

PACKAGE INSERT



BAUSCH + LOMB Vision Shaping Treatment VST®

Boston® Orthokeratology (oprifocon A) Shaping Lenses for Overnight Wear for Bausch + Lomb Vision Shaping Treatment VST®

Rev. 2025-02

8147003

Important

Please read carefully and keep this information for future use.

This package insert is intended for the eye care practitioner but should be made available to patients upon request. The eye care practitioner should provide the patient with the patient instructions that pertain to the patient's prescribed lenses.



CAUTION: Federal (USA) law restricts this device to sale by or on the order of a licensed healthcare practitioner.

Boston® Orthokeratology (oprifocon A) Shaping Lenses should be fitted only by a contact lens fitter trained and certified in the fitting of conventional (non-reverse geometry) and reverse geometry contact lenses.

Non-sterile. Clean and condition lenses prior to use.

Description

Boston® Orthokeratology (oprifocon A) Shaping Lenses are lathe cut contact lenses with spherical or non-spherical posterior surfaces in blue, green, red and yellow tinted versions. The posterior curve is selected to properly fit an individual eye for orthokeratology and the anterior curve is selected to provide the necessary optical power for a temporary reduction of myopia. A peripheral curve system on the posterior surface allows tear exchange between the lens and the cornea.

Boston Orthokeratology (oprifocon A) Shaping Lenses are made from Boston® Equalens® II (oprifocon A) polymer with a water content of less than 1%. The material is available with or without an ultraviolet absorber, Uvinul D-49. The blue tinted lenses contain D&C Green # 6 as a color additive. The green tinted lenses contain D&C Green # 6 and C.I. Solvent Yellow # 18 as a color additive. The red tinted lenses contain D&C Red # 17 as a color additive. The yellow tinted lenses contain C.I. Solvent Yellow # 18 as a color additive.

Lens Parameters Available

Chord Diameter	9.6 mm to 11.6 mm
Center Thickness	
For Low Minus Lenses	0.20 mm to 0.32 mm
For Plus Lenses	0.20 mm to 0.32 mm
Base Curve	7.30 mm to 10.15 mm
Reverse Curve	5.0 mm to 9.0 mm
	Steeper than the base curve in proportion to the amount of correction
Alignment Curve 1	7.0 mm to 9.0 mm
	Steeper than the base curve but flatter than the reverse curve. Generally equal to the Flat K of the cornea being fit
Alignment Curve 2	7.25 mm to 9.25 mm
	Steeper than the base curve but flatter than AC1 and reverse curve
Peripheral Curves	9.00 mm to 15.00 mm
Back Vertex Power	+1.50 Diopters to -5.00 Diopters

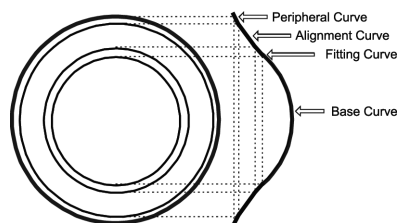


Figure 1: Representation of the reverse geometry lens design

Physical Properties

The physical properties of oprifocon A

Refractive index	1.423
Light Absorbance (absorbance units/inch)	
Blue (640 nm)	10.0
Green (640 nm)	4.8
Yellow (420 nm)	10.3
Red (525 nm)	2.5
Wetting Angle	30 degrees by Captive Bubble
Specific Gravity	1.24
Hardness	114 Rockwell
Water Content	less than 1%
Oxygen Permeability	127* (85**)

* Gas to Gas Method
($\times 10^{-9}$ (cm³/sec) [mL O₂/(mL $\times$ mmHg)] @ 35 °C)

** Polarographic Method (ISO/Fatt)

Actions

The Boston Orthokeratology (oprifocon A) Shaping Lens produces a temporary reduction of myopia by changing the shape (flattening) of the cornea, which is elastic in nature. Flattening the cornea reduces the focusing power of the eye, and if the amount of corneal flattening is properly controlled, it is possible to bring the eye into correct focus and completely compensate for myopia.

The posterior surface of regular contact lenses generally aligns with the central cornea and rests directly on the corneal tear layer. Regular contact lenses are designed to cause little or no effect on the cornea but Boston Orthokeratology (oprifocon A) Shaping Lenses are designed to purposely flatten the shape of the cornea by applying slight pressure to the center of the cornea when the patient is asleep.

After the lens is removed, the cornea retains its altered shape for all or most of one's waking hours. The lenses are designed to be worn overnight with removal during the following day. The Boston Orthokeratology (oprifocon A) Shaping Lenses must be worn at night on a regular schedule to maintain the orthokeratology effect, or the myopia will revert to the pretreatment level.

Indications

Boston Orthokeratology (oprifocon A) Shaping Lenses for Overnight Wear are indicated for use in the reduction of myopic refractive error in non-diseased eyes. The lenses are indicated for overnight wear as part of the Bausch + Lomb Vision Shaping Treatment VST® process for the temporary reduction of myopia up to 5.00 diopters with eyes having astigmatism up to 1.50 diopters. The lenses may only be disinfected using a chemical disinfection system.

Note: To maintain the Orthokeratology effect of myopia reduction, overnight lens wear must be continued on a prescribed schedule. Failure to do so can affect daily activities (e.g., night driving), visual fluctuations and changes in intended correction.

Contraindications (Reasons not to Use)

DO NOT USE the Boston Orthokeratology (oprifocon A) Shaping Lenses when any of the following conditions exist:

- Acute and sub-acute inflammations or infection of the anterior chamber of the eye
- Any eye disease, injury, or abnormality that affects the cornea, conjunctiva or eyelids
- Severe insufficiency of tears (dry eyes)
- Corneal hypoesthesia (reduced corneal sensitivity)
- Any systemic disease which may affect the eye or be exacerbated by wearing contact lenses
- Allergic reactions of ocular surfaces or adnexa which may be induced or exaggerated by wearing contact lenses or use of contact lens solutions
- Allergy to any ingredient, such as mercury or thimerosal, in a solution which is to be used to care for your Boston Orthokeratology (oprifocon A) Shaping Lenses
- Any active corneal infection (e.g., bacterial, fungal or viral)
- If eyes become red or irritated

WARNINGS

The practitioner should provide this warning to the patient.

