

Part 3 of 3

REVIEW OF OPTOMETRY

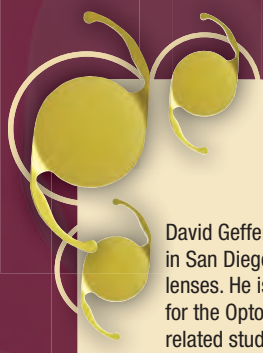
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The IOL Handbook

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Esteemed Panel of Authors

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A Historical Perspective on Cataracts

SO OFTEN IN SCIENCE, IT TAKES time before clinical discovery becomes accepted practice. Just as it took decades for Galileo to get acceptance that light objects fall as fast as heavy objects, many of the advances in cataract surgery have been met with strong resistance. Nevertheless, improved patient care has prevailed, and the procedure continues to advance.

The word "cataract" comes from the Greek "cataracta," meaning waterfall. It was believed that fluids filled the lens,

making it cloudy. Surgical procedures on the lens of the eye were first described around the 5th Century in a technique called "couching". This procedure consisted of taking a sharp instrument and pushing the opaque lens out of the line of sight and into the vitreous. This technique increased the amount of light getting to the retina, but pre-dated the use of any type of ophthalmic lens to correct the resulting refractive error. This technique continued through the Middle Ages in Africa, Europe, the Middle East and Asia. Two of the all-time great composers, Johann Sebastian Bach and Georg Frederic Handel, were rendered blind by the couching procedure at the hands of the same "surgeon." In the mid-18th Century, John Taylor, toured Europe performing couching operations before vast public audiences, but then left town before complications arose.

In 1748, Jacques Daniel is credited with developing the first extracapsular cataract procedure. Interestingly, Daniel's technique is very similar to the extracapsular technique that lasted until the development of phacoemulsification. Unfortunately, it took over 100 years before this innovation became

available.

During World War II, Gordon Cleaver, a Royal Air Force Flight Lieutenant had been shot down. The impact blinded his right eye and left his left eye badly damaged from the cockpit windshield.

It was Harold Ridley, M.D., who observed the plastic material from the cockpit windshield in Cleaver's left eye, but had not caused any further damage. Dr. Ridley had long thought about in-



Some type of cataract surgery has been explored for thousands of years, from the 5th Century until today's latest technology.

Growing Demographics of IOL Candidates

There are over 1.8 million cataract surgeries performed each year at an estimated cost of over \$3.4 billion dollars according to the National Eye Institute (NEI). As Baby Boomers continue to advance to the cataract age, the demand for cataract surgery will increase as will the expectations for a higher quality of vision after the surgery. This market for cataract patients continues to grow today and in the foreseeable future.

The number of Americans over 60-years-old grows at approximately 3.4 percent per year and will be almost 15 percent of the total population by 2020. It is estimated that 15 percent of those 60-64 year-olds have lens changes necessitating cataract surgery. That figure

serting an intraocular lens (IOL) in the eye prior to examining Mr. Cleaver. So, Mr. Cleaver became his "Phase 1" trial. Dr. Ridley went on to develop implantable lenses for cataract surgery—but not without a fight. Another ophthalmic legend of the day, Sir Stewart Duke-Elder, would refute Dr. Ridley's work as "beyond reproach" and would not even examine Dr. Ridley's patients. In fact, it wasn't until the 1970s when the intraocular lens became acceptable and not referred to as a "foreign body".

Another milestone in the history of cataracts occurred during a visit to the dentist. Dr. Charles Kelman came to the conclusion that the same ultrasound "method" that was being used to clean his teeth could be used to break up a cataractous lens without disturbing the rest of the eye. This new method changed cataract surgery from a hospital stay to an outpatient procedure, from a very large incision to a small incision, and from a procedure that merely cleared a clouded lens to a refractive procedure. Like his colleagues before him, Dr. Kelman's technique was not widely accepted. Opponents tried to rescind his operating privileges and deeming the procedure experimental and not reimbursable. Today it is the standard for cataract procedures.

While some type of cataract surgery has been around for more than 3,000 years, advances in cataract surgery continue to improve and will continue to do so in the future. Our challenge will be to identify those breakthroughs that provide improved patient care versus those that do not. ★

grows to 75 percent of those over 80-years-old.

By 2020, the number of Americans affected by cataracts is expected to grow to 30.1 million. The incidence does not appear to differ from males to females with Hispanics showing a slight increased in incidence from other races.

The number of elective IOLs has grown to over ten percent of the total number of lenses implanted in 2009, up from approximately two percent in 2004. This percentage is expected to grow as the Baby Boomers are in need of cataract surgery. Key factors in the growth of elective lenses include the ability of these lenses to be implanted in the eye safely, the ability of these lenses to give patients freedom from glasses and the satisfaction these lenses give patients, which allows for positive word-of-mouth referrals. ★

Lens Platforms

WHEN SIR CHARLES RIDLEY implanted the first IOL in 1949, he could have never imagined the industry that his bold invention would spawn. Since that time, IOLs have undergone a dramatic evolution in both design and functionality. Today, IOLs are made from a variety of materials, and represent a variety of designs, all to increase biocompatibility, reduce complications such as PCO and dysphotopsias, and to ease insertion through increasingly small incisions.

Here is a brief summary of lens design characteristics and a summary of the most popular lens platforms in use in the United States today.

Materials- IOLs are typically defined by the material that the optic of the lens is made from. Early IOLs were made from PMMA. PMMA lenses offered excellent optical clarity and were extremely biocompatible. Biocompatibility is essential to prevent inflammation and reduce deposits on the lens surface. Today, IOLs are made from three basic materials: Polymethyl methacrylate (PMMA), silicone, and acrylic. Acrylic lenses are further subdivided into hydrophilic and hydrophobic materials. Silicone and acrylic lenses dominate the U.S. market today because the material is flexible, which allows the lens to be folded, and therefore, inserted through a smaller incision. Silicone lenses have been associated with a higher incidence of posterior capsular opacification (PCO).

Design- IOLs are either one-piece or three-piece designs. Plate haptic lenses are a form of one piece design. In the one piece design, the optic is integral with the haptics, while in three piece designs, the haptics are a different material and are attached to the optic. Three-piece design lenses can be more rigid than one-piece designs, which can be an advantage in centration of the lens. Three-piece design lenses can also be placed in the ciliary sulcus, a useful feature in patients with loss of capsular sup-

port. Three-piece designs are generally less compact, however, and often require a larger incision size to place the lens properly.

Edge design- There has been a lot of interest in the design of the IOL optic edge. Variations in the edge design of the lens can reduce the incidence of posterior capsular fibrosis (PCO). A square edge on the posterior surface of the lens, which is in direct apposition to the posterior capsule, can act a barrier to the migration of residual lens epithelial



The basic Alcon lens platform is based on the AcrySof® IQ lens design, which is a one piece acrylic lens.

cells responsible for PCO. In addition, careful design of the lens edge can reduce the incidence of IOL related dysphotopsias by reducing unwanted reflections from the lens.

Haptic design- Most haptics today are open loop design in a variety of styles. Haptics in three-piece lenses are made from a variety of materials including PMMA and polypropylene or polyamide.

Lens angulation, the planar relationship between the optic and haptics of an IOL, will determine the angulation of the lens as it positions itself in the capsular bag. A small degree of posterior vault of the optic will prevent pupillary capture and help ensure contact with the posterior capsule. However, if the lens is inserted backward, it can result in a mild undesirable change in refractive outcome.



