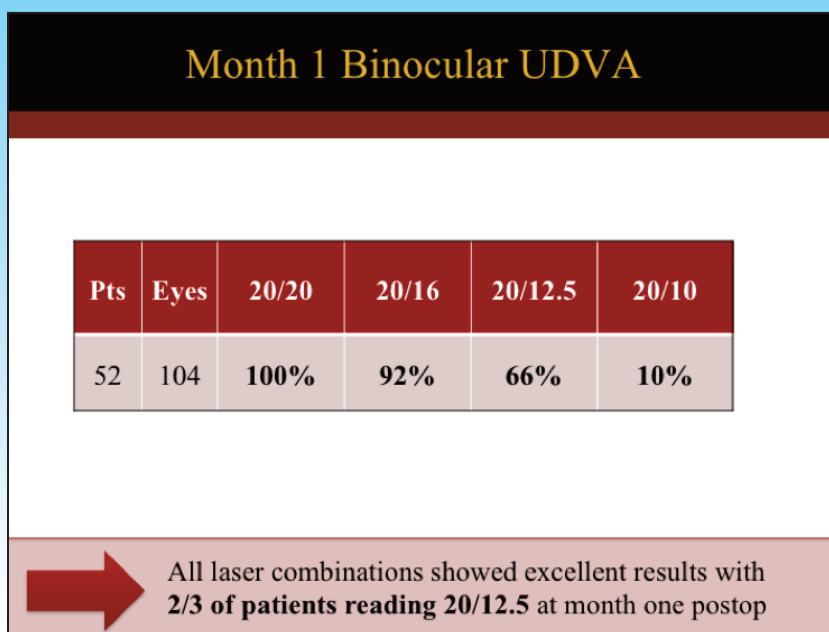


Figure 2. Month 1 binocular uncorrected distance vision across laser platforms

Source: Durrie Vision

continued on page 15





Lou Probst, MD

**“In the heyday of LASIK, hanging out a shingle was probably enough to drive business through the doors. Today’s much more cautious economic environment means expansion must become multifactorial.”**

## On the path to recovery?

by Lou Probst, MD

### Some early signs indicate a potential uptick in LASIK surgeries

**T**he fate of laser vision correction surgery is heavily associated with the U.S. Consumer Confidence Index, and many refractive surgeons (myself included) were somewhat surprised that when the Index rose last year with the economic recovery, LASIK surgeries did not increase concurrently.

For the first time in the past 5 years, however, we are starting to see some growth. It’s too early to say whether this is a true uptick or just an anomaly, as TLC The Laser Eye Centers only noticed this growth in the first quarter of 2014. Our locations are predominantly in the midwest, and we’ve been able to follow the economic recovery. Different parts of the U.S. have recovered at different rates. For example, our centers in Wisconsin were barely affected by the economic downturn, but mainly because that area has a high prevalence of high tech business and is predominantly white-collar industries. Illinois, however, is still slowly recovering. The housing market remains flat. In our Tampa centers, the economy is still depressed, but the housing market is starting to see an increase with smaller numbers of foreclosures.

### Millennials, Yummies, and more

Today’s laser vision correction market comprises three types of potential candidates:

The Millennials (the people who are now in their 20s and early 30s, also sometimes referred to as “Generation Y”) are a unique dynamic—their numbers surpass those of the Baby Boomer generation, and they are well-educated people who want LASIK. In some cases, their parents had LASIK. A recent article in *Time* said 62% of Millennials consider themselves disciplined or highly disciplined financial planners, and 84% consider themselves “passionate” about creating financial security.<sup>1</sup> This almost obsessive interest in money is rooted in the generation’s lack of it—this group was graduating college with enormous debt and few job prospects. They’re typically

