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# eFocus

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# Highlights of the 11th Annual San Francisco Cornea, Cataract, and Refractive Surgery Symposium

This year's Symposium brought together more than 150 Bay Area optometrists, some from as far up north as Sonoma and Mendocino counties, at the Four Seasons Hotel in San Francisco. The doctors enjoyed a morning of exciting presentations by world-renowned opinion leaders in the field of ophthalmology. Topics included dry eye treatments, pediatric refractive surgery, femtosecond laser cataract surgery, glaucoma, and retinal implants to cure blindness. In this issue of eFocus, we summarize the highlights of each presentation. If you would like to receive a copy of each presentation with an audio-file, please e-mail us at **info@pacificvision.org**.

## What's new in dry eye diagnosis and treatment

*Gary N. Foulks, MD, FACS; Professor of Ophthalmology, University of Louisville, Louisville, KY, Editor-in-Chief of the Ocular Surface*

- Several recent large studies shed light on diagnosis and treatment of dry eyes – The International Dry Eye Workshop Report (DEWS) and Report of the TFOS International Workshop on Meibomian Gland Dysfunction
- **DEWS Report** concluded that normal tear function requires two components – adequate tear quantity and normal tear quality. "Dry eyes" is, therefore, an incomplete definition of most patients' symptomatology. The more appropriate definition may be "Dysfunctional Tear Syndrome." This definition reflects the multifactorial nature of the disease.
- Factors that contribute to **Dysfunctional Tear Syndrome (DTS)** include – increased tear osmolarity and increased inflammatory mediators on the ocular surface and/or in the lacrimal gland. Inflammation is, therefore, considered to be the fundamental problem in DTS. Treatments should include methods to reduce inflammation, such as Restasis, steroids, and Azithromycin. Tear osmolarity (TearLab™) is a biomarker for DTS and can be followed to diagnose patients and monitor response to treatment. Measurement of inflammatory mediators in the tear film (RPS Inflammadry™) can also be performed in the office.

