The Catalys Precision Laser System (OptiMedica Corp., Santa Clara, CA) is designed to transform cataract surgery by replacing its inconsistent, manual steps. Developed by a team of OptiMedica scientists and engineers in collaboration with leading cataract and refractive surgeons from around the world, Catalys combines a femtosecond laser, integrated optical coherence tomography (OCT) imaging, and OptiMedica’s pattern scanning technology. A clinical study demonstrated marked improvement in the precision of several key surgical steps with the Catalys compared with a manual technique. This article explores the history of OptiMedica and the development process behind its Catalys Precision Laser System.

THE HISTORY OF OPTIMEDICA

OptiMedica was founded in Silicon Valley in 2004 by ophthalmic thought leader Mark Blumenkranz, MD, and four forward-thinking entrepreneurs. Their vision was to deliver innovative technologies to ophthalmologists and transform existing standards of care. They have done so broadly—across retina, glaucoma, and cataract—by questioning the status quo.

In 2006, OptiMedica’s initial commercial efforts began in retina with the PASCAL (PAttern SCAn Laser) method of photocoagulation. As the first breakthrough technology for panretinal photocoagulation in nearly 40 years, PASCAL dramatically improved the precision, efficiency, and comfort of the procedure. In less than 4 years, OptiMedica shipped more than 600 units in 40 markets around the world, with more than 750,000 patients treated and more than 30 million patterns delivered. This success drew the attention of Topcon Corp. (Tokyo), and the company added PASCAL to its product portfolio in 2008 and later acquired OptiMedica’s retina and glaucoma technology in 2010—an acquisition that was the largest in the history of Topcon’s medical device business. This strategic transaction positioned OptiMedica to focus exclusively...
on the development of its Catalys Precision Laser System, which it had begun in 2004.

**PRECISION LASER SYSTEM**

Expected to launch worldwide in 2011, Catalys is poised to deliver to cataract surgeons the same winning combination of precision, control, performance, safety, and efficacy that OptiMedica delivered in retina and glaucoma with PASCAL. Catalys is designed to replace the most manual steps of cataract procedures by providing custom control of capsulotomy size, shape and position; precise lens fragmentation, including segmentation and softening; exact laser incisions in the cornea to address astigmatism; and meticulously constructed multiplane cataract incisions.

Throughout the development of Catalys, OptiMedica has made numerous technology choices aimed at delivering unparalleled precision. The system is docked to the patient via the Liquid Optics Interface, which was designed as part of the optical path for the OCT and laser and provides a wide field of view for the surgeon. Additionally, sophisticated algorithms enhance Catalys’ integrated OCT. This system, called Integral Guidance (INTEGRated Algorithms), automatically identifies ocular surfaces and establishes safety zones that allow the physician to select and customize the treatment, ensuring that the femtosecond laser pulses are delivered precisely to the intended location.

**RESULTS**

The clinical results achieved with Catalys have established numerous benefits for use in cataract surgery. Data from a prospective, randomized, 29-patient study showed that Catalys delivered marked improvement over manual techniques across a number of key measures, including capsulotomy size, shape, and ease of lens fragmentation and disassembly. Capsulotomy size was measured by deviation of excised capsule disc diameter from the intended target. The average deviation in capsular disc diameter with Catalys was 27 µm, whereas the average deviation with the manual technique was 339 µm ($P < .001$). Capsulotomies delivered with Catalys and manually had a mean circularity of 0.942 and 0.774, respectively ($P < .001$); a score of 1.0 represented perfect circularity of the capsulotomy shape. Ease of lens fragmentation and disassembly was measured by cumulative dissipated energy (CDE) during ultrasound phacoemulsification. The observed CDE used for ultrasound phacoemulsification of the lens for laser-treated eyes (11.58 CDE) was significantly less than for the control eyes (18.54 CDE; $P = .028$). Catalys also delivered excellent capsulotomy centration. Using the target of centration within the dilated pupil, Catalys achieved an average distance from the intended center of 81 ±46 µm.

“The significant gains in precision we were able to achieve in the clinical study with Catalys represent an incredibly exciting development in the field of cataract surgery.”

—William W. Culbertson, MD

These results have promising implications for improving patient outcomes, OptiMedica medical advisory board chair William W. Culbertson, MD, of the Bascom Palmer Eye Institute, Miller School of Medicine, University of Miami, said. “The significant gains in precision we were able to achieve in the clinical study
“I can’t think of a more exciting time to be in ophthalmology. We are in the midst of a complete landscape change with the dawn of femtosecond laser cataract surgery, and we could not be more enthusiastic about the potential of our Catalys system to dramatically improve the precision of the procedure and thereby deliver significant benefit to both cataract surgeons and their patients.”

—Mark J. Forchette, president and CEO, OptiMedica

The development of Catalys has been steered by a group of outstanding leaders, including Dr. Blumenkranz, scientific advisor Daniel Palanker, PhD, and a talented senior management team made up of medical device executives with more than 190 years of collective experience. Members of OptiMedica’s current senior management team have held leadership positions at companies including Alcon Laboratories, Inc. (Fort Worth, TX); Boston Scientific (Natick, MA); Coherent, Inc. (Santa Clara, CA); Guidant (Indianapolis, IN); IntraLase (now Abbott Medical Optics Inc., Santa Ana, CA); and Medtronic (Minneapolis, MN). In addition, the company’s research and development staff, a group often described as refreshingly “Silicon Valley,” bring to the Catalys project unique technical perspectives and out-of-the-box thinking.

OptiMedica also has the support of a strong board of directors, led by chairman Brook Byers, as well as a group of premier venture investors including Kleiner Perkins Caufield & Byers (Menlo Park, CA); Alloy Ventures (Palo Alto, CA); DAG Ventures (Palo Alto, CA); BlackRock Private Equity Partners (Plainsboro, NJ); and Bio*One Capital (Singapore).

“I can’t think of a more exciting time to be in ophthalmology,” said Mark J. Forchette, president and CEO of OptiMedica. “We are in the midst of a complete landscape change with the dawn of femtosecond laser cataract surgery, and we couldn’t be more enthusiastic about the potential of our Catalys system to dramatically improve the precision of the procedure and thereby deliver significant benefit to both cataract surgeons and their patients.”

The Catalys Precision Laser System is not for sale in the United States.