PROBLEMS WITH CONTACT LENSES AND LENS CARE PRODUCTS COULD RESULT IN SERIOUS INJURY TO THE EYE.

It is essential that the patient follows the directions of the eye care practitioner and all labeling instructions for proper use of contact lenses and lens care products.

EYE PROBLEMS, INCLUDING CORNEAL ULCERS, CAN DEVELOP RAPIDLY AND LEAD TO LOSS OF VISION; IF THE PATIENT EXPERIENCES:

- Eye Discomfort
- Excessive Tearing
- Vision Changes
- Loss of Vision
- Redness of the Eye
- Other Problems with Their Eyes

THEY SHOULD BE INSTRUCTED TO IMMEDIATELY REMOVE THE LENSES, AND PROMPTLY CONTACT THEIR EYE CARE PRACTITIONER.

The risk of ulcerative keratitis has been shown to be greater among wearers of extended wear lenses than among wearers of daily wear lenses. The risk among extended wear lens wearers increases with the number of consecutive days that lenses are worn between removals, beginning with the first overnight use. This risk can be reduced by carefully following directions for routine lens care, including cleaning the storage case. Additionally, smoking increases the risk of ulcerative keratitis for contact lens wearers. It is recommended that contact lens wearers see their eye care practitioners twice each year or, if directed, more frequently.

Boston Orthokeratology (oprifocon A) Shaping Lenses are to be worn overnight with removal during all or part of each following day. Wearing the lenses continuously (extended wear) presents increased risk, which increases with the number of consecutive days that the lenses are worn between removals. Although the Bausch + Lomb Vision Shaping Treatment VST process prescribes only overnight wear with removal during waking hours, and although the safety risks of overnight wear with removal upon waking may not be as great as with extended wear, there is still increased risk beginning with the first overnight period.

Precautions

Eye Care Practitioner

Clinical studies have demonstrated that Boston Orthokeratology (oprifocon A) Shaping Lenses are safe and effective for their intended use. However, the clinical studies may not have included all design configurations or lens parameters that are presently available in the material. Consequently, when selecting an appropriate lens design and parameters, the eye care practitioner should consider all factors that affect lens performance and the patient's ocular health, including oxygen permeability, wettability, central and peripheral thickness, and optic zone diameter.

The potential impact of these factors on the patient's ocular health should be weighed against the patient's need for refractive reduction; therefore, the continuing ocular health of the patient, and lens performance on the eye should be carefully monitored by the prescribing eye care practitioner.

Boston Orthokeratology (oprifocon A) Shaping Lenses are supplied non-sterile in an individual plastic case. The lens is shipped dry and must be cleaned and conditioned prior to use.

Patient

Patients should be informed of the following precautions:

Solution Precautions

- Different solutions cannot always be used together, and not all solutions are safe for use with all lenses. Use only recommended solutions with the shaping lenses.
- Do not heat the wetting/soaking solution and lenses.
- Always use fresh, unexpired lens care solutions.
- Always follow directions in the package inserts of the contact lens solutions used.
- Use only a chemical lens care system. Use of a heat (thermal) lens care system can cause damage by warping Boston Orthokeratology (oprifocon A) Shaping Lenses.
- Sterile, unpreserved solutions, when used, should be discarded after the time specified in the labeling directions.
- Do not use saliva or anything other than the recommended solutions for lubricating or wetting lenses.
- Do not use tap water as a rinsing agent.
- Always keep the lenses completely immersed in the recommended storage solution when the lenses are not being worn (stored).

Handling Precautions

- Always wash and rinse hands before handling lenses. Do not get cosmetics, lotions, soaps, creams, deodorants, or sprays in the eyes or on the lenses. It is best to put on lenses before putting on makeup. Water-based cosmetics are less likely to damage lenses than oil-based products.
- Be certain that your fingers or hands are free of foreign material before touching your contact lenses. Microscopic scratches of the lenses may occur, causing distorted vision and/or injury to the eye.
- Carefully follow the handling, insertion, removal, cleaning, disinfecting, storing and wearing instructions in this booklet and those prescribed by your eye care practitioner.
- Always handle your lenses carefully and avoid dropping them.
- Never use tweezers or other tools to remove lenses from the lens container unless specifically indicated for that use. To remove the lens from the case, pour the solution containing the lens into the palm of your hand.
- Do not touch the lens with your fingernails.
- To minimize lens warpage during cleaning, the lenses should be cleaned in the palm of the hand rather than between the thumb and fingers.

Lens Wearing Precautions

- **CAUTION:** Non-sterile. Clean and condition lenses prior to use.
- If the lens sticks (stops moving) on the eye, follow the recommended directions on Care for a Sticking (Non-Moving) Lens in the **Instructions for Wearers Booklet**. The lens should move freely on the eye for the continued health of the eye. If non-movement of the lens continues, you should immediately consult your eye care practitioner.
- Never wear your contact lenses beyond the period recommended by your eye care practitioner.
- Avoid, if possible, all harmful or irritating vapors and fumes when wearing lenses.
- If aerosol products such as sprays are used while wearing lenses, exercise caution and keep eyes closed until the spray has settled.

Lens Case Precautions

- Contact lens cases can be a source of bacterial growth. To prevent contamination and to help avoid serious eye injury, always empty and rinse the lens case with fresh, sterile rinsing solution and allow to air-dry.
- Replace your lens case at least once every 3 months or as directed by your eye care practitioner.

