Bausch & Lomb
Boston®
update

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Hyperpermeability and Hypertransmissibility:
Their Updated Definitions and Importance in the GP World

By William J. Benjamin, OD, MS, PhD

Oxygen transmissibility (Dk/t) often is compared at the centers of –3.00D gas permeable (GP) contact lenses. This practice seemingly consolidates a complicated concept into a single number. However, it overestimates the transmissibility elsewhere on a lens and overstates the Dk/t at the center of other refractive powers in the same material.

This practice also confuses the definition of hypertransmissibility for a GP contact lens, as shown in Figure 1,[1] for which hypertransmissibility requires at least 80 Fatt Dk/t units.

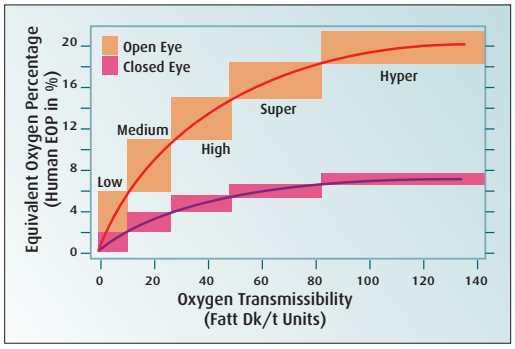

Figure 1. The traditional method for estimating Dk/t at the center of a –3.00D lens confuses the definition of hypertransmissibility for a GP lens.

Consistent Comparison

A more acceptable definition of thickness (t) has been recommended to allow a more appropriate and consistent comparison of Dk/t from lens to lens. This is called the ***mean harmonic thickness*** over the optic zone.[2] Its definition has been standardized by the American National Standards Institute and the International Organization for Standardization.[3,4]

Oxygen travels through the area of a lens in a radial fashion and, thus, the mean harmonic thickness is conceptually more applicable than other thicknesses. The use of

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Events Calendar

September

3–6	XVIII Congresso Brasileiro de Prevenção da Cegueira, Florianópolis, SC, Brazil
26–28	Beijing International Optical Fair, China*
26–28	VDC, Jena, Germany**

October

8–10	XVI Congresso Norte-Nordeste de Oftalmologia, Belém, PA, Brazil
9–11	EFCLIN, Glasgow, UK**
23–26	LXII Annual Congress of Japan Clinical Ophthalmology, Tokyo*
31–Nov. 1	Austrian-Swiss Keratokonus Congress, Bern, Switzerland*
31–Nov. 2	Korean Ophthalmological Society Meeting, Seoul, South Korea*

November

3–4	Romanian Contact Lens Congress, Sibiu, Romania*
6–8	Hong Kong International Optical Fair, China*
13–15	CLMA, Hoover, Alabama, USA**
28–30	XI Congresso de Oftalmologia da USP, São Paolo, SP, Brazil

December

7	Korea Contact Lens Study Society Meeting, Seoul, South Korea*

* Indicates Bausch & Lomb Boston attendance
** Indicates Bausch & Lomb Boston exhibit

A New Generation Hyper-Dk GP Material

A brief summary of an investigators' roundtable reported in *Contact Lens Spectrum*, October 2007.[1]

By Craig W. Norman, FCLSA

Historically, clinicians have been concerned about a potential trade-off between better oxygen transmission and lens performance characteristics, such as wetting and lens flexure, with higher-Dk GP lenses. Recently, investigators evaluated the new Bausch & Lomb Boston XO_2® (hexafocon B) lenses, with the consensus being very positive.

This new hyper-Dk (Dk=141*) material provides a 40 percent increase in oxygen permeability compared with the original Boston XO® material, supporting corneal health. Here is a brief summary of the investigators' findings.

Study Design

In a randomized study, 150 subjects were dispensed a lens made from Boston XO_2® for one eye and a lens made from Boston XO® (Dk=100*) for the contralateral eye. These successful GP lens wearers were refit with similar lens parameters and continued their habitual lens care regimen. Patients wore the lenses on a daily wear basis and

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Hyperpermeability and Hypertransmissibility, continued from page 1

mean harmonic thickness balances the contributions of the thinner and thicker areas of a contact lens in the calculation of Dk/t. If we must describe the Dk/t of a lens using a single number, we now can produce a Dk/t value that is generally representative of the GP lens. If that value is at least 80 Fatt Dk/t units, then the lens would be considered hypertransmissible.

