Myopic Progression Control

One of the most exciting areas of research in Orthokeratology (Ortho-K), AKA, Corneal Reshaping (CR), has to do with the control of myopic progression.

At the present time it appears very likely that CR can essentially stop the progression of myopia in the young, emerging myope. Finally we may have something that actually works. The jury is still out but the research continues and each new study is pointing in the same direction: The use of CR lens molding on the young myope is the best alternative for preventing the progression of myopia.

It's better than Rigid Gas Permeable lenses (RGPs), it's better than bifocals, it's better than progressive lenses, atropinizing drugs, vision therapy (VT) and it's better than under-correcting the myopia.

It is my belief that nearly every emerging myope should be given the opportunity to have CR. It allows the stabilization at low levels of myopia and the wearing time of the molds can often be reduced. They don't have to progress over three years from -.75 to -1.75 before you step in with a better alternative. You don't have to watch the average of -.37D per year progression. Keep them at a low level and they will most likely never desire any other type of correction, including Lasik.

Why does CR control myopia?

It turns out that myopia development appears to be controlled by the focus of the peripheral retina. At the recent Orthokeratology Academy of America meeting, there was a fair amount of discussion, continued from last year, about myopia control based on research by Earl Smith, O.D. of the College of Optometry, Houston. His research is with monkeys but the results have been found in many different species. The eye has a process called emmetropization that continually tries to zero-out refractive errors that is mediated primarily by the peripheral retina to a much greater degree than the central retina. The eyeball grows longer (axially) during maturation, which causes the myopia, and stops growing when the peripheral retina comes into focus. Think of peripheral hyperopia existing separate and distinct from "regular" or central (foveal) focus, or what Dr. Smith calls hyperopic peripheral defocus. If you have good central acuity, you still might have a peripheral defocus. If your peripheral retina is hyperopic, in effect that image is behind the peripheral retina, then the signal within the retina is to keep growing, and the central retina moves further out (grows) from zero error (plano) to myopic if measured centrally, like we all do measure it. If your peripheral retina is not hyperopic, in effect the peripheral image is on retina and the retinal signal is to stop or slow growth. The key to control the growth is curvature or shape “shell”of the visual field - move the peripheral retina where it needs to be; for progressive myopes, curve it inward (with more plus) in the periphery.

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There appears to be an age limit of about 8 to actually reverse the process in humans. Older than that is mostly to slow or stop it from getting worse. Standard spectacle lenses with their "corrected curves" move the peripheral image in the direction that encourages myopic progression. CR corneas due to their peripheral reshaping, move the image in the direction that discourages axial growth. CR leaves the peripheral retina myopic outside the central 10 degrees or so. Instruments are being designed to allow peripheral refractions - in effect auto refractors that can measure off-axis rays. Such instruments have the promise of allowing us to accurately predict individual myopic risk.
The whole story won't be in for a long time. If you have absorbed what I have said above, you might say, "Just under-correct the kids: they'll have relatively less peripheral retinal hyperopia." The problem is that the only two real studies that looked at this were stopped when it became evident that undercorrecting myopes made them worse compared to controls that were fully corrected.

The following studies have been done with humans and CR.

LORIC (Long Term Ortho-K Research In Children) Pauline Cho showed that axial length increase was 50% in Ortho-K patients compared to the control group in glasses. Although Ortho-K slowed myopia, the effect couldn't be predicted for individuals.
Current Eye Research, 30:71–80, 2005
 ISSN: 0271-3863 print / 1460-2202 online
http://www.exceleyecare.com/pages/5/The%20Longitudinal%20Orthokeratology%20Research%20in%20Children%20(LORIC)%20in%20Hong%20Kong.pdf

CLAMP (Contact Lens And Myopia Progression) Jeff Walline studied 59 RGP eyes versus 57 soft lens eyes. There was no difference in axial length growth. RGPs flattened the cornea .5D, while soft lenses steepened it .5D. RGPs slowed progression but only a small amount.
Walline JJ, Jones LA, Mutti DO, and Zanik K: A Randomized Trial of the Effect of Rigid Contact Lenses on Myopia Progression. Arch Ophthalmol 122: 1760-1766, 2004
http://www.nei.nih.gov/neitrials/viewStudyWeb.aspx?id=81

