



## Press Release

### Innovative ZEISS Solutions for Managing Widespread Myopia

Progressive myopia, i.e. near-sightedness that becomes worse over time, is especially prevalent among young people in Asia, where currently up to 90 percent of children and teenagers up to 20 years of age are nearsighted. While there is not (yet) a cure for this visual impairment, ZEISS is launching several innovations in Asia for children affected by progressive myopia. Innovation to manage myopia matters because near-sightedness is increasingly becoming a global problem: in the future, half of the world's population could be nearsighted.

AALEN, 18. April 2018

Each year at the beginning of March, members of the eye care industry convene in Shanghai for the largest trade fair in Asia devoted to good vision and healthy eyes. One particularly alarming trend has opticians, optometrists, ophthalmologists and eyeglass manufacturers worried: the increasing prevalence of near-sightedness among Asian children and teenagers. This includes progressive myopia, a form of near-sightedness that becomes more severe over the years and can lead to high myopia. In Asia, almost nine out of ten children are myopic (1). Unlike those with normal vision, people with myopia often have elongated eyes (axial myopia). Progressive myopia can cause longitudinal growth over more than ten years, extending the eye by several millimeters and leading to values of up to -12 diopters. The most distant point a person with such poor vision can see clearly is just 8 cm away from the eye. Myopia simplex usually develops in children aged ten to 12 and is hereditary. This generally does not lead to values greater than -6 diopters.

Progressive myopia is particularly prevalent in Asia. Urbanization and digitalization are supposed to be responsible for the spread of near-sightedness. As a consequence, children are not exposed to enough natural light necessary for healthy eye development – especially in late childhood and adolescence. Spending just 45 minutes outside can reduce the progression of myopia by 25 percent. A study from Taiwan reported 50 percent effectiveness with this simple method. Without the stimulus provided by natural light – which probably boosts the production of dopamine on the retina – the human eye tends to become myopic. This problem is further exacerbated by school attendance and the extensive use of digital devices, which forces the eye to adapt to near-vision work, i.e. to accommodate a short distance over a long time period. Myopia begins to develop in childhood and usually stops after puberty. Insufficient exposure to daylight increases the likelihood of developing myopia by a factor of 5, while additional near-vision work can make it almost 16 times more likely (3).



In addition to limiting natural vision, near-sightedness poses an elevated risk of severe eye diseases. The elongation of the eye increases the likelihood of retinal detachment, a gray clouding of the eye (cataract), and excessive eye pressure (glaucoma). With near-sightedness of -6 diopters or more, the risk of suffering from macular degeneration also increases, which can lead to serious visual impairments and ultimately causes blindness.

### **Previous treatment options have ranged from contact lenses and drops made from pharmaceutical methods to special eyeglass lenses**

For myopia simplex, eyeglass and contact lenses as well as laser correction for adults' eyes are standard means of correcting a person's vision. "Globally, more and more treatment options are being tested and researched for progressive myopia," says Sven Hermann, CSO/CMO of ZEISS Vision Care. "Thus far, no one has found a catch-all solution for myopia, but optical and pharmaceutical methods as well as those focused on behavioral factors are available." Eyeglass lenses are the most common form of correction, although those lenses specially developed for myopia correction have proven more effective than single vision lenses (4).

Current treatment methods include orthokeratology, where the patient wears contact lenses during the night. These reshape the curvature of the cornea and slow down the longitudinal elongation of the eye. Soft contact lenses that ensure a clear image at the fovea but not on the retina are also used. Pharmaceutical methods like atropine eye drops (atropine is found in deadly nightshade and has long been used in cosmetic and medical products because it dilates the pupil) have proven effective for myopia, but too little research has been done on the long-term success and side effects. Eyeglasses are the most common method, because these do not present the risks and side effects associated with other solutions. A change in lifestyle is always recommended. "The more time children and teenagers spend outside, the better – that goes for everyone. Natural light provides the stimulation necessary for the eye's development," says Hermann. "There is still no treatment for stopping high myopia progression that provides sustainable long-term outcomes. That is why we talk about 'Myopia Management.' We can give parents an effective tool so that their child's near-sightedness remains manageable while preventing subsequent visual impairments or eye diseases as much as possible."