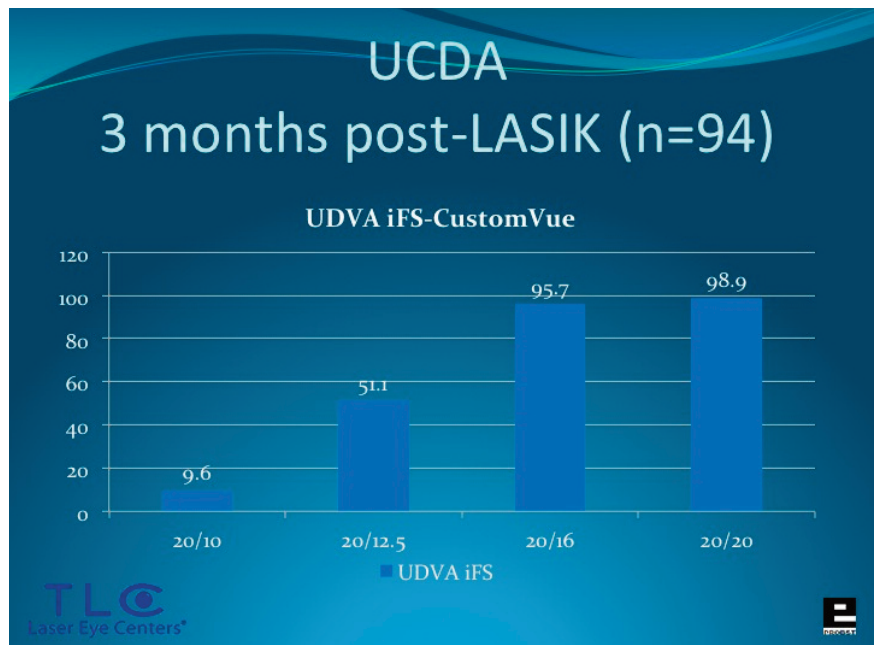


Figure 1. Three months post-LASIK results

Source: Lou Probst, MD, TLC Laser Eye Centers

underemployed and living with their parents; they’ve witnessed their parents lose jobs or struggle through pay cuts. So, what money Millennials do have, they’re reluctant to spend. Certainly, they’re reluctant to spend it on LASIK, regardless of how much they may desire it. Yet this group remains optimistic about their financial future, and we should not discount this potential revenue base.

What’s more encouraging for our practices, however, is a subset of the Millennials. Financial planning firm HSBC released a report last month titled “The Rise of the Yummy: Young, Urban, Male: three reasons to rejoice.”<sup>2</sup> The Yummies graduated college with high-paying jobs in hand. High-end retailers (including Michael Kors, Burberry, and Coach) are actively pursuing this subset. Psychologically, these consumers want to display social status early on, and customized laser vision correction easily falls into that category.

The final group comprises those whose parents have the disposable income and are willing to spend it on their children. The parents typically had LASIK and are the instigators with their children. They view it as the last major financial responsibility—they’ve paid for braces, for college, and now for LASIK. This group already knows the benefits laser vision surgery can offer—and their surgery was long before the days of wavefront-

guided lasers, or even femtosecond lasers in some cases.

### Patient expectations

With the latter of the three Millennial groups, parents expect the child to do at least as well postoperatively as the parent did. These are a thoroughly unique set of potential patients. They’re typically in their last year of college and have a laissez-faire attitude. There’s a youthful confidence in this group, a very relaxed view of life.

While we expect patients to get nervous about the procedure, this group is almost the exact opposite. They’re indifferent, as though LASIK was something they were always going to get. They know what it is from their parents; they understand its benefits. This group may need a bit more chair time to thoroughly review potential complications simply because they don’t believe any negatives about LASIK exist. They continually view LASIK as just another step in their life plan, as common as graduating high school or college.

### Today’s patient generator

In the heyday of LASIK, hanging out a shingle was probably enough to drive business through the doors. Today’s much more cautious economic environment means expansion must become multifactorial—direct marketing, OD referrals,

# Re-examining visual recovery in the LVC patient

by Steven J. Dell, MD

**R**efractive surgeons avoid LASIK in certain populations because of a concern over dry eye and to avoid the potential for ectasia that LASIK brings, and about 18% of ASCRS members currently perform PRK instead. Yet we know LASIK has an incredibly high patient satisfaction rate and much faster visual recovery than PRK, so the question remains: Are we being overly cautious by performing surface ablative techniques? One of the largest cohorts to date (more than 45,000 eyes) would seem to suggest we are.

Optical Express conducted a visual recovery analysis of 1,846 eyes that underwent PRK compared to 44,475 eyes that underwent LASIK in 2013; fairly standard inclusion criteria were used, including that evaluations were on eyes that had primary laser vision correction procedures only, procedures had to be consecutive, and ablation profiles used CustomVue with the VISX Star S-4 (wavefront-guided) (Abbott Medical Optics, AMO, Santa Ana, Calif.). For LASIK, the femtosecond flaps were all created with the IntraLase laser (AMO). Follow-up was at 1 day, 1 week, 1 month, and 3 months.