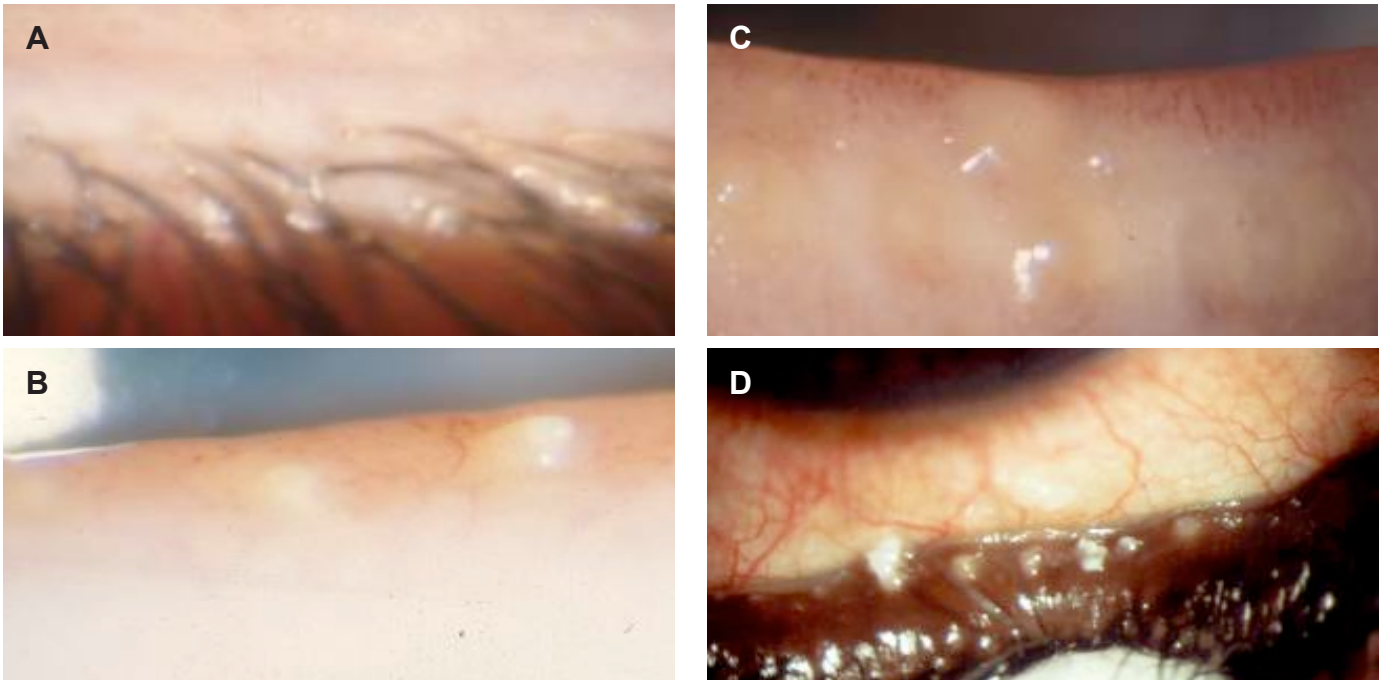


**Figure 1**. Clinical patterns of MGD. (A) Epithelial plugging. (B) Turbid. (C) Turbid with clumps. (D) Paste

- **TFOS International Workshop on Meibomian Gland Dysfunction Report** concluded that MGD is the most frequent cause of evaporative dry eye. The pathophysiology of MGD is obstruction of MG orifices caused by epithelial proliferation and keratinization and abnormal MG secretion. The character of meibum is an important feature of grading MGD severity and monitoring response to treatment (**Figure 1**).
- **New approaches to MGD therapy** include monitored pulsatile thermal compression of eyelid with LipiflowTM System (**Figure 2**) and cannulation of the MG orifices with fine needle (Maskin procedure, Rhein Medical, Inc; St Petersburg, FL).

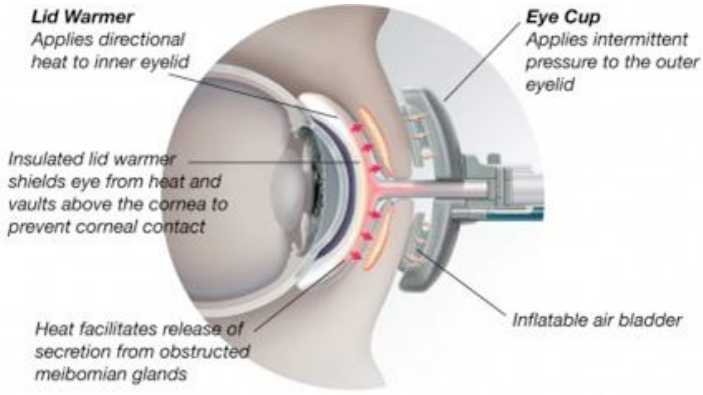


**Figure 2**. Lipiflow™ System (TearScience, Inc.; Durham, NC)

## Refractive surgery in the US Military

*David Tanzer, MD; Director Emeritus US Navy Refractive Surgery Program, Surgeon General's Advisor for the Navy, TLC Laser Eye Centers, San Diego, CA*

### Refractive surgery process: tips for success

- Most patients start the process by being referred from a military optometrist
- Optometrists screen for candidacy based on age, refractive error, occupation, hobbies, and corneal appearance
- Optometrists discuss all refractive surgery treatments – PRK, LASIK, ICL, and RLE
- Patients are then referred to a refractive surgery center for treatment
- After treatment, patients return to the referring OD for postop care
- Each service has an OD training course

### PRK: tips for success

- Routine postoperative drops are – Zymaxid, FML, and NPATs. Topical NSAIDs are not used
- Vitamin C 1gm daily for 3 months postoperatively
- Sunglasses with UV protection at all times outdoors during the first year postoperatively
- IDE study of PRK vs. all-laser LASIK showed no difference in vision outcomes between the treatments by 3-6 months postoperatively. The two are comparable in BSCVA, predictability, quality (HOA, low contrast sensitivity), and subjective appraisal of outcome