Delivery System- Each lens platform has a “delivery system” designed to implant the lens. Various known as “shooters” or injectors, these devices have become the most common way that IOLs are delivered into the eye following removal of a cataract.

In the early age of phacoemulsification, the advantage of smaller incision size was mitigated by the need to enlarge the incision to accommodate the implantation of PMMA lenses. The incision generally needed to be enlarged to about 6.0 mm to accommodate the diameter of the optic of the IOL. With the advent of acrylic and silicone material lenses, the flexibility of these materials allowed the lens to be folded prior to insertion in the eye. This allowed the surgeon to implant the lens through the small phaco incision without having to enlarge the incision to accommodate the lens. The smaller incision also allowed the incision to be “self sealing,” thus eliminating the need for closure of the wound with sutures.

Early on, the IOL would be folded with forceps and delivered into the eye. This resulted in an uncontrolled unfolding of the lens, creating the potential for problems. Lens delivery devices were developed to easily insert the lens into the eye in the folded configuration, control the placement of the haptics in the capsular bag, and allow the lens to unfold in a controlled fashion.

Optic enhancers- All IOLs today contain Ultraviolet (UV) absorbers to prevent excessive retinal exposure to UV light. In addition, various manufacturers have added chromophores to the lens to increase absorption of potentially harmful visible light in the violet and blue spectrum to simulate the characteristics of the natural lens.

Fabrication- Current IOLs are either lathe cut or compression molded.

Lens platforms- The IOL market in the United States has evolved to include three major players and a host of other manufacturers. Each

of the major manufacturers has built a line of products to support their lenses and this has become known as their “platform.” Lens platforms are often used in conjunction with the manufacturers phaco machine and viscoelastic material.

Alcon has the largest market share of IOLs in the United States. The basic Alcon lens platform is based on the AcrySof® IQ lens design. The one piece design lens is made from a hydrophobic acrylic material, is biconvex in shape, and is aspheric with negative spherical aberration to neutralize the natural positive spherical aberration of the cornea. The lens is compression molded and contains a blue light absorbing chromophore which absorbs light in the 400-475

Abbott Medical Optics (formerly American Medical Optics) (AMO) has developed a lens platform around the Tecnis lens, the first aspheric IOL approved in the United States. The Tecnis lens is made from a hydrophobic acrylic material and is available in both one piece and three piece designs. The lens is also available in silicone material. The lens is an aspheric biconvex lens with negative spherical aberration designed to neutralize the positive spherical aberration of the cornea. The lens is lathe cut with open loop “C” shaped haptics made from PMMA. The edge is square at the posterior surface of the lens and is vaulted five degrees posteriorly. The lens has UV absorbers incorporated but no chromophores that absorb light in the visible spectrum.

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nm wavelength range (FDA Submission Data: AcrySof IQ lens, Alcon Surgical). The lens has a square edge design and an open loop “L” shaped haptic with no vault. In addition to the monofocal aspheric IOL, the AcrySof lens is available in a toric design as well.

The AcrySof IQ Toric lens is identical to the AcrySof IQ monofocal IOL with the addition of 3 different toric powers with correction of approximately 1.0, 1.5 and 2.0 diopters of astigmatism at the spectacle plane. The haptic design of the AcrySof IQ lens provides excellent stability and centration of the lens. Rotation of the lens is less than 4%, a particularly important feature of the toric lens (FDA Submission Data: AcrySof IQ Toric Lens, Alcon Surgical). The AcrySof IQ ReSTOR IOL adds multifocality to the other design features of the lens platform. The AcrySof IQ ReSTOR lens has an apodized optical system on the front surface of the lens and provides an add power of +3.0 D or +4.0 D at the spectacle plane. The delivery system of the AcrySof IOL allows placement of the lens through an incision size as small as 2.2 mm.

The Tecnis lens is also produced as a multifocal lens with an aspheric front surface and a diffractive posterior surface for pupil size independent near vision (Tecnis multifocal). The delivery system for the Tecnis lens requires an incision size of approximately 2.6mm (FDA Submission Data: Tecnis Lens, AMO). The Tecnis platform does not include a toric lens design.

Bausch & Lomb (B&L) produces the Sofport lens platform. The Sofport is a three-piece silicone lens. The lens is a biconvex aspheric design and has no spherical aberration. The lens has a square edge with open loop “C” shaped haptics made from PMMA. The lens has a five degree posterior vault and also has incorporated their “Violet Shield Technology” to absorb visible light in the violet spectrum which may potentially damage retinal cells (FDA Submission Data: Sofport lens, Bausch & Lomb). Bausch & Lomb has also developed the Akreos lens platform. The Akreos is a one-piece hydrophilic acrylic material with an aspheric design. Like the Sofport, the lens is designed to have no spherical aberration. The lens is lathe cut and comes in varying

total diameters depending on lens power for improved centration. The lens has a posterior square edge and has a novel four haptic design for increased centration and stability. The delivery system for B&L lenses requires an incision size of approximately 2.6mm (FDA Submission Data: Akreos Lens, Bausch & Lomb).

Our patients today have a wide range of options in IOL design each with its own set of advantages and potential disadvantages. Technology in the development of these lenses will continue to march forward with the ultimate goal to completely correct the patient's refractive error, restore accommodation, and to minimize the risk of unwanted side effects. ★

The Essentials of IOL Optics

ONE OF THE BIGGEST REVOLUTIONS in eyecare was the acceptance of IOLs in the 1970's. Prior to that, elderly people were at the mercy of thick, visually disturbing glasses or high-powered contact lenses. Without their correction, these people had limited function. The introduction of IOLs gave these people freedom and the ability to function without the crutch of their corrections. However, it was soon realized that these lenses had their own limitations, too. Early cataract surgery often produced large amounts of residual astigmatism as well as spherical errors and did not correct near vision. Therefore, the patient was still very dependent on glasses or contact lenses. As surgical procedures improved and wound size grew smaller, the predictability of the endpoint refractive error was greatly enhanced. By the late 1990's, most patients were getting results that provided excellent distant vision or the ability to have monovision.

Aspheric IOLs

In the late 1990's, we began to look at more than just simple refractive error. We obtained the technology to measure higher order aberrations. This led us to discover that the average human eye changes in aberrations over time.

The vision deteriorates over time as we age. The eyes of a young person have little if any spherical aberration, and 19 years of age seems to be optimal. That is the time of best contrast sensitivity as well as optical quality. The cornea has positive spherical aberration, which is neutralized by the negative spherical aberration of the lens. With age, the lens hardens and changes shape

and decreased spherical aberration occurs. This causes light scatter and results in sub-optimized vision. With the implantation of a spherical IOL, we will clear the vision of the patient due to the opacification of the lens, but we are not correcting for spherical aberration to neutralize the corneal spherical aberration. Functional vision was not optimized with spherical lenses, and we still found patients not feeling that their vision was "crisp." In 2004, aspheric IOLs were introduced. We now have three approved lenses: Bausch & Lomb's Softport, AMO's Tecnis and Alcon's AcrySof IQ IOL. These three lenses correct for slightly differing amounts of spherical aberration. By measuring corneal spherical aberration preoperatively, the surgeon can select the appropriate IOL for the individual. The Bausch & Lomb lens adds no spherical aberration, the Alcon adds 0.20 microns of spherical aberration and the Tecnis adds 0.27 microns of negative spherical aberration.

