Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

BLINK: Don't Miss It

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Congratulations to all the investigators at the Ohio State University and the University of Houston on the publication of the Bifocal Lenses In Nearsighted Kids (BLINK) Study.[1] A publication in the *Journal of the American Medical Association* (JAMA) is something to be very proud of. Readers of this editorial can download the paper in its entirety.

The BLINK study was a double-masked randomized clinical trial, so neither the patients, nor the investigators making the key outcome measures, knew which lenses were worn. Children aged 7 to 11 years with −0.75 D to −5.00 D of myopia were randomly assigned to wear CooperVision's Biofinity distance-center multifocal with high add power (+2.50 D), medium add power (+1.50 D), or single-vision soft silicone-hydrogel contact lenses. Among the very impressive features of the clinical trial is that over 97% of the 294 children completed the 3-year study. Anyone engaged in clinical research knows how challenging it can be to recruit patients, let alone retain them for the duration of the study.

This is one of very few *three-year* randomized clinical trials of myopia control[2-4] and thus offers a wealth of information. So what does the BLINK Study tell us?

1. Add power is important

Two different add powers were evaluated and the overwhelming conclusion is that +2.50 D works, but +1.50 D doesn't. The higher add slowed progression by 0.46 D over three years, whereas the lower add slowed myopia by only 0.16 D. Axial elongation, which underlies, and is highly correlated with, myopic progression showed the same result. The high add slowed axial elongation by 0.24 mm over three years, while the medium add slowed elongation by only 0.08 mm. Thus, BLINK is the first study to show a clear dose-response effect for add power and something discussed by Philip Cheng in the feature article of this issue of contact lens update. The importance of add power has been hinted at in previous studies of overnight orthokeratology. For example, in the Longitudinal Orthokeratology Research in Children (LORIC) study—the first to evaluate the influence of overnight orthokeratology on myopia progression—it is clear from the data that orthokeratology is less effective in lower myopes than in higher myopes.[5] This has been confirmed in subsequent clinical trials.[6] This reduction in efficacy likely occurs because orthokeratology induces less peripheral plus in the lower myopes because they need less central corneal flattening. What is still unknown for soft multifocal lenses is whether increasing the add power above +2.50 D would further slow myopia progression.

The BLINK study results suggest that the relationship between add power is nonlinear. It could be interpreted that doubling the add triples the treatment benefit, but that would lead to the unlikely prediction that a +5 D add would stop progression altogether. More likely is that there is a threshold, below which the add power is insufficient

to slow myopia progression. This raises the question as to whether there is an upper threshold, above which additional add power has no additional benefit on slowing myopia. Finally, the data presented in the BLINK paper are averages across children—something I'll revisit later.

2. The first cut is the deepest

Over half of the treatment benefit—which some of us like to refer to as the Cumulative Absolute Reduction in axial Elongation (CARE)—occurs in the first of the 3 years.[7] In the first year, the high add lens slowed axial elongation by 0.13 mm, while the subsequent two years of treatment only contributed an additional 0.10 mm of benefit. Not surprisingly, the same is true for progression in diopters: the high add lens slowed progression by 0.24 D, with the next two years adding only an additional 0.22 D of benefit. This is consistent with other long-term studies. For example, the COMET study found that all of the modest 0.20 D slowing of myopia occurred in first of the three years.[2] While the MiSight clinical trial found a much more clinically meaningful 0.67 D slowing of progression, 0.38 D occurred in the first year.[4] This has important ramifications for the clinical management of myopia. First, results from one-year studies cannot simply be extrapolated over subsequent years. Second, while myopia calculators are very useful for predicting a child's likely refractive trajectory, unfortunately, most of these tools overpromise in terms of treatment, with constant percentage slowing of progression in every year of treatment. The BLINK study along with the aforementioned clinical trials clearly demonstrate that this is not a realistic expectation. This is one of the major challenges for those of us engaged in myopia management. How can we achieve greater slowing of progression beyond the first year? Five-year results from the MiSight clinical trial suggest a reasonably consistent slowing of axial elongation in years 2 through 5, but can we aim to do more? Would changing treatment strategy work, e.g., from soft multifocals to overnight orthokeratology? What about adding atropine to the mix? There are few studies of combination therapies for myopia control, although recently published clinical trials of adding low concentration atropine to overnight orthokeratology suggest that atropine adds only additional benefit in the first year,[6] or the first six months,[8] and only in lower myopes.[6]

