

Figure 4. Flat fitting-keratoconus lens.

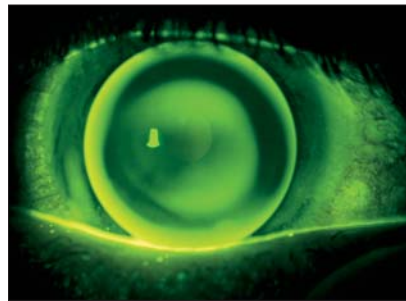


Figure 5. Lens design using increased sagittal height fitting technique.

and 15.5mm in diameter. We choose these lenses when a corneal contact lens cannot be fitted properly, for example, in cases of advanced keratoconus or PMD, or in cases where the lens should show some tear pooling but not much movement due to advanced epithelial dystrophy. We also fit mini-scleral lenses in the cases mentioned above when the patient has symptoms of extensive foreign body awareness when wearing corneal lenses.

Patient-centric care

The most important advice we can offer to practitioners is to be vigilant with after-care on a regular basis. Recognizing when it is time to change lens geometry is important to avoid a breakdown of the epithelial tissue, resulting from too much pressure on the apex.

Another important consideration, especially in advanced keratoconus, is that patients are

Figure 6. Videokeratography of keratoconic cornea.

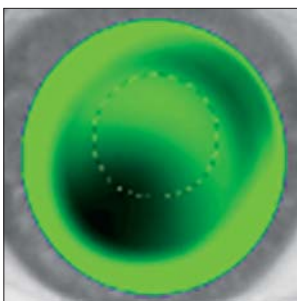


Figure 7. Software simulation of a rotationally symmetric keratoconus lens.

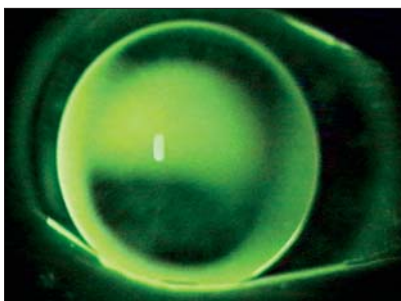


Figure 8. Fluorescein pattern of a rotationally symmetric keratoconus lens.

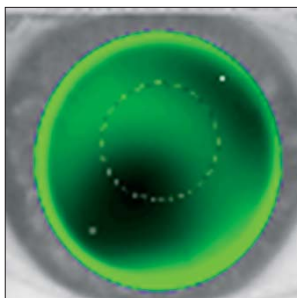


Figure 9. Simulation of a quadrant-specific keratoconus lens.

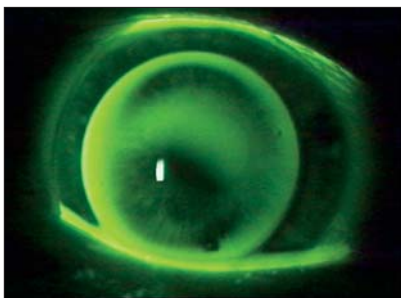


Figure 10. Fluorescein pattern of a quadrant-specific keratoconus lens.

continue to look for lens designs that will provide the best vision while taking care of the fragile cornea. ▶

Mr. Widmer is involved in the development and introduction of new contact lens products and fitting techniques for Hecht Contactlinsen GmbH. He has written articles and lectured on these topics internationally. He practices at Contactlinsen-Institute in Hamburg, Germany, the Eyehospital in Basel, Switzerland, and the Contactlinsen-Institute in Freiburg, Germany.

Mr. Muckenhirn is cofounder of Hecht Contactlinsen GmbH. He has a special interest in topographic measurements of the cornea, and he developed the first aspheric contact lens based on topographic data. He continues to develop new contact lens designs and fitting techniques and writes and lectures on these topics internationally.



Frank Widmer (left) and Dieter Muckenhirn

Did you know...

