

Please give  
to Friend or  
Relative who  
suffers with  
Keratoconus  
Eye Disease  
Please Read

## Containment of keratoconus and other abnormally shaped corneas

An holistic approach that focuses on the healthy part of the cornea

**K**eratoconus and other abnormally shaped corneas are very challenging, time and material intensive. Topographical mapping helps to diagnose, choose and design base curve and other parameters for an efficient physiological aspheric rigid gas (ARGP) permeable contact lens. This is not a one-lens fit. The ECP must change lenses as the cornea makes healthier, flatter, and symmetrical changes. All this talk, hype, and articles about fitting these extremely high astigmatic and aspheric corneas with soft silicone hydrogel lenses is not what my teachers and mentors, Dr Leonard Bronstein and Dr George Iacono taught me in practice. Refractively these patients are primarily myopes with irregular high astigmatism who exhibit distorted and uneven corneal sphericity as shown on corneal contour mapping. Keratoconics are low or subnormal vision patients, so what can soft lenses do for the irregular myopic and astigmatic correction, containment, and positive reformation of distortion, compared to a well fit superior intermediately aligned ARGP? Dr Bronstein said a well-fit contact lens should not bind anywhere on the whole cornea, should centre and move vertically with upper lid attachment, and exchange tears under the lens on the blink so the patient can see better and is more comfortable wearing lenses all day.<sup>1</sup>

If you take topographical mapping across the keratoconic cornea, you will see the inferior cornea is invaginated or dimpled in (steeper in curvature), pushing the central and superior cornea out. It is always bilateral, but one cornea is more advanced than the other. Dr Bronstein felt keratoconus was a redistribution of the pressure and not just an ectasia of the cornea, and said the central ring will be pointed or oblong, not round. If you look straight ahead and put your index finger on your lower lid and press in you have induced a close topography of keratoconus, in my opinion. Why not match or align the aspheric corneal shape with an ARGP?<sup>1</sup>

If you fit soft or soft silicone hydrogel lenses, which curvature are you looking at? Which part of

the cornea is diseased and dying and which area is alive and healthy? Do we, as clinicians, preserve and enhance what is living and ignore what is dying? Do we focus on the disease (central Ks) and run the risk of pinching off or peripherally sealing off the healthy and flatter superior cornea with steeply fit spherical RGPs with apical clearance or alignment? Do soft contacts or steeply fit spherical RGPs seal off, or suck onto, the superior quadrants of these aspheric corneas, helping to invaginate the inferior cornea, induce oedema, and trap old tears carrying out waste products such as lactic acid, carbon dioxide, and dead cellular debris? With very high oxygen permeable contacts (soft or rigid), is this what causes the central stippling, 3-9 staining, vertical folds, we see in apical clearance or apical alignment fits? My teachers, Dr Bronstein and Iacono, impression was 'yes.' In soft silicone hydrogel fits, look at the amount of neovascularity you are inducing on the whole cornea. Does this induce a steep cone and more myopia on pseudocones (distorted corneas) from tight-fitted contacts and poor refractive surgery results? Are the discomfort and reduced wearing time caused by not looking at and fitting the whole cornea and not

### In short...

Dr Eger was taught to fit GP contact lenses utilizing topography by Dr Leonard Bronstein, who, in the 1950s, was a student of Newton Wesley, OD, a keratoconic patient who had worn a flat superior alignment fit successfully well into his 90s. Since then, he has long been a disciple of the 'big picture' philosophy, incorporating a holistic approach to managing keratoconus by optimizing lens design, accommodative function and nutritional supplementation. He outlines the background to his teaching and then how he has put this into practice treating top athletes and provides some case studies to illustrate his points. He also invites OTEurope Digest readers to email his patients directly to find out their experiences. His approach is far from traditional and in some areas, one suspects, ophthalmologists may not agree but there is no arguing that he is clearly motivated by patient outcomes.

managing the patient in a holistic manner? Is 3-9 staining just from poor blinking or an RGP fit that is too steep or tight? Is it just looking at design from keratometry readings giving you central Ks and not fitting aligned to the 9th ring flatter periphery? Dr George Iacono said this is: "Just fitting the 3 mm island," and added, "we all know what happened to Three Mile Island."

#### First rigid CL case using Bronstein's method

I would like to share with you why I believe superior intermediate alignment with ARGPs help improve abnormal corneas like keratoconus. In 1975 Dr Bronstein taught me how to fit Korb designed upper lid attachment fits with rigid lenses on normal corneas. He instructed me to fit these lenses acting like the lids, that would centre, have a fulcrum point in the horizontal meridian and rock as if on a see-saw, exchanging fluid by pooling fresh tears in behind the contact and expelling old tears on the next blink. He called this creating a tear-pump for good corneal homeostasis and balance.

#### Drs Bronstein and Reynolds guidelines for good fits:

To insure proper fluid dynamics, it is desirable that all lenses be positioned slightly above the centre of the cornea. With blinking, the lens should move vertically down by the upper eyelid, into the lower fornix, and then pull back up into the normal rest position. This is so the lens moves with the lids. The lens movement smears the pre-corneal fluid around the cornea so there are no dry spots (stippling effect as seen with fluorescein). It is recommended the lens must be loose enough that any portion of the lens does not dig into the limbal area. Any touching portion of the lens should be at tangency.<sup>1</sup>

All I know is, patients felt good and could see well behind these custom-designed rigid lenses.

#### First keratoconus patient, traditional vs Bronstein method

In 1977 I was presented with my first keratoconus case, and fitted it applying three-point touch with very slight apical clearance. This was one day after I attended my first Bronstein Contact Lens Seminar. I had Dr Bronstein check my fit with another well-respected contact lens practitioner. The patient and both doctors confirmed it was a good traditional fit. The patient had 20/25 BVA through this spherical hard contact lens with very light and superficial central punctate staining and light 3-9 staining, examined by fluorescein analysis. It fitted exactly like the other lens he was wearing, since he came to me to replace one cracked hard contact lens.