At baseline, the mean preop best corrected visual acuities (BCVA) were identical:  $-0.09 \pm 0.05$  logMAR. There were statistically significant differences in the two groups in mean myopia ( $-2.97 \pm 1.90$  D in the LASIK group,  $-2.85 \pm 1.93$  D in the PRK group;  $P=0.0099$ ) and in mean hyperopia ( $+1.83 \pm 0.98$  D in the LASIK group and  $+1.57 \pm 0.95$  in the PRK group;  $P=0.0003$ ). There were more myopes in the PRK group (89%) than in the LASIK group (85%). There were 43% of patients in the PRK group with  $-1$  D to  $-2$  D manifest preop sphere, and 40% in the LASIK group. Manifest preop cylinder was fairly well matched, too, with 53% in the PRK group and 51% in the LASIK group at  $-1$  D.

## Early postop data favors LASIK

The postoperative uncorrected distance visual acuity (UCDVA) significantly favored LASIK in percentage of patients reaching 20/16 by all time points up to 1 month. At day 1, 72% of LASIK patients but only 9% of PRK patients

## Binocular % 20/16 UCDVA by time point: Significant difference in favor of LASIK

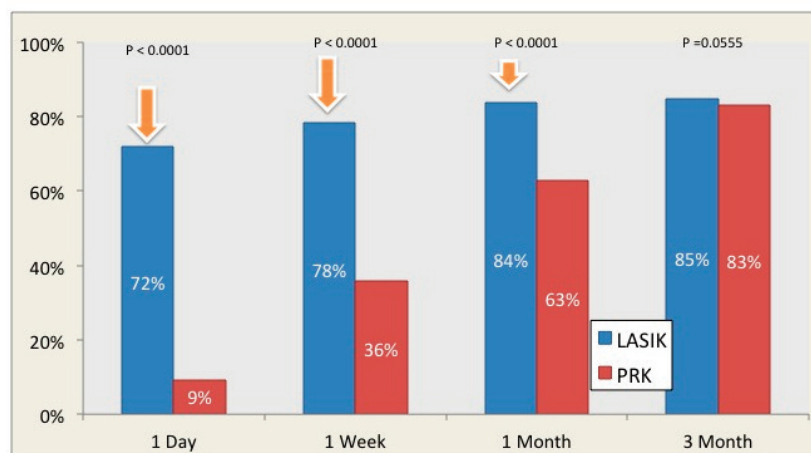


Figure 1. Percentage of patients reaching 20/16 by time point

Data courtesy of Optical Express

reached 20/16. Binocular UCDVA outcomes for LASIK vs. PRK patients reaching 20/20 were: 90% vs. 23% at day 1, 93% vs. 61% at week 1, and 95% vs. 84% at month 1, respectively.

## Correlating preop data to ectasia risk

With data from more than 205,000 patients treated with LASIK or LASEK between 2007 and 2011, an Optical Express analysis found the overall ectasia rate is rather small—0.028% ( $n=58$ ). Of potential interest, however, is that the anterior curvature appeared to be most predictive, while posterior elevation was a lower predictive value.

Using the Randleman Ectasia Risk Score System<sup>1</sup> to categorize eyes, 16,375 were considered “high” risk. Of those, only eight eyes developed ectasia, leading to the conclusion that the Randleman Ectasia Risk Score System on its own has a low predictive value. Some patients, therefore, may have been excluded from LASIK for reasons that seem to have little statistical justification. It is also worth mentioning that the natural incidence of keratoconus should lead to the development of some new cases of ectasia in a population of more than 16,000 carefully monitored eyes, even without surgical intervention.

## Patients prefer LASIK

More importantly, patients are subjectively reporting better outcomes with LASIK earlier than with PRK.

Not only does that contribute to the “wow” factor, but may impact referrals.

Patients preferred LASIK (93% were “satisfied”) to PRK (84%) at month 1 ( $P < 0.0001$ ); by month 3 the differences were not statistically significant, although patients did continue to prefer LASIK more.

The majority of patients in both groups reported “none/a little” dry eye discomfort at month 1, but again, patients in the LASIK group had better outcomes (85%) compared to PRK (79%;  $P=0.0015$ ). By month 3, the differences were not statistically significant, but still favored LASIK over PRK (90% vs. 87%, respectively).

At month 1, starburst or halos only affected 10% of patients in either group, and by month 3, only affected 6% of LASIK patients and 5% of PRK patients.