- It is estimated that keratoconus occurs in 1 out of every 2,000 people in the general population.
- It is believed that genetics, the environment and the endocrine system all play a role in keratoconus.
- Symptoms of keratoconus generally begin in the late teens or the early twenties but can start at any time.
- Keratoconus has no known significant geographic, cultural or social pattern.

Source: The National Keratoconus Foundation

<http://www.nkcf.org/>

CLMA Honors David Bland

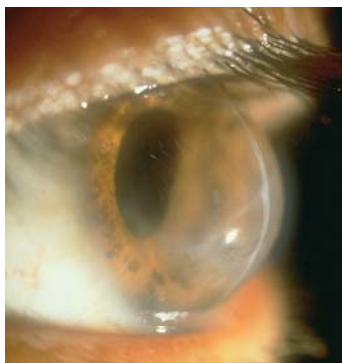


David Bland, Bausch & Lomb Director of North American Sales, received the Contact Lens Manufacturers Association Industry Enhancement Award for unselfish dedication to the CLMA and the contact lens industry from Janice Schramm of Valley Contax, Springfield, Ore.

Keratoconus: Current Theories and Practices

A review of recent articles reveals the dedication of researchers and clinicians worldwide as they seek more satisfactory therapeutic options.

By Craig W. Norman, FCLSA



Scientists and clinicians have been studying keratoconus for more than 150 years, but only in the last 50 years has our knowledge grown substantially, mostly because of clinical and laboratory research made possible by new technology. In the past year, more than 100 papers have been published in peer-reviewed journals, and count-

less other articles have appeared in professional publications. A brief synopsis of some of these articles follows.

General Topics

■ 2008 Sir Norman McAlister Gregg Lecture: 150 years of practical observations on the conical cornea – what have we learned? *Clin Experiment Ophthalmol.* 2009;37:160–176.

In his Gregg lecture, McGhee provides a highly referenced, wide-ranging overview of historical and contemporary aspects of keratoconus, including:

- Diagnostic, phenotypic and prognostic factors revealed by large clinical studies
- Critical diagnostic advances enabled by Placido and slit-scanning computerized corneal topography
- The emerging roles of higher-order aberration wavefront analysis and corneal hysteresis in delineating early and subclinical keratoconus
- Inheritance and genetic predisposition to keratoconus
- Corneal microstructural changes revealed by *in vivo* confocal microscopy
- Unifying theories to explain associations between keratoconus, atopy, eye rubbing and keratocyte apoptosis
- Surgical options for keratoconus, such as corneal transplantation, intrastromal ring segments, collagen cross-linking and keratocyte transplantation.

McGhee concludes that after 150 years, “Our knowledge of keratoconus remains incomplete, but technological advances should enable us to put together the final pieces of the jigsaw in the foreseeable future.”

■ Keratoconus with high hyperopia. *Eye Contact Lens.* 2009;35:159–162.

Although rare, keratoconus may occur in cases of high hyperopia. Management of hyperopic keratoconus with GP contact lenses may be similar to that applied with other cases of keratoconus as illustrated in this case.

Martin examined a 32-year-old man with severe hyperopia and a 10-year history of daily hydrogel contact lens wear to confirm suspected keratoconus. The patient’s Orbscan topography was consistent with bilateral asymmetric keratoconus, showing asymmetry of central dioptric power, irregular astigmatism, high anterior and posterior corneal elevation values, and corneal thickness in the cones at 450 and 471 microns OD and OS, respectively. Slit lamp biomicroscopy showed Vogt striae OD. The patient was fitted with high-Dk GP contact lenses in a keratoconus design.

Corneal Surface Analysis

■ Scheimpflug imaging of corneas after collagen cross-linking. *Cornea.* 2009;28:510–515.

Koller and colleagues recruited 21 patients with progressive keratectasia. One eye per patient was treated with collagen cross-linking (CXL) using the riboflavin/UV-A approach, while the fellow eye remained untreated and served as control. In the 1 year following treatment, researchers reported the following:

- None of the treated eyes showed topographic progression in contrast to the control group, in which 8 eyes experienced significant progression.
- Minimal curvature radius increased significantly after 1 year, compared with preoperative measurements; whereas in the untreated fellow eye, it decreased significantly.
- Minimal corneal thickness was significantly reduced after treatment ($P < 0.002$ at 12 months).
- Corneas showed an evolution toward a more regular shape as indicated by a significant reduction in 4 of 7 keratoconus indices.
- No complications of CXL occurred in this small study group.