Four weeks after this refit, Dr Bronstein challenged me to fit this case with superior intermediate alignment (5.8 – 6.5 mm from centre) using a Reynolds Corneoscope to measure 75% of the corneal surface. My patient agreed to try this unique and controversial fitting technique. The base curve was approximately +1.75 D, flatter than the flat central K from keratometry. When I first saw this lens on his cornea, I got very upset when I examined him with fluorescein, seeing central bearing, superior alignment and inferior clearance so dramatic that every other blink a bubble of tear fluid escaped from the bottom of the lens. I was not experienced enough to ask the patient how the lens felt, so I said: "Man, doesn't that hurt?" The patient smiled because this aspheric hard contact lens felt very comfortable and his sight was 20/15 -3. I insisted he come back the next day, not believing this. His entrance BVA with contacts was now 20/15 and no central corneal staining and with 50% improvement of the 3-9 staining. We later adjusted the lenses (reducing diameter .2 mm, re-add PC and heavy blend). One month later we refitted +0.50 D flatter in the base curve to finish the case. The 3-9 staining had somehow disappeared. Truth to me is efficient performance. In his least aggressive cone, he is still

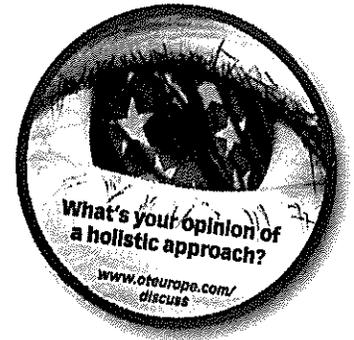
wearing this lens design today in an advanced RGP material.

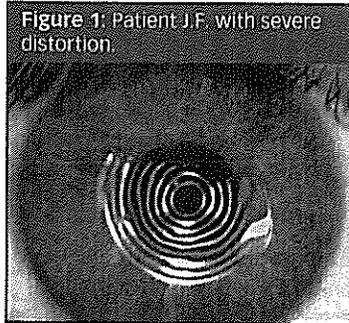
#### Specific research project needed

I asked many of these questions to the CLEK Study<sup>2</sup> and to the president of an optometry school, hoping they would do a study evaluating topography improvement, lens wearing time, aided and unaided visual acuity improvement and changes to the corneal surface with fluorescein analysis between patients wearing steeper apical clearance fits and flatter intermediate superior aligned ARGPs fits. The original lenses fit should be changed to a different base curve after the topography initially flattens and becomes more symmetrical. As the cornea flattens, the initial lens becomes tight and steep compared to the new flatter corneal shape, so the lens begins to distort the topographical image. The lens may decentre and lose the good metabolic tear pump (sucks on), and the patient loses comfort. All or some of these signs indicate a re-fit is in order. In most cases it is a +0.50 to +0.75 D flatter base curve from the last lens design as the cornea reforms and goes toward more symmetry. Time is of the essence when dealing with dynamic corneal reformation. I can see how non-dynamic flat fitting might cause corneal scars, as in the pseudocone example below. First sphericize the cornea as described, then fit to contain or retain the new shape.

#### Aligned ARGPs make a difference

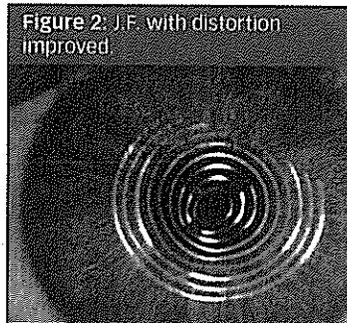
These topographical changes on a 15 year old male keratoconic fit with attention to the superior intermediate area (5.8 – 6.5 mm from centre) show dramatic restoring of abnormal corneal contour (seen before in Figure 1 and after in Figure 2 of a steep 3 point touch fit compared to this flatter and superior aligned fit) that was shown in my published comments.<sup>2</sup> This topographic improvement was





also shown in another article.<sup>3</sup> I commented in lectures<sup>4</sup> on this particular keratoconic bowler's wearing time increase. The topography showed the restoring of abnormal corneal contour, improved aided and unaided BVA with this controversial flatter and looser fit compared to his older apical clearance fitting. Drs Bronstein and Reynolds felt the cornea acted like it was more plastic than elastic. If comfort and vision improves, it stands to reason, so does a patient's life and balance. Three months after this refit was completed (after 5 - 6 changes in base curve as the cornea was reforming and sphericizing) this patient bowled a perfect 300 game. He later got a rare bowling scholarship to ASU. He considered joining the PBA tour but I lost contact with him and he and his mother eventually ended up in an ophthalmology office to get a debatable PK on the most advanced cone that was seeing 20/25 -3 with contacts, wearing time all waking hours, but with a white corneal vertical glazing.

In my lectures on my keratoconus research I focused on positive sight, comfort, physiological and topographical changes seen with fitting superior intermediately aligned RGP aspheric fits. It was a controversial presentation that was well received, especially by the newer eye care practitioners in the audience. A pioneer in the early development of contact lenses, Dr Newton Wesley, is still wearing lenses with this fitting philosophy. He was wearing ARGPs all day and no corneal scarring or corneal graft. Dr Bronstein was a student of Dr



Wesley and passed this information on to me and told me Dr Wesley went to over 10 practitioners until he was successfully fitted this way.

#### When a corneal transplant should be performed

In 1993 I asked Dr Edward Shaw, who had the largest corneal surgical practice in Phoenix treating corneal abnormalities including keratoconus, "When does a keratoconic patient need to be referred for a transplant or corneal graft?" The discussion was published<sup>1</sup> and presented in a lecture.<sup>4</sup> Dr Shaw answered directly and succinctly that is was when any of the following occur:

- When the patient can't see adequately even though the lens is properly fitted.
- Wearing times goes down, or lenses pop out.
- When lenses cause damage of pain such as repeating ulcers.<sup>1</sup>

He said any of these symptoms may indicate it could be time to refer for a corneal transplant.

