



Issue 059

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At Pacific Vision Institute, we believe that co-management of surgical patients is the foundation of successful outcomes. From preoperative screening to postoperative care, patients benefit from co-managed care and warm relationships their primary eye care doctors built with the PVI team over the years. We strive to do the very best for your patients, to support you as the co-managing partner, and to expand your capabilities so that the best care can be delivered to each patient. Pacific Vision Institute, is one of the first practices in the US to implant J&J Tecnis Symfony IOL for far/intermediate vision. With meticulous surgery and careful lens selection, many patients can achieve 20/15 distance vision and excellent intermediate/near vision. This month, PVI became the first practice in San Francisco Bay Area to implant J&J Tecnis Synergy IOL in a high myope undergoing RLE surgery. Patient wanted the widest range of vision from far to near.

## Making sense of IOLs: an OD primer to an ever-growing field of intraocular lenses for cataract and lens replacement surgery

Eye care has undergone tremendous growth and diversification recently. From myopia control to glaucoma management, from corneal refractive surgery to cataract and lens surgery, we can now truly customize treatment for each individual patient. When patients ask us "What is the best lens for my cataract or RLE surgery?" or "What is the best laser refractive surgery?" or "What is the best antibiotic?" Or "What is the best drop for my glaucoma?", we can answer that now, more than ever, we can offer a truly customized solution to fit each person's individual life style and eye health.

Developments in the field of intraocular lenses (IOLs) have been especially exciting as we focus on the fundamental goal of helping our patients achieve the widest possible range of vision, aiming to regain the vision of their youth. From diffractive to refractive optics, from multifocal to extended depth of focus technologies, the field of IOLs has grown exponentially in the past decade, creating a sophisticated array of solutions that we can chose from to help our patients "turn back the clock."

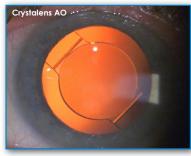
# Clinical News & Views

### **Historic Overview of IOLs**

Original intraocular lenses had positive spherical aberration. Since cornea naturally has positive spherical aberration, about +0.25 on the average, the original IOLs added to that spherical aberration, resulting in the increased overall ocular spherical aberration postop. Optical performance of these lenses was, therefore, not great by modern standards. Spherical aberrations resulted in decreased contrast of the retinal image and glare, especially at night. Initial advances in IOL design aimed to improve optical performance by reducing overall ocular spherical aberration after cataract and lens replacement surgery. Several decades ago, a company in Netherlands, called Tecnis, developed a lens with a mild negative spherical aberration, approximately -0.20, to counteract positive corneal spherical aberration, thereby aiming to create minimal total spherical aberration in the postoperative eye. The company was acquired by Pfizer, which was acquired by Advanced Medical Optics (AMO). AMO continued to use Tecnis IOL technology to build on, ultimately developing multifocal lenses to address presbyopia needs. AMO was acquired by Abbott Laboratories, which, in turn was acquired by Johnson & Johnson. To-date, the fundamental optic quality of a Tecnis lens is considered to be the gold-standard in the industry.

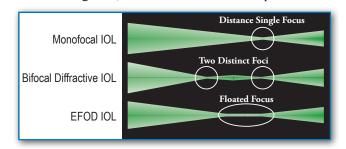
Shortly after Tecnis introduced an IOL with a mild negative spherical aberration, Alcon developed a lens with a mild negative spherical aberration as well. It named the lens AcrySof IQ. Whereas Tecnis (J&J) lens has prolate anterior surface, AcrySof IQ (Alcon) has prolate posterior surface. Tecnis and AcrySof IQ monofocal lenses are the foundation upon which all the advanced IOLs are built, creating toric, multifocal, and Extended Depth of Field (EDOF) lenses manufactured today by each company.

"Aspheric" vs. True aspheric

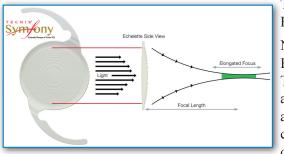


### **Presbyopic IOLs**

# After the quality of the optic was improved, attention was turned to expanding the range of vision. **ReSTOR** (Alcon) was one of the first multifocal IOLs. It came in several powers, allowing for either far & intermediate vision or far & near vision. Dr. Barry Seibel, Director of Cataract and Lens Surgery at PVI, was the first surgeon in San Francisco to implant ReSTOR IOL in an artist seeking presbyopia solution after her cataract surgery.