## LASIK: tips for success

- 100% femtosecond laser facilitated
- Studies have shown femtosecond LASIK to be safer and better than mechanical microkeratome
- Reverse bevel edge created with the iFS 5th generation femtosecond laser is essential to achieving flap stability and corneal nerve regeneration to minimize dry eyes (**Figure 3**).
- Allowed for anyone on active duty with rare service-related exceptions

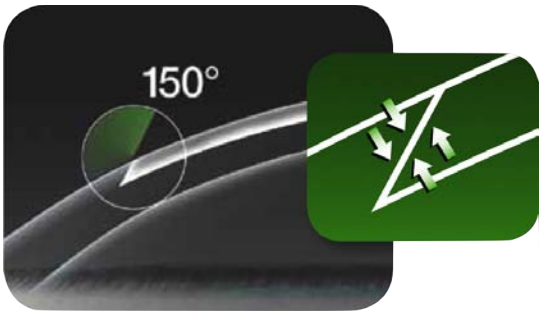


**Figure 3**. Reverse bevel side cut angle results in better flap stability and faster regeneration of the corneal nerves. The incidence of dry eyes is minimized. Although many femtosecond lasers are available to create the LASIK flap, reverse bevel side cut angle can be achieved only with iFS 5th generation femtosecond laser

## Outcomes based patient management

*Ella G. Faktorovich, MD; Director of Pacific Vision Institute, Founder of the Annual San Francisco Cornea, Cataract, and Refractive Surgery Symposium, San Francisco, CA*

- Because there is variability in how individual patients respond to treatment, we must use statistical principles to compare the results of different treatments, surgeons, and technologies.
- When comparing the results of two different treatments, surgeons, or technologies, ask the following 4 questions

| Ask these 4 questions | 4 S's of Statistical Comparison |
|---|---|
| Are the groups comparable?<br>• Preoperative characteristics (prescription!)<br>• Surgical steps (size of epi defect, mitomycin used?)<br>• Postop medications and management | Same type pre-treatment |
| Are the postop results compared at the same time? | Same time post-treatment |
| Are the sample sizes comparable? | Sample size |
| Are the standard deviations comparable? | Standard deviation |

- Comparison of PRK outcomes was used to demonstrate the application of statistics (**Figure 4**)
- New technique improves post-PRK vision immediately postop. During the first week after PRK, there is transient mild myopia that is most likely due to transient stromal edema and epithelial healing. Uncorrected vision is typically 20/40. We are now using either -0.75D or -1.25D contact lens instead of plano during the first week postop. As a result, average uncorrected vision improves by 2 lines.

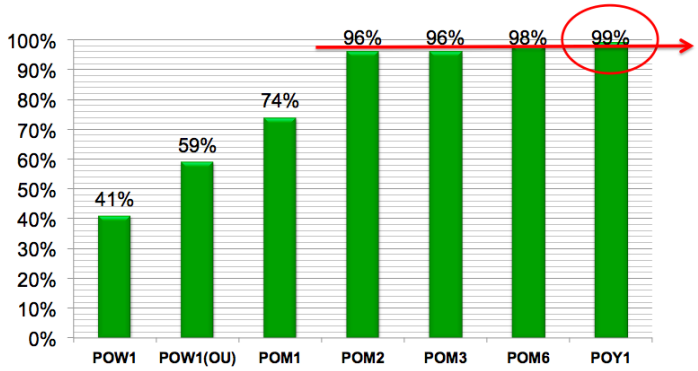


**Figure 4**. Results of PRK performed at Pacific Vision Institute. Percent of eyes with 20/20 or better UCVA vs. postop time (193 eyes, preoperative refractive error was -4.95+/-2.15D SE and 1.25+/-1.05D A)

## Pediatric Refractive Surgery

*Erin Durrie Stahl, MD; Pediatric Consultant, Pediatric Refractive Surgery, Durrie Vision, Overland Park, KS*