Discuss these topics with each patient:

- Wear of contact lenses during water and sporting activities
 - Use of any medication in your eye
 - Importance of adhering to the recommended follow-up schedule to assure the continuing health of your eyes
 - Informing your doctor (health care practitioner) about being a contact lens wearer
 - Informing your employer of being a contact lens wearer
- Note:** Some jobs may require the use of eye protection equipment or may require that contact lenses not be worn during work hours.
- What should be done if vision is inadequate during the day

Adverse Effects (Problems and What to Do)

Patients should be informed that the following problems might occur:

- Eyes stinging, burning, itching (irritation), or other eye pains
- Comfort is less than when lens was first placed on eye
- Feeling of something in the eye, such as a foreign body or scratched area
- Excessive watering (tearing) of the eyes
- Unusual eye secretions
- Redness of the eyes
- Reduced sharpness of vision (poor visual acuity)
- Blurred vision, rainbows, or halos around objects
- Sensitivity to light (photophobia)
- Dry eyes

Please refer to the Clinical Study Section of this package insert for adverse effects observed during the study.

If the patient notices any of these conditions, the patient should be instructed to **IMMEDIATELY REMOVE THE LENSES.**

The patient should be advised to follow these instructions:

- If the discomfort or problem stops, then look closely at the lens.
- If the lens is in any way damaged, DO NOT put the lens back on the eye. Place the lens in the storage case and contact the eye care practitioner.
- If the lens has dirt, an eyelash, or other foreign objects on it, or the problem stops and the lens appears undamaged, thoroughly clean, rinse and disinfect the lens; then reinsert it. Do not use a tap water rinse, use the approved conditioning solution as a rinsing agent.
- If the problem continues, **IMMEDIATELY** remove the contact lenses and consult the eye care practitioner.

When any of the above problems occur, a serious condition such as infection, corneal ulcer (including those caused by *Acanthamoeba* organisms), neovascularization, iritis, persistent stromal edema or GPC (giant papillary conjunctivitis) may be present. The patient should be instructed to keep the lens off the eye and seek immediate professional identification of the problem and prompt treatment to avoid serious eye damage including corneal scarring, opacification, blindness or loss of eye.

Clinical Study Data

Demographic Information

A total of 378 eyes (191 patients) were enrolled in the clinical study with 264 eyes (134 patients) completing a minimum of 9 months of contact lens wear. Data on 210 eyes (eyes with more complete effectiveness data) were analyzed for safety and effectiveness after 9 months of wear (the "core" group). In addition to this core group, 54 eyes were analyzed for safety data (the "adjunct" group). The entire population consisted of 128 females and 63 males, ranging in age from 17 to 64.

Effectiveness Outcomes

The average amount of myopia that can be expected to be corrected is shown in the following table. These values are only averages and some patients can be expected to achieve more or less than these averages.

Average Reduction in Myopia (Diopters) (210 Core Eyes)		
Initial Myopia	Mean Reduction (D)	Mean Residual (D)
0 to -1.00	1.15	0.21
> -1.00 to -2.00	1.52	-0.15
> -2.00 to -3.00	2.39	-0.13
> -3.00 to -4.00	3.29	-0.22
> -4.00 to -5.00	3.85	-0.57
> -5.00 to -6.00	4.67	-0.68
> -6.00	4.88	-1.25

Uncorrected Visual Acuity (UCVA)

The primary efficacy endpoint for the core group was the number of eyes achieving at least 2 lines of improvement in uncorrected visual acuity with **at least 20/40 vision**. Of the 210 Core eyes available at 9 months, 199 eyes (95 %) met these criteria of success, while 11 eyes did not achieve this successful outcome.

Primary Efficacy Endpoint at 9 Months Stratified by Pre-Treatment Myopia Core Eyes (210)

Pre-Treatment Myopia (MRSE)								
	0 to -1.00 D*	< -1.00 to -2.00 D	< -2.00 to -3.00 D	< -3.00 to -4.00 D	< -4.00 to -5.00 D	< -5.00 to -6.00 D	< -6.00 to -7.00 D	Total n
A. # eyes at 9 months with 2 lines improvement and 20/40 or better	5	60	72	34	22	5	1	199
B. # eyes at 9 months not meeting above criteria, data available	1	3	4	0	3	0	0	11
C. # eyes enrolled and available at 9 months	6	63	76	34	25	5	1	210
% eyes at visit with Acuity "Success" (A/Dx100)	83.3	95.2	94.7	100.0	88.0	100.0	100.0	94.8
MRSE Mean	0.21	-0.15	-0.13	-0.22	-0.57	-0.68	-1.25	
Std. Dev	0.17	0.64	0.50	0.51	1.14	0.68	0.0	

* Only 1 eye had an MRSE < -1.00 (0.63)

Post-treatment visual acuity was assessed on the 210 analyzed core eyes. Seventy-three percent (73 %) achieved 20/20 or better, 95 % achieved 20/40 or better.

Accuracy

At 9 months, 80 % of the core eyes achieved a reduction of myopia to within 0.50 D of target and 93 % achieved a reduction to within 1.00 D of target. The accuracy of the temporary reduction in myopia is given in the following table, which also shows the final acuity without lenses. However, accuracy of correction is less with correction higher than 4.00 D than with those less than 4.00 D.

Visual Outcome Accuracy of the Temporary Reduction of Myopia, Final Acuity Without Contact Lenses (Core Eyes at 9 Months)

Initial Myopia**	% Within 0.50 D of Target*	% Within 1.00 D of Target*	% With Final VA 20/20 or Better*	% With Final VA 20/40 or Better*
< 0 to -1.00 D	100 %	100 %	100 %	100 %
-1.25 to -2.00 D	81 %	93 %	82 %	94 %
-2.25 to -3.00 D	87 %	96 %	77 %	94 %
-3.25 to -4.00 D	79 %	94 %	71 %	100 %
-4.25 to -5.00 D	60 %	88 %	64 %	95 %

* 100%# reported/# in category

** Manifest Refraction Spherical Equivalent

Wearing Time

The lenses were intended for overnight wear only. The average wear time was reported to be between 8 and 10 hours per night, and there was no apparent relationship between the number of hours of wear and the visual outcome, for any amount of pretreatment myopia.

Effects on Astigmatism

Either increases or decreases in astigmatism may occur following orthokeratology. Of the 210 analyzed eyes, 35 % showed no change in refractive astigmatism, 41 % showed a decrease of one diopter or less, 2 % showed a decrease greater than one diopter, 20 % showed an increase of one diopter or less, and 2 % showed an increase greater than one diopter.