### **Expanded ZEISS Myopia Management Lens Solutions available starting in 2018**

ZEISS is focusing on further developing eyeglass lens technology to manage progressive myopia. Two different designs have been shown to manage myopia progression. ZEISS will offer these in a portfolio for China and other Asian markets starting in 2018.

The idea of peripheral defocus forms the foundation for ZEISS MyoVision. With a myopic eye, eyeglass lenses are used to ensure that distant objects appear in focus in the visual center of the brain. The image on the periphery is formed just behind the retina. This is called 'peripheral defocus' or 'peripheral hyperopic shift,' and it sends a signal to the eye to elongate and thus



increase myopia. The optical design of ZEISS MyoVision corrects a person's vision so that the image appears clear at the center (fovea) and is corrected in the periphery. For people with progressive myopia, this can slow the longitudinal growth of the eye ball and thus might counteract the progression of short-sightedness in the period studied (5). The high acceptance rate and wearer tolerance of the first special corrective eyeglass lens for children with progressive myopia in Asia launched in 2011/12 – ZEISS MyoVision – speak for themselves. With ZEISS MyoVision Pro, an improved version of this design will come to market in 2018. The calculation of the freeform surfaces has been optimized. Of particular interest are the modifications to the optical designs with AgeFit Junior Technology, which incorporate the age-specific values to optimally correct the vision of children aged six to 12. ZEISS MyoVision Pro precision lenses are highly asymmetrical, aspheric eyeglass lenses with different designs for the right and left eye that are calculated and manufactured exclusively with ZEISS freeform technology.

'Accommodative lag management' is a second important concept that delivers scientifically sound results. This optical design addresses two effects that have been proven to play a role in the development of myopia (6). For myopic children, the near-vision accommodation does not correspond entirely to the distance of the object they are looking at, meaning the image is not entirely clear. The image is formed slightly behind the retina, which in turn encourages the eye to grow even more. As a consequence intense close-up work, particularly reading or looking at a tablet or smartphone, often increases near-sightedness. The newly developed design of ZEISS MyoKids precision eyeglass lenses makes near vision tasks easier. Near vision support has been demonstrated so slow myopia progression (7). In combination with Digital Inside Technology from ZEISS, the lens design has also been optimized for the frequent use of smartphones and tablets. Wearing a special pair of glasses that reduces accommodative lag and provides targeted near vision support has been a reliable solution for 20 years, and has proven effective for children between five and 16 years of age (9).

A study from the ZEISS Vision Science Lab at the University of Tübingen, Germany, demonstrated that the Accommodation Lag Management design of ZEISS MyoKids reduced the accommodative lag up to 30% better than conventional progressive lenses (10). Reducing the correction values around the near vision zone stimulates the child's eye for better accommodation and encourages a natural head angle for near vision activities. ZEISS MyoKids stands out because of the quick adaptation period and high lens acceptance rate. A wearer trial with 252 children in Hong Kong and China in summer 2017 showed that 91 percent of the children between six and 12 years of age adjusted to the new glasses within a week and were satisfied with clear vision at all distances. Nine out of ten children reported that they felt more comfortable using digital devices with ZEISS MyoKids.



### **Myopia affects the entire world: half of the global population could be nearsighted by 2050**

With ZEISS Myopia Management Lens Solutions, a new product portfolio will be available in Asia starting in 2018 specially designed to help actively manage myopia progression in particular, and even prevent its negative effects in children between the ages of six and 12, i.e. the critical age for eye development. "Both designs – for changing how the image is formed on the peripheral retina and supporting near accommodation – have been scientifically proven to be effective," says Prof. Dr. Siegfried Wahl, Head of the ZEISS Vision Science Lab at the University of Tübingen. "We offer both solutions so that eye care professionals as well as young, nearsighted eyeglass wearers and their parents can select lenses that reflect their personal needs and preference. Going outside every day and taking a break from our phones to look into the distance for good eye development is an absolute must for everyone – including children, no matter where they live."

Modern lifestyles and work have increased the frequency of near-sightedness also in the Western world. In 2050, approximately one half of the world's population, i.e. five billion people, could be near-sighted (2). Urbanization and digitalization are the primary causes. The human eye was not designed to perform so many near work activities, i.e. frequently looking at small smartphone screens, reading or working at a monitor, and was not designed for the fact that we spend most of our time indoors. "Regular eye tests, spending enough time away from screens and getting enough natural light outdoors are the best preventative measures for both young and old," says Wahl. "Whoever works a lot sitting at a monitor should wear specially designed glasses and observe the 20-20-20 rule. Every 20 minutes, focus on an object 20 meters away for 20 seconds, such as by looking out the window. This will help your eyes relax."