Aspheric IOLs need to be centered well to have the optimal effect. And, the higher the negative spherical aberration added, the more important centration becomes. If the lenses which induce negative spherical aberration should decenter, they will induce more aberrations, especially coma. Surgeon skill is becoming more important in cataract surgery as it is really a refractive procedure today. Research has shown that aspheric IOLs increase contrast sensitivity, and this will help your patients improve their functional vision. Studies done at driving simulators have shown correcting higher order aberrations can increase the reaction time of driv-

ers. I believe that if a patient decides to use a single vision IOL, it should be an aspheric lens. You need to discuss with your surgeon which lenses they use and why.

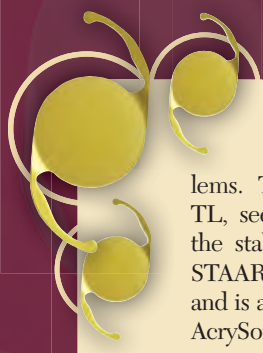
Toric IOLs

Aspheric IOLs, while providing excellent optics, still do not address two of the major concerns in correcting our patients' vision: astigmatism and presbyopia. Today, toric IOLs are now available to address patients' astigmatism. First, we need to analyze the patient's prescription and determine the amount of residual astigmatism we expect to find. Preoperative keratometry readings are important to take. Once the crystalline lens is replaced, the lenticular astigmatism present at pre-op will be gone. If there appears to be greater than three quarters of a diopter of corneal astigmatism, it is time to start the discussion with the patient about possible solutions. In our office, I have found the discussion of deluxe lens options to be quite straightforward. Patients understand astigmatism will decrease their acuity. Patients also understand that they are not able to read without the help of some near correction. While the multifocal option involves lengthy discussions and education, I have found our astigmatic patients embrace the idea of toric IOLs. This is similar to our soft lens patients with moderate amounts of cylinder; they readily accept toric soft lenses. The patient readily understands that the more sophisticated design has an additional cost associated with it.

There are currently two toric lenses available to our patients, the STAAR Toric (STAAR Surgical) and the AcrySof IQ Toric (Alcon) IOL. The STAAR Toric comes in two models, correcting 1.50D or 2.25D of astigmatism. The early model of the STARR lens, the TF, was plagued by rotation stability prob-



AcrySof IQ Toric IOL is one of two approved astigmatism correcting IOLs on the market.

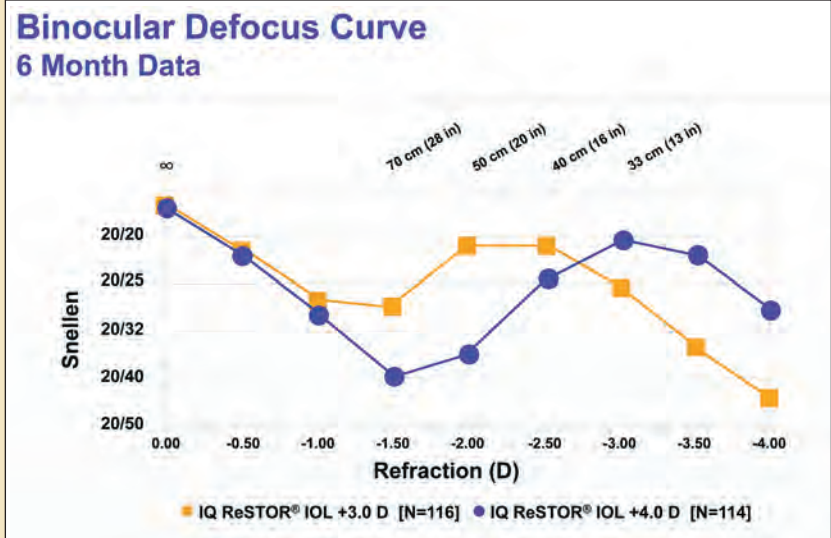


lems. The latest model, the TL, seems to have improved the stability of the lens. The STAAR material is silicone and is a one-piece design. The AcrySof IQ Toric currently comes in three models, correcting approximately 1.0, 1.5 and 2.0 diopters of astigmatism at the spectacle plane. The high quality optics obtained by the AcrySof Toric can be attributed to the aspheric optics as well as the unique design to create rotational stability. The Alcon acrylic material has a “tacky” surface quality that promotes short-term stability and generates fibronectin and other natural tissue adhesives that stabilizes the implant to the capsule bag over the long term. The design of the haptics also helps to stabilize the lens. The haptics are open-loop modified L-haptics with three reference dots on each side that mark the axis of the cylinder on its posterior surface. Chang reported the mean rotation for the AcrySof IQ Toric IOL was less than four degrees from initial alignment 12 months postoperatively.¹ The silicone surface of the STAAR lens is much more slippery, and therefore tends to rotate more. Lens placement is critical for the optics to perform properly. For every three degrees of rotation, you lose approximately 10% of the astigmatic effect. We have found in our practice correcting the astigmatism at the nodal point of the eye yields better results than toric LASIK.

Presbyopia-Correcting IOLs

The golden ring for our cataract patients is the correction of presbyopia. Our goal is to provide the vision of the eye with full accommodation and no potential for glare and halos—although we are not there yet! However, we have three very good options approved in the U.S. at this time with two or three new designs nearing approval.

Let's start by discussing the accommodative lens. Bausch & Lomb's lens is the Crystalens. This lens has gone through several design changes from the early models to the 5.0 and the currently used HD design. The newest change is the introduction of the AO which uses aspheric optics to enhance overall vision. The lens has excellent distance optics, as it is a single vision lens that has hinged



Six-month data reported from U.S. clinical trials on the IQ ReSTOR® IOL +3.0 D (Alcon Laboratories, Inc.) showed patients experienced an improvement in intermediate vision.

haptics that allow the lens to move forward. The amount of movement will determine the level of accommodation the patient achieves. Since it is a single vision lens and now comes in an aspheric button on the center of the optic, patients will achieve distance vision similar to the other single vision aspheric lenses on the market. The lens is clear and does not have a UV blocker.

There are two theories to achieve an accommodative affect. The first is the lens will move forward with contraction of the ciliary body, and thereby putting pressure on the vitreous to push on the posterior surface of the lens. The secondary theory is arching the lens where the pressure seems to flex the lens to achieve a change in power and aberrations to allow for near acuity. The amount of accommodation seems to vary and has been reported from 1.0 to 2.50 diopters in some cases. In our practice, we typically aim for the dominant eye to be between 0-0.25 D and the non-dominant eye to be between 0.5-0.75 D. We achieve good intermediate and often adequate near with this recipe. We also find the Crystalens to be an excellent choice for previous refractive surgery patients. Especially for our RK patients, it helps with the diurnal fluctuation many have.

Multifocal IOLs

Multifocal IOLs simultaneously produce near and far images on the retina

which cause some stray light. The Tecnis multifocal from AMO uses a full-aperture diffractive design to achieve the two focal points. With a 5mm aperture, the Tecnis IOL splits light energy to 41% to near and 41% to distance. The anterior surface is aspheric while the posterior has the diffractive surface. The diffractive surface creates 4 diopters of power which is about 3.6 diopters of effective add. Since the posterior surface is diffractive across the full surface, it is pupil independent. The FDA clinical trials showed distance vision with 100% at 20/40 and 86% at 20/25 or better. Near results were over 99% at 20/40 or better with 77% at 20/25 or better. More than 93% of patients were comfortable at near, intermediate and distance. The lens blocks UV radiation from 430nm and below.