- Guidelines for recommending refractive surgery to patients under 18 years old
  - When patients with anisometropic amblyopia or bilateral high refractive errors are failing traditional treatments.
  - Reasons for failure include
    - Cannot use glasses due to neuro-developmental delays, such as autism, prematurity, or cerebral palsy
    - Dermatologic or craniofacial disorders
    - Contact lens intolerance
    - Inability for the patient (parent) to comply with occlusion therapy and/or refractive correction
  - How pediatric refractive surgery performed
    - Typically requires general anesthesia by a pediatric anesthesiologist in a pediatric setting
    - Nitrous oxide cannot be used because it will interfere with laser function

- Target refraction is emmetropia or mild hyperopia. Patients will likely need enhancement surgery in the future

- Types of pediatric refractive surgery
  - LASIK and PRK
  - Phakic IOL
  - Refractive Lens Exchange (RLE) – may be appropriate for high hyperopes and children with ROP who have crowded anterior chamber (**Figure 5**). RLE may be protective against pupillary block glaucoma.

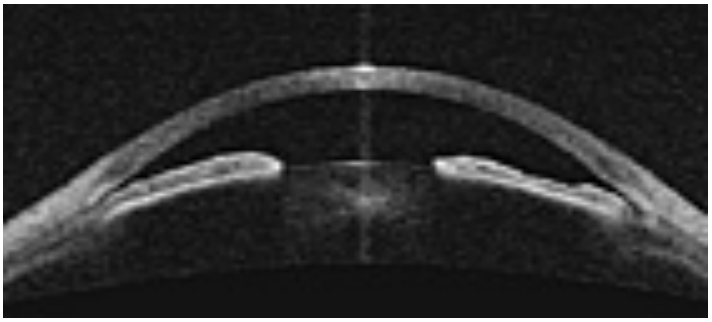

**Figure 5**. Anterior segment OCT scan of a high hyperopic child shows crowding of the anterior chamber. Patient is best treated with RLE. Monofocal IOLs are used in children.

## Femtosecond Laser Cataract

*Neil J. Friedman, MD; Director of Lens and Cataract Surgery, Pacific Vision Institute, San Francisco, CA*

- Currently, there are **4 femtosecond laser devices** for cataract surgery – Catalys Precision Laser System (OptiMedica); LensAR Laser System; LenSx Laser (Alcon), and VICTUS (B&L, Technolas). All do an excellent job of creating incisions in the cornea and lens. However, they differ in the technology used to dock to the eye, image the ocular structures, and identify and map the cornea and lens surfaces. A non-applanating fluid interface with automatic surface detection offers the most advantages
- How do femtosecond lasers used in cataract surgery differ from the lasers used in LASIK surgery?
  - Laser-cornea docking interface configuration is different (**Figure 6**)
  - Imaging requirements are significantly more sophisticated in femtosecond lasers used for cataract and lens surgery because it is necessary to image and measure intraocular components (**Figure** 7)
  - Patient age and health are typically less robust in patients undergoing cataract and lens than in patients undergoing LASIK surgery. Therefore, it is important to minimize the IOP rise.
- Of the 4 available laser systems, Catalys™ Precision Laser System (OptiMedica) offers the gentlest laser-cornea interface, with considerably less IOP rise than other lasers, and the most accurate imaging of intraocular components (**Figure 8**). This allows for the safest treatment.