'Hyper' Defined for a Series

What about a lens series or brand? For instance, is the Menicon Z brand of spherical contact lenses hypertransmissible, and is its material (tisilfocon A) hyperpermeable? How about the new Boston XO_2® (hexafocon B) or any other type of GP contact lens? To define an entire lens series or brand, not just a single lens, as hypertransmissible, it was further proposed that hypertransmissibility be required for each spherical power from –8.00D to +6.00D, which is the range needed to fit at least 99% of potential wearers based on the approximate distribution of ametropia in the population.[2] For GP lenses, the thickest mean harmonic thickness will be at the plus power extreme.

GP lens brands consisting of materials with oxygen permeability (Dk) less than approximately 140 Fatt Dk units will not produce at least 80 Fatt Dk/t units in the extreme plus power (see Table 1). [Note that the required Dk is greater than that of soft lenses (100 Fatt Dk units) because the thinnest spherical GP lenses are thicker than soft lenses by roughly 40%.] These materials may be capable of hypertransmissibility in lenses of low or moderate power, but the entire series could not be so classified. The new Boston XO_2® must be manufactured at its thinnest in order to technically achieve hypertransmissibility at the plus extreme.

Hence, two types of GP lenses could be considered hypertransmissible for at least 99% of the population, as calculated when mean harmonic thickness is derived for the optic zones of spherical lenses at the extremes of the refractive error distribution. The materials composing these lens series, therefore, would be hyperpermeable. These updated definitions of lens hypertransmissibility and material hyperpermeability are compatible with and complementary to their original definitions,[1] the Dk/t criterion of Holden & Mertz[5] corrected for the edge effect, and the recommendation of Harvitt & Bonnano[6] as Dk/t is normally used (at the center of a low-minus lens), with a hedge against the adverse oxygen impact of altitude.[2]

	Material permeability (Dk) from package inserts (Fatt Dk units)	Estimated transmissibility (Dk/t) using MHT method (Fatt Dk/t units)	
Tisilfocon A	163	95	Hyper-transmissible
Hexafocon B	141	81	
Roflufocon E	125	72	Super-transmissible
Paflufocon D	100	58	
Hexafocon A	100	57	

MHT = *M*ean *H*armonic *T*hickness

Table 1. To define a lens series or brand as hypertransmissible, hypertransmissibiity was required for each lens power from –8.00D to +6.00D.

Oxygen Independence

Lens hypertransmissibility and material hyperpermeability are not all hype. Material hyperpermeability allows the hypoxic effects of normal thickness variations across lenses, thickness differences between lenses, variations in material Dk between lens batches, and even differences in Dk between two distinct hyperpermeable materials, to be of subdued clinical impact.[7,8] Indeed, it is now difficult to clearly distinguish clinically relevant differences between spherical lenses made of one hyperpermeable or superpermeable GP material vs. another on the basis of hypoxia.[9]

Using hyperpermeable materials, lens manufacturers and practitioners achieve unprecedented "oxygen independence" in material and design decisions[10] and are able to emphasize other aspects of contact lenses. The use of hypertransmissible lenses is proliferating to better accommodate an extended range of designs, additions, astigmatisms, modes of wear and ocular conditions. Lenses are being better customized to fit the individual patient without so much worry about oxygen disadvantages.

Dr. Benjamin is a tenured professor of optometry and vision science at the University of Alabama at Birmingham (UAB) School of Optometry. He is the director of the Eye Physiology and Ocular Prosthetics Laboratory, a senior scientist of UAB's Vision Science Research Center, and a clinician in contact lens practice and primary eye care.