## Practice economics

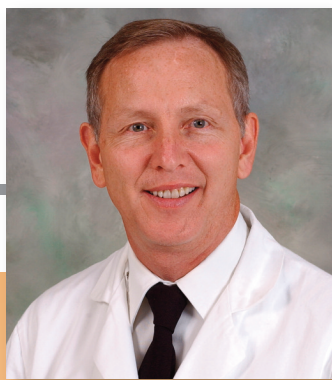
Determining which procedure is better for the health of the practice is multifactorial. The inherent delay in short-term visual recovery in PRK patients leads to fewer patient-to-patient referrals—up to 2 per procedure, according to a survey of leading surgeons. PRK patients need close to an additional 20 hours of follow-up, whereas the LASIK patient is often seen only once or twice after the initial surgery.<sup>2</sup> That additional chair time with the PRK patient is lost revenue and far outweighs the cost of femtosecond upgrades for LASIK. The longer visual



Steven J. Dell, MD

**“Some patients, therefore, may have been excluded from LASIK for reasons that seem to have little statistical justification.”**





Steve Schallhorn, MD

**“Both advanced wavefront and topography-guided ablations have their benefits, and I believe the future of visual outcomes for our patients is beyond 20/20.”**

## Better diagnostics leads to better outcomes

by Steve Schallhorn, MD

**New wavefront-guided system incorporates the best Hartman-Shack aberrometer available, with additional exciting technologies to come**

**O**ptical Express is continually investing in the best refractive technologies for our patients. There are several exciting developments in laser vision correction, with advanced wavefront diagnos-

tics and topography-guided ablations coming soon. Overall, I firmly believe we will see even better outcomes with these new technologies and start seeing results that bring us beyond the 20/20 baseline of our current devices.

We recently had the opportunity to explore a new wavefront diagnostic device. We began evaluating the iDesign aberrometer (Abbott Medical Optics, AMO, Santa Ana, Calif.), part of the iDesign Advanced WaveScan Studio, in a few of our U.K. and Japanese clinics in mid-2012 to see how the results compared with those of the WaveScan (AMO). While I had my doubts that the new technology

could match the outcomes of our fine-tuned and consistently good LASIK using the WaveScan, the results were so impressive we decided to incorporate the iDesign into all of our clinics by the summer of 2013.

We were already producing customized ablations and individualized treatments based on the unique aspects of each eye, however the iDesign further improves that aspect of laser vision correction. It's a significant incremental improvement in customized treatments using a better diagnostic device. It works by taking five measurements (wavefront aberrometry, autorefractometry, topography, keratometry, and pupillometry) in a single capture sequence. The Hartmann-Shack sensor has a higher resolution and a higher dynamic range (sphere range from -16 D to +12 D, cylinder up to 8 D, and higher order aberrations RMS [root mean square] up to 8 microns). It can provide absolute registration of eye motion and pupil shift. Overall, the amount of data that we are capturing is much greater, and this is reflected in our outcomes.

### What we found

After rolling out the device in all of our clinics, we (Optical Express) undertook a large-scale comparison.

We analyzed 8,905 eyes (4,721 patients) with low-to-moderate myopia that underwent LASIK with the iDesign in the U.K. and retrospectively compared results to 27,290 matched eyes (14,589 patients) that underwent LASIK with the WaveScan just before the iDesign rollout. The iDesign group had surgery between May 30, 2012 and August 24, 2013, while the WaveScan group underwent surgery between January 1, 2012 and June 18, 2013. There were slightly more women in each group than men, and the average age was about the same (33.8 years in the iDesign group and 34.6 years in the WaveScan group).