J&J's solution to presbyopia was its **Tecnis Multifocal** lens. Many surgeons liked the quality of the Tecnis optic and preferred this lens to ReSTOR. Both types of lenses are considered "bifocal" because they provide two viewing options: far and intermediate or far and near. With the far/near option, patients may experience "intermediate drop" or gap in vision. For example, they can see far and read but not see the computer. This phenomenon is common with ReSTOR's far/near lens.



Tecnis Multifocal does not provide as much add in it's far/near version as ReSTOR can, and its"intermediate drop" is not as noticeable.

Both, Tecnis and AcrySof IQ line of lenses are called "aspheric." However, they are not truly aspheric. They have mild negative spherical aberration. It is important to know this because implanting such an IOL in a post-hyperopic LASIK/PRK eye, for example, may result in INCREASED negative spherical aberration and increased glare after cataract and RLE surgery. Such eyes may benefit from an original IOL design with positive spherical aberration or from a true aspheric IOL. True aspheric IOLs are manufactured by Bausch & Lomb. **Crystalens AO**, a pseudo-accommodating IOL, is the best known true aspheric IOL.

Nevertheless, to reduce vision gaps, J&J developed a lens incorporating Extended Depth of Focus (EDOF) technology, called **Technis Symfony**. The IOL has a biconvex wavefront-designed anterior surface and a posterior achromatic diffractive surface with an echelette design. This format creates an achromatic diffractive pattern that elongates a single focal point and compensates for the chromatic aberration of the cornea. While still a diffractive optic, the extended foci allows for nearly all light to be transmitted through



the IOL, with the reduction of chromatic aberrations. Patients have good distance and intermediate vision with minimal reduction in contrast which makes Symfony an ideal lens for patients with previous corneal refractive surgery and in patients with ocular pathology who are OK wearing reading glasses for small print and



don't mind glare/haloes around lights. Symfony was the first EDOF lens on the market and remains a popular choice for many patients.

Alcon's solution to "intermediate drop,"



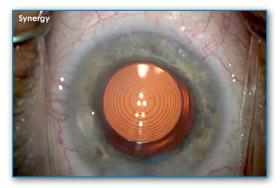
was to create a trifocal lens, called **PanOptix**. The lens covers the intermediate as well as near and far distances, but there could be dysphotopsias and "waxy" vision due to significant reduction of contrast. This lens may be considered in patients who want the widest range of vision, but spend most of their time on computer and reading. Careful preoperative assessment is essential to rule out

any ocular disease, including ocular surface disease, corneal, retinal, or optic nerve pathology. In depth discussion needs to be undertaken with patients to make sure they are OK with trading spectacle independence for reduced quality of vision and possibly significant dysphotopsia. Patients with history of previous refractive surgery are not the best candidates for this lens.

This year, another EDOF lens received FDA approval. Unlike Symfony (J&J), **Vivity** (Alcon) is non-diffractive. It utilizes a refractive ring to provide intermediate vision. The risk of glare after Vivity implantation is no more than after a monofocal lens which makes it an excellent choice for patients concerned about glare. It does cause reduction in contrast and is, therefore, not the best choice for patients who had previous refractive surgery or patients with any ocular disease that may cause reduction in contrast, such as ocular surface disease, AMD, dreusen, and glaucoma or glaucoma suspect, for example. As with Sympony, patients can expect good distance and intermediate visual



acuity but will need to wear reading glasses for small print. As with any IOLs, meticulous phaco surgery is essential to successful outcome. It is, however, especially true when a Vivity implant is planned. Decentration may result in a demarcation line in the visual axis. Additionally, it comes in limited powers and may not be available for patients with longer axial lengths.



The most recent additions to the IOL field are Synergy, a J&J version of a trifocal IOL, and Eyhance, also from J& J. Unlike PanOptix trifocal IOL, **Technis Synergy** is not solely diffractive. Rather, it combines both diffractive and EDOF components aiming for a wide range, continuous vision with less light splitting. As a result, it may provides better contrast and perform better under low light conditions. This lens may be a good choice for patients who want the widest range of vision with the most spectacle independence. They need to be counseled, however, that glare and some reduction in contrast is still possible. It may, therefore, not be an ideal choice for patients with previous refractive surgery or any ocular disease.

