

Top Products of 2010

Dr. Osher provides his annual review of the most important technologies of the year just past and the developments that will shape the year to come.

BY ROBERT H. OSHER, MD

The year 2010 was another terrific one for new products. At October's annual meeting of the American Academy of Ophthalmology in Chicago, I reviewed nearly 100 new products that affect cataract surgeons. This article describes some of the highlights.

DIAGNOSTICS

Freedom Meditech, Inc. (San Diego, CA, and Cleveland, OH), introduced a noninvasive diabetes screening technology capable of identifying patients at risk up to 7 years before the onset of this disease. The ClearPath DS-120 is a proprietary device designed to quickly detect elevated crystalline lens fluorescence of biomarkers in the diabetic metabolic pathway. An FDA filing is underway.

Carl Zeiss Meditec, Inc. (Dublin, CA), released the IOLMaster 500. It features higher speed than the previous model, dual-mode measurements, composite signal filtering, seamless data integration with the Synergy Ultrasound A-scan, a new graphical user interface, and easy data transfer to the Holladay consultant program. The Lenstar LS900 (Haag-Streit AG, Köniz, Switzerland) met with an enthusiastic reception from the ophthalmic community for its capability of quickly and accurately measuring nine different parameters, including axial length, keratometry, anterior chamber depth, corneal thickness, and lens thickness. The Lenstar can autopopulate the Holladay II formula and link to an electronic medical record. Tracey Technologies (Houston, TX) introduced the iTrace, which combines aberrometry, refraction, topography, and pupillometry. The device measures accommodation in three dimensions, calculates refractive error at different pupillary sizes, and separates corneal from lenticular astigmatism, which has proven very helpful in the selection of toric lenses.

OR VIDEO AND THREE DIMENSIONS

Sony Corporation of America (New York, NY) debuted a new three-dimensional (3-D) system consisting of two PMW-10MD cameras on a Zeiss adapter using a passive, micropolarizer filter that produces a full high-definition image (resolution, 1,920 X 1,080). The company's new LMD2551MT monitor switches between two and three dimensions. TrueVision Systems, Inc. (Santa Barbara, CA), the 3-D pioneer in ophthalmology, developed a template for the capsulorhexis, limbal relaxing incisions, and a toric IOL's alignment. Teaching cataract surgery in 3-D has many advantages and will inevitably become standard at major meetings in the future. One drawback is the necessity of special glasses. Enter Get3DDisplay, LLC (San Francisco, CA), which introduced breakthrough technology that uses 7- to 65-inch monitors and does not require glasses.

MICROSCOPES

The Zeiss Lumera 700's (Carl Zeiss Meditec, Inc.) first year of availability in the United States was an unparalleled success. Its Stereo Coaxial Illumination enhanced the red reflex like no technology before it. Ophthalmologists can expect this microscope to become a "satellite office" connecting the clinic to the OR in the future.

INCISIONS AND CLOSURES

Formed in July 2010, Beaver-Visitec International (Waltham, MA) acquired the trend-setting line of safety blades from BD (Franklin Lakes, NJ). Crestpoint Management Ltd. (St. Louis, MO) began importing the MANI knives from Japan, and Richard Packard, FRCS, FRCOphth, of Windsor, United Kingdom, introduced the Windsor knife (not available in the United States). As this blade penetrates tissue, its profile progressively thickens

to increase resistance and avoid inadvertent perforation of the lens.

Beaver-Visitec International and Ocular Therapeutix, Inc. (Waltham, MA), each introduced an ocular adhesive for sealing the cataract incision.

OPHTHALMIC VISCOSURGICAL DEVICES

Abbott Medical Optics Inc. (AMO; Santa Ana, CA) released its Healon5 and Healon Dual Pack. The Healon5 protects the cornea, widens the pupil, and deepens the chamber while the Healon is easily removed from the capsular bag after the IOL is in place. Zeiss introduced Visthesia (not available in the United States), which combines sodium hyaluronate with lidocaine. Two different preparations for topical and intracameral use endow this ophthalmic viscosurgical device with anesthetic activity.