Overnight Wear Safety Summary

In this study all eyes were evaluated for safety of overnight wear for orthokeratology to treat myopia and myopia with astigmatism. Two hundred and sixty-four eyes were followed for 9 months. The data on best corrected acuity, adverse events, slit lamp findings and symptoms provide reliable indications of the safety of opriocon A in this treatment modality.

Best Spectacle Corrected Visual Acuity (BSCVA)

The majority of core eyes (those eyes with more complete effectiveness data upon which the primary effectiveness determinations can be made), 73 % had no change in BSCVA from baseline. 18 % had a gain of 1 line, <1 % had a gain of 2 lines, and 1 % had a gain of > 2 lines in BSCVA as compared to baseline. Concurrently, 8 % had a loss of > 1 line as compared to baseline. No core eyes had a loss of ≥ 2 lines of BSCVA.

For the 54 completed adjunct eyes (those subjects for which incomplete data was collected but enough data is provided to use as safety data) the change in lines of BSCVA at the 9-month post-treatment interval showed 41 % had no change in BSCVA from baseline, and 1 % gained 1 line. There were 4 % with loss of 1 line in BSCVA. Data were not reported for 29 eyes.

When considering all eyes entered into the study, there were a total of 42 incidents (in 34 eyes) of at least a temporary reduction of ≥ 2 lines of BSCVA during the course of the study.

Only 12 of the 42 incidents occurred after 3 months. Duration of the vision loss was not accurately determined in all cases, but for incidents in which there is some documentation and recovery was demonstrated, length of time to documented recovery varied from 1 day to 9 months. Thirty-three eyes had a duration of reduced vision of > 7 days.

Four eyes in 3 patients showed a reduction of ≥ 2 lines of best corrected acuity from initial visit to last study visit. One of these eyes was subsequently documented to return to normal acuity. No significant ocular abnormalities were observed in these eyes with biomicroscopy at the time of study exit.

Slit Lamp Findings

For 2907 eye exams, there were 14 exams showing slit lamp findings greater than grade 2 reported as follows: grade 3 for staining (3 incidents); grade 4 for staining (2 incidents); grade 3 for injection (2 incident); grade 3 "other" (4 incidents); and ungraded (3 incidents: 2 staining and 1 tarsal abnormality). All findings greater than grade 2 resolved without further complications. There were 5 slit lamp findings > Grade 2 or ungraded, in the Core, and 9 in the adjunct. The most significant of the > Grade 2 findings, were 3 Grade 3 Corneal Staining cases, 2 Grade 4 Corneal Staining cases, 1 case of Corneal Infiltrates (grade 3) and 2 Cases (2 eyes of 1 subject) of trace Iritis.

Symptoms, Problems and Complaints

Subjects were asked to report symptoms and complaints at each follow-up visit. For core and completed adjunct eyes, poor distance vision was reported for 17 % (389/2389), flare or ghosting were reported for 9 % (216/2389), and all other symptoms (poor near vision, red eye, excessive lens awareness/pain, excessive discharge, burning/itching, and photophobia) were reported for 8 % (188/2389) throughout the study. It appears that the eyes with initial myopia above 3.00 D had a higher incidence of these visual disturbances.

Discontinuations

Of the 90 adjunct subjects, 55 subjects (110 eyes) discontinued before completing 9 months of wear, for reasons as listed in the following table:

Reasons for Discontinuation		
Clinical Reasons*	# eyes	% of all eyes
Unacceptable vision	52	14 %
Lack of comfort	28	8 %
Unacceptable physiology	12	3 %
Non-clinical Reasons		
Lost-to-follow-up	38	10 %
Other **	10	3 %

* Several subjects reported more than 1 reason for discontinuation, without giving any priority to the reasons.

** "Other" included returned to spectacles (2 eyes), night vision bothered (2 eyes), wanted prior uncorrected near vision (2 eyes), financial (2 eyes), and could not maintain visit schedule (2 eyes).

Adverse Events and Complications

There were 12 significant lens-related adverse events reported in 10 subjects. Two eyes had bilateral grade 4 staining with significant decrease in vision to 20/80. One eye had grade 3 corneal staining secondary to a dislodged lens. One eye had significant corneal distortion with reduced vision to 20/200 and rippling on the cornea. Two eyes had bilateral iritis with trace cells and flare in both eyes. One eye had corneal infiltrates.

Two eyes had abrasion (grade 3 staining). One eye had reduction of BSCVA to 20/50 secondary to a decentered lens. One eye had reduction of BSCVA to 20/60 due to central staining. One eye had reduction of BSCVA to 20/60 with no reason given.

All of these eyes that showed acuity reductions were documented as returning to normal vision, except two eyes of one subject with severe corneal staining that showed ≥ 2 lines loss of BSCVA. The return to pretreatment VA was not recorded on the case report form of this subject although the subject returned to soft contact lens wear and verbally reported that vision was normal. Of the 10 subjects for which adverse events were reported, 4 subjects discontinued the study. All adverse events resolved without further complications.

Change in Corneal Cylinder

The reduction in refractive error and improvement in unaided visual acuity is the result in part of a change in the corneal radius as measured by keratometry. The keratometer measures the corneal curvature in the two principal meridians at a chord diameter slightly less than 3 millimeters. The keratometer does not provide data of the local curvature inside or outside of the location of its measurement.

Fourteen percent (14 %) of all treated eyes manifested more than one diopter of increase in corneal cylinder from baseline to the 9-month visit. The core group contained 26 eyes with greater than 1 D increase and the adjunct group contained 24 eyes with greater than 1 D increase.

There were 7 eyes in the core group and 11 in the adjunct group that had increases (initial to patient's last visit) in corneal cylinder of > 2 D. No eye with cylinder increase > 1 D had a BSCVA at exit worse than 20/30.