**Technis Eyhance** (J&J) is a monofocal lens that has been slightly modified in the center to increase depth of focus. This creates slightly better intermediate vision than a monofocal lens but not as good as EDOF lenses. This could be a good choice for patients looking for distance and some intermediate vision, who are concerned about glare, want minimal reduction in contrast, and are OK with less spectacle independence than they would have with either Symfony or Vivity.



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# Clinical News & Views

#### **Patient Selection Pearls**

- What is the patient's postoperative vision goal? Patients who want the widest range of vision with the least spectacle dependance can be considered for trifocal IOLs, such as Synergy or PanOptix. Patients need to be counseled that the tradeoff of spectacle independence for most distances may be decreased quality of vision. If patients want less of an impact on their quality of vision, they need to consider choosing one of the EDOF lenses (Symfony or Vivity) or a bifocal lens, such as Tecnis multifocal, for example. This means, they will need glasses to read small print. To reduce the need for reading glasses, an EDOF lense may be implanted in their dominant eye and a higher add bifocal, in the other eye. Alternatively, EDOF lenses may be implanted in both eyes, but a non-dominant eye may be targeted for mild monovision.
- What is the patient's tolerance for glare? For patients who are worried about glare, trifocal lenses are best avoided, although a lens such as Synergy, for example, that combines diffractive and EDOF optics may be less of a glare risk postop. Vivity is an optimal lens for patients who are concerned about glare, providing these patients' eyes are healthy, they have not had previous refractive surgery, and are OK with glasses for small print. Eyhance may also be considered, but it may not provide as much of an intermediate add as an EDOF lens.
- Does the patient have any eye conditions that can reduce contrast? Patients with ocular surface disease, corneal dystrophies, AMD, dreusen, epiretinal membrane, and glaucoma/optic nerve problems are typically not good candidates for trifocal IOLs. A bifocal, Technis multifocal, may be considered, but an EDOF Symphony is the best choice for these patients. It is more forgiving of both lower and higher order aberrations than other presbyopic lenses, has better modulation transfer function, resulting in sharper and better contrast.
- **Does patient have history of previous corneal refractive surgery?** Patients with previous refractive surgery can have outstanding outcomes with presbyopic lenses. The optimal lens for these patients is Symfony. It is such a high-quality lens that sometimes, with binocular summation, patients can gain one more line and read J1. Alternatively, non-dominant eye can be targeted for mild mono vision.
- What about astigmatism? All lenses come in a toric version, with astigmatism correction starting at 1D at a corneal plane. Anything less than 1D, can typically be corrected with Limbal Relaxing Incisions (LRIs). At Pacific Vision Institute, the procedure fee for Advanced IOLs includes laser vision correction enhancement, if a patient has postoperative refractive error they want addressed.

Alcon (AcrySof IQ)					
Lens Name	Lens Type	Optics	Postop vision goal	Best for	Limitations
Monofocal	Monofocal	Monofocal "aspheric"	Distance	Patients OK with glasses for all distances	No intermediate or near vision
Toric	Monofocal	Monofocal "aspheric"	Distance	Patients OK with glasses for intermediate and near	No intermediate or near vision
ReSTOR +/- Toric	Presbyopia- correcting	Diffractive Multifocal ("Bifocal)	Distance + Near OR Distance + Intermediate	Patients who had ReSTOR in the other eye and like it	Intermediate vision drop
PanOptix +/- Toric	Presbyopia- correcting	Diffractive Multifocal ("Trifocal")	Distance + Interme- diate + Near	Patients who want the widest range of vi- sion and are OK with glare and decreased contrast. No previous refractive surgery, good tear film, no cornea/glaucoma/retina/ optic nerve problems	Significant dysphotopsias Decreased contrast
Vivity +/- toric	Presbyopia- correcting	Non-diffractive EDOF	Distance + Interme- diate	Patients who want distance and intermedi- ate vision, are OK with readers and who are worried about glare. No previous re- fractive surgery, good tear film, no cornea/ glaucoma/retina/optic nerve problems	Decreased contrast; Available lens powers are limited; Precise surgical skill is required to avoid decentration that can result in demarkation line through the line of sight