## Availability of ZEISS MyoVision Pro and ZEISS MyoKids in Asian markets

All ZEISS MyoVision und ZEISS MyoKids precision eyeglass lenses are delivered with full UV protection (ZEISS UVProtect).

### ZEISS MyoVision Pro – organic materials

- Prescription lenses with ZEISS DuraVision Platinum or LotuTec coating, also available as photochromic ZEISS PhotoFusion lenses in grey or brown
- Plastic 1.5 - 0.00 D to -6.00 D / cyl 2.0
- Plastic 1.6 0.00 D to -9.00 D / cyl 4.00
- Plastic 1.67 0.00 D to -9.00 D / cyl 4.00
- Stock lenses with ZEISS DuraVision Platinum or LotuTec in Plastic 1.5 and Plastic 1.6 available

### ZEISS MyoKids Pro – organic materials

- Prescription lenses with ZEISS DuraVision Platinum or LotuTec coating, also available as photochromic ZEISS PhotoFusion lenses in grey or brown
- Plastic 1.5 from 0.00 D to -7.00 D / cyl 4.00
- Plastic 1.6 from 0.00 D to -10.00 D / cyl 6.00
- Plastic 1.67 from 0.00 D to -12.00 D / cyl 6.00
- Stock lenses with ZEISS DuraVision Platinum or LotuTec in Plastic 1.5 and Plastic 1.6 available

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(3) Dtsch Arztebl Int 2017; 114(35-36): 575-80; DOI: 10.3238/arztebl.2017.0575, Lagrèze, Wolf A.; Schaeffel, Frank: Myopieprophylaxe / Preventing myopia – Schaeffel, Frank; Ziemssen, Focke, o.J., "Patienteninformation Kurzsichtigkeit (Myopie)", [https://www.medizin.uni-tuebingen.de/uktmedia/Patienten/PDF\\_Archiv+/Patientenbrosch%C3%BCren/Augenklinik/Patienteninformation+Kurzsichtigkeit+Schaeffel+Ziemssen.pdf](https://www.medizin.uni-tuebingen.de/uktmedia/Patienten/PDF_Archiv+/Patientenbrosch%C3%BCren/Augenklinik/Patienteninformation+Kurzsichtigkeit+Schaeffel+Ziemssen.pdf) – as of 28.2.2018

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(9) Leung et al. 1999, Hasebe et al. 2008, Yang et al. 2009, MCPAL2 test China and Japan 2011, MCPAL3 test Malaysia 2014

(10): Schilling T, Ohlendorf A, Varnas SR, Wahl S. Peripheral design of progressive addition lenses and the lag of accommodation in myopes. Invest Ophthalmol Vis Sci. 2017;58:3319–3324.

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#### About ZEISS

ZEISS is an internationally leading technology enterprise operating in the optics and optoelectronics industries. The ZEISS Group develops, produces and distributes measuring technology, microscopes, medical technology, eyeglass lenses, camera and cinema lenses, binoculars and semiconductor manufacturing equipment. With its solutions, the company constantly advances the world of optics and helps shape technological progress. ZEISS is divided up into the four segments Research & Quality Technology, Medical Technology, Vision Care/Consumer Products and Semiconductor Manufacturing Technology. The ZEISS Group is represented in more than 40 countries and has over 50 sales and service locations, more than 30 manufacturing sites and about 25 research and development centers around the globe.

In fiscal year 2016/17 the company generated revenue approximating €5.3 billion with over 27,000 employees. Founded in 1846 in Jena, the company is headquartered in Oberkochen, Germany. Carl Zeiss AG is the strategic management holding company that manages the ZEISS Group. The company is wholly owned by the Carl Zeiss Stiftung (Carl Zeiss Foundation).

Further information is available at [www.zeiss.com](http://www.zeiss.com)

#### Vision Care.

The Vision Care business group is one of the world's leading manufacturers of eyeglass lenses and ophthalmic instruments. The business group develops and produces offerings for the entire eyeglass value chain that are distributed globally under the ZEISS brand. The business group is allocated to the Vision Care/ Consumer Products