Summary of Key Safety Variables

A summary of key safety variables is presented in the following table:

Summary of Key Safety Variables		
Criteria	All Treated Eyes (364)	
	n	%
Significant Adverse Events	12*	3
Loss of ≥ 2 lines BSCVA†‡	4	1
BSCVA worse than 20/40†	1	<1
Increase of > 1 D Refractive Cylinder†	12	3
Increase of > 1 D Corneal Cylinder†	50	14

* Includes 4 discontinued subjects (6 eyes)

† From baseline to exit visit

‡ There were 42 incidents (in 34 eyes) of at least a temporary reduction of ≥ 2 lines of BSCVA during the course of the study. All except 4 discontinued eyes were documented as returning to normal during the study; one eye was documented to return to normal acuity after the study. No significant ocular abnormalities were observed in these eyes with biomicroscopy at the time of study exit.

Post-Lens Removal (Regression Study)

Uncorrected Visual Acuity (UCVA)

The effects of wearing your lenses at night are not permanent and slowly diminish after you remove your lenses. While this does not present a problem for most wearers, it is important to realize for some patients their vision at the end of the day may not be fully satisfactory for highly demanding visual tasks. Although this may not be an issue for most wearers, the eye care practitioner should consider each patient’s “late in the day” circumstance to discuss what steps the patient should take if this is a concern. The objective of this study was to evaluate the post-lens removal regression in subjects who had achieved refractive stability* following overnight orthokeratology treatment using Boston Orthokeratology (oprifocon A) Shaping Lenses.

Regression of Visual Acuity

To help you assess the change in vision over time following lens removal, subjects that achieved refractive stability in this clinical study were evaluated at 5-Hour, 24-Hour, 3-Day, and 1-Week Visits after removing their lenses. One hundred eighty-four eyes (105 subjects) achieved refractive stability* and completed the Regression Phase.

The following table presents a summary of uncorrected distance visual acuity (UCVA) through the Regression Phase. At the beginning of the regression phase, 100 % of the eyes that achieved refractive stability had UCVA of 20/40 or better**. At the 5-Hour visit of the Regression Phase, 98.9 % of the eyes had 20/40 or better. By the 24-Hour visit, 66.5 % of the eyes still had UCVA of 20/40 or better.

* Refractive stability was considered to be achieved when on two visits, separated by a minimum of 27 days in the same lens, the refraction (defined as the MRSE) varied not more than + 0.50 D.

** Most states require 20/40 in better eye for an unrestricted driver’s license.

Summary of Uncorrected Distance Visual Acuity (UCVA) Through the Regression Phase										
	At Lens Removal		5-Hour Visit		24-Hour Visit		3-Day Visit		1-Week Visit	
	#	%	#	%	#	%	#	%	#	%
20/15	8	4.3	10	5.4	4	2.2	0	0	0	0
20/20	136	73.9	131	71.2	48	26.4	20	11.3	3	1.7
20/25	26	14.1	22	12.0	25	13.7	14	7.9	7	3.9
20/30	10	5.4	16	8.7	21	11.5	23	13.0	8	4.4
20/40	4	2.2	3	1.6	23	12.6	20	11.3	20	11.0
Worse than 20/40	0	0	2	1.1	61	33.5	100	56.5	143	79.0
Total	184	100.0	184	100.0	182	100.0	177	100.0	181	100.0

At the start of the Regression Phase, there were 101 (54.9 %) eyes that had a Manifest Refractive Spherical Equivalent (MRSE) between ± 0.25 D and 134 (72.8 %) between ± 0.50 D. For these eyes, the mean time (in hours) following lens removal until MRSE regression to -1.00 D or worse is summarized in the following table for completed eyes achieving stability. The eyes with greater pretreatment myopia had less time (in hours) until MRSE regression to -1.00 D. Similarly, there was tendency for the eyes with greater pretreatment myopia to have less time until they regressed to 20/40 or worse as time progressed.

Average Number of Hours Until Manifest Refractive Spherical Equivalent (MRSE) Regressed to -1.00 D Following Lens Removal					
Refraction (MRSE at Lens Removal)	Pretreatment Myopia (MRSE)				
	-1.00 to -2.00 D	-2.12 to -3.00 D	-3.12 to -4.00 D	-4.12 to -5.00 D	-5.12 to -5.75 D
+0.37 to +0.50 D	156.3	62.2	32.0	-	-
+0.12 to +0.25 D	136.9	56.2	28.7	24.0	-
Piano	92.0	63.3	25.2	58.0	-
-0.12 to -0.25 D	101.8	56.1	28.5	29.0	25.0
-0.37 to -0.50 D	75.7	24.7	44.6	7.0	5.0

Post-Market Surveillance Study Incidence Rate of Microbial Keratitis in Pediatric Patients Compared to Adults

The purpose of this post-market surveillance study was to determine whether the incidence of microbial keratitis in pediatric patients, defined as persons under the age of 18, is higher than in adult patients wearing orthokeratology reshaping lenses overnight in patients fitted with either Paragon CRT, Paragon CRT 100, or Boston Orthokeratology (oprifocon A) Shaping Lenses. Bausch + Lomb and Paragon Vision Sciences collaboratively sponsored the study. The study question was whether the incidence of microbial keratitis was higher in pediatric patients than in adult patients.

Study Design

The study identified patients fit by a randomly selected, stratified (low- and high-volume prescribers) sample of practitioners. The patient-sampling strategy was designed to identify enough patients that had been fit with corneal reshaping lenses with sufficient follow-up to provide 2000 patient-years of exposure. The primary endpoints for the study were defined as the incidence of microbial keratitis in pediatric and adult groups and the difference in rates between the two age groups.

Study Population

The retrospective study design did not employ patient enrollment but rather the selection of practitioners. The random sampling strategy recruited equal numbers of low and high-volume practitioners, but limited the number of patients contributed by any one practitioner to 50, in order to minimize the respondent burden and to avoid any single practice contributing a substantial proportion of the sample.

Patients were not prospectively enrolled according to strict inclusion and exclusion criteria, but instead were identified retrospectively through lens orders from 2005 and 2006.