I feel many of these cases may have been fitted too steep. Refitting flatter and aligning the flattest superior 9th ring (without losing horizontal positioning and moving vertically) may provide better corneal metabolism and could postpone the need for an immediate transplant. If irritation or poor visual acuity persists, then a transplant must be done.<sup>1</sup>

My comment back to him was:

"What if we just fit the RGP lens flatter in base curve using aspheric RGP lenses, paying attention to the superior curvature above the central apex of the cornea? He smiled of course as he knew Dr Gene Reynolds of Dean McGee Eye Institute and the Len Bronstein philosophy on paying attention to the superior periphery's flatter radius of curvature. Fitting and designing the base curve there helps minimize chaffing or seal-off on the whole cornea, not just looking at the central steeper nipple in the design of customized rigid aspheric contacts. Drs Reynolds and Bronstein both taught students attending their Bronstein Contact Lens Seminars to fit comfortable rigid lenses using corneal topography to guide the lens design for size, base curve and aspheric eccentricity, with lenses centering, moving, and with a good healthy tear pump. Dr Reynolds felt you could not fit a hard lens too flat as long as it centred and moved vertically and exchanged tears. Dr Reynolds asked us if a bespoke brassiere maker would design cup curvatures to align the steeper nipple radius of curvature or the radius of curvature of the flatter bulk of the woman's breast? When you laugh and learn, that is called teaching in my opinion!

#### Using ARGP fit to the whole cornea

Using a series of different lenses, the cornea could reform. The first lens would be fitted in the periphery, the flattest ninth corneal ring. This ninth ring is usually much flatter than the central three millimeters, which is equivalent to the K readings. The lens used is usually a highly oxygen permeable special aspheric design RGP custom fit to the abnormally shaped cornea. The principle behind this therapy is similar to unwrinkling a dent punched in a plastic milk carton or ping-pong ball. If you press slightly on the periphery of the dent, the centre pops out to a normal smooth surface. Once you have obtained a

smooth and clear corneal surface with a flatter and looser fitted therapeutic lens, you must change to a slightly different lens. Each lens creates a new corneal shape, and the lens must be constantly changed as the cornea changes.<sup>3</sup>

Maybe this is the plasticity they mentioned and what I am seeing when I fit and look at my keratoconics this unconventional way, and see dramatic topography change for the better. I always ask the patient how the lens feels. I know it can be fitted too flat, as when the lens decentres it stops moving and stops pumping tears. For lack of a better term, I would call this 'intuitive fitting,' between how the patient feels with the doctor's design, the observation of the performance of the lens on the keratoconic cornea, and objective topography changes.

I managed my successful keratoconic bowler for three years, but in the cornea of the more aggressive keratoconic eye, I noticed a white vertical glazed streak extending from 2mm above to 2mm below the centre of the pupil. The patient had no discomfort or loss of wearing time and BVA was 20/25 +2 with this flatter fit. There was good centering, movement, and tear pump, with no central or peripheral fluorescein staining.

This was the first time I ever witnessed scarring or glazing. Dr Bronstein diagnosed this as glazing but I questioned him about this being scarring. I asked at his seminar what it was since vision and comfort was not diminished. Dr Bronstein abruptly cut me off. I'd appreciate some feedback if any other ECP has seen this and how they manage it. The evidence of corneal scarring on four other cones I've managed looked more like white outlined golf holes or divots. These patients don't complain of discomfort or vision impairment. I've tried to re-fit them steeper, but they lose a line or two of sight and wearing time decreases with some central superficial punctate staining. When I

go back to the flatter fit this corneal staining goes away and they feel better. I've learned to ask the patient: "How does the lens feel?" They have the disease, not me, and they are learning to listen to their body, what I call 'intuitive healing.'

I lost contact with my keratoconic bowler and found out his mother was offered a corneal transplant by a surgeon who told me later he was amazed this patient could see so well with my unusual fit that the patient wore all day. I asked this doctor why a transplant was done on the one eye. He said: "It was such a steep nipple cone it would eventually need a transplant anyway." I heard from secondhand sources that the patient's mother paid the doctor only what her insurance would cover for a transplant. When the patient came to me, they paid a fee for service, a global fee. A few years later the graft was rejected, but the patient had not gone back for another surgery. I no longer read about this talented bowler in the sports pages, so maybe it is true; the eyes lead the body, efficiently or inefficiently.

#### **Why is it politically incorrect to mix contact lenses with vision developmental treatment?**

I believe in vision therapy, functional vision, and putting low plus lenses on patients with inefficient accommodative facility, especially in keratoconus. I believe too much reading or poor facility is a large component of accelerating keratoconus. Most of my pre-presbyopic keratoconics wear +0.50 or +0.75 readers over their contacts. They do stretching or yoga so they have flexibility and balance in the whole body. They meditate or pray and breathe correctly for better outlook overall. Proper exercise and nutrition are also necessary for release of stress for keratoconics and athletes. All of these tools help expand peripheral awareness and relax accommodation, in my clinical experience. I feel it aids in keeping

the internal cornea from changing from within when under stress.

