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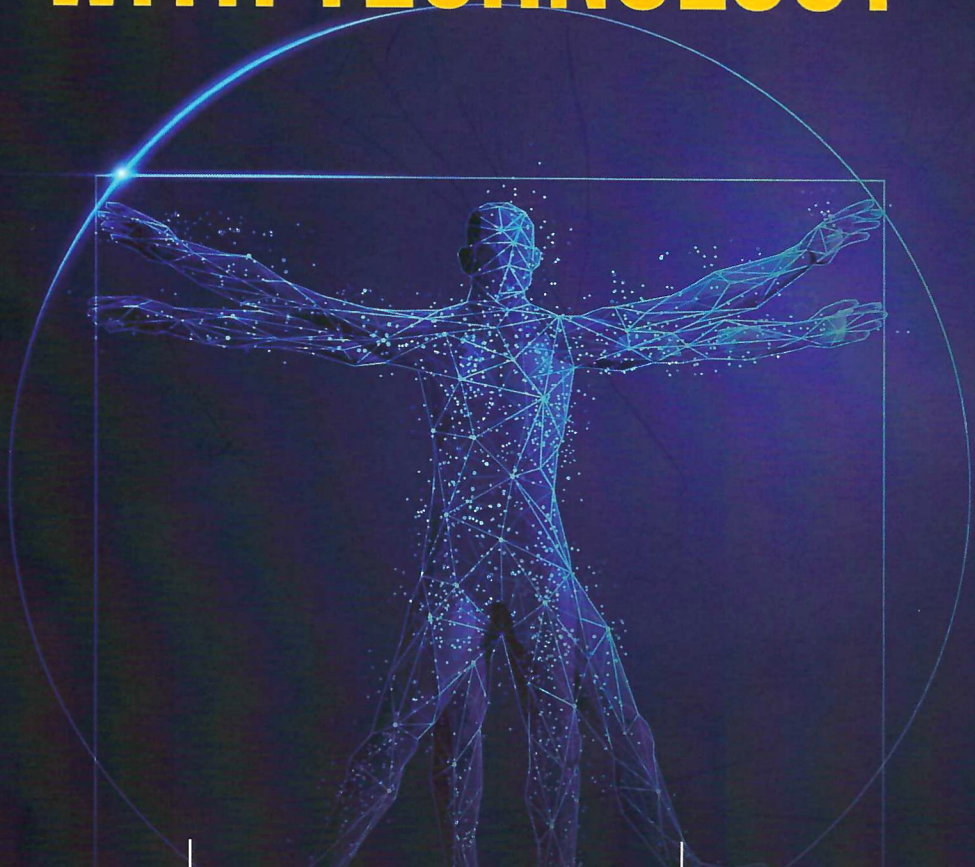
TRANSFORMING HEALTHCARE WITH TECHNOLOGY



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Repeated Low-Level Red-Light Therapy Presents Exciting New Possibility in the Fight Against Myopia

Repeated low-level red-light (RLRL) therapy, now available through a medical device, could potentially change the treatment landscape for myopia and save billions of eyes from sight-threatening conditions in future.

by **Hyma Haridas**

Refractive error, in particular myopia, is one of the five leading causes of sight-threatening conditions in the world.[1] According to the Brien Holden Vision Institute, by 2050, about 50% of the world's population is expected to be myopic, representing a 117% increase since 2000.[2]

Particularly concerning is that 10 percent of the population, or approximately 1 billion people, are predicted to develop high myopia, which is categorised as a refractive error of -5.00 diopters or higher.[2] Developing high myopia increases the child's risk of developing sight-threatening conditions, such as retinal degeneration, glaucoma, retinal detachment, and cataract.[3] The risk of serious sight-threatening conditions increases by 3.4 times with high myopia of between -6.00 to -10.00 diopters, and 22 times with myopia of above -10.00 diopters.[4]

Axial length elongation, the fundamental pathologic change of myopia, is at its most exponential when children's eyes are rapidly growing before the age of 10 and slows down in the pre-teen and teen years.[5] Typically, a myopic child can expect their myopia to progress at an average rate of about -1.00 diopter annually, from the age of six until the end of adolescence, which puts the child at risk of developing high myopia between the ages of 11 and 13 years.[6]

Hence, to effectively slow down myopia and avoid sight-threatening conditions in adulthood, it is essential to detect the condition and intervene as early as possible.

High Myopia Increases Risk for Pathologic Myopia, Glaucoma

Studies show that individuals aged 40 years with high myopia have an increased prevalence of maculopathy or macular degeneration, which contributes to pathologic myopia,[7] although some individuals with low myopia and emmetropia can also develop the condition. The condition currently affects about 28.7 percent, 45.9 percent, 72.7 percent and 65 percent of adults or the elderly with high myopia in Singapore, Japan, Taiwan, and Beijing respectively.[7]

Prof Ohno-Matsui, speaking at the recent launch of the Eyerising Myproclear desktop device in Kuala Lumpur, Malaysia

Prof He, one of the primary researchers involved in studying the effects of RLRL therapy in myopia

Professor Kyoko Ohno-Matsui, Chairperson of the Department of Ophthalmology & Visual Science and Chief of the Advanced Clinical Center for Myopia, Tokyo Medical and Dental University (TMDU), said, "The rapid increase and prevalence of myopia and high myopia in recent years is expected to cause the prevalence of pathologic myopia to dramatically increase in the near future. Based on data, we know that approximately one-half of the subjects with high myopia are potentially at risk of developing pathologic myopia in adulthood."