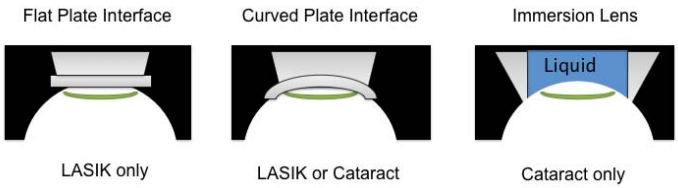


**Figure 6**. Difference between femtosecond lasers used in LASIK vs. lens surgery

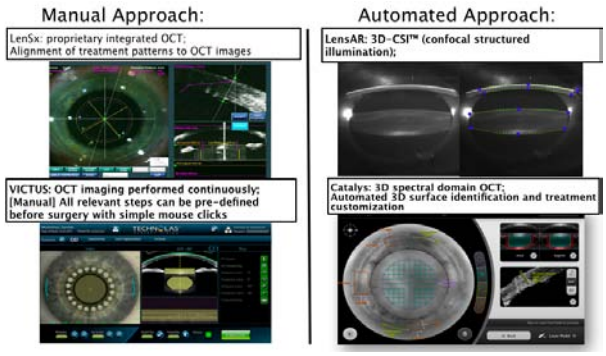


**Figure 7**. Femtosecosnd lasers used in lens surgery require sophisticated imaging technology

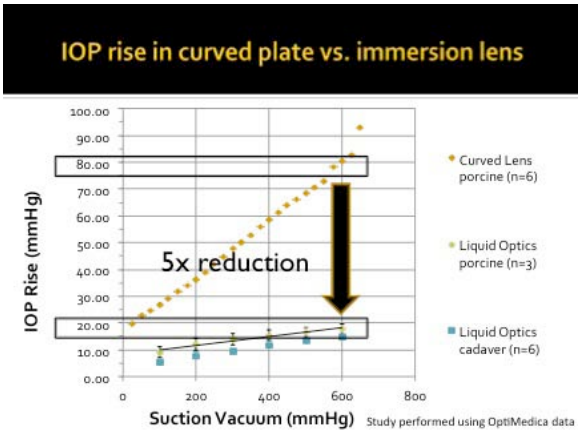


**Figure 8A**. Catalys™ Precision Laser System (OptiMedica) results in the lowest IOP rise vs. other lasers


**Figure 8B**. Catalys™ Precision Laser System (OptiMedica) is demoed at the recent American Society of Cataract and Refractive Surgery in Chicago. (photo by Ella G. Faktorovich, M.D.)

## Lens Replacement Surgery

*Jason E. Stahl, MD; Director Refractive Lens Department, Durrie Vision, Assistant Clinical Professor of Ophthalmology, Kansas University Medical Center, Kansas City, KS*

- A new term was introduced: **Dysfunctional Lens Syndrome (DLS)**. DLS includes loss of zoom function (presbyopia), degrading optics (light scatter and decreased quality of vision), and opacification (decreased best corrected vision).
- Loss of zoom and decreased quality of vision happen long before the final stage of DLS – the decrease in best corrected vision
- Lens replacement surgery (RLE) may be performed at any point after onset of any DLS symptoms. RLE is a 4 in 1 procedure. It accomplishes the following
  - Improves distance vision
  - Improves near vision
  - Eliminates future cataract surgery
  - Stabilizes vision (IOL will not age like the crystalline lens)
- Intraoperative wavefront aberrometry allows the surgeon to calculate IOL power while the patient is under the operating microscope (**Figure 9**). This method insures extraordinary accuracy in IOL power calculation – even in eyes with previous corneal refractive surgery. Refinement of surgical astigmatic treatments with LRI's or Toric IOLs is also possible.


**Figure 9**. Intraoperative aberrometry improves refractive accuracy of refractive outcome after lens replacement surgery. (TOP) -1.04D refractive outcome is predicted if a 20.5D IOL is inserted. (BOTTOM) Intraoperative aberrometry, however, shows that the 20.5D IOL power will actually result in a -0.65D refractive outcome

## Refractive and Cataract Surgery Considerations in Patients with Glaucoma and Glaucoma Suspects

*Andrew G. Iwach, MD; Director of Glaucoma Center of San Francisco, San Francisco, CA*

- In patients with narrow angles, the crystalline lens plays a role in how they are treated. A peripheral iridotomy may be indicated in some, but a more definitive solution is to remove the crystalline lens. The angle will automatically open up greatly reducing the risk of angle closure.
- When noting IOP in the chart consider using $T_L$ to remind yourself that that patient had refractive surgery and the reading may be lower than it actually is.
- Every refractive surgery patient should have a complete eye exam pre-operatively looking specifically at the angle, optic nerve, and retina. Also, have a discussion with patients who have risk factors for glaucoma, such as African-American heritage and family history of glaucoma, so they aren't surprised in the future. They should also be informed about how having refractive surgery may affect monitoring intraocular pressure in the future.
- Patients with glaucoma, including filtered patients, may undergo PRK safely.