Researchers concluded that after cross-linking, the corneal shape undergoes a process of regularization, which is active during the first year after treatment and may continue. Longer follow-up is warranted to estimate the full amount of regression of the keratectasia after CXL.

■ Comparison of anterior chamber depth of normal and keratoconus eyes using Scheimpflug photography. *Eye Contact Lens.* 2009;35:120–122.

Edmonds and colleagues used Scheimpflug photography to measure the corneal anterior chamber depth (ACD), adjusted by age and sex, of 162 normal and 41 keratoconus patients.

Univariate analysis showed the mean ACD of 162 normal subjects was borderline significantly less than in 41 keratoconus patients (3.28 +/- 0.40 mm; $P = 0.079$). However, researchers found that sex ($P = 0.001$) and age ($P < 0.001$) are significantly related to ACD in all patients. Women with normal eyes had a significantly lower mean ACD than men. Women’s eyes with

keratoconus also had a lower mean ACD than men's eyes with keratoconus. Bivariate regression showed that with each additional year of aging, the ACD was decreased by an average of 0.012mm in a normal eye and by 0.014mm in a keratoconus eye. Regression analysis showed that sex ($P=0.003$), age ($P<0.001$) and keratoconus ($P=0.003$) are all significant variables for determining ACD. After adjusting for age and sex, keratoconus eyes had a significantly higher mean ACD (3.34 +/- 0.34 mm) than normal eyes (3.18 +/- 0.28 mm) ($P=0.003$).

Contact Lenses for Keratoconus

■ Contact lens-related quality of life in patients with keratoconus. *Eye Contact Lens*. 2009;35:123–127.

A total of 71 patients who wore GP, hybrid or soft toric contact lenses in at least 1 eye completed the Contact Lens Impact on Quality of Life (CLIQ) questionnaire. One eye of each patient was included in the study. Of these, 40 eyes used GP lenses, 20 eyes used hybrid lenses, and 11 eyes used soft toric lenses. In this study, Erdurmus and colleagues found no significant difference among the three groups in self-reported results from the CLIQ questionnaire ($P=0.8$). Regardless of modality, patients reported similar contact lens impact on their quality of life.

■ Update on scleral lenses. *Curr Opin Ophthalmol*. 2008;19:298–301.

Jacobs discusses the use of scleral GP lenses for the visual rehabilitation of ectasia and irregular astigmatism and as a therapeutic option for ocular surface disease. He cites individual cases and case series, as well as a comprehensive article reviewing the history and principles behind current scleral GP lenses, with particular attention to their use in managing ocular surface disorders. Jacobs concludes that clinicians who treat patients with ocular surface disease should consider scleral GP lenses as a therapeutic option for their patients, noting that advances in lens design make these lenses a practical option for an increasing number and variety of patients with corneal disease.

■ Jupiter scleral lenses in the management of chronic graft versus host disease. *Eye Contact Lens*. 2008;34:302–305.

In this retrospective case series, Schornack and colleagues evaluated 5 consecutive patients with severe keratoconjunctivitis sicca (KCS) associated with chronic graft versus host disease. These patients, who could not be managed adequately with conventional therapy, were successfully fitted with Jupiter scleral contact lenses (Medlens Innovations, Front Royal, Va., or Essilor Contact Lens Inc., Dallas, Texas). The researchers evaluated 3 outcome measures: the patient's ability to tolerate and successfully handle the lenses, improvement in symptoms of KCS and improvement in visual acuity. All patients reported subjective improvements in comfort; and best-corrected vision improved in 7 of the 10 eyes.