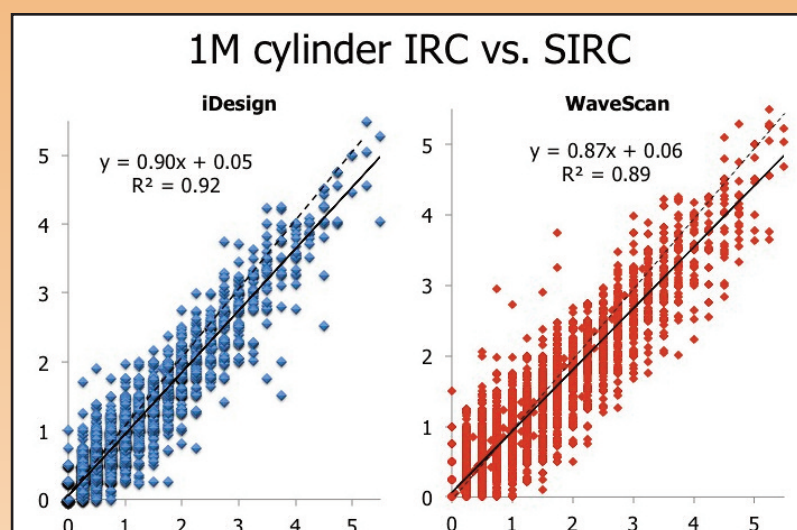


Figure 1. Intended cylinder correction

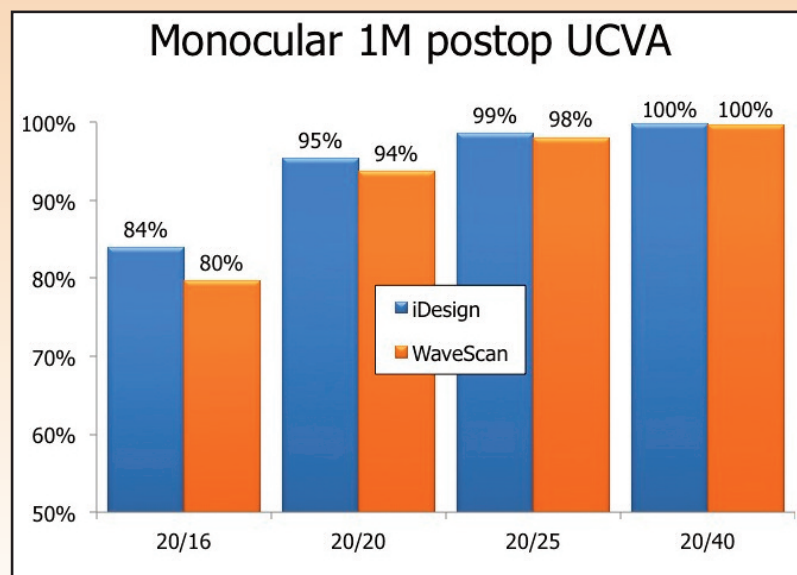
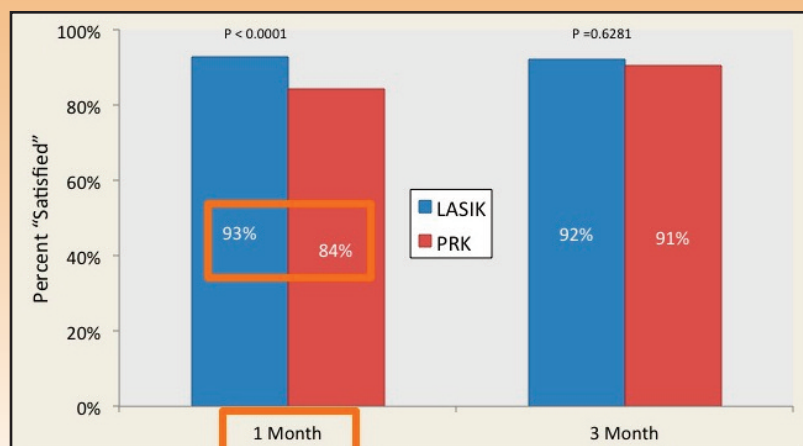


Figure 2: 1 month UCVA rates of WaveScan vs. advanced wavefront technology

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**Figure 2. How satisfied are you with the outcome of your refractive procedure?**

Data courtesy of Optical Express

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At baseline, mean preop sphere in the iDesign group was  $-2.80$  D and mean preop cylinder was  $-0.81$  D; mean preop sphere in the WaveScan group was  $-2.60$  D and mean preop cylinder was  $-0.78$  D.

We looked at uncorrected visual acuity (UCVA), preservation of best corrected visual acuity (BCVA), refractive outcomes, patient satisfaction, and visual symptoms. At month 1, 95.4% of the iDesign eyes were within 0.5 D and 93.9% of the WaveScan eyes were within 0.5 D (more than 99% in each group were within 1.0 D of intended correction). The correction ratio stratified by the intended cylinder correction was better in the iDesign eyes (Figure 1). Besides having an improved correction ratio, there was slightly less axis shift with the iDesign—61.4% of eyes were within 5 degrees, compared to 59.2% with the WaveScan.

In terms of refractive outcomes, all eyes in both groups were 20/40 or better, 95% of the iDesign eyes and 94% of the WaveScan eyes were 20/20, and 84% of the iDesign eyes and 80% of the WaveScan eyes were 20/16. Of note, binocular

uncorrected vision was 20/20 or better in 99% of patients in both groups. There was no difference in the change in BCVA between groups, and more patients gained one or more lines of vision than lost.

An important component of this study showed that patient satisfaction was higher for iDesign, with a better patient-reported quality of vision. An overwhelming 96.5% of iDesign patients were satisfied or very satisfied with their uncorrected vision. Visual symptoms were slightly better with iDesign—patients reported less difficulty with glare, halo, starbursts, and night driving in the iDesign group than in the WaveScan group, although neither group reported more than a moderate level of difficulty in any category or in night driving capability.

