FEATURED ARTICLE: The long & short of modern myopia control
Andrew D. Pucker, O.D.

An effective method for preventing myopia development would provide a significant benefit to millions of people around the world by decreasing their reliance on optical correction and reducing the condition’s economic burden on health and society.\(^1\) Therefore, developing an effective and safe means of preventing and/or treating this condition has been of great importance to the medical community. While treatments related to under-correcting spectacles, gas permeable contact lenses, and progressive addition lenses have previously been thought to provide benefit, they currently lack favor,\(^2\)-\(^6\) and investigators have turned their focus to the more recent approaches below.

**Optical Treatments:**

An early study by Wiesel and Raviola with monkeys serendipitously demonstrated that ocular growth could be altered with visual form deprivation.\(^7\) This work subsequently led to numerous experiments, which determined with various animal models that myopic defocus results in slowed eye growth and hyperopic defocus results in accelerated eye growth.\(^8\)-\(^10\) It was originally assumed that foveal stimulation produced these changes, yet after Smith and Colleagues demonstrated with a laser ablation experiment that the peripheral retina and not the fovea was primarily responsible for induced ocular growth,\(^11\) the field turned its focus to optically correcting the image on the peripheral retina and the below interventions:

- **Corneal Refractive Therapy (CRT):** CRTs are believed to work by altering the optics of the eye by flattening the central cornea and thickening the surrounding midperipheral cornea.\(^5,\)^\(^12\) This corneal rearmament theoretically results in less peripheral hyperopia and slowed myopic growth.\(^5\) CRT has been shown to be able to reduce myopia progression by up to 50.0 percent.\(^4,\)^\(^13,\)^\(^14\)

- **Multifocal Contact Lenses (MCL):** Center-distance MCLs are also thought to work by reducing peripheral retinal hyperopia; however, the image is altered by the optics of the contact lens instead of by corneal reshaping.\(^15\) MCLs have also shown significant promise,\(^4\) and Walline and Coworkers are currently working to rigorously test this method (NIH Reporter).

**Non-Optical Treatments:**

While the above optical treatments are currently the most favored means of combating myopic growth, there are two additional lines of research that have rendered promise.

- **Muscarinic antagonists:** Atropine is a non-specific muscarinic antagonist that has consistently demonstrated remarkable reduction in myopic progression\(^16,\)^\(^17\) but its negative side (e.g., cycloplegia) have prevented it from being a viable treatment. Nevertheless, recent work with low dose atropine (0.01 percent) has produced a similar reduction in myopic growth compared to higher concentrations of the drug (e.g., 0.5 percent) while lacking the undesired side effects.\(^16,\)^\(^17\)

- **Time Spent Outdoors:** Several studies have shown that time spent outdoors (not sports) can protect against myopia.\(^3\) While not all studies have been favorable, the larger, better designed studies have found positive results,\(^3\) and large, school-based clinical trials are currently underway in Asia to more rigorously test this treatment.\(^3\)
Myopia treatments and theories are continually evolving, and the above ongoing studies will surely provide additional insight into how to make better myopia treatments - though true prevention of myopia will not be possible until its genetics and risk factors are better defined.

References:
5. Choo JD, Holden BA. The prevention of myopia with contact lenses. Eye & contact lens 2007;33:371-2; discussion 82.
10. Smith EL, 3rd, Hung LF. The role of optical defocus in regulating refractive development in infant monkeys. Vision research 1999;39:1415-35.

Dr. Pucker received his Doctor of Optometry and Master of Science degrees from The Ohio State University. He is currently a clinical instructor pursuing a Ph.D. in vision science at The Ohio State University. Dr. Pucker’s research interests include the tear film, ocular inflammation, and contact lenses.

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