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International Offices

Europe:
Mr. Marcel Kopito
e-mail marcel_kopito@polymer.com

PRC/Taiwan/Hong Kong/Southeast Asia:
Mr. Jackson Leung
e-mail jackson_leung@bausch.com

Japan and South Korea:
Mr. Tatsuo Harata
e-mail tatsuo_harata@attglobal.net

Latin America/Australia/New Zealand:
Mr. Jonathan Jacobson
e-mail jonathan_jacobson@bausch.com

North American Offices

Jonathan Jacobson
Director of Global GP Business
e-mail jonathan_jacobson@bausch.com

Karen M. Dussault
Executive Administrative Assistant
e-mail karen_m_dussault@bausch.com

Christina Englund
Senior Graphic Designer
e-mail christina_englund@bausch.com

Kurtis Brown
Lens Design Consultant
e-mail kurtis_brown@bausch.com

David Bland
Director of North American Sales
e-mail david_bland@bausch.com

Peggy Becker
Senior Product Manager, Boston Materials
e-mail peggy_becker@bausch.com

Christine Hewitt
Senior Product Manager, Boston Solutions
e-mail christine.hewitt@bausch.com

Andrew White
Regional Manager
e-mail andrew_white@bausch.com

John Hibbs
Regional Manager
e-mail john_hibbs@bausch.com

Amy J. Kelly
GP Lab Sales Representative
e-mail amy.j.kelly@bausch.com

Jim Lunkley
Technical Field Representative
e-mail jim_lunkley@bausch.com

For newsletter information:
Bausch & Lomb Incorporated
Wilmington Facility, 100 Research Drive, Wilmington, MA 01887 USA
Phone 1-978-658-6111
e-mail boston@bausch.com

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A New Generation Hyper-Dk GP Material, continued from page 1

returned for scheduled follow-up visits over a three-month period. At various intervals throughout the study, the subjects and the investigators completed questionnaires to comment on their experiences.

Performance

The Boston XO_2® material performed at an equivalent level to the Boston XO® material. In terms of wettability, the two materials were comparable, and there was no variation in vision with Boston XO2®. Several investigators noted they had a disproportionately high percentage of high myopes (–7.00D to –17.00D), and they found the study lenses performed equally well, subjectively and objectively.

In the myopic patient population, investigators were satisfied with patients' comfort and vision. In patients with astigmatism, the test lenses were comparable to what patients had worn previously, and patients rated their vision as either the same or better than before. Of the handful of hyperopes in the study, similar results were reported.

The investigators reported excellent performance [with Boston XO_2®] in a general population of GP lens wearers.

Patients' Responses to Material

Although some patients had been wearing the control material, Boston XO®, others had been wearing different materials.

Investigators reported the study patients did as well with the new Boston XO_2® material as with their previous lens material. They saw no clinical differences between the patients' previous lenses and the study lenses. Some patients, however, said their eyes looked less red with the newer lenses.

My Clinical Experience

The investigators reported excellent performance in a general population of GP lens wearers. In addition, in my practice, Boston XO_2® has proven to be an excellent material for presbyopic and specialty lenses, such as for keratoconus and post surgery. In these cases, where the lens designs may be thicker or the corneal health somewhat compromised, using a hyper-Dk material that wets well and maintains its fitting characteristics is essential to long-term patient success.

Lenses manufactured from Boston XO_2® can be plasma treated in the same manner as other Boston materials. However, Boston XO_2® provides the stability of lower-Dk materials and is inherently wettable, making plasma treatment optional.

Healthy Alternative

A higher-Dk lens is beneficial for anyone who wears contact lenses. The investigators mentioned that they like a highly oxygen-permeable material for high myopes, especially those who wear their lenses all day, and patients wearing large-diameter lenses (>10mm).

Is it time for practitioners to refit patients from mid-Dk lenses into a hyper-Dk material? Patients want their eyecare professionals to give them their best professional advice. When new technology lenses allow more oxygen to reach the cornea without losing important performance characteristics, it may be time to recommend an upgrade.

Boston XO_2® material provides excellent oxygen transmissibility to support corneal health, while providing the wetting characteristics, deposit resistance, stability and visual acuity of lower-Dk materials.

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.

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* ISO/Fatt method

Not Your Father's Scleral Lenses

New materials and manufacturing processes expand the utility of mini scleral lenses.

