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A New Approach to Dealing With Myopia in Kids

The idea is to treat nearsightedness in children, rather than just correcting it

Myopia can increase the risk of a host of eye ailments in later life.

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By *Brian Gormley*

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As the number of people with myopia accelerates, an effort is under way to treat nearsightedness in children—rather than simply correct it with glasses and contact lenses.

By 2030, some 3.36 billion people will be myopic, up from 2.6 billion now, according to the World Health Organization. Those numbers stoke concern that serious eye diseases linked to severe nearsightedness could accelerate as myopia becomes more prevalent.

“If you develop myopia early in life, and it progresses to high myopia, you may be at higher risk for retinal complications later in life,” says Mary Frances Cotch, acting deputy director of the National Eye Institute.

Interest in tackling myopia has gained traction among companies on several fronts. In November, the U.S. Food and Drug Administration approved CooperVision Inc.'s MiSight, the first contact lenses indicated to slow the progression of nearsightedness in children. Some eye-care professionals are prescribing atropine eye drops and contact lenses approved for other uses to nearsighted children, as studies build the case that these therapies are effective in myopia control.

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Myopia, which affects about 42% of Americans, up from 25% in 1971, according to the National Eye Institute, essentially occurs when the eye grows too long from front to back. Consequently, images are focused in front of the retina, the light-sensitive tissue in the back of the eye, instead of on it, causing distant objects to appear blurry. Myopia typically develops in childhood and usually stops progressing by the late teens or early 20s, but can progress for longer, experts say.

Not for everyone

Doctors say mild myopia generally is of less concern but severe or "high" myopia, which affects about 4% of U.S. adults, raises the risk of eye conditions such as retinal detachment, glaucoma, early cataracts and myopic maculopathy, a leading cause of blindness world-wide.

"Every amount of myopia matters in terms of increasing risk," says Donald Mutti, the E.F. Wildermuth Foundation professor in optometry at the Ohio State University College of Optometry.

Genetics plays a key role in myopia, but researchers believe that environmental factors, such as people spending less time outdoors, could be contributing to its increase. A study published in 2015 in the Journal of the American Medical Association, found that adding an extra 40 minutes of outdoor activity to the school day reduced the incidence of myopia over a three-year span in a study of 6-year-olds in Guangzhou, China. One theory is that outdoor light stimulates the release of dopamine in the retina, which in turn inhibits the growth of the eye.

Some researchers say an increase in near-work activities such as reading and screen time also may be contributing to myopia's rise.

No test can definitively predict how nearsighted a child will become, and not all children progress to high myopia, says Kammi Gunton, a pediatric ophthalmic surgeon at Wills Eye Hospital in Philadelphia. As such, myopia-controlling treatments aren't for everyone, but they may be appropriate for those with a family history of high myopia and rapid progression of nearsightedness, says Dr. Gunton.

The MiSight lenses, which are FDA-approved for children beginning at ages 8 to 12, are worn during the day and discarded at night. They slowed the progression of myopia in a three-year clinical trial of 135 children ages 8 to 12, the company says. One part of the lens corrects vision while another part pulls peripheral rays of light, which would encourage the eye to grow, in front of the retina. This signals the eye to grow more slowly, according to CooperVision.

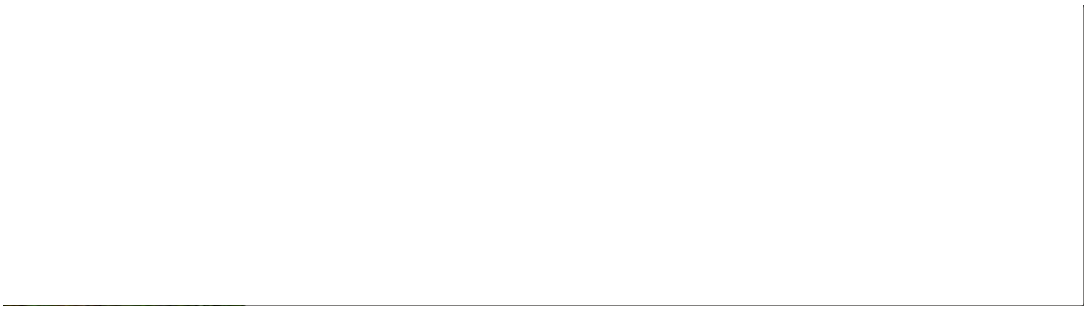
"It's effectively tricking the eye not to grow," says CooperVision President Dan McBride.