PHACOEMULSIFICATION

Alcon Laboratories, Inc. (Fort Worth, TX), plans to introduce the Ultrachopper on a 0.9-mm tip that will produce a blade depth of 1 mm during nuclear division. The Ambati tip (MicroSurgical Technology [MST], Redmond, WA) facilitates "carouseling" of the nucleus. Alcon's 12° OZil tip (Osher) with the bevel up or down (the author's preference) was designed to facilitate torsional phacoemulsification while enhancing phacoaspiration. Certainly, the improved followability and lesser repulsion used in nonlongitudinal ultrasound have been a winning combination for Alcon. The addition of Intelligent Phaco software increased the efficiency of cutting while reducing occlusion, surge, and the energy and balanced salt solution required.

AMO released the second-generation Ellips FX handpiece, which increases the stroke length and frequency of the elliptical oscillations. Dual-pump options allow venturi fluidics with increased cutting and hold but reduced chatter.

From Bausch + Lomb (B+L; Rochester, NY) came the Stellaris Digiflow. Its pressurized infusion achieves a more stable chamber with smaller incisions. B+L is the first major US company to crack the 2-mm barrier with coaxial phacoemulsification.

FEMTOSECOND LASERS

Alcon made headlines when it purchased LenSx Lasers, Inc., which signaled the former's commitment to femtosecond laser-assisted cataract surgery. The technology's advantages include a more precise capsulorhexis, more reproducible incisions, nuclear preparation by fracturing and quadrant softening, and titratable, more accurate astigmatic keratotomy. Although not yet avail-

able in the United States, the Catalys Precision Laser System (OptiMedica Corp., Santa Clara, CA) drew large crowds at the AAO Annual Meeting last year. LensAR Inc. (Winter Park, FL) also showed off its femtosecond laser while offering a peek at a related project for presbyopic correction.

At the ESCRS meeting in Paris, Technolas Perfect Vision GmbH (Munich, Germany) introduced a customized lens module for cataract surgery. The company's laser (not available in the United States) is also able to perform refractive, intrastromal, and therapeutic procedures.

IRRIGATION AND ASPIRATION

Alcon's soft silicone tip has probably saved more posterior capsules than any other technology. Last year, the company developed a polycarbonate tip for single usage. In response, B+L introduced the CapsuleGuard, a one-piece translucent silicone tip. The CapsuleGuard soft tips contain no metal and require no assembly or adjustment.

POSTERIOR CAPSULAR OPACIFICATION

The Dodick Laser Photolysis System (Arc Laser Corp., Salt Lake City, UT) was derived from the Dodick Nd:YAG laser. The system delivers ultrafast shockwave pulses generated by laser absorption in the titanium tip of the handpiece that disrupt the lens epithelial cells. Although the jury is out on whether the procedure prevents posterior capsular opacification, this new technology drew a great deal of interest at the ESCRS meeting in Paris.

IOLs

Hoya Surgical Optics, Inc. (Chino Hills, CA), brought the first preloaded IOL into the United States last year. The company has since continued to refine the technology so that injection can occur through incisions of 2 mm or smaller. At press time, Alcon planned to release the AcrySert C for injecting the company's Acrysof IQ lenses (6.00 to 30.00 D) at the end of 2010.

Industry continued to work toward more precise and accurate lens selection. Lenstec, Inc. (St. Petersburg, FL), introduced 0.25 D steps between 18.00 and 25.00 D for the Softec HD IOL. First Q (Mannheim, Germany) has expanded the power range of lenses from -10.00 to +45.00 D correcting up to 9.00 D of cylinder. Based on Alcon's success with the toric lens, AMO, Hoya, and B+L all plan to introduce toric IOLs in the near future. Alcon received approval for the AcrySof Toric IOL's T6 to T9 expanded range in Europe. Higher-order aberrations are being addressed by Hanita Lenses (Kibbutz Hanita, Israel). The company developed the Achroma IOL (not available in the United States), which eliminates chromatic

ic and spherical aberration to increase contrast sensitivity and widen the depth of field.

Several multifocal lenses gained FDA approval in 2010. The three-piece MN6AD1 model of Alcon's AcrySof IQ Restor IOL +3.0 D is designed for use when the capsular bag is not intact. Market share for AMO's Tecnis Multifocal 1-Piece IOL grew steadily last year, and Hoya's multifocal lens (not available in the United States) is developing a following overseas. This hydrophobic acrylic lens features PMMA chemically bonded haptics on a three-zone refractive optic. The Lentis Mplus (Oculentis GmbH, Berlin, Germany; not available in the United States) has two add options, 1.50 and 3.00 D. This single-piece biconvex acrylic lens features a sector add on either a plate or a C-shaped design. Fine Vision (a division of PhysIOL, Liège, Belgium) introduced a pupil-dependent, trifocal optic with a diffractive anterior surface and an aspheric posterior surface (not available in the United States).