Dr Bronstein always brought up in his seminars that there is a direct connection between the longitudinal trabecular fibers and the ciliary body and ciliary muscle, according to Zimmerman. When the ciliary muscle accommodates, it pulls the longitudinal fibers, causing the cornea to be pulled in slightly in the zone around Schwabbe's Ring, creating a negative zone in the critical part of the cornea that affects visual acuity (6th or 7th corneal ring on topography). Dr Reynolds said when the pressure in the anterior chamber drops, the cornea can become distorted, it acts as if it is plastic and takes on a new shape. When the eye is refilled with fluid it is drained at the same rate at which it is being filled, the cornea keeps its shape. When saline is injected in keratoconic eyes to increase the intraocular pressure (IOP), the keratoconic shape will disappear. It has not been discovered as to how to increase the IOP. Low pressures may make the cornea more susceptible to unusual shape changes.<sup>5</sup> Dr Bronstein always asked when teaching me to fit cones, what is the IOP? Years later I finally understood why all soft corneas (low IOP below 12 mm Hg by Goldmann) changes from the inside as well as the outside. Experience taught me these base curves should be fit at least +0.75 flatter than the normal fit because this is a very changeable cornea, inside and out. I have seen many of these soft keratoconic corneas show a pulsation of the vertical mires on Goldmann tonometry, corresponding with the pulse of the brachial artery. The IOPs were between 7 and 12 mm Hg without pachymetry adjustment because it was not regularly done in those days. I feel low and changeable pressures may be susceptible to accommodative overload or poor facility. If the ciliary body is spasming, so is its next-door neighbour, the

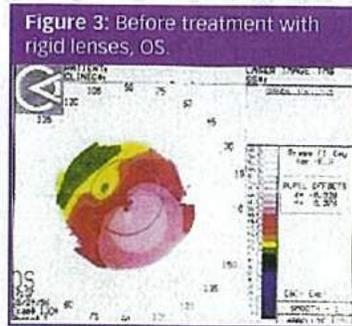


Figure 3: Before treatment with rigid lenses, OS.

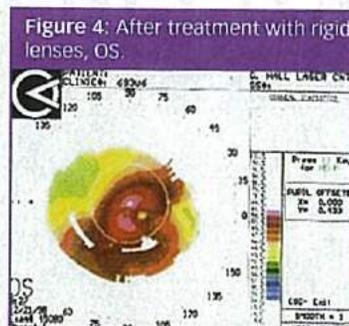


Figure 4: After treatment with rigid lenses, OS.

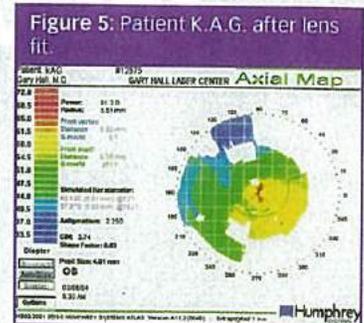


Figure 5: Patient K.A.G. after lens fit.

trabecular meshwork. How do you stop a charley horse? You massage, stretch, relax, and feed the body better.

Almost all my 358 keratoconics are high achievers, do mostly near-point tasks throughout the day, are detail oriented, introspective, analytical, and most have A+ personalities. Is it possible they don't use their energy efficiently and lose flexibility so when tremendous stress comes on (death in the family, divorce, job pressures, or overloads) the cornea makes a curvature change under a well fit lens they wore comfortably for years? When a person is stressed, accommodation tightens and tunnel vision ensues. Everyone has a pressure point for stress, so my theory is many cones hold it in their ciliary muscle. Accommodative stress is a catalyst to the progression of keratoconus.

When high stress happened, years ago before I started adding a holistic approach and partnering more with the patients for their overall wellness. I would often refit these patients because the lens was not fitting properly. Since adding a holistic approach and partnering more with the patients for their overall wellness, I am doing approximately 70% less refits because the patient is more proactive and balanced to handle stress, from my observations. If you work or play optimally with the least amount of time and energy because of improved visual efficiency, is this better for your confidence, trust, and quality of life? I've found out these cases have better long-term

results by allowing the informed patient to partner with their eye care professional.

#### Criticism of soft CLs for containment

Improved vision is a big factor for these patients, and soft contacts allow the corneal distortion to diffract as well as refract the light information coming into the eye. A well-fit superior intermediate aligned ARG aligned to the whole cornea, especially the flatter periphery, eventually creates more symmetry and a less wavy appearance, with proper changes in lenses as the cornea is reformed. This ARG will refract more light rays and cause little, if any, diffraction if it is well centred, peripherally aligned and moves vertically with the lids. With ARG lenses fit more in alignment to the 9th ring using corneal topography, there seems to be at least two or more lines of acuity improvement compared to soft and RGP spherical apically aligned or clearance fits. When your patient can now see better centrally, peripherally, globally and efficiently with well fit ARGs it stands to reason there is more quality, quantity and better light information entering the eye. If they see efficiently, they perform to their true and top potential.

We ought to look at the whole patient and enhance the big picture (efficient global seeing). When accommodation ranges are higher and more balanced in stimulation and relaxation, it affects the entire body, helping build a buffer or reserve against stress. Putting early

cones in glasses (a prison of prisms), soft contacts, not fully correcting visual acuity and sucking onto an asymmetrical part of the cornea causes peripheral seal off, oedema and neovascularity. We are fitting the steeper corneal nipple without looking at preserving what is living and healthiest (superior cornea) which is not the way Dr Bronstein, Dr Reynolds and Dr Iacono taught me to fit these patients. These were just some of the reasons they were very critical of soft lenses in these patients.

#### Future care and treatment

It is my opinion that most keratoconus is caused by a ciliary muscle hyper-overload which can be triggered by extreme emotional stress. It is possible that keratoconus cases have an overload stress in the ciliary muscle thereby dropping IOP via the connection of the trabecular meshwork connecting to the ciliary body. This may cause more distortion and invagination in the inferior margin of the cone, thereby causing more protruding and steepening of the cone.

Keratoconus patients must be responsible for controlling their disease internally as you, the doctor, control the external cornea with contact lenses and aligning the superior flattest 9th corneal ring. If we fit just to align the central apex of the cone; we will starve the healthy superior cornea because of a probable superior seal-off.