3. Progression is Becoming More Predictable

It is now well established that age and ethnicity are the most important determinants of myopia progression. Younger children progress faster than older children. Chua et al. showed that 7 year olds progress by an average of around 1.00 D a year, while 10 year olds progress by only 0.50 D per year.[9] Likewise, the Correction of Myopia Evaluation Trial (COMET) found that, among single vision wearers, 6 and 7 year olds progressed by 2.19 D over three years, whereas 10 year olds progressed by just 1.04 D.[10] Children of Asian descent progress faster than children of European descent. In their analysis of multiple studies, Donovan et al. predict that a 9 year old European child will progress by 1.32 D over three years, whereas an Asian child will progress by –1.89 D, i.e., 43% faster.[11] The same is true for axial length. Brennan et al. analyzed over 60 studies and showed that axial elongation in myopic children is also affected by age and race.[12] Regardless of age, axial elongation is around 50% faster in myopic Asian children. Likewise axial elongation slows with age: by around 15% per year in both groups of children.

With more quality data from long-term studies becoming available, some consistent patterns are emerging. In the BLINK Study, the unadjusted 3-year axial elongation in the single vision wearers was 0.62 mm. This is almost identical to the single vision soft lens wearers in the Adolescent and Child Health Initiative to Encourage Vision Empowerment (ACHIEVE) study (0.63 mm) and the MiSight clinical trial (0.62 mm).[4, 13] The percentage of Asian eyes and baseline age are similar in the three clinical trials, although the ACHIEVE study was conducted over a decade before the other studies. The remarkable consistency across these three studies suggest that we could, in theory, use these historical data to evaluate new therapies, of course accounting for age and ethnicity. While randomized clinical trials will remain the gold standard in clinical research, data from large studies are already being employed to create growth curves to help in the management of the individual myopic patient.[14] Online myopia calculators offer useful predictions of future progression based on age and race, but, as stated above,

may overpromise the benefits of myopia management.

4. Soft Contact Lens Wear in Children is Still Safe

Previous studies have shown that contact lens adverse events occur less frequently in 8 to 12 year olds than in older children and adults.[15] A review of nine prospective studies of soft lens wear in children, representing 1,800 patient years of wear found no cases of microbial keratitis.[16] The BLINK study contributes another important ~900 years of safety data. None of the adverse events reported were "serious or severe or caused permanent discontinuation of contact lens wear." There was one case of "probable microbial keratitis" and 8 episodes of infiltrative keratitis, all of which presumably resolved based on the previous statement. In summary, we can continue to assure parents of myopic children that soft contact lenses are a very safe option for myopia management.

What's Next from the BLINK Study?

This first BLINK paper describes the primary outcomes from the clinical trial, but what else should we expect to learn in subsequent publications from the study? The prevailing theory for the mechanisms underlying multifocal, dual-focus, and other therapies is that peripheral myopic defocus slows myopia progression in children. The BLINK Study measured peripheral refractive error in all children both with and without the contact lens.[17] Thus, a future paper from the study will undoubtedly describe whether higher levels of peripheral myopic defocus are associated with a decreased rate of myopia progression and whether the benefits of the high add lens are associated with a child's peripheral refractive error. This is an important question as it will let us know whether peripheral refractive error should be measured in clinical practice and whether personalized treatments are in our future.

Take Home Message

The BLINK Study has given us comprehensive data on the safety and effectiveness of multifocal soft lenses for myopia management and that the lenses can be fit in patients as young as 7 years. Based on comparative effectiveness and safety data, the MiSight lens is still to be preferred, but it's nice to have options to turn to if a patient has astigmatism,is outside the available power range or requires a different material or modality choice.

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