This supplement will provide you a reporting of the results from the 2016 ESCRS Survey. The 2016 ESCRS Survey was performed at the XXXIV Congress of the ESCRS in Copenhagen, Denmark. Delegates also had the option to take the survey via an electronic version at and following the ESCRS Congress. More than 1,879 delegates responded to this survey, which included 202 questions. Survey questions were developed and reviewed with the ESCRS leadership team, and substantiated by a data scientist.

ESCRS delegates were surveyed on 11 different clinical areas including: general cataract surgery, laser assisted cataract surgery, astigmatism management, presbyopia correction, ocular surface diseases, corneal refractive surgery, and others. The ESCRS leadership will regularly review the results of these annual surveys and this feedback will help us to better identify education needs of the Delegates. This data will also help expand the quantity and quality of education opportunities at the Annual Congress of the ESCRS, the ESCRS Winter Meeting, and multiple other education channels like EuroTimes articles and online forums.

ESCRS welcomes you to review the key findings and continue to seek upcoming educational opportunities that are made available to you. ESCRS also encourages all ESCRS Delegates to participate in the upcoming 2017 ESCRS Clinical Survey which will be launched in October at the Annual Congress in Lisbon and online at www.escrs.org/2017survey.
Survey Background & General Findings

202 Questions on key clinical opinions and practice patterns

Over 1800 Delegate respondents

Years in Practice

> 10 years: 56%
Currently in medical school, resident, fellow, 0-5 years in practice: 32%

Practice Setting

- Public Hospital: 40%
- Private Hospital: 20%
- Surgeon-Owned clinic / Academic Institution / Non Profit: 25%

22% Have already completed or plan to complete the Fellow of the European Board of Ophthalmology (FEBO) exam

61% Male
39% Female
Especially Cataract Surgery & Laser Assisted Cataract Surgery

Average Annual Volume of Cataract Surgery

455

eyes

Clinical areas where delegates believe laser cataract surgery provides a significant clinical benefit over standard cataract surgery

- Arcuate refractive incisions: 46%
- Capsulorhexis creation: 53%
- Lens fragmentation: 31%

*Distribution may be >100% as multiple selections are admissible

19% are performing femtosecond laser surgery on some of their cataract patients

21% perform bilateral/same-day cataract surgery beyond only patients extenuating circumstances. Primary reasons were patient convenience and faster visual recovery

48% perform biaxial cataract surgery

64% routinely optimize A-Constants every time a new lens is used
According to the 2016 ESCRS Clinical Survey, ESCRS delegates perform an average of 455 cataract surgeries per year. When asked their projection of the predominant system for IOL insertion in 2 to 3 years, 52% said a preloaded single-use push/plunger-style insertion system. Additionally, 48% said they currently perform biaxial cataract surgery.

When asked if they routinely optimize A-constants every time a new lens is used, 64% said they do. “Optimizing A-constants is important due to individual differences in surgical technique. Optimization is the standard for improving refractive outcomes,” said José Güell, MD.

Survey respondents were asked to indicate the clinical areas where they believe LACS provides a significant clinical benefit over standard cataract surgery. Delegates find the largest clinical benefit in capsulorrhexis creation (53%), arcuate refractive incisions (46%), and lens fragmentation (31%). “Any incision (cornea, capsule) will be better and more reproducible with the laser than with manual techniques,” he added.

According to the survey results, 31% of ophthalmologists believe that LACS is not a viable economic option for their practice. Twenty-six percent believe there is not enough data proving the clinical benefits of LACS, and 20% believe it interferes with patient flow, adds additional time, and their efficiency is reduced. “If you have minimal cases per year, I think you can always find a proper bilateral agreement with the company to introduce the technology in your practice,” he noted.
Presbyopia Correction

6% of cataract procedures involve a presbyopia-correcting IOL.

43% of cataract procedures are targeted for monovision or mini-monovision (0.75-1.25 is the most common diopter correction difference for monovision).

Most common category of presbyopia IOLs utilized today:

- Trifocal IOLs: 40%
- Bifocal IOLs: 34%
- Extended depth of focus IOLs: 18%

What presbyopia correction technology are you most interested in integrating in the next 5 years?

- Extended range of vision IOLs: 62%
- Trifocal/quadrifocal IOLs: 49%

65% believe that less than 0.75D of postoperative cylinder error is likely to have an impact on visual quality and patient satisfaction in presbyopia IOL patients.
Presbyopia Correction

By Filomena Ribeiro

According to the 2016 ESCRS Clinical Survey, 6% of ESCRS delegates' cataract procedures involve a presbyopia-correcting IOLs, and an average of 15% are toric presbyopia-correcting IOLs.