The AcrySof IQ ReSTOR IOL has two models. The first is the SN6AD1, the newest model, with a +3.0 D add and +2.5 D at the spectacle plane. The second is the SN6AD3 which has a +4.0 D add and +3.2 D at the spectacle plane. The lens has a central 3.6mm apodized diffractive surface with distance optical zones. The lens is built on the AcrySof aspheric platform to enhance overall vision. The problem with the earlier version (+4.0 D) was the intermediate distance. The newer version (+3.0 D) has gained much better patient acceptance. The new version has very good near vi-

sion and provides better intermediate vision than its predecessor. The lens also has a yellow chromophore to filter both UV and short end blue light to protect the macula. Our patients have adapted to this new lens very well. Six-month data reported from U.S. clinical trials on the IQ ReSTOR IOL +3.0 D showed patients experienced an improvement in intermediate vision.

Optics of IOLs are advancing rapidly. There are several exciting new designs in clinical trials. We are in a unique time for eyecare where we will be able to create new and more effective optical systems for the eye. Through cataract and refractive surgery, our patients will be able to see at the highest level possible. ★

I.Chang, DF. J Cataract Refract Surg. 2008 Nov;34(11):1842-7.

CLs vs. Presbyopia-Correcting IOLs: Tap into the Expanding Presbyopic Market

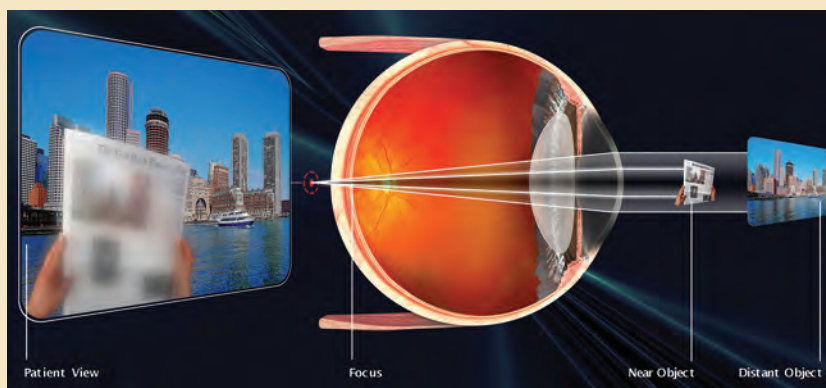
TO PUT IT SIMPLY, PRESBYOPIA is the new frontier for eyecare. Just consider, 10,000 Baby Boomers will turn 50 each day until 2014. This group is more demanding, they are better educated on new technologies, and they can afford them. The Boomers are more in tune with their looks, and they don't want to look their age. They are willing to spend money on Botox, designer clothes and refractive procedures.

Demands for near vision have never been higher. These new Boomers are spending more of their time utilizing high tech devices such as Blackberrys™, iPhones™, and the latest in computer technologies. In fact, it is estimated that 43% of the 79 million adults over 50 currently use the Internet 11-30 hours per week.

Manufacturers have provided great advances in all aspects of presbyopic correction. As a result, we have many new advanced progressive spectacles, multifocal contact lenses, presbyopic laser techniques and IOLs for our presbyopic patients.

Contact Lenses for Presbyopes

Today, less than 10% of people ages 50-64 wear contact lenses, compared to 33% of people ages 35-49 who wear contact lenses. This represents a wonderful opportunity for our practices to educate our patients about this exciting technology. The success rates for these lenses have risen rapidly, and the patients who wear multifocal lenses are very loyal and refer their friends. Comparing years 2007 to 2008, multifocals were the only lens modality to



Presbyopia correction presents a growing market for your practice, as 10,000 Baby Boomers will be turning 50 each day until 2014 and will seek precise near vision correction.

Today, less than 10% of people ages 50-64 wear contact lenses, compared to 33% of people ages 35-49 who wear contact lenses.

show growth. Multifocal fits have been rising rapidly while monovision has declined. It is important to point out that the 40-55-year-old female controls recommendations for health care for their children, spouses as well as their parents. Fitting this group in multifocal lenses helps keep these patients returning to your office more frequently. Keep in mind that the average contact lens patient returns every 1.5 years, while spectacle patients return at a rate of every 3.5 years.

Presbyopia-Correcting IOLs

When talking to our patients about multifocal or accommodative IOLs,

we often hear about previous failure with contact lenses. The patient may have tried a multifocal lens years ago or tried monovision with little success. The mention of a presbyopia-correcting lens sends bad memories to their heads. Even if the patient had never tried contacts, they always know someone who was "unhappy." This presents an extra challenge to us in our discussion of presbyopia-correcting IOLs. We need to make the patient understand that contact lenses are not the best indicator of success with presbyopia-correcting IOLs. The reverse is not true. Patients who have had good success with a multifocal contact lens understand the limitations and benefits these IOLs represent. I have found that our patients have done extremely well adjusting to presbyopia-correcting IOLs with previous multifocal contact lens wear.

We do not recommend trial fitting patients with multifocal contact lenses to test for acceptance of a presbyopia-correcting IOL. ★



Preoperative Patient Discussion

IN CONSIDERING THE visual needs of our patients, no one is as qualified and experienced in understanding and communicating these needs to patients than their optometrist. Therefore, the preoperative patient visit is an excellent opportunity for you to share information not only on cataracts, but also on the many exciting elective IOL options that are available to your patients.

With this in mind, when a patient

develops a cataract, education should begin long before the patient gets to the ophthalmic surgeon. This education should include the potential need for surgical intervention and how that will impact their visual needs. Although there is an increasing recognition among surgeons of the importance of the refractive outcome of cataract surgery, too often, there is an emphasis on achieving good anatomical results free of post-surgical complications.

Modern IOLs have revolutionized cataract surgery by eliminating the need for aphakic spectacles or contact lenses. Patients today have a bewildering choice of refractive options when contemplating cataract surgery, and every optometrist should help guide their patients in understanding those options and making recommendations based on your experience and the needs of your patients. Remember that the preoperative patient discussion is an opportunity not only to edu-

Name _____ Date _____

What is your occupation? _____

Please list your favorite hobbies?

Which of the following activities would you be interested in seeing well without glasses?

- Reading the newspaper
- Reading the prescription medicine bottle
- Looking at your watch
- Working on your computer
- Dialing a phone
- (Ladies) Putting on your make up
- (Men) Shaving your face

Other activities you would enjoy without glasses _____

What sporting or recreational activities do you currently engage in?

Please tell us about any vision concerns that are not addressed above.

Place an "X" on the following scale to describe your personality as best you can:

Easygoing _____ Perfectionist

Patient Signature _____

Technician

Physician

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cate your patients, but also an exciting opportunity for your practice.