For these treatments, we used the AMO recommended iDesign nomogram, which made a slight sphere adjustment based on the amount of cylinder. Our WaveScan treatments used the refined Optical Express nomogram where we matched the manifest sphere

recovery times in PRK may also add up to \$300 for pain medications, the costs of which are borne by the practice or passed along to the patient.<sup>2</sup>

LASIK also may be a compelling choice for enhancements, especially in premium IOL patients. In general, that patient population is older and already likely to have even slower healing times than the traditional laser vision correction patient. If premium lens patients need an enhancement, they're not likely to be satisfied with the initial surgery, and surface ablation will only prolong the healing process (again, likely to result in fewer referrals).

#### Reference

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2. Javitt JC, Chiang YP. The socioeconomic aspects of laser refractive surgery. *Arch Ophthalmol*. 1994;112:1526–1530.

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and added a 5% boost. At Optical Express, we're looking to further improve iDesign outcomes, but clinicians need to remember the outcomes we are already getting with the iDesign are exceptional.

Overall, I think the diagnostic capabilities of the iDesign are remarkable. The wavefront measurement takes the entire optical system into consideration when planning treatments, and we have seen excellent results with this new device.

#### Topography-guided ablations also on the horizon

There are additional exciting technologies on the horizon, with topography-guided ablations. The FDA approved the WaveLight System (Alcon, Fort Worth, Texas), and it uses both Placido disk and Scheimpflug technology, and captures between 22,000 and 25,000 elevation points. Preliminary data shows promising results for treating virgin eyes: 92.7% of all study eyes achieved 20/20 or better, and 68.8% achieved 20/16 or better after 3 months. Almost 30% gained at least one line of BSCVA 3 months postop, and 98% said they would undergo

the procedure again. Topography-guided ablations have advantages in that ophthalmologists are very familiar with topography maps, and there can be less fluctuation compared to a wavefront measurement, as there is less worry about accommodation. Overall, this looks to be a promising treatment option for virgin eyes as well as for therapeutic needs.

#### The future: Beyond 20/20

There are exciting technologies on the horizon for laser vision correction, and we are moving closer to truly customized ablations. Both advanced wavefront and topography-guided ablations have their benefits, and I believe the future of visual outcomes for our patients is beyond 20/20. We need to adapt our technology and measurement standards for delivering these results and provide this high-quality vision to our patients.

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## Management of astigmatism symposium addressing ASCRS membership practice patterns

by John Vukich, MD



John Vukich, MD

**“When asked where laser-assisted cataract surgery may provide a significant clinical benefit versus conventional cataract surgery, 57% of respondents believed there were significant clinical benefits for femtosecond arcuates over manual incisions.”**

**A**t the ASCRS•ASOA Symposium & Congress, John Vukich, MD, co-moderated “The Management of Astigmatism” symposium and opened the program with a presentation on data based on the 2013 ASCRS Clinical Survey. This survey represents 1,041 unique ASCRS members, focusing on the most compelling and controversial issues facing the membership.

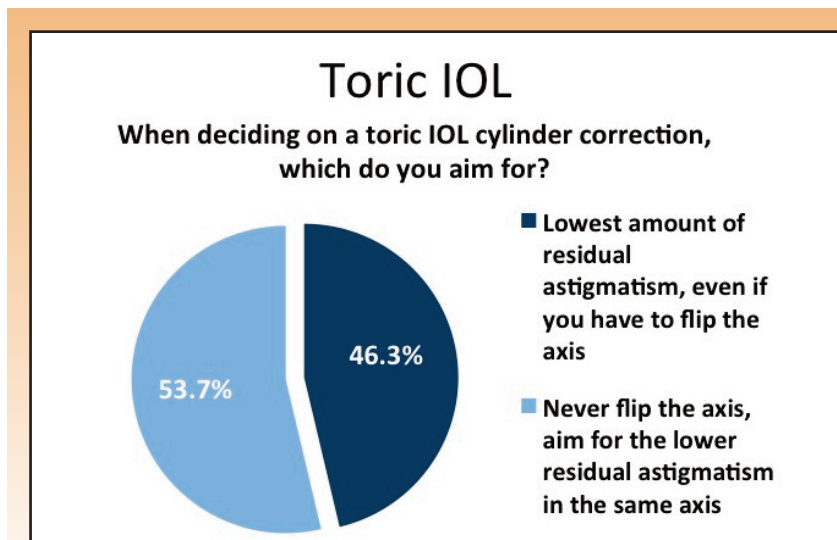
A key section of this survey was based on astigmatism management. Different categories of astigmatism were addressed including the following:

- Femtosecond vs. manual arcuate incisions
- Acceptable residual cylinder levels with multifocal IOLs
- Toric IOLs and related power and axis issues
- Overall case management of astigmatic patients

Dr. Vukich used the data from this large study to address current practice behaviors for the membership and discuss educational gaps and opportunities for future ASCRS programs.