Safety Evaluation

Participating practitioners reviewed their medical records for up to 50 patients, selected at random. Only data on lens wear from 2005 onwards and cases of possible microbial keratitis from 2005 onwards were analyzed in order to minimize bias.

A total of 86 practitioners completed a standardized summary form to capture patient age, fitting date, and duration of lens wear. In addition, practitioners were asked to report any potential cases of microbial keratitis associated with the selected corneal reshaping lenses using the criterion of a painful red eye that required a visit to a doctor’s office. The definition of microbial keratitis was one or more corneal stromal infiltrates greater than 1 mm in size, pain more than mild, and one or more of the following: anterior chamber reaction more than minimal, mucopurulent discharge, or positive corneal culture. Also considered was whether the practitioner prescribed treatment consistent with the standard of care for microbial keratitis in terms of choice of medication, frequency and duration of use.

An Outcomes Assessment Panel reviewed all potential cases of microbial keratitis masked to patient age. The Panel members were chosen based on their expertise in the assessment, evaluation, and management of contact lens related complications. Individuals with associations with either sponsor were excluded.

The incidence rate and confidence intervals were estimated as the ratio of the number of cases in an age group divided by the years of lens wear. Confidence intervals for the difference in the incidence rates between pediatric and adult patients were also calculated.

Results

Of the 200 randomly selected practitioners, 9 could not be contacted. Of the 191 practitioners that could be contacted, 119 agreed to participate (62 %) and of these, 86 returned completed forms, 11 withdrew, and 22 failed to submit data in spite of multiple reminders. Of the 72 non-participating practitioners (191 minus 119), approximately 10 % declined to participate and the remainder would not return repeated phone calls from the Lead Investigator. The completed forms corresponded to 2202 lens orders and represented unique 1494 patients. Limiting the sample to those beginning lens wear in 2005 or 2006 provided 2599 patient-years of lens wear (exceeding the goal of 2000) for 1317 patients (677 children and 640 adults). At the original fitting date the mean age of the pediatric group was 12.2 ± 2.5 years and the mean age of the adults was 38.0 ± 11.1 years. The mean follow-up for the pediatric group was 2.1 ± 0.8 years, with 620 (92 %) having at least 12 months of follow-up. The mean follow-up for the adults was 1.8 ± 1.0 years, with 497 (78 %) having at least 12 months of follow-up.

The Outcome Assessment Panel identified two cases of microbial keratitis within 2599 patient-years of overnight corneal reshaping lens wear. Both cases of microbial keratitis occurred at least one year after fitting and neither resulted in any documented long-term loss of best corrected visual acuity. **Table 1** summarizes the incidence data for microbial keratitis based on the 2599 patient-years of lens wear. The overall estimated incidence of microbial keratitis is 7.7 per 10,000 patient-years including the estimated incidence of 13.9 per 10,000 patient-years for the pediatric group, and 0.0 per 10,000 patient-years for adults.

Table 1 Incidence of Microbial Keratitis Patients with at Least 3 Months of Lens Wear in 2005 and 2006			
	Pediatric Patients	Adults	Overall
N	677	640	1317
Cases	2	0	2
Years at Risk	1435	1164	2599
Incidence Rate per 10,000 patient-years	13.9	0.0	7.7

A conservative analysis of 685 patients who began wear of overnight corneal reshaping lenses after January 2005 and had at least one year of documented lens wear is presented in **Table 2**. These patients contribute a total of 1415 patient-years of lens wear (794 pediatric and 621 adult).

Table 2 Incidence of Microbial Keratitis Patients with at Least 1 Year of Lens Wear in 2005 and 2006			
	Pediatric Patients	Adults	Overall
N	378	307	685
Cases	2	0	2
Years at Risk	794	621	1415
Incidence Rate per 10,000 patient-years	25.2	0.0	14.1

Conclusions

The primary goal of the study was to compare the risk of microbial keratitis between children and adults with at least 3 months of lens wear.

In this retrospective study, the following rates of microbial keratitis were observed:

- In Children: 2 cases of microbial keratitis were reported (13.9 per 10,000 patient-years). Both cases of microbial keratitis occurred at least one year after fitting and neither resulted in any documented long-term loss of best corrected visual acuity.
- In Adults: 0 cases of microbial keratitis were reported.

Results from this retrospective observational study are tentative and not conclusive. Results from a large, well-controlled prospective clinical trial can provide more definitive results.

Data on rates of infectious corneal ulcers in children wearing other types of contact lenses is not available. For comparison, Poggio et al. (1989)*, estimated the risk to be ~21 per 10,000 patient-years for extended-wear soft contact lenses (lenses worn overnight) and ~4 per 10,000 patient-years for daily wear soft contact lenses.

* / Poggio EC, et al. The incidence of ulcerative keratitis among users of daily-wear and extended-wear soft contact lenses. N Engl J Med. 1989 Sep 21;321(12):779-83.

Study Strengths

Previous published studies have reported individual or small series of patients presenting with microbial keratitis, none have compared incidence among adult and pediatric populations. This was a retrospective study which looked backward over a period of time to compare the groups. Retrospective studies are particularly useful in investigating diseases or adverse effects with low incidence of occurrence. This was a study (2599 patient-years) of randomly selected patients fitted by 86 randomly selected practitioners over two years. Cases were classified by an independent group of experts using clear and established criteria and without knowledge of whether the patient was a child or an adult.