Educate Patients on Treatment Options

When patients are faced with a diagnosis of cataract, there can be significant fear and apprehension. Patient education can alleviate this anxiety. Not all patients will require surgical intervention, but all patients deserve to be fully educated about the condition and their treatment options. For many patients, an updated spectacle prescription and reassurance are all that is needed, since their visual demands do not exceed their visual performance. In determining if the patient is a surgical candidate, it all comes down to a very simple question. If the patient would like to see better and feels impaired by their current level of visual function, then cataract extraction is the best option. We no longer wait for the cataract to “ripen” or mature, since the risk of complications from surgery are small. We intervene when the patient is sufficiently symptomatic, and the small risk is less than the potential benefit.

Education Methods and Topics

If the patient is indeed a surgical candidate, each patient should be fully informed of the risks, benefits and alternatives to surgical cataract extraction. You can use an anatomical model or figure, which often provides the patient with the basic understanding of a cataract and how it is to be removed. Video and animations for this discussion can also prove very useful in helping the patient understand what will happen should they elect to undergo surgery.

Most effective discussions begin with an explanation of exactly what is a cataract, since many misconceptions continue. In each case, we carefully explain that a cataract is simply causing less than perfect vision, but that it is not damaging the eye or affecting the fellow eye. Cataract surgery is an elective procedure and there are few medical indications to remove the cataract. Reassure patients that deferring surgery will not increase the risk of surgical complications or make the procedure more difficult unless the cataract is very advanced. You should carefully explain to the patient the methods used to remove a cataract. Keep in mind that you will need extra

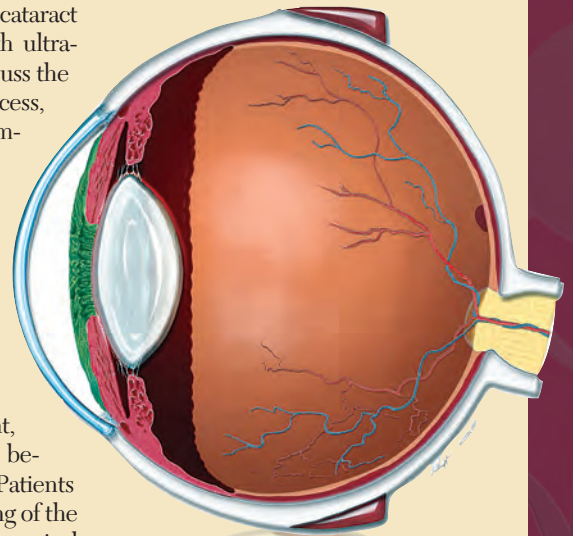
time to explain that primary cataract surgery today is performed with ultrasound and not with a laser. Discuss the extraordinarily high rate of success, but also discuss the small but important risk of complications.

Discuss IOL Options

Just as important as the discussion of potential complications is a discussion of the patient's options for their post surgical refractive outcome. You should be aware of the visual needs of the individual patient, and to never prejudge a patient before presenting their options. Patients should have a good understanding of the role the IOL plays in their post-surgical outcome.

The standard option is a monofocal IOL, we use an aspheric lens as our primary lens in all patients.

We then begin a careful discussion of alternative lens options. Perhaps the easiest discussion is when patients are good candidates for a toric IOL. In this case, the recommendation is easy since the results are predictable and the side effect profile of toric IOLs is very favorable. We then discuss the options for correction of presbyopia. This is a more detailed explanation, since explaining accommodation and multifocal lenses is not completely intuitive to most patients. We need to make sure patients understand the benefits and limitations of presbyopia-correcting lenses. We want to make sure the patient has excellent ocular health and does not have glaucoma, ARMD or retinal disease that would diminish the potential for an excellent outcome. We also assess the patients' personality to determine if they are highly critical visually or seem more tolerant of change and imperfection. Such judgments are difficult in a short time, but knowing the patient over the course of several years gives the O.D. an excellent opportunity to get a feel for the chances of success and the patient's tolerance for an extended period of adaptation. If the patient is an acceptable candidate physically, ocular health wise and with an accepting personality, then we discuss the specific lens options including multifocal IOLs and/or accommodating IOLs. Based on our experience, most patients will do quite well with a multifocal IOL. They will have some

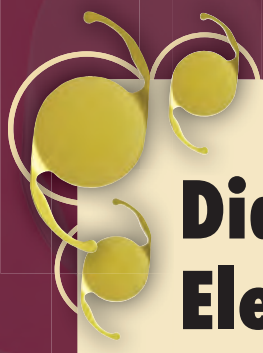


The preop visit should include in depth discussion on the potential need for surgical intervention and how it will impact their visual needs.

glare and decreased contrast sensitivity, but over a period of three-six months, they adapt very well and are extremely satisfied.

Multifocal lenses provide an excellent balance between outstanding distance vision and useful near vision. We also carefully explain to patients that bilateral implantation of the lens will ease the transition and hasten any adaptation that occurs. We do not use a presbyopia correcting lens in patients with unilateral cataract.

After the discussion of the various lens options with the patient and making an IOL recommendation, we then discuss the additional cost associated with these new technologically advanced lenses. We are careful to point out not only the extra cost of the lens, but also the increased time and complexity associated with both the pre-operative assessment and post-operative care. The discussion of these options with the patient can take considerably more time for patients who are interested in having a presbyopia correcting lens implanted, since there are often more questions and consideration to the patient's individual situation and visual needs. Considering the extra time involved counseling patients, the extra cost of the lens, and the extra time and commitment during the post-operative period, the extra charge for these lenses are well earned. ★



Diagnostic Equipment for Your Elective IOL Practice

THE PRIMARY EYE CARE PHYSICIAN IS VERY familiar with cataract evaluation. Oftentimes, the optometrist, acting as the “gatekeeper” provider, will be first to diagnose cataract and recommend treatment when appropriate. It is perfectly germane to the role of optometric medical eye care to diagnose cataract, recommend surgical consultation when necessary and discuss intraocular lens options, which have become myriad with advanced “lifestyle” implant technology.

Early Education is Key

The patient interview is one of the most important aspects of the cataract consultation and subsequent IOL selection. We provide all prospective cataract surgery patients with a packet of information explaining cataract surgery and introducing advanced lifestyle IOL options at the time of cataract diagnosis.

Key Points

1. Educate patients early.
2. Perform a thorough patient interview and consider using a preoperative questionnaire.
3. Pay close attention to slit lamp and dilated fundus findings.
 - a. Tear film considerations.
 - b. The cornea must be clear.
 - c. Vitreous opacities.
 - d. Macular pathology.
4. Make a specific IOL recommendation.

When the patient returns to the office for biometry, they then have a strong substrate knowledge base allowing them to feel confident with their IOL choice.

I avoid use of terms such as “always” and “never,” which could foster unrealistic expectations for our patients. We want to share patients’ experiences to help prospective cataract patients gain a full understanding of

what to expect. Moreover, early education is critical to the growth of elective IOL volume in the eye care provider’s practice.

Today’s Cataract Patient

Cataract is a disease of senescence. As such, optometrists expect to find lenticular changes as their patients approach retirement age and beyond. Certainly, one would expect activity of daily living (ADL) attenuation secondary to clinically significant cataract in a patient aged 75 years. What one may not necessarily expect is ADL to affect lenticular changes in say, a 55-year-old. However, this is precisely the population — the Baby Boomers — where our attention should now be affixed.