One of the most important and challenging decisions that surgeons face is choosing the right implant technology for each patient when correcting presbyopia and attempting to deliver a spectacle-free refractive solution at the time of cataract surgery. The demography has undergone a tremendous change in recent years. Loss of intermediate vision leaves the new wave of presbyopic patients disappointed. This focal point is needed for everyday activities, such as reading phone, tablet, or computer screens. As found from the 2016 ESCRS survey, 43% of cataract procedures are targeted for monovision or mini-monovision. 0.75D-1.25D is the most common diopter correction difference for monovision.

This reality has guided the technological evolution of IOLs with new solutions, such as the trifocal and the new concept of extended depth of focus (EDOF) that meet the needs of intermediate vision in the multiple daily activities. Quality of vision is also important, and EDOF technology allows better contrast sensitivity.

Currently, approximately 30% of cataract patients in my practice have premium refractive IOLs. If the patient is interested in spectacle independence, one important step is to identify which distances are most important for daily functioning. A careful examination, proper biometric analysis, understanding IOL technologies, and patient education allow optimal choice for the patient and outstanding refractive outcomes.

ESCRS delegates most commonly use trifocal IOLs (40%), bifocal IOLs (34%), and extended depth of focus (EDOF) IOLs (18%). In the next 5 years, delegates report they are most interested in integrating extended range of vision IOLs (62%) and Trifocal/Quadrifocal IOLs (49%).

The importance of corneal astigmatism correction in patients who are to receive multifocal implants cannot be overestimated. If the corneal astigmatism is not addressed, the patient will not have satisfactory quality of vision and will experience loss of contrast sensitivity and more dysphotopic phenomena. This will compromise spectacle independence after cataract surgery.

Major technological developments have occurred, with better diagnostic systems, calculators, marking systems, and more stable platforms with regard to rotation. Our experience has shown that patient satisfaction is really good. Biometry is an important key for these patients with low astigmatism. New equipment, such as multicolor LED technology and new developments in calculators, allows us to reduce post-surgery refractive errors. Simultaneously, EDOF IOLs have improved the residual astigmatism tolerance. All of this is associated with greater predictability with regard to incisional techniques, and it expands confidence in toric IOLs for low levels of astigmatism.

We are very excited about the evolution of EDOF technology, which was recently approved by the FDA. This technology addresses the issues we still have in intermediate vision, in contrast sensitivity, and in dysphotopic phenomena.

65% of ESCRS delegates believe that less than 0.75D of postoperative cylinder error is likely to have an impact on visual quality and patient satisfaction in presbyopia IOL patients.

When pursuing any surgical solution for presbyopia, the refractive target must be precise. From an optical point of view, the IOLs will deliver the best quality of vision and the best visual acuity for far distances when we target emmetropia. Satisfaction drops significantly with residual refractive error of more than 0.5 D. more if it is hyperopic. Some low add multifocal and EDOF IOLs can have good results with myopic micromonovision in the non-dominant eye. Cylinder errors over 0.50 D may reduce dramatically the performance of the multifocal IOLs.

The preoperative evaluation should be exhaustive to obtain the best biometric measurements. A retrospective study in our population showed that the Barrett Universal II formula and Warren Hill RBF can increase the probability of a spherical residual error less than 0.5. Similarly, new toric calculators such as Barrett toric calculator and Abulafia-Koch formula have demonstrated the ability to improve our results.
Astigmatism Management/Toric IOLs

7% of cataract procedures involve a toric IOL

53% believe that less than 10 degrees of rotational error, from the intended axis, will have a significant impact on visual quality and visual acuity.

Most common procedure to manage astigmatism in a monofocal cataract patient with the following amounts of cylinder:

- 0.75D: 42%
- 1.25D: 35%
- 1.75D: 55%

15% use digital/automated registration to match the preoperative and intraoperative axis of astigmatism.

Posterior corneal astigmatism (PCA):

- 29% do not believe it is clinically significant.
- 35% believe it is already included in the IOL calculation.

For a 1.5D cylinder patient, how many degrees of difference between diagnostic tests on the meridian would you allow before repeating measurement or canceling the implantation of the toric IOL?
Astigmatism Management/Toric IOLs

By David Spalton

From the 2016 ESCRS survey, surgeons report that 7% of their cataract procedures involve a toric IOL. 53% believe less than 10 degrees of rotational error from the intended axis will have a significant impact on visual quality and visual acuity. I think this result is rather surprising. It is important to understand that 10° of misalignment results in a 33% loss of cyl correction, 30° results in a total loss of cyl correction. Additionally, 10° is approximately 1 mm of circumference at the limbus, so critical alignment is of paramount importance to toric IOL correction of astigmatism. The IOL needs to be placed accurately (and to maintain that position postoperatively).