By Kurtis Brown

With the development of hyper-Dk materials and ultra-precision, computer-controlled manufacturing processes, a new generation of large-diameter lenses is starting to appear in the offices of modern GP fitters. Increasingly, laboratories and practitioners are becoming interested in fitting large-diameter GP designs for a variety of applications, such as postsurgical cases, irregular corneas, patients who are having difficulty adapting to GP lens wear or patients for whom GP lens comfort is essential. To meet this need, Bausch & Lomb has made Boston® Equalens® II, Boston XO®, and Boston XO_2® materials available for manufacturing large-diameter lenses.

Evidence of this trend was apparent at the 2008 Global Keratoconus Conference (GKC) held in January in Las Vegas, where fitters and lens designers from around the world presented papers and posters, describing the use of large-diameter and scleral lenses. Notably, Perry Rosenthal, MD (USA), moderated an international panel, including: Don Ezekiel, AM, OD (Australia); Christine Sindt, OD (USA); and E. Simone Visser, MSc (The Netherlands).

New Designs Introduced

Manufacturers introduced two new commercially produced, large-diameter designs at the GKC: the MSD lens, a mini scleral design developed by Rikke Dootjes of Viscon Corporation, Edmonton, Alberta, Canada; and the SoClear lens, developed by Dakota Sciences in Sioux Falls, S.D. Also available in North America are the DigiForm lens from TruForm Optics in Dallas; the Jupiter Scleral Lens from Essilor of America Inc.; and the Maxim Scleral Lens from Accu Lens in Denver. These are interesting and complementary design options for fitters who want to work with clinically proven large-diameter designs.

Offer your most challenging patients real hope for better vision and improved corneal health.

DigiForm Lens: The DigiForm lens, available in Boston XO® and Boston XO_2®, is a 15.0 mm lens with a single fenestration. The DigiForm lens has five design options: keratoconus, post-graft, post-LASIK, post RK and normal cornea. Each design has a 14-lens trial set.

The DigiForm lens was developed by electronically collecting data on hundreds of eyes. Each of these "digital molds" has a diameter that extends well beyond what conventional topography can measure. After digitizing and categorizing these eyes, the manufacturer created five template designs. A lens is fit by choosing the design appropriate to the patient's condition and then selecting one of the 14 trial lenses within that set.

In October 2007, a patent was filed on this method of scleral lens fitting.

Jupiter Scleral Lens: The Jupiter Scleral lens falls into two main design categories: the 15 mm diameter (miniscleral) series and the 18 mm diameter series. Both series are true scleral lenses in that they bear on the sclera and vault the cornea.

The Jupiter 18 mm series is designed to be a semi-sealed lens and does not need to closely contour the cornea. The scleral portion is designed to allow adequate tear exchange but hold a much larger volume of tears. It can address irregular and asymmetric corneas, as well as provide a large tear reservoir for severe dry eye cases. The Jupiter 15 mm series lens more closely follows the contour of the cornea. All Jupiter 15 mm and 18 mm series lenses use aspheric optics to reduce spherical aberrations to enhance visual acuity.

The Jupiter 15 mm and 18 mm series lenses are available in three configurations to address different corneal geometries by varying the posterior design: the Jupiter Standard design, the Jupiter Advanced Keratoconic design, and the Jupiter Reverse Geometry design. Toric scleral zones are available to enhance the alignment on eyes with very irregular scleras.

Essilor recommends the Jupiter lens for patients on whom alternative GP designs will not center or will cause intolerable bearing forces on the central cornea. These lenses are also indicated for irregular corneas with advanced keratoconus, trauma, or postsurgical deformities consequent to a graft, RK, PRK and LASIK. Additionally, the Jupiter lens is recommended for conditions where the cornea and/or sclera are extremely dry and need protection from direct exposure.

Maxim Scleral Lens: The Maxim is a proprietary 16 mm scleral lens from Accu Lens. Maxim incorporates a multicurve posterior surface that allows for alignment and vaulting of the cornea. Fitting is performed by sagittal depth rather than base curve. A simple 12-lens trial set of different sagittal values is sufficient to manage almost any type of corneal distortion, including transplants, keratoconus, PMD and corneal injuries.