Our job is to preserve what is healthy and enhance it. If we as doctors and fitters are controlling the corneal contour and giving the cone a more spherical appearance by the proper

application of pressure from the outside, then it stands to reason that the patient's behavior, respiration, proper exercise and accommodative stability, is creating a stabilizing effect internally.

If we look at the cornea as a tyre, the road contour (contact lens fit) controls the shape of the tyre. However, the shape can also be controlled by deflating its pressure (ciliary muscle-improved tonicity and relaxation ability). Ludlam in his report to the College of Optometrists in Vision Development in 1989, stated that children after vision therapy who worked on improving ocular motilities and accommodative flexibility all showed lower IOP after treatment than before.

With stable IOP and proper corneal-contact lens bearing relationships, keratoconus, pseudo-keratoconus (from tight fitting lenses or post refractive surgery warpage) and myopia can be vastly improved. Therefore, you and the patient share the work in treating the disease or improving the condition.<sup>1</sup>

#### **ARGPs for keratoconics and abnormally shaped corneas**

All my keratoconic cases are fitted with ARGPs or reverse geometry lenses. They wear their lenses comfortably for up to 16-18 hours a day. I've never had to fit bitoric lenses or piggy-back lenses because in my experience and what I learned from my teachers, tells me that the metabolic tear pump exchange of fresh oxygenated tears and waste products are slowed down behind tighter fits and will accelerate the eventual transplant of these challenging corneas.

Most experienced contact lens fitters will admit the most difficult, challenging, and appreciative person is a keratoconic. It takes second place to fitting a corneal transplant. These patients want to see normally, feel comfortable with contacts all their waking hours, take their lenses off and feel hopeful they have improved unaided sight, instead of a progressive increase of

the degenerative myopic condition from steep apical clearance fits with RGP spheres and soft contacts. Soft contacts may be a quick fix to initial discomfort from apical clearance fits that may contribute to vertical folds, SPK, 3-9 staining, and Fleishers rings. Soft and soft silicone hydrogel have some inefficiencies compared to flatter superior intermediately aligned ARGPs for helping low vision patients with keratoconus, distorted corneas from tightly fitted contacts (soft and rigid), and warpage from some refractive surgeries. Many soft lenses tend to wrap the cornea, they seal or tend to suck onto the flatter corneal topography showing neovascularity. This may cause more corneal dystrophy because waste products are trapped behind the soft lens, and the cornea may change or distort to manufacture a way to get these waste products expelled from behind the contacts. When ARGPs are fit progressively paralleling corneal changes, approaching alignment in the flatter superior mid-periphery, positive changes occur. I have seen vertical folds, SPK, 3-9 staining decrease or disappear, sight improve (aided and unaided), myopia and astigmatism decrease. Patients make intuitive (as opposed to analytical) decisions as faith builds because they trust what they see, they move and breathe more efficiently and the whole person heals positively from a condition, not a disease. Soft contacts will eventually lead to neovascularity, stagnation of tear exchange, increase in corneal distortion, increase in myopia and astigmatism, patients upset by torn contacts, repeated ulcers and lead to an earlier corneal transplant. Dr Bronstein taught that these fits are not controlling, reforming, or helping the cornea maintain wellness or balance against this sight-threatening disease.

#### **See the big picture**

In any treatment, truth is efficient performance but today it may be what is politically correct. Someone once said: "We value information

over wonderment." I tell my athletes and keratoconics, "You can't think the feel." That is, you can't see the big picture and use intuitive vision to become loose and successful through over-analyzing because it returns a small picture. When keratoconic patients understand and learn how to be more efficient with their energy, they react, breathe, posture and move more efficiently because they see a bigger picture. Seeing the big picture enhances peripheral vision, accommodative flexibility and localization in space. They become more balanced, trusting, and less stressed in life. This, I believe, keeps the internal cornea less likely to change under extreme emotional stress, life or death situations, and loss of loved ones.

The difference between an innovator and a crazy person is power, influence, and money. My three patients who were in my 1999 *Contact Lens Spectrum* article, *The Big Picture: Treating the Whole Keratoconus Patient*, want to let all eye care practitioners who have an open mind to email them. They will tell you about the success of superior intermediately aligned ARGPs and accommodative relaxation results. They will tell you the care they received from me, and that I don't give them sympathy in relation to their disease, I push them to embrace it whether my techniques are traditional or not. None of them have scarring, and most are at least 10 years on with my fit. If it gives them efficient performance because it works, then they will keep practicing these wellness tools so they can hopefully avoid an eventual corneal transplant and lead a normal life.

Email contacts for Dr Eger's patients can be found later in this article.