US surgeons anxiously await the introduction of Alcon's AcrySof IQ Restor Toric lens, which successfully debuted in Europe in 2010. Both the M-Flex Multifocal IOL (Rayner Intraocular Lenses Ltd., Hove, East Sussex, United Kingdom) and Zeiss' Acri.Lisa multifocal toric lenses have also been quite popular in Europe. Neither is available in this country. Zeiss' lens can be injected through a sub-2-mm incision, which probably reduces induced cylinder.

Accommodating IOLs continue to attract a great deal of attention, although only B+L's Crystalens is approved in this country. AMO's Synchrony lens is performing well, according to the recent peer-reviewed literature. The NuLens (NuLens Ltd., Herzliya Pituah, Israel) met with an enthusiastic reception at the ESCRS meeting in Paris, thanks to the positive review by Spanish surgeon Jorge Alió. Lenstec submitted data on the Tetraflex accommodating IOL and awaits a decision from the FDA on approval. Encouraging reports have also circulated about several fluid-based accommodating lenses being developed by PowerVision, Inc. (Belmont, CA), AkkoLens International BV (Breda, The Netherlands), and Adoptics AG (Brügg, Switzerland).

A potpourri of other IOLs made headlines last year. Calhoun Vision, Inc. (Pasadena, CA), reported excellent results with the Light Adjustable Lens in Europe (lens not available in the United States). The Implantable Miniature Telescope (VisionCare Ophthalmic Technologies, Saratoga, CA) received FDA approval. Rayner's Sulcoflex secondary implants (not available in the United States) were shown to safely and effectively correct asphericity, multifocality, and toricity.¹ In the category of phakic IOLs, Alcon expects its Cachet lens

to become available in the United States this year. The ACIOL goes through a 2.6-mm incision. STAAR Surgical Company (Monrovia, CA) received CE Mark approval to add its hyperopic toric product to the company's line of ICLs, which should allow virtually any phakic refractive error to be corrected.

TECHNOLOGY FOR ALIGNING A TORIC IOL

US surgeons are embracing toric lenses, and their rising market share indicates a changing standard of care for cataract patients with astigmatism. Four categories of technology are being developed to ensure the steep meridian's accurate identification and precise alignment of the IOL. Geuder AG (Heidelberg, Germany) introduced Tomark (available from Crestpoint Management Ltd.). Using this small instrument, the surgeon sets the axis and then marks the cornea at the slit lamp via either a tonometer or a handheld pendular instrument.

With iris fingerprinting, an image of the dilated pupil is captured during the initial examination, and software then determines the exact degrees at which iris landmarks are located. This technology has been introduced by Micron Imaging Systems, LLC (Pegram, TN), and Haag-Streit. Iris registration is another highly precise method developed by SensoMotoric Instruments GmbH (Teltow/Berlin, Germany), Zeiss, and TrueVision.

The final category is intraoperative alignment. Holos (Clarity Medical Systems, Inc., Pleasanton, CA; planned US availability in 2011) is the first scanning wavefront device that guides the surgeon in real time as he or she rotates the IOL to the targeted meridian.

INSTRUMENTATION AND DEVICES

Crestpoint, B+L Storz, and Geuder have joined forces to develop a new approach to handheld markers for identifying the targeted meridian. The semilunar markers snuggle up to the limbus, allowing a highly precise mark to be made with either ink or cautery. The companies' new speculum widens the interpalpebral distance, while allowing elevation of the individual lid off the globe through an adjustment of the wire blades.

Mastel Precision, Inc. (Rapid City, SD), introduced a modified, low-profile version of its full-circle protractor that is less bulky but still has the exquisitely etched numerals (the Osher/Nichamin Ring). MST designed a superb manipulator to facilitate the insertion and removal of the company's Malyugin Ring. Boris Malyugin, MD, moved the eyelet to the end of a Cionni Ring for Sclera Fixation (Morcher GmbH, Stuttgart, Germany) to allow its injection into the capsular bag. Anita Nevyas-Wallace, MD, developed an expandable barrier glide (Varitronics Inc., Broomall, PA) that creates a synthetic capsule or barrier to

prevent nuclear fragments from subluxating posteriorly through a torn posterior capsule. MST also introduced a new set of looped capsular retractors, which are remarkably gentle and less likely to tear the edge of the anterior capsule. In India, Dr. Arup Bhaumik built a snare for extracting an IOL through the same cartridge from which it was injected. For this clever idea, he received the grand prize at the 2010 ASCRS Film Festival.