# Clinical News & Views

Johnson & Johnson (TECNIS)					
Lens Name	Lens Type	Optics	Postop vision goal	Best for	Limitations
Monofocal	Monofocal	Monofocal "aspheric"	Distance	Patients OK with glasses for all distances	No intermediate or near vision
Toric II	Monofocal	Monofocal "aspheric"	Distance	Patients OK with glasses for intermediate and near	No intermediate or near vision
Eyhance +/- Toric II	Monofocal+	Slight central lens steepen- ing	Distance + very mild intermediate add	Patients who want a little bit of intermediate vision, are OK with glasses for some inter- mediate and all near tasks, and are worried about glare, No previous refractive surgery, good tear film, no cornea/glaucoma/retina/ optic nerve problems	Some decrease in contrast
Multifocal +/- Toric II	Presbyopia- correcting	Diffractive Multifocal ("Bifocal")	Distance + Near a <i>OR</i> Distance + Intermediate	Patients who want good distance and inter- mediate vision and are OK with glasses for small print	Some intermediate vision drop but not as much as PanOptix
Symfony +/- Toric II	Presbyopia- correcting	Diffractive EDOF	Distance + Inter- mediate	Patients who want distance and intermedi- ate vision, are OK with readers, and had previous refractive surgery, and/or issues that decrease contrast, i.e. tear film, cornea/ glaucoma/retina/optic nerve. Patients are OK with some glare.	Some glare
Synergy +/- Toric II	Presbyopia- correcting	Multifocal + Diffractive EDOF ("Trifo- cal EDOF")	Distance + Inter- mediate + Near	Patients who want the widest range of vision and are OK with glare. No previous refractive surgery, good tear film, no cornea/glaucoma/ retina/optic nerve problems	Some glare Some decreased contrast but not as much as PanOptix

Bausch & Lomb					
Lens Name	Lens Type	Optics	Postop vision goal	Best for	Limitations
Crystalens AO	Pseudo-ac- comodating	Monofocal True aspheric	Distance + Inter- mediate	Patients with ocular pathology who are not candidates for multifocal or EDOF lenses but who would like some intermediate vision; Patients who don't want any dysphotopsia or loss of contrast and are ok with mild in- termediate add and readers; Post-hyperopic LASIK/PRK	May not result in significant add; Precise surgical skill is required to precisely center the lens; Early YAG capsulotomy may be required

### Post-multifocal IOL refraction pearls

- Auto-refractors (including aberrometers) may give inaccurate readings in patients with multifocal IOLs. Do not use auto refractor as a starting point for refraction.
- Check the visual acuity of the patient without correction.
- Start by adding +1.00 D to the phoropter. This should result in a loss of VA.
- If there is no loss of visual acuity, then add another +1.00 D and check the VA.



#### 5 Essential Tests for Successful Outcomes with Cataract and RLE Surgery



At Pacific Vision Institute, extreme attention is devoted to insuring accurate preoperative data collection. Corneal astigmatism, for example, is evaluated with 3 different devices to insure consistency of measurements, within 0.5D. Consistent, reproducible data is essential to accurate planning of astigmatism correction. Analysis of corneal higher order aberrations is also essential in determining what IOL to select. Patients with small myopic or hyperopic LASIK/PRK corrections in the past can be accurately detected. Spherical aberration profile of an IOL can then be selected to counteract corneal spherical aberration providing the least overall aspheric profile to optimize postoperative vision. IOL Consultant software is used to track outcomes and generate surgeon-specific nomogram-based IOL calculations

- 1. IOL Master K's, Axial Length, Anterior Chamber Depth, White-to-White
- 2. Topography K's, Regular vs. irregular astigmatism, ocular surface, previous refractive surgery
- 3. Pentacam K's, spherical aberration (SA)
- 4. ETM with Widefield OCT ocular surface, epithelial basement membrane dystrophy
- 5. Posterior Segment OCT Retina, optic nerve

#### Patient C.B. (Co-managing OD Sausalito Optometry)

64 y.o. woman s/p myopic LASIK at Pacific Vision Institute 20 years ago. Diagnosed with cataracts by her OD. Retired.