MSD Lens: With an average diameter of 15.8 mm, the MSD lens is designed to vault the cornea and rest on the sclera. The space between the cornea and the back surface of the lens fills with tears, which creates a tear layer that minimizes the optical distortion irregularities of the cornea and allows the back surface of the lens to be elevated above the cornea's epithelial surface. This minimizes the chance of contact lens-induced corneal-surface irritation and, as with other large-diameter designs, facilitates good lens centration.

The posterior surface of the MSD design incorporates reverse geometry with specially designed optical and posterior curves. Owing to the reverse geometry, the sagittal depth of the lens can be changed independently of the central optic zone profile or midperipheral and limbal zone clearance values. In addition, the MSD lens has a thin profile designed to minimize interaction between the lens edge and the lid.

The MSD lens manufacturer sees it as a tool for treating oval cone and nipple cone keratoconus, pellucid marginal degeneration (PMD) and keratoglobus, as well as RK-, PRK- and LASIK-

induced ectasia, post-graft cases and other compromised or irregular corneas.

SoClear Lens: With a 14-mm standard diameter, the SoClear lens is fit 1.00 mm to 1.50 mm larger than the VID and is designed to equally distribute pressure along the corneal and scleral surfaces. The central and peripheral portions of the SoClear lens may be adjusted independently.

According to the manufacturer, the design goal for this lens is to provide visual performance consistent with GP designs, and comfort and stability approaching that of hydrogel designs. Although the SoClear lens originally was developed for complex irregular corneas, some fitters are using it for less challenging patients because of its increased comfort and stability compared with that of smaller-diameter lenses.

The SoClear design has been found helpful in treating cases of corneal scarring, corneal disease, such as keratoconus and PMD, and postsurgical irregularity. What's more, the larger non-evaporative surface area covered by the GP material appears to greatly mitigate dry eye symptoms.

More Innovations to Come

Over the next year, we can expect to see several new large-diameter products, ranging from intralimbal to full scleral lenses. With the availability of hyper-Dk materials and the ongoing development of sophisticated fitting techniques, this modality will be creating exciting new opportunities to offer your most challenging patients real hope for better vision and improved corneal health.

Kurtis Brown is a lens design and manufacturing consultant to Bausch & Lomb.

Spotlight on Jackson Leung

For this issue's Spotlight, we spoke with Jackson Leung, the Bausch & Lomb Boston Products Group regional manager for China, Taiwan, Hong Kong and Southeast Asia.

What is your background?

I was born and raised in Hong Kong. I am a graduate of Hong Kong Polytechnic University (HKPU), where I studied optometry. I also earned my master's degree from HKPU, after researching myopia control. After graduation, I joined Essilor Far East Ltd., where I created education and promotional programs for progressive spectacle lenses and contact lenses in Hong Kong and Asia. In 1993, I joined the professional services team of Bausch & Lomb Asia and moved to the Boston Products Group in 2000.

How would you describe your work with the Boston Products Group? What are your responsibilities?

The Boston Products Group is just like a family. People in the group are very friendly and help each other. Although the group is small, all members are very experienced and well known in the GP field. My responsibility is to grow the GP market in north Asia, mainly China, Hong Kong, Taiwan and other regions in Asia.

What do you think is the most significant change in the GP industry since you started?

The most significant change is the growth of the GP business in China. When I joined the Boston Products Group in 2000, we had one Boston GP lab in Shanghai. Now, we have Boston labs in Shanghai, Hangzhou, Shenyang, Hefei, Wenzhou and Hong Kong. Over the past 10 years, we have conducted annual fitting education seminars in China, partnering with local Boston labs. These seminars have provided training for more than 5,000 doctors, motivating them to begin fitting GP lenses.

Where do you think the GP industry is headed?

The GP business will develop in the area of specialty lenses. Ortho-k, keratoconus and large-diameter GP lenses will be the future. Made-to-order systems will replace stock lens systems. Thanks to computer-driven high-tech manufacturing, each patient's GP lenses will be totally tailor-made.

How do you spend your leisure time?

Hong Kong is a very busy and crowded city. I like to visit green places with my wife and our puppies when we have time. Eleven years ago, we decided to move to Lamma Island, a small island in the southern part of Hong Kong, which features fishing villages and good seafood restaurants. There are no cars on the island, and the air quality is very good. Bicycles are the most popular form of transportation on Lamma Island. We have a small garden, and gardening is one of my hobbies. My other hobbies are going on outings, reading, watching movies and eating.