Study Limitations

Retrospective studies are useful in providing estimates of relative risk; however, there can be limitations associated with a retrospective design involving adverse events occurring in the past. Bias can be introduced with a retrospective design, for example, by practitioners or patients declining to participate. While study sites were selected at random, participation was voluntary and practitioners who had observed cases of microbial keratitis may have been less willing to participate. Although the retrospective analysis was of patients fitted over a two-year period, the incidence rate calculations assume that the occurrence of microbial keratitis is constant over time, i.e., there are assumptions associated with the use of constant-rate denominators. Such assumptions may not be valid as the risk may change over time. Patients were selected at random, but lens wear was not documented beyond practitioner report. The practitioners’ inability to confirm whether some patients wore the study lenses and whether they wore the lenses for the minimal time required may have inflated the total years at risk, thus artificially depressing the reported incidence of microbial keratitis and increasing the statistical power of the study. Nonetheless, 1158 of the 1317 patients had at least one year of wear documented by the practitioner and 81 patients were documented as discontinued by the practitioner. A total of 78 patients can be regarded as lost to follow-up. Only 86 out of 200 (43 %) targeted practitioners enrolled in the study by returning the completed form. The classification of microbial keratitis was determined by an Outcome Assessment Panel without direct contact with the patient or photographs. These factors should be considered when evaluating the significance of the results.

Evaluation of Non-Spherical (Toric) Posterior Peripheral Curves on Astigmatic Patients

The effect of non-spherical posterior peripheral curves was evaluated on patients that were orthokeratology lens-naïve, had spherical refractive error between plano and -5.00 D, astigmatism no greater than 1.50 D, and corneal topography sagittal height differential of ≥ 30 microns between the 2 main meridians (flat and steep) at an 8-mm chord. The primary effectiveness outcome was the proportion of patients who achieved monocular high-contrast uncorrected distance visual acuity (UDVA) of 20/40 or better in both eyes at the 3-Month Follow-up Visit.

Data on 45 (patients with more complete effectiveness data) were analyzed after 3 months of wear (the “core” group). For the core patients available at 3 months, 42 subjects (93.3 %) met these criteria of success, while 3 patients did not achieve this successful outcome.

Summary of Monocular High-contrast Snellen UDVA: Patients
20/40 or Better in Both Eyes at the 3-Month Follow-up Visit

	Orthokeratology Lens N = 45
3-Month Follow-up Visit	
20/40 or better, n/N (%)	42/45 (93.3 %)
95 % CI*	(821, 977)

CI = confidence interval; UDVA = uncorrected distance visual acuity

Note: n represents the patients with 20/40 in both eyes and N represents the core patient group.

*95 % CI was calculated using Wilson-Score method

While the lens was on the eye, a lens fit assessment was conducted at the Dispensing and 1-Day Follow-up Visits. For lens fit assessments, ratings of excellent (fully centered) and good (slight decentration) were considered acceptable. Acceptable lens fit assessments were reported for 96.1 % of eyes and 96.1 % of subjects at the Dispensing Visit. Following the first night of overnight wear of the lenses, acceptable lens fit assessments were reported for 95.5 % of eyes and 93.9 % of subjects. There were no reports of poor lens fit assessments.

The primary safety outcome was the rate of significant adverse events at the subject and eye levels. Among dispensed subjects, no significant adverse events were reported. Review of the other safety clinical data demonstrated acceptable safety findings.

Fitting

CAUTION: Boston Orthokeratology (oprifocon A) Shaping Lenses should be fitted only by a contact lens fitter trained and certified in the fitting of conventional (non-reverse geometry) and reverse geometry contact lenses.

Conventional methods of fitting rigid contact lenses for orthokeratology DO NOT APPLY to the Boston Orthokeratology (oprifocon A) Shaping Lens. For a description of fitting techniques, refer to the Fitting Guide for Boston Orthokeratology (oprifocon A) Shaping Lenses for Overnight Wear for Bausch + Lomb Vision Shaping Treatment VST; copies of the Fitting Guide are available from:

Bausch & Lomb Incorporated
1400 North Goodman Street
Rochester, NY 14609 USA
1-800-333-4730

Recommended Wearing Schedule

Although many practitioners have developed their own initial wearing schedules, the following sequence is recommended as a guideline. Patients should be cautioned to limit the wearing schedule as recommended by their eye care practitioner regardless of how comfortable the lenses feel.

Wearing Schedule: On night one lenses should be inserted at a time early enough to achieve 8 to 10 hours of closed eye wearing time (sleep). A well-fit lens provides for centration with the eye closed. The effects of lid interaction on blinking and gravity may result in lens decentration during open eye wear. The patient should place the lens(es) in their eye 15 to 20 minutes before going to sleep.

Be aware "when in doubt, take it out". It is important that the new wearer not sleep in a lens that has a significant foreign body sensation. In the event of foreign body sensation, instruct the patient to remove the lens, clean and re-wet it; and again, place the lens in the eye. If the sensation continues, remove the lens. The lens should not be worn.

Appointment Schedule: The patient should report for follow-up evaluation the morning after the first overnight wear. The visit is best scheduled within a few hours of awakening and the patient should report with lenses in place. This visit provides an excellent opportunity to evaluate lens centration and potential lens adherence.

Upon the absence of clinical signs and complications, the patient may be instructed to continue overnight wear of the lenses until the next scheduled follow-up visit.

An alternate daytime wear schedule may be offered at the practitioner's discretion.

Myopic Reduction Maintenance Lens (Retainer Lens) Schedule

After a period of several days, or when the eye care practitioner is satisfied that the patient has adapted to the Boston Orthokeratology (oprifocon A) Shaping Lenses, the eye care practitioner may optimize the wearing schedule for an individual patient to monitor the duration of visual improvement. This may continue as long as the patient can see clearly. When it is found that the patient experiences a visual decrement following lens removal, the schedule of overnight wear must be modulated to maintain visual performance.

Lens Care Directions

Eye care practitioners should review with the patient all lens care directions, including both basic lens care information and specific instructions on the lens care regimen recommended for the patient:

Soaking and Storing Your Lenses:

- You should fill your lens case with fresh solution every time you disinfect your lenses, and never "top-off" or re-use solution. You should discard your solution immediately after your lenses have been removed from the lens case.
- You should not expose or store your lenses in or rinse your lens case with any water, such as tap, bottled or distilled, or with any non-sterile solution.

WARNING:

- Failure to discard solution from lens case after each use, "topping-off" solution or use of water to care for your lenses may lead to contamination resulting in eye injury and potential loss of vision.