■ Using Large-Diameter GPs to Improve Comfort: These four cases demonstrate that larger diameters offer many benefits when fitting GP lenses.

In this article, published in the May 2009 issue of *Contact Lens Spectrum*, John Laurent, OD, PhD, notes that despite the improved physiology of today's GP lenses, "patient discomfort with these lenses is essentially the same as it was with PMMA lenses," primarily because of the sensation patients experience when their eyelids touch the edges of the lenses. Laurent presents cases of keratoconus patients whose chief complaint was discomfort. He describes his fitting process and the positive outcomes he achieved using large-diameter GP lenses.

Laurent notes: "The semi-scleral lenses I fit on these patients were more comfortable than their previous corneal lenses because of the reduced interaction between the eyelid and the contact lens. The comfort of a large-diameter GP lens that fits under the eyelid can approach the comfort achieved with soft lenses."

■ Refitting Keratoconus Patients: Explaining The Missing Diopter

In this article, published in the May 2009 issue of *Contact Lens Spectrum*, Bezalel Schendowich, OD, FIACLE, discusses shape changes, sometimes induced by contact lens wear, in the keratoconic cornea. Citing a 2002 publication by Mountford and Noack in which they report an unexpected diopter overrefraction after the first week of contact lens wear in approximately 15% of cases, Schendowich offers an explanation for this phenomenon and describes how he refits his keratoconus patients with this in mind. Schendowich describes common refitting scenarios and offers practical advice on fitting and patient management.

■ Contact Lens Options for Managing Keratoconus: By knowing your options you can meet the goals of a successful contact lens fit and patient satisfaction.

In this article, published in the April 2009 issue of *Contact Lens Spectrum*, Nicky Lai, OD, MS, FAAO, reviews the basic principles for diagnosing keratoconus and discusses current contact lens options—soft, GP, hybrid and piggyback—for these patients. He includes a table of lens options and fitting strategies for various patient types.

Lai's comprehensive review covers lens designs, fitting strategies and troubleshooting techniques. He notes: "These options aren't presented as a progression of lenses throughout the disease, but as a survey of some alternatives. What is successful for one patient may not be to another, so different strategies can increase success." ▶



Craig Norman is director of the Contact Lens Section at the South Bend Clinic in South Bend, Ind. (USA). He is a fellow of the Contact Lens Society of America and an advisor to the GP Lens Institute. He is a clinical and educational consultant to Bausch & Lomb.

Around & About

Educational, Informational and Marketing News
from the Boston Products Group

Suplementos Ópticos Hosts Boston Products Update Seminar



Pictured from left to right are eyecare practitioners Claudia Morales, Rocio de Morales, David Ocampo and Brenda Ocampo, who were among the attendees at a seminar hosted by Suplementos Ópticos in Guatemala City. These brief monthly meetings are designed to enhance practitioners' expertise in solving vision problems with Boston products. Instructors were Luis Noriega and Jorge Jurado. Photo by Jaime Cabrera.

British Contact Lens Association



Dee Kerr congratulates incoming BCLA president William Thomas at the 2009 BCLA Gala Dinner.

Shanghai International Optical Fair



Dr. Tom Tao (left), owner and CEO of Autek, and Jackson Leung at the Hefei Autek booth.



Ms. G.F. Wang, RGP Manager for Oculus, and Jackson Leung at the Oculus China booth.

Moscow Optic Exhibition



At the Moscow Optic Exhibition, DoctorLens promoted Boston buttons and solutions, as well as various specialty GP lens designs. Left to right: Dr. Dmitry Mirsayafov, orthokeratology expert and owner of DoctorLens; Dr. Oxana Anikeeva, RGP and ortho-k lens fitter; Marcel Kopito.

Opti Munich



Opti Munich, the largest optical trade exhibition in Germany, attracts visitors from Austria, Germany, Switzerland and the Netherlands. Left to right: Peter Bruckmann, President of the WVAO Germany, Marcel Kopito, Dee Kerr, Eduard Bosshard, optometrist in Switzerland.

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