B+L Storz released a novel magnifier to which a scrub technician could easily become addicted; the instrument facilitates the sleeve's placement on the phaco and I/A tip and "eliminates" presbyopia when he or she loads the IOL into the cartridge.

The field of prosthetic iris devices made remarkable progress last year, although these implants are still only available in the United States through an exemption for compassionate use. Morcher's Irismatch system offers 55 color options. Dr. Schmidt Intraocularlinsen GmbH (Sankt Augustin, Germany; distributed by HumanOptics AG, Erlangen, Germany) introduced a remarkable foldable prosthetic iris device that is hand painted to match the color of the patient's residual iris tissue or the iris of his or her contralateral eye. Four different devices aimed at combining cataract surgery with a pressure-lowering procedure made headway toward acceptance among cataract surgeons who want to combine the cataract operation with a pressure-lowering procedure at the same time. They include Alcon's Ex-Press mini glaucoma shunt, iStent (Glaukos Corp., Laguna Hills, CA; not available in the United States), CyPass (Transcend Medical, Menlo Park, CA; not available in the United States), and phacocanuloplasty.

DRUGS

The pharmaceutical industry was highly active in 2010. After Alcon bought Durezol from Sirion Therapeutics, the drug's market share rose steadily. This difluorinated prednisolone derivative is the most potent ocular steroid available and is prepared as an emulsion free of benzalkonium chloride. The biggest news in non-steroidal anti-inflammatory drugs was the FDA's approval of Bromday (Ista Pharmaceuticals, Inc.), the first once-a-day agent for the treatment of postoperative inflammation and pain.

Two new fluoroquinolone formulations were introduced last year. Zymaxid (Allergan, Inc.) is a 0.5% fortified gatifloxacin. Alcon's Moxeza, moxifloxacin 0.5%, is a reformulation of the company's Vigamox with a new vehicle, xanthan gum, which has twice the penetration to support b.i.d. labeling.

In response to AzaSite's (Inspire Pharmaceuticals, Inc.) success in treating blepharitis, Alcon introduced

Tobradex ST, with increased viscosity for a higher tissue concentration aimed at *Streptococcus* and *Staphylococcus*. Still, a majority of clinicians agree that the antibiotics are most effective when combined with a full therapeutic regimen for blepharitis (for example, use of SteriLid eyelid cleanser and the Nutridox Convenience Kit from Advanced Vision Research [Woburn, MA]).

EDUCATION

Eyemaginations, Inc. (Towson, MD), introduced Luma, an extraordinary tool for educating patients. Japanese ophthalmologist Junsuke Akura received the grand prize at the ESCRS Film Festival last year for his development of Kitaro, a new practice eye. The popularity of surgical simulators such as EYESI (VRmagic GmbH, Mannheim Germany) grew in US residency programs.

Gerd Auffarth, MD, and colleagues won the Asia Pacific Film Festival's grand prize for their "Is It Real?" video about the EYESI. At its annual meeting, the AAO released an hour-long complications video reviewing the management of the posterior capsule. This DVD is the companion to the first volume on anterior capsular problems published in the Academy's Expert Management Series. After 27 years of educating cataract and refractive surgeons worldwide, the *Video Journal of Cataract and Refractive Surgery* completed its first year on a high-definition Web site. Back issues of the journal are now available on Eyetube.net and through the AAO.

Finally, the author is pleased to announce a new educational meeting, Cataract Surgery: Telling It Like It Is! The inaugural forum this month will bring together six individuals who have devoted their careers to teaching colleagues how to manage difficult cases in cataract surgery. The content of the meeting will focus on the management of complications, challenging cases, and controversies. It will also buck the recent continuing medical education regulations that prevent surgeons from saying what sometimes needs to be said. Attendees can be sure of getting their money's worth at this educational free-for-all. ■

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1. Kahraman G, Amon M. New supplementary intraocular lens for refractive enhancement in pseudophakic patients. *J Cataract Refract Surg*. 2010;36(7):1090-1094.