When asked where laser-assisted cataract surgery may provide a significant clinical benefit versus conventional cataract surgery, 57% of respondents believed there were significant clinical benefits for femtosecond arcuates over manual incisions. Interestingly, this number was much higher for U.S. surgeons, with nearly 70% believing that a femtosecond arcuate may be clinically superior to a manual incision. Approximately 55% of the ASCRS membership saw benefits with capsulorhexis creation.

Dr. Vukich discussed a hot topic for the management of multifocal IOL patients as well: the average acceptable postop residual error and how it affects visual quality or satisfaction. The respondents reported that 0.71 D was the average acceptable postop cylinder error after implantation before they believed there was a statistically significant reduction in visual quality or patient satisfaction. When looking at the data in another manner, 45% of the membership indicated that 0.75 D or more cylinder was acceptable for these patients. Acceptable residual sphere was slightly lower, with an average acceptable postop error of 0.61 D before it impacts visual



**There is a 50/50 split of membership beliefs when it comes to flipping the axis or aiming for lower residual astigmatism levels with toric IOLs.**

quality or satisfaction for multifocal patients, and 35% indicating that 0.75 D or more was acceptable.

When asked how they manage significant postoperative astigmatism levels in multifocal levels, only 52% of the survey respondents stated that they use an excimer laser to address this refractive error. In fact, 32% of the ASCRS member respondents reported never performing a laser vision correction enhancement on a multifocal IOL patient due to residual refractive error.

Toric IOLs averaged 19% of all cataract procedures, however this number was lower in the U.S. at 15%. Survey data showed that ASCRS members believe on average that 7.2 degrees of postoperative rotational error from the intended axis is acceptable before it starts to affect visual quality and acuity in toric IOL patients. Surprisingly, 33% of respondents stated that 10 degrees or more of postoperative rotational error is acceptable.

There was a 50/50 split of opinion when it came to flipping the axis with toric IOLs: half of the population aims for the lowest amount of residual astigmatism, even if it means flipping the axis. The other half of survey respondents believe in never flipping the axis, but aiming for the lower residual astigmatism in the same axis.

Dr. Vukich discussed ASCRS members' preferences for diagnostics. There is no consensus “go to” machine for toric IOL astigmatism power decisions. Overall the

IOLMaster (Carl Zeiss Meditec, Jena, Germany) was the most commonly used device, however topography and manual keratometry were also common choices. This is similar when it comes to toric IOL astigmatism axis decisions, with topography diagnostic devices appearing the rough preference, with the IOLMaster and manual Ks also being used. However, no single category of diagnostics was used by more than 40% of respondents for driving power or axis decisions.

When presented with a case study of a 25-year-old low to moderate myope with 2.5 D of astigmatism, the membership showed high confidence in laser vision correction as the procedure of choice, with 92% selecting this treatment. However, when presented with a cataract patient with 1.25 D of astigmatism, the membership was much more conservative, with only 50% choosing a toric IOL.

Overall, Dr. Vukich was excited about sharing these key practice patterns and educational gaps. The data from the 2013 ASCRS membership survey was used to drive some of the ASCRS programming at this year's meeting and provided the foundation for several CME education symposiums, based on topics such as astigmatism management.

The 2014 survey took place at this year's annual meeting, and an *EyeWorld* supplement will be published this fall with a summary of the key findings.

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would implant a toric IOL, and just less than 10% would prescribe glasses or contact lenses.

Interestingly, the average postoperative rotational error that was considered acceptable before it started to affect visual quality and acuity was 7.2 degrees, and 33% of respondents felt that 10 degrees or more of postoperative rotational error was acceptable.

Additionally, 46.3% of respondents said that they aim for the lowest amount of residual astigmatism, even if they had to flip the axis, and 53.7% said they never flip the axis and that they aim for the lower residual astigmatism in the same axis.

According to the survey results, the most common device (used by more than 35% of respondents) to determine the power of astigmatism was the IOLMaster (Carl Zeiss Meditec, Jena, Germany). When

making a decision on the axis, however, topography was the preferred method.