#### **Topography for better patient outcomes**

My definition of a good ECP taking

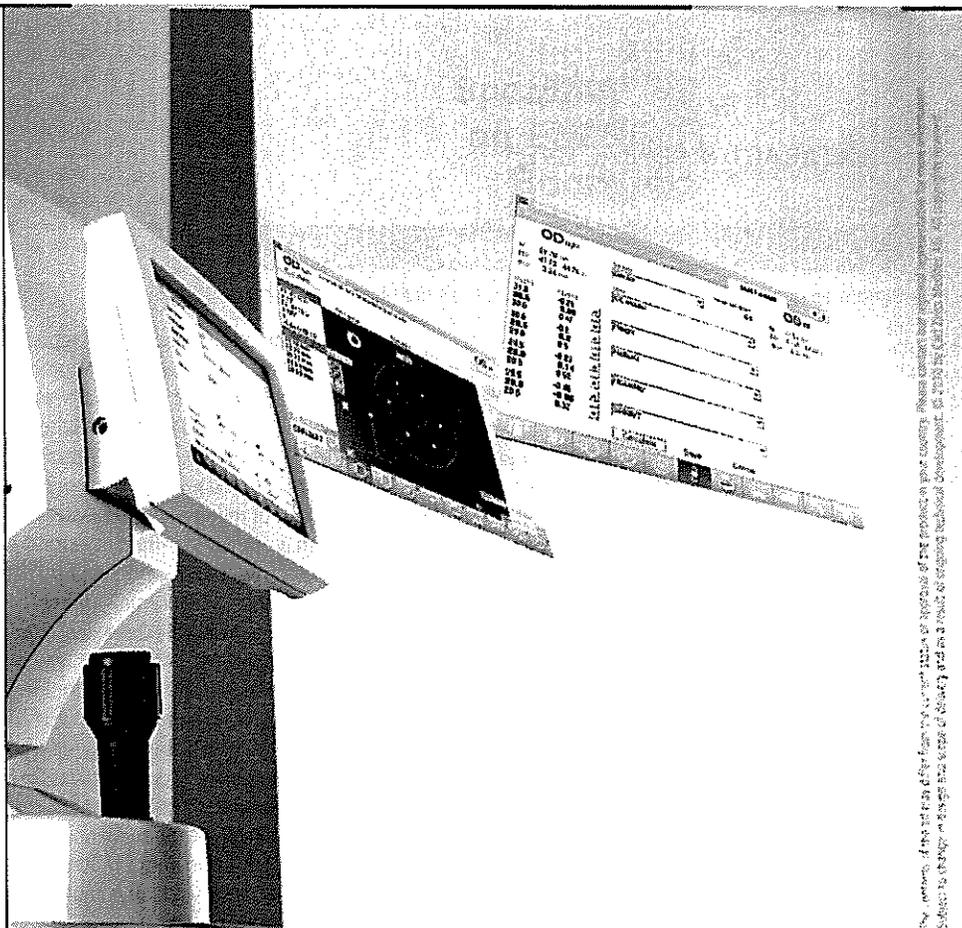
on challenging corneas like these is one who is a good teacher, technician and tactician who can help change the destiny of a patient's disease or condition for the better. When we go to a heart specialist or an oral surgeon, they usually show us evidence (x-rays) of how our body compares to normal films. The doctor does this to show us there is a problem and what can be done. We can use topography to show patients their departure from a normal cornea and what can be done. The evidence helps patients trust and know that your special care is backed up with high technology lenses and instrumentation. These patients are less resistant to the higher global fees to manage these challenging cases that need more time, materials and corneal topography with fluorescein analysis. They are more willing to partner with ECPs to help improve and contain their disease. The patient has keratoconus, not the doctor, so why not help these high achieving A+ personalities learn more physical, ocular and emotional balance to create a buffer for their high stress lifestyle?

With well-fit superior intermediate aligned ARGP lenses, corneal contour often improves with acuities (aided and unaided) and comfort. There are others, besides me, who are sensitive to all the literature demeaning this fitting style. Do we go underground to satisfy these young low vision patients (most I see are in their early 20s)? All my patients pay my global fee for materials and services for six months at the beginning of treatment, so I believe I am working for them. They are very intelligent, analytical, doubting, fearful and high achieving patients. I believe there is more to a keratoconic patient than looking at the outside of the cornea.

**Corneal change in accommodative facility and peripheral vision improvement**

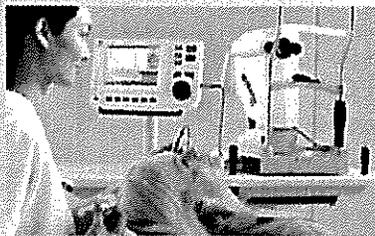
The key is to control the posterior of the cornea and try to make it less

[www.oteurope.com/cat\\_ref](http://www.oteurope.com/cat_ref)



# IOLMaster 500

**The fastest and easiest way to the right IOL**



Today, selecting the right IOL to meet individual patient expectations is more crucial than ever. The IOLMaster<sup>®</sup> 500 incorporates advancements designed with the challenges of today's cataract practice in mind: **precision, simplicity, outcomes.**

Even if the patient's eye cannot be measured optically, the Sonolink option allows a convenient workflow by seamlessly linking the A-Scan synergy to the IOLMaster 500.

For further information, visit [www.meditec.zeiss.com/iolmaster](http://www.meditec.zeiss.com/iolmaster)

Visit us at ESCRS, Booth 215, Hall Maillot

**Carl Zeiss Meditec AG**  
 Jena / Germany  
 Phone: +49 36 41 22 03 33  
 Info@meditec.zeiss.com  
 www.meditec.zeiss.com



The contents of this advertisement are not intended to constitute an offer of any product in your country. Please contact your local representative for more information. Subject to change without notice. © 2010 Carl Zeiss Meditec AG

changeable. If the IOP stays stable from unstressed accommodative facility, then the RGP fit is easier and gets better long-term results. When patients learn to build up and enhance accommodative facility, peripheral enhancement, proper nutrition, exercise, and rest they can take on more stress with less change or spasm from the ciliary muscle, causing less spasm to its next-door neighbour the trabecular meshwork. I do fewer refits when we add these to the treatment regimen.

Pressure forces in keratoconus come from inside forces also. Causes of keratoconus from textbooks like Adler and Mandell are from too much reading, a genetic defect of one of the genes yielding abnormal collagen, allergies, heredity, stress, rubbing your eyes, and contact lenses. All my keratoconics are intelligent and well-read people. I believe myopia can increase from inefficient

accommodative facility. It happened to me in my second year of optometry school. The reading demand was higher than I had ever experienced. I was emmetropic entering optometry school. At the end of my second month of my second year I was 20/50 with a -1.25 D.S. refractive error O.U. When I played golf and tennis on the weekends, I saw normally (what I used to see), but by the end of the week, my sight deteriorated. When I had to study over the weekends and did not exercise or play sports, my sight was 20/50, and my peripheral vision felt more tunneled in. I also had headaches from reading. Since I wasn't a long-term reader, I chose the option of wearing + 0.50's instead of wearing the -1.25 prescribed for distance, accommodative and ocular motility eye exercises and made time for my sports. At the end of the year, I was emmetropic with plano refractive error. Today I am emmetropic but

presbyopic.