**Goal:** Great distance vision and as much near vision as possible without significant dysphotopsia and loss of contrast. OK with some glare.

OK with some glare.					
Exam:	OD	OS			
MRx	-2.00 DS 20/30-2	-0.75 DS 20/30+2			
SLE	3+ACS, 1+NS	1+NS			
IOL Master Cyl	1.4D @ 127	0.78D @ 35			
Topography	s/p myopic LASIK	s/p myopic LASIK			
Pentacam SA (µm)	0.715 SimK (n=1.3375, 15°) Total Corneal Refr. P. (4mm) Difference K1: 40.8D (42.6°) K1: 39.9D (65.9°) Axis: 23.3° K2: 41.7D (132.6°) K2: 40.4D (155.9°) Km: 41.2D Km: 40.2D Km: 10D Astig; 0.9D Astig; 0.5D Astig; 0.4D Total CRP: Center Avg 1mm Avg 3mm Min 3mm Max 3mm Apex: 40.6D 40.5D 40.0D 38.1D 41.4D Pupit: 40.6D 40.5D 40.0D 38.1D 41.4D Total Cor. Astig. (WFA) (4mm zone): -0.8D (43.7°) Total Cor. Sph.Aberration (WFA Z40) (6mm zone): 0.715 µm Total Cor. Irregular Astig. (WFA H0 RMS) (4mm zd 0.279 µm ACD (Int.): 3.14 mm ACD (Ext.): 3.59 mm Axial/Sag. B/F (76.7 % Ø Cornea: QS: ▲ Data Gaps! Pupil Dia: 3.34 mm Pachy: Apex: 449 µm Thinnest: [446 µm Difference; 3 µm]	0.671 SimK (n=1.3375, 15') Total Corneal Refr. P. (4mm) Difference K1: [40.8 D (80.8 ')] K1: [39.9 D (44.6 ')] Axis: [36.2 * K2: [40.9 D (170.8 ')] K2: [40.2 D (134.6 ')] Km: [40.8 D] Km: [40.1 D] Km: [0.7 D] Astig: [0.1 D] Astig: [0.3 D] Astig: [-0.2 D] Total CRP: Center Avg 1mm Avg 3mm Min 3mm Max 3mm Apex: [39.3 D] [39.3 D] [39.4 D] [38.8 D] [40.1 D] Pupit: [39.3 D] [39.3 D] [39.4 D] [38.8 D] [40.1 D] Pupit: [39.3 D] [39.3 D] [39.4 D] [38.8 D] [40.0 D] Total Cor. Astig. (WFA) (4mm zone): [-0.2 D (68.1 ')] Total Cor. Sph.Aberration (WFA Z40) (6mm zone): [0.671 μm Total Cor. Irregular Astig. (WFA HO RMS) (4mm a] 0.154 μm ACD (Int.): [2.95 mm] ACD (Ext.): [3.43 mm Axial/Sag. B/F [78.4 %] Ø Cornea: QS: ▲ Data Gaps! Pupit Dia: [3.14 mm Pachy: Apex: [475 μm] Thinnest: [472 μm] Difference; [3 μm]			
ETM	s/p myopic LASIK	s/p myopic LASIK			
Posterior Segment OCT	WNL	Epiretinal Membrane			

**IOL Recommendation:** Tecnis Symfony Toric (Patient is s/p corneal refractive surgery who wants great distance vision. Select an IOL with the best contrast of all the multifocal lenses but the trade off is readers for near tasks and some glare) **Postop:** 20/15 and J2



#### Patient H.H. (Co-managing OD Dr. G.S., Marin)

#### 88 y.o. man. Retired engineer

**Goal:** Great distance vision and as much near vision as possible. Does not want any glare. Wants to pass DMV test. OK with magnifiers for small print