Scenes from a Hong Kong seafood market:
Right: seafood vendors at work.
Below: Jackson Leung, center.

Ortho-k Roundup

Initial Findings of SMART Study Announced

By S. Barry Eiden, OD, FAAO, and Robert L Davis, OD, FAAO

The ongoing clinical evaluation of Stabilizing Myopia by Accelerating Reshaping Technique (SMART) is analyzing data collected from 10 investigational sites to explore the mechanism of myopia reduction and myopia stabilization in pediatric subjects ages 8 to 14 years. This 5-year investigation is comparing vision, the progressive nature of myopia, wearing habits and comfort between overnight orthokeratology and soft lens wearers.

Design and Protocol

At its conclusion, the SMART study will have enrolled a total of 300 subjects: 150 test subjects fitted with a reverse-geometry/overnight orthokeratology design (Euclid Systems Corporation Emerald) and 150 control subjects fitted with silicone hydrogel lenses (Bausch & Lomb PureVision®) for daily wear and monthly replacement.

The test lenses are fit empirically, with the investigators supplying manual keratometry readings, manifest refraction and horizontal corneal diameter to the manufacturer, which determines the initial lens parameters. Interestingly, 80.5% of the eyes to date were fit with the first lens, and another 15% of the eyes required only one additional change to achieve fitting success. Only two of the 10 investigators had previous experience fitting the Emerald design.

Once a year, refractive, axial length, vitreous chamber depth and keratometric/topographic readings will be analyzed for stabilization and progression. At yearly intervals, test lenses will be returned to investigators and replaced with control lenses until stabilization occurs. The stabilized readings will be compared to baseline to demonstrate the net effect of the treatment procedure compared to the control group.

Ortho-k Researchers Present Findings at ARVO

Several scientific posters relating to the field of orthokeratology were presented at the 2008 meeting of the Association for Research in Vision and Ophthalmology (ARVO). Summaries of the data reported follow:

Posterior Corneal Shape Changes in Overnight Orthokeratology

Presented by H.A. Swarbrick, J.H. Yoon.

The purpose of this study was to investigate posterior corneal shape changes in overnight orthokeratology over 14 nights wear of reverse-geometry, gas-permeable (GP) contact lenses. Eighteen young adult subjects with low myopia and astigmatism were fitted with BE ortho-k lenses worn overnight only for 14 days. Another group of 10 subjects with low astigmatism wore conventional GP lenses for one night. Corneal topographic data and total corneal thickness were measured at baseline and 8 to 10 hours after lens removal on days 1, 4, 7 and 14 of overnight ortho-k lens wear, and after one night of GP lens wear.

The results of this study demonstrate that overnight ortho-k lens wear does not cause flattening of the central posterior corneal curvature, at least in the first two weeks of lens wear. This supports the current hypothesis that the ortho-k refractive effect is achieved primarily through remodeling of the anterior corneal layers. Changes in posterior corneal asphericity toward an oblate shape implicates midperipheral corneal changes in the response to ortho-k lens wear.

Posterior Corneal Shape Changes With Overnight Corneal Edema in Rigid Conventional and Orthokeratology Lens Wear

Presented by J.H. Yoon, H.A. Swarbrick

The influence of overnight corneal edema on posterior corneal shape during sleep, and conventional and orthokeratology gas-permeable (GP) lens wear was evaluated in this study. Eighteen young adult subjects were fitted with reverse-geometry BE ortho-k lenses, which were worn overnight only for 14 days. A separate group of 10 subjects wore conventional GP lenses for one night in one eye only. Posterior corneal apical radius of curvature and asphericity were calculated, and corneal thickness was measured across the horizontal meridian.

The findings of this study are consistent with previous research, demonstrating inhibition of central edema in overnight orthokeratology, but a normal edema response in the midperiphery. Analysis relative to a fixed 8-mm chord demonstrates that the cornea swells in a posterior direction with overnight edema.

Mechanism for Corneal Reshaping in Hyperopic Orthokeratology—Suction or Molding?

Presented by P. Gifford, W. Au, B. Hon, A. Siu, P. Xu, H.A. Swarbrick.