Over the next two decades, the pool of potential cataract surgery candidates will swell by tens of millions. This “wave” of patients will be comprised of seniors leading very active lives who are concerned about getting older and

Keys for Successful Postoperative Management Elective IOL Practice

MANAGEMENT OF CATARACT OUTCOMES IS AN important aspect of routine optometric care. There is great satisfaction in witnessing first hand the “miraculous” changes that occur when a patient’s vision has been restored and his or her color perception enhanced. Adding to this already positive experience, patients will also enjoy the many benefits of advanced, lifestyle intraocular lenses, which render many without the need for spectacles postoperatively.

Optometry plays an integral role in patient selection, IOL recommendation and postoperative management of refractive cataract patients. It is important for optometrists to immerse themselves in elective IOL knowledge and be able to astutely manage patient expectations and outcomes.

Cataract care management has become an increasingly exciting aspect of practice. The diagnosis of cataract is no longer a diagnosis of “doom and gloom” for the patient. Rather, it is an opportunity of hope. Patients have options that were just a dream years ago. Indeed, their older peers and family members were not able to have the privilege of making IOL choices. The consultation has become patient-centric, and the eye care provider has the task of guiding the patient through myriad IOL choices that best suit the patient’s visual goals.

Once that patient has selected an appropriate lifestyle IOL and undergone successful surgery, it is now the responsibility of the co-managing physician to provide a “soft landing” for the patient. I will discuss each aspect of postoperative care and highlight specific areas of concentration to assure optimal outcomes. It is also important for us to keep our clinical senses on high alert for occult processes that may confound a perfect surgical outcome.

Day One Visit

The day one visit is a critical one. There is some controversy questioning the need of this day one visit, and whether it can be performed on the same day of surgery

looking older. Because glasses and bifocals have a social stigma associated with the aged, lifestyle intraocular lens acceptance will soar among this population. The prudent eye care practitioner should begin planting seeds of knowledge in their patients now to reap a harvest of elective IOL candidates in the future.

Diagnosis of cataract is clinical, and a patient's symptoms may not correlate with our clinical findings. Con-

or a week after surgery. Especially with advanced lifestyle IOL patients, this visit serves as a nidus to galvanize the patient's confidence that the choice of implant was the correct one.

Although the basic examination during the day one visit is performed the same way irrespective of IOL choice, these specific observations must be made between multifocal and toric IOLs.

Visual Acuity:

- Standard and Toric IOLs

Measure uncorrected distance visual acuity in the operated eye. Measure pinhole visual acuity for unexpected uncorrected results.

- Multifocal IOLs

I recommend testing at distance, intermediate and near visual acuity at this visit. If you demonstrate improved near visual acuity at this early stage, it builds excitement and anticipation for the second eye surgery. Capitalize on the results patients are sharing with you.

- Cornea

The cornea should be clear. Pay special attention to the presence of microcystic edema, as this is almost always an indicator of increased intraocular pressure. If IOP is high, manage with drops and/or oral agents in the usual manner, and discharge the patient when stable. If patients present with significant stromal edema and Descemet's folds, increase the frequency of postop steroid drops as frequently as every one-two hours while awake depending upon severity to facilitate visual recovery.

Anterior Chamber

The anterior chamber should be relatively quiet. It is not unusual to observe rare cells. Significant cells and flare in the absence of corneal edema should be managed by increased topical steroid frequency. If the anterior chamber reaction is severe as if looking into a snowstorm and is associated with central corneal edema, a relatively quiet eye (no significant injection), consider toxic anterior segment syndrome (T.A.S.S.). The surgeon should be notified and a retinal consultation may be indicated.

IOL

- Standard

The optic should be centered and clear.

Continued on Page 12

sider the 55-year-old active individual with symptoms of glare around headlights while driving at night. Your clinical senses should be immediately heightened to think "possible lenticular changes," and your clinical examination may reveal early, +1, say, nuclear sclerotic cataract. This is hardly a "diamond" in the eye, especially when you consider this patient may refract to 20/20.

A conundrum. Do you:

A. Refer to an ophthalmologist for a cataract evaluation?
Or

B. Prescribe your refraction with antireflective coating and reevaluate in six-12 months?

Both actions are appropriate. In the former, the patient is referred to a sub-specialist for evaluation and treatment of a disease process affecting quality of life. The surgeon may or may not recommend surgery at the time of examination, but the impetus for flow of information regarding intraocular lens options has begun. In the latter, the patient will be educated regarding options for cataract surgery and appropriately "primed" for future discussion regarding implant surgery. What is common to the two scenarios, irrespective of when surgery is actually scheduled, is early dissemination of information. Early education is critical to the eventual success, or failure, of a practice to assimilate into elective IOLs and increase conversion.

Advanced Diagnostic Practices

Equipment important for use in determining severity of cataract and gauging an appropriate referral window for routine general medical eye examinations include:

- Snellen visual acuity chart
- Slit lamp, topography
- Binocular indirect ophthalmoscope (BIO).

More advanced diagnostic equipment include:

- Optical coherence tomography (OCT)
- Colvard pupillometer
- IOL Master or LENSTAR™

Slit Lamp Evaluation Pearls

The importance of careful examination of the patient is self-evident. Several key areas of concentration will elucidate an appropriate candidate for advanced IOLs versus one who should be excluded from candidacy.

Working anteriorly to posteriorly, the following areas require careful discernment:

- **Adnexa:** Even trace amounts of lid disease, namely blepharitis, can have a profound and deleterious effect on subjective outcomes. Since lid disease can stifle appropriate tear production, lid disease should be managed aggressively prior to cataract surgery. I recommend use of all tools in our arsenal to manage blepharitis, such as warm soaks, sterile lid cleansing pads, antibiotics and steroids.



• **Tear film:** The multilayer, biologic tear film is the principle refractive surface of the eye. If this surface is challenged from adnexal disease causing insufficiency in any of its components—oily, aqueous or mucin—a patient will perceive their vision as “fluctuating,” “waxy,” “blurry,” or they will experience “glare and halos.” The astute clinician manages tear film insufficiencies aggressively with all elements in his armamentarium to create a uniform refractive surface to enhance subjective visual acuity postoperatively. Use of supportive products, such as preservative-free tears, long-lasting non-preserved artificial tears, ophthalmic gels, prescription agents such as Restasis (Allergan) and punctal plugs can be used in varying combinations to ameliorate dry eye symptoms.

• **Cornea:** Early in my career, I worked with an ophthalmologist who was fellowship trained in cornea. He taught me an important rule about corneal tissue: The cornea should be clear. If we keep this rule on the tip of a neuron while examining patients, we may avoid pitfalls such as recommending advanced IOLs to the wrong patients and elucidate etiology of amorphous postoperative complaints.

Steps Toward a Successful Elective IOL Practice:

1. Communicate your belief in elective IOLs.
2. Assume all cataract patients are potential elective IOL candidates until proven otherwise.
3. Describe elective IOLs to patients as an investment that never depreciates.
4. Set reasonable expectations.
5. Educate patients early.
6. Involve family members in cataract consultations.

mendation. Attention must also be given to the pattern of astigmatism. Asymmetric, non-orthogonal, irregular or apical astigmatism may confound candidacy for advanced IOL technology altogether.

• **Lens:** The type of cataract diagnosed: nuclear sclerotic, cortical, posterior subcapsular, anterior subcapsular, etc., should not preclude one patient versus another for consideration of advanced IOL technology. Careful attention should be noted, however, to other subtle findings such as pseudoexfoliation, phacodonesis and whether the cataract’s genesis is traumatic.