15% of respondents currently use digital image registration or intraoperative wavefront aberrometry to match the preoperative and intraoperative axis of astigmatism. Drawings don’t work. One really needs a good photograph for anatomical landmarks, and there can be problems as vessels can be lost by blanching from mydriatics, conjunctival edema, or hemorrhage, and iris features can be lost by pupillary dilatation. The ultimate development of this is to use integrated biometry and digital image recognition, and these systems appear to be easy and accurate to use. I think they will come into everyday practice as the standard of care in due course. I haven’t used intraoperative wavefront aberrometry, but I hear that there is a substantial learning curve if one is to get reliable results as things like lid squeezing, speculum pressure, wound hydration, and intraocular pressure can cause artifacts. Currently, most surgeons use a manual device to mark the axis preoperatively, and I think there is a lot to be said for those devices that mark both the horizontal and vertical axes (giving 3 points), but my own preference is to mark the axis with a slit-lamp prior to surgery using a needle to make a scratch on the cornea. Although digital image recognition is more accurate, many publications show that manual marking, when done carefully, provides very acceptable results.

According to the ESCRS survey, optical biometry is the most commonly used preoperative measurement for power and axis when implanting a toric IOL (65% power and 63% axis). Thirty-eight percent use tomography for axis decisions, and 35% use topography for power decisions.

Pentacam imaging or topography is essential to identify irregular astigmatism, surface disease, and the axis. Power is better measured by optical biometry. There is the interesting dichotomy in that low powers are more difficult to measure, but misalignment is less serious (eg, 10° misalignment of a 1.5 D cyl = 0.5 D), whereas high cys are easier to measure but alignment is more critical (10° of a 6 D cyl = 2 D). The clinical problem is what to do when there is a disparity between power and axis from different instruments. It is now possible to take this into account using the Barrett toric calculator, which can provide a vector average of the readings from three different devices. I haven’t had much experience with this yet, but it seems a very intriguing solution to a common clinical problem.

Ophthalmologists were also asked how they manage posterior corneal astigmatism. Thirty-five percent said they believe it is already included in the IOL calculation, and 29% do not believe it is clinically significant.

Posterior corneal astigmatism is an extremely important confounding factor unless taken into account, particularly in eyes with relatively low astigmatism. The go-to formula for toric calculation clearly is the Barrett formula accessed on the ASCRS or APACRS websites. It now forms the basis of most of the manufacturers’ toric calculators. I routinely use this formula for all my toric patients and am really pleased with the results. The odd thing is that, at present, this theoretical model seems to be more accurate than using direct measurements of the posterior cornea surfaces although this may change as OCT of the cornea improves. The Heidelberg device is potentially looking very good for this.
Ocular Surface Diseases

Do you examine the ocular surface in preoperative cataract surgery exams?

- 49% Yes, in all cases
- 19% Only when the patient presents with dry eye symptoms
- 25% Cataract patients who present for their pre-operative consult with ocular surface dysfunction that requires treatment

Top therapies and treatments for managing the following (beyond artificial tears and lid hygiene)

- **Moderate dry eye**: Hot compresses and Oral Omega-3
- **Severe dry eye**: Ciclosporin, punctal occlusion, and Oral Omega-3
- **For managing MGD**: Thermal lid expression, Topical corticosteroid, and oral cycline

Key objections to including advanced tear film diagnostics in a practice

- **25%** Limited access to technologies
- **27%** Increases my chair time
- **33%** Technologies not paid by health system
- **41%** Cost to me
Ocular Surface Disease

By Beatrice Cochener

The condition of the ocular surface is a hot topic right now, because ophthalmologists understand its impact on quality of vision and on the life of our patients. Therefore, we are becoming more aware of the importance of its evaluation.

In a recent survey, ESCRs delegates said they believe about 22% of their cataract surgery patients present for their preoperative consult with sufficient ocular surface dysfunction that requires treatment. Additionally, ESCRs ophthalmologists believe approximately 20% of their cataract patients develop symptoms post-operatively but were asymptomatic prior to surgery.

It is more common than we think for nonsymptomatic cataract surgery patients to become symptomatic postoperatively, especially in the elderly population. Causes of this include loss of lid elasticity, hormonal changes, and medications that can impact tear film. Meibomian gland dysfunction is the most common cause of ocular surface disease in these patients. My colleagues and I recently conducted a study at our university center in France of Meibomian gland disease in cataract surgery patients using meibography. We found that 52% of patients had Meibomian gland disease (3% were severe and 49% were asymptomatic), while 40% will report functional symptoms after the surgery.