COMET (Correction of Myopia Evaluation Trial) Progressive Addition Lenses slowed myopic progression by .13D over five years, an effect considered negligible.
Gwiazda J, Hyman L, Hussein M, Everett D, Norton TT, Kurtz D, Leske MC, Manny R, Marsh-Tootle W, Scheiman M, and the COMET Group: A randomized clinical trial of progressive addition lenses versus single vision lenses on the progression of myopia in children. IOVS 44: 1492-1500, 2003.
http://www.nei.nih.gov/neitrials/viewStudyWeb.aspx?id=9

CRAYON (Corneal Reshaping and Yearly Observation of Nearsightedness) An update to the LORIC study.
Jeff Walline. CR slows axial growth over the study length of two years. Not yet published. Walline, Jeffrey J., Slowing Myopia Progression with Lenses, Contact Lens Spectrum, June 2007 2

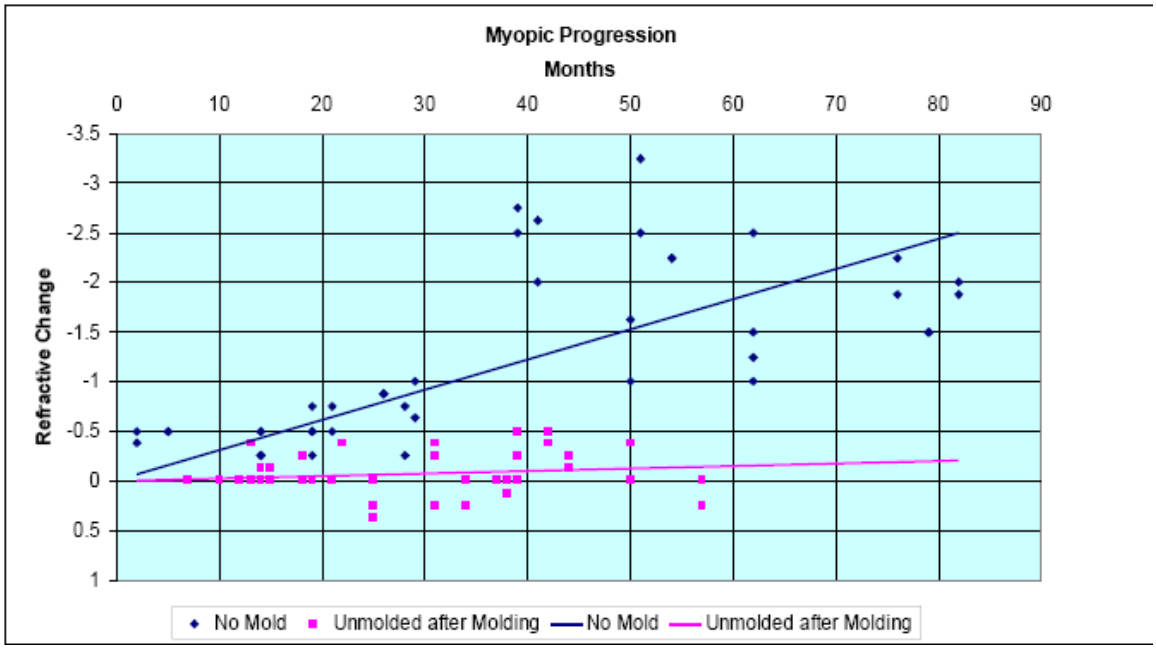
COOKI (Children's Overnight Orthokeratology Investigation) essentially proved that CR works overnight for children in the 8-11 year old group.
Invest Ophthalmol Vis Sci 2003;44:
http://www.dreamlens.at/The_Childrens_Overnight.pdf

SMART (Stabilization of Myopia through Accelerated Reshaping Technologies) A five year study where after each year of wear the patient is allowed to normalize without wearing their molding lenses after which they start wearing their lenses again. Preliminary results show stability after one year.
The EyeVis Eye and Vision Research Institute.

CANDY (Controlling Astigmatism and Nearsightedness in Developing Youth) showed myopic progression of -.37D per year in normally corrected myopes and -.03D per year in CR patients. Patients were allowed to normalize at various times during their CR wear. The study graph below summarizes the data.
David Bartels, Peter Wilcox
http://www.wavecontactlenses.com/download/candy.pdf

The last two studies (SMART and CANDY) are attempting to answer the question of whether the stabilization is just a temporary phenomena that would disappear on cessation of lens wear. It appears that the CR effect is such that patients regress back to their starting point of CR wear, not partially regress or even progress to where they might have been if not wearing CR lenses.

The studies are not definitive. It will be a long time before such data is recognized as clinical fact. But, the overwhelming evidence at this time is that CR is a very good alternative for young myopes and *the only* real effective procedure we have of suspending the progress of myopia.



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