The purpose of this study was to investigate the mechanism underlying hyperopic orthokeratology by comparing the short-term clinical effect of lenses before and after central lens fenestration. Twelve subjects were fitted with rigid hyperopic ortho-k lenses in one eye only, with the fellow eye acting as a non-lens-wearing control. Lens specifications were matched to provide the same post-lens tear film profile in all subjects. Non-fenestrated lenses were worn on the open eye for 1 hour and on the closed eye for 4 nights. Subjective BVS refraction and corneal topography were measured at baseline, after 1 hour of lens wear, and within 1 hour of waking on days 1 and 4 of overnight lens wear. The lenses were then sent for three 0.75-mm fenestrations within the central optic zone. A hyperopic ortho-k effect was established in as little as 1 hour, with increased effect with longer lens-wearing time. Central fenestrations did not alter the clinical outcomes, indicating that lens compression in the paracentral region as opposed to central post-lens tear film suction is the primary mechanism behind the hyperopic ortho-k clinical effect.

A Study of the Repeatability of Peripheral Refraction Measurements and the Effects of Orthokeratology Contact Lens Wear

Presented by Y. Liu, J. Hsieh, C.F. Wildsoet

This study examined the reliability of cycloplegic peripheral refraction measurements using a Grand Seiko WR-5100K autorefractor, and the effect of orthokeratology lens wear on peripheral refractions. Speculation that peripheral refractive errors underlie myopia development and progression motivated this study. Peripheral refractive errors were measured at 5-degree intervals out to 35 degrees eccentricity using a Grand Seiko WR-5100K autorefractor with an add-on red LED fixation bar at 50 cm. Prior to ortho-k treatment, subjects showed either little change in mean sphere refraction with eccentricity or relative hyperopia compared to their central refraction.

The Grand Seiko WR-5100K autorefractor with add-on fixation bar allows reliable measurement of peripheral refractive errors out to 30 degrees eccentricity in orthokeratology-treated subjects.

Higher-order Aberrations and Contrast Sensitivity After Discontinuation of Overnight Orthokeratology

Presented by T. Hiraoka, C. Okamoto, Y. Ishii, F. Okamoto, T. Oshika

Overnight orthokeratology has been reported to increase corneal irregular astigmatism and ocular higher-order aberrations, and reduce contrast sensitivity function. It remains unknown, however, whether these changes completely recover after discontinuation of ortho-k. The authors conducted a 13-month prospective study to address this question. Thirty-four eyes of 17 subjects who underwent overnight ortho-k for 12 months were included in the study. Their mean age was 23.9 ± 3.5 years (mean ± standard deviation). Asymmetry and higher-order irregularity components were calculated in the central 3-mm zone by using Fourier analysis of the corneal topography data. Ocular higher-order aberrations for a 4-mm pupil were measured, and the root-mean-square (RMS) of the third- and fourth-order aberrations was determined.

The study confirmed that the effect of overnight ortho-k is completely reversible in light of optical quality of the eye and quality of vision, as well as refraction and visual acuity. The full recovery of corneal irregular astigmatism, ocular higher-order aberrations and contrast sensitivity was faster than that of refraction and uncorrected visual acuity.

Changes in Peripheral Refractive Error Due to Accommodation and Higher-order Aberrations

Presented by C.A. Clark, P.S. Soni, L.N. Thibos

Peripheral refractive error has been hypothesized to be a stimulus for myopia progression. In addition, myopia progression has been heavily associated with near work. To date, some question if accommodation has an effect on peripheral refractive error, as different studies have shown conflicting results. The purpose of this study is to examine the effects of accommodation on peripheral refractive error. Twenty subjects with refractive error in the range of +4.00D to –7.00D participated in this investigation. The Hartmann-Shack technique was used to measure the central and peripheral refractive error at ±30° in the nasal and temporal periphery along the horizontal meridian.

Researchers concluded that changes in spherical aberration may have an association with changes in peripheral refractive error. If this is correct, it could explain some of the discrepancies between past studies. If peripheral refractive error is important for myopia progression, changes in spherical aberrations may be an important factor in determining progression.