Exam:	<b>OD</b> (dominant)	OS			
MRx	0.00+0.5x88 DS 20/30-2 / J10	+2.00 DS 20/25-2 J10			
SLE	3+NS	3+NS			
IOL Master Cyl	0.57D @ 107	0.67D @ 68			
	AL: 23.37 mm (SNR = 382.6) K1: 43.38 D / 7.78 mm @ 17° K2: 43.95 D / 7.68 mm @ 107° R / SE: 7.73 mm / 43.67 D Cyl: 0.57 D @ 107° ACD: 2.59 mm WTW: 11.9 mm Vertex: 12 mm Status: Phakic	AL: 23.59 mm (SNR = 125.6) K1: 42.99 D / 7.85 mm @ 158° K2: 43.66 D / 7.73 mm @ 68° R / SE: 7.79 mm / 43.33 D Cyl: 0.67 D @ 68° ACD: 2.66 mm WTW: 11.7 mm Vertex: 12 mm Status: Phakic			
Topography	WNL	WNL			
Pentacam SA (µm)	0.233	.306			
ETM	WNL	WNL			
Posterior Segment OCT	WNL	WNL			

**IOL Recommendation:** Vivity recommended in both eyes - good distance and intermediate, less glare than other lenses **Postop:** 20/25 and J2 OU

#### Patient P.H.

49 y.o. woman high myope. Initially presented for a LASIK consult, but corneas were too thin for either LASIK or PRK. Off label ICL vs. RLE discussed with the patient. Vivity considered, but doesn't come in high enough powers

Goal: Wants the widest range of vision possible and is OK with the trade off glare and some reduced contrast

Exam:	OD	OS (dominant)
MRx	-9.50 + 0.75 x 139 (20/20-)	-9.75 + 1.25 x 033 (20/20-)
SLE	WNL	WNL
IOL Master Cyl	0.6D @100	0.71D @59
Topography	flat cornea	flat cornea
Pentacam SA (µm)	0.274	0.267
ETM	WNL	WNL
Posterior Segment OCT	WNL	WNL

**IOL Recommendation:** Tecnis Multifocal (+2.50 add at the spectacle plane) in dominant eye; Tecnis Synergy in non-dominant eye

Postop: OD: 20/25 J1 and OS 20/20 and J2



- Dr. Barry Seibel, Director of Cataract and Lens Surgery at PVI, becomes **the first surgeon in San Francisco** to implant Johnson & Johnson **Tecnis Synergy IOL** in patients undergoing cataract and RLE surgery.
- PVI research on Screening Refractive Surgery Candidates is selected for presentation at this year's American Society of Cataract and Refractive Surgery 2021.



- Dr. Ella Faktorovich is an invited guest speaker and section chair at **Neurotalk 2022** in Lisbon, Portugal
- Dr. Ella Faktorovich's publications cited in 24 peer reviewed publications this year to-date. The publications included Current Opinion in Ophthalmology, Eye, Experimental Eye Research, Investigative Ophthalmology and Visual Sciences, Stem Cells International.

Dr. Barry Seibel demos Ngenuity 3-D microscope. The Ngenuity employs

an advanced stereoscopic display to recreate binocular disparity, targeting the delivery of visual information to the right and left eyes. Notably, this kind of depth perception is not reproducible with standard analog oculars. When this is combined with passive, polarized 3D glasses, the system provides a dynamic and immersive 3D visualization experience not only for the surgeon but also for all others in the OR, including residents, fellows, medical students, and co-surgeons



# **Refractive Surgery Advisor**



#### Q: What is better ICL or RLE for a patient in mid 40's who is not a candidate for LASIK or PRK?

A: When potential refractive surgery patients come in for a consultation, it's important to be prepared with all the options. Every patient is going to need a unique strategy to figure out how to make them happiest. These are patients that you'll probably see

years after surgery, so you want to give them something to make them happy in the long term as well as short term. As a rule of thumb, we recommend ICL for patients who have some remaining accommodation. These are patients who are typically under 50 years old. Once they lose accommodation, they can either wear reading glasses, have monovision laser vision correction, or have the phakic IOL removed followed by RLE with presbyopic IOL

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### **OPTOMETRIC CE EVENTS**

Wednesday, October 6th, 2021 (San Francisco): Making sense of IOLs: an OD primer to IOLs for cataract and refractive surgery.

#### Thursday, October 7th 2021 (Marin):

Making sense of IOLs: an OD primer to IOLs for cataract and refractive surgery.

#### March 2022, Four Seasons Hotel, San Francisco: 18th Annual San Francisco Cornea, Cataract, and Refractive Surgery Symposium

### Contact Information

To schedule a patient, please contact



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