From the ESCRs data and the experiences in my practice, we now understand that an ocular surface disease not treated before refractive surgery will worsen after surgery. It is the most frequent and severe postoperative complication, so it is imperative that the ocular surface be examined before surgery.

In the 2016 ESCRs survey, 49% of ophthalmologists reported that they examine the ocular surface in preoperative cataract surgery exams, and 19% only examine the ocular surface when the patient presents with dry eye symptoms. I believe that surgeons should screen for ocular surface disease in the majority of their patients because the ocular surface disease can be asymptomatic preoperatively and become symptomatic postoperatively. We know that it is always better to prevent than to treat, meaning that the discovery of an ocular surface disease does not necessarily contraindicate the surgery, but it justifies preparing the ocular surface for the surgery and informing the patient.

According to the survey, at the initial point of care, 40% use tear breakup time, and 37% use corneal and conjunctival staining. 69% use Schirmer’s testing and 60% use Meibomian gland expression as decided during the consultation. Above all, remember how much we can learn from a careful exam of the ocular surface at the slit-lamp, including the cornea (subepithelial cysts, opacity, endothelium), conjunctiva (bulbar and tarsal, grading hyperemia), lids (Meibomian gland, margins hyperemia, irregularity, telangiectasia), but also the patient’s face (features of rosacea, lupus, etc.). We shouldn’t forget the key value of one drop of fluorescein that gives you information about tear film stability with the tear breakup time, severity of the disease graded with the Oxford scale on the cornea, and the chronicity of the disease on conjunctiva. Finally, expressing the meibum manually from the lid will reflect the quality of the lid layer. However, it has been well established that the dye test together with a questionnaire of life are subjective and are not always correlated to the reality of the disease. That is why looking for instrumental tools that could quantify the different layers help us to understand the physiopathology of the disorder and guide us in the therapeutic strategy has been one of the big goals of research during the past 5 years. Luckily, we already have some nice equipment in our practice that can help us in checking the tear film: topography and aberrometry (especially double pass concept OQAS), contrast sensitivity, and MTF, HD OCT assessing the epithelial and tear film thickness and meniscus. To specifically assess the ocular surface, devices have been developed to check the meibomian function, adding the ability to quantify the ability of complete blinking and thickness of tear and maybe soon automatic tear breakup time. Finally, a new area has been opened regarding biomarkers. The pioneer is osmolarity, and there are many others in development targeting a refinement in detection and characterization of combined inflammation.

Survey respondents were asked about the therapies and treatments they use to manage the various forms of ocular surface diseases. Delegates report using customized artificial tears/lubricants and oral omega-3s to manage moderate dry eye. For managing severe dry eye, the majority responded using Ciclosporin, punctal occlusion, and Oral-Omega 3’s. For managing Meibomian Gland Dysfunction, the top therapies used is thermal lid expression, topical corticosteroid, and oral cycline’s.

In our daily practice, there is no rationale for treating asymptomatic patients, but according to the increase in ocular surface disease induced by corneal or intraocular surgery, we should consider preoperatively any ocular surface abnormality in order to try to prevent postoperative dryness. Informing the patient of this risk and explaining that ocular surface disease can be a source of visual impairment and that a lagophthalmy can be related to dryness is already a first step. This will help to decrease the level of patient disappointment and to convince him or her about the importance of providing good care to the ocular surface. The hierarchization of treatment may change from one country to the other, but we would assume that a certain consensus can be found in Europe. Artificial tears were readily combined with or replaced by more sophisticated lubricants (hyaluronic acid, osmoprotectors, cationic solution). We should always look for compromise between fluidity that compensates insufficient tears but may not stay long enough on the ocular surface and viscosity that provides a longer protection but impairs vision. That can include combining drops for daytime and gel or ointment for night. In addition, management of Meibomian gland disease by warming and cleaning lids is crucial. In case of excessive evaporation, (permanent or transitory) plugs can help to reduce the number of instillations. Only in severe cases of ocular surface disease can the use of anti-inflammatory agents be justified: topical steroid, cyclosporine 0.05% or 0.1%, and general cyclin or topical azithromycin for advanced Meibomian gland disease. We hope that refined diagnosis allowed by these new platforms of diagnosis will allow more targeted treatment.

The instructional course devoted to ocular surface, organized by EuCornea & ESCRs, will offer the opportunity to go deeper inside these different aspects of ocular surface disease and will hopefully help all members to understand the fundamental role of the ocular surface.