New Boston® Diagnostic Case

The Boston Products Group recently announced the availability of a new Diagnostic Lens Set Case. The case has been redesigned with the contact lens fitter in mind and offers several important improvements. Look for these new features:

- A slimmer outer case has inserts into which lens vials snap securely. The new cases may be stored vertically on a bookshelf.
- Cases are available in 12-, 14-, and 26-lens configurations.
- Heat-shrink seals are included with each case. With these Boston-branded seals, lens vials may be sealed securely so that you will know when a vial has been opened.
- A staging area for the selected right and left lens aids in the fitting process.
- One-piece molded plastic inserts are easy to clean.
- Recessed areas on the inside of the case accept standard waterproof labels. With the increased surface area of the case cover, you will enjoy new dimensions of customization. Fitting guides, contact information for the laboratory or other information can be included in these areas.
- The same wet-ship vials that are used in the current Generic Wet Case are used in the new diagnostic case; any current Boston vial labels will work with the new cases.

The current Generic Wet Case (CP0638) will continue to be available.

Around & About

Educational, Informational, and Marketing News from the Boston Products Group

ISOK 2008 Boasts International Slate of Speakers

The 2nd International Symposium on Orthokeratology (ISOK) was held in Singapore in May 2008. Organized by the Society of Orthokeratology (Singapore), under the Permanent Secretariat, the School of Optometry, Hong Kong Polytechnic University, the ISOK featured 10 internationally renowned speakers: Dr. Pauline Cho (Hong Kong), Dr. Jennifer Choo (Australia), Mr. James Chong (Singapore), Prof. Michael Collins (Australia), Dr. Stan Isaacs (Singapore), Mr. Craig Norman (USA), Mr. Tony Phillips (Australia), Prof. Earl Smith (USA), Dr. Jeffrey Walline (USA) and Prof. Xie Pei-ying (China).

The goal of the symposium was to present the current science and practice of orthokeratology and to build consensus on more controversial issues in orthokeratology practice.

Left to right: Dr. Stan Isaacs (Singapore), Dr. Jennifer Choo (USA), Mr. T.C. Tan (Malaysia), Mr. Tony Philip (New Zealand), Ms. Tan Bay Wah (Malaysia), Ms. Liew Mei Lin (Malaysia), and Mr. Jackson Leung (B&L).

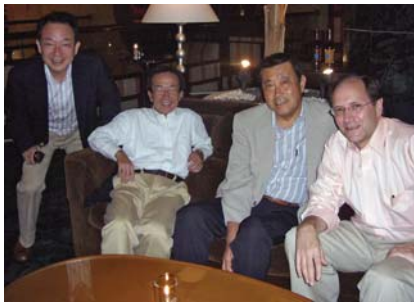
OAA Posts Record Attendance

The focus was on nonsurgical myopia control at the annual meeting and educational conference of the Orthokeratology Academy of America this spring in San Diego. More than 200 attendees heard researchers from around the world describe their outcomes, including some detailing the cellular changes responsible for the results.

Pictured above is Dr. Helen Swarbrick, from the University of New South Wales, Sydney, Australia, who presented on recent research in orthokeratology.

Mr. Craig Norman lectures on fitting and management of orthokeratology.

Left to right, Mr. Shinji Nozaki (Nippon Contact Lens), Mr. Tatsuo Harata, Mr. Jun Mizutane (President, Nippon Contact Lens) and Mr. Jonathan Jacobson at the 1st Asia Orthokeratology Contact Lens Conference (AOCLC), Seoul, South Korea, in July.



Left to right: Dr. Ron Watanabe, Dr. Steve Hitzeman, Dr. Sue Kovacich, Dr. William Miller and Dr. Neil Hodur at the 2008 Bausch & Lomb Educators' Meeting, Niagara Falls, Canada, in July.

Left to right: Sergey Konkov, Dmitry Mirsayafov, Tamara Istomina, Oxana Anikeeva, Vasiliy Presnukhin and Tatjana Marusenkova of DoctorLens at the MSOO 2008 meeting in Moscow in March.

Bausch & Lomb

Bausch & Lomb Incorporated
Wilmington Facility
100 Research Drive
Wilmington, MA 01887 USA

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