## New Technologies for Retinal Degenerations

*Jacque Duncan, MD; Professor of Clinical Ophthalmology, Director of Retinal Degenerations Clinic; UCSF Department of Ophthalmology, San Francisco, CA*

- Retinal prosthetic devices can now be implanted in patients who lost photoreceptors due to retinal degenerations such as Retinitis Pigmentosa. The goal of the device is to bypass the missing photoreceptors. Patient wears special eyeglasses with an attached video camera. The camera transmits the signal to the retinal implant.

The implant stimulates the bipolar cells. Bipolar cells transmit the signal via optic nerve to the brain. Patients have been shown to regain the ability to identify the position, orientation, and motion of objects as well as identify high contrast objects like windows and doorways.

- One of the devices is the Argus II made by Second Sight. It is now in FDA-approved IDE clinical trial. Using this system, blind subjects have been shown to improve their performance on visual tasks (**Figure 10**)

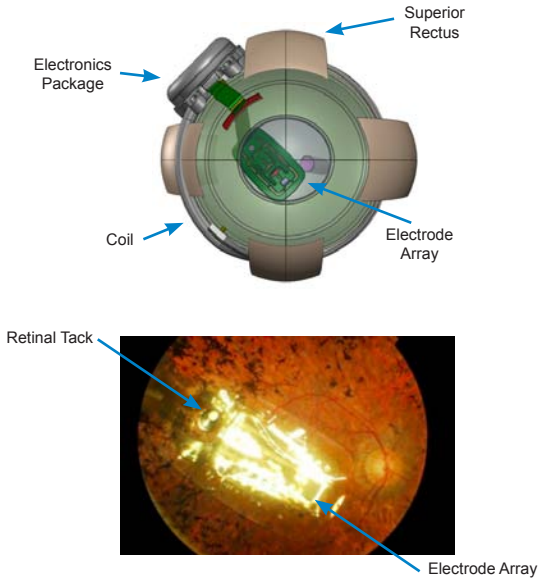


**Figure 10**. Second Sight Argus II Retinal Prosthesis System

- For patients with degenerative retinal diseases who still have photoreceptors, treatment with Ciliary Neuro-Trophic Factor (CNTF) is in clinical trials. The treatments aim is to slow down loss of photoreceptors. CNTF is delivered to the retina by an encapsulated cell intraocular implant that contain modified RPE cells that produce sustained release CNTF over extended time frame (**Figure 11**).

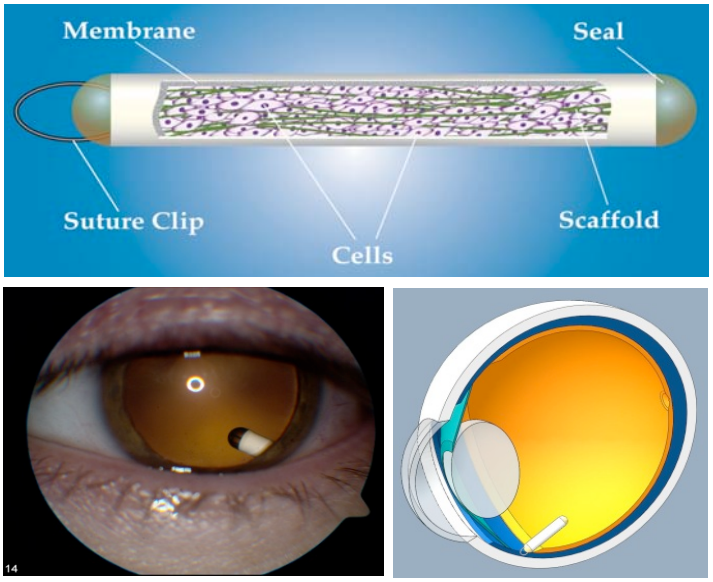


**Figure 11**. Intravitreal implant of encapsulated RPE cell technology device delivers sustained release growth factor (CNTF) to delay photoreceptor degeneration in patients with Retinitis Pigmentosa. RPE cells transfected to produce CNTF. Device releases 1.53 ± 0.5 ng/day CNTF (15 nm pores) (ECT Technology - Neurotech USA)

**Sight Gags** *by Scott Lee, O.D.*





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