To get the full benefit, children must wear the lenses 10 hours a day, six days a week, until their late teens, says Carlee Young, a pediatric optometrist in Frisco, Texas. All contact lenses pose a small risk for infection, which can lead to vision loss or blindness. Daily contacts significantly reduce but don't eliminate that risk, she says, adding that most 8-year-olds she sees can put the lenses in by themselves and maintain the good hygiene practices that are key to reducing infection risk.

Among the older treatments for myopia are rigid but breathable contacts worn while sleeping, called orthokeratology, or Ortho-K, lenses—made by companies including the Bausch + Lomb division of Bausch Health Cos.

These lenses temporarily flatten the central cornea to enable myopic people to see clearly the next day without glasses or contacts, and have been FDA-approved for that use since 2002. Because studies have shown that Ortho-K lenses also can slow the eye's growth, they are prescribed off-label for myopia control, as well.

Ortho-K lenses change the focus of light in the periphery of the eye, which triggers signals that slow the eye's growth, says Earl Smith, a professor at the University of Houston College of Optometry, and a scientific adviser to companies developing myopia treatments.



These lenses also carry a small risk for a type of infection called microbial keratitis, which can be blinding, according to a 2018 paper in the journal Ophthalmology, though the risks are minute if the lenses are handled correctly, says Roxanne Achong-Coan, an optometrist in Ocoee, Fla., who has prescribed Ortho-K to patients. She says Ortho-K can be a good option for children who swim or play contact sports.

Some optometrists and ophthalmologists are prescribing eye drops consisting of low concentrations of atropine to control myopia without the risks associated with contacts.

Atropine is FDA-approved as a treatment for conditions including lazy eye, but not yet for myopia. A study of more than 400 4- to 12-year-olds in Hong Kong, published in the journal Ophthalmology, has burnished the case for low-concentration atropine, finding that it helped control myopia with no major side effects, though the researchers note that how it works isn't fully understood.

Once the eye has elongated, surgery can't reverse it back to normal, says Jason C.S. Yam, associate professor in the Department of Ophthalmology and Visual Sciences at Chinese

University of Hong Kong, and leader of the study. The time to intervene is in childhood, he says, adding that if myopia isn't controlled, "our society will suffer from a much-increased burden of eye disease."

Atropine drops must be taken every day potentially for several years, so the biggest challenge with the treatment is compliance, says Aaron Miller, a pediatric ophthalmologist with Houston Eye Associates in Tomball and The Woodlands, Texas, and clinical spokesperson for the American Academy of Ophthalmology.

SightGlass Vision eyeglasses have special features designed to control myopia in children.
PHOTO: SIGHTGLASS VISION

Other risks include light sensitivity, difficulty with near vision, enlarged pupil, and risk for allergic reaction or toxicity from the eye drop, Dr. Gunton says. For now, low-dose atropine must be ordered from pharmacies that make custom preparations of medicines, doctors say. But companies such as Nevakar Inc. of Bridgewater, N.J., Eyenovia Inc. in New York and biotechnology startup Sydnexis Inc. of Del Mar, Calif., are working to develop atropine treatments specifically for myopia. All three have products in late-stage clinical trials and say they hope to seek FDA approval in the coming years for their treatments. Eyenovia's system consists of a proprietary hand-held device designed to deliver micro-doses of the medicine into the eye.

'A godsend'

Raghu Parthasarathi, of Germantown, Md., says a combination of therapies worked for his 11-year-old daughter, whose myopia progressed rapidly from 2016 to 2017. After her doctor at Treehouse Health LLC—which does business as Treehouse Eyes, and operates myopia-control centers and licenses its brand and intellectual property to eye-care centers looking to offer myopia therapy—prescribed a customized version of Ortho-K contact lenses and then added atropine drops six months later, her vision stabilized.

"To us, it's a godsend," he says.

Meanwhile, SightGlass Vision Inc. has developed special eyeglasses designed to control nearsightedness by lowering the amount of contrast in the wearer's peripheral vision, which in turn slows the growth in the eye, says Joe Rappon, chief medical officer for the Palo Alto, Calif.-based firm.

In late May, SightGlass secured marketing authorization for its spectacles in the European Union, the U.K. and some other countries. It is running a 256-person study of its glasses and plans to file for FDA approval in 2021, Chief Executive Thomas Chalberg says.

Mr. Gormley is a special writer for The Wall Street Journal in Boston. Email brian.gormley@wsj.com.

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