• **Vitreous:** Vitreous opacities and posterior vitreous detachment may influence a patient’s subjective evaluation of outcome and should be taken into consideration when recommending certain lifestyle implants. Many patients,

• **Topography or Pentacam corneal analysis** can also prove invaluable to decipher and correlate conflicting information during preoperative evaluation. Special consideration must be given to corneal astigmatism. The presence or absence of corneal cylinder can influence proper IOL recom-

• **Multifocal**

Obvious concentric rings can be seen on the multifocal IOL and is the signature of a multifocal IOL. The central zones enhance near visual acuity and more peripheral zones assist with intermediate and distance visual acuity.

• **Toric**

For patients receiving a toric IOL, I recommend dilating the operated eye on day one to ensure proper axis alignment. Three dots will be found at the periphery of the optic 180 degrees apart from one another. The alignment of the peripheral dots on the optic should match the planned corrected axis of astigmatism. A good indication of whether the axis if properly aligned is uncorrected visual acuity. If the visual acuity is found to be within acceptable range (>20/30) at this visit, that is strong empirical evidence that alignment was achieved.

After careful evaluation of the day one surgical patient, the patient will be discharged with instructions to use postoperative medications as directed, sleep with an eye shield over the operated eye and limit physical activity. My typical postoperative medical regimen is:

Antibiotic:

- Vigamox (Alcon) t.i.d. x one week

Steroid:

- Omnipred (Alcon) (or equivalent) t.i.d. x one week then b.i.d. x four weeks*

Non-steroidal:

- Nevanac (Alcon) t.i.d. x one week then b.i.d. x four weeks*

* I typically extend use of the steroid and non-steroidal drops to six weeks postop for elective IOL patients.

in fact, erroneously believe cataract surgery will eliminate floaters. It is important to inform patients that floaters will not disappear after cataract surgery. Moreover, patients with symptomatic floaters may not be appropriate candidates for multifocal IOL technology.

• **Macula:** We perform preoperative OCT on all prospective elective IOL candidates to rule out presence of occult epiretinal membranes and macular thickening. Subtle macular pathology— even fine pigment mottling— can negatively affect elective IOL outcomes, especially multifocal IOLs. Careful observation and thorough preoperative testing can prevent most cases of recommending an elective IOL to the wrong surgical candidate and thus save countless minutes— which can seem like hours— in the examination lane. A potential acuity meter

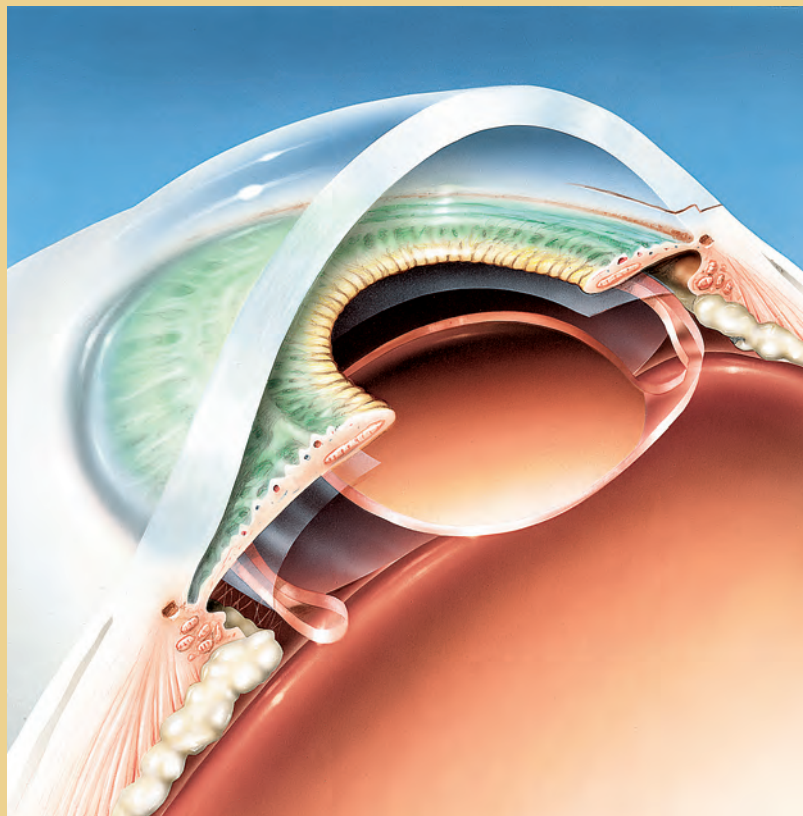
Week One Visit

By now, the patient should be more accustomed to the improved visual acuity and anticipate surgery on the fellow eye if it has not yet had surgery. At this visit, offer reassurance, be sure the patient understands how to continue medications and offer explanation for any questions they have about their experience.

I discontinue antibiotic drops at this visit and continue both steroidal and non-steroidal drops b.i.d.

Visual acuity should be crisp and measured in the same fashion as day one. Also, slit lamp evaluation is performed in the same manner as day one. Any corneal edema or folds noted at day one should be cleared at this visit and the anterior chamber should be deep and quiet.

If corneal edema and folds persist and/or an anterior chamber reaction persists, I recommend performing gonioscopy to search for a retained lens material in the angle. Retained lens material in the eye can induce chronic inflammation and may be cause for patients to return to the O.R. for irrigation. If the angle is clear, I recommend dilating the eye to search for retained lens material. Most instances of retained lens fragments are benign, and the remnants will slowly resorb over time. With any



Once a patient's vision is restored, careful postoperative management is critical.

retained lens material finding, consult the surgeon.

Subtle corneal changes can greatly influence a patient's experience with their surgical eye. Become a keen observer of subtleties and remember "the cornea should be

clear" and manage tear film issues aggressively.

Month One Visit

At one month, the fellow eye may or may not have been operated on

Continued on Page 14

(PAM) may also be used preoperatively if visual outcome is questionable.

Recommend a Specific IOL


Once a careful preoperative examination has been performed, I recommend making a specific IOL recommendation, whether a standard, toric or multifocal IOL. The clinician should be comfortable enough with his findings and know the patient well enough to be confident to refer to an ophthalmologist for a formal cataract consultation.

The M.D. will perform several other

tests necessary to deliver a desirable outcome. The surgeon will generally perform a second dilated fundus examination, perform an OCT and topography. Colvard pupillometry may be obtained to determine mesopic pupil size, and IOL Master™ testing will be performed to determine proper IOL power. Some optometric practices perform IOL Master™ testing, which is perfectly acceptable utilizing a well-trained technician who delivers consistent data. For patients who are candidates for a toric IOL, a computer generated Toric Calculator is used to determine the precise planned axis of

rotation of the implant for optimal acuity (www.acrysoftoriccalculator.com).

Together, the optometrist and ophthalmologist must educate prospective surgical candidates regarding intraocular lens technology available today. Because cataract surgery is deemed "refractive" surgery, emmetropia is an expected outcome for a large proportion of our healthy surgical patients. Utilizing today's most sophisticated implant technology and exacting clinical acumen, patients benefit from near-perfect outcomes and have options their parents did not have. ★



yet. I recommend performing a dilated fundus examination at this visit after careful visual acuity assessment and slit lamp evaluation. It is at this point during the post-operative experience that cystoid macular edema (CME) may manifest. Be alerted to this entity with any drop in best-corrected visual acuity. A cystic appearance to the macula will be evident, and your diagnosis can be solidified with OCT.