When we read more than our accommodation can handle (as a pre-presbyope) the ciliary muscle spasms, in my opinion, from over-fatigue. I have used an accomatrac vision trainer and seen how relaxing accommodation with correct visual imagery can temporarily improve topography and unaided sight in keratoconus and myopia. The ciliary muscle's next-door neighbour, the trabecular meshwork, is affected by its proximity. There may be a jelly-shell-like change of the internal curvature of the cornea because of accommodative fatigue or spasm caused by IOP changes in the anterior chamber. This is my theory, and a topographer with built in pachymetry might prove this. All my pre-presbyope keratoconics wear +0.50 or +0.75 readers over their superior intermediate aligned ARGPs lenses for accommodative relaxation and a buffer against stress. They also do vision efficiency drills to enhance peripheral awareness. The ability to see the 'big picture' controls the internal curvature of the cornea, instilling relaxation from stress, in my clinical experience. I assume they have better reserves and total balance in their whole body to control stress, resulting in fewer refits. If we don't have any stress we are looking up at the grass instead of down at the grass. It's learning how to balance good (eyestress) with bad stress for total wellness. This improved balance also comes from good nutrition, meditation, exercise, religious prayer, laughter and stretching. Myopes and keratoconics have too much of an 'in' look, they can learn to have more of an 'out' look by seeing the big picture intuitively or automatically without thought. This helps them keep the cornea like an eggshell instead of like a changeable jelly-shell to simplify the long-term fit. Hopefully, my patients will outlive me and wear their superior intermediate aligned

Table 1: Patient K.A.G record.

**11/15/05 Last full exam**  
**Spectacle RX**  
 OS +0.50 -2.00 x 97 20/25+3 K 48.50 x 52.00  
 no staining, good centering, movement and tear pump  
 Unaided OD 20/25+2 OS 20/40-2  
 No staining, good centering, movement and tear pump, shape factor consistent from previous exam  
 No complaints with contacts, worn all day through last trimester, including through delivery of baby

**10/7/03 – 12/2/03 Last fit (after 5-6 lens changes)**  
 OS fit with Boston XO, flat edge profile (peripheral curve)  
 BC 41.87 (8.06 mm) +6.75 D. 9.7 diameter, flat edge (asphericity)  
 VA with lenses 20/25+3, unaided 20/40  
 Worn all day with good comfort, no staining, no scarring

**12/22/03** **2/6/04 (Figure 3)**  
 OS Ks 48.50 x 52.00

**1997**  
 After fitting superior intermediate aligned ARGPs and 5-6 refits as the cornea reformed, sphericizing.  
 VA with lenses 20/25+1, unaided 20/40  
 Lenses worn all day with good comfort, no staining, no scarring (Figure 4)

**Wearing spherical RGP apical clearance 3-point touch lenses**  
 VA with RGPs 20/80 BVA, unaided 20/400-  
 Lenses worn 2-3 hours on, 2-3 hour off, poor comfort, with central and peripheral staining  
 Patient was on a transplant list (Figure 5)

ARGPs efficiently, like Dr Newton Wesley, to live without fear of a corneal transplant or loss of normal vision, for a better quality, long, happy, and successful life.

### Patient outcomes build practice loyalty

I have a special interest and passion for helping these challenging patients, regardless of the political pressure traditional ECP may place on my unconventional methods. I have a lot of keratoconus patients nagging me to get my methods published. I learned many of these techniques from my mentors Drs. Bronstein and Iacono, my teachers who are now deceased. I hope practitioners can appreciate the positive topography changes they see, without corneal scarring,<sup>6</sup> in my and the new topography on patient K.A.G.<sup>6</sup> using a new ARGP design with Boston XO material. The three patients in this article are eight to twelve years out on their superior intermediate aligned ARGPs. I feel patients and pictures speak louder than words and traditional theories and practices that criticize this way of fitting.

#### What the patients say...

Here are the emails of these patients who will tell you their true experiences with superior intermediate aligned ARGPs with no corneal scarring from flat fits.

**Patient K.A.G.** krissygolub@cox.net

**Patient A.P.** apineda16@comcast.net

**Patient D.W.** dwilcoxson1@cox.net

### Keratoconus reformation and containment

The most dramatic reformation of keratoconus I've seen is patient K.A. who got married and is now K.A.G. She is one of three published

[www.oteurope.com/cat\\_ref](http://www.oteurope.com/cat_ref)

## Speakers' Forum\* on ESCRS Paris Booth #214



### Saturday September 4<sup>th</sup>

- 1.00 pm** Off-flap Epi-LASIK vs LASIK in myopic Asian eyes using two excimer lasers: 1-year follow-up  
*Tran Hai Yen, MD (Vietnam)*
- 2.00 pm** AS-OCT measurements of OUP SBK flap thickness after myopic LASIK on Asian eyes  
*Yue-Guo Chen, MD (China)*
- 3.00 pm** The ultimate frontier of Endothelial Keratoplasty: Ultra-Thin DSAEK  
*Massimo Busin, MD (Italy)*
- 4.00 pm** Comparison between OUP SBK and Ziemer LDV<sup>®</sup> for myopic and astigmatism treatment  
*Wang Qin Mei, MD (China)*
- 5.00 pm** Manœuvres and tricks to promote tissue adhesion in DSAEK  
*Antonio Sabala, MD (Spain)*