Rub and Rinse Time:

- Follow the complete recommended lens rubbing and rinsing times in the labeling of your solution used for cleaning, disinfecting and soaking your lenses to adequately disinfect your lenses and reduce the risk of contact lens infection.

WARNING:

- You should follow the complete recommended lens rubbing and rinsing times in the product labeling to adequately disinfect your lenses and reduce the risk of contact lens contamination. Reduced rubbing or rinsing time may not adequately clean your lenses.
- Never use water**, saline solution, or rewetting drops to disinfect your lenses. These solutions will not disinfect your lenses. Not using the recommended disinfectant can lead to severe infection, vision loss or blindness.

Lens Case Care:

- Clean contact lens case with digital rubbing with fresh, sterile disinfecting solution. **Never use water.** Cleaning should be followed by rinsing with fresh, sterile disinfecting solutions (**never use water**) and wiping the lens cases with a fresh, clean tissue is recommended. Air-drying or recapping the lens case lids after use without any additional cleaning methods should be avoided. If air-drying, be sure that no residual solution remains in the case before allowing it to air-dry.
- Replace the lens case at least once every 3 months or as directed by your eye care practitioner.
- Contact lens cases can be a source of microbial growth.

WARNING:

- Do not store your lenses or rinse your lens case with water or any non-sterile solution. Only use fresh solution so you do not contaminate your lenses or lens case. Use of non-sterile solution can lead to severe infection, vision loss or blindness.

Water Activity:

- Do not expose your contact lenses to water while you are wearing them.
- Ask your eye care practitioner for recommendations about wearing your lenses during any activity involving water.

Discard Date:

- Discard any remaining solution after the recommended time period indicated on the bottle of solution used for disinfecting and soaking your contact lenses.

WARNING:

- Using your solution beyond the discard date could result in contamination of the solution and can lead to severe infection, vision loss or blindness.

The lens care products listed below are recommended by Bausch & Lomb Incorporated for use with the Boston Orthokeratology (oprifocon A) Shaping Lenses.

Lens Care Table	
Product Purpose	Lens Care System Chemical (Not Heat)
Clean	Boston ADVANCE® Cleaner
Disinfect, Store, Rinse	Boston ADVANCE® Conditioning Solution
Multi-Action (Clean, Condition, Disinfect, Rinse and Cushion)	Boston SIMPLUS® Multi-Action Solution
Rinse	Bausch + Lomb Sensitive Eyes® Saline Solution
Lubricate/Rewet	Boston® Rewetting Drops
Weekly Enzymatic Cleaner	Boston® ONE STEP Liquid Enzymatic Cleaner

The directions found in the package inserts from these products should be followed. Failure to adhere to these procedures may result in the development of serious ocular complications. A patient should not switch from one care system to another unless it has been determined by the eye care practitioner that this is necessary. Do not mix or alternate the disinfection and storage systems unless so indicated on the product label.

Inform the patient of the following lens care suggestions:

- Boston Orthokeratology (oprifocon A) Shaping Lenses must be both cleaned and disinfected each time you remove them. One procedure does not replace the other. Cleaning is necessary to remove mucus and film from the lens surface. Disinfecting is necessary to destroy harmful germs. To minimize lens warpage during cleaning, the lenses should be cleaned in the palm of the hand rather than between the thumb and fingers.
- Care of the Boston Orthokeratology (oprifocon A) Shaping Lenses may be accomplished with the use of either a two-bottle care regimen (separate conditioning solution and a separate cleaning solution) or a one-bottle care regimen (a multi-action solution that is an all-in-one-solution).

For a two-bottle system – Clean one lens first. The recommended procedure is to always clean the same lens first to avoid mix-ups. Rinse the lens thoroughly with saline indicated for the care of gas permeable lenses to remove the cleaning solution. Place the lens into the correct storage chamber and fill the chamber with the recommended disinfecting solution as recommended by your eye care practitioner. Clean and rinse the other lens in the same manner and place it in its chamber with fresh disinfecting solution.

For a one-bottle system – Clean one lens first. The recommended procedure is to always clean the same lens first to avoid mix-ups. Rinse the lens with the one-bottle solution. Place the lens into the correct storage chamber and fill the chamber with the recommended one-bottle disinfecting solution as recommended by your eye care practitioner. Clean and rinse the other lens in the same manner and place it in its chamber with fresh one-bottle disinfecting solution.

- Tightly close the top of each chamber of the lens storage case.
- To disinfect your lenses, leave them in the solution for at least the period indicated on the product label.
- Leave the lenses in the closed storage case until you are ready to put the Boston Orthokeratology (oprifocon A) Shaping Lenses in your eyes. DO NOT RINSE THE LENSES WITH TAP WATER PRIOR TO PLACING THE LENSES IN YOUR EYES.

Lens Case Cleaning and Maintenance

Contact lens cases can be a source of bacteria growth. Lens cases should be emptied, cleaned, rinsed with disinfecting solutions recommended by the case manufacturer, and allowed to air-dry. Lens cases should be replaced every 3 months or as directed.

Enzyme Cleaning

The eye care practitioner may recommend enzyme cleaning. Enzyme cleaning does not replace routine cleaning and disinfecting. The patient should carefully follow the instructions in the enzymatic cleaning labeling.

Emergencies

- If chemicals of any kind (household products, gardening solutions, laboratory chemicals, etc.) are splashed into the eyes, the patient should:
- FLUSH EYES IMMEDIATELY WITH TAP WATER.
 - REMOVE LENSES.
 - IMMEDIATELY CONTACT THEIR EYE CARE PRACTITIONER OR VISIT A HOSPITAL EMERGENCY ROOM WITHOUT DELAY.

How Supplied

Each lens is supplied non-sterile in an individual plastic case. The case, packing slip or invoice is marked with the base curve, power in diopters, diameter, center thickness, color, and lot #.

Reporting of Adverse Reactions

All serious adverse experiences and adverse reactions observed in patients wearing or experienced with the lenses should be reported immediately to the manufacturer.

Bausch & Lomb Incorporated
1400 North Goodman Street
Rochester, NY 14609 USA
1-800-333-4730

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