Once the patient is bilaterally implanted, adaptation should occur in a stepwise pattern. For patients who elected to proceed with standard or toric IOLs, the one month visit is the time when a final spectacle prescription is given and medications discontinued. Toric patients generally require only reading glasses postoperatively. For multifocal IOL patients, neuroadaptation will continue and the patient should be enjoying glasses-free vision at all distances. Medications are continued an additional two weeks.

Month Three

You should consider sending a survey to your elective IOL patients at this point. Ask about their spectacle-free experience, how the implant has changed their outlook, whether they would recommend the same technology to a friend or family member, etc. These are good data to continue practice growth and share with staff members to maintain excitement about elective IOL technology.

Month Six and Twelve

I recommend that patients should return six months after their procedure for a full medical eye examination. It is at this visit patients can discuss their results with the clinician and express concern over any issues they may have experienced.

Common issues dealt with at this visit are generally qualitative issues such as:

- Halos and glare

- Fluctuating vision
- Blurry vision
- Missed expectations

Etiology for qualitative issues are generally quickly discovered after a careful clinical examination. They are typically related to:

- Posterior capsular opacification (PCO)
- Tear film abnormalities
- Residual refractive error

tion for treatment of astigmatism in a multifocal IOL. Unplanned residual refractive error is typically the result of corneal astigmatism or ametropia due to planned lens power. Unplanned residual refractive error can be managed with laser vision correction, piggyback IOLs, spectacle or contact lens use.

Elective IOL patients typically have little tolerance for any postoperative outcome that is less than satisfactory. It is important to deal with

As the cataract patient population swells and patients seek youthful options for their visual experiences, we have an opportunity to significantly alter a patient's life in a positive way.

PCO

With improved intraocular lens designs and materials, PCO is less common. Especially with multifocal IOLs, faint PCO can produce dramatic symptoms of glare. I recommend intervening early with the earliest signs of PCO to address the patient's complaint. PCO is treated in an office setting with Nd:YAG laser capsulotomy.

Tear Film Abnormalities

As discussed earlier, the tear film is the principle refractive surface of the eye. The astute clinician manages tear film insufficiencies aggressively with all elements in his armamentarium to create a uniform refractive surface to enhance subjective visual acuity postoperatively.

You can use supportive products, such as preservative-free tears, long-lasting non-preserved artificial tears, ophthalmic gels, prescription agents such as Restasis (Allergan) and punctal plugs, in varying combinations to ameliorate dry eye symptoms.

Residual Refractive Error

There are two types of residual refractive error: 1) Planned and 2) Unplanned. Planned residual refractive error generally occurs because of planned postop laser vision correc-

their complaints professionally and diplomatically. Irrespective of how careful the clinician was to not overstate potential visual outcome, the patient expects near perfection. We have tools at our disposal to assist them and eliminate their concerns. Do not hesitate to bring the surgeon back into the management of an unhappy patient.

Insertion of elective IOL candidates and patients into your practice is an especially gratifying experience. As the cataract patient population swells and patients seek youthful options for their visual experiences, we have an opportunity to significantly alter a patient's life in a positive way. Lifestyle intraocular lenses have completely altered the perception of cataract surgery, changed the way surgeons perform phacoemulsification and have left an indelible mark on all eye care provider practices.

It is only the beginning. Technology will continue to evolve. Patients will soon start the conversation about lifestyle IOLs because they have heard of them on television, the Internet, reading a magazine or speaking with a friend or relative. The time to prepare your practice for this exciting journey is now. It will be an incredible experience for both the clinician and staff. ★



IOL Technology on the Horizon

THE ULTIMATE GOAL OF lens surgery is to restore accommodation to an amplitude similar to that of a 25-year-old. There are many intraocular lenses, in various stages of development, which are designed to provide a level of accommodation beyond any lens available today. These lenses use various optical and structural methods to achieve accommodation.

The AcrySof IQ ReSTOR Multifocal Toric IOL is designed to provide presbyopia correction as well as astigmatism correction. The AcrySof IQ ReSTOR Multifocal Toric IOL has a +3.0 D add power with different diopter of astigmatism correction.

Synchrony IOL (AMO, Santa Ana, CA) is a single-piece, silicone, dual optic and foldable lens. The lens uses a high power (30-35D) anterior optic and a negative power posterior lens which are connected by a spring like haptic. A small amount of anterior displacement of the anterior lens results in increased near vision. The lens is in its "compressed" state when inserted into the capsular bag. When the ciliary body contracts, relaxing the zonules, the anterior lens moves forward, resulting in near vision. In a pilot evaluation of the lens, it showed a mean accommodation of 3.22 diopters (0.88 D STD).

The NuLens Accommodating IOL (NuLens, Ltd., Herzliya Pituah, Israel) uses a unique design to obtain near vision. The structure of this lens allows it to change the

anterior curvature of the lens during accommodation. This sulcus fixated lens uses a dynamic diaphragm to force a silicone gel (index 1.40) through a small hole in an anterior diaphragm when the ciliary muscle contracts. The pressurized gel bulges forward through the hole, creating an increasingly more positive refracting surface. This is a similar mechanism used by waterfowl when making underwater dives. Accommodation has been measured at 8D on average.

Smart IOL (Medennium, Irvine CA) is a flexible thermoplastic gel that can be produced to specific size shapes and powers. It is a thin rod at room temperature that expands to fill the capsular bag when inserted within the eye. The material is flexible enough to change during the constriction of the ciliary muscle. The lens has been inserted into cadaver eyes and is awaiting further development before being inserted into human eyes.

Light Adjustable Lens (Calloun Vision, Pasadena, CA) is a photosensitive adjustable foldable 3-piece IOL. Macromers are embedded into the matrix of the lens. Focal UV light is delivered to the lens, which causes a polymerization of the macromers and allows them to migrate to the desired location (for example, to the center of the lens for increased plus). A final irradiation can lock in the final power of the lens. Therefore, the power of the lens can be altered after insertion, allowing for treatment of myopia, hyperopia or astigmatism.

Arturo Chayet, M.D. et al, reported in *Ophthalmology* that 92.9% of patients were within 0.25D after "correction" with the light adjusted lens, and they were able to treat up to 1.5 diopters of refractive error. It is anticipated that wavefront corrections and presbyopic treatments may be able to be performed on this lens.

Time will tell which, if any, of these lenses will achieve the lofty goal of truly restoring accommodation. History has shown us not everyone will recognize the best lens as it emerges. The pursuits of providing improved patient care will eventually yield the holy grail of eye care, a lens as remarkable as the human crystalline lens. ★



The Optometric Council on Refractive Technology (OCRT) is optometry's home for those involved in refractive surgery and the advanced technologies available for analysis and correction of patients' vision. Our mission is to advance the art and science of refractive technology for optometrists.

Membership in the OCRT is open to optometrists, vision scientists, optometric residents and students. If you would like to receive a membership application or have questions about membership in OCRT, please contact OCRT Membership Chairs, Dr. J. Christopher Freeman at jcfreeopt@yahoo.com or Dr. Andrew Morgenstern at andrewmorgenstern@gmail.com. For more information on the OCRT, please visit <http://www.ocrt.org/>