"Aside from pathologic myopia, glaucoma is also a concern for myopic patients. People who are myopic double their risk of developing glaucoma compared to the general population (8). Therefore, controlling myopia progression from an early age is crucial to prevent or minimise the prevalence of sight-threatening conditions," added Prof Ohno-Matsui.

Even an increase of -1.00 diopter in myopia is associated with a 67 percent increase in the prevalence of pathologic myopia[9] and a 20 percent increase in open-angle glaucoma,[10] which means that in populations that are highly myopic like those of many countries in the Asia-Pacific region, an increasing number of adults will suffer from sight-threatening conditions, and subsequent loss of productivity in the next 20 to 30 years, if interventions are not introduced early enough.

Managing Myopia

Effective myopia management typically involves a combination of evidence-based therapies and lifestyle modifications, such as spending more time outdoors.

"Evidence shows that spending more time outdoors is an effective way of reducing the prevalence of and preventing the onset of myopia in children. In a study of six-year-olds in Guangzhou, China, we found that an additional 40 minutes per day of outdoor activity at

school resulted in a reduced incidence rate of myopia over the next three years," says Professor He Mingguang, Head of Ophthalmic Epidemiology, Centre for Eye Research Australia; and Professor of Ophthalmic Epidemiology, University of Melbourne, Australia.[11]

The World Health Organisation (WHO) states that children who spend more than two hours a day outdoors have a lower risk of myopia than children who spend less than two hours, even if they continue to do "near work" or have two myopic parents.[12] Near work is defined as any activity that requires focusing on objects within arm's reach from the eyes and is not only confined to using electronic devices. Reading, writing, painting, playing cards games, or certain musical instruments such as the piano, are also considered "near work".

Unfortunately, urban Asian children typically spend only about 30 minutes outdoors on a weekday,[13] as Asian parents tend to have very high expectations for their children to excel academically, leading them to allocate more time for intensive study indoors, both in and out of school.[14]

"The promising emerging data on low-level red-light therapy (RLRL) and the convenient and non-invasive nature of treatment thus make it an exciting new addition to the eye care professionals' (ECPs) toolkit in the fight against myopia, especially in younger children, and children who are not suitable candidates for the other evidence-based treatments," said Professor He.

Red-Light Therapy in Slowing Down Myopia Progression

The benefits of red-light therapy have recently been extended to slowing down progression of myopia. Professor He, one of the primary researchers involved in studying the effects of RLRL therapy in myopia, explains, "There is a growing body of research into the benefits of red-light therapy, or low-level light therapy, in eye health and vision restoration. Red-light therapy is a therapeutic technique in which light-emitting diodes (LED) diffuse red and near-infrared (NIR) light at specific wavelengths through the skin and into the cells, activating the body's own mitochondrial response to create energy and boost the functioning of tissues and organs.[15]

"While investigating its efficacy in treating myopia, my colleagues and I found that children who underwent RLRL therapy for three minutes twice a day, five days a week, significantly reduced their myopia progression over a period of six months.[16] The primary outcomes show RLRL therapy had 69.4 percent efficacy in controlling axial length elongation, and 76.6 percent efficacy in controlling myopia progression."[17]

A post-trial follow-up study also found that the treatment effect was sustained for up to two years after the treatment was stopped, with only a modest rebound effect.[18] Additionally, according to a study published in 2023, nearly a quarter of children benefitted from at least 0.05mm axial length shortening following 12 months of RLRL therapy,[19] the first treatment for myopia to achieve such results.

"Studies indicate that RLRL therapy is not just beneficial in reducing or slowing down myopia progression but potentially reversing axial lengthening, which other myopia treatments are currently unable to achieve. While this area still requires further investigation and more in-depth study, these early findings are very encouraging," said Professor Ohno-Matsui, who has recently embarked on a clinical trial for RLRL therapy in Japan together with Professor He.

The recent launch of the Eyerising Myproclear device, which uses repeated low-level red-light therapy to treat myopia, in the Asia-Pacific region, is a positive development for myopia management. The desktop device enables children with myopia to undergo therapy in the comfort of their own homes under the supervision of a parent or guardian, potentially transforming the treatment landscape for myopia in this region.

Widely available in China and approved by its National Medical Products Administration (NMPA), the technology has already received regulatory clearance from the Conformité Européene (CE) in the European Union, Medicines and Healthcare Products Regulatory Agency (MHRA) in the United Kingdom, Medsafe in New Zealand, and is currently preparing for Food and Drug Administration (FDA) approval in the United States. APBN

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