If a patient has residual astigmatism, the first step in treatment is to determine the cause. Common causes of residual astigmatism include inaccurate preoperative measurements, inaccurate axis marking, ocular surface disease, surgically induced cylinder, IOL tilt, and IOL rotation.

Treatment options include glasses or contact lenses, AK/LRI, laser vision correction, and repositioning the IOL.

For example, let's say a patient is 1 month after having a T9 implanted and has residual astigmatism of 1.75 D at 150 with uncorrected visual acuity of 20/60, so the patient is not too happy, and the IOL is currently aligned at 100 degrees. In cases like this, the surgeon can use the astigmatism fix

calculator ([www.astigmatismfix.com](http://www.astigmatismfix.com), developed by **John Berdahl, MD**, and **David Hardten, MD**). After plugging in the requested information, the surgeon will be told that rotating the lens to a particular axis will reduce astigmatism, and it will give him or her a predicted refraction that should be achieved by rotating the lens to the recommended axis. In this example, the predicted refraction was  $-0.29 + 0.32 \times 150$ . So rotating the lens would be a good option in this patient as long as too much time has not elapsed since surgery and the patient is agreeable to a second surgical procedure.

Next, the current and the ideal axes are marked, viscoelastic is injected underneath the capsule, the lens is freed up and rotated, and the residual viscoelastic is aspirated.

The bottom line is that prevention is always the best treatment, so it is important to be precise in your

preoperative measurements, marking and placement of the lens, and in removing residual viscoelastic from behind the lens and around the lens so it doesn't rotate postoperatively. At the end of the procedure, it is important to reinflate the eye to a good pressure and to make sure the incisions are sealed to avoid wound leakage and then shallowing of the chamber, which could lead to rotation of the lens. All of these things will lead to a good outcome and hopefully will not result in residual astigmatism. The good news is that if you do encounter residual astigmatism, the astigmatism fix calculator can help you find the best approach for treating and resolving it.

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and use both the Pentacam (Oculus, Wetzlar, Germany) and the HD Analyzer (Visiometrics, Barcelona, Spain). We perform optic nerve optical coherence tomography (OCT), wide field photos, and macular OCT. We take LOCS III photos and perform anterior segment OCT. These tests are repeated on patients' biennial exams.

Endothelial cell photographs have been helpful for illustrating to patients the effects of contact lens overwear and setting appropriate expectations for patients with

compromised endothelial cells. Confirming these diagnoses in advance helps manage patient expectations.

One additional benefit is that all these people will eventually need to have lens surgery. By collecting baseline data on 100% of them, we improve the chances that we will choose the correct IOL when the patient has refractive lens exchange or cataract surgery.

### Final thoughts

None of what we do makes a difference if the patient is unhappy. Today, "20/happy" means different

things to different people, depending on their lifestyle. Our mantra remains: Patients must have at least the same vision postoperatively as their preop BCVA. Then we do the best we can to meet or exceed those expectations.

We have moved our discussion away from talking about 20/20 outcomes to discussing the likelihood of a patient seeing 20/16 or 20/12.5, always explaining that the majority of our patients see 1 to 2 lines better than 20/20 after surgery.

We also use online surveys to gauge patient feedback. We've

found we're much more likely to proactively address any issues that may arise than be relegated to reactively trying to "fix" an issue. In the first 3 months we used these surveys, we increased the percentage of patients who were "very likely" to recommend our center from 90.2% to 96.6%.

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and word of mouth are the only ways to successfully and continually grow a business. Direct marketing is often too expensive for very little return: Practices must spend about \$400 per patient to break even.

The latter two will only grow a business if the visual outcomes are exceptional. At TLC, we have our staff trained to test beyond 20/20. It's not enough to just provide an extra line. We have to give patients the best chance to see as well as they can. In a study we did in 2012 (n=94 patients), using the iFS femtosecond laser and CustomVue wavefront-

driven ablations (Abbott Medical Optics, Santa Ana, Calif.), bilateral uncorrected distance vision at 3 months post-LASIK was exemplary—95.7% of our patients had 20/16, and more than half had 20/12.5. These are the results Millennials will boast about to their entire social media "family."

Millennials are going to immediately post to Yelp, Twitter, or Facebook about their surgery. Reinforcing the successful outcomes with these patients will help grow your word-of-mouth referrals quickly.

ODs are still a significant source of patient referral. When they choose your center, they're relying on your results to be exemplary—after all, it's likely the patient will still see the OD for most primary eyecare needs. Involve the OD community by sharing your results and the capabilities of your technologies. ODs will be more confident in choosing your center if they know you're tracking results and continually seeking to improve those results as well.

### References

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