### Sunday September 5<sup>th</sup>

- 1.00 pm** OUP SBK: the evolution of microkeratomes – Thinner, safer and more predictable  
*Renato Neves, MD (Brazil)*
- 2.00 pm** The ultimate frontier of Endothelial Keratoplasty: Ultra-Thin DSAEK  
*Massimo Busin, MD (Italy)*
- 3.00 pm** «Femto-Furrow»: Unanticipated stromal tissue loss following femtosecond flap creation  
*James S. Lewis, MD (USA)*
- 5.00 pm** Preliminary results with the OUP SBK microkeratome  
*Paulo Schor, MD (Brazil)*

### Monday September 6<sup>th</sup>

- 10.00 am** Microkeratome-assisted Keratoplasty for the surgical treatment of Corneal Scars  
*Massimo Busin, MD (Italy)*
- 11.00 am** OUP SBK vs IntraLase<sup>®</sup> 60kHz for thin flap LASIK: prospective analysis  
*Aylin Kilic, MD (Turkey)*
- 12.00 pm** DSAEK: Five Year Results  
*Francis Price, MD (USA)*
- 1.00 pm** Corneal epithelial healing rates after advanced Epi-LASIK surgery  
*Robert J. Mitchell, MD (Canada)*
- 2.00 pm** Partial thickness corneal transplant: DSAEK and ALTK  
*Pierre Fournié, MD (France)*
- 3.00 pm** OUP SBK vs Ziemer LDV for thin flap LASIK: prospective analysis  
*Nikica Galic, MD (Croatia)*
- 4.00 pm** DSAEK made easy  
*Aiaa El-Danasoury, MD (Saudi Arabia)*
- 5.00 pm** English experience with OUP SBK microkeratome: my first clinical outcomes  
*Mohamad G. Ayoubi, MD (UK)*

\* Topics and speakers are subject to change.

MORIA SA, 15, rue de la République, 92100 Nanterre, France. Tel: +33 (0)1 47 37 11 00. Fax: +33 (0)1 47 37 11 01. [www.moria.com](http://www.moria.com)

cases.<sup>6</sup> She found me through the Internet by email with another patient of mine, AP, case 2 in the same article, a chemistry professor at the University of New Mexico, who has an Ivy League PhD. Isn't it interesting how intelligent and scholarly many keratoconics are? If they are too analytical (small picture seeing) they lose their balance to become more intuitive (big picture seeing) so they can relax their stress holistically.

The videokeratograph maps of K.A. have been published.<sup>6</sup> It showed evidence that keratoconus can rehabilitate (reform), or change shape for better symmetry and improve corneal tissue response with well-fit superior intermediate aligned ARGPs. Her unaided BVA when the case was done, was better than the aided BVA of the steeper 3 point touch fit of the original lenses she initially came in with. Four years later we had to refit these well-fit superior intermediate aligned ARGPs because of improved diet. This is the completion of the case using a new ARGP using Boston XO material. I was impressed with the eccentricity of this new aspheric and tried my best to fit on K, apical clearance, or light apical touch so it would be more politically accepted medically. When topography showed slight distortion, central corneal staining, 3-9 staining, or the patients said they were aware of lenses, we changed to +0.50 to +1.00 flatter base curve. We ended up with a much flatter fit than I envisioned, but look at the newest videokeratograph. Pictures don't lie. (Table 1) K.A.G. had a baby last year and wore these lenses in her last trimester of pregnancy and throughout her delivery of her baby boy. I examined her eyes before her delivery and saw no corneal scarring or staining, 20/20 OD and 20/25 +1 OS BVA with contacts, and wearing time was all day. This is not a girdle fit, in spite of what you may

hear at lectures or read in articles. Girdles are tight and confining, my fits are just the opposite. My keratoconic patients don't buy their lenses online, and they pay fee for service, \$3,000-\$3,500 for a 6 month global fee, including materials. My pseudocone fees are \$795-\$2,000 depending on the severity of the corneal distortion.

K.A.G. finally agreed to yoga and stretching exercises 2-3 times per week. She also switched to a vegetarian diet rich in plants and whole foods. These measures helped increase the stability of the cornea and therefore the contact lens fit.

My keratoconus research resulted in only 1% needing corneal graft or transplant and only four incidents of corneal abrasion that were treated and resolved without ulcerations or scars. I have been nagged and provoked by my keratoconic patients as to why this non-traditional technique of keratoconic treatment isn't published more in articles, politically accepted, or on the internet (they do check). I thought an optometry school would be open minded with a grant to look at steep apical aligned or clearance fits compared to superior intermediate aligned fitting using aspheric RGPs. This could check for changes of cornea using topography, pachymetry, fluorescein analysis using biomicroscopy, visual acuity changes (aided and unaided), and tonometry impressions using a Goldmann tonometer, accommodative relaxation techniques and peripheral vision enhancement. Why can't we study both fitting philosophies to find out what works best for patients? I have never worn a girdle, but some women have told me they are tight and restrictive, but a well-fitting bespoke brassiere is loose and comfortable throughout the day. Which would you rather wear?

#### References

1. J. Eger. Corneal Rehabilitation on Abnormally Shaped Corneas, Including Keratoconus, *Contacto*, June 1995.
2. J. Eger. Another View of Keratoconus *Contact Lens Spectrum*, letter to the editor. November 1996.
3. J. Eger. Corneal Rehabilitation Using Corneal Topography," *Contact Lens Forum* July 1990.
4. National Eye Research Foundation lectures in Las Vegas, Nevada, 1991, 1994.
5. D. McConnell. Eye Contact *Phoenix Gazette* 19 January 1991.
6. J. Eger. The Big Picture: Treating the Whole Keratoconus Patient *Contact Lens Spectrum* October 1999.

**Author**  
Dr Jeffrey J. Eger, O.D. F.I.O.S. can be reached by Email at [drjeffeger@cox.net](mailto:drjeffeger@cox.net) and his website is [www.allamericansportvision.com](http://www.allamericansportvision.com)